VOORBURG GROUP ON SERVICE STATISTICS

13th Meeting
Rome
21-24 September

Short-term Economic Indicators using Administrative Data

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Short-term Indicators of Business Activity

Statistics New Zealand conducts an Annual Enterprise Survey which covers the entire economy, including the services sector. However, it has only four surveys of business to produce short-term economic indicators. These surveys cover the following areas:

- manufacturing,
- building activity,
- wholesale trade,
- retail trade.

This leaves a huge gap in the services area where there are few reliable short-term indicators. The rapid growth in many of the services industries is making the gap more serious.

To remedy this problem, Statistics New Zealand is currently developing an economy-wide short-term indicator series using administrative data. The aim is to fill the gap left by existing surveys. For this series the key source of administrative data is information supplied to the Inland Revenue Department via Goods and Services Tax returns.

In this paper I will first describe the Goods and Services Tax. Section B will describe Statistics New Zealand strategy for using GST-related data in the production of statistics. Section C will describe some of the issues which had to be resolved during the development process. Finally I will give some examples of the series which have been produced as they relate to services industries.

A. The Goods and Services Tax

The Goods and Services Tax (GST) is a valued-added tax, which was introduced by the New Zealand Government in 1 October 1986. It is currently charged at a universal rate of 12.5%. There are very few exemptions. It is charged on both current and capital goods. The tax is collected by the Inland Revenue Department (IRD).

Coverage

Any business or individual conducting a taxable activity with a turnover (or expected turnover) of more than $30,000 per 12 month period must be registered for GST. However those with taxable activity of less than $30,000 can also register on a voluntary basis if they wish. Often it is in their interests financially to register.

Exemptions

There are very few exemptions to GST. There are no exemptions or differential rates for goods or services considered to be "essentials". Transactions involving exempt items are not recorded on GST returns. The most important exemptions are:

- services supplied to non-residents, eg legal services;
- stores supplied to aircraft and ships for use outside New Zealand;
- transport of passengers and goods to and from New Zealand;
- donated goods and services sold by non-profit bodies;
- private dwellings;

- goods not in New Zealand at time of supply;
- certain exported services.

B. STRATEGY FOR USING GST-RELATED DATA

Statistics New Zealand has had access to GST records since the Inland Revenue Department introduced a new computer system in 1992. The GST database contains a vast amount information which had not been available before. It covers most businesses in the economy. The availability of GST data from the IRD provides the opportunity for the development of a range of short-term economic indicators.. It has the potential to provide:

- an economy-wide short-term economic indicator series
- a significant improvement in the range of measures covering service industries.
- a time-series of detailed industry information useful for micro-analysis
- regional information

GST Information Available

They key relevant variables supplied with GST returns are as follows:

- GST registration number
- Period covered by GST return
- Start and end date of period
- Total sales and income (including GST) for the collection period
- Total purchases and expenses (including GST) for the collection period, excluding imported goods
- Zero rated supplies
- GST adjustments calculation
- Total GST collected

Strategy

Statistics New Zealand has a four stage strategy for the use of GST data.

i) The first step was to use GST records to update and maintain the Business Frame. GST turnover is currently being used to identify units to be added to the Frame update surveys. This has been done for several years.

ii) GST sales are being investigated for use as a sample design variable for some surveys in preference to the traditional full-time equivalent employees variable. This is currently being done for the Annual Enterprise Survey.

iii) An Experimental GST indicator is currently being prepared for release in early October 1998. Estimates will be produced for 82 Industries (see below)

iv) Statistics New Zealand is currently developing and Economic Statistics Strategy. This will lead to the integration of survey and administrative data to achieve the efficient production economic statistics. As part of this strategy, GST data will replace some of the survey data in existing quarterly statistics, thereby achieving cost efficiencies and reduction in respondent load. Analysis of the experimental GST series will expand our understanding of the data as a step towards integrating it with existing survey data.

Release of Experimental Series

We are proposing to release an experimental indicator series on October that will include:

- Monthly sales and purchases
- Actual and seasonally adjusted series
- by ANZSIC division (17 industry divisions) in an Information Release
- by 82 ANZSIC based industries (see Appendix 1) in electronic format for interested users
- covering the period April 1992 to March 1998.

