

Developing and implementing a survey on intermediate consumption for the service sector in Sweden concerning reference year 2007- Special focus on Railway transport.

Margareta Carlsson and Daniel Lennartsson
Statistics Sweden

Abstract

Information about intermediate consumption for the service sector is an important input to the National Accounts. Up until now there has been no regular data collection in this area. From the Structural Business Statistics (SBS) information about *Raw materials and consumables* and *Other external expenses* are collected. These two aggregated variables are then to be further specified. Different kind of sources are used for this purpose; the Combined Nomenclature (CN), income and cost statements, information from branch organizations and product groups that National accounts have in their supply and use tables. To collect data on *Other external expenses*, information from the income- and cost statement have been used which is combined to Swedish general chart of accounts (BAS) which is commonly used by almost every small and medium sized enterprise in Sweden. From the SBS we have estimates of the main variables based on known values from the Swedish Tax Agency. To collect data for *Raw materials and consumables* a telephone follow up study has been made.

The pilot survey of intermediate consumption is done for the third time for the reference year 2007. The following activities were covered; transport, computer services, business services and sewage and refuse disposal, sanitation and similar activities. For the reference year 2007 all data was collected within the SBS survey. In this report it will be a special focus on intermediate consumption for *Railway transport*.

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Background

In the year of 1856 the Swedish State Railways (SJ) was formed and in this year the first train left from Gothenburg central railway station. This train had a speed of 30 kilometers per hour. When the railway system was growing in Sweden villages was growing to cities, and it gave material to industries and the possibility for people to travel. At the same time as people started to travel by train Sweden got a uniform national time system.

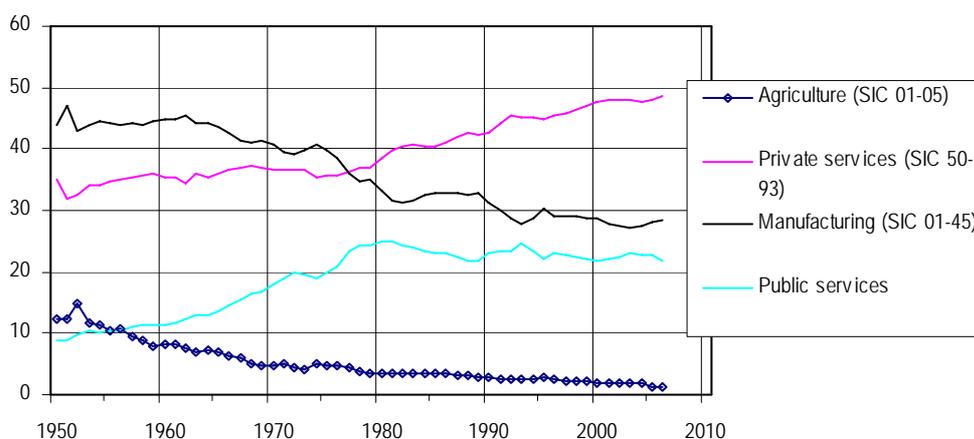
Down below we give some of the most important years for the Swedish railway system:

- In the year of 1871 a railway station was formed in Stockholm which made it possible to travel by train between the two largest cities, Gothenburg and Stockholm.
- In the year of 1894 Sweden got the first restaurant coach.
- In the year of 1939 the parliament made a decision that the whole railway system should be owned by the state.
- In the year of 1995 the parliament made a decision of free competition. Just a few per cent of the traffic goes to other operators but has since then steadily been growing.

1. Introduction

During the last 30 years Sweden has gone from being a manufacturing nation to more and more become a service producing nation. In the beginning of 1950 35 per cent of the value added was coming from the service sector and 45 per cent from the manufacturing sector. In the year 2007 it was the other way around and 49 per cent of the value added in the Swedish economy was coming from the service sector and 29 per cent of the value added from manufacturing sector.

Share of value added in current prices 1950-2007, by sector



The statistics for the service sector has not followed the change in the economy and there is still much more statistics for the manufacturing sector compared to the service sector.

Information about the intermediate consumption for the service sector is an important input to the National Accounts in the calculation of supply and use tables. Up until 2005 there has been no regular data collection in this area. The National Accounts have instead been forced to work with different assumptions in their calculations of the Gross Domestic Product (GDP). In order to handle this shortage a project started within Statistics Sweden to develop and implement a new survey. Focus of the survey is to measure the product breakdown on intermediate consumption in order to get a good picture of the variation of production of goods and services within the service sector.

