SIKA

COMMODITY FLOW-SURVEY 2001

Method report

Preface

The intention of the commodity flow survey is to improve knowledge about the business sector's goods transport and to ensure the creation and maintenance of an overall picture of the needs of the business sector to move goods within Sweden and internationally. A main objective of the commodity flow survey is to describe the geographic locations between which goods are moved.

The Commodity Flow Survey 2001 includes transport of goods with Swedish and foreign recipients and foreign consignors. The survey provides information about the type, values and weights of commodities and the geographic origin and destinations for goods shipments. The survey was financed by SIKA – the Swedish Institute for Transport and Communications Analysis – which is the responsible agency for official statistics concerning transport and communications in Sweden, and the Swedish National Rail Administration, the Swedish Civil Aviation Administration, the Swedish Maritime Administration, Vinnova and the National Road Administration The producer is Statistics Sweden, Transport Statistics programme.

The results of the survey have been published in SSM 071:0201 which is available on SIKA's website www.sika-institute.se. The main purpose of the present report is to describe the method although some results will be presented.

Stockholm, May 2003

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1 Summary

The summary consists of two parts. The first describes the scope and content of the report. The second summarises a part of the results of the survey.

1.1 Content and scope

The aim of the commodity flow survey is to improve knowledge about the business sector's transport of goods and ensure that an overall picture of the need to move goods within and outside Sweden can be created and maintained. One of the main aims of the commodity flow survey is to describe the locations between which different shipments of goods are moved.

The Commodity Flow Survey 2001 includes transportation of goods with Swedish and foreign recipients and foreign consignors. The survey provides information about the type of commodities shipped, their value, weight, and transport mode as well as the origin and destination of shipments. Funding was provided by SIKA – the Swedish Institute for Transport and Communications Analysis - which is the responsible authority for official statistics concerning transportation and communications in Sweden and the National Rail Authority, the Civil Aviation Administration, the National Maritime Administration, Vinnova and the National Road Administration. The producer is Statistics Sweden, transport statistics programme.

The survey was carried out partly as a sample survey and partly as a register-based survey. The sample survey covered the mining, manufacturing and wholesale sectors. The sample survey was supplemented with register data for the sectors' production of forest and logging products, sugar beet cultivation and dairy farming.

The survey population in the sample survey consisted of outgoing and incoming shipments at particular local units within the companies. From a sample of 12,419 local units, commodity flows were estimated for a universe of approximately 38,000 local units.

The sample was selected using a stratified three-stage sampling-design in which the first sampling stage consisted of local units within the companies. The second sampling stage was reporting different periods of measurement for the respective unit and the third sampling stage individual shipments at the respective unit in the selected reporting period.

The sampling frame of local units was constructed by selecting a subset of local units from the Business Register (CFAR). The CFAR is a database maintained by

Statistics Sweden (SCB) containing information about local units. A new sampling frame for the CFS was constructed for each respective quarter.

Local units in the sampling frame were stratified by size of local unit, geographic location and the main type of commodity production. The latter stratification variable had to be derived from the sector to which the local unit belonged. The size of the local unit was measured by the number of employees at each local unit.

Small local units falling below a specified cut-off limit varying by different strata were excluded from the sampling frame. The stratification according to the size group produced four different size-groups. Local units in the largest-size group were selected with certainty on a quarterly basis. Local units in the second largest-size group were selected with certainty on an annual basis. Local units in the two smallest-size groups were randomly selected within each stratum where the probability of selection varied according to group size and other stratification variables.

Consequently, the design of the sample meant that the largest firms in size group 1 were sampled four times during the year. The reporting period each quarter for the largest local units was set to one week randomly selected and separated by a 13-week period to assure equal representation during the year.

The local units in the smaller-size groups were included in the survey with randomly distributed reporting periods over the year. To assure sufficient representation, the length of the reporting periods was adjusted for these local units according to the size of the local unit so that local units in size-group 2 were included with reporting periods of two weeks and local units in size group 3 with reporting periods of three weeks.

In the third sampling stage, each selected local unit was requested to report a systematic sample of individual shipments, i.e. a sample of shipments at fixed intervals depending on the total number of shipments made during the reporting period, as estimated by the respondent. Bearing in mind the potential burden on the respondent, the total number of shipments for which details was to be reported for different categories, i.e. outgoing shipments with recipients within and outside the county and incoming shipments, was limited to 150.

1.2 Outcome

The total value of outgoing shipments in 2001 amounted to just over SEK 1 905 billion with a total weight of just over 246 million tonnes.

Major categories of outgoing shipments in weight terms include agricultural and forest products, unprocessed mineral products, ores and metal products, other manufactured products, petroleum products and solid mineral fuels. In value terms, manufactured products, foodstuffs and machinery and machine parts were the most important categories.

The most common transport mode was transport by lorry or car with an estimated share of approximately 65 per cent of the outgoing transport both in value and weight terms. Rail transport accounted for just over 5 per cent and rail transport combined with another transport mode for around 9 per cent of the outgoing transport in weight terms. In value terms, the corresponding shares were just over 3 per cent and just over 4 per cent respectively. Cargo vessel as single outgoing transport mode accounted for 13 per cent and just under 3 per cent in weight and value terms respectively.

The total value of incoming shipments from abroad was just under SEK 477 billion and the total weight of these shipments was estimated at 61.4 million tonnes in weight terms.

The largest categories of incoming commodities in weight terms were petroleum products, chemical products and other manufactured products. In value terms, the largest category of commodities was other manufactured products and the next largest petroleum products.

Lorry transport in *various combinations* with ferry or cargo vessel transport accounted for 30 per cent of the total incoming volumes in weight terms. For natural reasons, Sweden often being considered in transport contexts as an island, lorry or car transport as *single* transport mode is of much lesser importance for incoming shipments from abroad compared with outgoing shipments which also include domestic transport. Cargo vessel was the most important single transport mode for import shipments. This transport accounted for 51 per cent of the transport volumes in weight terms. Lorry transport and lorry transport in combination with ferry transport are the most important transport modes.

2 Introduction

In autumn 2000, Statistics Sweden, SCB, was commissioned by the Swedish Institute for Transport and Communications Analysis to carry out a commodity flow survey for 2001. VFU01. Two smaller commodity flow surveys had been carried out in 1996 (VFU 1996) and 1998 (VFU 1998) by SCB.

The commodity flow survey is intended to improve knowledge of transport of goods by the business sector and to obtain and maintain an overall picture of the need to move goods within and outside Sweden. A main objective of the commodity flow survey was to describe the locations between which different shipments of commodities were moved.

VFU01 intended to survey the geographic distribution of shipments of commodities in weight and value terms in the mineral, manufacturing and wholesale sectors during 2001. In addition to geographic data and volume measures, information about certain quantitative variables was obtained such as types of commodities and transport mode. The regular sample survey was also supplemented by register data for production of forest and logging products, sugar beet cultivation and dairy farming.

The survey was designed as a sample survey addressed to individual local units within the companies. The design and methods of the survey were based to a great extent on VFU 1998. Two important differences were a larger sample of local units and a new sampling plan.

3 Publication

The commodity flow survey for 2001 (VFU01) is included in Swedish official statistics. The statistics were published in SSM 071:0201 in autumn 2002.

The survey which is subject to the Official Statistics Act entailed an obligation to provide information on a confidential basis. Provisions on the obligation to provide information were continued in regulations (SFS 1992:889), (KAMFS 2001:8) and (SIKAFS 2001:6).

4 The content and design of the survey

This chapter begins with a description of the survey population and sample. It also describes the content and implementation of the survey.

4.1 Population, sampling frames and sampling

The target population of the survey consisted of shipments generated by companies within the sectors included in the survey. The survey unit consisted of local units within the companies. Local units are a natural survey unit for a survey intended to describe the geographic distribution of shipments.

Sampling frames of local units within the sectors included in the survey were established for each quarter. The sampling frame was constructed by selecting a subset of local units from Statistics Sweden's Business Register (CFAR).

Local units in the sampling frames were stratified by main type of commodity produced, number of employees and geographic location. A separate sample of local units was made for each quarter. The sample consisted of just over 3 100 local units each quarter in a population of approximately 38 000 local units. The selected local units were randomly allocated to a reporting period each quarter varying between one and three weeks depending on the size of the local unit. The reporting periods were evenly distributed over each quarter. During the reporting period, a systematic selection of individual shipments was made in accordance with the instructions in the survey form. A more detailed description of the sampling plan and stratification is contained in Annex 2: Sampling plan in VFU01.

4.2 Scope

The aim of the commodity flow survey is to improve knowledge about the business sector's transport of goods and ensure that an overall picture of the need to move goods within and outside Sweden can be created and maintained. One of the main aims of the commodity flow survey is to describe the locations between which different shipments of goods are moved.

Shipments

A shipment is defined as a unique delivery of goods with the same commodity code according to the commodity classification[1], to/from the local unit or to/from

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[1] See Annex 4

a particular recipient/supplier. Accordingly, a shipment is not necessarily linked to a particular delivery of goods. The great majority of reported shipments have, however, been associated with individual invoices, consignment bills, or similar documents.

Sectors

The sample survey consisted of local units in the mining, manufacturing and wholesale sectors[2]. The sample survey was supplemented with register data for the sectors' production of forest and logging products, sugar beet cultivation and dairy farming.

The size of the local unit

The sampling frame of the sample survey consisted of all local units within the aforesaid sectors with the exception of local units with few employees. This minimum size, or cut-off limit, varied between survey groups (stratum), The cut-off limit for stratum in the mineral extraction and manufacturing industry varied between 0 and 20 employees. The cut-off limit for the wholesale sector was set at 1 employee. A more detailed discussion on the size limits is contained in Annex 2.

Geographic scope

The survey included local units located in Sweden and shipments with recipients within and outside Sweden and consignors outside Sweden.

Reference period

The survey covered the calendar year 2001.

Shipment variables

The survey included information about shipments with quantitative and qualitative variables.

Quantitative shipment variables

- Invoice value excluding value-added tax and freight costs (kronor, SEK)[3]
- Weight excluding packaging (kilogram)[4]

Qualitative shipment variables

- Address for shipment which has been received/sent from/to another address than the address of the local unit
- Commodity code
- Cargo type

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[2] In addition to SNI 51; Wholesale trade, SNI 50301; Wholesale trade with spare parts and accessories for motor vehicles except motorcycles, were included.
[3] "Value" is used as an abbreviation for invoice value in the report
[4] Weight is used as an abbreviation for net weight in the report

- Dangerous goods (cross-marked)
- All transport modes in Sweden
- All transport modes outside Sweden
- The recipient's postcode (for delivery in Sweden)
- The final destination in Sweden (border crossing point for export/import)
- Final destination abroad
- Recipient country
- Place sent from
- Country sent from
- Access to and use of private siding for rail transport
- Access to and use of wharf for sea transport

The form

The forms consisted of four parts: part A - D

Part A and B related to shipments – the difference between these parts consisted of part A relating to shipments with recipients within the same county and part B relating to other shipments with recipients outside the consignor's county and export shipments. Part C of the form related to incoming shipments from abroad. Part requested information on access to and use of private sidings and/or wharves for rail and sea transport.

A systematic sample of individual shipments was to be reported in each part A-C. The maximum number of shipments reported on in detail in accordance with the sampling plan was limited to 50 shipments in each part. In addition, the total number of shipments during the reporting period was separately reported in part A-C.

4.3 Implementation of the survey

The provision of information was either made on the form or through a spreadsheet-based form template available on SCB's website. The form and instructions for the survey were addressed to the person responsible for transport at the local units in the sample and sent just over two weeks before the start of the reporting period. Two written reminders were sent and telephone contact was made with the larger local units that had still not responded.

A number of checks of incoming material were undertaken, including consistency checks of the correlations between transport mode and border crossing points/destinations, correlations between commodity types and commodity value, correlations between sector and commodity type and correlations between cargo type and commodity type. The stated volumes sent were checked against information on production values and the turnover of the companies.

5 Response frequencies and coverage

This chapter reports on the response frequencies and overcoverage for the local units included in the survey, in total and broken down by sector, size group and geographic location. Overcoverage consists of local units included in the sampling frames but which did not generate shipments that formed part of the survey's target population of shipments. Administrative activities of various kinds were the most important category within this group of local units.

Undercoverage on the other hand, consists of local units which can be assumed to generate shipments belonging to the survey's target population of shipments, but which were not included in the sampling frame of the local units. The chapter also contains a brief discussion of various calculations of weighted response frequencies. Furthermore, response frequencies are reported broken down by type of reporting, through form or spreadsheet.

5.1 Total response frequencies and overcoverage

The survey responses consisted of information received from local units containing at least one separate shipment with a stated value or weight and geographic destination. Information received with partial non-response regarding other variables, have accordingly been classified as survey responses. Active local units without shipments during the reporting period, such as stationary lorries, were also classified as survey responses.

Table 1   Total response frequency and overcoverage

Response frequency	Relevance overcoverage	Actuality overcoverage
78.4	12.7	3.1

The unweighted response frequency was 78.4 per cent. The response frequency is calculated on the basis of the net sample – the original sample less overcoverage. Overcoverage consists of local units which were included in the sampling frames but which did not generate shipments that belonged to the survey's target population of shipments. The actuality overcoverage consists, for instance, of local units whose activity had ceased at the time of the survey. Relevance overcoverage consists of local units with a type of activity that did not generate shipments. Further comment on overcoverage is contained in section 5.5.

