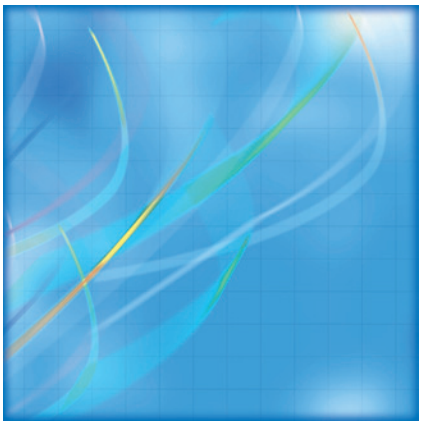
Catalogue no. 13F0031MIE — No. 010
ISSN: 1707-343X
ISBN: 0-662-34318-2

Research Paper

The 1997 historical revision of the Canadian System of National Accounts

Measurement of output, value added, GDP in Canada and the United States: similarities and differences



by Kishori Lal

National Accounts and Analytical Studies Field
22, R.H. Coats Building, Ottawa, K1A 0T6

Telephone: 1 800 263-1136

This paper represents the views of the author and does not necessarily reflect the opinions of Statistics Canada.

Statistics Canada Statistique Canada

Canada

The 1997 historical revision of the Canadian System of National Accounts

Measurement of output, value added, GDP in Canada and the United States: similarities and differences

by
Kishori Lal
Associate Assistant Chief Statistician
Statistics Canada

13F0031MIE No. 010
ISSN: 1707-343X
ISBN: 0-662-34318-2

National Accounts and Analytical Studies Field
22, R.H. Coats Building, Ottawa, K1A 0T6
Statistics Canada

How to obtain more information :
National inquiries line: 1 800 263-1136
E-Mail inquiries: infostats@statcan.ca

June 2003

Published by authority of the Minister responsible for Statistics Canada

La version française de cette publication est disponible sur demande (n° 13F0031MIF au catalogue).

TABLE OF CONTENTS

Introduction

Both Canada and the United States have a very comprehensive set of statistics on national accounts and these are, by and large, consistent with the revised world-wide guidelines on national accounting, the System of National Accounts 1993 (1993 SNA). The 1993 SNA was produced under the joint responsibility of the United Nations, the IMF, the Commission of the European Communities, the OECD and the World Bank. The Commission of the European Communities and its statistical bureau, Eurostat, have produced a national accounts manual, the European system of accounts, ESA 1995, (Luxembourg, 1996) for use in the European Union. The 1995 ESA is broadly consistent with the 1993 SNA as regards the definitions, accounting rules and classifications. To ensure that the methodological provisions in the 1995 ESA are strictly applied, the Council of the European Union has adopted this manual in the form of a Council Regulation in 1996, thus giving it a solid legal basis. All member countries of the European Union follow, and must follow by regulation, the European system of accounts, ESA 1995. Due to this specific use of the manual and their measurement in mind, the concepts in the 1995 ESA have been expressed in operational terms to provide greater precision, common understanding and consistent application throughout the European Union. The OECD uses a single joint questionnaire, Questionnaire SNA 93/ ESA 95, to collect national accounts data from all member countries, countries of the European Union, and others, including Canada and the United States.

We fully recognise the importance of an internationally comparable set of national accounts statistics amongst all OECD member countries, particularly between Canada and the United States, so that economic analysts can use our statistics and draw conclusions with confidence. However, there exist some differences with the 1993 SNA in both countries. Further, the departures from the 1993 SNA are not necessarily identical in the two countries Thus, we will attempt to have a list, as complete as possible, of all such departures so that the users can make meaningful comparison of the published national accounts data by the two countries.

The 1993 SNA is a vast framework and is built around a sequence of inter-connected flow accounts linked to different types of economic activity taking place within a given period of time. It starts with the production account, links it to the income and outlay account, to the capital finance account and finishes with balance sheets that record the values of stocks of assets and liabilities held by institutional units or sectors at the beginning and end of the period.

In Canada, it is Statistics Canada which is solely responsible for all SNA components whereas in the United States, the Bureau of Economic Analysis (BEA) is responsible for most of the SNA components. Only a handful of SNA components are produced by organisations other than the BEA; these are: Federal Reserve Board produces financial accounts and balance sheet accounts as well as Index of Industrial Production and the Bureau of Labour Statistics compiles labour and productivity estimates at a detailed industrial level.

This paper is limited to those issues which affect primarily the production account, specifically the **level** of output, value added and GDP, both at the total economy level and by industry or sector, **all at current prices**. GDP per capita, distribution of equalisation payments to provinces within Canada, level of GDP for regular assessment to pay contributions to international organisations etc, are some of the examples that illustrate why we need to pay attention to estimate proper levels. In any case, the starting position for calculating constant price growth rates, in most cases, is the current level of output and its industrial detail, GDP and its components. The methodologies used to develop constant price estimates are quite similar in the two countries, as both use Chain Fisher Volume indices, the indices also preferred by the 1993 SNA; however, undoubtedly, the two systems employ deflators, direct valuation, and quantity extrapolation to prepare volume estimates which are not always identical. Thus our similarities and differences in methodologies, conventions, assumptions, classifications etc which affect the current price values affect the constant price series, though not identically.

Section A : 1993 SNA Production boundary, areas not yet implemented

In this section, we will first look at the evolution of the production boundary in the national accounts leading to the 1993 SNA. We will then expand on those areas which may significantly affect the level of output, value added or GDP and which have not yet been implemented in Canada and the United States.

1. Evolution of the production boundary to the 1993 SNA

Level of output and level of value added in any economy are immediately affected by economic production activities included in or excluded from the boundary of its national accounts. The boundary of economic production in the measurement of a nation's income or wealth (or what we now call national accounts) has continued to change and has always expanded since the days of the Physiocrats in the 18th century. The Physiocrats believed that the only productive sector of an economy was agriculture and other sectors did not produce an output of any value. However, by the time the classic work of Adam Smith's Wealth of Nations appeared in 1776, manufacturing was considered as another productive sector of the economy. It was commonly accepted up to the beginning of the 20th century that services were not productive. Services began to be accepted as productive in the market oriented economies in the 20th century; however, in the system of accounts in the centrally planned economies, called Material Product System (MPS), the only services accepted as productive were those related to the distribution and/or transportation of goods; all other services had no value. Since the 1950's, there have been three documents published by the United Nations and other international organisations for compiling national accounts for the market oriented economies, with economic production boundary expanding with each newer version. MPS was also published by the UN in the 1970's but, as noted above, it was applicable only to centrally planned economies. MPS became irrelevant after the collapse of central planning system in 1989.

As each newer version of national accounts included more activities than the previous one, it is, thus, important that we examine the production boundary outlined in the latest version, the 1993 SNA, and its implementation in the national accounts of Canada and the USA so that a proper comparison can be made of their published accounts vis-a-vis each other and internationally. At the international level, the 1993 SNA is the main document, though several countries have made some adjustments and modifications when implemented in their accounts.

As the SNA production boundary is defined with reference to the economic production activities, let us note the precise meaning attached to this term by the 1993 SNA. The 1993 SNA states: "Economic production may be defined as an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital, and goods and services to produce outputs of goods or services. There must be an institutional unit that assumes responsibility for the process and owns any goods produced as outputs or is entitled to be paid, or otherwise compensated, for the services provided. A purely natural process without any human involvement or direction is not production in an economic sense. For example, the un-managed growth of fish stocks in international waters is not production, whereas the activity of fish farming is production" (paragraph 6.15). The 1993 SNA production boundary is the same as the boundary of economic production except that the SNA does not include the production of services by households for their own consumption. Examples of such services are preparation of meals in households, taking care of children and the elderly by other household members, etc. It may be noted that the production boundary of the 1993 SNA was augmented from the earlier United Nations SNA, called A System of National Accounts, published in 1968, (1968 SNA). In it, only production of primary goods, typically agricultural products, produced by households for their own consumption was included, whereas in the 1993 SNA, production of all goods produced by households for their own consumption is included. Imputation of the value of goods produced by households for their own consumption is limited, in both Canada and the United States, to farm products; however, goods other than agricultural, produced by households for their consumption, are insignificant in both countries but could be quite significant in many developing countries.

The effect of production boundary changes is not the same over time in a given country and may differ greatly amongst countries, depending upon their institutions and levels of economic development. With economic development, services previously performed in households may now be performed in the market and thus included in SNA. This would increase both level of output and GDP and their growth rates, yet no new production has occurred. Similarly, activities such as prostitution, narcotic drugs and certain economic activities performed by unauthorised producers are economic activities, included in some countries and excluded in others. They may also have been excluded in earlier periods and might now be included. Thus observed growth rates, both inter-temporal and inter-country, become problematic.

2. Production boundary, illegal production

Illegal production activities such as prostitution, narcotic drugs etc occur in all countries, more in some and less in others or that is perhaps what is perceived. Historically, it was assumed that such illegal activities should not be included in the value of production of a nation, as a nation's production was thought to represent the **welfare** of its citizens. GDP was a moral GDP. National accountants have not lost any moral values in the recent period but have recognised that the national accounts must record all production in the market for them to be comprehensive, coherent and comparable, inter-temporally and internationally, and useful for policy purposes.

2.1 1993 SNA

It is explicitly stated in the 1993 SNA that illegal production forms part of the SNA boundary, whereas it was previously assumed that the1968 SNA excluded these activities as there was no explicit mention of them therein. The 1993 SNA states: "Despite the obvious practical difficulties in obtaining data on illegal production, it is included within the production boundary of the System. There are two kinds of illegal production : a) The production of goods or services whose sale, distribution or possession is forbidden by law; b) Production activities which are usually legal but which become illegal when carried out by unauthorised producers; e.g., unlicensed medical practitioners" (paragraph 6.30). The 1993 SNA makes a cogent case for inclusion, stating: "Transactions in which illegal goods and services are bought and sold need to be recorded not simply to obtain comprehensive measures of production and consumption but also to prevent errors appearing elsewhere in the accounts if the funds exchanged in illegal transactions are presumed to be used for other purposes… The failure to record illegal transactions may lead to significant errors in the financial account and also the external account of some countries" (paragraph 6.31). Examples of activities which may be illegal but productive in an economic sense include the manufacture and distribution of narcotics, illegal transportation in the form of smuggling and services such as prostitution.

Note that the term illegal production as defined above in the 1993 SNA is not synonymous with the boundary of the so-called underground economy, also referred to by many other terms, such as informal, concealed, unmeasured, unrecorded, untaxed, etc. Most of the production activities in the underground economy are included and have always been included in the value of national accounts of many OECD countries, mostly due to the methods and conventions used in its measurement. Illegal production forms only a part of the underground economy, and is probably the most difficult to measure, hence ignored or used to be thought earlier to be excluded from the official measurement of production, as noted above.

2.2 Canadian practice

The production boundary in the Canadian System of National Accounts (CSNA) is very close to, though not identical with, the 1993 SNA; the main difference is the treatment of illegal production. Early in the 1990's, smuggling of cigarettes in Canada from the USA occurred on a fairly large scale: these were really Canadian cigarettes exported to USA and smuggled back to Canada. This activity was estimated in the amount of $700 million in 1991, $1.1 billion in 1992, $2 billion in 1993, $800 million in 1994 and only $200 million in 1995. The values of both imports and household consumption were changed in the published accounts. This activity dwindled by 1995, after taxes on cigarettes were lowered to levels so that smuggling was not very profitable anymore. Apart from this, we have not included any values for other illegal activities such as narcotics and prostitution. These activities do occur in Canada, so imputing zero value to them is problematic. How large are these activities, and have they grown faster or slower than the rest of the economy are questions whose answers impact on published estimates of production levels and growth rates. The CSNA examined this issue and published a manual in 1994, called The Size of the Underground Economy (Catalogue 13-603) wherein it stated that its best guess was that illegal production represented at the most 1% of GDP.

Amongst the OECD countries, to the best of our knowledge, only Finland has so far incorporated an estimate of output of prostitution in their accounts. In Finland, prostitution services make a tiny one-thirtieth of one percent of final consumption expenditures of households. Assuming that Canadians have attitudes and spending for prostitution services similar to those in Finland, we could add about $200 million to our household expenditures and to GDP, for the year 2000. A fair amount of narcotics is probably imported, thus we might be missing both imports and domestic consumption, without affecting GDP. However, the dealers in Canada do charge significant trade margins on the imported narcotics and we have no explicit estimate for this activity, thus it could be missing, but even here some of this missing activity might implicitly be included in our statistical discrepancy.

As noted above, the term illegal production is not synonymous with the production activities in the underground economy. Most of the underground economy is covered in Canada because of the way we use our methodologies, balancing procedures, conventions, specific imputations made to our recorded estimates, etc. Again the readers may refer to our document, The Size of the Underground Economy, Studies in National Accounting, noted above. Statistics Canada compiles GDP through three independent methods, with annual IO tables providing benchmarks for the estimates, with the result that any significant activity missed in one method is usually picked up in the other and the commodity balancing done at very detailed level in the IO tables further assures the exhaustiveness of our measurement. There are very few countries having such a comprehensive set of procedures for calculating GDP. Some users ask us whether we are fully covering the activities of the First Nations in Canada. Most of the members of the First Nations live and work in the communities where other Canadians live and their economic activities are covered exactly the same way as those of other Canadians. About 250,000 members of the First Nations live on Indian Reserves. They may produce some products and sell them in the market off Reserves and they may buy products again from the market off Reserves and both of these transactions are covered in the normal routine of our surveys and are picked up in the commodity balances used in the IO tables. They may also produce goods which are entirely consumed within the Reserves and these may include hunting and fishing products for their own consumption and most likely, they are missed, as we do not have any specific imputation made for their value. We have no firm estimate of how significant is their value but we may hazard a guess from our imputation for farm products which are produced and consumed by the farming households. In the case of agriculture, we have made an imputation for the value of agricultural products consumed by the farmers and this value is less than $200 million in the current period. Most likely, the value of hunting and fishing for own consumption on the Reserves is much less than the imputation for farm output made in agriculture. Thus what we may be missing is quite small and statistically insignificant for the overall economy.

2.3 USA practice

Illegal activities, as defined in the 1993 SNA, are also excluded from the national accounts of the United States. Again, it must be noted that the production related to the illegal activities forms only a part of the underground economy and most of the underground economic activities are included in the published value of production and GDP in the United States. The BEA examined this issue in the mid-eighties and published several articles on this topic, in their Survey of Current Business (Carol Carson -May and June 1984, Robert Parker -June 1984, and Frank de Leeuw -March 1985), pointing out the material significance of such activities and how they were included in the official numbers. Further, the BEA has prepared an update of the work on underground economy for the Economic Commission of Europe in 2002. There is no reason to believe that the production of illegal activities in the USA is significantly different than in Canada wherein the best guess is about 1%.

Just to close the discussion on smuggling of cigarettes to Canada, there was no adjustment made in the United States. Exports of such cigarettes from Canada were recorded as imports from Canada in the USA but their further re-export was recorded as destined for some third country, not Canada. This required us to adjust our imports from USA to be consistent with our allocation of smuggling to the household consumption.

2.4 Concluding remarks

It is reassuring to observe that both Canada and the USA have an almost identical SNA production boundary, both **explicitly** do not include the illegal production activities such as prostitution, narcotics etc., in their accounts and the value of their production in both countries is not very significant. It is quite possible that some of these activities might **implicitly** be included in the accounts in some miscellaneous series or in the statistical discrepancy between the two sides -income and expenditure- of the GDP. Developing explicit estimates of illegal production activities should not be ignored forever, as these activities do occur. There is an additional political reason why the statistically advanced countries, such as Canada and the United States, should make an effort to conform with the 1993 SNA recommendation on this issue so that some other countries where such activities are significant are encouraged to do the same.

3. Valuation of own-account construction by households

Households are engaged in the construction of their own dwellings or other structures for their own use, or on structural improvements or extensions to existing dwellings or structures. Typically the households buy the required materials from the market and provide their own labour to complete the job. This household activity falls within the production boundary of the SNA. Own-account construction by the households makes a significant proportion of total residential dwellings and other structures in most economies, the less developed an economy, the higher the proportion.

3.1 1993 SNA

The 1993 SNA recommends that the value of such output should be imputed on the basis of the prices of similar products sold on the market (paragraph 4.147). It further specifies: "It will usually be necessary to value the output of own-account construction on the basis of costs as it is likely to be difficult to make a direct valuation of an individual and specific construction project that is not offered for sale. When the construction is undertaken for itself by a business enterprise, the requisite information on costs may be easily ascertained, but not in the case of the construction of dwellings by households or communal construction for the benefit of the community undertaken by informal associations or groups of households. Most of the inputs into communal construction projects, including labour inputs, are likely to be provided free so that even the valuation of the inputs may pose problems. As unpaid labour may account for a large part of the inputs, it is important to make some estimate of its value using wage rates paid for similar kinds of work on local labour markets. While it may be difficult to find an appropriate rate, it is likely to be less difficult than trying to make a direct valuation of a specific construction project itself " (paragraph 6.86). The 1993 SNA emphasises the same valuation principle again (see paragraph 10.78) where it states that the value of finished structures will be seriously underestimated if the imputed value for unpaid household labour is not included. Guidelines in the 1995 ESA are similar to the ones in the 1993 SNA. It may be noted that an identical extension to two dwellings in the same locality, one produced by a construction contractor and the other produced by the household with its own labour must be valued similarly for capital investment as they provide identical services.

3.2 Canadian practice

In Canada, and most likely in other OECD countries, new residential structures are, by and large, produced by the construction contractors whereas households are typically engaged in their alterations and improvements. Alterations and improvements make a very significant proportion, approximately 32% and ownership transfer costs account for approximately 17% of the total value of residential structures in the CSNA. Further, alterations and improvements by homeowners (owner-occupied dwellings) represent the largest proportion of alterations and improvements, approximately 75%. In estimating alterations and improvements, many sources are utilised such as : Survey of Household Spending, Homeowner Repair and Renovation Survey, Building Permit data, and the Survey of the Real Estate Rental and Leasing and Property Management industries. It is estimated that two-thirds of homeowner alterations and improvements are done by contractors and the rest done by households, using their own labour. In Canada, we have not imputed any value to the labour provided by the households.

Our ballpark estimate for 1997, for example, of the value of homeowner alterations and improvements done by households is $2.4 billion of the total value of residential construction of $30 billion in the national accounts. This is built as follows: 32% of the total value of residential construction of $30 billion is accounted for by alterations and improvements, 75% of such alterations etc are made for the owner-occupied dwellings and a third of such activity is done by the homeowners with their own labour. Typically, the ratio of labour to materials in such construction activity is one to one, thus our accounts may be missing an imputed value of labour of $2.4 billion in 1997 or about 8% of total value of residential construction.

3.3 USA practice

Unlike in Canada, the BEA accounts include an imputation for own-account labour of owner-occupants but only for new single-family housing units. There is no imputation for labour by owner-occupants for improvements and renovations. Of course, direct costs of materials and supplies are always added in the own-account construction by the owner-occupants. The BEA practice of including an imputation of labour for owner-built new units, but not for improvements, reflects the methods used by the Census Bureau in preparing the source data for construction. The value of this imputed labour is US$8.2 billion for 2001, a value proportionately much smaller than the one suggested for the Canadian imputation because it does not include labour imputation for improvements which are very labour intensive.

3.4 Concluding remarks

In Canada, there is no imputation made for the value of labour provided by the homeowners to produce alterations and improvements to their own residential structures and in the United States, the value of imputation is limited to the new construction of single units only, though both the 1993 SNA and the 1995 ESA recommend to impute full value of own-account labour. Member countries of the European Union follow the 1995 ESA and are required to include an estimate of the value of free labour provided by the households for own account construction. It is our understanding that Australia also imputes such a value in the investment series for residential construction. Once we implement the 1993 SNA

recommendation, the value added in the construction industry will increase by the estimated amount of own account labour (classified as mixed income), and an identical increase will be shown in the value of residential construction. With this incorporation, the value of residential construction in Canada is estimated to increase by about 8% and the level of GDP will increase by about three-tenths of one percent and a bit less in the USA as there is already some imputation.

4. Investment in cultivated assets: livestock, plantations and orchards

In economic theory, national accounting and, by and large, also business accounting, there is general agreement that products used repeatedly or continuously over periods of time of (at least) more than one year to produce other goods and services should be classified as capital assets. In the national accounts, buildings, machinery and equipment have always been classified as capital assets because they are continuously used over long periods to produce other goods and services. In agriculture, investment in cultivated assets such as livestock, plantations and orchards is quite significant, yet, such investment was not recognised as a capital asset in the international manuals on national accounts, prior to the 1993 SNA, for reasons unknown.

4.1 1993 SNA

In the 1993 SNA, the asset boundary was extended to align it more closely with economic theory and reality, and it now includes investment in cultivated assets as capital assets. The 1993 SNA notes: "Cultivated assets consist of livestock or trees that are used repeatedly or continuously over periods of time of more than one year to produce other goods and services. Thus, livestock that continue to be used in production year after year are fixed assets. They include, for example, breeding stock, dairy cattle, sheep reared for wool and draught animals. On the other hand, animals raised for slaughter, including poultry, are not fixed assets. Similarly, trees (including shrubs) that are cultivated in plantations for the products they yield year after year -such as fruit trees, vines, rubber trees, palm trees, etc.- are fixed assets. On the other hand, trees grown for timber that yield a finished product once only when they are ultimately felled are not fixed assets, just as cereals or vegetables that produce only a single crop when they are harvested cannot be fixed assets" (paragraph 10.83). Capitalising such livestock and trees as cultivated assets rather than treating expenditure on them as intermediate consumption, adds to the value of output and GDP, both for agriculture and the total economy. Its economic significance, no doubt, differs greatly amongst countries as well as among various regions of the same country. For example, sheep reared for wool are very important in Australia and Scotland, vineyards are important in California, France, Italy, Ontario (Niagara belt) and British Columbia in Canada, and so on. Thus, it is necessary to be fully aware of its implementation amongst countries for proper analysis of their performance and their international comparability.

4.2 Canadian practice

We fully support the 1993 SNA recommendation in this regard. However, we have not yet implemented the 1993 SNA recommendation, primarily because traditionally, cultivated assets have never been included in the capital stock series, and this is not a strong reason. All expenditures to grow breeding and dairy cattle are, at present, intermingled with the expenditures to grow slaughter cattle. The value of animals not yet slaughtered is added together with the value of dairy and breeding animals as part of inventory accumulation in final demand in the CSNA. Dairy and breeding cattle are not capitalised. Similarly, the output of the fruit bearing trees in the vineyards and other farms is not shown, and all the expenditures to grow these trees are intermingled with other intermediate consumption expenditures for the production of fruits. There is no capital formation recorded for fruit trees.

The following changes will be required to follow the 1993 SNA guidelines:

a) Expenditures to grow breeding stock (the term breeding stock is used to include both dairy cattle and breeding stock) will have to be separated from those for slaughter animals.
b) In the inventory stock of cattle, the value of breeding livestock will have to be separated from slaughter animals and the breeding livestock will be added as capital formation.
c) Expenditures to grow fruits will have to be separated from expenditures to grow fruit bearing trees.
d) A new own account production of fruit bearing trees will be created, and it will be reported in gross fixed capital formation in the final demand.
e) Rates of consumption of fixed capital (CFC) will have to be estimated for both breeding livestock and fruit bearing trees for use as expenditure on CFC in the value added of agriculture.

The result from these changes will be as follows:

a) Gross fixed capital formation for breeding livestock will increase by the value of their output, counterbalanced by an identical decrease in the value of inventory accumulation of cattle in the final demand.
b) Gross fixed capital formation of fruit bearing trees will increase by the value of the new own account production.
c) Gross value added in agriculture will not change for the change in the treatment of breeding livestock but net value added will decease by an identical increase in CFC for breeding livestock.
d) Output of agriculture and also gross value added will increase in agriculture by the value of own account production of fruit trees. Additional CFC of fruit trees will be added in agriculture.

To repeat, expenditures on cultivated assets are not treated as investment in the Capital and repair expenditures surveys of Statistics Canada, nor are they treated as gross fixed capital formation in the CSNA. The importance of these cultivated assets is different across provinces and territories, thus adding another caveat to inter-provincial comparison. For example, dairy farming is more important in Quebec and orchards are more important in Ontario and BC, compared to other provinces.