2. National accounts

The Gross Domestic Product (GDP) is the value of all goods and services which is produced within the country for the use for consumption, investments and export during a period. GDP is measured at market prices and is the sum of all the industries' value added, plus product taxes (value added tax, alcohol tax, etc.) minus product subsidies.

The level of value added is defined in the European System of Accounts (ESA) for each, such as the following:

$$VA = \text{production} \quad \textit{minus} \quad \text{intermediate consumption}$$

or in greater detail, one might write

$$VA = \text{Turnover} \quad \textit{minus} \quad \text{business costs} \\ \textit{plus} \quad \text{changes to inventory} \\ \textit{plus capital} \quad \text{formation by the producer}$$

The intermediate consumption of goods and services is calculated within the national accounts in something that is called supply and use tables. Supply and use tables are composed of activity and product matrices, which in detail describe the domestic production processes and transaction with products within the country. These tables show:

- The structure of the production costs and the income which is generated within the production process.
- The flow of goods and services which is produced within the country's economy.
- The flow of goods and services into and from foreign countries.

The calculations within the supply and use tables in Sweden are done for approximately 400 product groups and 135 activity groups. In annex 1 an extract for the activity of railway transport can be seen. The service sector is calculated for 41 activities.

The level of the intermediate consumption in each activity is taken from the Structural business statistics. Up until now there has been no regular data collection in this area for breakdown on product groups. The National Accounts have instead been forced to work with different assumptions in their calculations of the intermediate consumption for the service sector.

3. Survey on intermediate consumption (ICS) 2007

3.1 Structural Business Statistics at Statistics Sweden

The survey on intermediate consumption (ICS) is very tight connected to the Structural Business statistics¹ (SBS). All data in the ICS is collected within the SBS survey. Therefore a short description of the SBS is given in this part.

The Structural Business Statistics is an EU-regulated survey carried out on a yearly basis. Statistics Sweden has recently implemented a new method for the SBS. A key factor of this new method is the use of administrative data (SRU) from the Swedish Tax Agency to a larger extent than before. From the SRU certain main variables such as *Sum of expenses for raw materials and consumables* and *Other external expenses* can be derived for every object in the population of interest in the SBS. These main variables are very important in the production of the ICS survey. The quality, though, of the cost specification in the SRU is considered low so total cost (the sum of the cost variables) is used in the SBS. In fact, the sums of those totals are used as known population totals in the estimation phase. Additional primary data collection is needed within the SBS to meet the demands from the National Accounts and the SBS regulation. But this additional data collection is limited to obtain estimates of desired relative distributions such as total costs divided into components, rather than estimates of unknown totals. The SBS produces separate estimates of the variables, *Expenses for raw material*, *Expenses for resale* and *Other external expenses* (divided into a few further specified components) based on information from all large enterprises complemented with information from small enterprises based on a sample survey.

3.2 A survey on intermediate consumption

The study variables in the survey on intermediate consumption (ICS) are, as already mentioned, further specifications of the two aggregated variables *Expenses for raw materials* and *Other external expenses*. Within the SBS some of the specifications concerning other expenses already are collected on a yearly basis, such as:

- Freight and transports
- Temporary manpower
- Computer program
- Rent for premises
- Purchased services and cost of administration
- Advertising and PR
- Other

It is the variables *Other*, *Purchased services and cost of administration* and *Advertising and PR* in *Other expenses* that is the main target for the ICS survey together with the variable *Expenses for raw materials*. The ICS survey for the reference year 2007 was a part of the SBS survey. The activities that was surveyed were transport (NACE 60), computer services (NACE 72), business services (NACE 74) and sewage and refuse disposal, sanitation and similar activities (NACE 90).

There were several objectives of the pilot survey:

- The possibility to collect required information from the enterprises.
- Get feed-back from the respondents on the questionnaire design.
- Estimate relative distributions of *other external expenses* from the pilot survey and compare them with the estimated distributions from the SBS for earlier years.
- To get a picture of what kind of *raw materials* and type of *other external expenses* that is used in each sector.
- Explore the structure of the expenses, is it similar for all enterprises in the same sector, is it the same for small and large enterprises.
- Estimate relative distributions and population totals of the specifications and give the National Accounts to explore.

