Logistics and Transport Management

Master Thesis No 2002:57

ANALYSIS OF FREIGHT FLOWS FROM NORWAY TO SWEDEN

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ISSN 1403-851X
Printed by Elanders Novum

ABSTRACT

In spite of the role and importance of freight transportation, it is often an overlooked aspect of the transportation system. This thesis report analyses freight flows from Norway to Sweden, and computes source-final destination matrix of redistribution of flows to final destinations. Thus the main purpose of the thesis is to find out the destinations of the freight flows to Sweden from Norway. Our preliminary analysis included determination of seasonal variations of the freight flows for the various commodity groups, and the proportion of flows from the border stations. Furthermore, we aggregate the flows into some geographic areas in Sweden and analyse the composition and proportion of the flows to the geographic areas emphasizing on the geographic areas with higher volumes.

Finally, in the second part of the research we propose that further research is necessary to redistribute the flow to final destinations. In this context, we explore the industrial structures of Sweden and employ an algorithm to redistribute the flows to the various counties by comparing flows to postcodes declared to the customs by importers to estimated flows to industries, using employment ratios as proxy for industrial concentration and subsequently, intermediate input consumption. Using the algorithm , we demonstrate how to compute a source-final destination matrix indicating the redistribution of the flows.

Key Words: Freight Flows, Destinations, Industrial Structures, Geographic Areas, Commodity Groups, Redistribution, Source-Final-Destination Matrix.

ACKNOWLEDGEMENT

I want to express my profound gratitude to my husband, Wisdom, for the moral and physical support he gave me throughout these difficult times.

Secondly, I will like to thank Astrid Nunez for spending time to translate relevant materials from Swedish to English for this research purpose.

Furthermore, I am grateful to Mintiwab Bezabeh, Patrick Brouzell, Godwin Vondolia, and all those who contributed in diverse ways to this thesis.

Finally, I am indebted to my professor Arne Jensen for taking time despite his busy schedule to read my report and give invaluable comments.

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PART I

PART ONE

CHAPTER ONE: INTRODUCTION

This introductory chapter presents the background of the research, statement of the problem, objectives/purpose of the research, the scope and limitations of the study, methodology for data analysis and finally a graphical presentation of the general outline of the thesis.

1.1 BACKGROUND

Transportation is an important and all-inclusive element in our society, affecting every person directly and indirectly. The goods we consume, our economic livelihood, our mobility and our entertainment are in some way affected by transportation. Transportation has a catalytic effect on our society in that it stimulates commerce and movement and vice versa. Freight transport is a very important part of most economic and social activity. Industries rely on some form of goods movement to maintain commerce, which may range from large shipments of bulk commodities to overnight package delivery across the country as well as the national borders of the country.

Over the years, transport growth has been a prominent feature of the development of Western societies including Sweden and her neighbours. Freight transportation plays an important role in the economy of Sweden, as the demand for goods transport is strongly dependent on the level and nature of economic activities. As transportation is part of a production process, it ensures that bits and pieces are assembled through the use of logistics chains, allowing for the delivery of the necessary inputs for production including the necessary material and labour and allows the finished products to be delivered to the market.

The transportation of freight in Sweden has been increasing over the years. Statistics indicate that a large part of the goods transport in Sweden is predominantly by road, with goods transport by lorry accounting for the largest proportion of transports in the country. According to the Swedish Institute for Transport and Communications Analysis (SIKA) reports, goods transport by road account for 42% of the total amount of goods transport in 2000. Between 1975 and 2000, the total amount of goods transport (measured in ton kilometres) increased by 35% to 89 billion ton kilometres. However, road transports alone increased by 75% (SIKA 2002).

Freight movements by lorry from Norway to Sweden pass through twenty-one border points. Over the years Sweden has been the largest importer of goods from Norway representing over 50% of the total international transports by road from Norway. For example, out of a total of 1790.5 (1000 tons) of international transports from Norway in 2000, 922.2 (1000 tons) were transported to Sweden and out of 1650.0 (1000 tons) in 2001, 980.0 (1000 tons) were transported to Sweden. This constitutes 51.5% and 59.4% of the total exports by road from Norway in 2000 and 2001, respectively. The Tables 1.1 and 1.2 show a break down of international transports from Norway: Tonnage carried and Transport performances.

Table 1.1: International Transports from Norway: Tonnage carried (1000 tons)

	1996	1997	1998	1999	2000	2001
All countries	**1 933.3**	**1 989.0**	**1 950.7**	**1 826.3**	**1 790.5**	**1 650.0**
European Union	1 878.1	1 914.0	1 862.3	1 780.2	1 709.9	1 610.5
Belgium/Luxembourg	27.8	30.1	45.9	60.2	46.3	21.3
Denmark	157.4	192.1	189.6	198.9	237.5	145.1
Finland	37.3	46.3	39.6	22.9	61.2	36.2
France	100.5	118.6	98.7	118.4	93.7	77.0
Greece	1.3	-	1.5	7.7	0.3	0.7
Italy	33.0	45.4	57.1	44.8	40.4	66.1
Netherlands	62.9	49.4	71.6	104.3	66.2	87.4
Portugal	6.1	5.1	13.3	2.9	2.2	2.5
Spain	25.8	19.7	21.0	11.2	10.3	8.2
United Kingdom	8.4	5.0	10.4	10.0	10.4	11.1
Sweden	**1 163.3**	**1 120.3**	**1 109.4**	**925.0**	**922.2**	**980.0**
Germany	245.4	269.7	195.9	260.7	202.5	165.5
Austria	8.9	12.3	8.4	13.2	16.5	9.2
Other countries	55.2	75.0	88.4	46.1	80.6	39.5

Source: Statistisk Sentralbyrå- Bureau of Statistics Norway

Table 1.2

International transports from Norway: Transport Performances (Mill. ton-kms)

	1996	1997	1998	1999	2000	2001
All countries	**1 506.5**	**1 719.5**	**1 604.0**	**1 692.7**	**1 594.1**	**1 434.2**
European Union	1 419.9	1 611.7	1 494.5	1 620.1	1 492.2	1 378.7
Belgium/Luxem-bourg	38.7	49.1	66.6	71.7	58.1	26.5
Denmark	130.9	197.1	173.8	183.7	228.8	136.5
Finland	38.1	57.9	41.6	23.6	63.0	39.5
France	195.9	233.2	185.0	223.5	177.0	138.3
Greece	3.1	-	3.9	21.0	0.8	1.9
Italy	71.0	97.6	111.3	90.9	83.3	141.3
Netherlands	71.9	56.6	81.0	122.2	78.3	112.6
Portugal	22.2	16.3	45.8	11.5	7.6	8.5
Spain	77.9	58.8	63.5	30.9	33.9	22.2
United Kingdom	21.2	10.1	18.5	24.0	20.0	14.9
Sweden	**463.6**	**552.6**	**481.3**	**510.4**	**457.8**	**551.9**
Germany	271.4	262.3	211.3	284.2	231.1	170.2
Austria	14.0	20.1	10.8	22.4	32.5	14.5
Other countries	86.6	107.8	109.5	72.6	121.9	55.6

Source: Statistisk Sentralbyrå- Bureau of Statistics Norway

1.2 STATEMENT OF THE PROBLEM

The movement of freight is an important but often overlooked aspect of the transportation system. While much research and planning has centred on passenger transport, freight transport analysis has received relatively little attention.

Sweden exports a lot of processed goods to other parts of the world. As a result, Sweden imports some raw materials and other semi-processed products from other parts of the world. This is because the exports have high import content.

The business environment today has introduced outsourcing of parts of the supply chain of logistical activities to reduce/lower production costs. Further,

fierce competition force firms to increased economies of scales and efficiency and thus, to outsource large parts of their production to other countries. Accordingly, this has resulted in an even higher dependence on transportation. The choice of location for production or for the imports of raw materials is to a large extent influenced by transportation factors. The outsourcing of production is only made possible due to the lower costs and efficiency of the modern transportation. Thus, transportation and logistics play increasingly significant parts for firms today. Many industries and businesses in Sweden purchase their raw materials and other intermediate products from Norway because of the proximity of Norway to Sweden.

Over the years, Sweden has been a major importer of goods from Norway. Since 1996, Sweden takes a larger share of the total amount of goods transported by road from Norway, constituting over 50% of the international transports. In the first and second quarter of 2002, 64 249 and 65 672 lorries carried goods out of the national borders of Norway to Sweden respectively (Tables 1 and 3), with a total volume of 982 500 tons and 1 036 289 tons respectively (Tables 2 and 4). This represents about 684 and 722 trucks of goods leaving Norway daily to Sweden for the first and second quarter respectively. At the Svinesund border alone, an average of 348 lorries cross the border daily. Some of the lorries through Sweden especially most of the non-Swedish trucks are transit lorries.

Despite the large volumes of goods transported from Norway into the country, no (known) research exists on the final destinations of the goods. The only information that exists is the postcodes declared to the customs offices, which does not necessarily represent the final destinations of the goods. It is usually very complicated to forecast freight transport due to dynamics of origins, destinations, value, volume and weight of the goods being transported. It is a matter of importance that we know the various points in Sweden where these freights that are coming from Norway are delivered, so as to facilitate an effective and efficient analysis of freight transport as well as transport planning of the country. Thus research that seeks to analyse type and composition of flows and redistribute the flows to destination points is necessary.

1.3 OBJECTIVES/PURPOSE

The main objectives of this research are first, to analyse the flow of goods from border points between Sweden and Norway to various locations in Sweden declared to the customs office and secondly, to compute a source-final destination matrix based on source data declared to customs and a research plan for final destinations.

