

STATISTICS SWEDEN

Economic Statistics/Business Structure

Daniel Lennartsson

Annika Lindblom

The implementation of a more efficient way of collecting data for the Short term Statistics in Sweden

1. Background

1.1 Objectives

Statistics Sweden started a project in August 2008, with grants from Eurostat, to test if it was possible to use data from the value added tax register (VAT) in the production of the turnover statistics for the service sector.

From year 2001 to year 2007 have the VAT register been used as data source for the quarterly turnover statistics together with questionnaires for large enterprises.

The turnover statistics became monthly from 2008 after demands from the users. The first approach for the new statistics was to use VAT for the small and medium sized enterprises. The large enterprises should provide figures on questionnaire. But unfortunately for the project the Swedish Government made a decision that enterprise with a turnover less than 40 million SEK (approximately 4 million Euros) should provide figures on a quarterly basis instead of monthly. This late decision made it impossible to evaluate if the VAT register was a suitable data source for the turnover statistics. It is this evaluation that this project will do.

1.2 Description of the work

The data collection for the turnover indicator in other services has changed since the reference year 2008. The data is now only collected through questionnaire. The method of data collection was changed because of two reasons, the first one was that the data should be collected on a monthly basis and secondly because the legislation for the value added tax register (VAT) was changed from monthly to a quarterly reporting basis for enterprises with a yearly turnover less than 40 million SEK from reference year 2008 and onwards.

This project aims to find a model where VAT data can be used together with questionnaires. Statistics Sweden shall weight pros and cons for the use of administrative data, in terms of quality of the produced estimates, of cost of collection, timeliness and burden of business.

1.3 Expected results

The results of the actions undertaken to find a model where VAT data can be used together with questionnaires in turnover statistics for the service sector. It should include a detailed description of the methodology chosen and its application into working tools.

Statistics Sweden approach is to:

- ✓ use a sample survey (and collect information direct from the enterprises) for a monthly indicator
- ✓ explore the possibility to use VAT-data for small enterprises in the production of the detailed quarterly estimates

Study different methods to use observed values in the VAT-data to compensate for enterprises not submitted the VAT return, due to timeliness.

1.4 Purpose of the action

This purpose of the action is to find a model where VAT data can be used together with questionnaires. Statistics Sweden shall weight pros and cons for the use of administrative data, in terms of quality of the produced estimates, cost of collection, timeliness and burden of business.

2. Introduction

This part of the report will describe the work, which are going to be done in this project. This part starts with a brief description of the survey today followed by a description of this project.

2.1. Survey today

Statistics on Turnover in Other Services is produced and published every month. Data is collected by questionnaires. Questionnaires are sent out once a month to approximately 4 200 enterprises and to about 5 700 additional enterprises each quarter. Enterprises with a quarterly questionnaire have to split the turnover on months. From the small sample (4 200 enterprises) is a preliminary monthly estimate produced 35 days after the end of the reference month. A definitive monthly estimate is produced when data has been collected for a quarter, based on the 9 900 enterprises.

Enterprises are to submit their turnover regarding a specific month to Statistics Sweden at the latest the 15: th in the following month. For example, reference period January is to be reported at the 15: th February at the latest. The only variable collected in this survey is total turnover.

Following industries are examined in the quarterly survey according to NACE Rev 2; 45-96 excluding 64-66.

Swedish short term statistics follows the European regulation; Council Regulation of Short Term Statistics, EC 1165/98. Turnover in Other services is used as a key input into the calculation of the Swedish Gross Domestic Product (GDP). The results from the survey are disseminated about 35 days after current month end.

2.2. A new survey design

Statistics Sweden approach is to:

- ✓ use a sample survey (and collect information direct from the enterprises) for a monthly indicator which is published after T+35 days
- ✓ explore the possibility to use VAT-data for small enterprises in the production of the detailed quarterly estimates after T+45 days

Study different methods to use observed values in the VAT-data to compensate for enterprises not submitted the VAT return, due to timeliness.