The experimental series will be updated each quarter.

We will invite feedback from interested users on the methodology used to derive the estimates and the potential uses for the series. The feedback from this consultation process will be used to plan the production of a monthly official series.

C. SOLUTIONS TO CONCEPTUAL ISSUES

In developing the experimental series, several conceptual problems have had to be resolved.

a) Assigning Industry Codes

The population for the new series is all GST registered units To produce industry statistics, an industry code (ANZSIC) and other classification variables had to be assigned to every GST unit. This was done by matching the GST units to the Statistics New Zealand Business Frame. Once a match was achieved, an industry classification could be assigned to each return. The classification assigned to a unit is that which is appropriate for the period to which the particular GST return relates. The match to the Business Frame also enables us be able to assign an institutional sector classification and we are planning to investigate matching geographic unit data to provide a regional analysis.

A match to the Business Frame was not possible for all units.

i) A match was not possible for economically insignificant units (below the $30,000 cut off) which are not recorded on the Business Frame. This accounted for about 2 percent of GST units.
ii) Units with records for earlier periods which had since ceased were often hard to match.
iii) Businesses which are not New Zealand owned are sometimes not recorded on the Business Frame.
iv) GST units that were part of a group could not be matched. (see below)

If no enterprise match could be found for a unit, they were allocated an industry code by giving consideration to the company name, the activity descriptor on the tax registration database and any other information that was known about the business.

When the production of series from GST data becomes a regular event, the industry coding of significant new units should take place as soon as they record taxable income or payments. At this stage they will not have been surveyed as part of the Statistics New Zealand Business Frame maintenance strategy. It is likely that the maintenance strategy will need to be revised to accommodate the needs of this series.

Apportionment of Group Returns

In New Zealand, several companies may form a group, such that one company may represent the entire group for GST purposes. All companies must adopt the same accounting period and basis, but transactions between the companies are not generally liable for GST. Group membership may change over time depending on share holdings.

There are currently about 4,500 GST groups, comprising of about 12,500 enterprises. Group returns are significant in dollar value and they can cross many industries, even at a high level. This poses a problem, when attempting to produce results at industry level. A method had to be developed to apportion data from group returns to the businesses which comprise the group.

The first attempt to apportion these groups to the enterprise level was based solely on employment data from the Business Frame. However, this proved to be unsatisfactory for enterprises engaged in activities with large turnovers and few employees. For example, units in ANZSIC 7340 (Financial Asset Investors) and ANZSIC 7712 (Commercial Property Operators and Developers often have large financial flows to occur but very few employees on the Business Frame. A method was needed which would deal better with these situations.

An investigation was undertaken to identify other potential sources of information to apportion group sales. The chosen method was to use annual sales information from the IR10 form. This is a form containing a summary of each company's annual accounts, which must be filed annually with the IRD. It cannot be completed on a group basis and has relatively high coverage. Wherever possible sales information from IR10 returns are used to apportion group routines. This method produced more accurate results than the method relying purely on Full-time Equivalent employee (FTE) data. An additional benefit is that this method is not overly complex. Other possible information sources were also investigated, but none better were found. When annual IR10 data was not available for a particular year, IR10 data from the most recent year that had a non-zero sales was used. FTEs are only used to apportion sales from group returns, if an IR10 is not available.

Different Filing Frequencies

Reporting for GST can be on a one-, two- or six-monthly basis. Companies with an annual turnover (or expected turnover) of more than $24,000,000 must report for GST monthly. Two-monthly reporting is the default. The two-monthly periods can end in either even or the uneven numbered months. Companies with an annual turnover of less than $250,000 may adopt a six-monthly GST period. These six-monthly GST periods can end in any month of the year.

The series could have been calculated using the date of GST payment as the reference variable. However, this would have meant that the series would reflect cash flow to the IRD. For the purpose of measuring economic activity, an accrual basis is more relevant, so the decision was made to attempt a temporal apportionment of GST records to the month in which economic activity occurred. To produce a monthly series it has been necessary to develop a method to apportion two-monthly and six-monthly GST returns over the respective months each return represents.