The specific objectives of the first part of the report include:

- Investigating whether there are seasonal variations in the freight flows. The flows are aggregated into quarters, and some descriptive statistical analyses are used to determine the variations in the quarterly flows.
- Aggregating the locations/post codes in Sweden into some geographic zones, and determine the distribution, and proportion of the freight flows that are imported by the geographic zones into the country.
- Analysing the total and proportion of the freight flows for the various commodity groups for the year, and analyse the distribution and proportion of two-selected commodity groups (Chemicals and Metals) imported by the geographic areas.
- To select the geographic area in Sweden with the highest imports, and analyse the total and proportion of commodity groups imported by this area.

The specific objectives of the second part of the report include:

- To redistribute the freight flows of the two major commodity groups, Chemicals and Metals, to final destinations (i.e. county). The final destination data is hypothetically computed, based on industrial concentration, which is further proxied by employment rates of industries.
- Generating source-final destination matrix of redistribution of freight flows based on the hypothetical data.

1.4 SCOPE AND LIMITATIONS

The research focuses on road transports by truck into Sweden from Norway, concentrating on two commodity groups, chemicals and metals, in the analysis of redistribution of flows to destinations.

Data on real flows to industries is not available hence the researcher used employment levels of the industries as proxy for industrial concentration and consumption of real flows.

The comparison of the freight flows to postcodes and the real flows to industries in counties (i.e. final destination), for the purpose of investigating the redistribution of the flows, is conditional on the assumption of fixed proportions of imports of industries from Norway by road.

1.5 METHODOLOGY

In this section, the model or framework for the research is presented. Thus we present the procedure under which our objectives would be achieved and the methods that would be used in the analysis of the data for the purpose of the study.

The sources and types of data for the research are described in the first part of this section. In the second part we present the grouping or aggregation of the data for the purpose of the study. The types and methods suggested for the data analysis is presented in the third part of this section and the statistical softwares used in the data analysis are listed in the final part of this section.

1.5.1 Sources And Types Of Data

Secondary data was collected from the Swedish customs office for this research. This is primary data collected by the customs officials at the various

border stations. The data consists of the flows from Norway to Sweden by trucks for the year 2001.

The data was compiled monthly from each of the border stations by type of commodity, bulk, nationality of the truck and destination in Sweden according to the 2-digit post number for the year.

Post Number: The 2-digit post number is from 10-98, and shows the various locations in Sweden according to the Post Codes. A variable, *S*-, was included in the set of postcodes which is an error made by the forwarding agents during the process of declaring the goods to the customs.

Postcode 00: These are transit goods through Sweden to any of the EU countries. These goods are declared at the customs offices in Sweden but not delivered in Sweden.[1]

Nationality of Trucks: In this context, nationality of trucks transporting the goods refers to the country where the trucks have been registered.

Commodity Groups: The type of commodities imported are grouped according to the Harmonized Commodity Description and Coding System (HS Classification) by the customs as follows:

[1] The data set included "UK" as Postcodes, which should have been part of postcode 00. This code, as explained by the customs officer (Gunnel Karlsson), is part of the transit goods (post code 00).

Table 1.3: Commodity Groups and Corresponding Chapters in HS Classification

Commodity Group	Chapters in HS Classification
Jordbruk, råvaror	1, 5-6, 10, 12-15, 23
Jordbruk, livesmedal	2-4, 7-9, 11, 16-22, 24,
Kemi	25-40
Textil	50-67
Metall	72-83
Maskiner, electr., instruments	84-85, 90
Diverse	41-49, 68-71, 86-89, 91-96
(tom)*	

Source: Tullverket, Västsvenska regionen: Customs of West Sweden

- *Jordbruk, råvaror (Agriculture, Primary Goods)*: This group comprises live animals and animal products, live trees and other plants, cereals, vegetable products, animal and vegetable fats and oils and derivatives of these.

- *Jordbruk, livesmedal (Agriculture, Food)*: meat, edible meat offal and preparations of meat, fish, dairy produce. Edible vegetables and certain roots and tubers, edible fruit and nuts, coffee, tea, maté and spices, processed food, drinks, spirits and vinegar, tobacco and the derivatives of tobacco substitutes.

- *Kemi (Chemicals)*: Mineral products, products of chemicals and related industries, plastics and plastic goods, rubber and rubber goods.

- *Textil (Textiles)*: Textile goods; shoes, hats, umbrellas, parasols, walking sticks, sitting sticks, whips, horsewhips or parts of it, processed feathers or goods made of such, artificial flowers, goods made of human hair.

- *Metall (Metals*): Non-precious metals and goods made from these.

- *Maskiner, elect, inst. (Machines, electronics, instruments)*: Machines and apparatus and mechanical tools; electrical materials and parts of such

goods; apparatus for sound recording or playing; apparatus for image recording or showing for televisions plus parts and accessories of these.

- *Diverse (Others/Miscellaneous)*: Non-manufactured leather and skin; leather, fur skin and goods made from these materials, wood and goods made of wood, pulp from wood or other fibre rich cellulose containing substances, goods made of stone, plaster, cement, asbestos, glimmer or similar, vehicles, vessels and some transport equipment, weapons and ammunitions and parts and accessories of these, art collection items and antiquities.

- *Tom (Empty)*: No information in the tax form. Forwarding agents have not declared the type of good to the customs. The reason could be a very low value of the goods or personal belongings where data about statistical number is not necessary to reveal.

A detailed description of the chapters in the HS Classification is in the appendix.

1.5.2 Grouping/Aggregation Of Data

As part of our objectives to determine the proportion of the freight flows that go to various areas in Sweden, we aggregated the data according to some geographic zones in Sweden.

The postcodes are grouped according to the counties in Sweden. Table 1.4 shows the counties and the postcodes they represent.

Table 1.4: The Counties of Sweden and their Postcodes

COUNTIES	POSTCODES
Skåne Region	20-29
Blekinge County	37
Halland County	30-31
Kronoberg County	33-36
Kalmar County	38, 39
Gotland Community	62
Norrbotten County	94-98
Västerbotten County	90-93
Västra Götaland Region	40-47, 50-54
Jönköpings County	55-57
Östergötland County	58-59
Värmland County	65-68
Örebro County	69-71
Södermanland County	60-61 63-64
Stockholm County	10-19
Västmanland County	72-73
Dalarna County	77-79
Uppsala County	74-76
Gävleborg County	80-82
Jämtland County	83-84
Västernorrland County	85-89

Source: http://www.smittskyddsinstitutet.se/English/archive/counties/counties.htm [2]

1.5.3 Statistical Methods For Data Analysis

To investigate whether there are seasonal variations in the freight flows from all the border stations as well as the types of commodities we group the data in quarters (seasons), and use some statistical methods to analyse the data. The statistical methods used for this purpose are the Paired t-test, Linear Correlation, Coefficient of Variation and some basic descriptive statistics (mean, standard deviation).

[2] The postcodes were assigned by comparing the map of the provinces from the referenced source to the postcodes map.

The Paired t-Test

The paired t-test is used to test if there are any differences between the means μ_1 and μ_2 of X and Y in situations where we naturally have pairs of observations $(X_1, Y_1), \ldots, (X_n, Y_n)$, from a bivariate distribution. For instance, if we take readings from a particular site for 2 months, quarters, years, etc, with readings being taking for n sites, we may then wish to test if there has been any change in the means over the 2 periods. The test is based on the differences $D_i = (X_i, Y_i)$ for i=1,…,n. Thus the test is based on a single sample test (based on the sample $D_1, \ldots, D_n$ from the distribution of D).

The sample t-test is given by

$$t = \frac{\frac{1}{n}\sum_{i=1}^{n} D_i}{S_D}$$

Where

$$S_D = \sqrt{\frac{sumD^2 - \frac{(sumD)^2}{n}}{n(n-1)}}$$

The paired t-test is used to determine whether there are differences in the average quarterly freight flows for all the commodities. The quarters are paired for each commodity group across the border stations to test the equality between the means of the quarterly flows. For instance, if we take one commodity group (e.g. Kemi/Chemicals), we test for the equality between the means of Kemi, which is paired for all the quarters as follows:

- Mean flow of Chemicals (Kemi) in quarter one = Mean flow of Chemicals (Kemi) in quarter two (mean Q1= mean Q2)

- Mean flow of Chemicals (Kemi) in quarter one = Mean flow of Chemicals (Kemi) in quarter three (mean Q1= mean Q3)
- Mean flow of Chemicals (Kemi) in quarter one = Mean flow of Chemicals (Kemi) in quarter four (mean Q1= mean Q4)
- Mean flow of Chemicals (Kemi) in quarter two = Mean flow of Chemicals (Kemi)in quarter three (mean Q2 = mean Q3)
- Mean flow of Chemicals (Kemi) in quarter two = Mean flow of Chemicals (Kemi) in quarter four (mean Q2 = mean Q4)
- Mean flow of Chemicals (Kemi) in quarter three = Mean flow of Chemicals (Kemi) in quarter four (mean Q3 = mean Q4)

The null hypothesis of the test is that the mean difference is zero. If the null hypothesis is rejected, we use a one-tailed test for the alternative hypothesis to determine whether it is greater than zero or less than zero.

Linear Correlation Test

The linear or product-moment correlation or Pearson's r test measures association between variables that are ordinal or continuous, rather than nominal. The formula is given by:

$$r = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2}\sqrt{\sum_i (y_i - \bar{y})^2}}$$

where $\bar{x}$ is the mean of the x_i's, $\bar{y}$ is the mean of the y_i's.

The value of r, lies between –1 and 1 inclusive. It takes on a value of 1, termed "complete positive correlation," when the data points lie on a perfect straight line with positive slope, with x and y increasing together. If the data points lie on a perfect straight line with negative slope, y decreases as x increases, then r has the value –1; this is called "complete negative correlation." A value of r near zero indicates that the variables x and y are uncorrelated.