We have looked anew at the information collected and published by our Agriculture Division in regard to the value of breeding livestock. As at December 2001, the value of breeding livestock was reported to be $9,368 million and inventory of slaughter animals $6,232 million and this information is collected annually. (see Agriculture Economic Statistics, Cat: 21-603, Table on Balance Sheet of the Agriculture Sector, for more details). Typically, the dairy cattle produce milk for 6 to 7 years after they are two years old, so we have a good basis to calculate their depreciation rate. Thus, we can develop estimates for gross fixed capital formation for breeding livestock and their depreciation rates but separation of expenditures for producing breeding livestock from slaughter animals may require developing some methodology and conventions and some resources. As noted above, gross value added will not be affected by these changes.

There is no readily available information for the value of own account production of fruit trees and the expenditures for their production. However, let us make some ballpark estimate of the additional capital and its result on value added. In Canada, the value of production of fresh fruits is about $2.5 billion in recent years. Let us assume that the fruit trees yield fruits for about ten years if well maintained. Let us further assume that the cost of maintaining these trees is about $0.5 billion, thus the net yield of fruit trees is $2 billion. Assuming a rate of discount of some 8 to 10%, the market value of these trees may approximate $10 billion. Capital consumption will be approximately $1 billion, thus value added will increase by about $1 billion annually, if we conform to the 1993 SNA guideline in this case.

4.3 USA practice

As in Canada, cultivated assets are not capitalised in the national accounts of the United States, for reasons primarily statistical, thus their overall GDP and GDP for agriculture, are underestimated by the value of new investments in fruit trees. Again, the economic importance of these activities varies a great deal amongst the States.

4.4 Concluding remarks

In Canada, we have information for estimates of investment of breeding livestock but the expenditures to produce breeding stock are intermingled with those for slaughter animals; furthermore, the expenditures to grow orchards are not separable from expenditures to produce fruits. The situation in the USA is quite similar. In our opinion, it would be worthwhile to follow the 1993 SNA guidelines in this area. Our ballpark estimate is that we would add about $1 billion, to both value added and investment in agriculture in Canada, if cultivated assets are treated as investment. As the value of cultivated assets would be quite significant, particularly for agriculture and for regional accounts where such activities are important, it will be useful to have joint discussions with BEA to share expertise and develop a common methodology to make estimates.

5. Acquisition of entertainment, literary or artistic originals

Acquisition of entertainment, literary or artistic originals were not considered as gross fixed capital formation, and indeed, no intangible product was considered as a capital asset, in the international system of national accounts manuals prior to the 1993 SNA. In the 1968 SNA, the boundary of gross fixed capital formation was limited to tangible assets, such as buildings and machinery and equipment.

5.1 1993 SNA

The 1993 SNA asset boundary has been extended to align it closer to economic theory. Several types of intangible assets were added: mineral exploration; computer software; entertainment, literary or artistic originals; and other intangible fixed assets (see paragraph 10.34 b). Expenditures on mineral exploration and computer software now form part of investment and capital stock in the national accounts of both the USA and Canada. Both output and value added increased by the amount of the new addition of investment recognised in the accounts and the amounts were substantial.

Classification of entertainment, literary or artistic originals as gross fixed capital formation is probably the newest of the new extensions of the asset boundary in the national accounts. The 1993 SNA states: "Originals consist of the original films, sound recordings, manuscripts, tapes, models, etc., on which drama performances, radio and television programming, musical performances, sporting events, literary and artistic , etc., are recorded or embodied" (paragraph 10.94). It further states: "The acquisition of an original constitutes gross fixed capital formation. The original is often retained by its producer, but it may also be sold after it has been produced in order to be exploited by another unit. When it is sold, the gross fixed capital formation is measured by the price paid by the purchaser to acquire the asset. If it is not sold, ...it may be necessary to value the original by its cost of production, as in the case of many other kinds of output produced for own gross fixed capital formation" (paragraph 10.95).

Once a product is recognised as a capital asset, its service life needs to be determined in order to calculate its depreciation or consumption rate, for it to be used as part of gross value added in the using industry. Originals typically have copyright protection over a fairly long period. When a user buys the copyright for a given period of (at least) more than one year, it also acquires an asset which needs to be recognised. The debate is not settled yet on how to recognise and value licences and copyrights to use intangible assets like originals. This debate is similar to the one on how to value licences to use tangible assets like electro-magnetic spectrums for mobile phones. At the October 2001 meeting of the OECD National Accounts Experts, a Task Force on capitalisation of computer software was established. This task force has now recommended that the software original be recognised as a capital asset.

5.2 Canadian practice

Entertainment, literary or artistic originals are not recognised as capital assets in the CSNA. We do not have a big entertainment industry like the one in Hollywood but we have the National Film Board and the Canadian Film Development Corporation and some private sector enterprises involved in film production. We have many well known singers and song writers and authors. However, it is fair to assume that the economic importance of the entertainment originals of the film industry is far greater than that of literary or artistic originals in Canada. Annual expenditures of the National Film Board and the Canadian Film Development Corporation have been in the range of about $200 million recently. Most of their expenditures to help develop films in Canada are expensed in the entertainment and cultural industries and not capitalised. We have no other financial information at hand for the value of production of these originals by the private sector and by our singers, song writers and authors. Our ballpark guess is that the total annual expenditures probably do not exceed $500 million. Had we allocated these expenditures to produce capital assets as suggested by the 1993 SNA, the value added in the entertainment and cultural industries would have increased by the value of this new investment or about $500 million.

5.3 USA practice

As in Canada, the acquisition of entertainment, literary or artistic originals is not currently capitalised. The production of motion pictures, television, and sound recordings is important in the US economy, and implementing the 1993 SNA guidelines would increase the level of value added in the entertainment and cultural industries and the GDP for the overall economy by the value of this investment. It is our understanding that the BEA is planning to start research on this subject after its next comprehensive revision in 2003.

5.4 Concluding remarks

With the implementation of the 1993 SNA recommendation in this area, both the level of value added in the entertainment and cultural industries and overall GDP will increase in both countries, about $500 million in Canada and significantly more than ten times this value in the United States. This is one area where research needs to done to develop a reliable, acceptable and transparent methodology to estimate the value of such originals and share such research and findings with colleagues in other countries. Hence, it will be useful to have joint discussions with the BEA to share expertise and develop

a common methodology to calculate these estimates. The importance of the activities associated with such originals is unevenly distributed amongst the Canadian provinces and, of course, amongst countries. Thus, its exclusion adds one more caveat to the reliability and accuracy of published GDP series at the international level.

6. Net acquisitions of existing (used) assets

Capital formation is a very important item in the national accounts: it is a significant component of GDP; it cumulates to capital stock and the consumption of fixed capital (CFC) derived from capital stock and is again a significant component of gross value added. How existing used assets should be handled in the measurement of capital formation is a question which needs to be answered, as there are divergent practices on its treatment at the total economy level and by industry or sector.

6.1 1993 SNA

The 1993 SNA defines gross fixed capital formation as acquisitions, less disposals, of new or existing tangible and intangible fixed assets, major improvements to tangible non-produced assets and the costs associated with the transfers of ownership of non-produced assets (see paragraphs 10.33). There is no ambiguity on this issue in the SNA guidelines.

6.2 Canadian practice

At the total economy level, our treatment of existing or used assets is consistent with the 1993 SNA. Acquisition of imported used assets by enterprises are added to their gross fixed capital formation, and the value of used assets exported by enterprises are removed from their gross capital formation, as recommended in the 1993 SNA. Similarly, at the sector level, sales of used vehicles by businesses and governments to the household sector are removed from their capital investment in the period in which such transactions occur, and are added to household consumption. This treatment is again consistent with the one recommended in the 1993 SNA. However, when one business enterprise sells its used capital assets to another business enterprise or acquires used capital assets from another enterprise, these transactions are ignored in the measurement of capital formation **by industry**. When an enterprise acquires only used assets to produce something, it is shown at present as if it has no capital. On the other side, when an enterprise sells its used capital and has no more capital, it is shown as if it still carries all the capital it had before. This convention in the measurement of capital investment and later capital stock is followed by the Investment and Capital Stock Division as well as in the CSNA. Thus, our treatment of used assets by industry is not consistent with the one recommended in the 1993 SNA, and neither is it consistent with business accounting.

6.3 USA practice

As in Canada, net acquisitions of existing (used) assets at the total economy level and by sectors are handled according to the 1993 SNA recommendations. It is reported by the BEA that the source data often do not allow it to separately identify transactions involving used assets at the industry level and this is same situation as in Canada.

6.4 Concluding remarks

Both in the USA and Canada, the present practice of ignoring the purchase/sale of existing assets by industry within the business sector is inconsistent with both the 1993 SNA and the business accounting principles. Thus both countries may carry incorrect capital stock by industry. Our present practice does not affect gross value added in total or by industry but it has two serious consequences: a) incorrect capital stock by industry leads to errors in the calculations of multi-factor productivity estimates by industry and b) it leads to incorrect CFC by industry, and thus incorrect net value added by industry.

7. Value of Consumption of fixed capital, macro series

Value of consumption of fixed capital (CFC) is an important item in GDP or in gross value added by sector or industry. This item is also known in the literature as depreciation or capital consumption allowance. It makes about 13% of GDP in Canada and as a single item, its value is higher than any of the following well known items listed in the GDP : profits, interest income, net income of unincorporated businesses, net taxes on factors of production or net taxes on products. The only item of higher value than CFC is the wages, salaries and supplementary labour income. In the business sector or in

industries of the business sector, it is a charge against operating surplus, hence its calculated value helps to derive net value added from gross value added but the gross value added does not change. However, in the non-market (government and NPISHs) sectors whose output and value added are measured by adding all the costs, its value affects both the output and the gross value added, hence total GDP of the economy.

One needs to have data on investment in assets, capital stock, service lives of assets to calculate CFC. In the business accounts, depreciation is always calculated for tax purposes but the rate of depreciation may be determined by tax authorities, not necessarily connected with economic service life. Further, the values used of fixed assets are typically the book values or the historic costs, not their current market prices. Thus, the profits and other incomes reported by the enterprises reflects these values of depreciation. In the national accounts, the rules for calculating CFC are different from those in the business accounts.

7.1 1993 SNA

The 1993 SNA recommends that "... consumption of fixed capital must be valued with reference to the same overall set of current prices as that used to value output and intermediate consumption... It should therefore be calculated using the actual or estimated prices and rentals of fixed assets prevailing at that time and not at the times the goods were originally acquired. The historic costs of fixed assets, i.e., the prices originally paid for them, may become quite irrelevant for the calculation of consumption of fixed capital if prices change sufficiently over time" (paragraph 6.180).

Several methods to calculate CFC are noted in the 1993 SNA and in the OECD Manual, **Measuring Capital,** Paris 2001. The two most common methods are the straight-line depreciation (also called linear depreciation) and the geometric depreciation. With straight-line depreciation, the market value of an asset in constant prices is assumed to decline by the **same amount** each period. With geometric depreciation, the market value in constant prices is assumed to decline at a **constant rate** in each period. The 1993 SNA does not recommend one method over the other; it states: "Both the linear and the geometric, or declining balance, method are easy to apply. The choice between them depends upon knowledge, or assumptions, about the implied profiles of rentals which underlie them. It is not possible on a priori grounds to recommend the use of one in preference to the other in all circumstances. It is possible, for example, that linear depreciation may be realistic in the case of structures, while geometric depreciation is more realistic in the case of machinery and equipment". (paragraph 6.197). In the economic literature, particularly in the field of productivity analysis, there is a preference for geometric depreciation; further, the valuation of second hand goods in the market suggests a choice for geometric rates.

7.2 Canadian practice

Consumption of fixed capital is calculated by the Investment and Capital Stock Division (ICSD) of Statistics Canada using current market prices of fixed assets and estimates are published using both linear and geometric methods. However, this information is classified by industry, based on establishments rather than by sector based on institutional units such as corporations or companies. In the macro series of the CSNA, the value of consumption of fixed capital for the government sector, housing and agriculture is the one calculated by the ICSD, using current market prices of the capital stocks; however, for other sectors, the value of depreciation used is what enterprises report in their financial statements, typically using historic costs and tax determined depreciation rates.

Our departure in the CSNA from the recommended treatment on CFC has been due to our statistical sources and partly also because we did not put high enough priority to develop estimates consistent with the 1993 SNA. What one would need is to develop a methodology and a database to redefine the value of the ICSD's consumption of fixed capital classified by establishment-based industries to their institutional units, such as corporations which report profits. Only then, can the CSNA recalculate profits using the recommended CFC. During the last few years, two statistical developments have occurred at Statistics Canada which should help us to re-examine our existing approach: a) statistical information is now collected via a unified enterprise survey, thus making it feasible to integrate establishment data with sector/enterprise data, and b) the business register now includes both sector and industry classification for all economic entities. The new estimates of CFC, when applicable, will not affect GDP, but will change the value of consumption of fixed capital, counterbalanced by an equal change in the value of net operating surplus.

7.3 USA practice

The BEA values CFC for the macro SNA series for all sectors using assets at current cost and calculates depreciation using BEA-determined depreciation schedules (usually geometric) that are based on empirical research on used asset prices. Total profits are reported both using a) current cost and BEA-determined depreciation and b) tax-based historical-cost depreciation (referred to as "capital consumption allowances" or CCA). The difference between CFC and CCA is called the "capital consumption adjustment" and is also published.

7.4 Concluding remarks

In the NIPA accounts, CFC as well as CCA and capital consumption adjustment are published; CFC equals CCA less capital consumption adjustment. This provides a rich database to connect with tax based calculations and to calculate the preferred national accounts method for CCF. It is our judgement that the CSNA will better serve its users if it also adopts the innovative and pragmatic approach used in the BEA NIPA accounts. Then the CSNA will be consistent both with the 1993 SNA and the NIPA accounts, a huge improvement over the existing situation.

8. Consumption of fixed capital, industries

Calculation of CFC is very important for a fuller analysis of the macro SNA series. It assumes an additional importance in the calculation of value added by industry estimates, specifically net value added, rather than gross value added. Net value added, compared to gross value added, is preferred, as it is more in tune with the theoretically correct Hicksian concept of income and sustainable development. The theoretically correct concept of value added, consistent with Hicksian income, is the maximum value added which an economy can produce without reducing capital.

It may be worth noting that, in the late 1960's and early 1970's, there was an interesting debate in the USA over the preference for net value added over gross value added or vice versa for productivity analysis between Professors Jorgenson and Griliches on one side and Denison on the other. A summary of this debate can be found in the article by Charles R. Hulten, "Total Factor Productivity : A Short Biography," in New Developments in Productivity Analysis, edited by Charles Hulten, Edwin Dean and Michael Harper, 2001 , University of Chicago Press. Professor Hulten notes: "...Jorgenson and Griliches recognised that output must be measured gross of depreciation if it is to conform to the accounting system implied by the strict logic of production theory. This put them in conflict with Denison, who advocated a concept of output net of depreciation, and Solow, who used gross output in his empirical work but preferred net output on the theoretical grounds that it is a better measure of welfare improvement arising from technical progress" (page 14).

8.1 1993 SNA

As noted above, the 1993 SNA recommends that CFC must be valued with reference to the same overall set of current prices as that used to value output and intermediate consumption, both for the macro accounts and the production accounts by industry. The balancing item in the production account is value added and it can be measured either gross or net: that is, before or after deducting consumption of fixed capital. The 1993 SNA states: A a) Gross value added is defined as the value of output less the value of intermediate consumption; b) Net value added is defined as the value of output less the values of both intermediate consumption and consumption of fixed capital" (paragraph 6.4). The 1993 SNA fully supports the theoretically preferred concept of net value added and it states: "As value added is intended to measure the additional value created by a process of production, it ought to be measured net, since the consumption of fixed capital is a cost of production" (paragraph 6.5). After strongly asserting its preference for net value added, the 1993 SNA adds a flexibility to produce gross value added. It states: "... consumption of fixed capital can be difficult to measure in practice and it may not always be possible to make a satisfactory estimate of its value and hence of net value added. Provision has therefore to be made for value added to be measured gross as well as net" (paragraph 6.5). The result of this flexibility is that many countries produce only gross value added. From a conceptual point of view, it would have been appropriate, had the1993 SNA pushed hard for net value added as the primary featured measure. Further, given that the newer types of capital such as computers and computer software have short service life (three to five years, or even less), it would have been appropriate even from an operational point of view for the 1993 SNA to have pushed for the net value added concept.

8.2 Canadian practice

In the Canadian Input-Output tables, there has never been a separate estimate of consumption of fixed capital by industry, thus it has remained part of other operating surplus. However, as noted above, in the macro income and expenditure accounts, consumption of fixed capital is estimated for agriculture, own account housing, as well as for the government sector and it is calculated with reference to market prices. Furthermore, for the rest of the economy, depreciation is based on the historic cost of the value of capital stock and is determined by tax considerations. The ICSD calculates by industry capital stock and CFC at current market prices, the concept recommended by the 1993 SNA. Additional, though not very significant, resources will be required to make adjustments to the industry boundaries used in the ICSD calculations to bring them in line with the IO definition of industries. When such estimates of CFC by industry are incorporated in the Canadian IO tables, we will then have available both gross value added and net value added by industry. This additional detail, we believe, will substantially enhance the usefulness of our industry statistics.

8.3 USA practice

Consumption of fixed capital (CFC) is published for National Income and Product Accounts (NIPA), as noted above in item # 7, only by legal form of organisation, such as corporate business, non-financial corporate business, farms, non-farm housing, government, etc., but not by industry. Both the NIPA's and GDP by Industry accounts provide the capital consumption allowances (CCA) by industry, the former on a company basis (in table 6.22), and the latter on an establishment basis. Neither CFC nor CCA is available from the IO accounts.

BEA does publish CFC by industry on an establishment basis as part of BEA's Fixed Assets accounts. These estimates of CFC have not been used for GDP by industry because of a) BEA's concerns about the reliability of the industry distribution of fixed investment used in the perpetual inventory method, and b) potential inconsistencies between CCA from the capital stock and profits before tax converted from a company basis to an establishment basis in the GDP by Industry accounts.

8.4 Concluding remarks

The CSNA industry and IO accounts do not have CFC estimates and the BEA industry accounts have only CCA estimates, thus neither country produces the preferred CFC by industry. At Statistics Canada, CFC by industry is already calculated by the Investment and Capital Stock Division, but the industrial classification is not identical with the one used in the CSNA; this reconciliation is achievable with some additional, though not very substantial, resources. BEA does not believe that company-establishment conversion of CFC (if company estimates were available) is the best method to achieve the result of CFC estimates by industry. When source data become available that would allow BEA to estimate value added directly from establishment gross output and intermediate inputs, it may then consider using CFC from the Fixed Assets data as a measure of establishment-based CFC by industry.

We strongly believe that the usefulness of industry statistics will enhance substantially with the inclusion of CFC estimates, as this will permit to calculate both gross value added and net value added by industry.

Section B: Production account for institutional sectors, partially implemented

In the national accounts, the production account has always been given utmost importance. It is the first in the sequence of accounts compiled for any economy, thus, its compilation affects all the succeeding accounts in the system. The production accounts can be compiled for industries and then aggregated to the total economy or for institutional sectors and then aggregated to the total economy. The production account in the SNA contains three aggregate items apart from the balancing item. These are output, intermediate consumption, and consumption of fixed capital; the balancing item is value added, which can be measured either gross or net, that is before or after deducting consumption of fixed capital. Should such production accounts be prepared both by industry and institutional sectors? Production accounts by industry have been compiled by most countries over a long period and only recently have such accounts been recommended and prepared by institutional sectors. In this section, we will examine the sector boundaries used by Canada and the USA in this area vis-a-vis the international recommendations and their impact on inter-country and international comparability.

9. Business sector

It is quite natural to think of developing estimates of production of an economy distributed into two broad sectors, the market producers and the non-market producers, as their respective motives to produce goods and services are quite

different. Market producers or producers in the business sector, must at least cover all their costs of production and make profits if possible, whereas the non-market producers may provide their output free or at prices which are not significant to cover their costs of production. Let us see the guidelines for aggregating institutional units for production accounts in the 1993 SNA.

9.1 1993 SNA

The 1993 SNA states: "The production account is the first in the sequence of accounts compiled for institutional units, sectors and the total economy. The incomes generated by production are carried forward into subsequent accounts so that the way in which the production account is compiled can exert a considerable influence on the System" (paragraph 6.1). It further states that production accounts are compiled for establishments and industries as well as for institutional units and sectors. Overall numerical consistency requires that the output of an institutional unit engaged in production should be equal to the sum of the outputs of the individual establishments of which it is composed (see paragraph 6.2)

The first UN document on National accounts, produced in the mid-1950's, did not specify a production account by industry or by sector, as it limited itself to the preparation of only macro estimates of national accounts. The UN 1968 SNA manual went much further and according to it, separate production accounts were required for industries but not for individual institutional sectors; only one consolidated production account was recommended for the economy as a whole. The 1993 SNA provides a framework for a **full** sequence of accounts and for this the only unit which cuts across the full set of accounts is an institutional unit or an institutional sector as only institutional sectors can be utilised to compile the income and outlay account, the capital and finance account and the balance sheet account. It is quite logical to have the same unit for the sequence of accounts and for a full appraisal of its performance. Compared to the 1993 SNA, the 1968 SNA did not provide a full set of accounts, hence could afford to ignore the compilation of a production account for institutional sectors.

The 1993 SNA requires the compilation of production accounts for five mutually exclusive sectors. It defines an institutional unit "as an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities" (paragraph 4.2). The resident institutional units that make up the total economy are grouped into the following five mutually exclusive sectors (paragraph 4.6):

i) the non-financial corporations sector;
ii) the financial corporations sector;
iii) the general government sector;
iv) the non-profit institutions serving households (NPISHs) sector;
v) the household sector.

9.2 Canadian practice

The CSNA produces production accounts for all years for which input-output tables are compiled, but the sector classification is different from that of the 1993 SNA. A business sector is created, which comprises all producing units of the non-financial corporations sector, the financial corporations sector and the household sector of the 1993 SNA. Two additional sectors, the general government and NPISHs (see additional details on their sector boundary below), produce goods and services primarily not for sale in the market but for their own consumption. All producing units of the Canadian economy are thus included in the production accounts of the business sector and the two non-market sectors. The business sector is not defined in the 1993 SNA but it is used both in the USA and Canada. Its boundary is close to, though not identical with, the market production of an economy, as the non-market sectors can and do produce minor secondary output for sale in the market. We have not been able to follow the recommendation of the 1993 SNA regarding an integrated set of production accounts for both institutional sectors and industries. Note that the government business enterprises are allocated to the business sector and they are classified by industry.

Our presentation is different mostly because of the way our production surveys have historically been conducted. Our production surveys have traditionally collected information on outputs, intermediate inputs etc., from establishments, without much regard to their relationship with institutional units (often called companies or enterprises in Canada) of which they formed part. Thus, it was not possible to reclassify information collected from establishments to their institutional units. However, the recent approach to collect all commodity outputs and inputs from unified enterprise units and the

classification of these units linked with their establishments in our expanded Business Register may permit us to re-examine our approach to the development of production accounts for institutional sectors in addition to our regular production account by industry.

Though we have not yet implemented the 1993 SNA recommendation to produce full production accounts separately for each of the three sectors making up our business sector, it is possible to delineate, with some additional work, the financial corporations sector. The boundary of the finance and insurance sector #52 in the North American Industry Classification System (NAICS), is quite similar to the financial corporations sector of the 1993 SNA, except the NAICS industry 5242, Agencies, Brokerages and other Insurance Related Activities, which includes significant activity provided by the unincorporated enterprises. NAICS industry 5242 is separately identified in the CSNA worksheet level detail. NAICS Finance and Insurance less NAICS 5242 is almost identical with the financial corporations sector of the 1993 SNA.

