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Short term services indicators

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Abstract

This paper explores the possibility of using VAT data as a short term indicator for services industries. In a large number of countries, VAT data provides a wealth of information about a wide spectrum of industries at little additional cost. Using implicit price indexes, we compare data from Canada's Goods and Services Tax (GST) to Statistics Canada's established monthly real GDP program. We find that VAT data can not be put to optimal use when proper producer price information is not available.

1. Introduction

In Canada as in many other countries, the measurement of annual industry data is fairly well established . Typically, the services industries are less well measured than the goods-producing and goods-related industries, but some form of measurement generally exists for a large part of the services sector.

But policy analysis does not always focus on, or wait for, annual data. There is a need for indicators of the evolution of the economy on a sub-annual basis. Canada has sub-annual survey data for goods-producing industries and goods-related services such as wholesale and retail trade, but we do not have such surveys across the entire services sector.

However, developing and running sub-annual surveys is not the only option for filling this gap. There are other forms of sub-annual information for the services industries. One such source is the Statistics Canada monthly GDP (gross domestic product) index which will be briefly discussed in section 2.

Recently, a current dollar, quarterly projector of industry revenue (turnover) has been developed using Canada's relatively new VAT. Some graphical representations of the quarterly indicator will be shown for selected services industries.

While a current dollar sub-annual estimate is useful, a 'real', or constant dollar estimate would be even more desirable. In section 4, we explore the idea that some existing price deflators from the system of national accounts could be of some use in deflating the current dollar indicators.

2. Sub-annual gross domestic product by industry

Statistics Canada has produced a monthly index of Gross Domestic Product[1] at factor cost by industry in constant dollars (GDP) since 1926. The monthly GDP program uses the annual Input-Output accounts as a benchmark. These annual IO tables are based on complete industrial information available two to three years after the reference year. The monthly GDP, on an industrial basis, is determined by projecting forward from these annual benchmarks. In particular, the growth rate of real value-added[2] for each industry is approximated by the movement of the projector.

For the goods-producing industries, the industry's gross output is used as a projector. This approach assumes that technology is constant, i.e. that the ratio (in constant dollars) of gross output to value-added is constant in the short run. It also assumes that the product mix in the industry's output

[1] For more information on the methodology underlying the estimates see Statistics Canada Catalogue no. 15-0001-XPB, *Gross Domestic Product by Industry*. Some copies of the methodology will be available at the Voorburg meeting.

[2] Value-added (or GDP at factor cost) is equal to gross output minus intermediate inputs (VA = GO – II).

varies slowly over time[3]. The sum across industries of all of these projected values becomes GDP by industry for the total economy in the current month.

Services industries do not fall among the group of industries described above. Services have always posed a problem in monthly GDP calculation. Not unlike that of other developed economies, Canada's statistical system was built around goods-producing industries. Industry-based surveys on resources extraction, manufacturing and goods-related activities have been around for a half century. Industry-based surveys on service providers were largely non- existent until the mid-1980s.