5.2 Reporting via electronic medium

Table 2 shows the share responding by electronic medium, mainly standardised spreadsheets available on SCB's website, and shares of total weight and value which can be assigned to these respondents. The relatively high shares of the total estimates is explained by the reporting via data medium being considerably more common among the larger local units. The response share using data medium was 18.1 per cent for the largest local units in size group 1 compared with 1.6 per cent in size group 4.

Table 2   **Electronic reporting. Response frequency and shares of estimated values**

Response frequency electronic reporting	Share of estimated weight shipments	Share of estimated value shipments
10.9	22.3	28.5

The quality of the reported data can, inter alia, be assessed on the basis of the size of the partial non-response for different survey variables. The partial non-response as a proportion of the total estimate with respect to invoice value was slightly lower in the material reported via data medium. The partial non-response for this group with respect to invoice value was 3.7 per cent compared with 9.1 per cent for other respondents. The partial non-response calculated as a share of the total estimate with respect to weight was 1.2 per cent for respondents via data medium compared with 0.8 per cent for others. Partial non-response is also taken up in section 6.

5.3 Weighted response frequencies

Unweighted as well as weighted response frequencies are often reported. Weighted response frequencies should be reported to shed light on the significance of the non-response taking into consideration varying response rates in different important reporting groups. The weighted response frequencies are commonly calculated on the basis of the inverted sample probabilities for the respective survey unit, which in this context means that local units with fewer employees in the smaller size groups are weighted up when calculating response frequencies. At the same time, however, these local units were of less significance for estimates of total values and weights.

In the light of this, the weighted response frequency should take into consideration in a better way the shifting consignment volumes of local units. Several weighting variables are then possible. Preferably a variable independent of the survey highly correlated with the consignment volumes should be used. Two possible variables are turnover or production value of all local units in the sample. However, statistics broken down at local level are not available for these variables. As an approximation, estimated values in the survey in the respective size group have been choosen and an assumption made that non-responding local units do not differ on average from responding local units regarding shipment value within respective size group. Since this entails an approximation, the size-

weighted response frequency in this way only provides an indication of the importance of the object non-response.

Table 3   Response frequencies unweighted, weighted by number and by size

Unweighted response frequency	Response frequency weighted by number	Response frequency weighted by size
78.4	73.2	85.3

There is a considerable difference between the weighting alternatives. The number-weighted response frequency of 73.2 per cent reflects the relatively higher non-response among smaller local units with lower sample probabilities. The size-weighted response frequency of 85.3 per cent reflects on the other hand the extensive shipment volumes and relatively greater importance of the larger local units for the quantitative estimates.

A conservative conclusion can be that the object non-response has been less important for the estimates of the survey's quantitative variables than what is indicated by the unweighted response frequency of 78.4 per cent and the number-weighted response frequency of 73.2 per cent.

This conclusion only applies to the significance of the object non-response isolated and does not concern other characteristics of the reported material. No broader interpretation can be made of the size-weighted response frequency as regards the survey results other than with regard to the relative importance of the size groups. In the light of what has been said above about the limitations of the number-weighted and the size-weighted response frequencies in various respects, only the unweighted response frequencies are reported from now on.

5.4 Response frequencies and overcoverage by industry and size group

The reported size groups refer to the size according to the number of employees. Size group 1 consists of the largest local units. The definition of the size groups varied by survey strata and is described in more detail in Annex 1 – sampling plan in VFU01.

Table 4   Response frequencies and overcoverage by industry

Sector	Number of local units in sample	Response frequency	Relevance overcoverage	Actuality overcoverage
Mining	215	82.1	14.9	1.9
Manufacturing industry	5 555	81.9	6.3	1.9
Wholesale trade	6 649	75.0	17.9	4.2
Total	12 419	78.4	12.7	3.1

Note: The response frequencies have been calculated on the basis of the number of respondents in the actual sample less the overcoverage local units. Overcoverage is calculated as the proportion of overcoverage local units in the original sample.

Table 5   Response frequencies and overcoverage by size group

Size Group	Number of local units in the sample	Response frequency	Relevance overcoverage	Actuality-overcoverage
1	5 393	83.8	5.7	1.4
2	2 360	77.5	12.0	2.4
3	2 683	71.5	13.5	4.0
4	1 983	70.7	31.3	7.6

Note: The response frequencies have been calculated on the basis of the number of respondents in the actual sample without the overcoverage local units. Overcoverage is calculated as the proportion of overcoverage local units in the original sample.

The response frequency in the wholesale trade sector was lower compared with other sectors, which is mainly explained by the lower response frequencies among the largest local units in size group 1 and among the smallest in size group 4. The response frequencies were relatively similar within the mining and manufacturing sectors. However, the overcoverage was considerably greater in the mining industry.

The differences in response frequencies between the size groups show similarities with VFU98. The response frequencies in both surveys were markedly lower in the smaller size groups. The most marked difference was found between size groups 2 and 3. The limits between these size goups varied by survey stratum. In most cases the limit was set to 20 or 50 employees.

5.5 Overcoverage by industry and size group

The overcoverage can be broken down into actuality overcoverage and relevance overcoverage. Actuality overcoverage occurs, for instance, when activities have ceased after the time the sample is selected at the beginning of the respective quarter. Activities that were dormant at the time of the survey have been classified as actuality overcoverage.

Relevance overcoverage in VFU01 occurred when local units with activity of a
type that did not generate commodity flows were included in the sampling frames.
In order to reduce relevance overcoverage, auxiliary local units were excluded
from the sampling frames. Auxiliary local units include central administration and
other internal company services, such as warehousing, property management and
transportation. These types of local units are identified with their own designation
in CFAR. However, this has only reduced overcoverage marginally since the
number of auxiliary local units in the sampling frames has been few.

**Table 6   Response frequencies and overcoverage by industry and size
            group**

Sector	Size group	No. of local units in the sample	Response frequency	Relevance overcoverage	Actuality overcoverage
Mining	1	88	84.8	10.2	-
	2	109	80.0	15.6	1.8
	4	18	80.0	33.3	11.1
Manufacturing industry	1	3138	86.5	3.3	1.2
	2	1021	77.8	7.2	2.5
	3	1076	72.9	9.7	2.9
	4	320	75.2	22.2	3.8
Wholesale trade	1	2167	79.5	9.1	1.6
	2	1230	77.0	15.7	2.4
	3	1607	70.5	16.1	4.7
	4	1645	69.5	33.1	8.3

Note: The response frequencies have been calculated on the basis of the number of respondents in
the actual sample less overcoverage local units. The overcoverage is calculated as the proportion
of overcoverage local units in the original sample.

Relevance overcoverage has largely consisted of local units with various forms of
service activities, such as repairs, sub-contracting, agency, civil engineering and
contract companies. Other activities categorised as relevance overcoverage were
sales and marketing offices and sales where the purchaser collects the goods at the
local unit.

The total overcoverage was 15.8 per cent. Relevance overcoverage was
considerably lower for the manufacturing industry compared with the other
sectors. The difference in relevance overcoverage between the manufacturing
industry and other sectors was evenly distributed between the different size
groups. Overcoverage was consistently largest in size group 4 in the different
sectors. Size group 4 was limited by local units with fewer than 10 employees in
the manufacturing industry and fewer than 5 employees in the wholesale trade.

Relevance overcoverage in the mining industry consisted of different service and contract companies in, for instance, civil engineering activities and earth and gravel pits where the purchaser collects the good directly at the local site.

Relevance overcoverage was also high in the wholesale trade, in particular in size group 4. Some industries with a particularly high overcoverage proportions in this group were wholesale trade with electrical items, metals, timber and office equipment. Overcoverage proportions in these groups were generally high during the survey quarters and amounted in some cases to almost 50 per cent. In addition the number of local units in the sample was relatively large in some cases.

Various possibilities of reducing overcoverage in future surveys should be considered. Usable register information is lacking for this purpose with the exception of classification for auxiliary local units. A considerable part of the relevance and actuality overcoverage is to be found in size group 4 and then in particular in the mining and wholesale sectors

5.6 Undercoverage

A quantifiable measure of undercoverage is lacking for VFU01. Undercoverge can be assumed to be of limited importance. Information relating to the sector to which local units belong and the number of employees is checked regularly in CFAR. Some under coveage can arise, however, when local units which come into being towards the end of the reference period are not included in the sampling frame at the time of sample selection.

5.7 Response frequency and overcoverage by the location of the local unit

The geographic distribution of response frequencies and overcoverage is of interest since an uneven distribution can reduce the usability of the survey material in connection with different geographic reports.

Table 7   Response frequencies and overcoverage by the location of the local unit (county)

County	Number of local units in the sample	Response frequency	Relevance overcoverage	Actuality overcoverage
Stockholm county	3022	73.6	19.5	3.7
Uppsala county	225	76.8	14.2	3.6
Södermanland county	304	85.3	7.2	3.0
Östergötland county	465	86.9	12.7	2.8
Jönköping county	578	79.9	7.4	2.2
Kronoberg county	337	80.7	8.0	2.7
Kalmar county	292	77.2	6.2	2.1
Gotland county	41	92.5	2.4	-
Blekinge county	207	68.5	15.9	2.9
Skåne county	2034	79.0	14.5	4.0
Halland county	338	83.4	6.2	3.0
Västra Götaland county	1874	77.6	10.8	2.2
Värmland county	333	78.7	6.0	2.4
Örebro county	405	86.1	7.9	5.2
Västmanland county	355	83.4	11.0	2.5
Dalarna county	300	77.2	8.0	1.0
Gävleborg county	279	80.8	6.8	1.8
Västernorrland county	351	77.7	12.3	4.8
Jämtland county	139	86.7	10.1	3.6
Västerbotten county	302	83.3	8.9	1.7
Norrbotten county	238	73.4	7.6	2.5

Note: The response frequencies have been calculated on the basis of the number of respondents in the actual sample less overcoverage local units. Overcoverage is calculated as the proportion of overcoverage local units in the original sample.

Both response frequencies and overcoverage differ to some extent between counties. The greatest differences are to be found between Gotland county, with a response frequency of 92.5 per cent, and Blekinge county with a response frequency of 68.3 per cent. Both these counties are included with a relatively small number of local units in the sample and are of small importance for the total estimates.

The response frequencies also vary between the large countries. The response frequency was 73.3 per cent for local units in Stockholm county, 77.6 per cent for Västra Götaland county and 79.0 per cent for Skåne county.

Table 8   **Response frequencies and overcoverage by the location of the local unit (NUTS II)**

National area NUTS II	Number of local units in the sample	Response frequency	Relevance overcoverage	Actuality overcoverage
1 Stockholm	3022	73.6	19.5	3.7
2 Eastern Central Sweden	1754	84.6	10.5	3.4
3 Småland with islands	1248	79.8	7.1	2.2
4 Southern Sweden	2241	78.0	14.6	3.9
5 Western Sweden	2212	78.6	10.1	2.3
6 Northern Central Sweden	912	78.9	6.9	1.8
7 Central Norrland	490	80.3	11.6	4.5
8 Upper Norrland	540	78.8	8.3	2.0

Note: The response frequencies have been calculated on the basis of the number of respondents in the actual sample less overcoverage local units. Overcoverage is calculated as the proportion of overcoverage local units in the original sample.

The response frequencies are relatively evenly distributed over the NUTS II areas. There are more significant differences between the Stockholm region and Eastern Central Sweden.

5.8 Consequences of object non-response and overcoverage

Besides reduced precision in the estimates as a result of object non-response, there is a risk of distortion of the survey results. In the case, for instance, of lorry transport being more frequent among smaller local units compared with the larger, the share of lorry transport can be underestimated since the object non-response has been largely among the smaller local units. The distortion in this example can in principle be easier to take into consideration compared with the consequences of non-response or incomplete reporting, for larger local units. For these local units, a basis for statistical comparisons with other survey units is often lacking since large local units are often unique with respect to one or more survey variables.

During planning of VFU01, a relative precision measure (the theoretical mean error) at different response frequencies was calculated as a quality indicator for the survey. It may be justified to compare this with the actual average error in the survey.

The theoretical mean error takes in this case only into consideration consequences of object non-response isolated. Uncertainty of the estimates depending on the sample of individual shipments is not included by this measure. 0 shows the theoretical average error at an 80 per cent response frequency as a proportion of the point estimates broken down by NUTS II regions. As a comparison, the

theoretical mean error at a 100 per cent response rate and the actual mean error calculated for the object/local unit sample stage in VFU01 at just over 78 per cent response frequency, are shown.

Table 9   Expected/actual relative mean error for a year estimate of commodity value with a sample size of 3 200 local units/quarter[5]

National area NUTS II	Expected mean error (%) 100 per cent response frequency	Expected mean error (%) 80 per cent response frequency	Actual mean error (%)
1 Stockholm	2	5	5
2 Eastern Central Sweden	2	5	4
3 Småland with islands	3	4	6
4 Southern Sweden	2	4	6
5 Western Sweden	2	5	4
6 Northern Central Sweden	3	6	3
7 Central Norrland	3	7	13
8 Upper Norrland	4	8	5
Total	1	2	2

Besides the differing response frequencies, the actual mean error also reflects the overcoverage in the different reporting groups. This is clearly shown in a comparison between the expected and actual mean errors for the geographic areas in northern Sweden. The response frequencies were similar overall in these areas. The differences between actual and expected mean errors are related here to differences in overcoverage between the different regions (cf 0). Overcoverage was thus considerably higher in Central Norrland compared with the rest of Norrland. For the rest of Sweden, actual and expected mean error was at similar levels. Overcoverage was high both in the Stockholm area and in southern Sweden at the same time as the sample was considerably larger in these areas compared with northern Sweden.