The objective of the pilot survey was to shed light over several things and the design of the pilot survey could therefore not be optimized for any specific purpose. It was mandatory for the enterprises to participate in this pilot survey.

3.2.1 Object and population

The surveyed object was enterprise unit, which in most cases is the same as the legal unit or the accounting unit. In some cases was data collected at the enterprise group level or for several legal units. In cases when the enterprise unit had many activities it was divided into several kind of activity units. With this division it was possible to do both institutional (enterprise) and functional (kind of activity) statistics. Data concerning costs were collected at the functional level. All enterprises that had activities during the reference year were included in the frame except for financial enterprises.

3.2.2 Frame

The coordinated sample system, SAMU, which is created yearly based on Business register is used to create the frame. From this it is also decided which enterprises data shall be collected on a questionnaire and when the administrative data shall be used. To be included in the frame the enterprise should have an activity during the year and it should also be active. An enterprise is active in the Business register if it is registered for employer fees, is included in the VAT register or is registered for enterprise tax.

The survey on intermediate consumption for 2007 covered NACE 60.1, 60.21, 60.22, 60.23, 60.24, 72, 74.2, 74.3, 74.5, 74.6, 74.7, 74.8, 90. The estimations in this survey were done at this level.

3.2.3 Sample

3.2.3.1 Sample

In the SBS survey there are three different specification surveys:

- SpecRR – Specification of costs and turnover.
- SpecI – Specification of investments.
- SpecA – Specification of investments shares and stocks.

Of the three specification surveys it is SpecRR which deals with costs and it is therefore this one that is described here. SpecRR is suffering from sample error and the sample for SpecRR cover approximately 15 000 enterprises. In the activities that cover the survey on intermediate consumption 2 953 enterprises was sampled. The sample for these activities was divided into 15 three-digit activities. A simple random sample was drawn from each strata, where the probability to be sampled was proportional to size, i.e a large enterprise has a higher probability to be sampled than a smaller enterprise. The following three digit activities were covered in the ICS 2007:

Table 1 Sample size

Activity	Sample size
60.1	11
60.2	610
72.1	169
72.2	391
72.3	43
72.4	66
72.5	15
72.6	35
74.2	854
74.3	21
74.5	86
74.6	24
74.7	208
74.8	346
90.0	74
Total	2 953

3.2.3.2 Subsample for raw materials

The initial thought was that a sample survey should be done for the covered activities with a detailed description on costs for raw materials. After contacts with branch organizations, accounting reports and the foreign trade statistics it was concluded that there still was lack of information to create a questionnaire on detailed product groups. It was therefore decided to make a telephone follow up study to enterprises that had provided figures on the following variables in the SBS survey:

v3003 – Raw materials

v3004 – Consultancy services

v3009 – Other costs for services in the production

Data about which costs that are hidden under these costs should be collected and specified in telephone contact with the individual enterprise. The thought with this collection was not to make good estimates but was more to be seen as a collection of which costs was hidden under raw materials and that can be used in a questionnaire in the future. The number of telephone contacts that was made in different activities can be seen in table 2 below.

Table 2 Number of telephone contacts

Activity	Sample size	Comments
60.1	2	
60.2	40	20 large and 20 small enterprises
72.1-72.4;72.6	30	15 large and 15 small
72.5	8	
74.2	25	10 large and 15 small
74.3	5	
74.5	10	5 large and 5 small
74.6	10	5 large and 5 small
74.7	10	5 large and 5 small
74.8	30	10 large and 20 small
90.0	15	
Total	185	

3.2.4 Reference year

Data in this survey cover reference year 2007. For larger enterprises with a broken accounting year the reference period that cover accounting from the first of May the actual reference year to 30th of April the year following reference year. For an accounting year that is shorter than 12 month's figures have been estimated to cover a period of twelve months. For the small and sampled enterprises which were based on administrative data and have a broken accounting year the reference period was based on the accounting period which were finished during the reference year.

3.2.5 Variables

The costs for these activities were divided as follow of table 3.