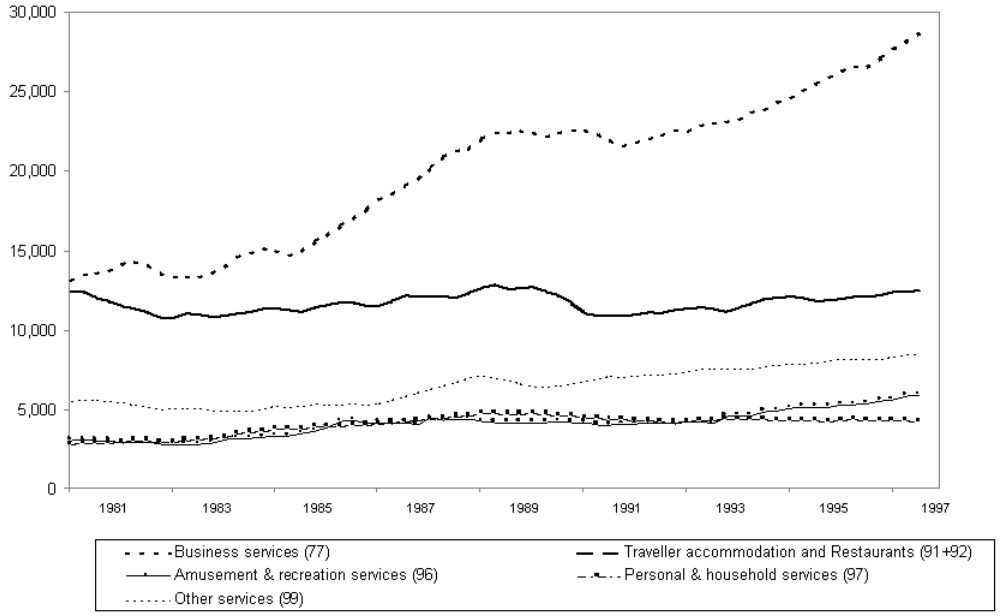
This scarcity of survey data explains why the monthly production indicators used for GDP estimation are based, for the majority of services industries, on an "hours worked" measure of labour input (wages and salaries expressed in base year dollars). These series originate from Statistics Canada's monthly Survey of Employment, Payrolls and Hours (SEPH), which covers the whole economy, except for agriculture, fishing and trapping. The ratio of labour input to gross output is assumed to be constant in the short term, which allows hours worked to be used as a projector for most of services industries' GDP.

An estimator of gross output is used for services when labour input bears only a faint connection with output or when some survey or industry data is available. One of those exceptions is financial services, where financial market indicators are used. Others are accommodation and restaurants; data on room rentals is available from the industry, and a monthly survey of restaurants has existed for some years.

[3] Both these assumptions apply only to the calculation of GDP at constant prices. Also, the higher the level of disaggregation, the more robust the results.

Thus, the monthly GDP measure, although imperfect for services industries, has provided the only comprehensive sub-annual information on these industries for many years.

Graph 1
GDP at factor cost by industry
in million 1986 dollars



3. Using VAT data as a short term indicator

An economy-wide subannual indicator as discussed above cannot be set up overnight. Concepts must be clarified, a production system must be put in place and a wide set of data sources must be evaluated in terms of both statistical reliability and timeliness. As already explained, Statistics Canada managed to put its monthly GDP program in place only after some key subannual surveys were established. (In fact, until 1963, the program was limited to an "industrial production index" -- GDP for only goods-producing industries -- due to lack of data sources[4].)

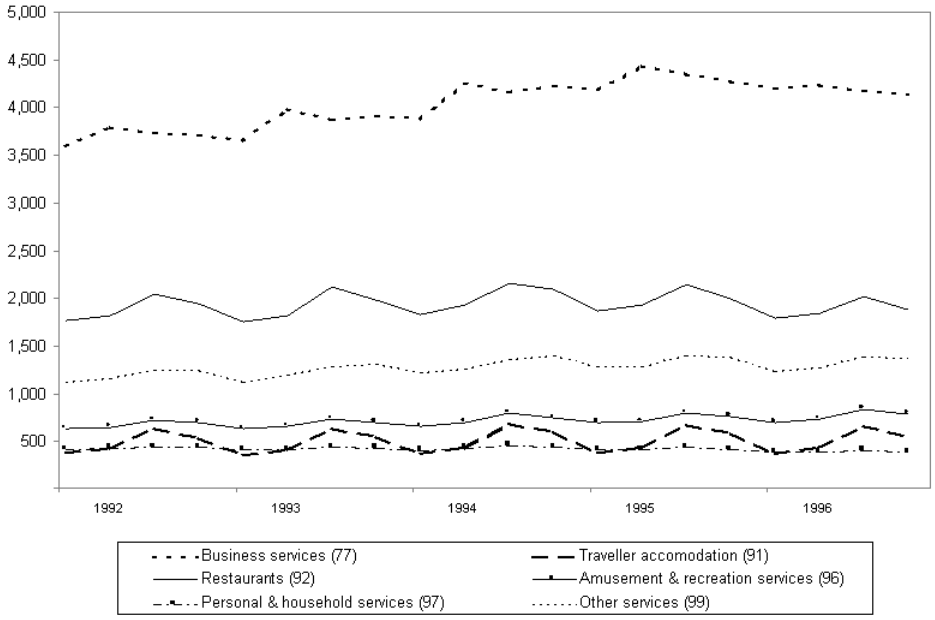
Statistical organizations looking for ways to estimate industry-wide short term indicators need not set up a multitude of sub-annual industry-based surveys to provide the key data inputs needed. In many countries, value-added tax (VAT) data can be used and lead to satisfactory results.