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[5] The number of local units was somewhat lower in the actual samples.

6 Partial non-response

This section deals with imputation of variable values in the case of partial non-response. The size of the partial non-response for different variables is reported by sector and different groups of shipments.

6.1 Imputations

Imputations of quantitative variable values in the case of partial non-response with respect to either value or weight, have in the first place been made by calculating an average commodity value (kilo price) for the reported shipments with information about both value and weight for a given local unit. In the event of partial non-response of any of the quantitative variables for all shipments for a given local unit, the commodity values have been calculated on the basis of reported values for other local units belonging to the same SNI5 group.

Various alternatives for imputations in the event of complete partial non-response of any of the quantitative variables for a given local unit, were studied in conjunction with VFU98. The difference between the different methods such as imputation based on average values or commodity values calculated at commodity type level and the above-mentioned variant were found to be small.

In the case of partial non-response for any of the qualitative variables such as commodity type, assessments have been made from case to case. Where possible, imputation has taken place on the basis of the company or sector the local unit belonged to. In all, it concerned a few cases.

A further type of imputation which has been relevant in the case of object non-response for local units sampled each quarter, has been to replace missing information for a quarter with data from another quarter, possibly with seasonal adjustments. The background was that some respondents explicitly stated that they had evenly distributed commodity flows over the year with substantially the same recipients and consigners. This type of imputation has been undertaken in some hundred cases.

6.2 Partial non-response by industry

The partial non-response is reported here partly as proportions of the reported number of shipments and as proportions of the estimated totals. The shares of the partial non-response of the estimates in Table 11 consist for the variable's value and weight of the share's imputed values for the respective variable. For the cargo type and transport mode of the variable, the estimated shares consist of the relative part of the partial non-response of the estimated commodity values for the

respective variable. The shares for the other qualitative variables in the following tables of value shares have been calculated in a corresponding way. The importance of the partial non-response in value terms was consistently less compared with the corresponding shares calculated on the basis of the number of shipments. The partial non-response has accordingly in the first place concerned smaller volume shipments. An exception consisted of the imputed commodity values for shipments linked to the manufacturing industry.

Table 10   Partial non-response by industry. Shares of individual shipments, for shipments with recipients in Sweden

Sector	Value	Weight	Cargo type	Transport mode
Mining	6.3	0.3	0.0	0.0
Manufacturing industry	6.0	2.5	17.7	4.3
Wholesale trade	15.9	7.4	12.3	2.7
Total	12.8	5.9	13.9	3.2

Table 11   Partial non-response by sector. Shares of imputed values and weights and shares of estimated values for other variables, for shipments with recipients in Sweden

Sector	Value	Weight	Cargo type	Transport-mode
Mining	3.4	0.0	0.0	0.0
Manufacturing industry	13.0	1.4	1.6	0.3
Wholesale	6.6	1.4	1.5	0.8
Total	9.7	1.1	1.5	0.6

The following tables, 12-15. show corresponding measures for the partial non-response for the different variables associated with foreign shipments. The tendency for partial non-response to be less significant in value terms compared with number measures also applies to these shipments. This applies for instance to the variable border crossing point, where the partial non-response of the number of detail-reported shipments in the wholesale trade sector totalled 66.7 per cent. However, non-response of the border crossing point, applied to the smaller shipments in volume terms, which means that the corresponding proportion in value terms totalled 19.3 per cent. It can also be noted that the partial non-response for the variable final destination abroad was very low.

Table 12   Partial non-response by sector. Shares of individual shipments, outgoing shipments with recipients outside Sweden

Sector	Value	Weight	Cargo type	Transport mode	Border crossing point	Final destination
Mining	0.0	0.2	0.0	0.2	7.4	66.6
Manufacturing industry	9.3	3.2	8.5	7.7	38.9	2.1
Wholesale trade	3.5	10.9	5.8	41.1	66.7	13.1
Total	6.4	6.9	7.1	23.8	52.2	7.8

Table 13   Partial non-response by sector. Shares of imputed values and weights and shares of estimated values for other variables, outgoing shipments with recipients outside Sweden

Sector	Value	Weight	Cargo type	Transport mode	Border crossing point	Final destination
Mining	0.0	0.0	0.0	0.0	2.1	82.1
Manufacturing industry	4.4	0.3	1.8	0.9	17.1	1.7
Wholesale trade	2.4	0.8	5.7	3.2	19.3	4.1
Total	4.1	0.3	2.3	1.3	17.3	2.7

Table 14   Partial non-response by sector. Shares of individual shipments, incoming shipments from abroad

Sector	Value	Weight	Cargo type	Transport mode	Border crossing point	Place sent from
Mining	0.0	0.0	0.0	0.0	1.4	0.0
Manufacturing industry	19.5	2.5	2.6	0.9	12.3	3.6
Wholesale trade	7.4	8.7	2.0	3.4	19.2	3.1
Total	13.0	5.8	2.3	2.3	16.0	3.4

Table 15   Partial non-response by sector. Shares of imputed values and weights and shares of estimated values for other variables, incoming shipments from abroad

Sector	Value	Weight	Cargo type	Transport-mode	Border crossing point	Place sent from
Mining	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing industry	15.4	0.2	0.8	0.8	6.9	4.5
Wholesale trade	4.0	0.8	0.5	0.5	10.0	6.2
Total	9.6	0.3	0.7	0.7	8.5	3.1

7 Reconciliation

In this section, the results from VFU01 compared with other statistical information and various causes of discrepancies are discussed.

7.1 Comparable data

Reconciliation of VFU data in relation to other statistics can primarily be made for the value of transported goods. For other variables, information is lacking in most cases on breakdowns of comparable sub-groups which makes meaningful reconciliation difficult. A further problem concerns the use of various definitions and delimitations. An example is the survey of lorry transport[6] undertaken by Statistics Sweden (SCB) at the request of SIKA. In this survey, data on the weight of the transported goods is obtained. Comparisons with VFU are made difficult, however, by the lorry survey following the lorry and not the goods. VFU provides information about the origin and final destinations of the goods regardless of transport mode and change of transport mode.

The access to comparable information differs somewhat between the different sectors. For the mining and manufacturing industry, statistics on the production of commodities and industrial services (IVP) provide a relatively good comparative material. This is primarily due to the value variables, invoice value in VFU and production value in IVP, being comparable variables. The production value, or the market value of the quantity produced according to IVP, ought to be a variable which is relatively comparable with invoice value excluding VAT and freight costs according to VFU. However, a proviso must be made for the statistics on production of commodities including industrial services and that freight costs can be assumed to be included in the final production value. A further proviso must also be made for reporting on the basis of a split financial year being accepted in IVP. In IVP, a lower cut-off limit of 20 employees is also applied. For companies with 10 to 19 employees information is obtained from the National Tax Board's standardised summary accounts. This means that VFU has a better coverage of local units with few employees. However, IVP is a total survey insofar as information provided constitutes total information over the year for the requested variables. This contrasts with VFU where the statistics provided relate to limited reporting periods and a selection of shipments during the reporting period.

Another source for comparisons consists of the short period industry survey produced by SCB which, among other things, provides data on industry's sales values. This statistics is reconciled, however, in relation to IVP and a special reconciliation of VFU data in relation to the industry survey has not been undertaken for this reason.

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[6] Swedish national and international road goods transport

For the sector wholesale trade, VFU data can primarily be compared with information from business statistics and the VAT register at SCB. Information on turnover in the VAT register is obtained from the companies' VAT returns. The taxable turnover is calculated on the basis of tax reported, while tax-free turnover and export is obtained directly from the returns. In certain cases, VAT is reported through parent companies or associated companies.

For shipments with recipients outside Sweden and for incoming shipments to Sweden, comparisons can be made with the foreign trade statistics at commodity group level.

7.2 Reconciliation at aggregated levels and causes of discrepancies

The total value of outgoing shipments for the mining and manufacturing industry is estimated according to VFU01 at approximately SEK 1 165 billion in 2001. The value of the industry's supplies during the same time period amounted according to IVP to SEK 1 121 billion[7].

Broken down by industry sectors, VFU data shows relatively good agreements for most sectors such as foodstuffs, timber, paper, metal and chemical industry. For these sectors discrepancies exist both upwards and downwards which indicates the absence of systematic errors.

Data for the wholesale trade sectors SNI 51 and SNI 50301 have been reconciled in relation to the turnover values from SCB's statistics of trade with goods and services. The total net turnover for these sectors was over SEK 862 billion in 2001. The estimated value (invoice value excluding VAT and freight costs) for the corresponding sectors in VFU01 was just under SEK 699 billion. The greatest differences were to be found in the wholesale trade with machinery and other wholesale trade besides wholesale trade with consumer, input goods and machinery.

The value of the total commodity export was just under SEK 690 billion in 2001 and the import value just under SEK 503 billion for the sectors which were covered by VFU01[8].

The value of the outgoing shipments with foreign recipients amounted in VFU01 to just under SEK 683 billion and the value of incoming shipments sent from abroad to SEK 476 billion.

Seasonal variation over the quarters in VFU01 can for instance be reconciled with the development in the industrial production index[9] for the mining and

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[7] SCB, Sweden's statistical databases. Industrial production by commodity group in accordance with KN 4-figure level. Years 1996-2001.
[8] SCB, Foreign trade statistics and the business register.
[9] SCB, Sweden's statistical databases. Industrial production index by sector.

manufacturing sectors. Both series show a decline between quarter 2 and 3 which amounts to approximately 25 per cent in VFU01 and just under 18 per cent in the industrial production index.. However, VFU01 concerns transported goods and not production during a given time period. The changes between other quarters are relatively similar in VFU01 and the industrial production index.

Compared with the development of turnover for wholesale trade[10], VFU01 shows a somewhat larger decline between quarter 2 and 3 and a similar development between quarter 3 and 4.

Further breakdowns of various commodity groups, sectors or trade partners is in this context less meaningful. Discrepancies between VFU-data and other sources appear for the wholesale trade sector and the commodity groups machinery and other finished goods.

Some general reasons for the differences between VFU-data and other statistics of commodity values:

• VFU covers information on transported goods. The information from the business statistics relates to total commodity production and turnover. The clearest difference in this respect applies to sales where the purchaser obtains the commodity at the local unit. The provider of the information lacks in this case knowledge of the destination of the commodity transport and this form of sales is classified as relevance overcoverage in VFU01.

• Partial weaknesses in the reporting from larger local units. It cannot be disregarded that larger companies are of particular importance for estimates of the total transport volumes. VFU01 is a new survey that must be said to place relatively great demands in particular on the larger local units. One problem in conjunction with VFU01 has been outsourcing of transport functions which has taken place within different companies. This has sometimes involved lack of clarity on the obligation to report in the survey.

• One of the criteria in the sample selection of local units for participation in VFU01 consists of the number of employees at the respective local unit. Local units with few employees thus received, given other sample selection criteria, low sample probabilities. However, there are examples of activities where the correlation between the number of employees and transported commodity volumes is weak. A couple of cases consist of petroleum and grain stocks. These types of local units were relatively weakly represented in the survey. This was one reason for a review of the sample selection plan that was carried out for quarter 3 (see Annex 2. section 2.6). In a comparison with SIKA's shipping goods statistics, some underestimation moreover appeared for transport of petroleum products via port terminals. VFU01-data for the different ports were corrected on the basis of this information.

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[10] SCB, Sweden's statistical databases. Turnover development of the wholesale trade by sector.

- In conjunction with the reporting of foreign shipments, some under-reporting has probably arisen due to lack of clarity about the provision of information as regards commodity flows directly from foreign suppliers to end customers which do not physically pass through the reporting local unit. Another important problem in this context can apply to the provision of information in conjunction with deliveries free of freight to the purchaser. Furthermore, in VFU01 an exception was made to avoid possible double reporting, an exemption from the reporting of shipments where the wholesaler is responsible for the delivery.

- Other sectors that are not included in VFU01. A considerable discrepancy exists between the total import value for all sectors and the import value for the sectors covered by VFU01. It has not been possible to trace the exact origin of this difference. It seems probable that a considerable part can be derived from commodity import classified in the retail trade sector. Other sectors in primary, service, construction activities which are not covered by VFU are hardly considered to be able to account for import values of a more substantial size.

- Transportation coupled to the activities of primary industries. These sectors account for considerable transport volumes, in particular in weight respects. The sectors are only included in VFU01 to a limited extent.

8 Data basis

This chapter briefly discusses the quality of the data in the information, possible weighting procedures and the treatment of extreme values.

8.1 Data quality

The great majority of information on individual shipments reported was accompanied by references to documents such as invoices or consignment notes. In the cases where a larger number of shipments were reported electronically, the bases for this has consisted of excerpts from the computing systems of local units The samples of individual shipments have in most cases been well distributed over the reporting periods. The information on the total number of shipments has in a few cases been uncertain. Overall, however, the quality of the information reported to SCB is considered to be very good.