2.3. VAT data

The contribution from the service sector continues to grow which means that this sector now is a key factor in the economy. This means that the users demand a timely monthly indicator. Statistics Sweden's approach is to use a sample survey for the monthly indicator and to use VAT-data for the detailed quarterly estimates.

2.3.1. Legislation

The Swedish Parliament approved a change in return period, regarding reporting VAT, from month to quarter, in force from first January 2008, regarding small enterprises.

Enterprises with an estimated annual turnover:

- ✓ exceeding 40 million SEK are, as before, required to report VAT on a monthly basis
- ✓ below or equal to 40 million SEK are required to report VAT on a quarterly basis
- ✓

Timeliness for the VAT data:

- ✓ The VAT-return for a large monthly enterprise must be submitted at the latest about **25** days after the end of the reference month
- ✓ The VAT-return for a small quarterly enterprise must be submitted at the latest about **40** days after the end of the reference quarter
- ✓ Statistics Sweden need the VAT-data about **35** days after the end of the reference quarter

2.3.2 Data quality

In the year 2000 Statistics Sweden made quality studies of the VAT data.

The main conclusions from those studies were:

- VAT data for small and medium sized enterprises is of better quality than data collected by questionnaires. In most cases VAT data for small and medium sized enterprises are similar to data that are provided in annual reports. There were a lot of reasons why the data in questionnaires had lower quality compared to the VAT data. One reason was that enterprises had problem with inclusion or exclusion of VAT taxes, another reason was that enterprises just reported for one local unit instead of the whole enterprise. In some cases it was just problem with the motivation of providing data on questionnaires.
- For large enterprises there are differences in turnover data in VAT and turnover data in annual reports. One reason for this is that VAT data in some cases are reported for a group of enterprises.

- There are also differences between VAT data and annual reports for enterprise groups. The differences are worst for large enterprises. There are also differences for small and medium enterprise groups but this are of minor importance. This has been evaluated by Statistics Sweden in another project over the turnover statistics.

2.3.3. VAT information

In this part data from the VAT will be presented. In table 1 we can see the amount of turnover that is split on different VAT groups. The total turnover for the service sector is 3 738 billion SEK.

Table 1 Turnover for different reference periods

| NACE rev1.1 | Year basis | Quarterly | Monthly | Total | Share |
|------------------------|-------------------|------------------|------------------|------------------|--------------|
| 50 | 4 120 | 32 242 | 361 625 | 397 987 | 11 |
| 51 | 10 373 | 81 952 | 1 162 112 | 1 254 436 | 34 |
| 52 | 6 830 | 57 856 | 348 258 | 412 945 | 11 |
| 55 | 3 695 | 27 883 | 69 863 | 101 441 | 3 |
| 60 | 2 652 | 20 638 | 138 404 | 161 694 | 4 |
| 61 | 258 | 1 433 | 36 042 | 37 733 | 1 |
| 62 | 11 | 959 | 49 411 | 50 381 | 1 |
| 63 | 1 391 | 12 073 | 177 731 | 191 195 | 5 |
| 64 | 844 | 1 290 | 185 971 | 188 105 | 5 |
| 70 | 2 796 | 39 514 | 105 846 | 148 156 | 4 |
| 71 | 450 | 4 606 | 26 122 | 31 178 | 1 |
| 72 | 2 671 | 20 532 | 134 724 | 157 928 | 4 |
| 73 | 281 | 1 395 | 88 894 | 90 570 | 2 |
| 74 | 7 091 | 70 045 | 275 974 | 353 111 | 9 |
| 90 | 66 | 1 132 | 18 270 | 19 468 | 1 |
| 92 | 478 | 4 790 | 60 167 | 65 435 | 2 |
| 93 | 415 | 3 783 | 12 934 | 17 132 | 0 |
| Total | 45 750 | 391 358 | 3 301 429 | 3 738 537 | 100 |

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Enterprise that provide VAT on a monthly basis stand for 88 per cent (or 3 301 billion SEK) of the turnover in the service sector. Enterprise that provides VAT on a quarterly basis stands for 11 per cent and the last per cent comes from enterprise that provides VAT on a yearly basis.