Canada's VAT is called the Goods and Services Tax (GST). On January 1st, 1991, it was introduced to replace a tax formerly collected on manufacturer's sales. Some exemptions to GST apply to both goods and services. But since services had been exempt from any tax before the GST was introduced, a wealth of administrative data on services industries appeared with the introduction of this tax. Further, since firms were given a lot of flexibility as to the frequency of their remittances of tax, and many of them, especially the larger ones, opted for a monthly scheme, we suddenly had available

[4] The program was then operating on a quarterly cycle. It became a monthly in 1970.

monthly industrial data with a direct link to economic performance. Statistics Canada promptly began to assess these data[5].

Graph 2
GST Revenue by SIC
in million dollars



Comparisons between GST-based revenue data[6] and survey data followed. On an annual basis, some similarities existed. Sub-annual detail however was a problem as payment frequencies varied

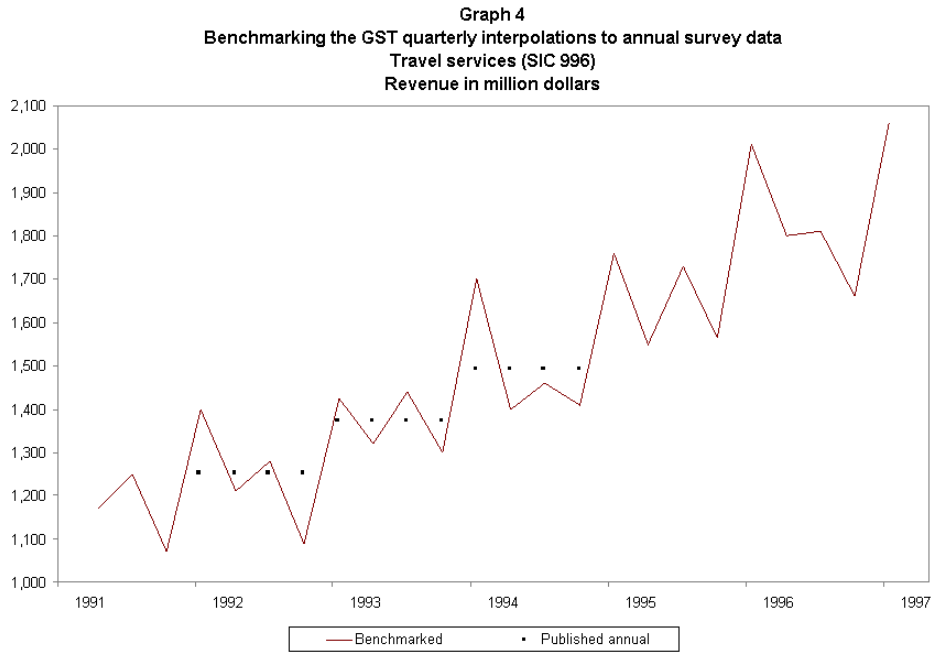
Industrial coding of the tax data was of insufficient quality. A link to Statistics Canada's Business Register database corrected this[7]. More work remains to be done in order to maintain an up-to-date link. At present, information put on the Business Register is not relayed to the tax database.

A two-step edit and imputation model was also built. The first step consisted in correcting obvious errors such as missing values. The second step compared each observation to the industry and the remitter's past patterns and then corrected outliers. The amount imputed represented 12% of the total.