The producing units in the household sector operate almost entirely in the non-financial part of the Canadian economy. It can be argued that these producing units, also called unincorporated business enterprises, are more like quasi-corporations following the 1993 SNA terminology, and are thus classifiable with the corporations sectors in the production accounts. The 1993 SNA defines quasi-corporations as follows: "Quasi-corporations are unincorporated enterprises that function as if they were corporations...Such an enterprise must, of course, keep a complete set of accounts" (paragraph 4.49). In Canada, all unincorporated enterprises submit the Canada Customs and Revenue Agency T-1 Return, and thus have separate accounts. This fulfils a condition of the 1993 SNA for production accounts. However, they are not capable, in their own right, of owning assets and incurring liabilities, independent of households owning such enterprises: thus, they are not full-fledged corporations or quasi-corporations. In the subsequent sequence of accounts related to income and outlay, capital and finance and balance sheet, we recognise this characteristic of household-owned unincorporated enterprises and include them with the household sector, rather than with the corporations sector. Separating unincorporated enterprise units from the production account of the business sector will require a significant amount of work which will be possible only when we obtain data from unified enterprise surveys, with detail kept separately for corporate and unincorporated enterprise units.

9.3 USA practice

The BEA produces national income and product accounts (NIPA) which include tables providing information on production accounts for sectors. The overall definition and boundary of the sectors are similar to those in Canada but the details are different. These sectors are: (1) business, (2) households and non-profit institutions, and (3) general government (see Table 1.7 Gross Domestic Product by Sector). The business sector measures production by all market producers (entities that produce goods and services for sale at a price intended at least to approximate the costs of production), including production by government business enterprises, as well as certain other types of production by non-profit institutions serving business, Federal Reserve Banks, and services of owner-occupied housing and of buildings and equipment owned by non-profit institutions. Note that the production measurement therein is limited to value added (also called "gross product" or "gross domestic product" in various BEA tables) only, and not the full production account which includes also output and intermediate consumption. It may be noted that the housing sub-sector under the Business sector in Table 1.7 includes government enterprises engaged in housing activities.

Government business enterprises are not classified by detailed industry in the GDP by industry accounts or IO tables; rather, they are aggregated under Special Industries in two blocks: Federal, and State and local. This presentation has an advantage that the users can very quickly assess the significance of government business enterprises in the economy but its disadvantage is that the NIPA's industry or IO data are not comparable in detail with data for the same industry published by other departments which classify such enterprises by industry.

In addition to the information for the total business sector, the value added of all Corporate Business (in current prices only) and of Non-financial Corporate Business (in current and chained prices), are presented in NIPA table 1.16. Thus in the United States, the GDP of financial corporations can be residually calculated. Similarly, the value added of the non-corporate sector (mostly unincorporated business enterprises owned by the household sector) may also be residually calculated within the business sector. The macro aggregates by sector that are presented in NIPA tables 1.7 or 1.16 (or that can be residually calculated from Table 1.16) are based on data by legal form of organisation. The data by legal form of organisation are benchmarked to estimates derived from samples of individual institutional units from the Internal Revenue Service for profits, net interest and CCA or from establishment data classified by legal form from the economic census for

compensation of employees. These estimates are also available by industry. The IRS data are available annually, but the compensation of employees by legal form data are available only every five years and must be interpolated.

Output (called gross output in the US accounts) and intermediate consumption are not shown in NIPA tables, but can be inferred, at annual frequency, from the GDP-by-industry tables and input-output tables, for most of the sectors. Farm gross output (which includes farm housing) can be obtained directly from GDP by industry and NIPA table 8.10, Farm sector output. Housing gross output can be obtained directly from NIPA 8.12, Housing sector output but the published GDP by industry estimate differs slightly because it excludes government enterprises. There is no issue for output of general government and private households because output equals value added by definition. The most difficult adjustment concerns NPISHs. In the GDP by industry accounts, the estimates of these organisations are embedded in the data for several industries and are not readily separable.

9.4 Concluding remarks

Both Canada and the USA compile production accounts for institutional sectors with similar, though not identical, boundaries: the business sector, the government sector and the NPISHs sector. It may be noted that neither country fully follows the guidelines of the 1993 SNA in this regard. In Canada, the production account for the three sectors includes output, intermediate consumption of goods and services and, residually, value added. In the United States, there is additional detail within these three sectors and value added is produced for each of these; however, gross output can easily be inferred for all the sectors from the annual GDP by industry accounts or IO tables, except NPISHs. Further, the USA can provide the sectoral breakdown of value added within the business sector whereas Canada does not currently have such estimates.

Both Canada and the USA need to develop **production** accounts for institutional sectors to conform with the 1993 SNA recommendation. This will help us to fully integrate with the income and outlay, capital finance and balance sheet accounts for institutional sectors which we already compile and which are consistent with the 1993 SNA guidelines. Production account by sector is one of the crucial recommendations of the 1993 SNA and should be given a high priority. In Canada, we may develop this database during the next few years as we obtain information from the unified production surveys and it is quite likely that the BEA, after the comprehensive revision in 2003, may start moving toward a sectoral presentation that more closely aligns with the 1993 SNA. Once done, we will have the same sectoral boundaries used for all of the accounts, (production, income and outlay, capital, and other accounts), and this will provide a rich database to analyse the performance of each sector of the economy in all its activities.

The business sector is widely used in productivity analysis in both Canada and the United States. In our judgement, it will be useful to retain it, as an alternative or supplementary sectoral presentation.

10. Government Sector

The institutional units performing functions such as government administration, public order and security, defence, social protection and social security are unambiguously classified in all countries in the government sector. However, functions such as education, health, recreation and culture are performed in many countries by both government units and non-profit institutions, the latter may be controlled and financed or simply partly financed by the governments. The sector classification of such non-profit institutions varies amongst countries, depending upon conventions, traditions, and interpretation of international guidelines, thus making international comparisons problematic.

10.1 1993 SNA

In the 1993 SNA (paragraph 4.113), the government sector consists of the following institutional units:

(a) All units of central, state or local government;
(b) All social security funds at each level of government;
(c) All non-market non-profit institutions (NPIs) that are controlled and mainly financed by government units.

The sector does not include government owned corporations (called government business enterprises in Canada), even when all the equity of such corporations is owned by government. These corporations form part of the corporations sector.

10.2 Canadian practice

The CSNA follows the same rules as the 1993 SNA for allocating units to the government sector with one modification relating to NPIs. We have not differentiated NPIs that are both controlled and mainly financed by government from NPIs that are only mainly financed by government units. We made a conscious decision to put the maximum weight on the mainly financed aspect as an operational guide to classify units as there is an excellent auditable information available to measure the share of finance. However, we have no readily available information to measure the degree of control in order to shift the classification of an NPI from one sector to the other when necessary. Thus, we have classified all NPIs mainly financed by government in the government sector, irrespective of level of control. Most of them are in the health and education sectors.

The value of output in the government sector equals its intermediate consumption, compensation of employees, consumption of fixed capital and taxes on factors of production (mostly on real estate property). As the methodology to estimate consumption of fixed capital for the government sector is different in the two countries and it affects the value of output, this issue is discussed under a separate heading below, issue # 11.

10.3 USA practice

There are major differences between the Canadian practice and that of the United States. In the production account, the US government sector is pretty much limited to government administration and defence. In the USA as well as in many other OECD countries, the maximum weight has been put on the control aspect as a guide to classify NPIs. Government controlled hospitals and universities are in the government sector. However, NPI's mainly financed but not controlled by the government are not allocated to the government sector.

There are certain conventions used in the estimation and presentation of industry tables which need to be noted for fuller understanding. The US accounts **currently** adopt the convention that purchases of goods and services by general government are final consumption expenditures, therefore, gross output of general government equals value added only and intermediate consumption is zero. In contrast, the 1993 SNA recommends that these purchases be classified as intermediate consumption and that final consumption consists of the collective services produced by these institutions.

It may be noted that in the upcoming comprehensive revision of the NIPA's in 2003, BEA is preparing accounts that will permit the presentation of government as a producer of services. Plans (see more information in the January 2003 issue of the Survey of Current Business) are to reflect government gross output and its components parts (value added and intermediate consumption), as well as its uses for final consumption expenditures, sales and own account capital formation, a presentation fully consistent with the 1993 SNA and the present Canadian practice. In the 1997 Benchmark IO tables, released in December 2002, the general government now includes force-account construction and own-account software inputs, in addition to labour compensation and consumption of fixed capital.

10.4 Concluding remarks

The government sector in both countries is quite large but in Canada it is even larger because many NPIs (which are mainly financed but not controlled by the government) are classified in the government sector. For example, the government sector in Canada makes about 16% of total value added, compared with about 10% in the United States. This huge difference primarily arises due to the different classification conventions used in the two countries. Canada includes, in addition to the activities noted for the USA, health services and the universities and these additions explain most of the difference in the published values for the government sector in the two countries. Thus, the values for activities limited to public administration and defence are quite comparable in the two countries if one goes into the detail but such detail is typically not presented or published in our regular aggregates. In any case, it is the published aggregate numbers that set the tone of economic, political and journalistic analysis.

As noted, the 1993 SNA recommends that the value of output of the government sector should include all their costs, intermediate consumption and all elements of value added; Canada follows this recommendation. The BEA is planning to follow the same in upcoming comprehensive revision of national accounts in 2003, and has already incorporated some of these recommendations in the 1997 Benchmark IO tables, released in December 2002.

11. Consumption of fixed capital, government sector

The value of consumption of fixed capital included in the value added of the government sector in Canada is about 13%, an item of a fairly significant value and of similar importance vis-a-vis the rest of the economy. It needs to be stated that a change in the value of consumption of fixed capital for a given period in the business sector affects the level of profits or net income but it does not affect the level of gross value added, hence GDP. However, a change in the value of consumption of fixed capital in the non-business sectors (government and NPISHs) affects the level of gross value added as it is an additional imputed item for cost, hence affects the level of GDP of the sector as well as of the total economy. There are two methods widely used to calculate CFC, linear and geometric and the resulting value is different.

11.1 1993 SNA

As noted above, the 1993 SNA does not recommend one over the other method; it states: "Both the linear and the geometric, or declining balance, method are easy to apply. The choice between them depends upon knowledge, or assumptions, about the implied profiles of rentals which underlie them. It is not possible on a priori grounds to recommend the use of one in preference to the other in all circumstances. It is possible, for example, that linear depreciation may be realistic in the case of structures, while geometric depreciation is more realistic in the case of machinery and equipment" (paragraph 6.197). In the economic literature, particularly in the field of productivity analysis, there is a preference for geometric depreciation; further, the valuation of second hand goods in the market suggests a choice for geometric rates.

11.2 Canadian practice

The Investment and Capital Stock Division (ICSD) at Statistics Canada calculates estimates of CFC for all industries using three methods, two of them are the most popular: linear depreciation rates and geometric depreciation rates. ICSD has published series for the government sector back to 1961 using both methods. In every year, the series based on the geometric rate is about 75% of the estimate based on the linear rate. For example, in 2001, the geometric depreciation value was $16.6 billion, compared with $21 billion using linear depreciation, a difference of $4.6 billion. The CSNA has continued to use the linear depreciation rather than the preferred geometric depreciation for this sector, perhaps, for historical continuity reasons. Back a few decades ago, the CSNA was including CFC in the government sector and at that time, the only method applied was linear. The CSNA stayed with the linear estimates even when the preferred calculation became available by 1996 or so, before the 1997 CSNA historical revisions. This higher estimate of CFC by $4.6 billion in 2001 has resulted in an increase, by the same amount, of both value of output and value added of the government sector. The share of the government sector in the overall economy is thus higher by about one half of one percent, due entirely to the convention chosen for the CSNA, and this is not an insignificant difference.

11.3 USA practice

The BEA uses geometric depreciation for most assets for all the sectors and industries, including the government sector; however, there are exceptions such as autos, computers, missiles, and nuclear fuel rods. For more information, see the most recent methodology for the Fixed assets estimates. If the geometric depreciation rate produces a lower estimate of CFC as in Canada, the published share of the government sector in the USA economy is lower compared with those countries using linear depreciation rates.

11.4 Concluding remarks

Here the issue is not of consistency with the 1993 SNA, as it does not recommend, on *a priori* grounds, the use of one method (say linear) in preference to the other (say geometric) method for calculating CFC but of the difference in methodology in the two countries (linear in Canada and mostly geometric in the United States) which affects the share of the value of output and of value added of the government sector in the economy. Many economists and analysts in North America prefer the estimates based on geometric depreciation. In principle, the life in the geometric method for depreciation is infinite but in practice, one truncates it and in Canada, it is truncated in the year which is five times the length of the average service life of the asset. Suppose the asset life of an asset is 10 years. In the linear methodology, the asset is completely removed from the stock at the 10^{th} year whereas in the geometric methodology, it will be removed at the 50^{th} year of the asset. Of course, the value of depreciation using the geometric methodology will be very small towards the end of the period.

There is a lot of sensitivity attached to the comparative role of government in the two economies. As noted in issue #10, Government sector, the published values are proportionately much higher in Canada than in the USA because the CSNA includes most of the NPIs in the government sector whereas the same are classified to the NPISHs sector in the BEA national accounts. The difference in methodology for CFC in the government sector aggravates this situation further as the Canadian linear methodology generates a higher value of CFC compared with the geometric methodology.

It is strongly recommended that the CSNA should re-examine its present preference for the CFC estimates based on linear methodology for the government sector, as the alternative geometric methodology has many listed advantages: a) it is the preferred methodology by many analysts; b) it is used, for most assets, by the BEA, thus both countries will have similar methodology; and c) its application will reduce the apparent gap in the role of the government sector in the two economies,

12. Non-Profit institutions serving households (NPISHs) sector

Non-profit institutions (NPIs) serve corporations, and governments and they are classified to those sectors. There are also NPIs which exclusively serve households, and these are called NPISHs and are discussed here.

12.1 1993 SNA

The 1993 SNA states: "Non-profit institutions are legal entities created for the purpose of producing goods and services whose status does not permit them to be a source of income, profit or other financial gain to the units that establish, control or finance them" (paragraph 4.161). Some NPIs charge prices and fees that are economically significant. The 1993 SNA defines significant prices as "prices which have a significant influence both on the amounts the producers are willing to supply and on the amounts purchasers wish to buy" (paragraph 4.161). NPIs which charge significant prices are typically part of the corporations sector and these, for example, include chambers of commerce, trade organisations, industry associations, etc. The majority of NPIs, however, are likely to be non-market producers that provide goods or services to other institutional units either free or at prices that are not economically significant. NPIs which are non-market producers and are **controlled and mainly financed** by government are allocated to the government sector; most of those not allocated to the government sector form the NPISHs sector. Thus, the NPISHs sector is a residual sector.

12.2 Canadian practice

The 1993 SNA emphasises the double criteria, controlled and mainly financed, for classification of NPIs in the government sector whereas, in the CSNA, we have used a single criterion of finance as a guide for allocation. The residual NPISHs sector in the CSNA includes only those NPIs which are not mainly financed by the government, whereas the strict adherence to the double criteria of the 1993 SNA would lead one to include also NPIs mainly financed by government so long as they are not controlled by government.

In the production account, the value of output of the NPISHs sector equals its intermediate consumption, compensation of employees, consumption of fixed capital and taxes on factors of production, as recommended by the 1993 SNA. Note that the NPISHs sector is separately identified in the production account but it is not separated in the CSNA from the household sector for the income and outlay account, the capital and financial account, and the balance sheet account.

12.3 USA practice

In the United States, all NPIs mainly not financed by government form part of the NPISHs sector, as in Canada but it also includes all those NPIs mainly financed by the government so long as they are not controlled by it. The phrase mainly financed needs to be elaborated. In Canada, the hospitals are public hospitals, entirely financed by the government whereas in the United States, the funding or financing provided by the government is less than 50%. Similarly, the universities in Canada are financed for some 70% of their expenditures by the government but the financing by the government is much lower in the United States, even lower than in the hospital sector there. Thus, the criteria used by the BEA for classifying NPIs to the NPISHS sector reflect the institutional structure and financing arrangements there which permit an inclusion of many more NPIs in NPISHs than in Canada.

In the BEA NIPA accounts (Table 1.7), value added of NPISHs is published but there is no estimate of their output and intermediate expenditures. Further, the value added of the non-profit institutions sub-sector includes only compensation paid to employees of these institutions but the value added related to their ownership of fixed assets, that is the consumption

of fixed capital, is **currently** shown in the business sector. It is noted by the BEA that it is placed in the business sector by analogy to the treatment of owner-occupied housing. In both cases, the household or NPISH is thought of as running a separate rental business (in the real estate industry) in which the fixed assets are rented back to the owning household or NPISH. For the upcoming comprehensive revision in 2003, the BEA plans to change this treatment and start showing the rental value of NPISHs fixed assets in the NPISHs sector. Furthermore, the rental value of NPISH fixed assets will be allocated to the appropriate industry rather than shown in the real estate industry. These changes are described in an article, Preview of the Revised NIPA Estimates for 1997, Survey of Current Business, January 2003.

It is worth noting that the BEA differs from the 1993 SNA guidelines in the imputation of the rental value of fixed assets owned and used by NPISHs as it includes **net interest** as well as CFC, a convention which makes the value added of NPISHs higher than in other countries, including Canada, which follow the 1993 SNA. How important this addition is may be gauged from the following data: in 2000, gross value added of NPISHs (Table 1.7) was US$418 billion; imputation for CFC was US$40 billion and for net interest was US$17 billion (Table 8.21). These two imputations now form part the business sector but will be added to NPISHs in the upcoming comprehensive revisions, thus the value added for NPISHs would increase by 14%, of which 4% for net interest would be applicable only in the USA as no other country follows this convention so far. If we apply the same ratio in Canada, its overall GDP would increase by two-tenths of one percent.

In the GDP by industry accounts and the input-output tables, NPISHs are classified by industry along with other producers; thus, no separate output and their intermediate inputs are available. There are several non-profit hospitals as well as state and local government hospitals which now form part of NPISHs and they could be reclassified, but not done yet, as market producers, since their receipts generally approximate their expenses.

12.4 Concluding remarks

The concluding remarks concerning the government sector also apply here. In the United States, State and local government hospitals and universities are part of the government sector but all other hospitals and universities are in the NPISHs sector whereas all the NPIs in the hospital and education sub-sectors are included in Canada in the government sector. In Canada, NPISHs sector makes about 1% of total GDP whereas in the United States, it makes 4% and again a huge difference between the published data in the two countries. Apart from the classification differences, there is one additional reason for the difference in the share of value added of NPISHs sector in the two countries; in the United States, the consumption of fixed capital of NPISHs sector is currently allocated to the business sector whereas in Canada, it remains allocated to NPISHs but this will change, as noted above, in the upcoming comprehensive revisions. If we aggregate the two non-market sectors -Government and NPISHs- their share in the value added is 17% in Canada compared with 14% in the United States. Of the remaining 3% difference, about 0.5% is explained by the difference in the methodology of calculating CFC in the government sector and 0.4% is due to the current allocation of CFC of NPISHs sector to the business sector in the United States. The rest of the difference is mostly due to the much heavier involvement of governments in Canada, compared with the USA, in the provision of public health services to the population at large.

The published numbers encourage the users to draw wrong conclusions that there is more government and less charity in Canada compared with the situation in the United States but in reality this is not true. One possible solution may be to have detailed discussion with our colleagues in the BEA and jointly agree on the classification rulings to be adopted by the two countries. In the meantime, let us put more emphasis on the results of the two non-business sectors together and publish, within the government sector, sub-sector detail for a) government administration and defence and b) other government activities including education, health etc.

As noted, the 1993 SNA recommends that the value the output of the NPISHs sector should include all their costs, intermediate consumption and all elements of value added; Canada follows this recommendation and the BEA plans to change its present practice in the upcoming comprehensive revisions such that it will be consistent with the 1993 SNA.

It is encouraging to note that the forthcoming (2003) UN Handbook on Non-profit Institutions in the System of National Accounts (prepared in cooperation with the Centre for Civil Society Studies, Institute for Policy Studies, The Johns Hopkins University, Baltimore, USA) is proposing to produce a Satellite Account on Non-profit Institutions whose boundary is quite similar to the aggregation of all the NPIs in the 1993 SNA. For example, The UN handbook on NPIs (see paragraph 2.14) defines the non-profit sector as consisting of organisations that, (a) are not-for-profit and, by law or custom, do not distribute any surplus that may generate to those who own or control them; (b) are institutionally separate

from government; (c) are self-governing; and (d) are non-compulsory. Such a satellite account will eliminate some of the differences in classification rulings which we have observed between the two countries.

13. Household Sector

One of the primary purposes of economic production is to satisfy the needs of households and in developing countries most of such production is carried out by the households themselves. Even in developed countries, households provide a significant proportion of economic output. Thus it is important to have a precise understanding of what should be included in its boundary in the national accounts.

13.1 1993 SNA

In the 1993 SNA (paragraph 4.151), "the household sector consists of all resident households. Defined as institutional units, households include unincorporated enterprises owned by households, whether market producers or producing for own final use, as integral parts of those households".

13.2 Canadian practice

In the production account of the CSNA, as noted above, all producing units of the household sector are merged with the two corporations sectors to form the business sector. Even when households hire domestic workers, such as baby sitters and nannies, their activity is classified as part of "other personal and household services" industry in the 1980 Standard Industrial Classification or "private households industry" in the NAICS, but always as part of the business sector. Thus, in the Canadian production account, the household sector is not separately identified. Our departure from the 1993 SNA guideline is due to how our production surveys are conducted. The legal identification of the producing establishment as unincorporated or incorporated is of secondary importance for industrial statistics. Thus the detail on outputs and inputs by unincorporated sector, even when available for certain industries, is inadequate to produce the production account for the household sector. There are two statistical developments underway which should help us to separate the unincorporated enterprise units from the production account of the business sector. One is the enhancement of the Business Register at Statistics Canada which now includes the dual classification of enterprises and the establishments forming part of that enterprise, thus providing a sector classification of all establishments. The other development is the use of unified enterprise surveys, with detail available both for the enterprise and its constituent establishments. It is to be noted that the persons and unincorporated businesses sector of the CSNA relating to the income and outlay account, the capital and financial account, and the balance sheet account approximates the definition of the 1993 SNA with the one exception that the CSNA sector also includes NPISHs.

13.3 USA practice

In the United States, as in Canada, unincorporated enterprises owned by the household sector are merged with the corporate sector to form the business sector. In the 1992 Benchmark IO tables, there used to be one Household industry which related to the hiring by private households of domestic workers such as nannies and baby sitters and whose output consisted of compensation paid to such domestic workers. The value of this activity was insignificant, less than two-tenths of one percent of GDP. This activity, however, was treated as produced by the household sector, not by the business sector. In the 1997 Benchmark IO tables, this industry has been moved to Other services, following NAICS. It needs to be noted that in the upcoming comprehensive NIPA revision, the BEA is planning to add the owner-occupied housing industry to the household sector. For the income and outlay and capital finance accounts, the boundary of the household sector is closer to that in the 1993 SNA.

13.4 Concluding remarks

Both Canada and the USA differ from the procedure recommended by the 1993 SNA with respect to the boundary of the household sector for the production account. The share of value added by the household sector in the economy is zero in Canada and was less than two-tenths of one percent in the United States, produced by Household industry. The Household industry in the US IO tables has been moved to Other services, following NAICS, for the 1997 IO benchmarks. In all the OECD countries, own account housing services (owner occupied dwellings) are imputed to be performed by the household sector; most of agriculture, a significant part of the retail trade, repair services and professional services are performed by households. In the published detail, the share of household production is typically more than 20% of the total production

in most of the OECD countries, compared with zero in Canada and an insignificant amount in the United States, thus making international comparisons by sector very problematic. It should be possible to sort out in a few years the production boundary in the CSNA for the unincorporated enterprises owned by households in all the industries. The BEA is planning to allocate the owner-occupied housing to the household sector in 2003 and the CSNA may be encouraged to do the same, thus improving comparisons between the two countries as well as internationally.

Section C: Valuation issues and industry detail, varied practices

In contrast to the production account by institutional sectors, the production account by industry has been in existence for a long time. Many countries produce production account by industry using unique valuation practices and conventions, some produce them through the input-output tables and all face the issue of maintaining consistent long time series. This section will cover most of these issues for Canada and the USA and compare their practices and point out any differences from both the 1993 SNA and each other.

14. Valuation of output

Output may be valued at the factory gate of the producing unit, including product taxes, excluding product taxes, including revenue received as subsidies, not including revenue received as subsidies, at the place of the purchasing unit, etc. Different countries may choose different valuation conventions for valid reasons such as their particular business accounting rules, or the particular principles used for the statistical surveys; however, this would make international comparisons very problematic. Hence, in the various vintages of the International manuals on SNA, guidelines are provided to value output in a way that makes it internationally comparable.