Table 2 Proportion of turnover after reference period

| NACE rev1.1 | Year basis | Quarterly | Monthly small | Monthly large |
|------------------------|-------------------|------------------|--------------------------|--------------------------|
| 50 | 1.0 | 8.1 | 15.4 | 75.5 |
| 51 | 0.8 | 6.5 | 8.5 | 84.1 |
| 52 | 1.7 | 14.0 | 18.8 | 65.5 |
| 55 | 3.6 | 27.5 | 37.4 | 31.4 |
| 60 | 1.6 | 12.8 | 31.4 | 54.2 |
| 61 | 0.7 | 3.8 | 8.3 | 87.2 |
| 62 | 0.0 | 1.9 | 3.4 | 94.7 |
| 63 | 0.7 | 6.3 | 10.0 | 83.0 |
| 64 | 0.4 | 0.7 | 0.9 | 98.0 |
| 70 | 1.9 | 26.7 | 21.2 | 50.3 |
| 71 | 1.4 | 14.8 | 20.5 | 63.3 |
| 72 | 1.7 | 13.0 | 13.9 | 71.4 |
| 73 | 0.3 | 1.5 | 3.5 | 94.6 |
| 74 | 2.0 | 19.8 | 23.1 | 55.0 |
| 90 | 0.3 | 5.8 | 11.8 | 82.0 |
| 92 | 0.7 | 7.3 | 9.1 | 82.9 |
| 93 | 2.4 | 22.1 | 43.7 | 31.8 |
| Total | 1.2 | 10.5 | 14.5 | 73.8 |

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There is another pattern when we look at the number of enterprises on different periods. The large enterprises that provides VAT monthly stands for 74 per cent of the turnover but just 3 per cent of the number of enterprises. The quarterly providers stand for 10 per cent of the turnover but 39 per cent of the number of enterprises. It can also be seen that the monthly small enterprises stands for 46 per cent of the number of enterprises but just 14 per cent of the turnover.

Table 3 Proportion of enterprises after reference period

| NACE rev1.1 | Year basis | Quarterly | Monthly small | Monthly Large |
|------------------------|-------------------|------------------|--------------------------|--------------------------|
| 50 | 6.9 | 34.4 | 53.2 | 5.5 |
| 51 | 6.9 | 39.5 | 42.7 | 10.9 |
| 52 | 10.1 | 38.6 | 49.6 | 1.6 |
| 55 | 12.2 | 35.6 | 51.0 | 1.2 |
| 60 | 6.9 | 27.8 | 63.6 | 1.7 |
| 61 | 10.2 | 40.1 | 41.1 | 8.6 |
| 62 | 5.8 | 37.0 | 34.1 | 23.2 |
| 63 | 8.8 | 33.9 | 45.7 | 11.7 |
| 64 | 9.4 | 36.9 | 40.6 | 13.1 |
| 70 | 18.4 | 48.5 | 30.9 | 2.1 |
| 71 | 8.7 | 39.2 | 48.4 | 3.7 |
| 72 | 13.3 | 46.2 | 36.9 | 3.7 |
| 73 | 20.8 | 35.7 | 38.2 | 5.2 |
| 74 | 15.1 | 43.0 | 40.3 | 1.6 |
| 90 | 5.4 | 29.0 | 53.6 | 12.0 |
| 92 | 24.6 | 38.5 | 34.5 | 2.4 |
| 93 | 9.9 | 31.7 | 57.9 | 0.5 |
| Total | 11.9 | 39.2 | 45.6 | 3.3 |

2.3.4 VAT obstacles

If we should be able to use VAT data in the production of turnover statistics we need to have the information T+38 days after the end of the reference month. In table 4 we can see how much of the turnover data that is available at that time. This is the picture for the first quarter 2009 but a similar picture is given for other quarters as well.