The final modeled values were then compared to available survey data.

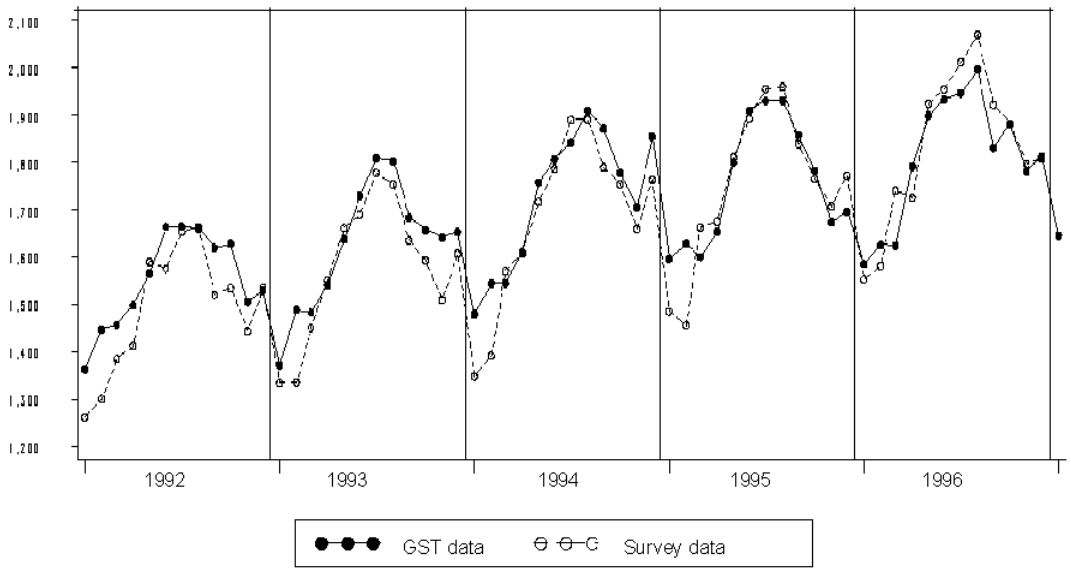
Graph 3
Benchmarking the GST quarterly interpolations to annual survey data
Computer and related services (SIC 772)
Revenue in million dollars

[7] A link was established for 26% of the accounts, representing 63% of revenue.



Restaurants was the only category for which sub-annual survey data existed. A comparison showed that revenue as declared by restaurant owners while remitting GST, and revenue as collected by Statistics Canada's monthly survey of restaurants, caterers and taverns were highly correlated.

Graph 5
Comparison of survey and administrative data
Restaurants (SIC 92)
Revenue in million dollars



4. Can the GST-based indicator be deflated?

While a current dollar sub-annual indicator based on GST data provides very useful information about the current evolution of the services sector of the economy, a constant dollar version of this indicator would be even more useful. To achieve this, it would be necessary to find an appropriate price series to deflate each industry group for which there is a nominal indicator. As we all know, price indexes do not exist for many of the products and/or industries in the services sector. Services which are oriented primarily to final consumption by persons generally have good CPI kinds of indexes. Producer services generally have not fared so well. However, there exist within the System of National

Accounts various implicit price indexes which cover ranges of products. It is possible that some of these groupings of products may be fairly closely associated with some of the services industries for which we have constructed a nominal indicator.

It also seems that if we have both a constant dollar indicator series (GDP) for a given industry and a current dollar indicator series for that industry (GST based), we can calculate an IPI (implicit price index) for the industry. Obviously, there would have to be many heroic assumptions made to truly believe in such an index. We do not propose to make such heroic assumptions, but rather to use such an index in a less rigorous way. We propose to compare it with the IPIs that exist in Statistics Canada's System of National Accounts (SNA). If a general correspondance can be found between the movements of the SNA IPI and our constructed IPI, then perhaps there exists a basis for further research work to develop an appropriate, accurate index. (Perhaps, for example, SNA methodology can be carried out at a finer level of product or industry detail to give an IPI more closely related to the industry being considered.) If on the other hand, no correspondance can be found, it suggests that this may not be a good avenue to pursue.