The hypotheses for this test are:

$Ho : r = 0$
$Ha : r \neq 0$

and $t_{(n-2)} = \dfrac{r}{\sqrt{\dfrac{1-r^2}{n-2}}}$

The Correlation test would be used in the study to determine whether there are variations in the proportion of flows for the various commodity groups across the border stations from all the quarters. The aim of this is to find out whether the flows for the commodity groups from the border stations have been consistent across the seasons.

Coefficient Of Variation (CV)

In the descriptive statistics analysis we use the standard deviation to measure the dispersion of the freight flows for the commodity groups in all the quarters. However, to account for or to determine the magnitude of the variation, we measure the Coefficient of Variation. This method is a measure of the dispersion as a proportion of the mean or the ratio of the standard deviation to its mean.

The formula for calculating the coefficient of variation is given by:

$CV = \dfrac{\sigma x}{\bar{x}}$

The higher the CV, the higher the variability, and the lower the CV, the higher is the consistency of the data.

The coefficient of variation would be calculated for all the commodity groups in all the quarters to determine the magnitude of the variation or the spread of the freight flows.

3.4 STATISTICAL SOFTWARES USED

The following softwares were used for the data analyses:

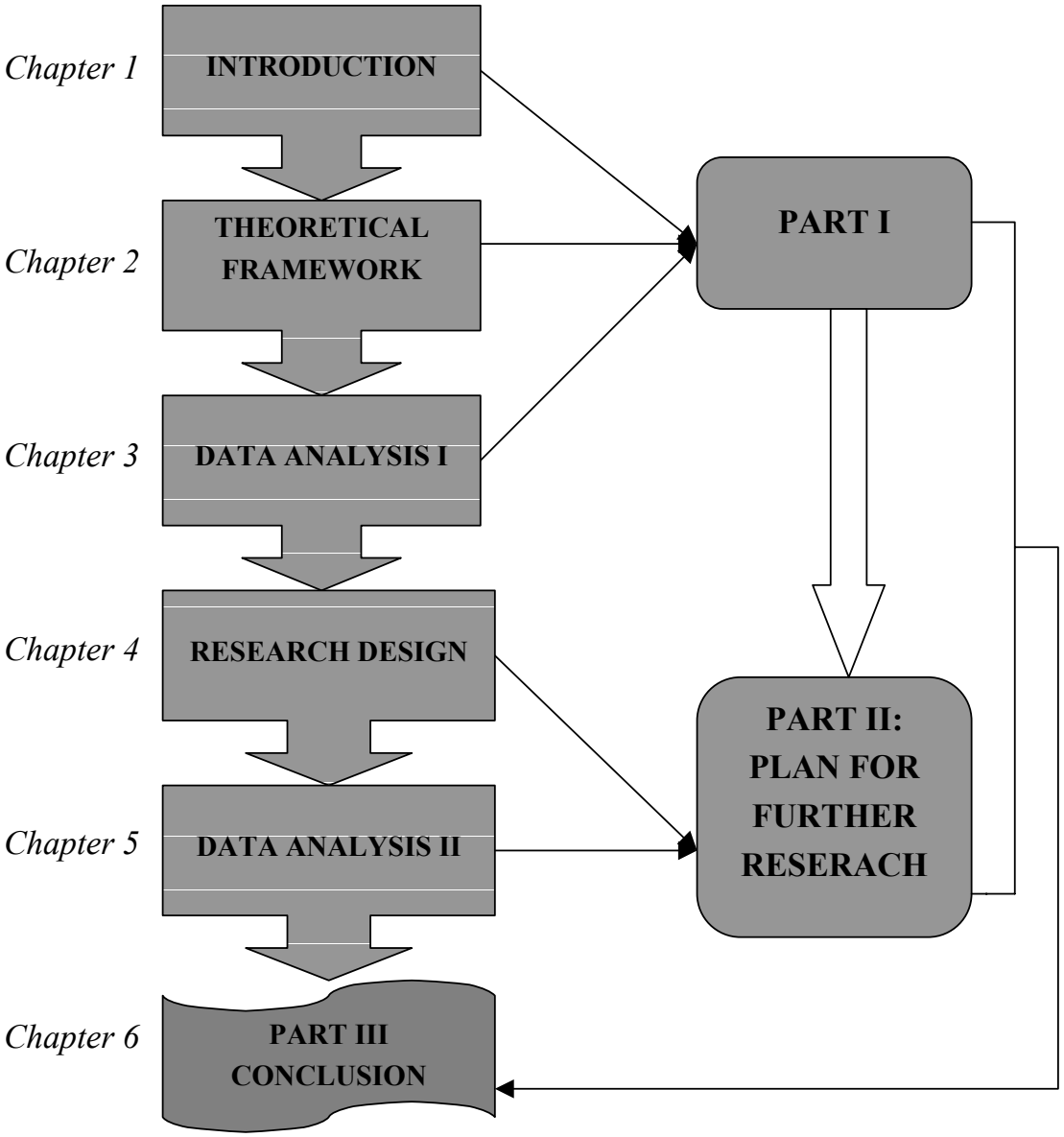
- Microsoft Excel
- Stata (Statistics Data Analysis)

3.5. OUTLINE OF THE THESIS

The general outline of the thesis is presented in Figure 1 below. The thesis report is divided into three parts. Part I consists of Chapters one, two and three. The Introduction consisting of the Background, Problem Statement, Objectives/Purpose, Limitations and Methodology are presented in Chapter one. We explore theories related to the problem under investigation under Theoretical Framework in Chapter two, looking at Transportation, Outsourcing and the Industrial Structure of Sweden. Part one ends with Data Analysis I in Chapter Three where we present an analysis of the data collected.

In Part II, referred to as Plan for Further Research, the research design to be used to collect data to completely solve the problem and the methods that would be employed to analyse the data are described in Chapter Four. Generated data is used to demonstrate how the results would be computed under Data Analysis II in Chapter Five. Finally we draw conclusions regarding the research findings in Part III, Chapter Six.

Figure 1: Outline of Thesis



Source: Own Model

CHAPTER TWO: THEORETICAL FRAMEWORK

2.0 INTRODUCTION

This chapter explores theories related to the problem under investigation. In this regard we look at Transportation, Outsourcing and Industrial Structure of Sweden. Since the freight flows is about trade in goods between these countries, and the use of transportation for such purpose, the first part of this chapter is on transportation; exploring its role in the movement of goods among and between countries.

The trend in modern philosophy of production is the outsourcing of components of production to other suppliers within or outside the national borders of a country. Hence we look at outsourcing in the second part of this chapter. Finally, we explore the industrial structure of Sweden in the third part of the chapter.

2.1 TRANSPORTATION

Transportation is a vital activity in moving both freight and passengers around the world. It is unquestionably the most important industry in the world. Without transportation, trade between nations would be impossible. Transportation is only one of the constituents of logistics, the others being the integration of information, inventory, warehousing, material handling and packaging. It is obviously one of the most observable parts of the logistics procedure due to the many trucks and trains that are used for the transportation of goods in today's society (Bowersox and Closs, 1996).

The main task of transportation is to move people and goods from one place to another. Coyle, Bardi and Novack (1994) define transportation as "the creation of place and time utility," where place utility means that goods are moved to a place where they have higher value than they had at the original place. Further,

place utility is created when transportation costs are reduced, which encourages producers to purchase products or raw materials from more distant suppliers. Time utility means that the service of transportation takes place when it is needed and refers to the fact that the demand for certain goods only exists during limited periods of time. Examples of such products are those related to national holidays. Christmas trees, Halloween costumes or Easter bunnies are only sold during certain periods of the year. Hence, time utility is created by efficient transportation that makes sure that those products will be available at the appropriate location for customers when needed (Coyle, Bardi and Novack, 1994).

Two major functions of transportation are the movement of products and product storage. Irrespective of the kind of product produced, some kind of transportation will always be required to move the product to the next production stage or closer to the final customer. Transportation uses resources such as environmental resources, which are the usage of fuel and oil and the creation of congestion, air pollution and noise pollution, and financial resources, which includes the expenses for the labour of the driver and for operating the vehicle. As a result it is essential that goods be moved only when it is absolutely certain that the value of the product will improve. Thus, the major aim of transportation is to move goods between two locations while minimizing costs although simultaneously meeting the demands of customers concerning delivery performance and shipment information availability. The temporal storage of products on vehicles during transportation is quite expensive. However, products are frequently moved again and generally do not remain stored in vehicles for longer periods of time. Therefore, the cost of unloading and reloading the products in warehouses is often higher than the storage in the transportation vehicle (Bowersox and Closs, 1996).

The performance of transportation is based on three main factors: cost, speed and consistency. The cost of transport refers to the expenses for moving goods from one geographical location to another. The speed is obviously how quickly something is moved. It is essential to find the correct balance cost and speed since the faster a service is provided the higher the costs. On the other hand, the higher the speed the shorter the transporting time for the goods, and thus the

shorter the time until the goods are unavailable for the customer. Finally, consistency is vital when it comes to the speed of the performed transportation. Thus if a shipment takes two days one time and five days the next, the problem of inconsistency is clearly affecting both the buyer and the seller. Time is valuable in logistics and speed and consistency together create quality in transportation (Bowersox and Closs, 1996).