14.1 1993 SNA

The preferred basis in the 1993 SNA for the valuation of output of goods and services produced for the market is at basic prices, especially when a value added tax (VAT), or similar deductible tax, is imposed (paragraph 6.218). It is defined as follows: “The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable and plus any subsidy receivable, on that unit as a consequence of its production or sale. It excludes any transport charges invoiced separately by the producer” (paragraph 6.205 a). There are taxes on products and other taxes on production; similarly, there are subsidies on products and other subsidies on production. Since there may be some ambiguity regarding which taxes and subsidies are referred to in the 1993 SNA definition, the 1995 ESA clarifies and restates it as follows: "The basic price is the price receivable by the producers from the purchaser for a unit of a good or service produced as output minus any tax payable on that unit as a consequence of its production or sale (i.e. taxes on products) plus any subsidy receivable on that unit as a consequence of its production or sale (i.e. subsidies on products). It excludes any transport charges invoiced separately by the producer. It includes any transport margins charged by the producer on the same invoice, even when they are included as a separate item on the invoice" (paragraph 3.48). Thus, in summary, the value of output of a product at basic prices represents the value of output at the gate of the producing unit excluding any taxes on product payable and including any subsidy on product receivable as a consequence of its production or sale.

14.2 Canadian practice

In the industry surveys conducted by Statistics Canada, producing units are instructed to value sales excluding any taxes payable on products and also **excluding** any subsidy receivable on products. Taxes on products are far more prevalent and significant in Canada compared to a handful of products which receive subsidies. Thus, the value of output of most products in our industrial surveys is at basic prices, as defined in the 1993 SNA. We are different from the SNA guidelines only in those handful of products which receive subsidies as our value of output in those cases does not include the subsidies received. We have modified the 1993 SNA valuation guidelines in such cases and have called this valuation at modified basic prices, the modification being the exclusion of subsidies receivable on products. Our rationale for this modification is that we find it useful to record the value of output based on observed transaction prices as received by the producers and paid by the purchasers and listed on invoices, and hence verifiable. Our modified basic prices are always lower than the 1993 SNA basic prices by the amount of the subsidies on products receivable by any given producer and these modified prices are the ones used in the CSNA IO tables. The CSNA definition of modified basic price reads as follows:

"The modified basic price is the price receivable by the producers from the purchaser for a unit of a good or service produced as output minus any tax payable on that unit as a consequence of its production or sale (i.e. taxes on products). It excludes any transport charges invoiced separately by the producer".

The modified basic price used in the CSNA IO tables is equivalent to the price at the factory gate of the producing establishment. The advantage of using it is that the valuation of transactions between producer and purchaser is transparent and verifiable. These important accounting characteristics are not available in the event that the basic price, as recommended in the 1993 SNA, is used for valuing output. In such a case, the transactions will be reported, not at the prices prevailing in the market but at higher **notional** prices (market price plus subsidy per unit), which the purchaser does not pay and does not record: a feature that is not very appealing.

Another advantage, which is even more useful, is the facility and efficiency that our modified basic price approach provides for calculating constant price IO tables. We produce current price supply tables at modified basic prices and current price use tables at both purchaser prices and modified basic prices. We start with use tables at purchaser prices, as recommended by the 1993 SNA, and convert them to modified basic prices, the same prices as those used in supply tables. Once we have converted our purchaser price use tables into modified basic prices tables, both the supply and use tables are available at the same prices. This additional calculation is not discussed in the 1993 SNA. In Canada, we collect the sale prices of products excluding the taxes on products and without including the subsidies on products. This set of prices is immediately applicable to the values in the use tables which have already been converted at modified basic prices.
Deflating the basic price supply table would be difficult as basic prices are not observed in the market from the purchasers' point of view and would, therefore, require bold assumptions. Furthermore, deflating the use tables at purchaser prices will be very expensive as, in principle, each cell in the use table at purchaser price has its own unique price deflator. The 1993 SNA guidelines are problematic to implement cost-effectively for Statistics Canada which produces both current and constant price supply and use tables and constant price value added by industry, using the recommended double deflation approach, as benchmarks for many series in the CSNA. Given that modified basic prices are transparent and, more importantly, given their advantage for calculating constant price IO tables and value added by industry, the CSNA has not incorporated the 1993 SNA recommendation to present value of output at basic prices for those products which receive product subsidies.

14.3 USA practice

In the industry and input-output accounts of the United States, output is valued at producer's prices. These prices have the following features: a) they exclude wholesale and retail trade margins as well as transportation costs; b) they include all federal customs duties, as well as all federal, state, and local government excise and general sales taxes collected by the producers for later transmission to the respective governments; and c) they do not include government subsidies received by the producers in the valuation of their output. As the valuation of output of the producers affects the valuation of their value added and other items in all accounts, it is crucial that its impact and boundary be well understood for proper international or inter-country comparisons. The valuation of output in the industry and Input-output accounts of the USA is higher by the amount of taxes less subsidies on products when compared with the valuation of output at basic prices in the 1993 SNA, and is higher by the amount of taxes on products when compared with the valuation of output at modified basic prices in the CSNA industry statistics. These product taxes contribute significant amounts, about five percent of value added for the total economy, and, more importantly, they have very substantial impact in industries such as wholesale and retail trade and restaurants and hotels in which they are currently included. The different valuation conventions used in the valuation of output in the USA and Canada impose serious difficulties for inter-country comparison of their industry statistics. The national accountants at the BEA are aware of this controversy and may move towards the 1993 SNA recommendation on basic prices and convert their industry accounts from producers' prices. The 1997 benchmark IO accounts, released in December 2002, have the valuation of output at producers' prices, thus the subsequent annual IO accounts as well as the upcoming GDP by Industry comprehensive revision will stay also at producers' prices. Conversion at basic prices may be considered for the next benchmark revision in 2007. In the meantime, BEA's GDP by Industry staff has been able to provide estimates at basic prices for some international submissions by excluding product taxes from both gross output and nominal value added, while including product subsidies.

14.4 Concluding remarks

We support the 1993 SNA preferred valuation of output at basic prices. In a handful of industries which receive product subsidies, we find it useful to modify the 1993 SNA definition by **not including** product subsidies in the valuation for two

reasons: a) the 1993 SNA valuation is not transparent, hence not verifiable from the records of the purchasers, and b) our modification makes the calculations of constant price IO tables very efficient, a feature not discussed in the 1993 SNA. The 1993 SNA prefers valuation of output at basic prices but also notes that "producer's prices may be used when valuation at basic prices is not feasible" (paragraph 6.218). In countries where the industrial surveys can collect information on the value of output **only** at producer's prices, there is no choice but to compile output at producer's prices. However, international comparisons are difficult to make when the valuation practices are different amongst the same block of countries such as the OECD or two neighbours such as Canada and the United States. Though not elaborated in the 1993 SNA, an argument can reasonably be made that product taxes should not be recognised as a revenue item as they do not add to the net worth of the producer collecting such taxes and then transmitting them to the governments. Business accounting principles do not record such tax collections on behalf of the government as revenue of producers. Producers' price valuation causes very significant additions to the output of trade industries, thus rendering international comparisons of industry statistics and resulting productivity calculations problematic.

Once the output values in the industry statistics of the USA are produced at basic prices, or preferably at modified basic prices, the industry series will lend themselves readily to inter-industry and international comparisons, particularly for multi-factor productivity analysis. See more comments on this topic in the next issue #15, Valuation of value added by industry.

15. Valuation of value added by industry

Value added is intended to measure the additional value created by a process of production. It is one of the most important constructs in the national accounts, hence its valuation must be carefully analysed. In economic theory, this concept has traditionally been known as value added at factor cost or GDP at factor cost. Some economists have preferred to use the concept value added at market prices which includes a slightly bigger boundary for valuation. As this is a very important construct, let us pursue its meaning as elaborated in the 1993 SNA.

15.1 1993 SNA

The 1993 SNA prefers that both output and the balancing item, value added, be valued at basic prices and it states: "Gross value added at basic prices is defined as output valued at basic prices less intermediate consumption valued at purchasers' prices" (paragraph 6.226). The preference for value added at basic prices rather than the traditional value added at factor cost derives from a proposition that one must take into account the **full** cost of factors of production in any analysis of production. Value added at basic prices is higher than the traditional value added at factor cost by the amount of other taxes on factors of production (such as property and payroll taxes) less other subsidies provided to factors of production (such as labour training). The value of output of any producing unit must be sufficient to pay the full costs of the intermediate consumption of goods and services and the full costs of the factors of production, labour and capital, used for its output, if the unit is to survive in the long run.

15.2 Canadian practice

The CSNA has always produced, for its industry statistics program, value added by industry (also called GDP by industry) at factor cost during the period from the 1950's to the year 2000. Our users were very familiar and comfortable with our concept of value added at factor cost, and this was also the concept used in economic textbooks. Despite this long tradition, we have now implemented the recommendation of the 1993 SNA for value added at basic prices. In the historical revision of the CSNA in 2001, we revised our GDP by industry series back to 1961 at basic prices. It may need to be repeated that our output by industry series are not at basic prices but at modified basic prices (as noted above in issue #14, valuation of output) but our value added by industry is at basic prices. The value added at basic prices of a producing unit in Canada is equal to its output valued at modified basic prices less its intermediate consumption at purchasers' prices **plus** any subsidy receivable by that unit as a consequence of its production or sale (i.e. subsidies on products). Rather than adding subsidies on products to the value of output, we add them to our calculated value added from modified basic prices. Our measurement of value added at basic prices is identical to the one produced according to the 1993 SNA conventions.

In Canada, the most important taxes on factors of production are property taxes and payroll taxes. Payroll taxes are imposed by four provinces (Manitoba, Ontario, Quebec, and Newfoundland), paid by the employers, and the tax liability is calculated as a proportion of total wages and salaries, in every industry. Such taxes were treated as social insurance, hence part of supplementary labour income (SLI) in the pre-1997 CSNA historical revision. Should employer payroll

taxes continue to be included as SLI or treated as taxes on production was the issue discussed in the CSNA in 1997. It was felt by the staff in the CSNA that any employer contribution not giving a **specific** economic benefit to the employees or his/her dependents should be considered as tax on production, not as SLI. Mandatory payments by the employers to the government, to cover pension benefits, employment insurance etc for the specific benefit of their employees, however, are part of SLI. Hence, it was decided to change the classification of payroll taxes from SLI to tax on production for the CSNA historical revision in 1997. The significance of our decision on payroll taxes may be gauged from the following data for 1998: total wages and salaries were $419 billion, total SLI was $56 billion and total payroll taxes (not included in SLI) were $7 billion. Had we added payroll taxes to SLI, total labour compensation would have increased by 1.5%.
Unlike the payroll taxes which affect all industries, the property taxes mostly affect the real estate industry. These taxes are quite significant, amounting to more than 5% of total GDP, but in the real estate industry, they amount to about 20% of value added. Subsidies on the factors of production, mostly for labour training, are not materially important, amounting to just two-tenths of one percent of labour costs, and are prorated on the wages and salaries by industry.

15.3 USA practice

In the United States, the BEA's GDP by Industry statistics and input-output tables use another concept of value added by industry: value added at market prices or producers' prices. As noted above, the value of output of industries in the USA is at producers' prices, which include all the federal, state and local government sales and excise taxes. Value added by industry is equal to its output at producers' prices less its intermediate consumption of goods and services at purchasers' prices. This calculation produces value added by industry which, in total, equals GDP at market prices. This presentation is quite appealing to users as it fits in with the notion that final expenditures on GDP at market prices must equal value added by industry at market prices. Many users in the USA are very familiar with this presentation and it is not the only country which adopts it. This valuation is higher than the one at basic prices, by the amount of product taxes collected by industries less subsidies on products received by them. Most of the product taxes, such as federal, state and local government sales and excise taxes in the USA (equivalent taxes in Canada are the goods and services taxes-GST- and the provincial sales taxes-PST) are collected primarily by trade establishments. Thus value added at market prices for the trade industry is much higher than its valuation at basic prices or at factor cost. On the other hand, value added at market prices for highly subsidised industries, such as agriculture, is lower than the one calculated at basic prices.

There is a small statistical and conceptual difference in the calculation of value added in the two programs, GDP by Industry and IO tables. In the GDP by Industry program, inventory valuation adjustment (IVA) is distributed by industry; however, in the IO tables, IVA is shown only at the total economy level, via a special industry called Inventory Valuation Adjustment in the Use matrix, whose only input is IVA and is listed in the row of value added. This convention in the IO tables is unique, as no other country, to the best of our knowledge, uses it. If it does not require lot of resources, its present application may be re-examined and perhaps dropped in favour of its distribution by industry, thus helping international comparisons

The USA provides to the OECD gross value added at basic prices for the total economy and details for six main industrial groupings. (See Table 2, Gross domestic product: output approach, in the 2002 edition of the OECD publication, National Accounts of OECD Countries Main Aggregates). The six industrial groupings are: 1. Agriculture, hunting and forestry; fishing; 2. Industry including energy; 3. Construction; 4. Wholesale and retail trade, repairs, hotels, and restaurants, transport; 5. Financial intermediation, real estate, renting and business activities; and 6. Other service activities. The BEA may, in the near future, adopt the 1993 SNA recommendation on basic prices and convert their industry accounts from producers' prices.

15.4 Concluding remarks

As of 2001, 24 member countries of the OECD (all 15 European Union countries, Canada plus eight others) use the recommended basic price valuation for value added by industry series. The remaining six member countries (Japan, Korea, New Zealand, Switzerland, Turkey, and the United States) use producer price valuation for output and, thus, residually producer price/market price valuation for value added by industry.

Let us gauge the statistical importance of the various valuations, using the CSNA data. In 2001, GDP at factor cost was $964 billion; adding $53 billion for taxes less subsidies on factors of production resulted in GDP at basic prices of $1017 billion; further adding $75 billion for taxes less subsidies on products resulted in GDP at market prices of $1092 billion. These additions not only affect the level of total GDP by industry but the effects are unevenly distributed across industries.

As noted, taxes less subsidies on the factors of production mostly affect the real estate industry. However, taxes less subsidies on products affect the trade and repair industries as well as restaurants and hotels. The different valuations make the inter-industry and inter-country comparisons of value added per labour unit or the labour productivity by industry measures very problematic.

Value added at market prices for trade industries is higher by a wide margin compared to its calculation at basic prices, because of a convention to include the taxes collected by these establishments on behalf of governments in their value added. Comments made above on the valuation of output equally apply here. The apparent presentational advantage of total value added by industry shown as equal to GDP at market prices needs to be assessed against its lack of international comparability and the conceptual difficulty of treating the collection of taxes by the business enterprises as their revenue item.

As noted above, the USA already provides value added at basic prices for six broad groupings of industries to the OECD and may, in the near future, adopt the 1993 SNA recommendation on basic prices and convert their industry accounts from producers' prices. Once the United States, and hopefully the remaining five countries still using producers' price valuation, convert to the recommended basic price valuation, the analytical usefulness will increase of not only their accounts but those of other countries' accounts as well, by making them comparable.

There is an additional issue of a difference in the treatment of payroll taxes in Canada and the United States. As noted above, payroll taxes paid by employers in four provinces in Canada are classified as taxes on factors of production whereas the same type of taxes are classified as contributions to social insurance, hence a part of SLI and labour compensation in the United States. This difference in the treatment does not affect value added at basic prices but does affect the share of labour compensation which is an important concept in productivity analysis. Using the convention of the United States, the share of labour compensation in Canada would increase by about 1.5%. It will be worthwhile to have a joint discussion on this issue with our colleagues at the BEA.

16. Supply and use tables

Supply and Use tables (also called Input-Output tables or Make/Supply and Use matrices) have been produced for a long time by many countries, in most countries by their official statistical organisations and in others by some private research institutes. The most famous name in this subject is that of Professor Wassily Leontief of Harvard University who did the pioneering work in this area and was awarded the Nobel prize in 1973 for this work. The input-output tables were very popular in most of the centrally planned economies as they were used for economic planning purposes. In the market oriented economies, they did not form part of the first manual on the System of National Accounts (SNA) document promulgated by the United Nations in the mid-50's. Early in the 1960's, it was felt that the UN SNA manual was inadequate to deal with a growing need for analysis for industrial detail, and with issues relating to income and outlay, accumulation of capital formation and capital finance etc. To take these analytical needs into account, a revised SNA, called A System of National Accounts was published in 1968 by the United Nations. This document was prepared by an outstanding group of national accounts experts, with Professor Richard Stone of Cambridge University, chairing most of the sessions. IO tables became a very prominent part of this report, for some countries too prominent a part, as IO tables assumed a centre stage in the production accounts of the SNA. An excellent annex on mathematical discussion of IO framework was added.

16.1 1993 SNA

The 1993 SNA provides a full sequence of accounts. It starts with production, follows where the fruits of production (value added and final expenditures) go and records the impact they have on savings of each of the important players, called sectors, in the economy. It then joins these results with their capital acquisitions and notes their impact on their net lending. It then examines how the net lending is financed and finally strikes a balance sheet for each of the sectors of the economy. The Production account by both sectors and industries are recommended but these are very macro series, without much detail by industry and commodity. The detail is recommended in chapter 15, called Supply and Use tables and input-output, after all the sequence of accounts have already been noted and explained.

The 1993 SNA notes: "The input-output tables and in particular the supply and use tables serve two purposes: statistical and analytical. They provide a framework for checking the consistency of statistics on flows of goods and services obtained from quite different kinds of statistical sources -industrial surveys, household expenditure enquiries, investment surveys, foreign trade statistics etc. The System, and the input-output tables in particular, serves as a coordinating framework for

economic statistics, both conceptually for ensuring the consistency of the definitions and classifications used and as an accounting framework for ensuring the numerical consistency of data drawn from different sources. The input-output framework is also appropriate for calculating much of the economic data contained in the national accounts and detecting weaknesses" (paragraph 15.3).

The 1993 SNA includes an integrated set of supply and use tables as well as symmetric IO tables. In the symmetric IO tables of the 1993 SNA, the number of rows and columns are identical and the same classifications or units are used in both rows and columns, such tables are industry by industry or commodity by commodity. The 1993 SNA states: "The System recommends that the statistical supply and use tables should serve as the foundation from which the analytical input-output tables are constructed" (paragraph 15.7).

16.2 Canadian practice

The CSNA has been producing annual supply and use tables, or input-output tables, starting with the reference year 1961. The dimensions of the Canadian IO tables are rectangular, meaning that the number of products is larger than the number of industries. Ever since the IO program was established at Statistics Canada in the early 1960's, it was decided to have rectangular IO tables because in the real world there are many more products than industries and that is how our industrial surveys have always been conducted. For IO tables to serve as an integration framework, it is essential to stick to the rectangular format. We were probably the first statistical institution who opted for the rectangular format. We could not have a better testimonial on the usefulness of rectangular format than from the father of input-output economics, Professor Leontief. Professor Leontief and Anne Carter mentioned two very important advantages of the rectangular format of the input-output tables over the traditional square input-output tables: a) It admits as much detail as is available in the basic census or survey records; and b) The meaning of each entry is straightforward because observed transactions are not combined with fictitious transfers, a feature of inter-industry square tables. (See Anne Carter and Wassily Leontief, Goals for the input-Output Data System in the Seventies, published in BEA's Survey of Current Business, July 1971, page 31).

In the CSNA, we have produced national annual IO tables, starting with 1961, and the latest one is for 1999. Previous to the current program with effect from 1961, the first IO table, The Inter-Industry Flow of Goods and Services, Canada, 1949, was published in 1958 by Statistics Canada (then Dominion Bureau of Statistics). This was a square 42 by 42 inter-industry IO table. It provided the basic data (factor cost and capital consumption allowances) and the weights for the industries detailed in the first publication, released in 1963, on Indexes of Real Domestic Product, 1946-61. The tradition for IO tables to be used as benchmarks for other sub-systems of the national accounts started with our first IO table for 1949 and has flourished since then. The format of the IO tables from 1961 was drastically different from that of the 1949 table. The dimensions of the IO tables were not only vastly enlarged but the basic format changed from a square matrix to a rectangular one.

The dimensions of the annual IO tables at the detailed worksheet level for 1961-1980 were 204 industries and 650 commodities, for 1981-1996 were 243 industries and 650 commodities and from 1997 and onwards, the dimensions are 300 industries and 700 commodities. Since 1996, we have produced provincial (10 provinces and three territories) IO tables with the same dimensions as of national IO tables. Our IO tables serve precisely the same statistical roles as noted in the 1993 SNA. The current price annual national IO tables are produced with a lag of 29 months but are held back for another 4 to 5 months for the current price provincial IO tables to be completed as well as the national tables to be converted at constant prices and all are then simultaneously released to the public, with a lag of 34 months.

The Canadian statistical input-output tables have three broad sectors of the economy: business sector, government sector, and non-profit institutions serving households (NPISHs) sector. The business sector is coterminous with the aggregation of producing units of three 1993 SNA sectors, namely non-financial corporations sector, financial corporations sector, and the household sector. The business sector is disaggregated by industry. The NPISHs sector is disaggregated by industry except one miscellaneous industry, however, the government sector is disaggregated, not by industry, but by broad functions, such as education, health, recreation, administration, etc.

In the CSNA, we do not produce supply or output tables at basic prices as recommended in the 1993 SNA, but at modified basic prices. (See more on this in issue #14, Valuation of output). The Canadian modified basic price has the advantage that it is observed (and can be verified) in the transaction records of the producing units. The 1993 SNA basic price requires information which the purchasing unit does not have; hence it must be imputed for users of products. Our preference

to connect our information with the accounting records of the institutional and producing units brings transparency to our statistical output.

16.3 USA practice

The history of producing IO tables in the USA starts with Professor Leontief's original 1936 article, "Quantitative Input and Output Relations in the Economic System of the United States", Vol 18, No. 3 (August 1936), which contained a table for 1919. He later produced a table for 1929, and then for 1939. These tables were included in his most quoted book, **The Structure of the American Economy, 1919-1939**, published in 1951. Under the Eisenhower administration, official input-output work was closed down from 1954-59 as the technique was considered to be a tool of socialism. It is ironical that the same technique was considered a tool of capitalism in the People's Republic of China. (See more details about it in an article by Karen Polenske, "Historical and New International Perspectives on Input-Output Accounts", in Frontiers of the Input-Output Analysis, Oxford University Press, 1989).

The BEA prepares detailed national **benchmark** input-output tables (make and use tables), with approximately 500 industries and 500 commodities, every five years; these tables incorporate economic census data that are available for those years and are usually produced with a time lag of about five years from the reference year. The tables for other years are summary tables and are based on more limited sample surveys and analytical methods. The dimensions of summary tables were 85 by 85 before the 1997 IO tables; the summary version of the 1997 benchmark table contains 134 industries (see Appendix A. Industries in the 1997 Benchmark Input-Output accounts, pp 39-43, Survey of Current Business, December 2002), thus the dimensions of the future summary annual tables may be 134 by 134.

With the completion of the 1992 benchmark IO Accounts, the BEA started producing **alternative IO tables,** which, with effect from the 1997 benchmark IO tables, are now referred to as **standard** NAICS based IO tables. The standard 1997 benchmark tables conform closely to the statistical data sources. The BEA notes: "In BEA's standard make and use tables, all of the products (primary and secondary) that are produced by an industry are assigned to that industry. As a result, the data in these tables are consistent with the industry-based data that are collected and reported by other statistical agencies" (see an article by Ann Lawson and others, Benchmark input-Output Accounts of the United States, 1997, published in Survey of Current Business, December 2002, page 27). These tables are more consistent with the GDP by Industry accounts and the gross state product accounts and with other industry data that are based on information collected using NAICS. In the 1992 standard tables, own-account construction done by non-construction industries was reassigned to the construction industry but in the 1997 standard tables, it is shown where work is done. The industrial boundary vis-a-vis secondary products in the Canadian IO tables is very similar to the standard IO tables in the United States, except for construction.

The 1992 benchmark IO tables were called **traditional** IO tables and their format was closer to the analytical or symmetric input-output tables of the 1993 SNA. The BEA has changed the terminology for the 1997 benchmark IO tables. The old traditional tables are now referred to as **supplementary** tables. The BEA notes: "In the supplementary make and use tables, some of the secondary products are reassigned to the industries in which these products are primary products. The data in these tables and in the total requirements tables that are derived from them are valuable for performing economic structural analysis, impact analysis, and other types of economic modelling" (see the article by Ann Lawson and others, referred above, Survey of Current Business December 2002, page 27). The supplementary make and use tables are based on the standard make and use tables, except that some of the secondary products are reassigned.