For all service activities 79 per cent of the data is available for all three months in a quarter. Ten per cent of the data is available for two months out of three and here some kind of imputation is needed for the third month in a quarter. For 12 per cent of the turnover no data at all is available. Most of these enterprises (74 per cent) are quarterly VAT-providers. Here is some kind of imputation needed for the whole quarter.

Table 4 Proportion of turnover that has been reported within 38 days after the expire date of the reference period

| NACE rev1.1 | For all Periods | One month of three | Two month of three | No data* |
|--------------|-----------------|--------------------|--------------------|-------------|
| 50 | 79.7 | 0.1 | 11.1 | 9.0 |
| 51 | 87.3 | 0.0 | 5.4 | 7.2 |
| 52 | 71.6 | 0.1 | 12.8 | 15.4 |
| 55 | 41.0 | 0.2 | 26.6 | 31.8 |
| 60 | 60.9 | 0.1 | 24.1 | 14.7 |
| 61 | 89.3 | 0.0 | 5.4 | 5.3 |
| 62 | 95.0 | 0.0 | 2.2 | 2.8 |
| 63 | 86.3 | 0.0 | 6.2 | 7.3 |
| 64 | 98.3 | 0.1 | 0.6 | 1.1 |
| 70 | 63.6 | 0.0 | 11.6 | 24.5 |
| 71 | 70.3 | 0.0 | 13.0 | 16.5 |
| 72 | 75.7 | 0.1 | 7.8 | 16.2 |
| 73 | 96.2 | 0.0 | 2.1 | 1.7 |
| 74 | 62.7 | 0.1 | 13.7 | 23.4 |
| 90 | 84.1 | 0.0 | 8.0 | 7.8 |
| 92 | 84.7 | 0.0 | 5.8 | 9.4 |
| 93 | 43.8 | 0.3 | 31.2 | 24.6 |
| Total | 78.6 | 0.1 | 9.5 | 11.7 |

*In this group 26 per cent come from monthly providers and 74 per cent from quarterly providers

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Ten per cent of the data is available for two months out of three and here some kind imputation is needed for the third month in a quarter. To do this imputation we need some kind information. In table 5 we can see how much of the turnover data we have for all three months among small and medium sized enterprises. For small and medium enterprises 24 per cent of the turnover is available for all three months after T+38 days. 76 per cent of the data is available for two out of three months and here some kind of imputation is needed (more details about this in chapter 3). The ratio of available turnover differs between 9 per cent (air transport) to 37 per cent (research and development).

Table 5 Proportion of turnover that has been reported within 38 days for small and medium enterprises

| NACE rev1.1 | Data for all three months | Data for two out of three months | Share |
|--------------------|----------------------------------|---|--------------|
| 50 | 11 812 | 40 969 | 22.4 |
| 51 | 25 235 | 61 291 | 29.2 |
| 52 | 14 311 | 50 464 | 22.1 |
| 55 | 5 432 | 25 342 | 17.7 |
| 60 | 7 421 | 37 994 | 16.3 |
| 61 | 708 | 1 994 | 26.2 |
| 62 | 109 | 1 064 | 9.3 |
| 63 | 4 037 | 11 379 | 26.2 |
| 64 | 266 | 956 | 21.7 |
| 70 | 8 510 | 16 463 | 34.1 |
| 71 | 1 208 | 3 887 | 23.7 |
| 72 | 4 151 | 11 354 | 26.8 |
| 73 | 1 100 | 1 852 | 37.3 |
| 74 | 14 364 | 46 648 | 23.5 |
| 90 | 439 | 1 491 | 22.7 |
| 92 | 899 | 3 475 | 20.5 |
| 93 | 1 188 | 5 207 | 18.6 |
| Total | 105 485 | 335 500 | 23.9 |

Twelve per cent of the data is not available for any of the three months (see table 4) and here some kind imputation is needed for the whole quarter. To do this imputation we need some kind information. In table 6 we can see how much of the turnover data we have for all three months among small and medium sized enterprises. For small and medium enterprises 39 per cent of the turnover is available for all three months after T+38 days. For 61 per cent no data is available at all. The ratio of available turnover differs between 19 per cent (air transport) to 59 per cent (research and development).