We have tried this approach on four 2-digit service industries. The IPI chosen for comparison with our calculated one is that which results from dividing current dollar and constant dollar personal expenditure (PE) estimates in the Income and Expenditure Accounts. Those estimates are part of the largest aggregate used in the expenditure-side calculation of the quarterly GDP at market price. The disaggregated constant dollar estimates are produced by deflating the current dollar ones using a combination of Consumer Price Index (CPI) series and other sources of price information. At a more

aggregate level, dividing the current dollar value by its corresponding constant dollar estimate gives us a Paasche-type implicit price index available on a quarterly basis[8].

The high variances and strong seasonal patterns of our constructed IPI strike the eye immediately. This leads us to take a step back and include annual growth rates in our study. With so little data available on service industries, even annual growth rates can be considered short term if they are timely enough.

Amusement and Recreation Services (SIC 1980 : 96)

This industry provides us with our most satisfactory result. Although not identical, the annual growth rates for each index have the same long-term trend. The average growth rates are within one percentage point of each other. Personal expenditure represents 70% of total demand for this industry.

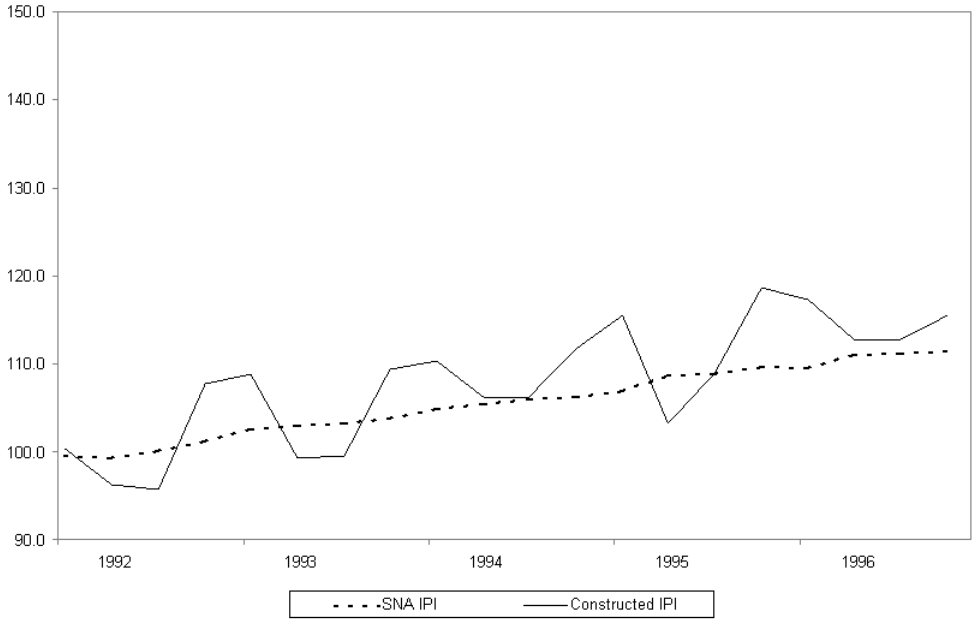
Table 1
Implicit Price Index, Amusement and recreation services
(Growth rate, %)

	Constructed IPI	SNA IPI
1993	4.2	3.1
1994	4.2	2.4
1995	2.7	2.8
1996	2.7	2.1
Average	3.4	2.6

The seasonal patterns of our constructed IPI are strong and their cycle does not correspond to that of the SNA IPI.

[8] It was impossible to match perfectly the commodity-based PE categories and our industry-based IPI. We limited our comparison to areas where the classifications came reasonably close. Another caveat is that the SNA IPI covers the Final Demand portion of the economy at market price, whereas our constructed IPI covers Total Supply at factor cost.