The first method tried was to use of monthly filers to apportion two- and six-monthly records to particular months. The method relied heavily on an assumption that large businesses (monthly filers) have the same monthly pattern of sales as smaller units (two and six-monthly filers). Further investigation proved that this assumption could not be sustained. Correlation between the movements of the monthly and two monthly series was tested. Only 20% of the compared series showed a correlation of 0.5 or better. Even after smoothing the series, only 30% of the series had a correlation of 0.5 or better. These results suggested that the assumption which underlay the methodology was not sound.

Our Survey Methods staff investigated the use of seasonal adjustment methods to produce factors that could be used to temporally apportion data from two-monthly filers. Seasonal adjustment factors were generated from a classical ARIMA seasonal adjustment exercise (X-12), using nominal time periods for the series of the odd month filers and even month filers series quite separately. To present X-12 with monthly data, each two-month data point was repeated. The 12 seasonal factors per for each series were then subset to 6 each and interleaved together to produce 12 nominally-dated seasonal adjustment factors per year.

The use of nominal dates (e.g. a December GST two-Month return is really a combined November plus December return) is a weak point in this process. However, the results stand up to scrutiny well and appear sensible in the great majority of cases.

Another method of producing seasonal factors was investigated. An attempt was made to determine seasonal factors using a non-linear optimisation technique. Variations upon this theme were attempted, but it was difficult to get adequate results consistently. No doubt there is a way of setting up the minimisation problem and of choosing a parameter-fitting technique that could do better, but it has eluded us so far.

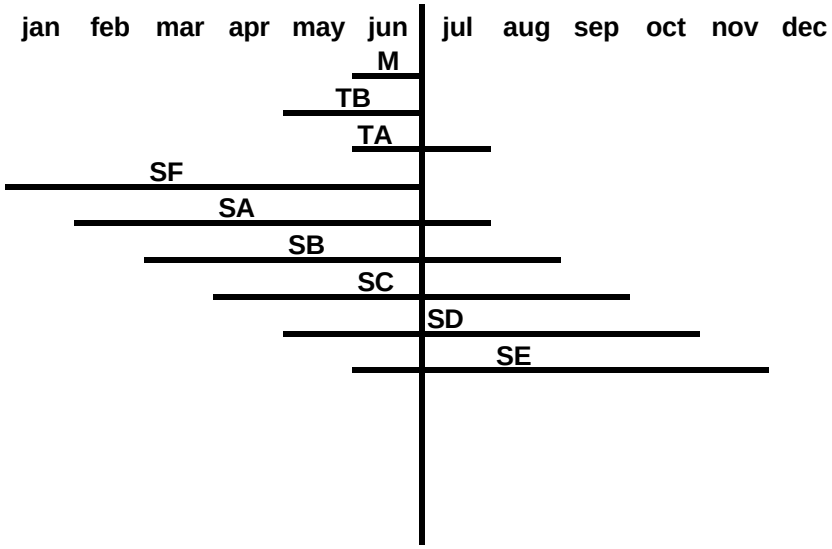
The seasonal adjustment-based method consistently provides a much more reasonable set of factors. This method is used in industries where the seasonal adjustment factors are technically stable and clearly believable. In the exceptions to this situation the monthly estimates will be generated through a uniform method (apportioning equally between the two periods). The uniform method was only needed for 9 of the 56 two-digit ANZSIC industries. The uniform method has been used for the 6 monthly filers.

In most instances the ratios were estimated at the two digit ANZSIC level. In cases where the seasonal pattern of lower-level industries are clearly different to the higher level ones, seasonal factors were generated at the lower level. For example, factors for the agriculture industry have been generated at the four-digit level.

The seasonal factor method will continue to be used in the short-term. However, further investigation will be undertaken to determine if more use can be made of monthly filers with annual sales of less than $24 million (i.e. those who are eligible to file two-monthly). If there sufficient numbers of these, they may be used to improve the quality of the factors applied to the two monthly filers. In the longer term, a separate project may be set up to improve estimation methods for the GST series, drawing on the work done in Statistics Canada by Pierre Cholette.