The scope and content of the reporting to VFU01 has been discussed with some of the larger companies. One point of view concerned the relatively limited samples. The alternative to the sampling procedure of particular shipments for the larger companies should primarily have been larger samples or total reporting via spreadsheets or another electronic medium.

8.2 Calibration

Calibration is a general method to correct estimates in statistical surveys by using auxiliary information correlated with the survey variables. The perhaps most frequent applications concern correlations for distortions in the estimates caused by large non -response among certain groups of survey objects. The calibration is carried out so that these objects are reweighted in the estimate calculations. At least as important aim in any calibration of VFU data is to adjust the total estimates taking into consideration the total values of the auxiliary variables.

Calibration is possible at different levels of aggregation. At the same time, it should be said that calibration can also introduce distortions into the results. Implementation of auxiliary variables such as total turnover can evidently entail such distortions since the geographic distribution of the shipments is to some extent unique for each local unit. This is particularly marked for the larger local units and a general reweighting of shipment volumes for these local units on the basis of data for total turnover should probably be avoided.

A review at company level in conjunction with reconciliation of VFU data with VAT register data and IVP data has in certain cases at the same time shown a need for some form of correction of VFU data. This is due to the particular

importance of the larger companies and the built-in random variation which occurs in the VFU estimates.

Calibration or reweighting of VFU-data should in the light of this in the first place be undertaken with respect to partial non-response of production or turnover values at company level. Implementations with respect to object non-response in larger groups of survey objects risks introducing distortions in important survey variables such as the geographic dimensions of the shipments.

8.3 Extreme values

Extreme values for particular shipments occur, for instance, for hi-tech products. The particulars of these shipments have been correct in the great majority of cases which have been checked. Commodity values can vary considerably between different shipments classified with the same commodity code. Individual extreme values at shipment level have in most cases been seen to have small significance for the total estimates at aggregated levels.

Extreme values relating go the total reporting at local unit level can, on the other hand, entail considerable distortions and increased uncertainty in the estimates of the quantitative variables. By extreme values at local unit level are meant exceptionally high values for the estimated totals of shipments associated with a local unit.

The quantitative variable values are then often consistently relatively high for most reported shipments at the same time as the design weights are large due to the specific stratum classification of the local units by size group. However, there are possibilities to compensate for these which will shortly be described.

Extreme values can in this context been determined in at least two ways:

- estimates for an individual local unit have a disproportionately heavy influence in the final point and/or variance estimates
- for point estimates as observed values with considerable discrepancies in relation to the mean value for local units within the respective stratum

The determination of extreme values has taken place on the basis of the local unit's relative contribution to the estimates. The contribution to the total point and variance estimates has been calculated for each of the individual local units and observations with unreasonably high proportions of estimates in relation to the size of the local units have been dealt with separately. Observations for some 20 local units have been excluded from the local unit population weighting scheme. These local units have consequently only been included in the survey outcome representing their own activity.

Annex 1   Result of outgoing and incoming shipments

1.1   Outgoing shipments, estimated values and weights

The total value of outgoing shipments in 2001 was estimated according to VFU01 at just over SEK 1 905 billion, of which export shipments account for just under SEK 683 billion. The total weight of outgoing shipments of transported goods was just over SEK 246 million tonnes, of which export shipments accounted for just over SEK 61 million tonnes.

The following tables of different sub-groups show the shares of the total amounts. The exactness of the estimates is specified as the mean error as a proportion of the respective point estimate.

1.2 Outbound shipments, estimated values by industry and size group

The basis for the sectors production of forest and logging products, dairy farming and sugar beet cultivation consists of register data from various sector organisations. No statistical measure of coverage is available for these sectors. However, coverage is assumed to be good on the basis of assessments within the respective sector organisation. The statistics in the sector production of forest and logging products consist of raw material transportation of mainly pulp wood, round timber and wood waste. These statistics are based on information about transport of forest raw material to approximately 300 different local units among sawmills companies in Sweden. The figures for sugar beet cultivation can be regarded as fully comprehensive and information about dairy farming almost fully comprehensive as regards milk weighed at the dairies.

0 shows outgoing shipments broken down by sector. The transport volume in weight terms is dominated by sectors associated with raw material handling and manufacturing industry. Wholesale trade is dominated by trade with input goods. The sector includes wholesale trade with fuels, metals, timber, building materials, ironmongery goods, heating, ventilation and sanitation fittings, chemical products and industrial necessities.

In value terms, manufacturing industry as a whole accounted for 61.4 per cent of the estimated volume outgoing shipments. The engineering and metal industry sub-group accounted for 31.2 per cent of the estimated total value. Total wholesale trade accounted for 36.6 per cent of the estimated total value.

Wholesale trade with food and wholesale trade with machines were the two most important sub-groups in wholesale trade in value respects.

Table 16   Shares of total estimates of outgoing shipments by industry

Sector	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Production of forest and logging products SNI5 02011	22.2	-	1.0	-
Sugar beet cultivation, Dairy farming SNI5 01114. 01211	2.4	-	0.4	-
Mining SNI 10-14	17.0	12	0.6	10
Manufacturing industry SNI 15-37	40.4	3	61.4	3
Foodstuffs and tobacco industry, etc. SNI 15.16	4.5	9	6.8	10
Wooden goods, pulp and paper industry SNI 20.21	11.6	5	10.3	6
Chemical and printing industry SNI 22-25	12.0	4	10.1	8
Engineering and metal industry SNI 27-35	6.5	4	31.2	4
Other manufacturing industry SNI 17-19. 26. 36.37	5.8	15	2.7	11
Wholesale trade and wholesale trade with spare parts for motor vehicles SNI 51 and SNI3 503	18.0	8	36.6	5
Wholesale trade with foodstuffs SNI3 513	4.2	12	10.2	11
Wholesale trade with other consumer goods SNI3 514	1.1	15	7.7	10
Wholesale trade with input goods SNI3 515	9.7	12	6.4	8
Wholesale trade with machinery SNI3 516	0.8	20	8.2	11
Other wholesale trade SNI3 503.511.512.517	2.2	33	4.1	17
Total	100	4	100	3

Tables 17 and 18 show estimated values by size groups and sectors. The largest local units in size group 1 account both in weight and value terms for approximately 65 per cent of the estimated volumes. The larger local units in manufacturing industry have had a particularly large influence on the estimated volumes. Local units in the smaller size groups have been of relatively little importance for the estimated volumes, in particular the smallest local units in size group 4.

The accuracy of the estimates is reduced for the smaller size groups, which is primarily related to VFU01 being a total survey of the largest local units to the extent that all local units in the population in this size were included in the survey, while the smaller local units were represented by sample with reduced sampling probability by size.

Table 17   Shares of total estimates of outgoing shipments by size group[11]

Size group	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
1	64.2	2	67.4	2
2	21.4	13	13.4	9
3	9.0	18	15.2	10
4	5.4	25	4.0	14
Total	100	4	100	3

Table 18   Shares of total estimates of outgoing shipments by industry and size group[12]

Sector	Size Group	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Mining	1	11.8	4	0.4	1
	2	9.7	26	0.3	26
	3	-	-	-	-
	4	1.0	85	0.0	80
Manufacturing industry	1	42.6	2	44.7	2
	2	6.8	12	7.5	13
	3	3.6	27	8.8	13
	4	0.8	35	1.1	24
Wholesale trade	1	9.8	6	22.5	6
	2	4.9	13	5.6	13
	3	5.4	24	6.3	15
	4	3.6	28	2.8	17
Total		100	4	100	3

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[11] The table applies to the sample survey and does not include data for the sectors production of forest and logging products, dairy farming and sugar beet cultivation

[12] See note 1

1.3   Outgoing shipments, estimated values by commodity group and transport mode

The distribution of transport volumes by commodity groups shows that the largest commodity groups in weight terms consisted of pulp wood, round timber and wood waste, unprocessed mineral products and building materials, other manufactured products and petroleum products and solid mineral fuels. In value terms, other manufactured products, foodstuff products, machinery and machine parts dominate.

Table 19   Shares of total estimates outgoing shipments by commodity group

Commodity group	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Agricultural and forest products excl. pulp wood, round timber and wood waste	4.2	12	2.2	12
Pulp wood, round timber and wood waste	24.5	1	1.1	6
Foodstuff products	10.4	8	18.5	8
Petroleum products and solid mineral fuels	12.2	6	3.5	9
Ores and metal waste	8.6	10	0.6	13
Metal products	5.0	6	7.4	11
Unprocessed mineral products and building materials	13.5	20	1.1	19
Chemical products and fertilisers	6.5	13	3.8	8
Medical and pharmaceutical products	0.1	18	4.1	10
Transport equipment and parts of transport equipment	1.0	9	9.9	9
Machinery and machine parts	1.1	17	14.9	8
Other manufactured products excl. transport equipment and machinery	12.9	7	32.9	4
Total	100	4	100	3

Table 20 shows the breakdown of transport volumes by transport mode or combinations of transport mode. Lorry or car transport as the single transport mode accounted for the weightiest transport mode with shares of approximately 65 per cent both in weight and value terms of the transported volumes.

Lorry transport in different combinations with ferry or cargo vessel transport was reported for just under 7 per cent of the total weight. Lorry in different combinations with rail and sea transport was reported for just over 2 per cent of total weight. Railway as the single transport mode account for 5.3 per cent and

railway combined with sea transport for 6.6 per cent of the transported weight. Cargo vessel transport accounted for 13.2 per cent of the total volume in weight terms.

In value terms transport by lorry and cargo vessel was of less importance and lorry combined with other transport modes and in particular air transport was of greater importance.

Table 20   Shares of total estimates of outgoing shipments by transport mode or combinations of transport modes

Transport mode	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Lorry, car or bus/coach	65.1	4	64.5	3
Lorry and ferry	0.5	18	1.7	12
Lorry and cargo vessel	2.6	8	3.9	6
Lorry, ferry and lorry	2.7	8	9.0	7
Lorry, cargo vessel and lorry	1.0	23	2.0	9
Air or air and car transport	0.1	17	4.0	11
Lorry, air and lorry	0.3	18	3.1	9
Railway	5.3	7	3.4	4
Lorry and railway	1.0	20	1.2	17
Lorry, railway and lorry	0.3	10	0.5	14
Lorry, railway and ferry/cargo vessel	0.8	9	1.1	9
Railway and ferry/cargo vessel	6.6	3	1.4	9
Cargo vessel	13.2	7	2.7	10
Other	0.2	63	0.6	35
Unknown	0.3	-	0.9	-
Total	100	4	100	3

It has only been possible to check the stated transport mode to a limited extent. It has been difficult for many respondents to state the transport mode when using Sweden Post's business package service.

Table 21 show the different combinations of transport mode in summary broken down by commodity groups. Lorry or car transport dominated in weight terms for transport of pulp wood, round timber and wood waste, unprocessed mineral products, building materials and foodstuff products. In value terms, other manufactured products and foodstuff products were most important. Lorry or car transport in combination with sea transport was dominated in weight terms by transport of metal products, chemical products and other manufactured products.

In terms of value, transport equipment, machinery and other manufactured products were the most important commodity types for road and sea transport.

For single air transport or air transport combined with another transport mode, the most important commodity types were medical products, transport equipment and parts, machinery and parts and other manufactured products.

For railway or railway in combination with another transport mode, the most important commodity groups in terms of weight were ores and metal waste, metal products and other manufactured products. In value terms, the most important products were metal products and other manufactured products.

For single cargo vessel transportation, the most important commodity groups were petroleum products and solid mineral fuels, unprocessed mineral products and building materials, chemical products and fertilisers.