Graph 6
Implicit price index
Amusement & recreation services (SIC 96)
1992=100



Personal and Household Services (SIC 1980 : 97)

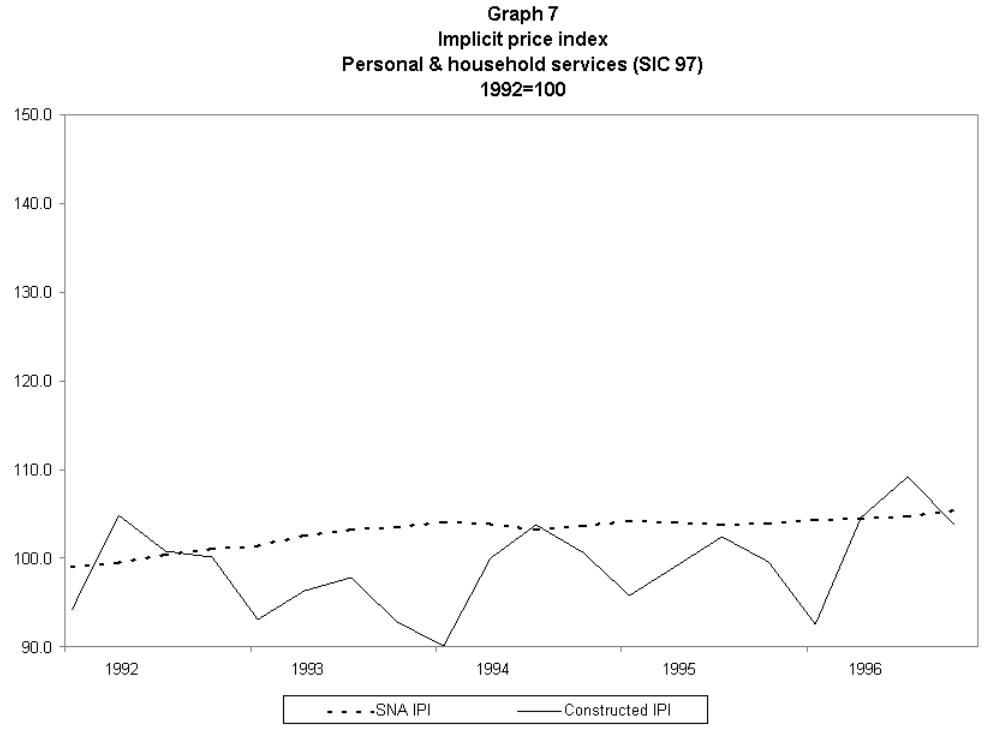
The results for personal and household services industries are not as good as for amusement and recreation services. Our constructed IPI's growth rate always remains within 10% of the SNA IPI. The average growth rates over four years are only 1.8 points apart. Personal expenditure represents 92% of total demand in this case. Our observation about the previous case is reinforced: the "personal" aspect of the service is clearly a cause of similarity between the two sets of indexes.

Table 2
Implicit Price Index, Personal and household services
(Growth rate, %)

	Constructed IPI	SNA IPI
1993	-4.9	2.7
1994	3.8	1.0

1995	0.6	0.2
1996	3.3	0.7
Average	2.8	4.6

The quarterly growth rates of our constructed IPI look quite volatile beside a very stable SNA IPI.



Business Services (SIC 1980 : 77)