There are five major ways of transporting goods. These include motor carriers (trucks), railroads, airline carriers, water carriers and pipelines. The motor carrier industry is known for its generally higher quality of service especially regarding accessibility, speed, reliability, frequency and lower loss and damage rates and therefore plays a major role in the transportation of higher valued and time sensitive traffic. Railroads were historically essential in the transportation of a wide range of commodities. However, today railroads focus on moving low value, high-density bulk products. The main advantage of airline carriers is speed although the costs are higher. Airlines often take smaller shipments with high value and fragile products. Water is the oldest mode of transportation. Water carriers' major advantage is the capacity of moving extremely large shipments. The main disadvantages are speed and its operation although the cost is relatively low. Finally, pipelines represent a unique transportation system in itself, operating 24 hours a day, seven days a week. Once a pipeline has been constructed, the operating cost is extremely low since pipelines are not labour-intensive. However, pipelines are not flexible and unfortunately limited to oil and oil products, natural gas, chemicals and coal (Bowersox and Closs, 1996, Coyle, Bardi and Novack, 1994).

Transportation can be analysed with concepts and relationships from several scientific disciplines, because transportation is intrinsically interwoven with most everyday social activities. Transportation is an important activity sector in society, whether we measure it in terms of economic performance, employment, welfare or investment. In economic terms, transport is *complementary* to these activities.

Experience shows that transportation is closely linked to the level of economic activity and material welfare of a free society, but this level does not develop

evenly over time. There are short-term waves forming recession as well as recovery periods, together forming a business cycle. There may also be underlying long-term trends, which materialize as long-term cycles appearing at intervals such as fifty years or more.

Levels of economic activity and material welfare are two very important factors in transport demand. In an open economy such as we have in the Scandinavian countries, economic and political conditions in trading partner countries also influence the volume of exports and imports and therefore transport demand. Investment in transport infrastructure as well as vehicles etc, influence competition in transport, efficiency in industry, welfare of a country, and location of dwellings and production. All these will in turn have a significant influence on transport demand.

2.1.1 International Transportation

A specific area or country will specialize in the large-scale production of goods for which it has the greatest advantage compared to other countries. However, a country cannot rely upon its comparative advantage and large-scale production without an efficient transportation system that can transport the produced goods to other areas or countries that need them (Coyle, Bardi and Novack, 1994).

Globalisation has completely changed the prerequisites for today's businesses and has forced enterprises to alter their ways of doing business. There are many factors influencing a company to internationalise. Enterprises are to a larger extent forced to expand and grow to survive in today's fierce competition. Additionally, the further development of technologies and capabilities are facilitated by increased global operations. There are five main factors driving the increasing global operations of firms: economic growth, supply chain perspective, regionalisation, technology and deregulation.

Firms' opportunities of further economic growth have been substantially diminished since the major industrial markets have stabilized or declined.

Hence the contemporary situation force enterprises to increase profits through global expansion into other developed or developing markets.

Enterprises' need to develop entirely new markets has resulted in a number of regional agreements or partnerships, with the purpose of facilitating trade between nations all over the world. Two examples are the European Union (EU) and the North America Free Trade Agreement (NAFTA). The development of communication and information technology has created a global need for products through the exposure of foreign consumers to foreign products. Greater information exchange between companies around the world as a result of the increased availability of computers and communication networks has also encouraged the internationalisation.

Deregulation of the financing and the transportation sectors has further motivated global expansion. Changes in regulations and procedures as well as free flow of currency exchange have facilitated global business. Relaxed regulations and restrictions and increased privatisation in the transportation sector has improved flexibility and efficiency and has consequently facilitated the internationalisation of enterprises (Bowersox and Closs, 1996). As a result, transportation has proved to be even more significant with today's globalisation than ever before. Companies depend on efficient transportation systems to better utilize the opportunities of internationalisation. Without the possibility of moving goods at a lower cost, high speed and consistency in speed, globalisation would have been impossible. Irrespective of the goods produced and where, some kind of transportation is and will always be necessary for the movement of goods.

2.2 OUTSOURCING

In modern times, there has been a shift in the production philosophy of firms worldwide from in-house production of activities and components to disintegration of the production process whereby these activities and components of production are now purchased from outside the firm. This change became necessary as a result of globalization and trade liberalization,

which led to some important changes in the procurement process, marked by an increase in the fragmentation of production. As a result, industrial firms of today do not operate independently, but source their raw materials and other components of production, based on factors other than transport cost. They now source globally and trade off the high transport costs with gains generated by economies of scale achieved at the country of production, lower prices offered by suppliers due to productivity gains, and gains from warehouse and storage centralization.

Flexible production and outsourcing are alternative modes of production. In recent years, outsourcing has increased quite rapidly. Outsourcing reflects a trend by manufacturing industries to return to their core: the areas in which the organizations have the greatest competitive advantage and the greatest returns are provided. Other necessary functions and activities are arranged through contracts with other organizations. Reasons for increase in outsourcing include a tendency of companies to concentrate on their core competencies, pressures to reduce costs and efforts to exploit external, specialized vendors more efficiently, availability, uniqueness, quality, and technical supremacy, access to new markets and response to changes in the market. Specialized producers are usually able to provide intermediate goods at lower cost and offer a wider choice of innovative products than in-house production due to larger production volumes and the positive effects of competition. The arguments often put across for outsourcing by many firms are investment requirement, rigidity of conventional production system, and internal production economies of scale are becoming less important than external economies of scale and scope that may be realized with outside suppliers. The associated advantages are increased economies of scale, exploiting specialized expertise (product or service) in the supply base, making both short and long-term financial advantages from the sale of resources, strategic realignment, need to focus on core operations, possibility to spread the risks for component development across a number of suppliers, and minimize costs and shorten product lead times and one obvious way forward is to outsource the design and manufacture of certain components or component systems.

As a result, companies in recent years have placed increasing emphasis on a 'core business' focus. This focus has resulted in growing interest in the 'core competencies' of the firm with a subsequent drive to concentrate internal resources on those tasks that support the 'strategic architecture' and maintain the firm's competitive advantage. The major reasons for this focus reflect the intense competitive climate of global business: product quality, flexibility of response in meeting product and volume requirements and needs for service, although cost is not entirely absent. Global supply networks are necessary in order to take advantage of access to technology, consistent quality, differences in productivity and cost.

2.2.1 International Outsourcing

Outsourcing transactions may take place within one and the same country (national outsourcing) or across borders between countries (international outsourcing). One of the most significant effects of trade liberalization on patterns of production and trade during the last decade is the phenomenon of international outsourcing. Competition among global companies emphasizes sourcing of supply around the world. This is often seen as ways for firms to look for cheaper suppliers to cope with increasing international competition. Also, multi market interactions among firms would result in a strategic incentive for international outsourcing. Trade liberalization also creates opportunities for multi-market interdependence and causes strategic outsourcing to occur.

Firms in many countries are now subcontracting abroad an expanding range of their activities, from product design and production of inputs to assembly, marketing and after sales service. Thus, the search for materials and components and managing the flow becomes an essential part of the international supply chain. Producers need specialized components to serve as an input into the production of its final goods. A final goods producer can manufacture components for itself, but the per unit cost is higher than specialized suppliers. Thus, domestic industries purchase some raw materials and intermediate goods from foreign producers.

Two main incentives for international outsourcing can be identified. First international outsourcing may be attractive if firms can exploit international factor price differences. Thus, the focus is on the impact of outsourcing on factor prices rather than on the number of outsourced components and industry concentration. The second main incentive is access to a larger variety of differentiated intermediate components. Therefore, disintegrated production allows specialization and internal economies of scale in the provision of intermediate goods and services.

Cars are produced by assembling components such as spark plugs, seat belts, tyres, gearbox, transmission, engine and so on. Modern production philosophy and globalization has enabled companies/firms to outsource parts of these components to other distant suppliers in other countries. Thus manufacturing companies in Sweden such as Volvo, SKF, Akzo Nobel, Astra Pharmacia, could outsource parts of the components to other manufacturing companies in Norway. Other industries such as the food industries could also purchase some of the raw materials or intermediate goods from other suppliers in Norway.

2.3 INDUSTRIAL STRUCTURE OF SWEDEN

2.3.1 Background

Sweden is one of Europe's most advanced and industrialized countries. Its people enjoy a very high standard of living and the benefits of an extensive and egalitarian social welfare system. The country has a stable democracy with no major economic, financial, or political vulnerabilities. Basic commodity-oriented industries play a key role in the Swedish economy, making Sweden a strong market for high-value processed consumer goods. Transportation, communication and trade are also very important. Farming is concentrated in the southern part of the country. The leading commodities produced in these parts of the country are daily products, grain (including fodder crops), sugar beets and potatoes. Large numbers of poultry, hogs and cattle are also raised.

The economy of Sweden is heavily oriented towards international trade and is open to imports and foreign investments. On a per capita basis, Sweden is among the largest importers in the world. Because income is evenly distributed among the Swedish population, consumption patterns are quite uniform. Sweden joined the European Union (EU) in 1995 but decided not to adopt the single European currency at the time. Although the current government is campaigning for membership, Sweden is unlikely to join the EMU at least until 2005.

The Swedish industry as well as the economy as a whole has undergone a rapid restructuring process during the past decade following the severe crisis in the early 1990s. The business sector is traditionally based on raw material industries such as paper and pulp, iron and other metals. However, the main competitive factor of the country today is knowledge and the flexible use of knowledge even though the supply of indigenous raw materials are still important elements of the industry. This is witnessed by Sweden's very fast expansion in the telecommunications industry and the pharmaceutical industry.