Table 6 Proportion of turnover that has been reported within 38 days for small and medium enterprises

| NACE rev1.1 | Data for all three months | No data | Share |
|--------------------|----------------------------------|----------------|--------------|
| 50 | 18 824 | 25 010 | 43 |
| 51 | 45 327 | 61 634 | 42 |
| 52 | 25 932 | 45 878 | 36 |
| 55 | 10 446 | 22 643 | 32 |
| 60 | 11 642 | 16 343 | 42 |
| 61 | 777 | 1 363 | 36 |
| 62 | 206 | 861 | 19 |
| 63 | 6 497 | 9 605 | 40 |
| 64 | 582 | 972 | 37 |
| 70 | 19 679 | 28 218 | 41 |
| 71 | 2 307 | 3 487 | 40 |
| 72 | 8 338 | 16 165 | 34 |
| 73 | 1 476 | 1 019 | 59 |
| 74 | 28 987 | 55 247 | 34 |
| 90 | 714 | 857 | 45 |
| 92 | 1 814 | 3 844 | 32 |
| 93 | 1 995 | 2 929 | 41 |
| Total | 191 817 | 303 | 39 |

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3. Statistical analysis

Statistics Sweden's survey on turnover in the service sector produces detailed quarterly estimates (turnover changes over time) for 127 domains based on the NACE Rev 2. Those quarterly estimates are mainly used by the National Accounts and must be finalised about 45 days after the end of the reference quarter. In order to produce timely quarterly estimates based on VAT Statistics Sweden need the VAT-data about **35** days after the end of the reference quarter.

3.1. Study concerning first and second quarter 2009

The objective of this study was to explore the possibility to use VAT-data for **all** small enterprises in the frame population when producing the detailed quarterly estimates. Enterprises considered as large in this survey will provide turnover values by questionnaire (complete enumeration). Statistics Sweden's approach is to collect this information in the frame work of the timely monthly indicator. Values from those large enterprises will therefore be considered as observed values in this study. The study means further to compare the true value of turnover for the 127 domains needed by the National Accounts based on observed VAT-data with estimates based on VAT-data where imputation has been made for a number of enterprises due to timeliness. This study was done in retrospect which means that VAT-data for all four quarters year 2008 can be observed, and that VAT-data for all enterprises regarding the first and second quarter year 2009 can be observed

As mentioned before, the Swedish Parliament approved a change in return period from month to quarter, in force from first January year 2008 regarding small enterprises. Large enterprises must submit their VAT-return to the Swedish Tax Agency at the latest **25** days after the end of the reference month. Small enterprises must submit their VAT-return to the Swedish Tax Agency at the latest **40** days after the end of the reference quarter. The smallest enterprises, with an estimated annual turnover below or equal to one million SEK, are permitted to report VAT on an annual basis. However, a small enterprise can decide to report VAT on a monthly basis if it is more convenient compared to quarterly reporting.

In order to evaluate whether VAT-data can be used instead of collecting the turnover values by questionnaire (from a sample of enterprises) timeliness for the enterprises reporting monthly and quarterly must be studied and the impact on the estimates due to imputation:

- ✓ Due to timeliness values for the third month often is missing in the VAT-data 35 days after the end of the reference quarter (about 80% of the enterprises)
- ✓ Produce *quarterly* estimates using observed monthly VAT- data. Values for the third month has to be imputed for the majority of the small monthly enterprises
- ✓ Due to timeliness values for the specific quarter often is missing in the VAT-data 35 days after the end of the reference quarter (about 82% of the enterprises)
- ✓ Produce *quarterly* estimates by using observed monthly and quarterly (and imputed monthly values). VAT-data for the four quarters preceding the quarter in question is used in the imputation

3.2. Current ratio imputation

3.2.1 The survey on turnover in the service sector before year 2008

The survey on turnover in the service sector (excluding the retail trade) was, from reference year 2001 until reference year 2008, a quarterly survey based on a mixture of administrative data (VAT) from the Swedish Tax Agency and of data collected from questionnaires. But due to the approval of change in return period for small enterprises, from month to quarter, Statistics Sweden was forced to collect the turnover values direct from a sample of enterprises from reference year 2008.