Projecting the End Months

For the last five months of the series some of the filing frequency types will not have filed returns as their reference period end data is actually still in the future. The diagram below describes the situation in the month of June for the nine different return frequencies.



M	monthly
TA	2 monthly (ending in odd months)
TB	2 monthly (ending in even months)
SA	6 monthly (period ending jan/july)
SB	6 monthly (period ending feb/aug)
SC	6 monthly (period ending mar/sep)
SD	6 monthly (period ending apr/oct)
SE	6 monthly (period ending may/nov)
SF	6 monthly (period ending jun/dec)

A method had to be developed for estimating the for the two and six monthly filers who have yet to provide a return for the reference month. The one developed uses a ratio of the value for reference period to the same period a year earlier from like frequencies which have filed. This ratio is then applied to the same frequency-of-return types that have not yet filed to produce an estimate for the reference month.

There are some problems with the method in that discontinuities (e.g. capital sales peaks) in the series that are being used to create the ratio affect the estimated value. In these cases, spikes were being replicated a year later in the estimated data. Setting limits on the ratios to use for forward estimating has produced an acceptable method controlling this problem.

Treatment of Capital sales and purchases

GST is charged on sales and purchases of both current and capital goods. Unfortunately, from a statistical point of view , the GST tax return completed by taxpayers does not record capital sales and purchases separately. Thus the values recorded are a mixture of capital and current items. Purchases and sales of capital where they are sufficiently large can cause spikes in the series.

There are three issues which arise from this problem.

- Purchases and sales of fixed capital, plant, machinery and equipment represent different economic phenomena from sales of goods and services. They are normally presented separately in statistical series. In the GST series these transactions cannot be readily identified unless they are unusually large. Therefore, we are not able to make any adjustment for these items. This means that the GST-based series are not strictly comparable with survey based economic statistics.
- When a business is sold as a “going concern” it will show up as a sale and a purchase in the GST-based series, sometimes in different industries. However, unlike purchases of plant and machinery, they are not additions to fixed assets, but are simply represent a change of ownership. They are not a sign of an increase in economic capacity. Their inclusion in the GST purchase and sales series makes it more difficult to understand what the series are measuring.
- If these capital purchases or sales of are very large they can cause a spike in the series. These “spikes” in the data not only distort the economic variable the series aims to measure, but they also

have the potential to breach Statistics New Zealand confidentiality rules. Where this occurs they should ideally be removed at the published industry level.

Earlier investigations attempted to identify capital sales using ratios at the unit level, but the results showed that a systematic approach to removing the effect was not possible. Consequently, a decision has been made that apart from very large spikes the series should be released as capital sales inclusive. A visual analysis of the series will be used to determine the existence of spikes and whether the spikes need to be removed from the series. If it is deemed appropriate to remove a spike, the forward estimate for the previous month for the current filer frequency will be used for the published series.

Future work

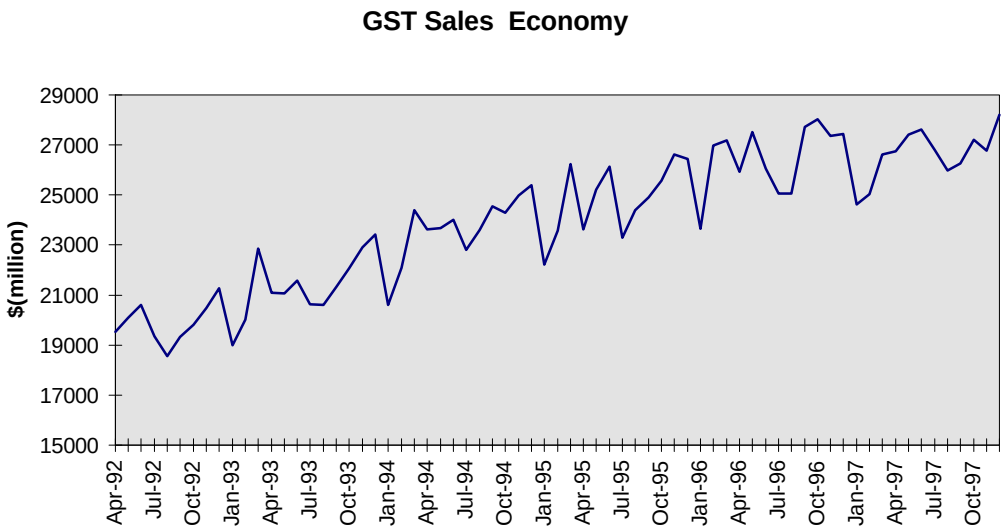
The work done so far has identified workable solutions to the problems outlined above. The limitations of these methods are far outweighed by the benefits that arise from the "richness" of this data source. Over time further work will be done to refine the solutions adopted for the experimental series in an effort to further improve its quality.