Table 21   Shares of total estimates of outgoing shipments by transport mode and commodity group

Transport mode	Commodity group	Share of estimated weight shipments	Share of estimated value shipments
Lorry, car or bus/coach	Agricultural and forest products excl. pulp wood, round timber and wood waste	2.9	1.7
	Pulp wood, round timber and wood waste	24.3	1.0
	Foodstuff products	9.9	17.1
	Petroleum products and solid mineral fuels	4.0	2.0
	Ores and metal waste	1.1	0.1
	Metal products	1.7	3.1
	Unprocessed mineral products and building materials	10.3	1.0
	Chemical products and fertilisers	3.2	2.0
	Medical and pharmaceutical products	0.1	2.4
	Transport equipment and parts	0.5	4.2
	Machinery and machine parts	0.7	9.1
	Other manufactured products excl. transport equipment and machinery	6.4	20.8
Lorry and ferry/cargo vessel or lorry, ferry/cargo vessel and lorry	Agricultural and forest products excl. pulp wood, round timber and wood waste	0.6	0.2
	Pulp wood, round timber and wood waste	0.1	0.0
	Foodstuff products	0.2	0.5
	Petroleum products and solid mineral fuels	0.0	0.1
	Ores and Metal waste	0.1	0.0
	Metal products	0.8	1.4
	Unprocessed mineral products and building materials	0.3	0.0
	Chemical products and		

Transport mode	Commodity group	Share of estimated weight shipments	Share of estimated value shipments
	fertilisers	1.1	0.8
	Medical and pharmaceutical products	0.0	0.6
	Transport equipment and parts for transport equipment	0.3	3.1
	Machinery and machine parts	0.3	3.1
	Other manufactured products excl. transport equipment and machinery	3.0	6.8
Air or air and road transport or lorry, air and lorry	Agricultural and forest products excl. pulp wood, round timber and wood waste	0.0	0.0
	Pulp wood, round timber and wood waste	-	-
	Foodstuff products	0.0	0.0
	Petroleum products and solid mineral fuels	0.0	0.0
	Ores and metal waste	-	-
	Metal products	0.0	0.0
	Unprocessed mineral products and building materials	-	-
	Chemical products and fertilisers	0.0	0.2
	Medical and pharmaceutical products	0.0	1.1
	Transport equipment and parts for transport equipment	0.0	1.6
	Machinery and machine parts	0.1	2.3
	Other manufactured products excl. transport equipment and machinery	0.3	1.9
Railway or railway combined with other transport mode	Agricultural and forest products excl. pulp wood, round timber and wood waste	0.3	0.1
	Pulp wood, round timber and wood waste	0.0	0.0
	Foodstuff products	0.2	0.6
	Petroleum products and solid mineral fuels	0.0	0.0
	Ores and metal waste	7.0	0.4
	Metal products	2.4	2.4
	Unprocessed mineral products and building materials	0.2	0.1
	Chemical products and fertilisers	1.1	0.5
	Medical and pharmaceutical products	0.0	0.0
	Transport equipment and parts for transport equipment	0.2	0.7
	Machinery and machine parts	0.0	0.3
	Other manufactured products excl. transport equipment and machinery	2.6	2.5
Cargo vessel	Agricultural and forest products excl. pulp wood, round timber and wood waste	0.4	0.1
	Pulp wood, round timber and wood waste	0.1	0.0

Transport mode	Commodity group	Share of estimated weight shipments	Share of estimated value shipments
	Foodstuff products	0.0	0.1
	Petroleum products and solid mineral fuels	8.1	1.4
	Ores and metal waste	0.4	0.0
	Metal products	0.0	0.2
	Unprocessed mineral products and building materials	2.7	0.0
	Chemical products and fertilisers	1.0	0.4
	Medical and pharmaceutical products	-	-
	Transport equipment and parts for transport equipment	0.0	0.1
	Machinery and machine parts	0.0	0.0
	Other manufactured products excl. transport equipment and machinery	0.5	0.4
Other/unknown	Agricultural and forest products excl. pulp wood, round timber and wood waste	0.0	0.0
	Pulp wood, round timber and wood waste	0.0	0.0
	Food products	0.1	0.2
	Petroleum products and solid mineral fuels	0.0	0.0
	Ores and Metal waste	-	-
	Metal products	0.0	0.3
	Unprocessed mineral products and building materials	0.0	0.0
	Chemical products and fertilisers	0.2	0.1
	Medical and pharmaceutical products	0.0	0.0
	Transport equipment and parts for transport equipment	0.0	0.2
	Machinery and machine parts	0.0	0.1
	Other manufactured products excl. transport equipment and machinery	0.0	0.4
	Non-response	0.2	0.2
Total		100	100

1.4 Outgoing shipments, estimated values for according to cargo type and transport mode

Besides transport mode, information was collected on cargo type, e.g. bulk goods, container-loaded goods or palletised goods. Table 22 shows the distribution of the estimated weights and values by cargo type. The most important cargo types in terms of weight consisted of bulk goods and pre-slung goods. In terms of value, palletised goods and other cargo types such as boxes, cardboard boxes and packages dominated.

Table 22   Shares of total estimates of outgoing shipments by cargo type

Cargo type	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Liquid bulk goods	15.8	5	3.5	7
Solid bulk goods	22.3	8	3.3	8
Large freight container	4.8	16	5.4	10
Other container	0.8	18	1.0	14
Palletised	14.8	6	47.2	4
Pre-slung	26.6	2	3.0	6
Self-propelling mobile units	2.2	25	4.0	11
Other mobile units	0.4	32	0.5	21
Other, e.g. boxes	11.2	9	28.7	4
Unknown	1.1	23	3.3	18
Total	100	4	100	3

In Table 23, the estimated weights and values are shown by cargo type and
transport mode. Lorry, car or bus/coach transport is dominated in weight terms by
palletised and pre-slung goods. In value terms, palletised gods and other cargo
types were most important. Road transport in combination with sea transport was
dominated in weight terms by transport of solid bulk goods and palletised goods.
In terms of value, palletised gods and other cargo types were the most important
cargo types in road and sea transport. For air transportation, the most important
cargo types were palletised gods and other cargo types.

For railway or railway combined with another transport mode the most important
cargo types in weigh terms were solid bulk goods and other cargo types. In value
terms, palletised gods and other cargo types were most important.

For cargo vessel transport, the most important cargo types in both weight and
value terms were liquid and solid bulk goods.

**Table 23   Shares of total estimates of outgoing shipments by transport mode
and cargo type**

Transport mode	Cargo type	Share of estimated weight shipments	Share of estimated value shipments
Lorry, car or bus/coach	Liquid bulk goods	6.5	1.9
	Solid bulk goods	8.7	1.1
	Large freight container	2.8	2.1
	Other container	0.3	0.5

Transport mode	Cargo type	Share of estimated weight shipments	Share of estimated value shipments
	Palletised	11.8	35.1
	Pre-slung	25.3	2.1
	Self-propelling mobile units	1.5	2.0
	Other mobile units	0.2	0.1
	Other, e.g. boxes	7.6	18.4
	Unknown	0.5	1.2
Lorry and ferry/cargo vessel or lorry, ferry/cargo vessel and lorry	Liquid bulk goods	0.4	0.1
	Solid bulk goods	1.6	0.8
	Large freight container	1.0	1.9
	Other container	0.1	0.2
	Palletised	1.8	7.9
	Pre-slung	0.5	0.4
	Self-propelling mobile units	0.4	1.5
	Other mobile units	0.1	0.3
	Other, e.g. boxes	0.9	3.3
	Unknown	0.0	0.2
Air or air and road transport or lorry, air and lorry	Liquid bulk goods	-	-
	Solid bulk goods	-	-
	Large freight container	0.0	0.3
	Other container	0.0	0.0
	Palletised	0.2	2.5
	Pre-slung	-	-
	Self-propelling mobile units	-	-
	Other mobile units	-	-
	Other, e.g. boxes	0.2	3.8
	Unknown	0.0	0.5
Railway or railway combined with other transport mode	Liquid bulk goods	0.2	0.0
	Solid bulk goods	7.9	0.9
	Large freight container	0.9	0.8
	Other container	0.4	0.3
	Palletised	0.8	1.6
	Pre-slung	0.7	0.4
	Self-propelling mobile units	0.3	0.4
	Other mobile units	0.1	0.1

Transport mode	Cargo type	Share of estimated weight shipments	Share of estimated value shipments
	Other, e.g. boxes	2.5	2.8
	Unknown	0.2	0.3
Cargo vessel	Liquid bulk goods	8.6	1.6
	Solid bulk goods	4.1	0.5
	Large freight container	0.1	0.3
	Other container	0.0	0.0
	Palletised	0.1	0.0
	Pre-slung	0.1	0.0
	Self-propelling mobile units	0.0	0.0
	Other mobile units	0.0	0.0
	Other, e.g. boxes	0.1	0.1
	Unknown	0.0	0.2
Other or unknown	Liquid bulk goods	0.0	0.0
	Solid bulk goods	0.2	0.0
	Large freight container	0.0	0.1
	Other container	0.0	0.0
	Palletised	0.1	0.2
	Pre-slung	0.0	0.0
	Self-propelling mobile units	0.0	0.0
	Other mobile units	-	-
	Other, e.g. boxes	0.0	0.3
	Unknown	0.2	0.9
Total		100	100

1.5   Outgoing shipments, estimated values by geographic location and destinations

Table 25 shows the breakdown of the outgoing shipments by consignment region. The regions coincide with the National Road Authority's categorisation by geographic areas as shown in Table 24. Outgoing shipments include both short-term and long-term shipments and domestic and foreign transport.

Table 24 Road regions and counties

Road region	County
Northern	Norrbotten and Västerbotten county
Central	Jämtland, Västernorrland, Dalarna and Gävleborg county
Stockholm	Stockholm and Gotland county
Western	Värmland, Västra Götaland and Halland county
Mälardalen	Uppsala, Södermanland, Örebro and Västmanland county
South-eastern	Östergötland, Jönköping, Kronoberg, Kalmar, and Blekinge county
Skåne	Skåne county

The Northern road region is dominated by outgoing shipments with relatively low-value goods. The opposite applies for the Stockholm county/Gotland. region The central region has a higher share of the outgoing shipments in value terms compared with the Northern region and approximately the same size share of shipments in weight terms.

The Western region accounts for substantial shares of the outgoing shipments in both weight and value terms. The Mälardal region accounted for approximately 10 per cent of the outgoing shipments in weight terms and for a somewhat higher share in value terms. The South-eastern region accounted for 12 per cent of the outgoing shipments in weight terms and for over 17 per cent in value terms. Skåne accounted for over 11 per cent of the outgoing shipments both in weight and value terms.

Table 25   Shares of total estimates of outgoing shipments by road region

Road region	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Northern	17.0	7	3.4	7
Central	18.6	5	10.6	7
Stockholm	8.8	15	20.7	7
Western	22.7	4	24.0	5
Mälardalen	9.8	10	12.7	7
South-eastern	12.0	6	17.2	6
Skåne	11.1	12	11.4	8
Total	100	4	100	3

Table 26 provides some categorisation in short-term and long-term transport to the extent that the outgoing shipments by county were distributed by shipments with recipients within their own county, recipients outside their own county and export shipments.

Several counties show a similar pattern with somewhat higher shares in weight
terms for shipments med recipients within their own county compared with the
shares in value terms. On average, somewhat higher shares of the outgoing
shipments were shipped to recipients outside their own county compared with
recipients within the county and the difference was more explicit in terms of
value. In certain countries, however, the geographic distribution of despatch
destinations deviated from this pattern. Thus, in Stockholm county, shipments
with recipients within the county dominated and the same applied to Skåne and
Västerbotten county. The relatively low shares of export shipments for Stockholm
county is explained by the county's size in population terms – which means a
considerable amount of transportation within the county. The low value
distribution is also explained by the relatively great importance of onward
distribution of imported commodities and commodities produced in the county for
other parts of the country.

Table 26   **Shares of total estimates of outgoing shipments by county of consignment**

From county	Recipients within county		Recipients outside county		Recipients outside Sweden	
	Share of weight	Share of value	Share of weight	Share of value	Share of weight	Share of value
Stockholm county	0.6	0.4	0.3	0.4	0.1	0.2
Uppsala county	0.3	0.1	0.5	0.5	0.2	0.4
Södermanland county	0.2	0.0	0.6	0.6	0.2	0.4
Östergötland county	0.2	0.1	0.4	0.5	0.4	0.4
Jönköping county	0.2	0.2	0.6	0.5	0.2	0.3
Kronoberg county	0.1	0.1	0.5	0.5	0.4	0.4
Kalmar county	0.3	0.1	0.4	0.5	0.3	0.5
Gotland county	0.0	0.2	0.4	0.7	0.6	0.1
Blekinge county	0.4	0.1	0.2	0.3	0.4	0.6
Skåne county	0.5	0.3	0.3	0.4	0.2	0.3
Halland county	0.1	0.1	0.5	0.6	0.4	0.3
Västra Götaland county	0.3	0.3	0.3	0.3	0.4	0.4
Värmland county	0.4	0.2	0.3	0.4	0.3	0.4
Örebro county	0.3	0.1	0.5	0.6	0.2	0.3
Västmanland county	0.3	0.1	0.6	0.4	0.1	0.5
Dalarna county	0.1	0.1	0.5	0.5	0.4	0.4
Gävleborg county	0.3	0.1	0.3	0.3	0.4	0.6
Västernorrland county	0.4	0.2	0.4	0.5	0.2	0.3
Jämtland county	0.2	0.1	0.5	0.7	0.3	0.2
Västerbotten county	0.7	0.3	0.2	0.4	0.1	0.3
Norrbotten county	0.2	0.2	0.3	0.3	0.5	0.5
Total	0.3	0.2	0.4	0.4	0.3	0.4

Table 27 shows the breakdown of export shipments by recipient country or region. The breakdown shows high shares for Germany, the Benelux countries, and the Nordic countries both in terms of weight and value. The country information required concerned the final destination. However, in certain cases, it was difficult for the recipient to specify the final countries of destination and the information may then relate to the recipient country in a transport chain of countries.

Table 27 **Shares of total estimates of outgoing export shipments by recipient country/region**

Land/Region	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Norway	9.0	8	9.1	6
Finland	7.4	12	5.2	11
Denmark	7.1	7	6.1	8
Germany	23.9	6	12.7	5
Benelux	11.2	3	9.8	6
Italy, Switzerland and Austria	4.4	5	6.1	8
France, Spain and Portugal	7.9	3	7.9	7
U.K., Ireland and Iceland	10.4	5	8.5	6
South-eastern Europe including Poland and the Czech Republic	2.8	8	5.2	10
Eastern Europe	0.7	11	1.6	11
North, Central and South America	6.8	23	12.1	6
Africa	3.8	5	2.0	17
Asia and Oceania	4.6	8	13.7	8
Total	100	3	100	4

1.6 Access to private siding and wharves

Two questions were included in the survey on access to and use of private sidings and wharves for rail and sea transport at the respective local unit.