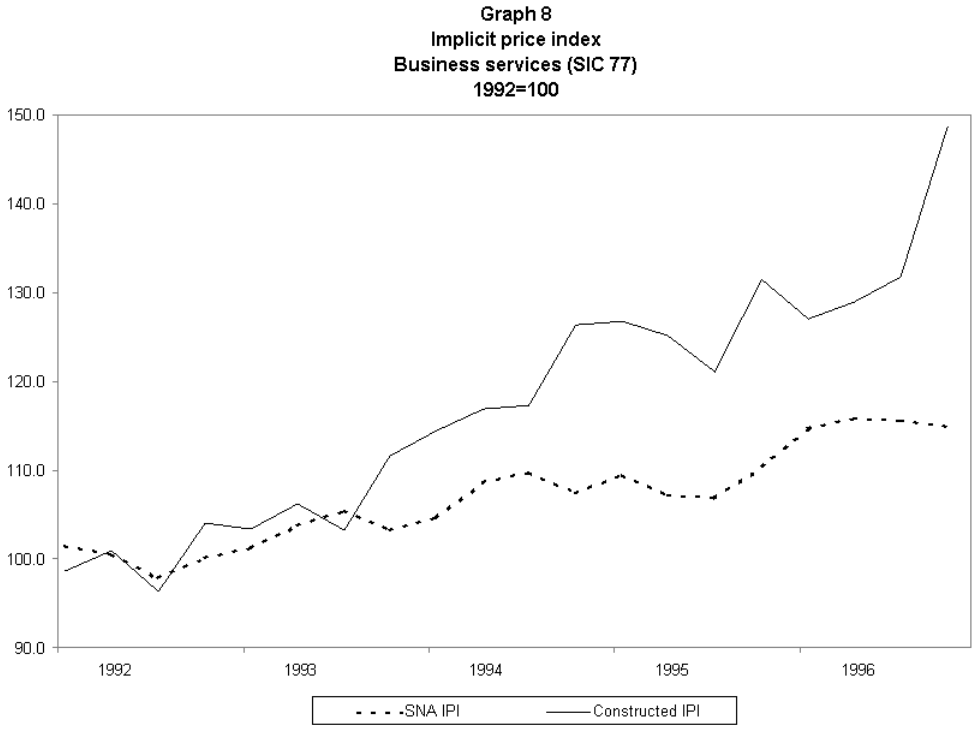
The results for this industry are not very satisfactory. The identical growth rates in 1996 are misleading, as other years show differences ranging from 2.0 to 7.8 in percentage points. The two indexes are not even centered around each other as the SNA IPI limits its growth to an average of 3.6% over four years, while our constructed IPI reaches 7.6% for the same period. This is likely caused by

the fact that we have poor price information across the entire range of business services. In the absence of solid data, different theoretical approaches for the two sets of IPIs lead to different results. Another reason for this divergence between price indices is that there is little similarity between business services purchased by personal expenditure (which represents only 4% of the total demand for this industry) and the ones purchased by the business sector.

Table 3
Implicit Price Index, Business Services
(Growth rate, %)

	Constructed IPI	SNA IPI
1993	6.1	3.4
1994	11.9	4.1
1995	6.2	0.8
1996	6.3	6.3
Average	7.6	3.6

Apart from the year 1992, where the quarterly movements are similar, the two indexes have different subannual movements. This is the industry where our constructed IPI shows the smallest seasonal pattern.



Accommodation services and restaurants (SIC 1980 : 91,92)