D. Output from the Experimental Series

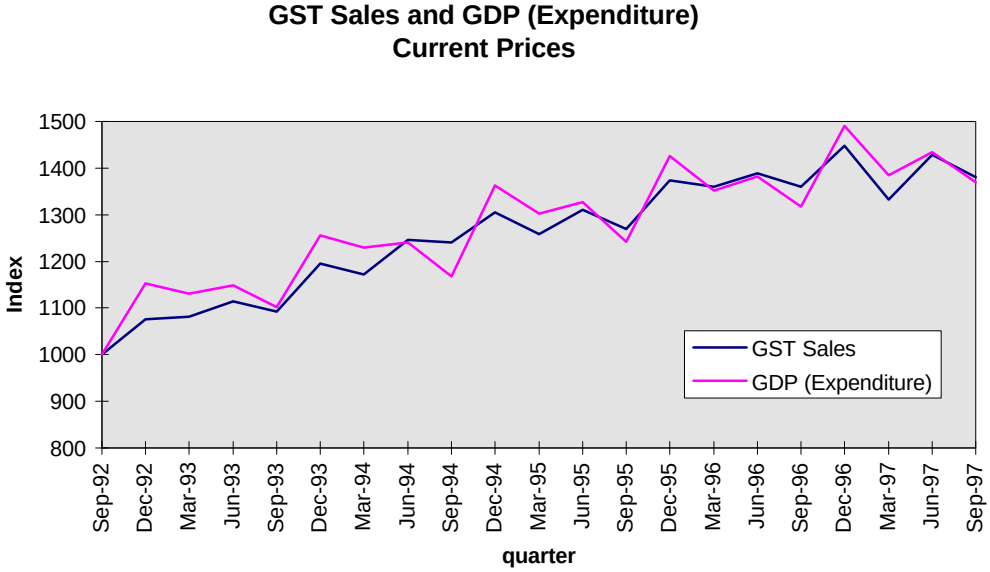
Some of the new series produced are illustrated below.

The Total Economy

This graph is shows GST sales for the total economy.