Table 28 **Access to and use of private sidings and wharves. Shares of number of reported local units**

Asset/use	Private siding Share of number local units	Wharf Share of number local units
Yes, which is used	9.9	4.0
Yes, which is not used	5.6	1.9
No	70.1	80.2
Partial non-response	14.4	13.9
Total	100	100

Table 29   Access to and use of private sidings and wharves. Weight and value shares

Access/use	Private siding Share of estimated weight	Private siding Share of estimated value	Wharf Share of estimated weight	Wharf Share of estimated value
Yes, which is used	29.4	17.9	16.4	5.1
Railway/sea transport	12.4	4.8	12.6	2.2
Yes, which is not used	4.5	7.0	1.8	2.9
No	47.5	60.4	62.9	77.6
Partial non-response	6.2	9.9	6.3	12.2
Total	100	100	100	100

The local units which have access to private sidings/wharves and use these account for relatively large shares of the estimated values. However, it should be emphasised that the stated shares do not reflect the extent of the actual use for the group that claims to use the private siding/wharf. This is reflected in the group railway/sea transport in Table 29 that specifies the share of the total estimates for this transport mode associated with local units that have access to and use the private siding/wharf. For over 40 per cent of the estimated weight, railway transport has thus been used by the local units that have access to and use the private siding. In railway and sea transport, all the combinations where the respective transport mode occurs have been included.

1.7   Incoming shipments from abroad, estimated values and weights

The total value of incoming shipments from abroad during 2001 was estimated according to VFU01 at just under SEK 477 billion. The total weight was estimated for incoming shipments at just over 61 million tonnes.

1.8   Incoming shipments by industry and size group

Table 30 shows the breakdown of incoming shipments by industries and Table 31 by size groups. The trend towards concentration of volumes to the larger local units which could be observed for the outgoing shipments is even more explicit for incoming shipments with shares around 75 per cent of the estimated volumes for size group 1.

Table 30   Shares of total estimates of incoming shipments by industry

Size Group	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Mining and manufacturing industry	69.6	4	49.2	3
Wholesale trade	30.4	9	50.8	5
Total	100	4	100	3

Table 31   Shares of total estimates of incoming shipments by size group

Size group	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
1	79.2	4	73.6	3
2	7.6	18	9.4	10
3	3.3	22	11.4	11
4	9.9	5	5.6	14
Total	100	4	100	3

1.9   Incoming shipments by commodity group and transport mode

The breakdown of transport volumes by commodity groups for incoming shipments show that the largest commodity groups in weight terms consisted of petroleum products, chemical products and other manufactured products.

In value terms other manufactured products accounted for the incomparably most important group followed by petroleum products.

Table 32   Shares of total estimates of incoming shipments by commodity group

Commodity group	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Agriculture and forest products	9.6	11	2.0	19
Foodstuff products	3.6	23	5.2	12
Solid mineral fuels	4.6	17	0.6	22
Petroleum products	41.7	2	12.3	3
Ores and Metal waste	6.8	17	1.4	13
Metal products	4.8	13	5.7	10
Unprocessed mineral products and building materials	5.4	8	1.0	38
Chemical products and fertilisers	11.2	13	9.4	10
Other manufactured products	12.3	18	62.4	4
Total	100	4	100	3

Table 33 shows the breakdown for incoming shipments by transport mode or combinations of transport mode.

Lorry transport in different combinations with ferry or cargo vessel transport was reported for just under 30 per cent of the total weight. Lorry, car or bus/coach as the single transport mode has for natural reasons been far less important for incoming shipments from abroad compared with the outgoing shipments which also include domestic transport. The single most important transport mode in eight terms for import shipments consisted of single cargo vessel transport which accounted for almost 51 per cent of the incoming transport. In value terms, lorry transport and lorry transport in combination with ferry transport were the most important.

Table 33   Shares of total estimates of incoming shipments by transport mode

Transport mode	Share of estimated weight shipments	Relative Average error estimated weight	Share of estimated value shipments	Relative average error estimated value
Lorry, car or bus/coach	10.8	22	23.3	6
Lorry and ferry	0.8	24	1.8	19
Lorry and cargo vessel	8.6	11	3.4	14
Lorry, ferry and lorry	8.3	8	32.7	6
Lorry, cargo vessel and lorry	12.0	13	6.4	8
Air or air and road transport	0.0	18	3.2	17
Lorry, air and lorry	0.1	13	5.0	10
Railway	1.4	14	1.7	16
Lorry and railway	0.4	37	0.6	31
Lorry, railway and lorry	0.6	18	1.6	19
Lorry, railway and ferry/cargo vessel	4.4	8	4.1	6
Railway and ferry/cargo vessel	1.5	11	1.6	5
Cargo vessel	50.9	3	13.2	3
Other	0.0	93	0.1	26
Unknown	0.2	42	1.3	21
Total	100	4	100	3

1.10   Incoming shipments by recipient road region and country of shipment

The breakdown of the incoming shipments by receiving road region shows that the Western region dominated in terms of weight. The Central region was in second place. Broken down by commodity values, the spread between the different regions in southern Sweden was somewhat more even. Western Sweden and the Stockholm region appear as the most important import regions overall.

Table 34   Shares of total estimates of incoming shipments by recipient road region

Road region	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Northern	4.8	16	1.8	16
Central	18.1	5	5.6	7
Stockholm	10.2	7	26.3	8
Western	46.1	6	34.1	4
Mälardalen	5.6	9	8.2	8
South-eastern	7.0	12	13.8	4
Skåne	8.2	19	10.2	11
Total	100	4	100	3

Table 35 shows incoming shipments broken down by sender country/region. The Nordic countries and the northern parts of Europe dominate. Germany accounted for a high proportion of the incoming shipments in value terms.

Table 35   Shares of total estimates of incoming shipments by country of consignment/region

Country/Region	Share of estimated weight shipments	Relative mean error estimated weight	Share of estimated value shipments	Relative mean error estimated value
Norway	16.3	3	8.4	6
Finland	9.6	9	6.0	11
Denmark	6.8	6	6.7	9
Germany	14.6	6	23.6	7
Benelux	12.3	19	10.2	6
Italy, Switzerland, Austria	1.8	37	5.6	8
France, Spain, Portugal	2.0	15	7.4	9
U.K., Ireland, Iceland	6.0	15	8.8	6
South-eastern Europe incl. Poland and the Czech Republic	4.4	21	3.8	6
Eastern Europe	11.9	7	2.4	9
North, Central and South America	8.2	11	8.0	8
Africa	1.0	3	0.6	9
Asia and Oceania	5.1	3	8.5	7
Total	100	4	100	3

Annex 2 Sampling plan VFU01

2.1   Introduction

In general, the sample for VFU01 can be described as a stratified three-stage probability sample. Stratified probability samples in different stages can be considered to be a standard solution in many situations. This applies in particular to company and local unit surveys when the surveyed units vary greatly in size. In conjunction with VFU01, stratification was necessary to ensure the requisite representation within geographic areas and commodity groups. Sampling in three stages, with a relatively small number of shipments reported on in detail during a limited time period in the last sampling stage, must be considered as necessary to keep the burden of information on the respondents at a reasonable level.

The sampling of the target population of individual shipments took place in VFU01 in three stages.

1. Selection of local units
2. Allocation of reporting periods for local units in sample stage 1.
3. Individual shipments at local units on the basis of sample stage 1 and 2.

Stage 1 entails a selection of local units by size according to volume of shipments, based on known but possibly incomplete information, with a sampling probability varying according to shipment volume. Stage 2 entails an even distribution of reporting periods during the reference period with variation in the length of the reporting period between one and three weeks, depending on the size of the local units according to stage 1. Stage 3 entails a systematic selection of individual shipments. Instructions for this were provided in the survey material and the respondent made a selection of shipments at certain set intervals depending on the estimated total number of shipments during the reporting period. These selection stages are described in more detail in sections 2.8 and 2.9 below.

Stratification and allocation of the selection in stage 1 was carried out in accordance with the description in points 2.2–2.7 below.

2.2   Starting points in stratification of VFU01

The starting point for stratification in VFU01 has been that it shall be possible to report statistics relating to commodity flows with a regional breakdown and with a breakdown for certain specified commodity groups (12 "STAN-commodity groups"). In order to ensure sufficient representation of local units with large consignment volumes and improve the accuracy of the survey stratification has

also taken place taking into consideration differences in shipment volumes between different local units.

2.3 Correlation between sector of industry (SNI) and type of commodity production

For the sectors mining (SNI 10-14) and manufacturing industry (SNI 15-37) it is possible with the help of statistics from SCB's survey of statistics on the production of commodities and industrial services (IVP) to link sector (sector categorisation in accordance with SNI) at local units level to commodity production expressed in STAN-commodity groups. Unfortunately, this is not possible for the wholesale trade (SNI51).

The linking of the industrial categorisation of a local unit and its commodity production expressed in STAN takes place in several stages. In the first stage, the key provided by SIKA is used between STAN-commodity groups and NST/R-nomenclature together with the key that exists between NST/R and the combined commodity nomenclature (KN), which is used in IVP, to create a key between KN and STAN. This key together with data from IVP for 1998[13] was later used to study the connection between STAN and the industrial categorisation of a local unit.

The outcomes show that for most sectors (five-digit-SNI), there is a clear or almost clear correlation between SNI and STAN. A clear correlation means in this case that commodity production for a particular sector falls within one and the same STAN-commodity group. However, it was necessary for further work that to also link the STAN-mixed sectors (five-digit SNI-level) within manufacturing industry to and only one STAN-commodity group.

This is achieved by the sectors where there is a clear correlation (i.e. commodity production took place within a number of STAN-commodity groups) being allocated to the STAN-commodity group which had the greatest share of the total commodity production in the sector in question. Since there is no basis for making the corresponding key between STAN and sectors in the wholesale trade, all local units belonging to the wholesale trade were allocated to "STAN-commodity group unknown" designated as 99.

2.4 Industry-dependent cut-off limits

With the aid of local unit-data from SCB's Company statistics for 1998 (FS98) and the key between SNI and STAN, it is possible to study the breakdown of turnover[14] and the number of employees between and within the different STAN -

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[13] Most recent available data at time of planning the survey

[14] Turnover information in business statistics has been collected at a higher level in the company than the local unit. The turnover as regards several local-unit companies has therefore been distributed down to local level with the aid either of the wages bill or the number of employees.

commodity groups. The following table shows the turnover, the number of employees and the number of local units broken down according to STAN and the number of employees at the local unit.

Table 36   **Turnover, number of employees and number of local units broken down according to STAN-commodity groups and number of employees**

STAN commo-dity group		Number employees									Distribu-tion STAN commodity group
		0	1-4	5-9	10-19	20-49	50-99	100 -199	200-	Total	
1	Share of Local units	44%	31%	10%	6%	4%	3%	1%	2%	100%	0%
	Share of employees	0%	5%	5%	6%	9%	13%	6%	55%	100%	0%
	Share of turnover	1%	2%	2%	4%	8%	9%	5%	68%	100%	0%
2	Share of local units	35%	27%	14%	22%	0%	3%	0%	0%	100%	0%
	Share of employees	0%	9%	13%	45%	0%	32%	0%	0%	100%	0%
	Share of turnover	10%	8%	6%	43%	0%	33%	0%	0%	100%	0%
3	Share of local units	47%	22%	8%	8%	9%	5%	2%	0%	100%	1%
	Share of employees	0%	4%	5%	10%	26%	30%	21%	4%	100%	2%
	Share of turnover	1%	2%	3%	9%	26%	32%	22%	4%	100%	2%
4	Share of local units	33%	28%	14%	10%	8%	4%	2%	2%	100%	3%
	Share of employees	0%	3%	5%	7%	12%	14%	15%	44%	100%	7%
	Share of turnover	2%	2%	3%	6%	14%	13%	19%	42%	100%	5%
5	Share of local units	39%	35%	13%	9%	3%	1%	0%	0%	100%	0%
	Share of employees	0%	19%	20%	27%	21%	14%	0%	0%	100%	0%
	Share of turnover	15%	17%	18%	21%	15%	14%	0%	0%	100%	0%
6	Share of local units	15%	52%	9%	4%	7%	6%	0%	7%	100%	0%
	Share of employees	0%	3%	2%	1%	10%	11%	0%	73%	100%	0%
	Share of turnover	4%	5%	2%	1%	13%	14%	0%	60%	100%	0%
7	Share of local units	22%	19%	19%	3%	8%	3%	8%	19%	100%	0%
	Share of employees	0%	0%	1%	0%	2%	1%	8%	87%	100%	1%
	Share of turnover	0%	0%	3%	0%	1%	0%	4%	92%	100%	0%
8	Share of local units	15%	25%	12%	9%	11%	10%	7%	12%	100%	0%
	Share of employees	0%	1%	1%	1%	3%	7%	10%	77%	100%	3%
	Share of turnover	0%	0%	0%	0%	2%	8%	15%	74%	100%	3%
9	Share of local units	39%	35%	9%	6%	4%	3%	2%	2%	100%	3%
	Share of employees	0%	3%	3%	4%	7%	10%	14%	59%	100%	7%
	Share of turnover	0%	2%	2%	3%	5%	6%	11%	72%	100%	6%

STAN commodity group		Number employees									Distribution STAN commodity group
		0	1-4	5-9	10-19	20-49	50-99	100-199	200-	Total	
10	Share local units	37%	33%	13%	8%	6%	2%	1%	0%	100%	2%
	Share employees	0%	9%	10%	13%	22%	21%	15%	10%	100%	2%
	Share of turnover	3%	9%	14%	13%	18%	22%	12%	9%	100%	1%
11	Share local units	30%	34%	11%	8%	8%	4%	2%	3%	100%	2%
	Share employees	0%	3%	3%	4%	9%	10%	13%	60%	100%	5%
	Share of turnover	1%	2%	2%	3%	7%	8%	11%	65%	100%	5%
12	Share local units	49%	27%	9%	6%	5%	2%	1%	1%	100%	42%
	Share employees	0%	5%	5%	7%	13%	13%	13%	44%	100%	53%
	Share of turnover	1%	3%	4%	5%	9%	9%	10%	59%	100%	35%
99	Share local units	51%	30%	9%	6%	3%	1%	0%	0%	100%	45%
	Share employees	0%	15%	15%	19%	23%	12%	9%	8%	100%	20%
	Share of turnover	5%	10%	13%	16%	20%	12%	11%	13%	100%	41%
Total share of local units		48%	29%	10%	6%	4%	2%	1%	1%	100%	100%
Total share of employees		0%	7%	7%	9%	14%	12%	12%	39%	100%	100%
Total share of turnover		3%	6%	7%	9%	14%	11%	11%	39%	100%	100%

Based on Table 36 the following cut-off limits were set in VFU01. The starting point for the proposal was to cover at least 95 per cent of both the turnover and the number of employees in each STAN-commodity group.