Table 3 Cost variables

Raw materials	Costs for taxi transports	Costs for office goods
Energy costs	Costs for transports with ship	Costs for electricity for heating
Costs for restaurant activities	Costs for transport agent activities	Costs for fuel for heating
Costs for financial leasing	Costs for machine services	Costs for distant heating
Other costs for rent and leasing of inventories	Costs for rent of vehicles/machines without driver	Real estate tax
Costs for fuel	Costs for vehicles excluding leasing	Sitelashold right
Costs for energy	Management fees	
	Legal and accounting services	Costs for radio and TV program
Costs for freights and transports	Costs for IT services	Costs for goods for hire
Losses on short term claims	Costs for data program	Costs for water and sanitation
Insurance costs for enterprise and properties	Network services	Costs for cleaning
Insurance and tax costs on vehicles	Bank costs	Costs for consumption material
Insurance costs on goods distribution	Credit card costs	Ticket costs
Other inventories with a life longer than one year	R & D costs	Car rent costs
Other inventories with a life less than one year	Economic consultancy services	Food and room costs
Exchange rate differences	Business organizations costs	Other travel expenses
Costs for rent and premises	Other costs for consultancy services	Sales costs
Restructuring costs	Costs for advertising and PR	Costs for printing materials
Maintenance and services costs for machine and inventories	Costs for rented personnel	Tele and data communications costs
Maintenance and services costs for vehicles	Gross costs in pools, passenger traffic	Costs for post
Maintenance- and services of real estate and installations	Harbor, canal- and pilot costs	Costs for guard and alarm
Costs for hired transport with aero plane	Loading- and unloading costs	License fees
Costs for hired transport with train	Costs for brokers and agents	Supervision fees
Costs for hired transport by road	Costs for packet tours (hotel and other arrangements)	Sales provision
Costs for hired bus transport	Intermediary costs for travel and hotels	
Costs for purchase of traffic	Costs for electricity for lightning	

3.2.6 Number of responses and partial non response

The number of responses is shown in table 4. NACE 60.1 was the activity with the highest unweighted response rate, 91 per cent. NACE 60.2 had the lowest response rate with an unweighted response rate on 70 per cent. The total response rate for ICS activities was 80 per cent. This is approximately the same as for the whole SBS which was 81 per cent. The weighted response rate for the ICS was 83 per cent, which is a little bit lower than the one for the SBS which was 87 per cent.

Table 4 Response rate by activity

Activity	Sample size	Number of respondents	Unweighted response rate	Weighted response rate
60.1	11	10	91	89
60.2	610	427	70	70
72.1	169	140	83	83
72.2	391	320	82	82
72.3	43	36	84	83
72.4	66	56	85	86
72.5	15	12	80	80
72.6	35	31	89	91
74.2	854	720	84	85
74.3	21	19	91	89
74.5	86	75	87	87
74.6	24	19	79	80
74.7	208	156	75	76
74.8	346	278	80	81
90.0	74	62	84	83
Total	2953	2361	80	83

The weighted partial non response is shown in table 5. In total it was a rather low partial non response in this survey. The partial non response varies between zero to nine per cent. NACE 60.2 was the activity with the highest partial non response rate, nine per cent. For railway transport the figure was three per cent. The lowest partial non response was in Technical testing (NACE 74.3).

Table 5 Weighted partial non response

Activity	Weighted partial non response
60.1	2.7
60.2	9.2
72.1	4.7
72.2	3.5
72.3	0.5
72.4	0.9
72.5	1.0
72.6	1.8
74.2	5.7
74.3	0.0
74.5	2.9
74.6	0.0
90.0	3.8

It was interesting to see if the weighted partial non response increased when we introduced a more detailed cost specification for the year 2007. Table 6 shows that the partial non response has not increased in a systematic way between 2006 and 2007. For some activities like NACE 72.1, 72.2, 72.4, 72.6 and 74.2 the partial non response has decreased. The conclusion is that a more detailed cost specification did not lead to a higher partial non response.

Table 6 Weighted partial non response over time

Activity	2006	2007	Difference
60.1	0.0	2.7	-2.7
60.2	8.2	9.2	-1.0
72.1	11	4.7	6.3
72.2	3.7	3.5	0.2
72.3	0.0	0.5	-0.5
72.4	1.2	0.9	0.3
72.5	0.0	1.0	-1.0
72.6	2.5	1.8	0.7
74.2	7.2	5.7	1.5
74.3	2.6	0.0	2.6
74.5	1.8	2.9	-1.1
74.6	0.0	0.0	0.0
90.0	0.0	3.8	-3.8

3.2.7 Editing

The data material which was collected from larger enterprises went through a rather detailed micro editing program where controls like summation, reasonable and relations between different variables was done. The smaller and medium sized enterprises have gone through a smaller

package of controls on micro level and after that a selective editing where large values within each activity was edited.