16.4 Concluding remarks

Canada has a very extensive IO program, with national detailed tables produced annually since 1961 and provincial detailed tables produced annually since 1996. These tables are used as annual benchmarks for all the national accounts series throughout the CSNA. Provincial IO tables in earlier periods were produced only occasionally, four times during 1971-1992. Canada has always produced rectangular supply and use tables, with the number of products much larger than the number of industries. It can always produce, very quickly, a square industry by industry table, as it only needs a multiplication of two matrices, industry by product make matrix and product by industry use matrix. Canada does not produce a symmetric commodity by commodity square input-output table (see more on this in issue #17, Symmetric input-output tables). In the United States, detailed benchmark IO tables are prepared every five years based on economic census data and summary tables are prepared for other years, based on more limited sample surveys and analytical methods. There are no five-year economic censuses in Canada except for agriculture, thus all the annual Canadian IO tables are

based on the same set of information every year. The standard benchmark tables for 1997 in the USA follow the same industry boundary as in NAICS, a feature very similar to the one followed in Canada. Additionally, the BEA produces supplementary IO tables where some industries are redefined such that they retain, by and large, the principal activity, and, thus, go towards the format of symmetric or analytical table, as noted in the 1993 SNA. In Canada, only the construction activity from all other industries is reassigned to the construction industry.

17. Symmetric Input-Output tables

In the rectangular input-output tables or the supply/make and use tables, produced in Canada and other countries, the number of commodities is much larger than the number of industries. These rectangular tables must be converted into square tables for them to be inverted and used for input-output analysis such as developing total output requirements from any given change in final demand. The square tables are called symmetric IO tables, when the number of rows and columns are identical and the same classifications or units are used in both rows and columns: such tables can be industry by industry or commodity by commodity. It has been argued in the literature that for the input-output analysis, the IO tables must be such that they represent stable technological relationships. In the regular supply and use tables produced by all or almost all countries, industries produce their primary products but also some secondary products which, of course, are primary to other industries. If one converts these rectangular supply and use tables into square symmetric industry by industry tables, the technological relationships represented by such tables must refer to the production of all products by that industry. It is generally asserted that the stable technological relationships are better represented by pure product technology. To do this, one must remove from each industry its secondary output and all its inputs and add both of these to the industry where such outputs are primary. As the only source of information of the input structure for the secondary products is the industry where such products are primary, one must use such information to remove the inputs of secondary output. This operation sometimes generates negative inputs in those industries from which inputs are being removed. As negative inputs are counter-intuitive and non-explainable, mathematical proration techniques and assumptions are used to get rid of these anomalies. The result is a symmetric product by product matrix, developed through many assumptions. Whether a statistical organisation should develop a symmetric industry by industry table or a symmetric product by product table for input-output analysis is an issue which continues to remain unsettled. Let us first see what the 1993 SNA recommends in this area.

17.1 1993 SNA

Statistical units, in particular establishments grouped in industries serve as a common basis for the production accounts and the supply and use tables in the 1993 SNA. Industries always produce primary products but they sometimes also produce secondary products which are primary to other industries. The 1993 SNA recommends a different analytical unit, however, for input-output analysis. The 1993 SNA states: “For purposes of input-output analysis, the optimal situation would be one in which each producer unit were engaged in only a single productive activity so that an industry could be formed by grouping together all the units engaged in a particular type of productive activity without the intrusion of any secondary activities. The appropriate analytical unit for purposes of input-output analysis is, therefore, a unit of homogeneous production, which may be defined as a producer unit in which only a single (non-ancillary) productive activity is carried out. If a producer unit carries out a principle activity and also one or more secondary activities, it will be partitioned into the same number of units of homogeneous production “ (paragraph 5.46). It further states: “Although the unit of homogeneous production may be the optimal unit, ... it may not always be feasible to partition establishments... into a series of mutually exclusive units of homogeneous production. In situations of this kind, it will not be possible to collect directly from the enterprise or establishment the accounting data corresponding to units of homogeneous production. Such data may have to be estimated subsequently by transforming the data supplied by enterprises on the basis of various assumptions or hypotheses” (paragraph 5.47). The 1993 SNA further states: "However, the unit of homogeneous production is not normally observable and is more an abstract or conceptual unit underlying the symmetric (product by product) input-output tables" (paragraph 15.14). Despite these recognised statistical difficulties, the 1993 SNA encourages the development of such analytical input-output tables based on a homogeneous production unit, or as close as feasible to such a unit.

17.2 Canadian practice

In the CSNA, we produce (or can easily produce) symmetric industry by industry input-output tables, but not product by product input-output tables. The symmetric product by product tables would have required significant resources and many artificial assumptions. In our judgement, their analytical usefulness is of dubious quality, hence their compilation continues

to be considered not cost-effective, and particularly when we already have developed detailed symmetric industry by industry tables.

In the Canadian input-output tables, we do not subdivide establishments to create units of homogeneous production except in the case of own account construction. Both in industry surveys and capital expenditure surveys, a fair amount of information is provided by the respondents to help us separate both the value of own account construction and the corresponding materials and labour used for this activity from all industries, which then is added to the construction industry. Thus for one major activity in our economy, we follow the same direction as noted for the analytical IO tables in the 1993 SNA, also because we get the basic information to do this partitioning. Such information is not collected for other secondary activities in the producing industries. Thus, in the Canadian IO tables, each of the 300 industries has its principal product (s) and its secondary products. There are about 700 products listed in the IO tables but they are aggregated from several thousand products reported by respondents. In fact, the three hundred IO industries have subsumed several thousand separate technologies, simply because of how our data are collected. We have an input or use matrix with 300 industries and 700 commodities and we have an output or make matrix of the same dimensions. Assuming constant domestic commodity shares and constant industry technology, a 300 by 300 industry by industry input table can be quickly produced by multiplying the two matrices, the make matrix with 300 industries by 700 commodities and the use matrix with 700 commodities and 300 industries. Homogeneous production would require a 700 by 700 product matrix, each column showing a unique technology to produce that product but we would have to invoke 700 input vectors from the 300 input vectors that we collect from industry surveys. This scale of artificiality would make any result of very dubious quality.

17.3 USA practice

In the supplementary (previously called traditional) IO tables produced by the BEA, secondary output including own-account construction and their inputs are removed from many industries in the standard tables and are added to the outputs and inputs of the industries where they are primary. The purpose of these reassignments is to assure that each resulting IO industry has a unique output and production process, represented by the mix of inputs, compared with other industries. These changes involve only the outputs and related inputs of some secondary products produced by an industry where the secondary product has a different input mix and production process from the industry's primary product. For example, hotel and lodging places typically provide eating and drinking services as a secondary product to their primary product of hotel and lodging services. The inputs and production processes for these two activities, however, are very different and need to be separated in the supplementary IO tables for the purpose of preparing total requirements table. Consequently, the outputs and inputs associated with eating and drinking services provided by the hotels and lodging places industry are redefined to the eating and drinking industry for the supplementary IO tables. Note that the changes to industry outputs and inputs for secondary products are made not for all industries but many of them, though large adjustments are made only to a few, compared to only one of construction in Canada. The purpose of these redefinitions in the supplementary IO tables is to attain a greater degree of homogeneity in the inputs required by an IO industry to produce its commodities. Thus, we can say that the approach followed for reassignments of secondary products for several industries, in the supplementary IO tables of the United States, goes **towards** the conceptual underpinnings of the analytical or symmetric IO tables of the 1993 SNA.

The differences between the supplementary (previously called traditional) IO tables and the standard (previously called alternative) IO tables arise entirely from the importance of secondary products. Standard tables keep the secondary products whereas such products are removed for several industries in the supplementary tables. The difference between the standard and supplementary tables was larger for some industries in the 1992 benchmark IO tables when SIC was the basis of classification, compared with the 1997 tables which are NAICS based. For example, redefined auto repair output from the retail trade industry made up almost 40 percent of IO repair industry output in 1992 but now with NAICS as the basis of classification, this difference is much smaller for the 1997 IO tables, as auto repair output is classified to repair industry, not retail trade.

Until 1992, BEA produced only product by product total requirements matrices, as well as industry by product total requirements matrices. For the 1997 benchmark IO tables which were released in December 2002, an industry by industry total requirements matrix was added to other existing tables.

17.4 Concluding remarks

The 1993 SNA encourages the development of symmetric product by product IO tables, based on a homogeneous production unit, or as close as feasible to such a unit. The Eurostat is in favour of transforming the supply and use tables into symmetric product by product IO tables (see Eurostat draft Input-Output manual, August 2002). The recommendation to produce symmetric product by product tables by both the 1993 SNA and the draft manual of the Eurostat is now challenged by some experts (see a paper by Bent Thage, Symmetric Input-Output Tables and Quality Standards for Official Statistics, presented at the 14th International Conference on Input-Output techniques, October 2002, Montreal).

The symmetric product by product IO tables recommended at the international level, particularly in the European Union countries, are of no more than 100 by 100 dimensions. Even 300 or 500 commodities are aggregations of some 50,000 or so commodities identified in the market. The meaning of commodity technology is questionable when 50,000 technologies are aggregated into a manageable set of 100 products or even 300 or 500 or 1000 products. Such an exercise can hardly be called generating homogeneous production units. One cannot derive any meaningful interpretation of product technology from such an aggregated matrix. Hence, there is no reason to spend vast resources to do such an exercise of very dubious quality.

One alternative is to produce, from the rectangular supply and use tables, symmetric industry by industry IO tables, with dimensions equal to the number of industries in the supply and use tables. The transformation of such tables is efficient, quite inexpensive, transparent, verifiable from the records and the resulting quality is the same as that of the basic tables. These are important ingredients to satisfy the quality dimensions increasingly required by the international organisations. One may also contemplate, as done in the USA and to a limited extent in Canada, redefining some important industries by removing their secondary products and their inputs and adding the same to the industries where they are primary. It is important to fully document these changes so that they are transparent to the users of both IO tables and statistics from regular industry surveys. We owe to our users a high quality and verifiable statistics, in as demystified a way as possible, so that they can use them with confidence.

The supplementary square (with 500 by 500 dimensions) benchmark IO tables in the United States, as noted above, redefine many important industries by removing their secondary products and their inputs and adding the same to industries where they are primary, thus going towards the analytical IO tables of the 1993 SNA, yet maintaining transparency. The construction industry, in the Canadian IO tables, is redefined as in the United States, with all the changes fully documented. The Canadian IO tables are rectangular but can readily be transformed into square (with 300 by 300 dimensions) industry by industry tables. Canada produces industry by industry total requirements matrix and the USA produces industry by industry (as well as industry by product and product by product) total requirements matrices to satisfy user needs for IO analysis. We have no hesitation to say that the technology reading available from the Canadian 300 by 300 industry IO tables is at least as good as, and most likely far superior to, the one available from the 100 by 100 product IO tables produced by some countries, with many assumptions and a lot of resources.

18 Production account by industry

The production account by industry or some important segment of this account, such as the well-known Index of Industrial Production, has continued to be compiled for a long time, and its compilation predates the modern system of national accounts which came into existence immediately after the second world war. Even countries which do not yet compile national accounts collect at least the output of industries of national importance, for both administrative and policy reasons, and thus have some rudimentary information for production account by industries. The production account by industry is prepared in many countries through the input-output tables but there is no inherent reason that it must be so. Input-output tables provide, of course, a useful framework for such statistics; however, those countries which do not regularly produce such tables, may still compile a production account by industry. This item may repeat several arguments already made above in the Supply and Use tables so that the discussion flows smoothly.

18.1 1993 SNA

It needs to be re-emphasised that the 1993 SNA recommends that the production accounts (output, intermediate inputs, value added) be compiled for establishments and industries as well as for institutional units and sectors. It states: "Overall numerical consistency requires that the output of an institutional unit engaged in production -that is an enterprise- should be equal to the sum of the outputs of the individual establishments of which it is composed. As these outputs include

deliveries of goods and services to other establishments belonging to the same enterprise, such inter-establishment deliveries are counted as part of the output of the enterprise as a whole even though they do not leave the enterprise" (paragraph 6.2). Like the institutional sectors, the establishments that make up the total economy are grouped into industries, following international or country-specific standard industrial classification (SIC) manuals. The 1993 SNA recommendation that inter-establishment deliveries always must remain counted, no matter what level of industrial aggregation, is very important from a statistical point of view. Some countries used to produce, or perhaps still produce, industry statistics in which every aggregation of the same sector, say manufacturing, would have a different total value of output, depending on the level of aggregation of the detailed industries.

18.2 Canadian practice

The CSNA compiles annual production accounts for industries through the input-output tables (also called supply and use tables) at both current and constant prices, and the monthly GDP by industry only at constant prices. The annual input-output tables provide benchmarks for the monthly GDP by industry calculations. The value of output is at modified basic prices for the annual series and the value of value added is at basic prices for both annual and the monthly industry series. Note that output by industry is not calculated for the monthly GDP by industry statistics. Inter-establishment deliveries within the same enterprise are counted as output both in Canada and the United States. The number of industries at the most detailed worksheet level was 204 for 1961-1980, 243 for 1981-96 whereas from 1997 and onwards, the number has increased to 300.

In the input-output tables, three broad aggregates are specified: industries based on business sector establishments, industries in the NPISHs sector, and sub-sectors (not industries) belonging to the government sector. The business sector consists of more than 250 industries but all establishments belonging to either of the two non-business sectors -NPISHs and the government- are excluded as they appear under their own sectors. The NPISHs sector has five separate categories: religious organisations, welfare organisations, sports and recreational clubs, educational institutions, and other organisations. Excepting other organisations, the other four categories in NPISHs follow the industry classification. This category is not really an aggregation of institutional units but of many establishment-based industries. The government sector has eight sub-sectors: hospitals, residential care facilities, university education, other education services, defence services, other municipal government, other provincial and territorial governments, and other federal government. Thus, the CSNA presentation of industries in the production account is different from the industrial groupings published by the Divisions conducting industry surveys at Statistics Canada. Each industry in the business sector or NPISHs and each sub-sector in the government sector contains, in detail, the output of goods and services, intermediate consumption of goods and services, and most of the elements of value added.

Though detailed outputs and inputs of goods and services in the government sector are not classified by industry, value added and its components are. This permits us to produce GDP by industry where each industry includes all establishments, business and non-business; however, the corresponding gross output and their intermediate inputs of goods and services by industry are not articulated by industry in the government sector. Similarly, the labour compensation of the establishments forming part of 'other organisations' in the NPISHs sector is allocated to industries for GDP by industry estimates, but the other operating expenditures are kept together primarily because the establishments are small and numerous and their data are not of the highest quality. However, given that labour compensation forms a very significant part of total expenditures in the category other organisations, other operating expenditures might as well be prorated on the basis of labour costs.

18.3 USA practice

The production account by industry in the USA is compiled through two programs: Benchmark and annual IO accounts, and GDP by Industry. Benchmark IO tables for approximately 500 industries are prepared every 5 years, based on economic census data that cover most industries. Annual IO tables for the other four years are prepared for approximately 85 industries, (now with effect from 1997 benchmark tables 134 industries) based on benchmark relationships extrapolated using less comprehensive survey data. Detailed estimates of the intermediate consumption of goods and services, as well as value added, required by each industry (except general government, government enterprises) for the production of its output are prepared. Value added is shown for three components (compensation of employees, indirect business tax and nontax liabilities, and other value added) for benchmark tables only. The term non-tax liability is not used in the 1993 SNA or in the national accounts of other countries. In the NIPA accounts, nontax liability includes other business liabilities to general government such as regulatory and inspection fees, special assessment, fines and forfeitures, rents and royalties, and donations. In Canada, these items are not shown separately and are part of other operating surplus by industry.

All Federal Government enterprises are listed together under three headings, rather than classified by industry: Postal service, federal electric utilities, and other federal government enterprises. Similarly, all State and local government enterprises are listed together under three headings, rather than classified by industry: State and local government passenger transit, State and local government electric utilities, and Other State and local government enterprises. There is also one specific General government industry. Previously, the value of output of general government industries was limited to value added only and zero was reported as intermediate consumption. In the 1997 benchmark IO tables, the general government industry includes the intermediate inputs for force-account (called own-account in Canada) construction and own-account software in the standard tables. However, other intermediate consumption for conducting the general government activities are not covered in the Use tables but are shown in the final consumption expenditures. It should be noted that BEA plans to revise the presentation of government production to show intermediate inputs and production of services as part of the upcoming NIPA comprehensive revision in 2003. This change in the NIPA's will be reflected in future IO and GDP by Industry accounts.

It may be noted that since June 2000, the GDP by Industry accounts provide an annual time series of nominal and real production accounts by industry going back to 1987 for all industries and back to 1977 for most industries. It should be further noted that there is a significant difference in methodology between the IO accounts and GDP by industry accounts and that only the latter program provides real estimates for industries .

18.4 Concluding remarks

Both Canada and the USA have extensive industry statistics programs, and their respective input-output tables play a crucial role. Both countries have classified their industries by sector but the sector boundaries are different as noted earlier in Section B, production account for institutional sectors.

In the United States, all establishments belonging to the business sector and the NPISHs sector are classified by industry but government business enterprises are not allocated by industry. All government business enterprises are aggregated in two groups, Federal Government enterprises and State and local government enterprises, and their individual establishments do not form part of their own industrial group. In Canada, government enterprises form part of the business sector and are classified with similar producing units. For example, the Federal, State and local government electric utilities are allocated to the same industry as the private sector industries in Canada but not in the USA. In the USA, government universities form part of General government industry and other universities are allocated to NPISHs but all universities are allocated to the government sector in Canada. In neither country, are the establishments in the government sector allocated to industries. In Canada, however, the value added for the two non-business sectors is classified by industry and it then is added to the value added of industries forming the business sector, thus producing comprehensive GDP by industry estimates.

The value of output for general government in the USA includes value added and (with effect from the 1997 benchmark IO accounts) force-account construction and own-account software and their intermediate inputs but the intermediate inputs for other general government activities are shown directly as final expenditures. In Canada and other countries, the value of such output includes both value added and corresponding intermediate consumption, thus the existing presentation in the USA is different from most other countries. It should be noted, however, that BEA plans to revise the presentation of government production to show intermediate inputs and production of services as part of the upcoming NIPA comprehensive revision in 2003. This change in the NIPA's will be reflected in future IO and GDP by Industry accounts. Thus in the GDP expenditures approach of the United States, government final expenditures have all the detailed purchases of goods and services plus the value of government services, which are equivalent to their value added. On the other hand, in Canada and other countries, government final expenditures have one item only, which is equal to the value of output of government services which are equal to their intermediate consumption plus value added. Total value added and total final expenditures in both countries' presentation are identical, but the details are different. This may be confusing for users.

In Canada, it will be useful (and it should not be very costly) to articulate by industry both the outputs and intermediate inputs in the government sector and other organisations in the NPISHs sector. Industries from the three sectors can then be re-aggregated following the same industry classification as in the Monthly GDP by industry program. This will permit us to have a **full** production account by industry for all three sectors as well as for the total economy. This development, when completed, will enhance the use of our industry statistics both within Statistics Canada and by outside analysts.

19. Long time series of industry Statistics

In both Canada and the United States, there have been many vintages of Standard Industry Classification (SIC) during the last 50 years and the newest one, the North American Industry Classification System 1997 (NAICS), is based on quite different organising principles compared with the earlier SICs. How the two statistical organisations responsible for producing industry statistics should maintain a long time series of these statistics and at the same time implement NAICS is an important issue which needs to be carefully deliberated. Implementation of revised industrial classifications inevitably produces statistical breaks, yet the demand from users for continuous time series remains unabated.

19.1 Canadian practice

The CSNA detailed industry statistics from 1961 onwards are classified on the basis of three Standard Industrial Classification (SIC) Manuals, all issued by Statistics Canada or its predecessor the Dominion Bureau of Statistics. The first one was issued in December 1960, called "Standard Industrial Classification Manual", the second one was called "Standard Industrial Classification Manual, Revised 1970", and the third one was called "Standard Industrial Classification 1980". All three followed the same principles of classification, except that the latter ones had more details as new industries emerged and were comparable. There was not much difficulty in reporting the Canadian industrial structure over time. In both the IO tables and the monthly GDP by industry measures of the CSNA, time series of industrial statistics are produced for some 150 industries (link level), consistently defined for the entire period, 1961 to 1997. At the worksheet level, there is even more detail available: statistics are produced for some 200 industries for the period 1961-1980, and for some 240 industries for the period 1981-1997.

NAICS is the joint product of three countries, Canada, Mexico and the United States. It is implemented starting with the reference year 1997 in Canada and the United States, and 1998 in Mexico. NAICS differs substantially from the SICs because it is based on a **single** organising principle, which is in contrast to the SICs which have no such single principle. NAICS is erected on a production-oriented or supply based conceptual framework, in which producing units that use identical or similar production processes are grouped together. Some SIC based industries were grouped on production-oriented principles while other industries were based on demand based principles. This difference in orientation created discontinuity in time-series comparability between SIC-based estimates and NAICS-based estimates. Even at major sector levels, such as retail trade and wholesale trade, the differences in values between the two classifications are substantial. This created a dilemma both for compilers and users of detailed industry statistics.

It is very expensive, even if it were possible, to re-code the establishments on a NAICS basis, in the back period for all or even most sectors of the economy. Then, how far back can or should one go for this exercise? For example, in manufacturing, establishments have been re-coded to NAICS for 1992 onwards, but not much has been done in other sectors. Even in manufacturing, what should one do for the period before 1992? Given time and resource constraints, one must develop other options to serve users who require long time series of data.

With the NAICS implementation, starting with the reference year 1997, the link level detail for the entire period from 1961 onwards could only be produced at the 119 industry detail level. The 119 industry link level follows the hierarchical structure of NAICS. SIC based worksheet level industries have been allocated to the new link level without regard to their own hierarchical structures. Very detailed reconciliations between the two series have been prepared and notes drafted. This information is available to enable users to reconcile the estimates for each of the119 industries based on the two classifications for the year 1997.

We have aggregated approximately 700 NAICS based industries (5 and 6 digit codes) into 300 worksheet level detail for CSNA for the years 1997 and onwards. It is this detail which is also concorded into the international ISIC3 for our presentation of national accounts, industry and productivity data to both OECD and other international bodies.

There is no easy solution to resolve this problem of statistical breaks, yet the demand from users for continuous time series remains unabated. A joint working group of compilers and major users has been established to devise some methodological technique (based on judgement and statistics) which would satisfy both users and compilers. Our methodology has involved, fundamentally, an examination of the commodity composition of production of each link level industry. We have restricted our examination to the commodity composition because there is a continuous time series for commodities for the entire period. Further, we have selected only those industries for adjustments which have some significant statistical difference (mostly more than 2%) of their commodity composition between the SIC and NAICS basis. We have removed a commodity,

part or whole, from one industry to be consistent with NAICS commodity production and the same value is added to another industry again making it as close as possible to the NAICS definition.

This **cut and paste method**, both for output and their inputs (always equal in value) has kept the balances intact and also kept our calculations in control. The cut and paste method worked as follows: for each paired industry, we determined which additional commodity was produced and how much was added for the NAICS basis from the SIC basis. We also determined from the USE matrix the input structure (both intermediate consumption and value added components in full detail) of this commodity production. It is this detail which was cut and pasted.