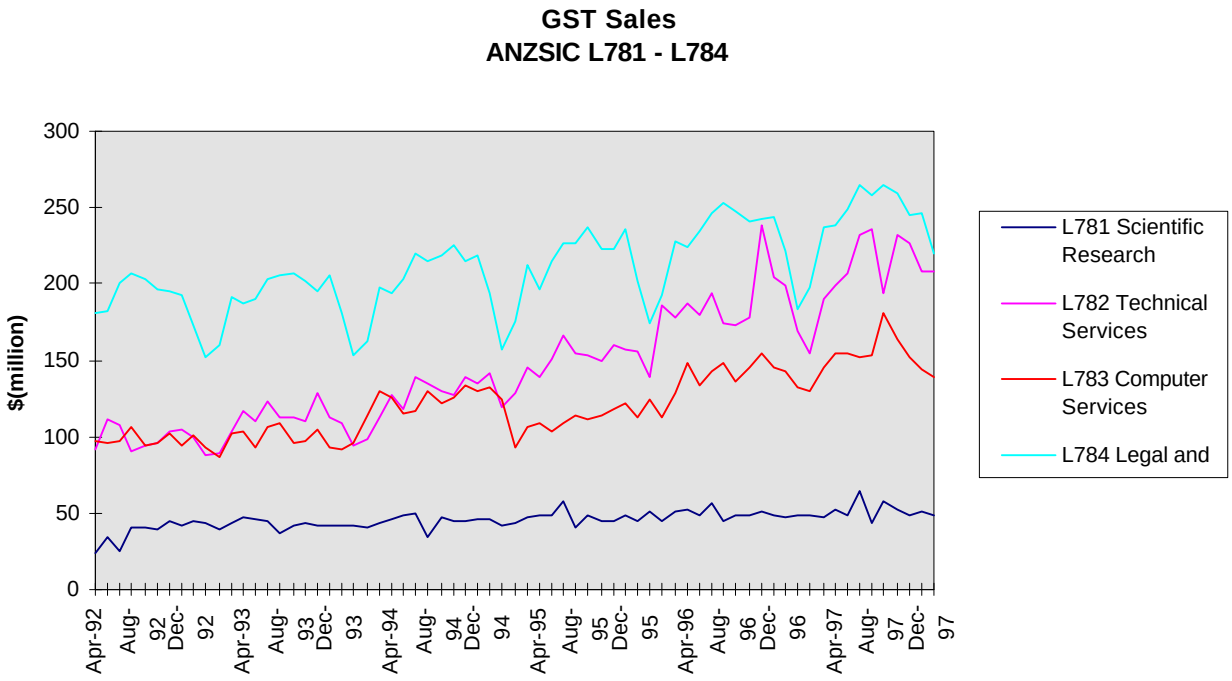


It can be compared to GNP Expenditure at current prices on a quarterly basis..



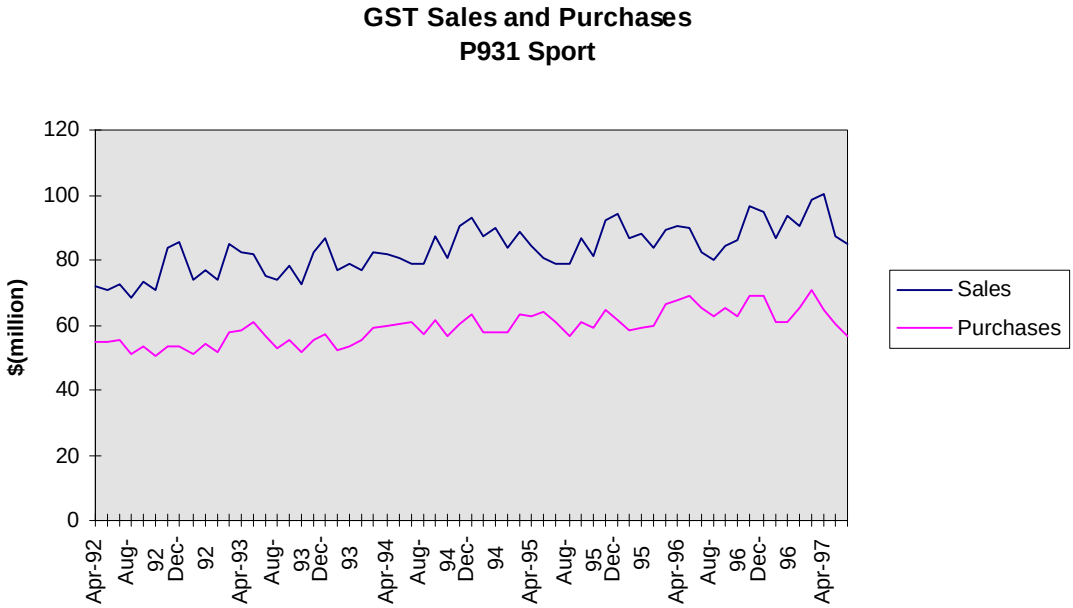
Business Services

The graph below illustrates series for some industries in business services sector. This is an area where these has been very strong growth, but statistics measuring this have been limited. There has been strong growth in technical services and computer services, but scientific research has remained relatively flat. Legal and accounting services have increased slowly, but exhibit a strong seasonal pattern, including longer breaks for the Christmas Vacation.