The administrative data from the tax authority was edited with a lot less controls. This editing was concentrated to values which have a large effect on the estimation within the strata.

After the edition was finalized at micro level and the selective editing was done was the data material corrected for the non response. After that the data from questionnaires was combined with the administrative data. This builds a common framework for the variable content. In the micro editing phase a special emphasis has been endowed for large values under *Other* under *Other external expenses*. A lot of contacts with enterprises were done for this and costs were moved to existing detailed cost variables.

As a last step the material is macro edited. In this work no difference is made between data from questionnaires or administrative data. Large values on *Other* has also been edited in the macro editing phase.

Raw materials by detailed costs have been collected in a telephone follow up study to enterprises that had provided figures on raw materials. Data was registered in a separate IT system for ICS. Data was collected from 185 enterprises with a spread on activities between 5 up to 40 enterprises. Within this small survey costs that relates to costs under *Other external expenses* been moved in the SBS statistics but has in the ICS system been registered as a cost for Raw material.

4. Results from the pilot survey

4.1 Unspecified costs

Some valuable results of the functioning of the questionnaire could be derived. A very low amount of *Other external expenses* are now found under *Other*, which indicates that the pre-printed variables have worked in a satisfying way. The amount of unspecified costs varies from one to seven per cent. This was one of the objectives of the pilot survey. These results can clearly be seen in table 7.

Table 7 Proportion of Other under Other external expenses unspecified in the SBS 2006 and SBS (ICS) 2007

NACE-Group	Other external expenses	
	Unspecified in SBS 2006	Unspecified in SBS 2007
60.1	18	2
60.21	14	2
60.22	70	7
60.23	42	1
60.24	24	2
72	48	4
74.2-74.3	53	5
74.5-74.8	51	6
90.0	38	7

4.2 Comparison of SBS 2005-2007

Some checking has also been made towards the SBS and especially the SRU. The checking is done by editing the level of *Expenses for raw materials and consumables*, *Purchased services and cost of administration* and *Other external expenses*. In case there is a difference checking is made towards the annual report and as a last way out the enterprise is contacted. In table 8 a comparison between the estimated cost distribution from the SBS 2005 and 2006 and the estimated cost distribution from the ICS (regarding variables included both in the SBS and in the ICS) is shown. All possible variables are not included in the table, only variables with a significant proportion.

In this part the costs division over time and for the activities covered in SBS and ICS 2007 and their costs in SBS 2006 and 2005 were studied. In SBS and ICS 2007 has we asked for more detailed costs specification of *Costs for services and for administration* and *Costs for advertising and PR* were collected. In SBS 2005 and 2006 only aggregates within these costs were collected.

In railway transport the costs *services and for administration* has increased from three to eight per cent between 2005 and 2007. This due to that we ask about costs for IT-services direct under costs for raw material but also due to that when we ask for more details we catch the costs in a better way. We can also see that the share of others has decreased, this is probably also due to that enterprises has moved costs from others to detailed costs for services and administration. It is also so that we have been editing a little bit more in SBS 2007 than we did in SBS 2006 and 2005. When enterprises have provided due with large figures under *Other* enterprises has been contacted to see what is hidden under there.

Table 8 Railway transport - Estimated relative distribution (%) of the cost variable *Other external expenses* from the SBS 2005 and 2006 and from the SBS (ICS) 2007

	Values			Shares		
	2007	2006	2005	2007	2006	2005
Total	-9 122	-8 452	-7 621	100	100	100
Goods for resale	0	-1	0	0	0	0
Raw materials	-32	-75	-60	0	1	1
Other external costs	-9 090	-8 376	-7 561	100	99	99
Costs for temporary manpower	-84	-70	-68	1	1	1
Costs for data program	-2	-3	-2	0	0	0
Costs for real estate	-347	-237	-260	4	3	3
Costs for purchased services and management fees	-713	-484	-246	8	6	3
Costs for advertising and PR	-187	-144	-19	2	2	0
Other costs	-7 748	-7 430	-6 949	85	88	91
Losses on short term claims	-9	-8	-17	0	0	0
Other	-1 163	-1 513	-1 750	13	18	23

4.3 Raw materials

In the ICS 2007 a special follow up study was made for costs that were hidden under raw materials. In railway transport there was costs for 370 million SEK under raw materials before editing. 338 million of these costs come from IT services and 32 million SEK come from unspecified costs.