In terms of operations, what this really involved is to determine which of the worksheet level industries would require further splits such that each split could be allocated to one of the 119 link level NAICS industries, the one which has similar or close to similar (difference no more than 2%) commodity production. Our examination led us to the conclusion that 204 of the 243 worksheet level industries could be allocated to one of the 119 link level industries for the entire period 1981 to date and the other 39 industries (38 in the business sector and one in the government sector) should be split such that each split is allocable to one of the 119 link level industries. The three digit code listed with each of the 39 industries below is the SIC-based IO industry code:

002. Field crop farms
003. Service industries incidental to agriculture
004. Fishing, and trapping industries
006. Forestry services industry
008. Other metal mines
013. Other non-metal mines (except coal)
016. Quarry and sand pit industries
172. Air transport and related service industries
173. Railway transport and related service industries
174. Water transport and related service industries
175. Truck transport industries
178. Taxicab and other transport industries
179. School and other bus operations industries
184. Other storage and warehousing industries
185. Radio and television broadcasting industries
188. Postal and courier service industries
191. Water systems and other utility industries n.e.c.
192. Wholesale trade industries
193. Retail trade industries
196. Credit unions and caisses populaires
197. Other financial intermediary industries
198. Real estate operator industries
199. Insurance and real estate agent industries
202. Computer and related services
204. Architectural , eng., & other scientific & tech services
205. Advertising services
206. Misc. business service industries
207. Educational service industries
208. Other health and social service industries
209. Health practitioners and medical laboratories ind.
210. Accommodation service industries
212. Motion picture, audio and video prod. and distribution
214. Other amusement and recreational service ind.
216. Laundries and cleaners
217. Other personal service industries
219. Mach. & equipment., auto & truck rent., & leasing services
222. Other services n.e.c.
223. Other repair services and services to buildings & dwellings
239. Non-business- Government, Other educational services

These changes were fully documented with notes and comments and are available to users. What we really provide is the following: SIC based Make and Use matrices at 119 link level industries; a new make matrix of the 39 selected industries, values with negative signs and all their splits (which are consistent with the NAICS classification) as positive values such that this matrix adds to zero in total and in detail; a similar use matrix for the same 39 selected industries, and again this matrix adds to zero in total and in detail. Summing these two make matrices gives a new NAICS based make matrix; similarly summing the two use matrices gives a new NAICS based use matrix.

19.2 USA practice

The statistical system in the USA provides different industry time-series prepared by several different agencies. Mostly, these industry statistics are classified on an establishment basis, but some are classified on a company or an enterprise basis. Within BEA, different industry time series are prepared from source data classified on both an establishment and a company basis.

BEA's GDP by Industry program provides annual current-dollar estimates starting with 1947, and annual real estimates starting with 1977. Real estimates are not provided before 1977 due to a lack of source data needed for the double-deflation method. Estimates from 1947-87 are classified according to the 1972 Standard Industrial Classification (SIC) system (1977 revision) and estimates from 1987 forward are classified according to the 1987 SIC system. The estimates before 1987 were not converted to the 1987 SIC due to a lack of adequate source data. Instead, estimates for 1987 are shown on the basis of both the 1972 and the 1987 SIC.

The two classification systems are very similar in structure and content, despite the lack of a single organizing principle. The 1987 SIC revision resulted in no net change in the number of detailed four-digit industries; however, a minor restructuring resulted in 34 new industries that were balanced by 34 deleted industries. The most significant change in the 1987 SIC system was the introduction of a new major group for Engineering, Accounting, Research, Management, and Related Services (major group 87). This change was balanced by a significant reduction in the size of Business Services (major group 73) and Miscellaneous Services (major group 89). Other significant changes included the transfer of certain types of equipment from Electrical and Electronic Machinery (major group 36) to Instruments and Related Products (major group 38) and to Industrial Machinery and Equipment (major group 35), and the movement of savings and loan associations and credit unions from Credit Agencies Other Than Banks (major group 61) to Depository Institutions (major group 60).

At their most detailed level, the GDP by Industry estimates are published for 66 industries at approximately the two digit-SIC level, with additional detail in some industry divisions and less detail in others. More aggregated results than two-digit detail are provided for farms, agricultural services, forestry and fishing, construction, wholesale trade, retail trade, and other services. More detailed industry estimates are provided for transportation equipment, communications, and real estate. BEA's decision to not implement the 1987 SIC revision before 1987 caused some difficulty for users of the industry data who were primarily concerned with long-term economic trends for detailed industries. BEA helped to bridge this gap not only by providing estimates according to both SIC systems for 1987, but also by providing estimates for combinations of industries with consistent definitions over time. For example, both current-dollar GDP by Industry and chain-type quantity indexes were provided for the combination of depository and no depository institutions back to 1947 for current-dollars and back to 1977 for quantity indexes. BEA has not provided estimates of chained 1996 dollars prior to 1987 due to the non-additivity of chained dollars.

Conversion of industry data to the new North American Industry Classification System (NAICS) is in the early stages in the U.S. statistical system. Data from the 1997 economic census were classified according to NAICS 97, and BEA's 1997 benchmark Input-Output accounts were released in December 2002 on a NAICS 97 basis. Several industry-based estimates in the NIPA, including sales and inventories for manufacturing and trade industries, are now provided on a NAICS basis. Most of the monthly and annual surveys conducted by the Bureau of the Census are now on a NAICS basis. BEA is scheduled to complete the conversion of its industry-based estimates to NAICS as part of the upcoming comprehensive revision in 2003. By that time, most if not all of the source data used for the NIPA and for GDP by Industry will be classified according to NAICS, with the producer price index prepared by the Bureau of Labor Statistics (BLS) the one major exception. See more details in regard to the implementation of NAICS in the USA in an article by John Kort, The North American Industry Classification System in BEA's Economic Accounts, Survey of Current Business, May 2001.

The current methodology for GDP by Industry imposes some fairly serious limitations on the ability to carry NAICS conversion back more than several years. Current-dollar estimates are based primarily on BLS administrative data for wages and salaries and on Internal Revenue Service (IRS) tax return data for corporate profits and other components of property-type income. Industry distributions for these income components are obtained from the NIPA and, with some adjustments, are used directly for GDP by Industry. Estimates of real GDP by Industry using the double-deflation method rely primarily on estimates of nominal gross output and price indexes for gross output and intermediate inputs.

Lack of consistent historical source data limits the feasibility of providing time-series data for GDP by Industry, based on the current estimating methodology, for the years prior to 2000. Estimates for the year 2000 will be provided on both a NAICS and SIC basis; however, because of the major differences between the two classification systems, maintaining consistency is difficult even at very high levels of aggregation. The NIPA components of gross domestic income will be available only from 2000 forward. Gross output by industry and the commodity composition of intermediate inputs will be available on a NAICS basis, starting in 1997, from the input-output accounts. It would be extremely difficult and costly to replicate existing procedures on a NAICS classification basis, primarily due to the lack of NAICS-based source data prior to 1997. BEA is exploring its options for the conversion to NAICS for earlier years, however, the costs associated with any such conversion that is not highly mechanized is estimated as very significant, given BEA's current program commitments.

19.3 Concluding remarks

In the CSNA, a project was established to produce a continuous time series at the 119 link level industry detail level, **approximately** consistent with NAICS, back to 1961, by the end of March 2003. The BEA is considering making conversion to NAICS for earlier years but has not yet reached decisions on the level of detail or time that would be covered. Our cut and paste methodology primarily relates to the changes in commodity output in industries following different vintages of classifications. We would like to share our approach with our colleagues in the USA and in other OECD countries and hope that they find it cost-effective. In our judgement, our users require long time series of industry statistics, defined, as closely as feasible, on a consistent basis. If statistical organisations do not provide these series, most major users will develop their own independent and most likely different estimates. This will be very confusing.
It is important to remain fully transparent, and document every paired change (note that a change from one industry may go to more than one industry) with notes and comments and make such information available to all users for all those industries selected for splitting to yield a consistent series. This will permit users to have a full understanding for all the changes and they may select, if they so desire, to skip some paired information from their analysis and still have all the industries and commodities remain balanced.

20 Statistical discrepancy

Macro series in the national accounts are built from a myriad of sources. Expenditure based GDP is built from expenditure surveys of households, sales of retail establishments, records of governments on their detailed expenditures, investment surveys of enterprises, exports, imports, etc. Income based GDP is built from surveys of labour compensation, profits, net income, capital consumption, etc. GDP is also calculated by summing the value added of all the producing units and this information is built from industry surveys on production, their intermediate expenditures and value added. These three approaches to estimate GDP must, in principle, produce the same results but in practice the results are not identical, hence a statistical discrepancy appears amongst these three estimates.

20.1 1993 SNA

The 1993 SNA is a conceptual document and in it all three approaches produce the same results, thus there is no provision for a statistical discrepancy, hence no guideline on how to handle it in the real statistical world. Its handling is left to the conventions, judgements, and imagination of the national accountants of each country. Some countries add all the three different levels of GDP from the three approaches, divide by three and that becomes the **official** GDP. Other countries only use two approaches, GDP expenditure based and GDP income based; they may add the two different levels of GDP and divide the total by two and that becomes the official GDP. Some other countries may accept one as more correct than the other, and then add the statistical discrepancy to the less correct side to make it equal to the one assumed to be more correct.

20.2 Canadian practice

In Canada, quarterly macro GDP is produced using both the expenditure approach and the income approach. The statistical discrepancy between the two series is divided by 2, one half is added to one side and the other half with reverse sign is added to the other side such that the two sides become equal. It is this equalled GDP which is the official level of GDP in Canada. At the annual frequency, IO tables are produced and they become benchmarks for the macro GDP estimates. All the elements in the macro series except the operating surplus on the income side and value of physical change in inventories (VPC) on the expenditure side are identical to those derived from the IO tables. In the macro series, the value of the statistical discrepancy plus VPC is made equal to the value of VPC in the IO tables; similarly, the value of the statistical discrepancy plus the operating surplus is made equal to the operating surplus in the IO tables. There is no provision for showing a statistical discrepancy in the IO tables.

As the accounts are struck, initially the statistical discrepancy may be large and it prompts us to re-examine our estimates, our methodology, our assumptions, our judgements etc. We go back to the records and make corrections where warranted. Once we have exhausted our probes, we are still left with a discrepancy, most likely smaller than the earlier one. At this point, we simply assume that the residual discrepancy is unbiased, one half is added on one side and the other half with reverse sign on the other side of our accounts, thus making the two sides identical in value.

20.3 USA practice

In the NIPA accounts of the United States, the statistical discrepancy between the expenditure based and the income based GDP is calculated and the entire amount is added to the income side as a separate item, thus making the two sides identical in value.

20.4 Concluding remarks

Canada and the USA follow different conventions to handle the statistical discrepancy between the two sides of the accounts which, in principle, must be identical. No matter what the national accountants do to handle the statistical discrepancy, it becomes problematic in times when the economy is growing or shrinking at very low rates, that is within the narrow range of zero. In such cases, the reported GDP growth rates might easily be due to how the discrepancy is handled rather than how the real economy is working. If there is no bias, the different handling of the statistical discrepancy has not much effect on the long term evolution of the economy but in the short term, its handling does affect the published growth rates and probably the economic policy issues emerging from such rates.

Section D: 1993 SNA production boundary, ready to expand

In this section, we will select, for elaboration, some of the important guidelines in the 1993 SNA which we find quite problematic for implementation. In some areas, we have already expanded the 1993 SNA boundary and in others, we would like the existing boundary to be expanded.

21. Valuation of financial intermediation services indirectly measured (FISIM)

Banks and other financial institutions provide a variety of services. Those specifically charged for include currency exchange, handling of cheques etc; and the corresponding revenues form part of the institutions' output. An additional, and very significant, part of their income comes from charging higher interest rates to borrowers and paying lower rates to depositors than they would need to if they charged explicitly for all their services. This "hidden" charge (known as imputed banking service in the 1968 UN SNA) is called financial intermediation services indirectly measured (**FISIM**) in the 1993 SNA.

21.1 1993 SNA

The 1993 SNA defines FISIM as follows: "The total value of FISIM is measured in the System as the total property income receivable by financial intermediaries minus their total interest payable, excluding the value of any property income receivable from the investment of their own funds, as such income does not arise from financial intermediation. Whenever, the production of output is recorded in the System the use of that must be explicitly accounted for elsewhere in the System. Hence, FISIM must be recorded as being disposed of in one or more of the following ways- as intermediate consumption by enterprises, as final consumption by households or as exports to non-residents" (paragraph 6.125).

It may be noted that the 1993 SNA does not include holding gains or losses in the valuation of output of any enterprise, financial or non-financial. In the valuation of output of certain financial institutions such as Insurance, it has specifically noted this restriction (see paragraph 6.138) while in other cases such as FISIM, it is not noted but always assumed. To further confirm this assumption, one may refer to the 1993 SNA definition of property income (paragraph 7.89) which provides no place for holding gains. This restriction is now challenged and we will come back to this later.

The debate on how to measure the value of FISIM and how to allocate it to all the users, is, at least, as old as the system of national accounts. In social and religious history, this debate goes back to the Middle Ages when charging interest was considered usurious; hence a sin. Even today, charging interest is not permitted in some countries. Staying with the limited national accounts history, an imputed banking output was recommended in the 1968 SNA but its allocation to users was not recommended. An artificial industry was created with zero output but it would use as an intermediate expenditure all the imputed banking services, thus generating an equivalent negative value added. This recommended arrangement did produce the value added for banks, quite similar in value to what they would report in their financial statements; however, there was no allocation to intermediate consumption of any industries using banking services, thus their value added remained exaggerated, counterbalanced by an identical negative value added in the above-noted artificial industry. Further, there was no allocation for use in final consumption or exports, thus use of banking services was unrecorded, and total expenditures on GDP remained under-estimated. In the discussions leading to the development of the 1993 SNA, the 1968 SNA recommendation was considered deficient by many national accountants, particularly those of both the USA and Canada. Thus it was recommended (see the 1993 SNA paragraph 6.125 as quoted above) that the output of FISIM be allocated to all the users.

At the time of the presentation of the draft of the 1993 SNA to the UN Statistical Commission in March 1993 for its approval, some representatives again raised the issue of the difficulties of allocating FISIM to users. Not to further delay its approval, the following flexibility was added in the 1993 SNA: "In principle, the total output should, therefore, be allocated among the various recipients or users of the services for which no explicit charges are made. In practice, however, it may be difficult to find a method of allocating the total output among different users in a way which is conceptually satisfactory from an economic viewpoint and for which the requisite data are also available. Some flexibility has therefore to be accepted in the way in which the output is allocated. Some countries may prefer to continue to use the convention proposed in the 1968 version of the SNA whereby the whole of the output is recorded as the intermediate consumption of a nominal industry" (paragraph 6.126). This flexibility has created problems for our submission of national accounts data to the OECD, as the European Union countries still use the 1968 SNA guideline, whereas the United States, Canada, Australia and New Zealand allocate FISIM to users.

21.2 Canadian practice

As noted above, the 1993 SNA recommends that the total value of FISIM be measured as total property income receivable by financial intermediaries minus their total interest payable, **excluding the value of property income receivable from investment of their own funds.** In the CSNA, we have not accepted this restriction of own funds in the calculation of FISIM both conceptually and methodologically (see issue #22, FISIM on own funds). In the case of financial institutions, the availability of own funds for loans is not very significant. In Canada, as in most other countries, own funds are used for fixed assets and other investments and only what is left is available for loans, etc. To put this in perspective, let us look at the following balance sheet information for banks for the year 1993 in Canada: Total assets were $548 billion, of which securities other than shares, and loans were $527 billion, and fixed assets and investments were $21 billion; total liabilities for intermediated funds were $507 billion and own funds were $41 billion, with total liabilities equalling $548 billion. Thus, own funds contributed only $20 billion ($41 billion less $21 billion) or 4% for total loans, the other 96% came from depositors. In our calculation of property income receivable from the investment of the available own funds ($20 billion in our example), we developed a methodology which, in our judgement, **clarifies** the definition of FISIM in the SNA such that the indirect measure of service output allocated to depositors is still made equal to zero (as there are no depositors) but the service output allocated to borrowers remains positive. Thus the Canadian definition of FISIM adds the bold bracketed insertion in the 1993 SNA definition and reads as follows: "The total value of FISIM is measured in the System as the total property income receivable by financial intermediaries minus their total interest payable, excluding the value **(calculated at the pure rate of interest)** of any property income, receivable from the investment of their own funds". The meaning of the pure rate of interest used in our definition is not much different from the 1993 SNA definition of reference rate: "The reference rate to be used represents the pure cost of borrowing funds "that is, a rate from which the risk premium has been eliminated to the greatest extent possible and which does not include any intermediate services" (paragraph 6.128). We

have operationally used the middle of the lending and borrowing rate for similar maturities, as a proxy for the pure rate of interest for our calculations.

In Canada, we allocate FISIM to all users, borrowers and depositors, and enterprises and final demand expenditures (persons, government and the rest of the world sector), all based on their respective assets and liabilities (distributed by detailed financial instruments). The total amount of loans should be similar in value to the total amount of deposits except when there are own funds available which are quite small. Given this, the distribution of total FISIM between borrowers and depositors should also be of similar value. In 1998, the value of FISIM output of deposit accepting financial intermediaries (banks and credit unions) was $23 billion and consumer loan companies (working primarily with own funds) was $3 billion, both totalling to $26 billion. About $13 billion of FISIM was allocated to enterprises and a similar amount to final expenditures, mostly to household consumption. In 1998, the distribution happened to be fifty-fifty, though it is a bit different for each set of financial enterprises; for example, for banks, FISIM allocated to enterprises was 54% and to final expenditures 46%. This distribution has been stable over the years. The money borrowed for house mortgages is allocated to real estate or own account housing enterprises, not to final demand expenditures, as this activity is deemed part of the business sector. In our submission to the OECD SNA data, we remove the FISIM allocation to final expenditures in order to remain consistent with the SNA series provided by other OECD member countries who have not yet allocated FISIM to users, including final consumption. Thus, our GDP total in the OECD publication on national accounts, say for 1998, is lower by $13 billion, or about 1.4%, than what we publish in Canada; similar deductions are made for all years. It is to the credit of the CSNA that it has always allocated this output to users, including final users, even when the 1968 SNA recommended otherwise

21.3 USA practice

In the United States, the calculation of the value of FISIM output is similar to its calculation in Canada. It is allocated to users, both industries and final demand expenditures (persons, governments and the rest of the world sector). However, the methodology of allocation in the USA is substantially different from the one in Canada. In the BEA accounts, all FISIM services are currently accrued to depositors only, whereas in Canada they accrue to both depositors and borrowers, almost fifty-fifty. The details are available from NIPA Table 8.21, Imputations in the National Income and Product Accounts. For example, in 2000, FISIM output was US$373.3 billion and was allocated as follows: Persons $265.4 billion; government $9.7 billion; business $77.1 billion and the rest of the world $21.2 billion. In that year, total GDP was $9810 billion. This allocation is different from the one in Canada: about 50% of FISIM is allocated to business compared to only 20% in the United States. This is almost entirely due to US allocation formula which assumes services to borrowers equal to zero. Most significant borrowing is typically done by the business sector (including home mortgages) and most significant depositing is done by households. The effect on FISIM allocation on total GDP is equal to its allocation only in the final demand which was $ 296.2 billion or equal to 3% , a ratio significantly higher than the one in Canada of 1.3%.

In the submission of national accounts data to the OECD, the USA makes no adjustment to its published GDP. Thus, compared with both those countries which do not allocate FISIM to users and those which allocate but make adjustments for the OECD accounts, the GDP of the USA was higher, for example by US$296 billion in 2000 or by about 3% and a similar ratio applies to all other years too.

21.4 Concluding remarks

Both Canada and the USA allocate FISIM to users and have been doing so long before the 1993 SNA. Total FISIM output, as a ratio of GDP, is very similar, about 3%, in both countries. Both Canada and the USA regret the last minute insertion of flexibility in the 1993 SNA (paragraph 6.126) regarding the allocation of FISIM that countries may not allocate FISIM to users, industries and final demand users. As of now, all EU countries follow the 1968 SNA flexibility recommendation in this regard and do not allocate FISIM to users, both industries and final demand. The result of this flexibility is that the SNA/ESA questionnaire requires the member countries to remove any FISIM allocation to final expenditures, thus reducing the value of GDP, even if the country has such an allocation in its own official accounts. GDP provided to the OECD by Canada is lower than what it publishes, by the value of FISIM allocation to final demand. This unsatisfactory situation may be resolved in the next few years when, as it looks likely, EU member countries may start allocating FISIM to all users.

The BEA is re-examining the present allocation formula that assumes zero allocation to borrowers. It is studying the use of a reference rate to allocate some services to borrowers, and may decide to change the allocation in the upcoming

comprehensive revision in 2003. When this is done, it will remove one more difference between the methodology of allocation and the substantial value difference by sectors between the two countries.
As noted above, four countries -Australia, Canada, New Zealand and the United States- allocate FISIM to all users (industries and final demand). In their submissions to the OECD, Australia and the USA do not make any adjustment on this regard in their published GDP, whereas Canada and New Zealand do. This needs to be looked at by the OECD, in the context of USA-Canada comparison.

In the measurement of output of FISIM, the 1993 SNA recommends removing any capital gains or losses from the property income received by the banks. However, financial institutions receive income from investing their financial property in bonds, loans, shares, securities and equity and it is the collective income from all these sources which they need to pay interest to depositors and the operating costs to run their institutions. It is the **collective income** which determines the rate of interest which they pay to their depositors. As national accountants, we cannot accept the deposit rate without simultaneously accepting all the elements of the income of financial institutions which they use to set such rates. Some, and increasingly more and more, financial intermediaries earn a substantial part of their income through capital gains associated with buying and selling securities and other financial assets. Following the 1993 guideline, their output is seriously understated Thus, the 1993 recommendation to exclude capital gains made by the financial institutions needs to be reconsidered, as it is producing results which are counter-intuitive for some and increasingly more and more financial intermediaries.

A further anomaly may arise when financial intermediaries manage asset portfolios on behalf of customers or on own account. When banks undertake management of asset portfolios for customers, they receive commission income, hence production occurs. However, when done on own account, no production is recorded under the 1993 SNA standards as the income is from capital gains and there is no intermediation involved. The same activity produces two different numbers, depending upon whose behalf the activity is undertaken and this is problematic.

Both these problems and some others are being examined by an OECD Task Force on the measurement of the banking output. Both the USA and Australia have strongly argued to re-examine the restriction on capital gains in the valuation of FISIM. See their papers, **Beyond 1993: The System of National Accounts and the New Economy** by Rob Edward and others from the Australian Bureau of Statistics and the **System of National Accounts for the New Economy: What Should Change** by Brent Moulton from the BEA, submitted at the International Association for Official Statistics, London August 2002. The positions taken by both Australia and the USA are very well articulated and we fully support them. Many of us now urge that the 1993 SNA restriction on capital gains for calculating the value of output of financial institutions be re-examined.

22. FISIM on Own Funds

In the developing countries the banking system is usually not as well-established as in the developed countries, hence the borrowers seek loans from money lenders or some household finance companies which have only their own funds to lend. Even in developed countries, there are financial enterprises, typically in the consumer finance area, which have their own funds (they are not allowed to accept deposits by law) and they lend such funds to households for mortgages and to meet other personal financial needs. They are not financial intermediaries, as they do not intermediate between the depositors and the borrowers, there being no depositors. They exist in the market, have intermediate expenditures, may hire employees, make profits and meet all expenses by lending money. How should their output be valued?

22.1 1993 SNA

The 1993 SNA recommends that property income receivable from investment of own funds be excluded from the calculation of FISIM, as such income does not arise from financial intermediation (see paragraph 6.125). The 1993 SNA has no provision for their output but expenses cannot be ignored in any balanced system: hence there is a dilemma. The significance of this industry is different in countries, high in developing countries and far less in developed countries with well functioning banking sectors.

22.2 Canadian practice

We have noted above in our discussion of FISIM the modification that we have inserted in the 1993 SNA definition of FISIM. Staying with the same definition, the output of consumer finance companies, which have only their own funds, is

calculated as follows: total property income receivable from borrowers less the imputed cost of property income of own funds (equal to own funds multiplied by the pure rate of interest). The entire output is allocated to borrowers, there being no depositors. The value of this output in 1998 was about $3 billion. We have classified this output as FISIM purely for convenience, and it represented about 11% of total FISIM of $26 billion as noted above for 1998.

In a formal sense, we have deliberately gone beyond the 1993 SNA recommendation and expanded the 1993 SNA definition in a fashion that avoids the dilemma noted above, which recognises only expenses but no output. When a borrower pays interest to a bank, it has two parts: the pure interest and the service fee. Similarly when the same borrower borrows from a finance loan company and pays interest, this, too, has two parts: the pure interest and the service fee. Borrowers pay fees, hidden in higher interest rate, no matter where they go. We believe that borrowers of these funds receive a service from institutions using their own funds. We call this service FISIM but we could easily have called it **FSIM**, financial services indirectly measured, rather than financial **intermediation** services indirectly measured. We have added FSIM and FISIM together.