Before reference year 2008 VAT-data was used for all small enterprises in the frame population for the survey on turnover in the service sector (excluding the retail trade). All large enterprises provided turnover values by questionnaire (complete enumeration). The quality, in terms of sampling error and non-response, of the survey improved by this census based approach. Statistics Sweden also focuses on response burden and the use of administrative data reduces the response burden among small enterprises.

Due to timeliness, only turnover values from (mostly) large enterprises was included in the VAT-data regarding the third month in a specific quarter. In order to produce the quarterly statistics using this administrative data for the small enterprises the third month had to be imputed for the majority of those enterprises. This was done by a method called “current ratio imputation” and this method worked well in this survey. This conclusion was based on evaluations¹, which have been possible to do, in retrospect, when the

¹ Evaluation of current ratio in the short term turnover statistics at Statistics Sweden, report 2004 ”Utvärdering av imputeringsmetoden current ratio i Statistiska centralbyråns omsättningsstatistik”.

information on all small enterprises finally was included in the VAT-data regarding the third month in a quarter.

Current ratio imputation was used for the enterprises with information on turnover in the VAT-data for two of the three month in a specific quarter. For the minimal number of enterprises in the frame population, missing information on turnover in the VAT-data (or there is only information on turnover regarding one month in the quarter) reweighing makes the compensation, imputed turnover values are, at this stage, used as true values.

The current ratio imputation was made by each NACE domain and quarter. This method could perhaps work even better if it was made by domain and size category. But in order to have enough data to base the ratio on it is necessary to use only domain.

The current ratio method works as follows:

$y_k^{(1)}$ = enterprise k:s turnover value month one

$y_k^{(2)}$ = enterprise k:s turnover value month two

$y_k^{(3)}$ = enterprise k:s turnover value month three

The imputed turnover value for enterprise k month three:

$$\hat{y}_k^{(3)} = (y_k^{(1)} + y_k^{(2)}) \cdot CR \quad (CR = \text{Current Ratio})$$

$$CR = \frac{\sum_r y_k^{(3)}}{\sum_r (y_k^{(1)} + y_k^{(2)})}$$

Where CR is based on enterprises (r) with information on turnover included in the VAT-register all three month in the quarter.

The most common missing month is the third month in a quarter, but if month one (or month two) instead is missing the same method is used (based on the y_k -values from the two month in the quarter where information on turnover is included in the VAT-register).

3.2.2 Approach for the survey on turnover in the service sector from year 2011

Statistics Sweden's approach, as mentioned before, is to use VAT-data for all small enterprises in the production of the detailed quarterly estimates, completed 45 days after the end of the reference quarter. The situation compared to before year 2008 has changed because of the approval of the change in return period from month to quarter for small enterprises. Therefore, Statistics Sweden's approach is to use the same imputation method, see above, for the monthly reporters. And also use current ratio imputation for the missing quarterly reporters, based on the quarterly values. Values imputed for monthly enterprises by CR are regarded as observed values in the CR-imputation of quarterly values. To reflect seasonal pattern five quarters is used in the CR-imputation.

For the missing value quarter (i) the current ratio method works as follows:

$y_k^{(i-4)}$ = enterprise k:s turnover value quarter (i-4), year (t-1)

$y_k^{(i-3)}$ = enterprise k:s turnover value quarter (i-3), year (t-1)

$y_k^{(i-2)}$ = enterprise k:s turnover value quarter (i-2), year (t-1)

$y_k^{(i-1)}$ = enterprise k:s turnover value quarter (i-1), year (t-1)

$y_k^{(i)}$ = enterprise k:s turnover value quarter (i) year (t)

The imputed turnover value for enterprise k quarter (i):

$$\hat{y}_k^i = \left(y_k^{(i-4)} + y_k^{(i-3)} + y_k^{(i-2)} + y_k^{(i-1)} \right) \cdot CR \quad (CR = \text{Current Ratio})$$

$$CR = \frac{\sum_r y_k^{(i)}}{\sum_r \left(y_k^{(i-4)} + y_k^{(i-3)} + y_k^{(i-2)} + y_k^{(i-1)} \right)}$$

Where CR is based on enterprises (r) with information on turnover included in the VAT-register all five quarters (including CR-imputed monthly reporters).