4.4 Total list of costs

Table 9 shows the division costs for railway transport in ICS 2007. The total costs amounts to 9 090 million SEK. The main costs are related to transport activities. The largest cost come from maintenance and service of vehicles, 1 932 million SEK.

Table 9 Costs for railway transport

Costs	Value (million SEK)
Total costs	-9 090
Maintenance and service of vehicles	-1 932
Other costs for freight and transports	-1 248
Costs for fuel	-894
Costs for hired transport by train	-743
Costs for leasing and short term rent	-584
Costs for hired transport by road	-494
Costs for IT-services	-447
Costs for rent of premises	-347
Fees for infrastructure	-222
Costs for goods and services on train	-208
Other costs for vehicles	-200
Other consultancy services	-191
Insurance costs for vehicles	-182
Tele- and data communications	-106
Other costs for advertising and PR	-99
Maintenance and services for machines and inventories	-97
Costs for temporary manpower	-84
Station fees	-79
Maintenance, security, planning of traffic	-73
Maintenance and services of real estate	-60
Costs for announce	-51
Sales costs	-46
Costs for enterprise insurance	-36
...	
Other costs	-226

As a summary it can be said that ICS for Railway transport has been working well. Of the total costs there is only 226 million SEK or 2.5 per cent of the total costs that is unspecified. This depends a lot on that a new control has been introduced for large values under *Other*. It also seems that it has been possible for the enterprises to provide data on the different cost categories. For other external expenses it seems to be rather easy for the enterprises to provide us with figures. The costs that have been printed are costs that the enterprises can identify themselves with.

5. Conclusions and future plans

The use of income and cost statements to get a good picture of what can be captured from the enterprises bookkeeping systems have proven to be successful. Along with the fact that references was made to the Swedish general chart of accounts (BAS), which is a commonly used by almost every small- and medium sized enterprises in Sweden. The possibility to send in income and cost statements instead of filling in the questionnaire has also been successful in terms of response burden.

A general conclusion from the pilot survey is that collecting data on intermediate consumption for these activities of the service sector and especially for the railway transport is feasible. The use of SBS data is successful in terms of response burden since, by using this method, the samples can be kept fairly small. However, the relative estimated distributions differ between SBS 2005 and 2006 compared to ICS 2007 so further studies are required.

For the reference year 2008 will NACE 50.2, 52, 61, 62, 64.1 and 85.1 be surveyed according to NACE Rev 1.1. The same survey design that has been used for ICS 2007 will be used for ICS 2008.

Annex 1 –Intermediate consumption in Railway transport 2007

Variable	CPA	Value SEK million
Total	Total	-9 056
Different manufacturing products	10-37	-104
Consumable materials	180000	-15
Costs for office material	210000	-8
Graphical production	222000	-17
ID cards	222500	-2
Fuel	230000	-894
Motor vehicles	340000	-201
Cars	341000	-23
Heating	403000	-1
Water	410000	-2
Maintenance of vehicles	50A000	-1932
Hotel services, Restaurant services	550000	-24
Transport	60-62X	-20
Land transport; transport via pipelines	600000	-1331
Other supporting land transport activities	63210C	-374
Activities of other transport agencies	634000	-1238
Post services	641000	-20
Telecommunications services	64201A	-106
Financial intermediation	65B000	-3
Insurance and pension funding, except compulsory social security	660000	-219
Letting of own property	7020A0	-347
Other real estate activities	70A000	-60
Manufacture of plastic products	710000	-584
Renting of automobiles	711000	-2
Data program	72A000	-447
Other computer services	722000	-2
Legal and accounting, bookkeeping and auditing services; tax consultancy	741000	-73
Advertising services	744000	-150
Labor recruitment and provision of personnel	745000	-84
Investigation and security activities	746000	-13
Industrial cleaning	747000	-16
Miscellaneous business activities n.e.c.	748000	-1
Activities of business, employers' and professional organizations	911000	-9
Other	999997	-734