22.3 USA practice

As noted above in our discussion on FISIM, the BEA allocates the entire FISIM output to depositors. As there are no depositors in the case of finance companies using only their own funds, there is simply no FISIM in the NIPA on this account. The BEA is considering allocating FISIM also to borrowers in the next comprehensive revision of the national accounts. Once that is done, BEA will also have an output of FISIM for all those companies using own funds to lend to others.

22.4 Concluding remarks

Canada estimates FISIM for all finance companies who lend money to others but use only their own funds and their entire output is allocated to borrowers. The borrowers pay the implicit service fee (hidden in the interest rate) whether the funds they receive come from depositors or from the owners themselves. When the BEA starts allocating FISIM to borrowers, it may pursue a methodology similar to the one in place in the CSNA for developing FISIM on own funds.

The recommendation in the 1993 SNA, which does not recognise the output of finance companies but must recognise their expenditures has created a dilemma. To escape this dilemma, the 1993 SNA may choose the modification inserted by Canada, which is repeated below: "The total value of FISIM is measured in the System as the total property income receivable by financial intermediaries minus their total interest payable, excluding the value **(calculated at the pure rate of interest)** of any property income, receivable from the investment of their own funds". Further, the 1993 SNA may call the new calculation **FSIM**, not FISIM. We are looking forward to the deliberations of the OECD Task Force on Banking Output, which must examine both the issue of holding gains and the recording of income from own funds.

23. Output of Central Banks

Financial intermediation is only one, and not necessarily the most significant one, of the many functions that central monetary authorities perform in most countries. Their other functions include formulating and implementing monetary policy, issuing and replacing bank notes, managing the public debt, etc. Delineating the cost structure of any of the activities, not necessarily the most significant one, is always problematic. What is the most appropriate way to value the output of central banks?

23.1 1993 SNA

The 1993 SNA states: "The services of financial intermediation provided by central banks should be measured in the same way as all other financial intermediaries" (paragraph 6.132).

Canada requested the Inter-Secretariat Working Group on National Accounts (ISWGNA) in 1995 to re-examine the 1993 SNA recommendation on this subject, as we were finding it difficult to implement. Our difficulties arose from the fact that a very significant portion of liabilities of a central bank are bank notes in circulation (more than 90% of the liabilities in the case of the Bank of Canada) and its property income derives from the assets in the form of the treasury bills and bonds provided by the central government to have access to these bank notes. Central banks are not like commercial banks as they perform, in addition to central banking services, many more functions, such as monetary policy, debt management,

etc,. ISWGNA deliberated and issued a clarification on the valuation of central bank output. In its January 1996 issue of SNA News and Notes, the following is noted: "ISWGNA also discussed the 1993 SNA method of measuring output of central banks which has caused a number of concerns owing to the large positive or negative numbers for gross output and possibly even a volatility in output....ISWGNA agreed that the SNA treatment should continue to be recommended as the first approach, but, where this approach leads consistently to inappropriate results, output could, as a second best approach, be measured at cost as for other non-market producers. However, under no circumstances can it be construed that the central bank is part of the central government, regardless of how its output is measured".

23.2 Canadian practice

The central bank in Canada, the Bank of Canada, serves four broad functions: formulate and implement monetary policy; issue and replace bank notes; provide central banking services; and manage public debt. Only activities related to the central banking services can generate FISIM. The bank does hold deposits and make advances as part of its banking activities but its other liabilities and assets are far more significant. For example, as at 31 December 1998, the assets of the Bank of Canada amounted to $35.3 billion and its liabilities of $35.3 billion had the following detail: Bank notes in circulation $32.6 billion and other liabilities of $2.7 billion consisted of $900 million deposits from banks and $1,800 million other liabilities, mostly securities sold under repurchase agreements. The Bank of Canada received revenue from investments amounting to $1,799 million, incurred operating expenses of $194 million, and remitted $1,679 million to the Receiver General for Canada. The Bank also reported its operating expenses by function: monetary policy $41 million; currency $57 million; central banking services $31 million and retail debt service $65 million. The CSNA decided to implement the modified recommendation (as issued in the SNA News and Notes in January 1996) for valuing its output, rather than the original formulation in paragraph 6.132 of the 1993 SNA. Its value in 1998 equalled all its operating costs of $194 million and was allocated entirely to the Federal Government.

How can we assure ourselves and our users that our calculation of the value of output of the Bank of Canada of $194 million in 1998 would not be much different had we used the complicated route of the 1993 SNA definition of FISIM but with our modification? We can convincingly argue that the liability of $32.6 billion for banks notes in circulation is more like own funds (created from printing bank notes); further, its liability owing to banks did not incur much interest liability. We noted above that the assets of $35.3 billion produced revenue of $1,799 million or a rate of interest of 5.1%. Given that the assets of the Bank of Canada overwhelmingly consist of risk-free Government of Canada treasury bills and bonds, it is fair to assume that the service fee portion of the interest charged on government bills and bonds would be no more than the operating cost incurred by the Bank. This assumption provides a straight-forward calculation of the pure rate of interest of 4.55% (total interest of $1,799 million less $194 million of operating expenses or a total of pure interest of $1,605 million divided by the total assets of $35.3 billion, giving a pure rate of interest of 4.55%). Interest cost on other liabilities of $1,800 million would approximate $92 million, using the same average rate of 5.1% for government borrowing. FISIM would be equal to investment income received of $1,799 million less the pure interest calculated for own funds of $1,483 million less investment income paid on securities of $92 million or a total of $224 million. This is higher by $30 million from our cost calculated output of $194 million, the additional income may cover some interest cost on the $900 million liability to banks. The interest rate on this liability would be much lower as there are legal requirements for the commercial banks to deposit some minimum required money with the Central Bank. We have gone through this exercise just to assure ourselves that the simpler method of calculating the value of output of the Bank of Canada produces results quite close to the complicated FISIM approach. We have no hesitation to assert that our calculation based on cost is robust and also easy to explain. Further, our allocation of this output to the Federal Government is intuitively appealing as it reflects closely the many activities, more significant activities than financial intermediation, regularly performed by our central bank.

23.3 USA practice

The BEA calculates the value of output of the central monetary authorities (Federal Reserve Board) as recommended in the 1993 SNA, thus FISIM is recognised. FISIM counts for most of their value, though a small amount, less than 20%, is due to some direct charges. Value of total output is less than $3 billion, (a ratio, similar to Canada, of less than 1% of total output of financial institutions). FISIM is allocated only to depositors.

23.4 Concluding remarks

The method of calculating the value of output of monetary authorities is different in the two countries but the resulting value is similar. Further, its allocation in the two countries is quite different. In the United States, it is allocated almost

entirely to enterprises, hence leaving overall GDP unchanged, whereas in Canada, it is entirely allocated to the federal government , hence adding to GDP. The amount is quite small, hence it has no significant influence on our results, but it is useful to clarify the underlying concept.

24. Valuation of Insurance services

The activity of insurance is intended to provide individual institutional units exposed to certain risks with financial protection against the consequences of the occurrence of specified events. It is also a form of financial intermediation in which funds are collected from policyholders and invested in financial or other assets which are held as technical reserves to meet future claims arising from the occurrence of the events specified in the insurance policies. It is generally recognized that the service output includes the transfer of risk, financial intermediation and administrative services such as the handling of claims. It is also recognised that insurers maximise profits by setting premiums based on their expectations or probability regarding future claims and investment returns.

24.1 1993 SNA

The 1993 SNA defines the output of the insurance activity, both life and non-life, in its Annex IV, The treatment of insurance, social insurance and pensions, (page 573, paragraph 18) as follows:

a) Total premiums or contributions earned;
b) Plus total premium or contribution supplements ;
c) Less claims or benefits due;
d) Less increase (plus decrease) in actuarial reserves and reserves for with-profit insurance.

The ESA 1995 clarifies and restates the definition of the output of insurance activity, both life and non-life, in its Annex III, Insurance (page 271, paragraph 27) as follows:

a) Total premiums earned;
b) Plus premium supplements;
c) Less claims due;
d) Less increase (plus decrease) in technical provisions against outstanding risks and technical provisions for with-profit insurance.

The definitions in the two documents are identical except that the ESA 1995 clarifies the meaning of actual reserves as provisions against outstanding risks.

Items a), b) and c) typically define the value of non-life insurance whereas all the four items, a) to d) define the value of life insurance, except when the non-life claim is paid as annuity. The 1993 SNA states: "Most of these reserves relate to life insurance but they may be needed in the case of non-life insurance when claims are paid out as annuities instead of lump sums" (see paragraph 6.138 d).

The 1993 SNA definition of the insurance output is different from the earlier 1968 SNA definition and includes an important item called investment income from technical reserves (also called premium or contribution supplement). As the premium supplement is a new item and quite significant in value, let us note how it is handled in the 1993 SNA. The 1993 SNA states: "Although the reserves are held and managed by the insurance enterprises, they are treated in the System as assets of the policyholders. The income earned on the investment of the reserves is, therefore, attributed to the policyholders for whose benefits the reserves are held. The income is recorded as receivable by the policyholders who pay it all back again to the insurance enterprises as premium supplements. These premium supplements must therefore always be equal in value to the corresponding income from the investment of the technical reserves" (paragraph 6.138 b). The revenues which the insurance enterprises have at their disposal to pay the claims include both the actual premiums earned and the premium supplements.

As in other financial intermediaries, the 1993 SNA does not include income from own funds. It states: "The income concerned comes from the investment of the technical reserves of the insurance corporations, ...and does not include any income from the investment of the insurance corporations' own funds" (Annex IV , paragraph 16). The 1993 SNA also

notes that "All changes in insurance technical reserves ... are measured excluding any nominal holding gains or losses" (paragraph 6,138). This limitation has raised both practical and conceptual difficulties, to which we will refer later.
The 1993 SNA definition works quite well in normal circumstances when claims due occur pretty close to probability expectations used by insurance corporations in setting the premium rates. However, when exceptionally big events such as hurricanes, earthquakes, floods etc., occur, claims due become very large, resulting in a reduction, sometimes a big reduction of measured output. The resulting reduced measure of output is counter-intuitive when in fact, the actual activity in the insurance corporations goes up. This is the issue which needs to be resolved.

The 1993 SNA provides some guidelines for recording the destruction of property resulting from acts of war or exceptional events such as natural disasters when it deals with the issue of consumption of fixed capital. It notes: "Consumption of fixed capital is a cost of production. It may be defined in general terms as the decline, during the course of the accounting period, in the current value of the stock of the fixed assets owned and used by a producer as a result of physical deterioration, normal obsolescence or normal accidental damage. It excludes the value of fixed assets destroyed by acts of war or exceptional events such as major natural disasters which occur very infrequently. Such losses are recorded in the System in the account for other changes in the volume of assets" (paragraph 6.179). The1993 SNA defines exceptional events also in paragraph 12.7.

The 1993 SNA guidelines on recording the losses due to exceptional events in the "other changes in the volume of assets account" are quite clear for the valuation of consumption of fixed capital. The same principles may apply to the destruction of property due to exceptional events. However, the issue of how to record the payment of exceptional claims still needs to be decided. This issue was discussed at the September 1999 OECD National Accounts Experts Meeting. It was suggested by several participants that this problem could be resolved if claims due are separated into two parts, regular claims due and exceptional claims due. Regular claims due should be recorded, as suggested in the 1993 SNA, in the production account but the exceptional claims due should be recorded in the capital account as capital transfers from the insurance corporations to the insured sectors. This solution would eliminate the volatility in the value of output of insurance corporations and would be more easy to explain. The recording of exceptional claims in the capital account seems quite sensible as they are more of capital nature. This solution, however, has not yet been implemented in any country.

There are two outstanding problems in the valuation of insurance activities which continue to bother national accountants at the international level; these are a) how to treat capital gains or losses on in the investment income and b) how and where to record exceptional losses. Both these issues are now being examined by an OECD Task Force on Non-Life Insurance.

24.2 Canadian practice

In the pre-1997 CSNA Historical Revision, the output of non-life (property and casualty) insurance was deemed equal to premiums less claims. The output of life insurance companies was deemed equal to the operating expenses plus the dividends paid by the stock insurance companies. For both life and non-life insurance, total claims paid sometimes exceeded the premiums receivable, thus generating a counter-intuitive result of negative output. The most important change in the 1993 SNA was the inclusion of the investment income from the technical reserves in the calculation of output. As noted above, this was a change from the 1968 SNA where such investment was not included. It was a welcome recommendation to add the income earned by insurance companies from prepaid insurance premiums and reserves against future claims to the premiums earned. Thus, at the time of the CSNA historical revision in 1997, the value of the output of insurance activities was calculated in a manner "quite similar" to what is suggested by the 1993 SNA and this calculation was carried in the CSNA time series back to 1961. The calculation for profits etc for the macro accounts did not include any capital gains or losses, as recommended by the 1993 SNA. However, in the calculation of output in the IO industry accounts, the entire investment income (including capital gains or losses) was and remains included, thus not fully conforming to the 1993 SNA guidelines. As the IO output and its distribution to all the users, including final demand, provides benchmarks for all the CSNA accounts, the value recorded for the household expenditures in the macro accounts also, thus, includes the effect of capital gains on output of the insurance industry.

Capital gains or losses: In the calculation of the investment income from technical reserves, the IO accounts in the CSNA did not exclude the capital gains or losses from other investment income and this was, mostly likely, unintentional. Our practice is not consistent with the 1993 SNA which recommends to exclude capital gains and losses from the investment income. However, we now believe, and we are not alone, that our practice not to exclude capital gains or losses is a correct one. An insurance enterprise, in a competitive world, must endeavour to make the maximum investment income from the reserves to set the rate of premium as low as possible. Whether such income is derived from investing in deposits, bonds,

securities, or equity is immaterial, once risks are taken into account. Thus, from a national accounts point of view, it is not logical to include some income and exclude some other income when an insurance enterprise takes both into account to set the premium rates. It is inconsistent to work with the reported premium rates without simultaneously taking into account all the investment parameters which the insurance enterprise uses to set such rates. As in other financial intermediaries, we do not separate the investment income of own funds from investment income of funds belonging to others. As investment funds are fungible as well as difficult to precisely identify on the balance sheet of an insurance enterprise, we have ignored this recommendation of the 1993 SNA and most likely it is not materially important.

Exceptional losses: The CSNA has not made, so far, any special adjustment to the recording of claims due to exceptional losses. In Eastern Canada, there was an exceptionally big ice storm in 1998 which destroyed many properties and hydro lines. The claims which the insurance corporations paid were quite large, thus resulting in a decline of output during that period whereas, in reality, the insurance activity had increased due to the massive handling of claims. We did not make any adjustment to our annual production account because the effect was not exceptionally large; however, we did adjust the output for that month as well as for that quarter, thus avoiding having negative output of insurance industry in our monthly and quarterly GDP by industry program when this event occurred. The value of output of insurance enterprises during that short period was projected on the basis of average premiums earned. We were not entirely consistent conceptually for an annual account and its sub-period accounts, but our results were intuitively right and this was important.

24.3 USA practice

This write-up on the USA practice is based on Dennis Fixler's paper, Rethinking the NIPA Treatment of Insurance Services for the Comprehensive Revision, presented at the BEA Advisory Committee Meeting, November 15, 2002.

The current measure of insurance output in the USA is based on the 1968 SNA convention which does not include the investment income from technical reserves, thus it is equal to premiums less claims. This value is lower than the one resulting from the 1993 SNA which includes such investment income. It is noted that the BEA would implement the 1993 SNA recommendation on investment income from technical reserves in its valuation of insurance in the upcoming comprehensive revision in 2003.

BEA has argued, both at the OECD Meeting of National Accounts, October 2001 and at the BEA Advisory Committee Meeting , November 2002 that capital gains should be included in the investment income. As well, Fixler argues to include the income from own funds in the calculation of investment from the technical reserves.

Recording of exceptional losses in the insurance output is found to be problematic by Fixler and others. As demonstrated by the insurance flows generated by the terrorist attacks on the World Trade Centre, large claims associated with catastrophes lead to unusual national accounts estimates. Using regular conventions, insurance output would decline which is counter-intuitive, as the actual insurance activity increases to handle vast claims

The BEA proposes to use an estimate of **expected** claims, rather than claims due as recommended in the 1993 SNA, for calculating the value of output of insurance enterprises. It is noted that the Australian Bureau of Statistics has already adopted the use of a measure of expected claims. Their measure is a 5-year centred moving average for routine or normal claims and a 19-year centred moving average for catastrophic claims. The use of expected claims in the production account will undoubtedly require adjustments for the difference between actual claims and expected claims in many other accounts, leading up to the closing of balance sheet. The balance sheet must include the full weight of actual claims paid.

24.4 Concluding remarks

There seems to be a consensus developing that the investment income from technical reserves should include all property income, including capital gains and losses and that the investment income from own funds should form part of its total, for it to be used in the calculation of insurance output. In the CSNA, we already follow this practice and the BEA would follow it in its 2003 Comprehensive Revision. Thus, we will have an identical methodology by 2003 except for the issue of expected versus actual claims. As noted, there has been only one exceptional event, the ice storm in 1998 in Canada which resulted in a small decline in our estimate of insurance output for the annual total. For the monthly GDP estimate, the CSNA used regular premiums as a proxy for output for the month in which this storm occurred, thus the decline in output was properly avoided. Expected claims have never been used in the calculation of insurance in the CSNA and our hesitation remains. Perhaps we are lucky in Canada, as the catastrophic events are extremely rare in our history, thus mitigating the

need to worry about a concept which may hardly be applied. However, as a member of the international community of national accountants, our general position is to remain very transparent about our calculations and to assure to our users that our estimates are verifiable from the records of the transactors. Rather than calculating expected claims every year, using moving averages, we would like to suggest that only in the catastrophic year, the actual claims be replaced by some other estimated claims, perhaps based on the growth of actual premiums and the difference between the actual and estimated claims be handled through a capital transfer in the capital account. These one-time adjustments should be fully documented and provided to the users.

25. Valuation of output of government services

Government services are not provided in the context of a market but are supported by taxes and consumed collectively by the society at large. Consequently, there are no market prices to determine their value. A long-standing convention to determine their value, in the system of national accounts, has been to deem it equal to their costs. The boundary of which costs should be included and which costs should be excluded has not been clear-cut, both conceptually and in practice. Further, the accounting conventions used for presenting the government accounts for budgetary purposes have been changing overtime. In the government budgets of many countries, all expenditures, operating and capital, are expensed in the period they are incurred. However, there is a strong thrust now to separate current operating expenditures from the capital expenditures for presentation of government accounts to international organisations (see more on this issue in the International Monetary Fund's Government Finance Statistics Manual, 2001).

In the system of national accounts, it is now generally agreed that the valuation of output of government services must include, a) all operating costs and b) costs of consumption of fixed capital formation. This convention, and its near universal practice, is a vast improvement over the earlier heterogeneous practices in many countries. Recently, the national accountants of some countries, particularly of the United States, have questioned the rationale of limiting the inclusion of the capital costs to only the consumption of fixed capital, rather than the **full cost of capital services** (consumption of fixed capital as well as the financial costs of capital). We will come back to this issue later but let us first record what the 1993 SNA says on this topic.

25.1 1993 SNA

The 1993 SNA states: "There are no markets for collective services such as public administration and defence, but even in the case of non-market education, health or other services provided to individual households, suitable prices may not be available. It is not uncommon for similar kinds of services to be produced on a market basis and sold alongside the non-market services but there are usually important differences between the types and quality of services provided. In most cases, it is not possible to find enough market services that are sufficiently similar to the corresponding non-market services to enable their prices to be used to value the latter, especially when the non-market services are produced in very large quantities" (paragraph 6.90). It further states: "For these reasons, and also to ensure that the various non-market services produced by government units and NPISHs are valued consistently with each other, they are all valued in the System by the sum of the costs incurred in their production: that is, as the sum of: intermediate consumption, compensation of employees, consumption of fixed capital, other taxes, less subsidies, on production. The net operating surplus on the production of non-market goods or services produced by government units and NPISHs is assumed to be zero" (paragraph 6.91).

It is important to underline that the 1993 SNA recommends that the net operating surplus in the non-market sectors should be **zero** which means that it does not recommend including the financial cost of capital, as the inclusion of financial cost of capital would generate operating surplus, as it always does in the production of market output. It is this recommendation which has led to objections by the national accountants in some countries. It is worth noting that the inclusion of financial cost of capital (which in terms of value will be quite significant) will raise the value of output of government services and the value added of the government sector by an equivalent amount. Also the share of the government sector will increase in the overall economy.

25.2 Canadian practice

In the CSNA, the value of output of government services is consistent with the formula recommended by the 1993 SNA. It is equal to their cost of production: the sum of: intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production. Subsidies on production are not allocated to the government sector in the

CSNA. No allocation of financial (or the interest) cost of capital is provided, at present, in the cost structure of government output. Let us see what would happen if we add full capital services in our government account. In 2001, the value of government current expenditures on goods and services was $204 billion, of which consumption of fixed capital amounted to $21 billion. For the same year, the value of government non-residential structures was $323 billion, residential structures $8 billion and machinery and equipment were worth $30 billion, or a total of gross fixed capital formation of $361 billion. In addition to the produced fixed capital assets of $361 billion, governments also own significant natural resources. A 5 to 6% interest rate on $361 billion assets would generate a net return of some $20 billion, an amount very similar in magnitude to the value of CFC of $21 billion. Thus, if we add the full cost of capital services, the value of government current expenditures would increase by $20 billion, or in other words, government expenditures will rise by about 10%, a very significant amount.

25.3 USA practice and their objections

In the NIPA accounts produced by the BEA, the value of output of government services, **at present**, is consistent with the formula recommended by the 1993 SNA. However, they have raised serious objections to the recommendation of the 1993 SNA. Robert Parker and Jack Triplett stated the BEA position in 1995 as follows: "Use of depreciation as a measure of the value of services of government fixed assets is a partial measure of the total value. In theory, the service value of an asset should equal the reduction in the value of the asset due to its use during the current period (depreciation) plus a return equal to the current value the asset could earn if invested elsewhere (net return)". (See their article, Review of the Comprehensive Revision of the National Income and Product Accounts: Recognition of Government Investment and incorporation of a new methodology for calculating depreciation, Survey of Current Business , September 1995). A recent review of the government sector of the U.S. national accounts by the Committee on National Statistics of the National Research Council, in a section entitled Going Beyond the System of National Accounts, puts the case against the convention of the 1993 SNA: "The assumption of zero net return is implausible. If net return were really zero, it would imply substantial over-investment in public capital. In fact, however, serious shortages of many types of public infrastructure, ranging from schools to transportation systems, are widely perceived to exist" (see C.M.Slater and M.H.David-editors Measuring the Government Sector of the U.S. Accounts. Committee on National Statistics, National Research Council, 1998, Washington, DC.

It is quite obvious that the BEA would like to add the full value of capital services (depreciation and net return to capital) in the current price valuation of government services, thus raising the value of their output and their value added.

25.4 Concluding remarks

The national accountants in the USA are not alone in raising objections to the recommendations of the 1993 SNA in regard to the value of output of government services. Australia has raised similar objections and we fully support their positions. These objections and concerns are also shared by a recent OECD document, **Measuring Capital: A Manual on the Measurement of Capital Stocks, Consumption of Fixed Capital and Capital Services (Paris 2001).** It states: "The production account in the 1993 SNA is not, in fact, a proper production account" (page 118). It further states that inputs of capital services need to "... be recorded in the production account alongside compensation of employees. The services may be valued by the actual or estimated pure rentals payable; that is, by the sum of depreciation and the capital, or interest, costs. While it would not be easy to estimate the value of capital services, it is no more difficult than estimating depreciation, or consumption of fixed capital" (page 118).

The value of capital services is measured by very few countries and nowhere are they included in the value added series in published national accounts. Some countries have developed some volume measures but to the best of our knowledge, no country has yet produced any current price measures. The United States, Australia, the 2001 OECD Manual on Measuring Capital, all point to the lack of inclusion and its articulation of full capital services as a major weakness in the 1993 SNA production account. Lack of full capital services in the valuation of government services is particularly damaging, both theoretically and empirically, as the values are very significant. Our rough calculations for Canada suggest an increase of $20 billion for 2001 due to net return on capital, an amount as big as the CFC for the government account.