3.3 Results from the study

Table 7 shows total turnover regarding the first quarter year 2009, the proportion of timely enterprises, the proportion of CR-imputed monthly reporters and the proportion of CR-imputed quarterly reporters. Table 8 shows the same results but for the second quarter 2009.

The two tables show that a large proportion of the turnover can be observed 35 days after the end of the reference quarter. The same results shows when looking at the more detailed level, which is the 127 domains. See appendix 1 for results regarding second quarter 2009.

Table 7 Observed turnover in million SEK and proportion of observed turnover and proportion of imputed turnover due to timeliness first quarter 2009

| NACE rev 2 | Number of enterprises | Observed turnover | Proportion of timely turnover | Proportion of monthly turnover CR imputed | Proportion of quarterly turnover CR imputed | Proportion of annual turnover CR imputed |
|---------------|--------------------------|----------------------|-------------------------------------|--|---|--|
| 36-39 | 718 | 9 371,4 | 89,98 | 6,30 | 3,71 | 0,01 |
| 45-47 | 68 512 | 438 149,1 | 83,12 | 9,19 | 7,62 | 0,07 |
| 49-53 | 22 693 | 92 133,5 | 77,75 | 15,08 | 7,04 | 0,13 |
| 55-55 | 19 559 | 23 703,8 | 42,24 | 31,89 | 25,67 | 0,20 |
| 58-75 | 91 886 | 197 664,1 | 72,00 | 11,79 | 16,03 | 0,19 |
| 77-82 | 13 612 | 42 835,9 | 73,05 | 13,95 | 12,80 | 0,20 |
| 90-96 | 21 470 | 19 536,7 | 64,03 | 21,20 | 14,17 | 0,60 |
| Total | 238 450 | 823 394,5 | 77,74 | 11,62 | 10,50 | 0,14 |

Table 8 Observed turnover in million SEK and proportion of observed turnover and proportion of imputed turnover due to timeliness second quarter 2009

| NACE rev2 | Number of enterprises | Observed turnover | Proportion of timely turnover | Proportion of monthly turnover CR imputed | Proportion of quarterly turnover CR imputed | Proportion of annual turnover |
|-----------|-----------------------|-------------------|-------------------------------|---|---|-------------------------------|
| 36-39 | 718 | 10 161,4 | 89,04 | 6,82 | 4,14 | 0,01 |
| 45-47 | 68 512 | 491 545,2 | 81,68 | 10,27 | 7,98 | 0,06 |
| 49-53 | 22 693 | 94 782,1 | 75,72 | 16,50 | 7,65 | 0,13 |
| 55-55 | 19 559 | 27 383,6 | 38,44 | 34,55 | 26,84 | 0,17 |
| 58-75 | 91 886 | 205 275,2 | 70,74 | 12,58 | 16,50 | 0,18 |
| 77-82 | 13 612 | 41 480,4 | 69,98 | 15,84 | 13,97 | 0,21 |
| 90-96 | 21 470 | 18 466,7 | 60,75 | 23,01 | 15,60 | 0,63 |
| Total | 238 450 | 889 094,6 | 76,25 | 12,69 | 10,93 | 0,13 |

In retrospect, it is possible to calculate the true value of total turnover by using observed turnover values from VAT for all enterprises in the frame population. This true value can then be compared with the estimates based on observed values 35 days after the end of the reference quarter complemented with CR-imputed values. This has been done for the first and second quarter 2009 and table 9 shows the result.