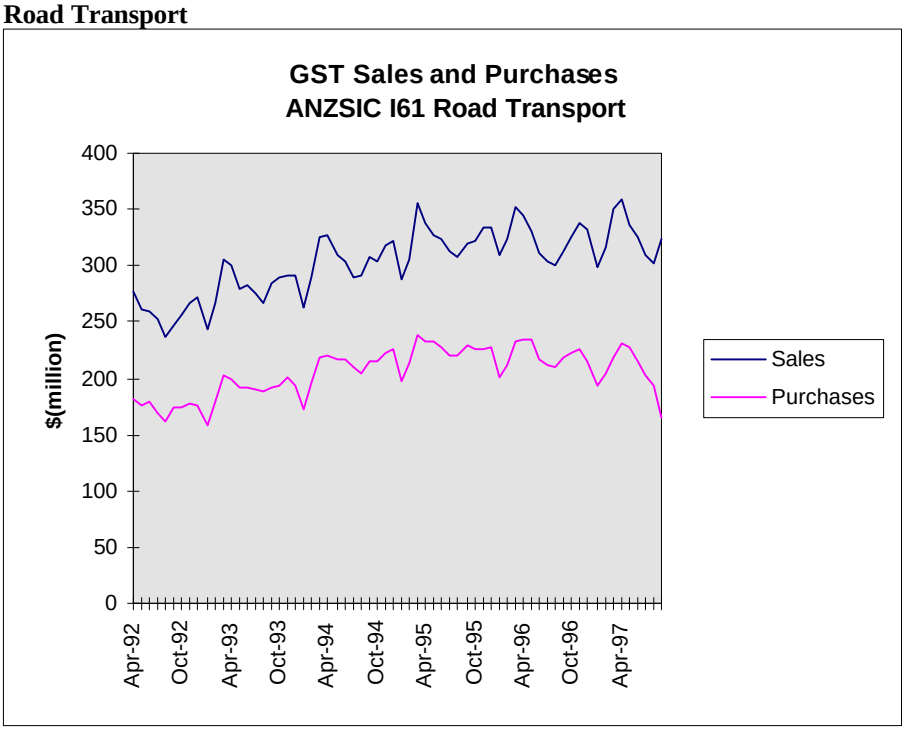


Sports Clubs

This is another important part of the modern economy. However, there are so many such clubs in New Zealand that surveying them using traditional methods would be prohibitively expensive. However, a good short-term indicator series can be produced using GST data, because most sports clubs register for GST.



Road Transport



These are just a sample of the large number of series that can be produced using GST series.

Conclusion

The benefits from the GST-based series to Statistics New Zealand will be considerable:

- The development of the GST-based series represent a huge step forward with respect filling a significant gap in the services statistics.
- The series have potential to be produced at a very low level of disaggegation. Initially, series will be published for 30 industries in addition to retail and wholesale trade. However, it is possible to produce statistics for sales and purchases at a 4-digit ANZSIC level. They only restriction on publishing estimates at this level, will be problems with group apportionment and confidentiality.
- As our understanding of the series increases it is likely that they can be used to replace employment-based estimates in Quarterly GDP.
- As the Economic Statistics Strategy is applied, likely that sample surveys, especially of smaller units, will be partly replaced