We believe that the 1993 SNA should be revised and expanded to reflect the full capital services, both CFC and net return, in the valuation of current price output of government services. The value of capital services will have to be produced. Thus it is necessary to examine the feasibility to produce both current price and consistent volume measures of capital services, all integrated in the national accounts, to better serve the users and to bring more transparency to these estimates.

This is one more area for joint research work between the CSNA and the BEA, particularly given its importance and its significance.
This note equally applies to the valuation of output of services produced by other non-market producers, such as NPISHs.

26. Valuation of defence services

Defence services, like many government services, are not provided in the context of a market, are supported by taxes and consumed collectively by society at large. Consequently, there are no market prices to determine their value. A long-standing convention to determine their value, in the system of national accounts, has been to deem it equal to their costs. However, there is a fair amount of divergence in practice amongst countries regarding the boundary of the costs to be included or excluded in any given calendar period, for the valuation of defence services. There is a universal agreement that all operating costs plus part of the capital costs consumed in any given period must be included; however, the boundary of what is capital in defence is not unambiguous.

26.1 1993 SNA

An issue has arisen in the most recent international system of national accounts, the 1993 SNA, regarding which capital investment should be considered as capital and which as operating. The 1993 SNA states: "In order to be treated as capital, a good must not only be durable but used repeatedly or be continuously in production over a number of accounting periods. However, if military weapons such as rockets, missiles and their warheads, are used in combat, they are used to destroy and not to produce. Thus, the actual use of destructive weapons can scarcely be treated as an input into an economic process of production" (paragraph 6.168). The 1993 SNA further argues: "The provision of defence, however, can certainly be construed as a form of production from which people benefit and for which they are prepared to pay, individually or collectively. Moreover, the provision of defence, like any other productive activity, does require the repeated or continuous usage of certain durable goods over a number of accounting periods. Thus, a distinction can be drawn between those durable goods that are actually used in much the same way as in any other type of production, and those which either are never used or, if they are used, do not constitute inputs into a productive process. This suggests a distinction between ordinary producers' durable goods of a kind used throughout the economy and destructive military weapons designed for combat" (paragraph 6.169). It thus recommends:"...expenditures by the military on weapons of destruction and the equipment needed to deliver them should be classified as intermediate consumption. Conversely, the construction of buildings for use by military personnel, including hospitals and schools, and also of roads, bridges, airfields, docks, etc. for use by military establishments should be treated as gross fixed capital formation" (paragraph 6.171). The 1993 SNA draws a clear boundary between typically military equipment, usable for military purposes only and the other capital equipment acquired by defence services but usable for civilian purposes. It should be noted that this distinction is not observed consistently across countries. As defence expenditures are usually quite large, this inconsistent treatment makes international comparison problematic.

26.2 Canadian practice

In Canada, we have implemented the recommendation of the 1993 SNA in regard to defence expenditures. For example, the Defence Department purchased equipment worth $2.5 billion in 1999, of which the expenditure on military equipment was of the order of about $1.9 billion. Following the 1993 SNA recommendation, this $1.9 billion was expensed in that year and only $0.6 billion was capitalised. Typically, purchases of military equipment represent more than 60% of total equipment purchased by the Defence Department. Had we capitalised all the military equipment, consumption of fixed capital, hence the level of our GDP would have increased by about $1.5 billion on an annual basis in the 1990’s. It should be noted, by those not immersed in SNA conventions that the classification of purchases of equipment from the operating to the capital category does not affect the level of final expenditures, hence GDP of a country. What affects the level of GDP is the inclusion of consumption of capital as an additional imputed current expenditure by the government sector.

26.3 USA practice

The BEA disagrees with the 1993 SNA recommendation in regard to defence expenditures and its position is well articulated in a recent paper, **The System of National Accounts for the New Economy: What Should Change** (prepared by Brent Moulton, June 2002 and presented at the International Association for Official Statistics, London August 2002). It notes: "The SNA recognises the provision of defence as a productive service, and the labour and non-weapons equipment and structures that are used by the military are considered as productive inputs. Technologically sophisticated aircraft, tanks,

and warships, however, are increasingly used as substitutes for personnel in defence activities. By not counting these critical inputs as providing capital services to the military forces, the SNA's treatment seriously impairs the accounts in describing the actual production process of defence services" (paragraph 35). It further argues: "The failure to recognise most defence equipment as capital also makes the accounts less useful in measuring saving and wealth. Military equipment are valuable assets that are sometimes sold and that should be reflected in national balance sheets" (paragraph 36). In BEA's view, military equipment is used continuously in the production of defence services and is thus a fixed asset of the federal government. The BEA believes that investing in the development and acquiring of missiles and rockets and other weapons such as atomic bombs provides continuous defence services to the community at large, hence it is capital.

This additional (compared with the 1993 SNA) capitalisation has added about US$60 billion of value added and final consumption of the government sector in the USA in the recent years. All other OECD countries follow the 1993 SNA guidelines. The OECD needs to present, to the extent possible, comparable inter-country valuation conventions in their reports. The OECD receives from the BEA national accounts data on the comparable 1993 SNA basis wherein the BEA removes the capitalisation of military equipment, causing GDP on an SNA basis published by the OECD to be lower than GDP on a NIPA basis by about US$60 billion (representing the consumption of fixed capital for military equipment, which in the NIPA's is included in general government value added).

26.4 Concluding remarks

The issue raised by the BEA that defence equipment provides continuous services has significant statistical implications and we fully support that its treatment in the 1993 SNA must be re-examined by the Inter-Secretariat Working Group on National Accounts with some urgency. Further, the 1993 SNA treatment requires an unattractive sequence of transactions whenever military equipment is traded. The sale of battleships, aircraft etc. between nations, in particular, is quite common and potentially significant. Under the 1993 SNA, their sale to a non-resident presumably requires the goods export entry be matched by a reduction in defence intermediate consumption. A payment in the form of reduced intermediate consumption lacks intuitive appeal as there cannot be negative intermediate consumption in reality.

Until the issues raised by the BEA and also Australia (and we are sympathetic to their well articulated concerns) are resolved at the international level, it is important that the OECD continue to publish internationally comparable series on defence expenditures such that the users can use these series with full awareness and confidence.

In addition to the debate whether equipment should be considered capital for defence services, the issue discussed above on including the **full cost of capital services** equally applies here.

27. Head Office activities

When an enterprise's production takes place in two or more different establishments, certain ancillary activities may be carried out centrally for the collective benefit of all the establishments. For example, the purchasing, sales, accounts, computing, maintenance or other departments of an enterprise may all be the responsibility of a head office which is located separately from the establishments in which the activities of the enterprise are carried out. There are two choices for handling the activities of the head office: a) the head office is recognised as a separate establishment; it has output and value added and it sells its services to the establishments it serves; or b) it is not recognised as a separate establishment, it has no output or value added and its costs are distributed to the establishments it serves, in proportion, for example, to the latter’s outputs or costs, and added to the latter’s own costs.

Total value added in the economy does not change but the distribution by industry (if the establishments are in more than one industry) and value added by regions (if the establishments are in more than one region) will change, depending on which choice is made.

27.1 1993 SNA

The 1993 SNA recommends choice (b) above as it does not recognise the provider of ancillary activities, such as a head office, as an establishment: thus it has no output. It states (paragraph 5.13):

"(a) The output of an ancillary activity is not explicitly recognised and recorded separately in the System. It follows that the use of this output is also not recorded;

(b) All the inputs consumed by an ancillary activity-materials, labour, consumption of fixed capital, etc.- are treated as inputs into the principal or secondary activity which it supports;

(c) It is not possible to identify the value added of an ancillary activity because the value added is combined with the value added of the principal or secondary activity."

27.2 Canadian practice

At Statistics Canada, head offices are identified as separate units, with geographical locations to which employment and capital expenditures are assigned, but this practice is limited to establishment-based surveys for manufacturing industries. For all other industries, head offices are not separately identified. For purposes of industrial classification, the entire unit is assigned to a single industry, the one in which the bulk of the value added of the establishments it serves is generated. In the Canadian input-output tables, there is no separate head office industry in the CSNA industry statistics as each head office is classified to the same industry as the most significant establishment (s) it serves. This classification convention in the CSNA is different from the one recommended in the North American Industry Classification System (NAICS) where a separate head office industry has been created which includes all head offices, no matter which establishments and industry they serve. With the present practice, the value added, say, for manufacturing, is the same in the CSNA as in the 1993 SNA but its industrial distribution is different depending upon whether the CSNA or the 1993 SNA convention is used. Further, the value of output as well as an identical value of intermediate consumption is higher in the CSNA than in the 1993 SNA.

As there are no outside market transactions for the services provided by the head office to establishments, one needs to develop some imputation convention to value its output. The value of head office output is equated, in the CSNA, to its operating costs. The entire output of the head office is completely used up as intermediate consumption by its serving establishments, thus reducing the value added of each establishment by the amount of use of the head office service.

In the Canadian provincial input-output tables, the head office is recognised as a separate establishment and, for purposes of industrial classification, the entire unit is assigned to a single industry. That industry is the one in which the bulk of the value added of the establishments it serves is generated, as we have done for national industrial statistics. The head office produces output which is completely used up as intermediate consumption by its serving establishments, thus reducing the value added of each establishment by the amount of use of head office service. Value added for the country as a whole does not change but its provincial or regional distribution does. It is reduced in some regions counterbalanced by an identical increase in the region of the head office. The regional distribution of both output and value added are different using the CSNA conventions compared with the 1993 SNA conventions

27.3 USA practice

For the 1992 input-output accounts of the BEA, head office activities were dealt with in a manner that is consistent with the 1993 SNA; that is, no output was imputed for them, and the expenses related to their activities were shown as inputs to the industry the head office served.

Head office activities are shown differently in the 1997 input-output accounts, released in December 2002. There is a NAICS industry for the management of companies and enterprises. The output of this industry is measured by its total costs; these include some expenses paid by the head office on behalf of other establishments of the company, as well as expenses related directly to head office activities. The services of head offices are then sold to the industries they serve. The result does not change total value added in the economy, but it changes its distribution because compensation, depreciation, and taxes paid by head offices are included in the value added of the new industry, rather than in the value added of the industry being served.

27.4 Concluding remarks

In the CSNA industry statistics, particularly its input-output tables, head offices are separately identified only for manufacturing and therein each head office is assigned to a single industry, the one in which the bulk of the value added of the establishments it serves is generated. The value of its output, (limited to the manufacturing sector), is equated to its operating expenses and is fully used by its serving establishments. In the United States, for the 1992 input-output tables,

the head office was not separately identified, and the tables followed the convention suggested in the 1993 SNA but in its 1997 input-output tables, head offices form a separate industry, and have their output and value added.

In the CSNA, we equated the value of the output of the head office, in the manufacturing sector, to its operating costs. The issue has arisen in regard to provincial accounts whether the present CSNA practice properly reflects the economic reality. Should the value of the output of a head office include, in addition to its operating costs, also a share of profits of its serving establishments. If it should, the share of profits allocated to the head office may be equated to its share of total wages paid by the enterprise multiplied by its total profits. One could devise some other convention to distribute profits. In any case, our present leanings are that in future the value of the output of the head office should be equated to its costs plus shared profits. This issue may be discussed with our colleagues in the BEA to arrive at a common joint decision.

The other issue of implementing NAICS head office industry in the Canadian statistics also needs to be settled as the USA has already decided to implement it in their industrial series effective 1997. In this context, it may be noted that it was not feasible to create a separate head office industry in the Canadian 1997 IO tables, even though they were based on NAICS, as there was no comprehensive data available. However, Statistics Canada has now implemented a survey program to collect head office data for all industries for the reference year 2002. Thus, it is planned to include a separate head office industry in the IO tables for 2002 and onwards, which will make the detail in IO tables in the two countries fully comparable.

The 1993 SNA recommendation becomes particularly problematic when input-output tables or industrial statistics are produced at the provincial or regional level. At the regional level, when the head office is situated in a region different from that of the producer units it serves, the application of the 1993 SNA recommendation would imply no contribution of the head office to the value added of its region. The present recommendation regarding the recording of head office activities in the 1993 SNA is counter-intuitive and must be changed to bring it in line with economic reality, for both industrial and regional statistics.

Overall conclusions

This report provides, in a summary fashion, similarities and differences in the production accounts of Canada and the United States. The discussion is limited to those issues which affect the **level** of output, value added and GDP, both at the total economy level and by industry or sector, **all at current prices**. We have noted 27 issues, distributed under four broad headings: A) An examination of the production boundary recommended by the 1993 SNA and the effect of lack of its **full** implementation on the level of production in the two countries. B) A review of present practices in the two countries in compiling production account for institutional sectors vis-a-vis the recommendations of the 1993 SNA and their effect on both inter-country and international comparisons. C) A review of the conventions used for valuation of output and value added in the two countries vis-a-vis the recommendations of the 1993 SNA and their impact on their inter-industry comparisons as well as international comparisons. D) A review of the present conventions in the 1993 SNA and differentiate those which have become un-aligned with the economic reality in the world, thus may be changed.

Effect on Total GDP, due to lack of consistency with the 1993 SNA

Both Canada and USA have an identical production boundary which is consistent with that of the 1993 SNA boundary, with only a handful of exceptions. Our ballpark estimate is that what we are missing could add to no more than one percent of overall GDP. In the case of Canada, in the current period, we could add about $2.5 billion for labour for own account construction, about $1 billion for capitalising orchards, about $0.5 billion for capitalising entertainment originals, and $0.2 billion for prostitution; add a few more billion dollars for narcotics and still we have not reached a total of $10 billion or one percent of our current GDP. The situation in the USA is probably the same. Having said that, we would still suggest that these activities should not be ignored for ever. Their overall impact is very small but their effect on regions and individual industries may be significant. Such industries include agriculture, construction, cultural and personal services industries. Further, their impact varies greatly amongst countries, particularly developing countries and this makes international comparisons problematic. As statistically advanced countries, we need to set an example to support the full implementation of the 1993 SNA throughout the world.

Effect on Total GDP, due to methodological differences with each other

There are several areas where the two countries use different methodologies and conventions which result in differences in the value of production. The two most noteworthy are the banking services (FISIM) and defence. The value of FISIM is calculated quite similarly in the two countries but its allocation to the users is very different. In the United States, the entire output is allocated to depositors but in Canada it is allocated to both depositors and borrowers as recommended in the 1993 SNA. As most of the depositors belong to the household sector and most of the borrowers belong to the business sector, the use of the US convention results in a much bigger allocation to final consumption by the households, hence GDP, compared with Canada. Our estimate is that this increases the total GDP in the USA by more than 1.5%, compared with Canada.

Another issue which the BEA has raised concerns the inclusion of military equipment in the capital for defence services, which the 1993 SNA does not recommend. This issue has been discussed in the BEA and other organisations in the USA and, in our judgement, they have made a convincing case for its inclusion, hence for revising the 1993 SNA in this regard. The BEA already includes this in its published GDP and its value is about US$60 billion in recent years, or more than 0.5% of GDP. Both the USA and Australia are challenging the present 1993 SNA guidelines on capitalisation in the defence services and we find their articulation very convincing. We all would like that the 1993 SNA restriction on capitalisation of military equipment be removed.

Per our present practices in the allocation of FISIM and capitalisation of defence capital, the GDP in the USA is more than 2% higher compared to Canada. The BEA is re-examining the present allocation convention of FISIM and may adopt the recommendation to allocate FISIM to all users, borrowers and depositors and in the next few years, the present restriction on capitalisation of military equipment may also be removed, thus, our present differences may disappear in the near future.

Non-business sectors

Both Canada and the USA compile production accounts for the two non-business (non-market) sectors, government and NPISHs. Their individual values are not comparable between the two countries. For example, the government sector in Canada makes about 16% of total value added compared with about 10% in the USA. Most of this difference is due to the

different classification conventions used: most non-profit institutions are allocated in the government sector in Canada while they are allocated to NPISHs in the United States. Thus the NPISHs sector makes about 4% of total GDP in the USA and only 1% in Canada. Additionally, in Canada, we have used a methodology to calculate CFC in the government sector which gives a higher estimate compared with the methodology used in the United States. The published numbers encourage one drawing wrong inferences that there is more government and less charity in Canada compared with the United States. The reality, however, is that the values for activities limited to public administration and defence are quite similar in the two countries and the major reason for the higher value of the government sector in Canada is the much heavier involvement of its government, compared with the USA, in the provision of public health services to the population at large. One possible solution may be for the CSNA to have detailed discussions with the colleagues at the BEA and jointly agree on the classification rulings to be adopted by the two countries. In the meantime, the CSNA may put more emphasis on the results of the two non-business sectors together and publish, within the government sector, sub-sector detail for a) government administration and defence and b) other government activities including education, health, etc.

Valuation of output and value added by industry

This is one more area where the difference in the practices of the two countries is vast. Canada uses the 1993 SNA recommended basic price for valuing value added by industry. Canada also uses the recommended basic price valuation for output for all products which do not attract subsidies. For a handful of products which get subsidies in Canada, we have modified the 1993 SNA recommendation by not including subsidies in the valuation of output. In the United States, both the output and the value added are valued at producers' prices which include all the sales and excise taxes levied by the various levels of governments. This convention adds, both in the output and value added, the sales and excise taxes collected by the enterprises for transmission to the governments. Gauging from the Canadian sources, these taxes added $75 billion in 2001 in the total GDP of $1,092 billion, and a very significant amount of these taxes were collected by the trade industries. Thus the value added of trade industries, for example, in the USA is higher by the amount of sales and excise taxes compared with the value added in Canada. The results of value added by industry in the two countries are not comparable. This has a major impact on comparison of productivity estimates by industry for the two countries, unless adjustments are made to put the value added series on a comparable basis, which are not easy.

Valuation of financial services

The valuation of financial services in the 1993 SNA was a major improvement over that in the 1968 SNA. However, some guidelines of the 1993 SNA have been found problematic for implementation and some others are being felt as deficient as we examine the rapid changes in the financial sector since the write-up of the 1993 SNA. In the calculation of output of financial services (banks, insurance companies, other financial enterprises), there are two major issues which need an urgent attention: a) should capital gains/losses be included and b) should income received from own funds be included? The 1993 SNA recommends excluding both. The OECD has established two task forces, one on banking and the other on insurance to deliberate on these and other issues. The BEA has argued, with well-articulated position, to include both capital gains and income from own funds in the output. We support the BEA position that the 1993 SNA needs to be revised in this regard. It may be noted that we have already included income from own funds in the output of financial services in the CSNA but in the USA, it is ignored because FISIM is not yet allocated to borrowers, as noted above.

How to treat the destruction of property from exceptional events such as big hurricanes and terrorist attacks such as September 11, 2001, is another important issue for the calculation of insurance services. The 1993 SNA is considered deficient both by the BEA and Australian Bureau of Statistics (and we agree with them), hence it should be re-examined. At present, the practice in this area in the two countries is different. The above noted OECD task force is looking at this issue and professionals from both the CSNA and the BEA are members of this task force. We are looking forward to their deliberations and conclusions.

Valuation of government services and defence

In the 1993 SNA, the valuation of government services, including defence is equated to their costs -intermediate consumption, compensation of employees and consumption of fixed capital. The BEA has been advocating to include the full cost of capital services -consumption of fixed capital **plus** financial cost or interest cost of capital -not just CFC in the valuation of government services. The BEA position is well articulated. We fully support that this issue be re-examined. Note that its inclusion will add a very significant amount to the value of government services and total GDP, for example in Canada, about $20 billion in the current period, a value of similar magnitude as CFC.

Head office activities

In addition to the valuation of financial services and government and defence services, the 1993 SNA is deficient in its handling of head office activities, particularly when accounts are prepared by regions. In the 1993 SNA, the head office is not recognised as a separate establishment, it has no output or value added and its costs are distributed to the establishments it serves. This convention produces counter-intuitive results when the head office is in one region and the establishments it serves are in other regions. In the NAICS classification, head offices are classified as separate establishments and form a separate industry. Head offices are separately identified in the 1997 benchmark IO accounts of the United States but in the Canadian national and provincial IO tables, head offices are recognised as separate establishments only in the manufacturing sector. This creates another difference in the practices on industrial classification in the two countries. This difference will disappear for the reference year 2002 and onwards when a separate head office industry is created in the Canadian IO tables.

Net value added

Net value added, compared to gross value added, is preferred, as it is more in tune with the theoretically correct Hicksian concept of income and sustainable development. Its calculation requires an estimate of consumption of fixed capital (CFC) by sectors and by industry. In the CSNA, there is no estimate of CFC by industry and even in the macro series, it is not the CFC which is used but the tax determined depreciation. In the BEA industry accounts, such CFC estimates are made and in the macro NIPA series, both tax determined depreciation and CFC are used. The US methodology to distribute enterprise-based CCA and capital consumption adjustment to industry-based CFC for the GDP by industry calculation is very innovative and pragmatic and, in our judgement, its adoption in the CSNA will greatly enhance the usefulness of its industry statistics.

Other issues

There are also similarities and differences in several other areas but they are not as significant as the ones noted above. Both Canada and the USA ignore the purchase/sale of existing capital assets by one industry to another within the business sector, a practice inconsistent with both the 1993 SNA and business accounting principles that could lead to incorrect multi-factor productivity estimates by industry. Both Canada and the USA do not compile production account by sectors, thus deviate from the 1993 SNA recommendation. The 1993 SNA has wisely recommended production account for institutional sectors as only they (not industries) are and can be used for the full sequence of accounts such as production, income and outlay, capital finance and balance sheet. Both Canada and the USA produce standard IO tables based on NAICS but the industrial aggregations are a bit different, thus they are not straightforwardly comparable in industrial detail. Both Canada and the USA have extensive industry statistics programs, and their respective input-output tables play a crucial role. Both countries have classified their industries by sector but the sector boundaries are not identical and the presentation of industrial detail for the non-market sectors is quite different. All these issues are discussed in detail in this document and the reader may refer to the relevant sections for additional information.

Final remark

Both Canada and USA have a very comprehensive set of statistics on national accounts and, by and large, these are consistent with the revised world-wide guidelines on national accounting, the 1993 SNA and with each other. The 1993 SNA is already 10 years old and some issues have emerged since then which require changes to its present guidelines. Our differences, in a few cases, from the 1993 SNA guidelines are due to the fact that as we started implementing them in our accounts, we found some of them quite problematic, thus either modified them or simply did not implement them and these differences were documented providing our reasoning for differences, and widely disseminated. The ongoing review of the SNA may resolve some of these differences. Some of the differences in the practices by the two countries may disappear in the near future as the professionals in both the BEA and the CSNA have shown a very high level and friendly cooperation in the deliberation of this report and are increasingly looking forward to further cooperation on harmonisation and improvement of our national accounts and hopefully, through this, also the international standards. This paper is the first concrete step on this path. The most important purpose of this document is to provide, to the compilers and users in both countries, a fuller understanding of our present practices, our similarities and differences, so that they can make meaningful comparisons of the published national accounts data. This paper is limited to those issues which affect primarily the production account, specifically the level of output, value added and GDP, both at the total economy level and by industry or sector, all at current prices. The methodologies used to develop constant price estimates are quite similar in the two countries, as both use Chain Fisher Volume indices, the indices also preferred by the 1993 SNA; however, undoubtedly,

the two systems employ deflators, direct valuation, and quantity extrapolation to prepare volume estimates which are not always identical. Thus our similarities and differences in methodologies, conventions, assumptions, classifications etc., which affect the current price values affect also the constant price series, though not identically. Thus, it will be useful to prepare a detailed document on the similarities and differences in regard to deflators used in the two countries.

One would hope that, in future, similar reports are prepared on other topics in the national accounts, which affect such important constructs as savings rate, net lending, the capital finance accounts and the balance sheet for the detailed institutional sectors and the economy as a whole. A detailed comparative knowledge and understanding of these topics will be very helpful to study the performance of the financial markets in our two economies which are increasingly getting bound together.

Note

I am deeply grateful for the very generous help and cooperation and detailed comments and clarifications provided by many colleagues at the BEA, particularly Brent Moulton (who organised most of the comments), Sumiye Okubo, Bob Yuskavage, Brooks Robinson, Ann Lawson, Mark Planting, and Karen Moses and at Statistics Canada, particularly Abe Tarasofsky, Karen Wilson, Yusuf Siddiqi and Trish Horricks, in the preparation of this report. However, the views expressed here are entirely mine and may not be attributed to any of the colleagues who helped me or to Statistics Canada or BEA.