Industrialization changed the country's economic growth from a poor agrarian country of less than 1.5% annually in 1750 to1850, to about 4% over the following century. The idea behind Sweden's successful economic transformation was the successful exploitation of its main raw material resources: wood, iron ore, and hydroelectric power. This in turn was based on heavier demand for wood products and ore from other countries in Europe and the growing demand for Swedish products as a result of the expansion of free trade in Europe before World War 1.[3]

There are many industrial companies in Sweden. The country's chief industrial centres are Stockholm, Göteborg, Malmö, Upssala, Västeras, Helsingborg, and Norrköping. The leading manufactures include iron and steel, machinery, precision equipment, forest products, processed food, chemicals, refined petroleum, construction materials, and motor vehicles. In terms of total production, the engineering industry accounts for more than 50% of total production (Table 2.1). After engineering comes the forest products industry

[3] www.se.si

(wood products except furniture, plus pulp, paperboard), which accounts for about one fifth of manufacturing output. The proportion of forest products as a percentage of total exports in 2000 is about 14%, followed by chemicals (10%) and metals (9%). The chemical industry (especially pharmaceuticals) accounts for 11% of total manufacturing output, and then comes food processing which accounts for about 6% (Tables 2.1&2.2).

Table 2.1: Composition of Industrial Output (2000)

Engineering	51.1%
Forest Products	19.7%
Chemicals	10.9%
Food	6.3%
Other	12%

Source: www.swedishtrade.se

Table 2.2: Composition of Merchandise Trade (2000)

Imports		Exports	
Electrical etc	23%	Electrical etc	23%
Chemical	9%	Machinery	15%
Machinery	12%	Wood etc	14%
Vehicles	11%	Vehicles	12%
Metals etc	8%	Metals etc	9%
Food etc	7%	Chemical	10%
Apparel etc	4%	Food etc	3%
Oil etc	8%	Oil etc	12%
Wood etc	3%	Other	2%
Other	15%		

Source: www.swedishtrade.se

However, the manufacturing sector in Sweden, as in practically all other industrialized countries, has become smaller as a percentage of GDP. Instead, the service sector has gradually enlarged its share of GDP. Since Sweden has scored export successes in recent years, the manufacturing sector's share of GDP has rebounded. In 2000, agriculture and forestry accounted for 2% of

GDP, manufacturing for 23%, the private sector (including construction, 4%) for 52%, non-profit organizations for 3% and the public sector for 19%.[4]

2.3.2 Major Types Of The Swedish Industry

Transportation Equipment

Transportation equipment is one of the most important industrial sectors in Sweden, both from an employment and export standpoint. Given its small size, Sweden has a broad transportation equipment sector, including cars, trucks and buses, aircraft (both military such as JS 39 Gripen-and civilian, although the later is being phased out), trains and marine and aircraft engines. Sweden is also a European leader in space research. Volvo, Saab and Scania dominate final vehicle assembly. Its many subcontractors understand the importance of the industry.

Mechanical Engineering

The engineering industry is the largest manufacturing industry in Sweden with a very high level of technology. Swedish engineering companies such as SKF, ABB and Ericsson and inventions like the ball bearing have given Sweden a good worldwide reputation in this sector. The car and airplane industries are also significant. Volvo and SAAB are well-known companies in these fields and produce both cars and trucks under various brand names. SAAB is also a producer of commercial and military airplanes.

Many traditional Swedish mechanical manufacturing companies have diversified into the electronics industry. Sweden has one of the most automatized manufacturing industries in the world, and Sweden's ABB is the largest producer of industrial robots in Europe. Ericsson is a very successful company in telecommunications and sells digital exchanges and cellular phone systems to markets all over the world. Mechanical engineering is dominated by

[4] www.swedishtrade.se

international companies such as ABB, Atlas Copco (mining and construction equipment), Electrolux (appliances), Tetra Laval (agricultural and industrial processing machinery) etc.

The Chemical Industry

Chemical products have been manufactured in Sweden for over a hundred years. The Swedish chemical industry was in the beginning mainly producing matches and explosives, while paint and plastics have grown to take a large share of chemical production after World War II. The medical part, dominated by Astra and Pharmacia & Upjohn, is the most research intensive of all industries and its products have been very successful during the last decades.

Pharmaceuticals are the second fastest-growing industrial sector in Sweden. It is still a relatively small sector in terms of jobs but accounts for about 4% of Swedish exports. Few companies, especially AstraZeneca and Pharmacia & Upjohn, too, dominate this industry. More than 90% of pharmaceuticals produced in Sweden are exported. The sector is very R&D intensive. R&D investments, account for about 20% of sales.[5]

Forestry

The Swedish forest industry has played an important part in the Swedish economy since the middle of the 19th century. It has over the years become mainly export-oriented and accounted for almost half of Swedish exports during the 1950s. The Swedish sawmill industry is still the largest in Europe and accounts for about 10% of the world's exports. In the pulp and paper industries, Sweden was the third largest exporter in the world in the early 90s. The Swedish forestry is the main supplier to the forest industry. Imports of raw materials are insignificant in this industry. Forests cover a large part of Sweden

[5] www.si.se

and the Swedish forestry is considered very modern and it operates with long-term ecological objectives.[6]

Until the inter-war period, the forest products sector was the dominating industry in Sweden. It has remained a key element of exports in subsequent decades. Another yardstick of its importance is the fact that around one half of Sweden's area is covered with forests. The industry remains vital from an employment standpoint in large portions of Northern Sweden. After Canada and Finland, Sweden is the world's leading exporter of forest products.

The two main sub sectors of forest products differ greatly from each other. In the wood product industry (excluding furniture), small companies predominate and the business is fairly fragmented. Its products have a relatively low value-added. The paper and paperboard industry, in contrast, have gradually shifted away from simple standard products toward more advanced ones. Companies in this sub sector have also strongly expanded their international operations over the past decade. Their production processes are generally very technology-intensive. After a number of mergers, StoraEnso, SCA, Holmen and AssiDoman dominate the Swedish forest products sector.

Food Processing

For many decades, the Swedish food processing industry lived in a protected market. This changed when Sweden became a member of EU. Combined with a sharp rise in foreign ownership, this has led to a dramatic increase in competition. Meanwhile, improved access to international markets for Swedish companies has resulted in a rapid increase in exports. Half the jobs in this sector are in foreign-owned companies. In the remaining half, producer cooperatives were totally dominant. Parts of the food-processing sector (alcoholic beverages and tobacco) are still dominated by government-owned companies.

[6] www.si.se

Iron and Steel

Sweden is one of the world's leading producers of iron ore; important mines are at Kiruna and Gällivare. Copper, lead and zinc ores and pyrite are also extracted. This is a traditional Swedish industry and Sweden was the largest exporter of iron products in Europe for over two hundred years. Its importance has however diminished in recent years. The LKAB Company dominates the mining industry and 90% of its production is exported, mainly to the German steel industry. The exports of iron ore have decreased since mid 1970s but Sweden is still among the top ten exporters in the world.[7]

The steel industry is also exporting most of its production. Swedish steel producers have concentrated on quality and more than half of the sales value consists of the more expensive special steel used for precision tools and ball bearings, etc.

The Service Industry

The service sector is by far the largest in the Swedish economy in terms of employment. It consists not only of traditional services like financial, educational and medical but also of an increasing service part in production industries. Large parts of the Swedish service industry belong to the public sector, for instance almost all hospitals, schools and childcare centres are owned by the State. A privatisation process has started in this sector and former monopolies like Posten (mail services), Telia (telecommunications) and SJ (railway transports) have been or are in the process of being introduced on the stock market.

[7] www.swedishtrade.se

2.3.3 Distribution Of The Industries In Sweden

Size Distribution[8]

The Swedish business sector consists of about 700 000 companies. No fewer than 20% of these operate in the agricultural sector, about 15% in manufacturing and construction, and about 65% in the service sector. More than two thirds of all companies have no employees. Among companies with employees, the average size is just over 15 people. There are about 50 000 industrial companies in Sweden of which more than 53% have no employees. Thirty-five percent have fewer than 10 employees and only slightly more than one percent of industrial companies have more than 200 employees. Measured in terms of total jobs, however, large work places and companies dominate. The average size of industrial companies with employees is about 30 people.

Industrial companies are thus generally larger than service sector companies. The percentage of all industrial employees working at companies with more than 200 employees is nearly 60%. At least 25% work in companies with more than 20 employees. In reality, the importance of large companies is even greater, since many formally separate companies belong to the same corporate group. Adjusted for this large corporate groups account for nearly 70% of total industrial employment in Sweden. This makes Sweden one of the countries with the greatest dependence on large companies.

Geographic Distribution

The number of industry employees in Sweden for 2000 were 723, 513. Major industrial areas in Sweden are in the counties of Skåne, the Västra Götalands Region, Stockholm, Uppsala and Jönköping. The total number of employees in the chemical industry in 2000 were 40 566. Chemical industries are concentrated in Stockholm County, Västra Götalands Region, Skåne County and Uppsala County. These counties employ 79% of the total number of employees in the chemical industry (Table 16).

[8] www.swedishtrade.se

The concentration of metal industries is widespread in Sweden. However, major metal industries can be found in eleven of the twenty-one counties in Sweden. The counties are: Jönköping County, Västra Götalands Region, Skåne County, Gävleborgs County, Dalarnas County, Västmanland County, Värmland County, SödermanlandCounty, Örebro County, Östergotland County and Stockholm County. The total number of employees in these counties are 91 720, constituting 78% of the total number of employees of 117 698 in the metal industries (Table 17).

In the food industry, Skåne County, the Västra Götalands Region and Stockholm County dominate, employ about 62% of the total number of employees in the food industries. Skåne County employs about 27%, the Västra Götalands Region 20% and Stockholm County 15% (Table 18). For textile industries, the concentration is in the Västra Götalands Region, Skåne and Halland counties. The Västra Götalands Region employs 5, 443 of the 11, 431employees in this industry in 2000, representing about 48% (Table 21).