Table 37   Industry-dependent cut-off limits in VFU01

Sni5-sectors categorised in STAN	Cut-off limit in VFU96 and VFU98	Cut-off limit in VFU2001	Number local units in target population (according to November 1999 -SAMU)	Number local units in survey population in use of earlier CUT-off limit	Number local units in survey population in use of new CUT-off limit
1	1 employee	5 employees	167	84	43
2	1 employee	1 employee	37	22	22
3	1 employee	5 employees	1 493	768	459
4	1 employee	5 employees	3 135	2 032	1 259
5	1 employee	No cut-off	164	91	164
6	1 employee	1 employee	51	38	38
7	1 employee	20 employees	51	37	20
8	1 employee	20 employees	297	239	113
9	1 employee	5 employees	3 357	1 823	892
10	1 employee	1 employee	1 995	1 248	1 248
11	1 employee	5 employees	1 807	1 220	693

12	1 employee	5 employees	43 037	20 549	10 302
99 (SNI51)	1 employee	1 employee	45 648	22 348	22 348
Total			101 239	50 499	37 601

2.5   Stratification and allocation of the sample of the first stage

Stage 1

Table 36 shows that there is a very skewed distribution between the twelve STAN-commodity groups both as regards the number of local units included in the respective group and the size of the commodity groups measured in turnover and the number of employees. To enable reporting of the outgoing commodity flow for these commodity groups, 12 pre-stratum are created in the first place which coincide with the twelve commodity groups. Moreover, a separate pre-stratum is created for local units in the wholesale trade (described as STAN 99 in Table 36). In all 13 different pre-strata are created.

Stage 2

Table 36 also shows that there is a skewed distribution within most STAN-groups (this also includes the wholesale trade-STAN 99). Skewed distribution means that a relatively small number of local units account for a large part of the total turnover and the total number of employees in the respective commodity group. Therefore, stratification is also made in stage 2 of a size stratification with respect to the number of employees. After a number of different approaches, three different size groups were selected in this stage, although the limits between size groups were allowed to vary here depending on the pre-stratum allocation.

Accordingly, after stage two, 13 (from the first stage) x 3 (from the second stage)= 39 new pre-strata have been created. In the following tables, these 39 pre-strata are presented with stratum sizes together with the size limits used in the different STAN-groups.

Table 38   Pre-strata, size limits and stratum size VFU01

STAN-commodity group	Size group	Size limit (Number employees at local unit)	Stratum size Number local units in the stratum (according to SAMU-Nov 99)
1	1	200-	3
	2	20-199	11
	3	5-19	29
2	1	10-	7
	2	1-9	15
	3	-	-
3	1	50-	88
	2	20-49	139
	3	5-19	232

STAN-commodity group	Size group	Size limit (Number employees at local unit)	Stratum size Number local units in the stratum (according to SAMU-Nov 99)
4	1	100-	128
	2	20-99	369
	3	5-19	762
5	1	10-	15
	2	1-9	76
	3	0	73
6	1	200-	3
	2	5-199	14
	3	1-4	21
7	1	200-	4
	2	20-199	16
	3	-	-
8	1	200-	35
	2	50-199	19
	3	20-49	59
9	1	200-	81
	2	100-199	73
	3	5-99	738
10	1	50-	66
	2	10-49	273
	3	1-9	909
11	1	200-	44
	2	50-199	116
	3	5-49	533
12	1	200-	391
	2	100-199	448
	3	5-99	9463
99	1	50-	461
	2	20-49	1356
	3	1-19	20531

The pre-strata that belonged to size group 1 and 2 were not further stratified but these pre-strata formed the final stratum.

Stage 3-Strata which are sample surveyed on a quarterly basis

The twelve pre-strata assigned to size group 3 and STAN-commodity groups 1-12. i.e. manufacturing industry were combined into a common pre-stratum. Of the original thirteen size group 3 pre-strata, two remained therefore ("Manufacturing-small" and "Wholesale trade-small").

Both "Manufacturing-small" and "Wholesale trade-small" were then categorised separately in two new size strata as follows:

Manufacturing-small
- Local units with at least 10 employees were assigned to a new size group 3
- Other local units were assigned to a size group 4

Wholesale trade-small
- Local units with less than 4 employees were assigned to a new size group 3
- Other local units were assigned to size group 4

This categorisation in 4 new pre-strata was undertaken primarily to obtain more homogenous (in the sense of reduced variance) stratum.

These 4 pre-strata were each stratified according to NUTS II area of Sweden which finally produced 4 x 8=32 strata which were sample surveyed on an annual basis. Allocation between these strata was carried out with the aid of "variance proportions" which were calculated on the basis of local unit data used to create Table 1 above.

To sum up, this stratification led to use of 58 different strata.

2.6   Stratification quarter 3 and 4

Analysis of data material for the first two first quarters in implementation of the survey indicated a somewhat inadequate coverage of certain capital-intensive activities with large shipment volumes and relatively few employees. Since size stratification of local units had to be based on the number of employees, there is a risk that such activities will not be represented in the survey in a satisfactory way.

In a review of local units and companies with respect to net turnover in accordance with the VAT register, it was seen that some sectors in particular in the wholesale trade with fuels and the wholesale trade with metals, differed from the sector otherwise with regard to turnover in relation to the number of employees.

In the light of this, the cut-off limits were adjusted as from quarter 3 for certain activities in the wholesale trade sector. The target was to increase the sample of local units with potentially large shipments in relation to the number of employees, at the same time as the total sample size was not to increase.

The following sectors with the largest average turnover per employee created new strata where the cut-off limits for size group 1 and 2 were lowered while other sectors at SNI5-level within the wholesale trade retained their original cut-off limits.

Table 39   Sectors with adjusted cut-off limits, quarter 3 and 4

51210	Wholesale trade grain, seed and animal fodder
51320	Wholesale trade meat and meat products
51330	Wholesale trade dairy products
51390	Non-specialised wholesale trade foodstuffs
51460	Wholesale trade medical equipment
51510	Wholesale trade fuels
51520	Wholesale trade metals
51640	Wholesale trade office equipment
51653	Wholesale trade telecommunication products

The cut-off limits for the new group were set at 20 employees for size group 1 and 10 employees for size group 2. This meant primarily an increased probability for local units with 10 till 19 employees within the aforesaid sectors being included in

the survey. The increase of the total number of local units in the selection as a result of this was small so that it was not necessary to reduce the sample otherwise.

2.7   Sample first stage - local units

The sampling frame was created for the respective quarter on the basis of current information from CFAR. All local units belonging to size group 1 were included in the sample. Local units belonging to size group 2 were allocated so that they were included in one of the quarterly samples during the year. All local units in size group 2 were thus included in the sample on an annual basis. For size groups 3 and 4 random samples of local units were made separetely for each quarter.

The number of local units in the sampling frame and the sample sizes in the different quarters broken down by stratum are shown in tables 40 and 41.

Table 40   Sampling frame and sample broken down by stratum, quarter 1 and 2

Stratum	Quarter 1 Number local units in the sampling frame	Quarter 1 Number in the sample	Quarter 2 Number of local units in the sampling frame	Quarter 2 Number in the sample
01199	3	3	3	3
01299	12	3	11	3
02199	7	7	7	7
02299	16	4	16	4
03199	83	83	82	82
03299	126	32	121	30
04199	128	128	116	116
04299	374	94	323	81
05199	17	17	15	15
05299	73	18	68	17
06199	3	3	2	2
06299	14	4	13	3
07199	4	4	4	4
07299	15	4	10	3
08199	34	34	34	34
08299	23	6	22	6
09199	82	82	77	77
09299	74	19	70	18
10199	70	70	69	69
10299	282	71	266	67
11199	40	40	39	39
11299	121	30	105	26
12199	384	384	367	367
12299	438	110	425	106
37301	951	20	871	46
37302	1067	25	1042	28
37303	1179	24	1172	31
37304	935	20	890	32
37305	1480	35	1440	63
37306	654	11	634	15
37307	256	10	250	10
37308	360	10	358	10
37401	961	12	871	13
37402	913	10	869	10
37403	783	10	750	10
37404	824	10	786	10
37405	1311	10	1244	10
37406	584	10	567	10
37407	268	10	251	10
37408	371	10	352	10

Stratum	Quarter 1 Number local units in the sampling frame	Quarter 1 Number in the sample	Quarter 2 Number of local units in the sampling frame	Quarter 2 Number in the sample
99199	461	461	463	463
99299	1414	354	1392	348
99301	1937	281	1941	99
99302	850	17	862	17
99303	536	10	542	14
99304	1092	164	1090	70
99305	1574	57	1614	68
99306	471	14	487	33
99307	203	10	211	10
99308	239	17	246	22
99401	4036	87	4126	112
99402	1642	10	1669	110
99403	1026	10	1048	21
99404	2090	19	2159	280
99405	3199	23	3258	30
99406	922	10	930	10
99407	435	10	457	10
99408	482	10	506	10
Total	37930	3051	37615	3224

The stratum designations used have the following meaning. Position 3 specifies size groups 1-4. Stratum designations whose first two positions are in the series 01-12 specify total-surveyed companies in size groups 1 and 2 within the mining and manufacturing industries. The first two positions specify here STAN-commodity group and positions 4 and 5 are unspecified since further stratification by NUTS II-region is not necessary for the totally counted local units. Stratum designations which start with 37 in the two first positions specify the remaining local units in the mining and manufacturing industry in size groups 3 and 4. These local units were sample surveyed and stratified by NUTS II-region 1-8 specified in positions 4 and 5. In the event of pre-stratification, the different STAN groups were combined for these local units and positions 1 and 2 are thereby unspecified.

The sector wholesale trade are contained in the series designated with 99 in position 1-2. These local units cannot be stratified according to STAN-commodity group. Local units in size groups 3 and 4 are stratified according to NUTS II-region 1-8 while this is not necessary for local units in size groups 1 and 2 since local units in these size groups are totally counted on a quarterly and annual basis respectively.

In quarter 3 and 4, stratification was changed as described in previous sections. This means that the wholesale trade was divided into two new stratum where local units with designation 99 in position 1-2 retained earlier selection criteria and local units with new selection criteria were designated 98 in position 1-2.

Table 41   Sampling frame and sample broken down by stratum quarter 3 and 4

Stratum	Quarter 3 Number local units in sampling frame	Quarter 3 Number in sample	Quarter 4 Number local units in sampling frame	Quarter 4 Number in sample
01199	3	3	3	3
01299	13	2	14	2
02199	7	7	7	7
02299	17	2	17	2
03199	82	82	81	81

Stratum	Quarter 3 Number local units in sampling frame	Quarter 3 Number in sample	Quarter 4 Number local units in sampling frame	Quarter 4 Number in sample
03299	126	16	125	12
04199	111	111	100	100
04299	345	43	342	33
05199	14	14	13	13
05299	77	11	78	9
06199	2	2	2	2
06299	16	2	16	2
07199	4	4	4	4
07299	12	1	12	1
08199	35	35	35	35
08299	23	3	23	2
09199	74	74	73	73
09299	73	10	74	8
10199	70	70	69	69
10299	282	37	282	27
11199	37	37	36	36
11299	112	14	114	12
12199	352	352	345	345
12299	467	65	462	56
37301	872	78	864	93
37302	1060	34	1059	41
37303	1184	46	1182	56
37304	912	39	909	47
37305	1455	75	1450	90
37306	647	19	649	22
37307	242	11	239	11
37308	371	11	372	13
37401	903	17	905	20
37402	884	10	881	10
37403	735	10	738	10
37404	787	10	786	10
37405	1217	10	1210	11
37406	576	10	575	10
37407	264	10	263	10
37408	331	10	331	10
98199	371	371	349	349
98299	582	146	568	106
98301	271	26	268	32
98302	111	10	107	10
98303	73	10	70	10
98304	97	10	96	10
98305	192	16	188	19
98306	56	10	59	10
98307	32	8	28	5
98308	34	9	34	6
98401	902	23	896	27
98402	316	63	314	63
98403	183	10	183	10
98404	313	78	309	59
98405	539	11	540	13
98406	172	10	168	10
98407	86	10	86	10
98408	98	10	101	10
99199	264	264	256	256
99299	1305	155	1301	120
99301	1531	43	1520	52
99302	663	14	667	17
99303	424	13	423	16
99304	933	61	924	72
99305	1317	51	1307	61
99306	406	29	409	34
99307	170	10	169	10
99308	199	10	199	10
99401	3206	111	3200	133

Stratum	Quarter 3 Number local units in sampling frame	Quarter 3 Number in sample	Quarter 4 Number local units in sampling frame	Quarter 4 Number in sample
99402	1375	10	1387	10
99403	889	23	890	27
99404	1903	16	1896	20
99405	2715	23	2697	28
99406	771	10	770	10
99407	382	10	376	10
99408	405	10	400	10
Total	38083	3091	37899	3053

2.8   Sample second stage – reporting periods

Each of the selected local units was allocated to a reporting period in accordance with Table 42. The reporting periods were distributed evenly over each quarter.