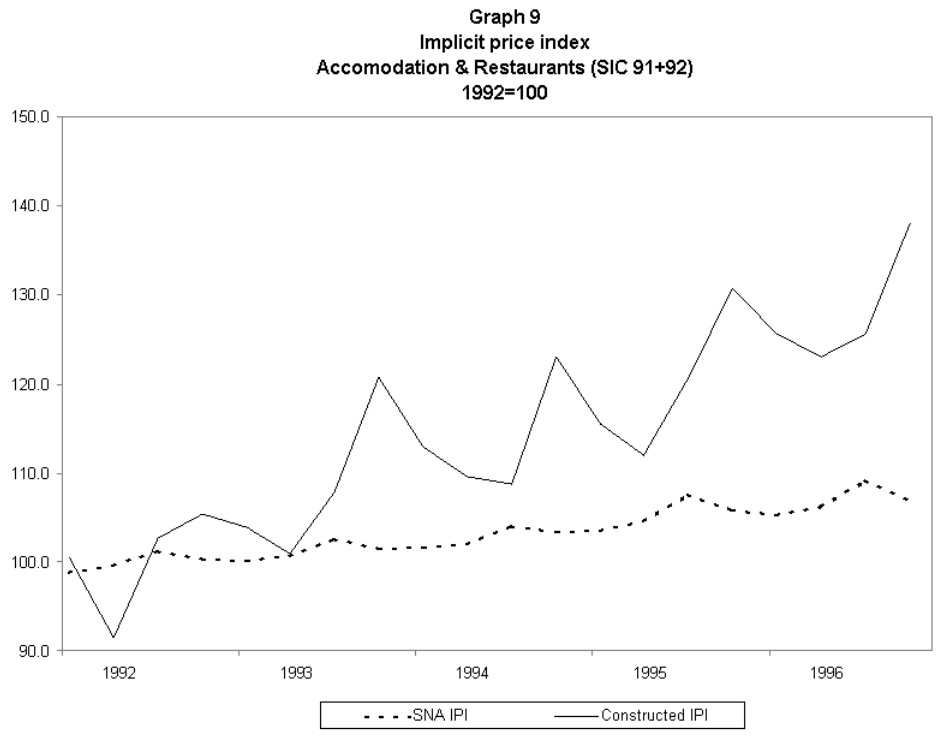
In this case again, the annual movements are quite different. The gap between the growth rates of the price indexes is more pronounced than for Business services. This is surprising given that we expect the product mix of personal expenditure and of final demand for this industry's output to be similar.

Table 4
Implicit Price Index, Traveler accommodation and restaurants
(Growth rate, %)

	Constructed IPI	SNA IPI
1993	8.3	1.3
1994	4.8	1.5
1995	5.4	2.5
1996	6.9	1.4

Average	6.3	1.7

Our constructed IPI's quarterly patterns are stronger than for Business services. The peaks and throughs do not match the SNA IPI's ones. Clearly, this last case is not a satisfactory result.



In general, our assessment of the constructed IPI against a control IPI based on Personal expenditure is that we have only very limited success. Viewed from an annual standpoint, two industries provide acceptable results, while the two other are clearly rejected. The industries providing the two acceptable cases are the ones where the majority of the industry's production is purchased by households. The reason is that in these cases the volume component of Personal expenditure is deflated

with a price index (the CPI) that has an almost direct link to the price effect observed in the GST revenue series.

Over all industries, our constructed IPIs show much stronger seasonal patterns than the SNA IPIs. The points of inflexion almost never match. Tax data is not like survey data : the signals embedded in it can be caused as much by the firm's internal administrative approach and its relation with the tax collector as by economic activity. More research remains to be conducted on seasonal patterns of the GST data itself. The use of seasonally-adjusted tax data, and its comparison to seasonally-adjusted price indicators, for the two industries most strongly linked to household demand would be the logical next step in the avenue opened by this paper. Unfortunately, our experiment did not give good results for business service industries. There are no magic solutions to the problem of finding good price indexes for this area of the economy.

1. Conclusion

Resources for statistical agencies are restrained and the demands on these resources expand with the growth of the size of, and the public interest in, the services sector. The existing goods-centered sub-annual surveys are of little use in filling the gap. The constant dollar monthly GDP measure provides one set of information on the short-term evolution of the services sector. The GST data being

collected and stored for administrative-only purposes also provides a source of information on the current growth of services industries.

The construction of an implicit price index allowed us to assess the acceptability of tax data as a short-term indicator. Although the results were far from good, industrial categories that are oriented towards household demand could perhaps benefit from further work with SNA-type IPIs.

The lack of statistical information about producer prices of services is probably the only barrier to using VAT data as a short term indicator of real industrial activity for service industries. The industries and products where the need is the highest are also the ones where the conceptual and methodological issues are the toughest. Thus, there is an ongoing need for international groups such as Voorburg and the OECD to continue their efforts to measure producer prices.

Questions for discussion:

1. Do many European countries use VAT data for short term indicator purposes? Can this be expanded to other countries?
2. In the absence of direct measures of producer prices, can implicit price indexes from the national accounts be of any use?