Transportation equipment is produced mainly in the Västra Götalands Region, Stockholm County, Östergötalands County, Blekinge County and Västmanland County. The Västra Götalands Region employed 45% of the total number of employees in the transport industry in 2000 (Table 20). In the machine industry, seven of the twenty-one counties employed about 67% of the total number of employees in the industry (Table 19). The seven counties are the Västra Götalands Region (18%), Skåne County (12%), Östergötalands County (10%), Stockholm County (8%), Jönköping County (7%), Örebro County (6%) and Kronoberg County (6%)

2.3.4 Composition Of Imports Of Goods And Services

Sweden does a large foreign trade, with the value of exports slightly exceeding imports. The main imports are machinery, manufactured goods, motor vehicles, foodstuffs, petroleum and petroleum products, and chemicals (Table 7); the chief exports are machinery, manufactured goods, iron ore, iron and steel,

motor vehicles, chemicals, and forest products. The principal trade partners are Germany, Great Britain, Denmark, France, Norway, Finland, and the United States (Table 6).

As a result of Swedish exports bringing foreign currency into Sweden, Swedish households and companies are better able to buy imported goods and services. Imports are more diversified than exports. Consumer products feature more strongly in imports than in exports. More than half of the total import volume comprises engineering products-both components and machinery for industry and home electronics and cars for private use.

Imports of raw materials and fuels, once a significant factor, are of relatively little importance nowadays in terms of import value. They mainly comprise crude oil, wood products and ore. Imported foodstuffs are also important in Sweden's food supply. Chemical products account for one-eighth of imports and are well represented in imports and exports. Important subgroups are chemicals, plastics and pharmaceuticals. Semi-manufactures of various kinds have about the same overall import value as chemical products. The most important groups in order of size are steel, other metals, yarns and textiles, paper and rubber goods.

Engineering goods today account for more than 50% of total imports. Electrical goods and computers, with a 20% share, is the largest product group not only in the engineering sector but also in the import trade as a whole (Table 7). Cars, car parts, industrial machinery and instruments are four other important sub segments.

If instruments are excluded, the other finished product category has around the same share as of the total import value as chemical products, i.e. one-eighth of imports. Other product areas include furniture, sports articles and toys.

One important factor underlying growth in imports is the amount of processed goods exported from Sweden. Also, a strong growth in the real income of households has resulted in a stronger demand for durable goods, thus leading to increase in imports of goods.

CHAPTER THREE: DATA ANALYSIS I

3.0: INTRODUCTION

In this chapter, the data for flow to geographic areas declared to the customs offices is analysed. The first section presents descriptive statistics of each commodity group followed by the correlation test, and the paired t-test. The second section looks at the total, proportion and composition of flows from the border stations. In the third section, we analyse the distribution and composition of the total imports by the geographic areas. We analyse the distribution and composition of flows for the commodity groups in the fourth section and the distribution and proportion of two commodity groups with high imports by the geographic areas in the fifth section of this chapter. In the sixth section we analyse the composition and proportion of the total imports by the highest geographic area. We then rank the postcodes with the highest total volume of flows as well as the total volume of flows for each of the commodity groups in the seventh section.

3.1 DESCRIPTIVE STATISTICS, CORRELATION AND PAIRED t-TEST FOR THE COMMODITY GROUPS

This section presents the descriptive statistics, correlation coefficients and paired t-test for the commodity groups for all the border stations across the seasons (quarters).

3.1.1 Descriptive Statistics For The Commodity Groups

In this part, we present and analyze the descriptive statistics consisting of mean flows, minimum and maximum flows, standard deviation and coefficient of

variation of the flows for all the commodity groups from the border stations across the seasons (quarters).

Jordbruk, Livsmedel (Agriculture, Food)

Table 3.1: Descriptive Statistics of Flow of Jordbruk, Livsmedel

Statistics	JLQ1	JLQ2	JLQ3	JLQ4
Mean	2486376	2100072	2033391	2411117
Min	0	0	0	0
Max	3.12e+07	2.52e+07	2.35e+07	2.83e+07
Sd	7635161	6158210	5780361	6916889
CV	3.07	2.93	2.84	2.87

Source: Own Computation

Table 3.1 presents the descriptive statistics for the commodity group jordbruk livsmedel (agriculture, food). It shows a high standard deviation for all the quarters indicating that there are significant variations in the flows for this commodity group from the border stations for all the quarters. The coefficient of variation is very high for all the quarters (about 300% of the mean) indicating a very high spread of the flows for the commodity group from the border stations. It is important to note that the zero minimum values mean that there were no flows of jordbruk livsmedel (agriculture, food) from some border stations for all the quarters. There were no flows of jordbruk livsmedel (agriculture, food) from Idre for all the quarters. From Strömstad, there were no flows during the first, second and fourth quarters. Gäddede and Örje did not record any flows for this commodity group during the second, third and fourth quarters, and Vittjärn also did not record any flows during the first and fourth quarters. Högen did not record any flows for jordbruk livsmedel (agriculture, food) for the first quarter **(**Tables 9-12).

Jordbruk, Råvaror (Agriculture, Primary goods)

Table 3.2: Descriptive Statistics of Flow of Jordbruk, Råvaror

Statistics	JRQ1	JRQ2	JRQ3	JRQ4
Mean	914746.6	909276.5	666032.9	624628.6
Min	0	0	0	0
Max	1.42e+07	1.32e+07	8696705	9260854
Sd	3426467	3184317	2102664	2240731
CV	3.75	3.50	3.16	3.59

Source: Own Computation

The descriptive statistics in Table 3.2 shows that there are significant variations in the flows of jordbruk, råvaror (agriculture, primary goods) from the border stations for all the four quarters. This is supported by a very high standard deviation (higher than the mean) and high coefficient of variation (over 300% of the mean) of the commodity group for all the quarters. The zero minimum values mean that there were no flows of jordbruk, råvaror (agriculture, primary goods) from some border stations for all the quarters. For example, Kiruna and Örje did not record any flows for this commodity group throughout the year. The border stations at Strömstad and Idre did not record any flows of jordbruk, råvaror (agriculture, primary goods) during the first and fourth quarters, Gäddede during the third quarter and Åsnes during the second quarter (Tables 9-12).

Kemi (Chemicals)

Table 3.3: Descriptive Statistics of Flow of Kemi

Statistics	KemiQ1	KemiQ2	KemiQ3	KemiQ4
Mean	9189629	8684148	8279671	8582204
Min	0	0	0	0
Max	7.92e+07	8.05e+07	6.96e+07	6.67e+07
Sd	2.22e+07	2.22e+07	1.96e+07	2.07e+07
CV	2.42	2.56	2.37	2.41

Source: Own Computation

The statistics in Table 3.3 show a high standard deviation. This means that there are significant variations in the flow of kemi (chemicals) for all the four quarters from all the border stations. This is supported by a high coefficient of variation (over 200% of the mean) indicating a high spread of the flows from all the border stations for all the quarters. The zero minimum values mean that there were no flows of kemi (chemicals) from some border stations for all the quarters. No flow of kemi (chemicals) was recorded from Örje throughout the year. Kiruna did not record any flows of kemi (chemicals) during the first, second and third quarters, and Gäddede during the first quarter (Tables 9-12).

Maskiner Elektr. Instrument (Machines, Electronics, Instruments)

Table 3.4: Descriptive Statistics of Flow of Maskiner Elektr. Instrument

Statistics	**MEIQ1**	**MEIQ2**	**MEIQ3**	**MEIQ4**
Mean	735449.2	639682.5	599934.9	795897.7
Min	0	0	0	0
Max	5213251	4794518	4672852	5183857
Sd	1534279	1361435	1279879	1698120
CV	2.09	2.13	2.13	2.13

Source: Own Computation

The statistics in Table 3.4 above show that there are variations in the flows of machines, electronics and instruments, from the border stations for all the quarters due to the high standard deviation, which is higher than the mean and a high coefficient of variation (over 200% of the mean). The zero minimum values means that there were no flows of machines, electronics and instruments from some border stations for all the quarters. The border stations that did not record any flows for this commodity group are Kiruna (first, second and third quarters), Idre (first and third quarters), Strömstad (first and second quarters) and Gäddede (first quarter) (Tables 9-12).

Metall (Metals)

Table 3.5: Descriptive Statistics of Flow of Metall

Statistics	MetallQ1	MetallQ2	MetallQ3	MetallQ4
Mean	4556672	4476775	3616981	4002402
Min	0	0	0	0
Max	3.09e+07	2.83e+07	2.46e+07	2.90e+07
Sd	8783176	8684327	7239329	8 229572
CV	1.93	1.94	2.00	2.06

Source: Own Computation

The standard deviations in Table 3.5 are very high (higher than the mean) indicating that there are variations in the flows of metals for all the quarters across the various border stations. The values for the coefficient of variation are also high indicating a wide spread of the flows from the border stations for the various quarters. The zero minimum values imply that there were no flows of metals from some border stations for all the quarters. The border stations that recorded zero flows for metals for some of the quarters are Kiruna (second, third and fourth quarters) and Gäddede (fourth quarter). There were no flows of metals from Örje throughout the year (Tables 9-12).

Textil (Textiles)

Table 3.6: Descriptive Statistics of Flow of Textil

Statistics	TextilQ1	TextilQ2	TextilQ3	TextilQ4
Mean	51865.41	43291.47	50375.71	43398.12
Min	0	0	0	0
Max	609511	473369	582771	552642
Sd	152759.2	117096.1	146050.3	135082
Cv	2.95	2.70	2.90	3.11

Source: Own Computation

The descriptive statistics in Table 3.6 show high standard deviations and coefficient of variation for the flows of textiles, implying that there are significant variations in the flows from the border stations for all the four quarters. The zero minimum values indicate that there were instances of no

flows of textiles for all the quarters. The border stations that did not record any flows for this commodity group are Gäddede, Örje and Kiruna (first, second and third quarters), Idre and Strömstad (first and second quarters), Junkerdal and Björnfjell (second quarter) (Tables 9-12).