Results regarding the first and second quarter (on an aggregated level) looks very promising, see table 9. The deviation between the true value and the estimates are quite small. The same results for the more detailed level show (of course) larger deviation in some domains, see appendix 2 for results regarding second quarter 2009. For a number of domains there is a natural explanation for the deviation and it is possible to correct, but for some domains we actually have a significant deviation.

Table 9 Observed turnover from VAT and observed turnover from VAT 35 days after the reference quarter

| NACE rev 2 | First quarter | | | Second quarter | | |
|---------------|----------------------|--|-------------------|----------------------|--|-------------------|
| | Observed turnover | Observed and imputed turnover | Deviation in % | Observed turnover | Observed and imputed turnover | Deviation in % |
| 36-39 | 9 371,4 | 9 419,1 | 0,51 | 10 161,4 | 10 241,4 | 0,79 |
| 45-47 | 438 149,1 | 439 633,3 | 0,34 | 491 545,2 | 493 322,5 | 0,36 |
| 49-53 | 92 133,5 | 92 430,9 | 0,32 | 94 782,1 | 94 742,0 | -0,04 |
| 55-55 | 23 703,8 | 23 795,4 | 0,39 | 27 383,6 | 27 203,0 | -0,66 |
| 58-75 | 197 664,1 | 198 519,9 | 0,43 | 205 275,2 | 204 969,4 | -0,15 |
| 77-82 | 42 835,9 | 42 839,6 | 0,01 | 41 480,4 | 41 035,5 | -1,07 |
| 90-96 | 19 536,7 | 19 792,4 | 1,31 | 18 466,7 | 18 647,1 | 0,98 |
| Total | 823 394,5 | 826 430,6 | 0,37 | 889 094,6 | 890 160,9 | 0,11 |

The quality of the estimates produced with observed values from VAT 35 days after the end of reference quarter complemented with CR-imputations should of course be compared with the quality of the estimates produced by the current sample survey. In order to compare those two estimates observed turnover values (on the enterprise level) from the VAT-data were used as study variable when estimating total turnover second quarter 2009 by the original sample. This means that every responding enterprise in the sample had an observed turnover value from the VAT-data and then estimates were produced exact the same way as for the collected turnover values (with the same weight system). This makes it possible to compare estimates from the current sample survey with estimates from the census based survey without having any measurement problems to take into account. The two estimates can then be compared with the true turnover value (on the domain level) based on observed values in the VAT-data from all enterprises in the frame population.

The result from this study looks also promising for the estimates produced by the census based method. In 94 out of the 127 domains this estimate is closer to the true value compared to the values produced by the current sample survey. A comparison was also made in order to explore systematic over or under estimation with the two estimation methods. It turned out that no sign of systematic over or under estimation could be shown, especially not with the census based method. Out of the 127 domains were 65 domains over estimated with the census based estimation method and 60 domains under estimated (and two domains were exact).

3.3 Conclusions from the study

The results from the study looks promising in terms of using VAT-data for all small and medium sized enterprises in the frame population (in the production of quarterly estimates). The study shows that in terms of turnover it is possible to observe a large proportion 35 days after the end of the reference quarter. This is of course, to a large extent, due to the fact that turnover values from all large enterprises is collected (and returned) at that time point.

Because of the large observed proportion of turnover in the majority of the domains it is possible to impute the rest of the enterprises. The study shows that current ration imputation method works well. But, there are a number of activities (domains) with a *very* large number of small enterprises. The observed proportion of turnover, 35 days after the end of the reference quarter, is smaller in those domains. Regarding those domains Statistics Sweden has to consider collecting the turnover values direct from a sample of enterprises. The same situation is applicable in the activities 85, 86, 87, 88 and 92 because enterprises classified into those activities are not obliged to pay VAT.

Before implementing this use of VAT-data the study must continue during the year 2010. Estimates for all quarter's year 2009 must be produced by using VAT-data and imputation. Those estimates must be compared with the final (true) estimates produced by observed VAT-data. Statistics Sweden must also study differences between estimates produced by the monthly indicator and estimates produced by this quarterly census based survey. Large differences between the estimates are not popular among the users.