Table 42   Distribution of length of reporting period by sector and size group

Sector	Size group	Length of the reporting period
Mining	1	1 week
	2	2 weeks
	3	3 weeks
	4	3 weeks
Manufacturing industry	1	1 week
	2	2 weeks
	3	3 weeks
	4	3 weeks
Wholesale trade	1	1 week
	2	2 weeks
	3	3 weeks
	4	3 weeks

2.9   Sample third stage - shipments

In the third and final sampling stage, the respondents were themselves, according to instructions from SCB, to make an independent systematic selection of shipments for which a detailed report was to be made. Before the systematic selection was made, the respondent should, however, break down their shipments in the three reporting groups, outgoing shipments within and outside the county and incoming shipments from abroad.

Separate systematic selections were taken from each of these three groups based on the total number of shipment in the local unit in the respective group during the reporting period according to the sampling timetable described in Table 43 below.

Table 43   Sampling timetable for the third sample stage shipments

Total number shipments under the reporting period in the respective group	Shipments which are to be reported on in detail
0-40	Every
41-100	Every other
101-200	Every fifth
201-400	Every tenth
401-800	Every twentieth
801-1600	Every fortieth

The sampling timetable was the same in the three reporting groups. In order to be able to calculate estimates, the respondents should also state the total number of shipments they had had during the reporting period in the respective reporting group. The local units which had more than 1 600 shipments in any of the three groups were urged to contact SCB. In these contacts, the ability of the local unit to supply information on all shipments via electronic media was investigated in the first place. Secondly, an estimate of sampling intensity was made so that detailed information about approximately 40 shipments was obtained.

Annex 3 Formulas for estimates in VFU01

Calculation of population totals in VFU was made by upward weighting of the various sample stage shipments, reporting periods and local units.
Let the stratum be indicated by h, local units by i and shipments by j. The designations (h, i, j) refer then to the j : th shipment form the i : th local unit in stratum h.
Let:
N_h = total number of local units in stratum h, $h = 1. 2. \dots , H$
n_h = Number of selected local units in stratum h
K_{hi} = Number shipments from local unit i stratum h, $i = 1. 2. \dots , N_h$

With designations
M_{hi} = Number of shipments from local unit (h, i) during the reporting period.
m_{hi} = Number during the reporting period of selected shipments from local unit (h, i).
v_{hi} = Number of weeks in the reporting period for (selected) local units (h, i).

Sending variables were designated
$\mathbf{x} = (x_{hij} : j = 1. \dots , K_{hi}, i = 1. \dots , N_h, h = 1. \dots, H,)$, x_{hij} = variable value for shipment (h, i, j).

Point estimate

A local unit's $\mathbf{x}$ - total during the reporting period is estimated by:

$$\hat{\tau}(x)_{hi}^{(mp)} = \frac{M_{hi}}{m_{hi}} \cdot \sum_{j=1}^{m_{hi}} X_{hij} ,$$

A local unit's $\mathbf{x}$ - total during the quarter is estimated by:

$$\hat{\tau}(x)_{hi} = \frac{13}{v_{hi}} \cdot \hat{\tau}(x)_{hi}^{(mp)} = \frac{13}{v_{hi}} \cdot \frac{M_{hi}}{m_{hi}} \cdot \sum_{j=1}^{m_{hi}} X_{hij}$$

A stratum total for $\mathbf{x}$ is estimated by: $\hat{\tau}(x)_h = \frac{N_h}{n_h} \cdot \sum_{i=1}^{n_h} \hat{\tau}(x)_{hi}$

Statistical measuring quantities

The survey's most important target quantities (i.e. the quantities that it is wished to estimate) consist of totals of the following type, with variation of variable $\mathbf{x}$ and reporting group G (= part quantity of the sending population);

$$\tau(x; G) = \sum_{(hij) \in G} x_{hij} .$$

The totals are obtained through successive summing of the sub-totals.

Local unit total : $\tau(x)_{hi} = \sum_{j=1}^{K_i} x_{hij}$,

Stratum total : $\tau(x)_h = \sum_{i=1}^{N_h} \tau(x)_{hi} = \sum_{i=1}^{N_h} \sum_{j=1}^{K_i} x_{hij}$,

Universe total : $\tau(x) = \sum_{h=1}^{H} \tau(x)_h = \sum_{h=1}^{H} \sum_{i=1}^{N_h} \tau(x)_h = \sum_{h=1}^{H} \sum_{i=1}^{N_h} \sum_{j=1}^{K_i} x_{hij}$,

A common type of reporting group G consists of shipments which relate to a designated collection of strata. The group total can then be written:

Stratum group total : $\tau(x;G) = \sum_{h \in G} \tau(x)_h = \sum_{h \in G} \sum_{i=1}^{N_h} \tau(x)_{hi} = \sum_{h \in G} \sum_{i=1}^{N_h} \sum_{j=1}^{K_{hi}} x_{hij}$.

Estimates of variance

The variance for the quarterly estimate is written:

$$\hat{V}(\hat{\tau}) = \left[\frac{13}{v_{hi}}\right]^2 \left[\sum_h \frac{N_h^2}{n_h}\left(1 - n_h/N_h\right)S_{h\hat{\tau}}^2 + \sum_h \frac{N_h}{n_h} \sum_{S_h} \frac{M_{hi}^2}{m_{hi}}\left(1 - m_{hi}/M_{hi}\right)S_{hi}^2\right]$$

where:
$S_{h\hat{\tau}}^2$ = the variance for $\hat{\tau}_i$

S_{hi}^2 = the variance for the y – values at the local unit i

The variances for the annual estimates are obtained by summing the quarterly variances with the summing of n_h - sample local units within the respective stratum – over the quarter.

Annex 4 Statistical codes

4.1   Commodity codes according to NST/R

Commodity groups in NST/R-term

Chapter	Commodity groups
0	Agriculture products and live animals
051.055.057	Pulp wood, round timber and wood waste
1	Foodstuffs and animal fodder
2	Solid mineral fuels
3	Petroleum products
4	Ores and metal waste
5	Metal products
6	Crude and manufactured minerals, building materials
7	Fertilisers
8 except 893	Chemicals and paper pulp except medical and pharmaceutical preparations
893	Medical and pharmaceutical preparations
910.920	Transport equipment whether or not assembled, parts thereof
931.939	Machinery, apparatus, appliances and engines; parts thereof
9 except 910.920.931.939	Other Manufactured articles and miscellaneous articles
	Unknown

4.2 STAN commodity groups

Commodity groups in STAN-term

STAN	Commodity groups
1	Agriculture products and live animals
2	Round timber
3	Railway or tramway sleepers of wood and other wood roughly squared, half squared or sawn and wood waste
4	Foodstuffs and animal fodder
5	Solid mineral fuels and crude oil
6	Petroleum products
7	Ores and metal waste
8	Metal products
9	Paper pulp and paper products
10	Crude and manufactured minerals, building materials
11	Chemicals except paper pulp
12	Transport equipment whether or not assembled, parts thereof. Machinery, apparatus, appliances and engines; parts thereof. Other Manufactured articles and miscellaneous articles

4.3   VFU Commodity codes

Commodities in CFS-term

Agriculture products, forest products, textiles and live animals

000	Live animals
010	Grain
020	Potatoes
030	Other vegetables, fresh or frozen or frozen fresh fruit and nuts
040	Textiles, textile goods, textile waste and artificial fibres
051	Pulp wood
052	Pit props
055	Round timber
056	Railways and tramway sleepers of wood and other wood roughly squared, half-sawn or sawn
057	Wood, charcoal, untreated cork and cork and wood waste
060	Sugar beet
090	Other untreated animal and vegetable material e.g.. rubber and untreated hides and skins

Foodstuffs and animal fodder

100	Sugar, beverages, coffee, spices, fruit, vegetables, meat, fish, dairy products and other foodstuffs and animal fodder and food waste

Solid mineral fuels

210	Coal and carbon bricks
220	Brown coal, brown coal bricks and peat
230	Coke, semi-coke of coal or brown coal

Petroleum products

310	Crude oil
321	Petrol
323	Paraffin, jet fuel and mineral turpentine
325	Distilled fuels
327	Residual combustible oils
330	Gaseous hydrocarbons, liquid or compressed
341	Lubricating oils and fats
343	Petroleum bitumen and bituminous mixtures
349	Other derivatives of non-fuels

Ores and metal waste

410	Iron ore and concentrated except iron pyrites
450	Non-iron ore and waste
460	Iron and steel waste and flue dust

Metal products

510	Pig iron and furnace steel, ferro alloys
520	Semi-finished rolled steel products and other semi-finished steel products
530	Rolled steel, beams, sections, wire rods, iron and tramway construction material of iron and steel
540	Steel plates, plates, band and band steel
550	Pipes, pipelines, cast iron and steel and forging
560	Non ferrous metals

Unprocessed minerals and processed minerals, building materials

610	Sand, gravel, clay, pumice stones and slag
620	Salt, iron pyrites, sulphur
630	Other stone, earth, macadam, chalk and minerals
640	Cement, lime
650	Plaster
690	Other manufactured building materials e.g.. concrete, bricks and tiles

Fertilisers

710	Natural fertilisers
720	Chemical fertilisers

Chemicals, Chemical products and paper pulp

811	Sulphuric acid, smoking sulphuric acid
812	Caustic soda and soda lye
813	Sodium carbonate, soda
814	Calcium carbide
819	Other basic chemicals
820	Aluminium oxides and hydroxides
831	Benzol
839	Pitch, mineral tar and other derivatives of unprocessed mineral chemical from carbon and natural gas
841	Paper pulp
842	Paper waste and waste products of paper
891	Plastic material, unprocessed
892	Dyeing, tanning and colouring material
893	Medical and pharmaceutical products, perfume and cleaning substances
894	Manufactured explosives, fireworks and other pyrotechnic products, sport ammunition
895	Starch and gluten
896	Other chemical products and preparations

Transport equipment, transport equipment, machinery

910	Transport equipment, transport equipment, assembled or in parts and parts for
920	Tractors, agricultural machinery and equipment, assembled or in parts and appurtenant parts
931	Electrical machinery, apparatus, equipment and appurtenant parts
939	Non-electric machinery, apparatus, tools and motors and appurtenant parts

Manufactured products and diverse products

941	Finished metal constructions and parts of metal constructions
949	Other manufactured products of metal
951	Glass
952	Glassware, ceramic and other mineral products
961	Leather, leather products, of raw hides and skin
962	Textile yarn, cloth, composite and other similar textile products
963	Bags, clothing, knitted and crochet products, footwear
971	Semi-finished products of rubber and rubber products
972	Paper and cardboard, unprocessed
973	Paper and cardboard products
974	Paper material
975	Furniture, new
976	Wooden and cork products, besides furniture
979	Other manufactured products
991	Empty packaging, packaging, used
992	Construction material, entertainment park vehicles and equipment, used
993	Removal equipment
994	Gold, coins, medals
999	Other manufactured products, not specified

4.5   Transport mode

Transport mode

	Transport mode
1	Passenger car
2	Lorry
3	Bus
4	Railway
5	Ferry
6	Cargo vessel
7	Air
8	Other
9	Unknown

4.6   Cargo type

Cargo type

	Cargo type
0	Liquid bulk goods
1	Solid bulk goods
2	Large freight containers
3	Other freight containers
4	Palletised
5	Pre slung
6	Mobile self-propelled units
7	Other mobile units
8	Unknown
9	Other cargo types, boxes

4.7   Road regions

Road regions

Road region	County
Northern	Norrbotten and Västerbotten county
Central	Jämtland, Västernorrland, Dalarna and Gävleborg county
Stockholm	Stockholm and Gotland county
Western	Värmland, Västra Götaland and Halland county
Mälardalen	Uppsala, Södermanland, Örebro and Västmanland county
South-eastern	Östergötland, Jönköping, Kronoberg, Kalmar, and Blekinge county
Skåne	Skåne county