Diverse (Others/Miscellaneous)

Table 3.7: Descriptive Statistics of Flow of Diverse

Statistics	DiverseQ1	DiverseQ2	DiverseQ3	DiverseQ4
Mean	1.51e+07	1.38e+07	1.31e+07	1.48e+07
Min	0	0	0	0
Max	8.50e+07	7.99e+07	7.61e+07	8.01e+07
Sd	2.79e+07	2.67e+07	2.51e+07	2.82e+07
CV	1.85	1.93	1.92	1.91

Source: Own Computation

From Table 3.7, the distribution of each of the flows indicates high standard deviations as well as wide spread of the coefficient of variation of the flows of diverse (others/miscellaneous) from the border stations for all the quarters. This means that there are significant variations in the mean flows for diverse (others/miscellaneous) across the border posts for all the quarters. It should be noted that the zero minimum values mean that there were instances of no flows of diverse from some border stations for all the quarters. It is clear from Tables 9-12 that there were no flows of diverse (others/miscellaneous) from Örje for all the quarters and Strömstad during the second quarter.

Tom (Empty)

Table 3.8: Descriptive Statistics of Flow of (tom)

Statistics	(tom)Q1	(tom)Q2	(tom)Q3	(tom)Q4
Mean	49799.23	112685.1	65391.57	49702
Min	0	500	0	2000
Max	323695	732453	4 57741	298212
Sd	96162.85	205068.5	131912.7	89374.8
CV	1.93	1.82	2.02	1.8

Source: Own Computation

The descriptive statistics in Table 3.8 show that the distribution of each of the flows have very high standard deviations. This implies that there are significant variations in the flows across the border posts in each quarter. It is important to note that the zero minimum values imply there were no flows from some border post for all the quarters. The border stations that did not record any flows for this commodity group throughout the year are Idre and Örje. The others are Kiruna (first, second and third quarters), Strömstad (first, second and fourth quarters), Gäddede (first and fourth quarters), Östby (first and third quarters), Junkerdal (first and second quarter), Åsnes (third and fourth quarters) and Vauldalen (fourth quarter) (Tables 9-12).

3.1.2 Correlation Coefficients Of The Commodity Groups For The Various Quarters

In this part we test whether the volume of imports of the various types of commodities from the border stations are similar across the quarters. For example, we test whether the imports of a particular commodity group from the various border stations in the first quarter have some similarity in terms of the proportion of flows with other quarters. To investigate whether the quarterly flows have been systematic or vary across the border posts, we estimated correlation coefficients for all the commodity groups.

Although the estimates are indicative of high positive correlation, we proceed to test whether the estimates are statistically significantly different from zero. The significance levels are in the parentheses in Table 3.9.

Table 3.9: Correlation Of Commodities Across Quarters By Boarder Posts

	Quarter 1	**Quarter 2**	**Quarter 3**	**Quarter 4**
Jordbrukli~Q1	1.0000			
Jordbrukli~Q2	0.9995(0.00)	1.0000		
Jordbrukli~Q3	0.9988(0.00)	0.9995(0.00)	1.0000	
Jordbrukli~Q4	0.9991(0.00)	0.9997(0.00)	0.9998(0.00)	1.0000
Jordbrukrv~Q1	1.0000			
Jordbrukrv~Q2	0.9991 (0.00)	1.0000		
Jordbrukrv~Q3	0.9932 (0.00)	0.9972(0.00)	1.0000	
Jordbrukrv~Q4	0.9993 (0.00)	0.9997(0.00)	0.9962(0.00)	1.0000
KemiQ1	1.0000			
KemiQ2	0.9987(0.00)	1.0000		
KemiQ3	0.9994(0.00)	0.9986(0.00)	1.0000	
KemiQ4	0.9969(0.00)	0.9948(0.00)	0.9974(0.00)	1.0000
Maskinerel~Q1	1.0000			
Maskinerel~Q2	0.9990 (0.00)	1.0000		
Maskinerel~Q3	0.9970 (0.00)	0.9991(0.00)	1.0000	
Maskinerel~Q4	0.9973 (0.00)	0.9938(0.00)	0.9904(0.00)	1.0000
MetallQ1	1.0000			
MetallQ2	0.9984 (0.00)	1.0000		
MetallQ3	0.9985 (0.00)	0.9992(0.00)	1.0000	
MetallQ4	0.9984 (0.00)	0.9974(0.00)	0.9993(0.00)	1.0000
Diverse~Q1	1.0000			
Diverse~Q2	0.9991(0.00)	1.0000		
Diverse~Q3	0.9992(0.00)	0.9998(0.00)	1.0000	
Diverse~Q4	0.9994(0.00)	0.9987(0.00)	0.9989(0.00)	1.0000
TextilQ1	1.0000			
TextilQ2	0.9961(0.00)	1.0000		
TextilQ3	0.9999(0.00)	0.9967(0.00)	1.0000	
TextilQ4	0.9969(0.00)	0.9951(0.00)	0.9966(0.00)	1.0000
(tom)Q1	1.0000			
(tom)Q2	0.9040(0.00)	1.0000		
(tom)Q3	0.9934(0.00)	0.9179(0.00)	1.0000	
(tom)Q4	0.9962(0.00)	0.9157(0.009	0.9942(0.00)	1.0000

Source: Own Computation

The correlation test in Table 3.9 shows that the proportion of flows of jordbruk livesmedal (agriculture, food), jordbruk, råvaror (agriculture, primary goods), kemi (chemicals), maskiner, elektr. Instrument (machines, electronics,

instruments), metall (metals), textil (textiles), diverse (others/miscellaneaous), and tom (empty) from the various boarder posts; and the flows have been consistent across the seasons (quarters). This is supported by the very high correlation coefficients between 0.998 and 0.999, 0.993 and 0.999, between 0.994 and 0.999, 0.990 and 0.999, 0.997 and 0.999, 0.995 and 0.999, 0.998 and 0.999, 0.904 and 0.996, respectively. From the t-test for the statistical significance of the estimates, we fail to accept the null hypotheses at 99% confidence level in all cases.

This finding is very interesting in the sense that, even in the face of seasonal variations across the various quarters, the proportion of relative flows across the border stations does not vary. Thus, given information on the proportionate flows across boarder stations, and the expected flow in some border stations in say the next quarter, we can predict flows in the remaining boarder stations with almost 99% confidence level. This implies that resources that could otherwise be directed to collecting some flow data could be saved.

3.1.3 Testing Equality Between Means Of Quarterly Flows

In this section, we used the paired t-test to perform a test of equality between the flows across quarters for each commodity group. The test results are reported in Table 3.10. We reject the null hypothesis of no significant difference between the mean flows only for significance level of at least 0.05.

The results from the tests in Table 3.10 indicate that, at 5% significance level, we fail to reject the null hypothesis for all commodities except maskiner, electr., instrument (machines, electronics, instruments), metall (metals) and textil (textiles). Thus, there are no statistically significant differences between the mean flows across the quarters for most of the commodities under consideration.

Table 3.10: Paired t-test For All Commodities[9]

	Mean of Q1=Q2	Mean of Q1=Q3	Mean of Q1=Q4	Mean of Q2=Q3	Mean of Q2=Q4	Mean of Q3=Q4
Jordbruk livsmedel						
T	1.0669	0.9932	0.3951	0.5985	-1.6267	-1.3471
P < t	0.8491	0.8323	0.6510	0.7211	0.0617	0.0984
P > t	0.1509	0.1677	0.3290	0.2789	0.9383	0.9016
Jordbruk, Råvaror						
T	0.0839	0.7545	1.0037	0.9107	1.2397	0.7313
P < t	0.5329	0.7692	0.8348	0.8120	0.8835	0.7624
P > t	0.4671	0.2308	0.1652	0.1880	0.1165	0.2376
Kemi						
T	1.1598	1.2885	0.7112	0.5612	0.1020	-0.4266
P < t	0.8684	0.8921	0.7564	0.7088	0.5400	0.3377
P > t	0.1316	0.1079	0.2436	0.2912	0.4600	0.6623
Maskiner, Electr Instrument						
T	1.8401	1.6607	-0.8629	1.1743	-1.3508	-1.3810
P < t	0.9578	0.9419	0.2005	0.8713	0.0978	0.0931
P > t	***0.0422***	0.0581	0.7995	0.1287	0.9022	0.9069
Metall						
T	0.3045	2.1553	2.1191	2.2294	1.4913	-1.3880
P < t	0.6177	0.9766	0.9750	0.9798	0.9223	0.0921
P > t	0.3823	***0.0234***	***0.0250***	***0.0202***	0.0777	0.9079
Textil						
T	0.8980	0.8830	1.4457	-0.8867	-0.0192	1.4621
P < t	0.8087	0.8048	0.9162	0.1942	0.4925	0.9185
P > t	0.1913	0.1952	0.0838	0.8058	0.5075	0.0815
Diverse						
T	1.8753	2.1742	0.4231	1.3453	-1.2318	-1.6752
P < t	0.9604	0.9775	0.6611	0.9014	0.1179	0.0567
P > t	***0.0396***	***0.0225***	0.3389	0.0986	0.8821	0.9433
Tom						
T	-1.6425	-1.4914	0.6831	1.1628	1.7285	1.4261
P < t	0.0600	0.0777	0.7478	0.8690	0.9484	0.9135
P > t	0.9400	0.9223	0.2522	0.1310	0.0516	0.0865

Ho: mean difference = 0

[9] The significant statistics are in bold italics. The output of the tests is provided in the Appendix.