4/09/98

Appendix 1

Proposed GST Series Published industries

	ANZSIC	Industry
A. Agriculture, Forestry and Fishing		
1	011	Horticulture and Fruit Growing
2	012, 0159	Livestock and Cropping Farming
3	013	Dairy Cattle Farming
4	014, 015 ex 0159, 016	Other Farming
5	02	Services to Agriculture, Hunting and Trapping
6	03	Forestry and Logging
7	04	Commercial Fishing
B. Mining		
8	11, 13, 14, 1513-1520	All Other Mining and Quarrying
9	12, 1511-2	Oil & Gas Exploration & Extraction
C. Manufacturing		
10	211	Meat and Meat Product Manufacturing
11	212	Dairy Product Manufacturing
12	213-9	Other Food, Beverage and Tobacco Manufacturing
13	22	Textile, Clothing, Footwear and Leather Manufacturing
14	23	Wood and Paper Product Manufacturing
15	24	Printing, Publishing & Recorded Media
16	25	Petroleum, Coal, Chemical and Associated Product Manufacturing
17	26	Non-metallic Mineral Product Manufacturing
18	27	Metal Product Manufacturing
19	28	Machinery & Equipment Manufacturing
20	29	Other Manufacturing
D. Electricity, Gas and Water Supply		
21	361	Electricity
22	362	Gas Supply
23	37	Water Supply, Sewerage and Drainage Services
E. Construction		
24	41, 42	Construction
F. Wholesale Trade		
25	451	Non-Food Unprocessed Primary Product Wholesaling
26	4521	Petroleum and Petroleum Products Wholesaling
27	4522	Metals Wholesaling
28	4523, 4796	Pharmaceuticals and Chemicals Wholesaling
29	4531, 4539, 4739	Building Materials, Supplies and Hardware Wholesaling
30	461	Machinery and Equipment Wholesaling
31	462	Motor Vehicle Wholesaling
32	4711, 4713, 4714, 4715	Food Primary Product Wholesaling
33	4712, 4716, 4717, 4718, 4719	Food and Grocery Product Wholesaling
34	472	Textiles, Clothing and Footwear Wholesaling
35	473	Household Appliances, Furniture and Floor Coverings Wholesaling
36	4794, 4795	Pulp, Paper and Paper Products Wholesaling
37	4791, 4792, 4793, 4799	Wholesale Trade Wholesaling n.e.c.

G. Retail Trade

38	5110, 5121, 5122, 5124, 5126, 5129	Food Retailing
39	5210	Department Stores
40	5221, 5223	Clothing and Softgoods Retailing
41	5222	Footwear Retailing
42	5231, 5232	Furniture and Floor Coverings Retailing
43	5234, 5235	Appliance Retailing
44	5233	Hardware Retailing
45	5241, 5242, 5243, 5244, 5245	Recreational Goods Retailing
46	5251	Chemist Retailing
47	5252, 5253, 5254, 5255, 5259, 5261, 5269	Other Stores Retailing
48	5311, 5312, 5313	Automotive Vehicle Retailing
49	5321, 5322, 5323, 5324, 5329	Automotive Vehicle Services
50	5730, 5125	Cafes, Restaurants and Takeaways
51	5710, 5720, 5740, 5123	Accommodation, Hotels and Liquor

H. Accommodation, Cafes and Restaurants

52	57	Accommodation, Cafes and Restaurants

I. Transport and Storage

53	61	Road Transport
54	64	Air Transport
55	62, 63	Rail and Water Transport
56	65, 66, 67	Other Transport, Storage and Transport services

J. Communication Services

54	71	Communication Services

K. Finance and Insurance Services

57	73	Finance
58	74	Insurance
59	75	Services to Finance and Insurance

L. Property and Business Services

60	771, 772	Property Operators and Developers
61	772	Real Estate Agents
62	773-4	Other Property Services
63	781	Scientific Research
64	782	Technical Services
65	783	Computer Services
66	784	Legal and Accounting Services
67	785	Marketing and Business Management Services
68	786	Other Business Services

M. Public Adminstration and Defence

69	81 (excl 8113), 82, 9631-3	Central Government Administration and Defence, incl Public Order and Safety Services
70	8113	Local Government Administration

N. Education

71	84	Education

O. Health and Community Care Services

72	861	Hospitals and Nursing Homes
73	862	Medical and Dental Services
74	863	Other Health Services
75	864	Veterinary Services
76	871	Child Care Services
77	872	Community Care Services

P. Cultural and Recreational services

78	91	Motion Picture, Radio and TV Services
79	92	Libraries, Museums and the Arts
80	93	Sport and Recreation

Q. Personal and Other Community Services

81	95	Personal Services
82	96 (excl 9631-9633), 97	Other Services