Regarding maskiner, electr., instrument (machines, electronics, instruments), the first quarter has a slightly higher mean flow relative to all other quarters. Secondly, the mean flow of metals was highest in the first quarter, followed by the second quarter; and the third and fourth quarters that have statistically equal mean flows. Thirdly, the first quarter of diverse (others/miscellaneous) had the higher mean flow than the second and the third quarters, but same flow as the fourth quarter. A summary of the results of the paired t-test is provided in Table 3.11 and the detailed test results are in Appendix 1.

Table 3.11: Ranking of Average Quarterly Imports According to Paired t-test

COMMODITIES	Q1	Q2	Q3	Q4
(tom)	1	1	1	1
Diverse	1	2	2	1
Jordbruk livsmedel	1	1	1	1
Jordbuk, råvaror	1	1	1	1
Kemi	1	1	1	1
Maskiner, elect. Instr.	1	2	2	2
Metal	1	2	3	3
Textil	1	1	1	1

"1" indicates the highest mean flow, and "4" is the lowest.

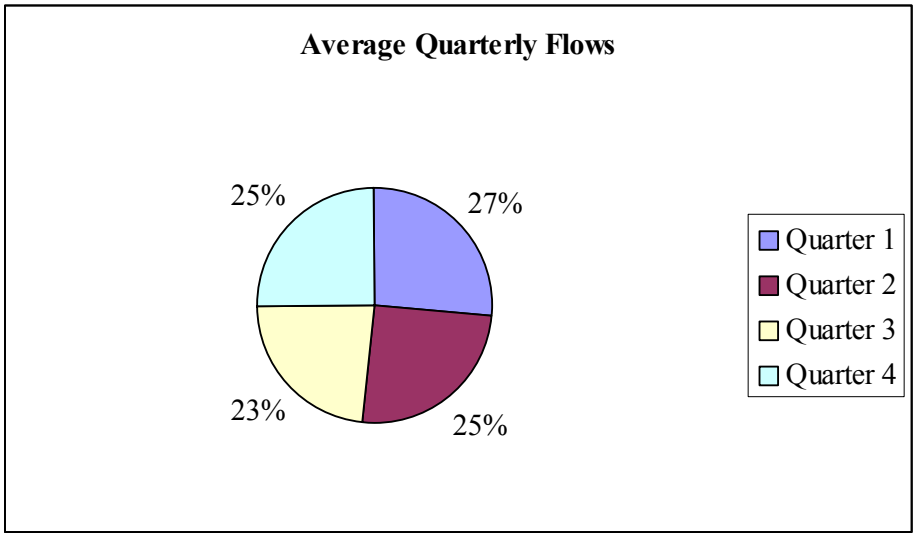
The summarised information in the Table 3.11 implies that the first quarter has the highest overall mean flow and the third quarter has the lowest. This is confirmed by the overall mean flows for the four quarters. The results are reported in Table 3.12. The results are consistent with the preceding analysis. The first quarter has the highest flow because at the beginning of the year stocks are replenished by industries. On the other Hand during the summer, which is the third quarter, most industries close down, hence the lowest third quarter flow observed from the data.

Table 3.12: Summary of Grand Average Quarterly Imports

COMMODITIES	Quarterly Imports			
	Q1	Q2	Q3	Q4
Grand Mean	3.30e+07	3.07e+07	2.84e+07	3.13e+07

The pie chart below indicates that the average mean flows for the first quarter is the highest (27%). The average mean flows for the second and fourth quarter is about the same (25%), and the third quarter records the lowest mean flows for all the commodity groups.

Figure 2: Average quarterly flows



NB: The second quarter, which is 24.878%, has been approximated to 25% when drawing the chart.

3.2: TOTAL AND COMPOSITION OF FLOWS FROM THE BORDER STATIONS

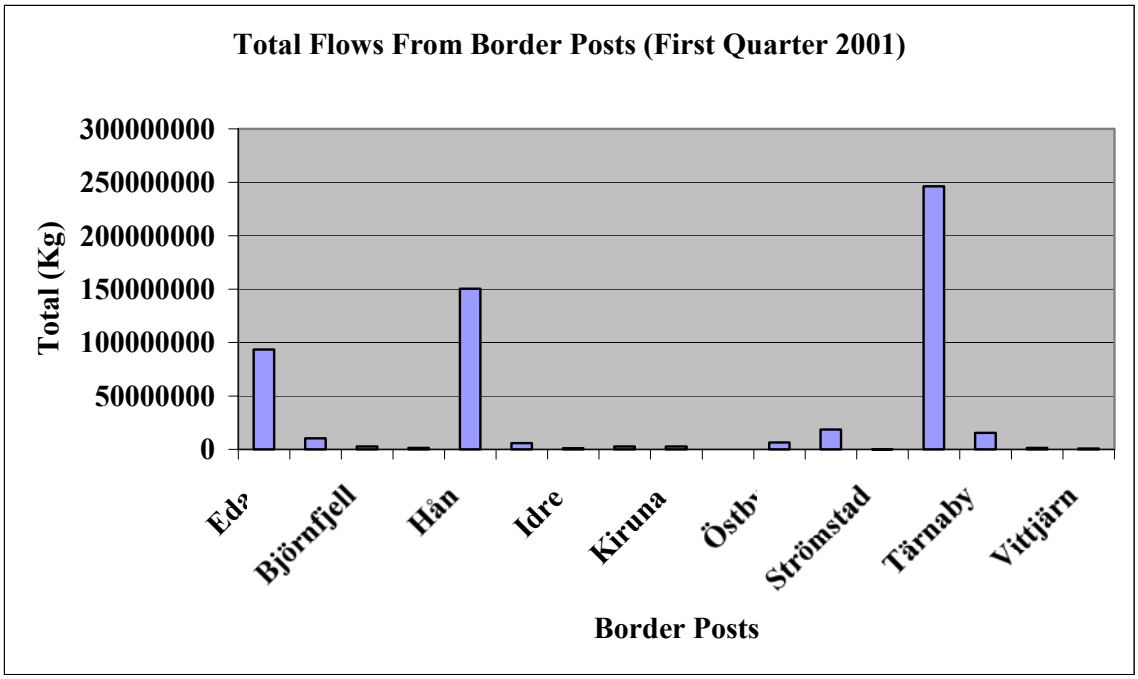
This section presents the total flows from the various border stations for all the quarters, the composition of the flows of the various commodity groups and their proportion from border stations.

3.2.1 Total Flows From The Border Stations

Figure 3 for the various border stations in the first quarter shows that the high flows are from Svinesund (250 million kilograms), then Hån (about 150 million kilograms) and Eda (about 100 million kilograms) in that order. There were low flows recorded from Gäddede, Idre, Vauldalen and Vittjärn. The area for Örje and Strömstad are not visible implying that these border stations recorded very low flows during the season.

FIRST QUARTER

Figure 3: Total Flows From Border Posts (First Quarter 2001)

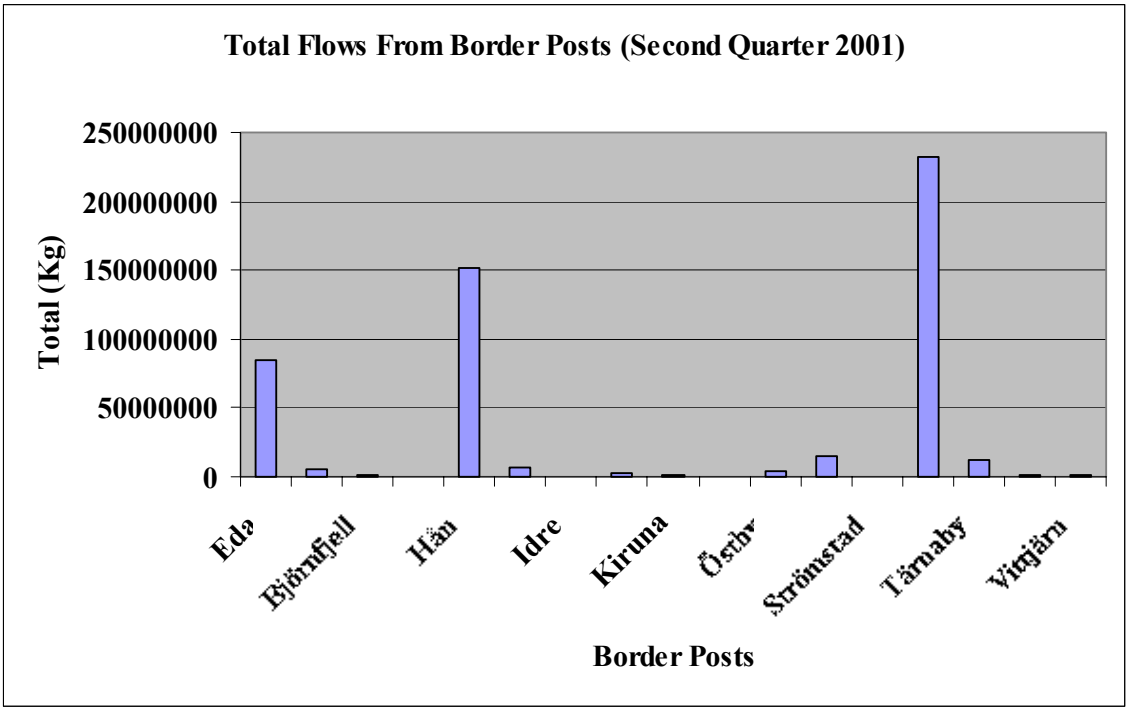


SECOND QUARTER

The flows for the second quarter (Figure 4) indicates that the high flows are from Svinesund (over 200 million kilograms), then Hån (150 million kilograms) and Eda (about 80 million kilograms). Comparatively, the total volume of flows from Svinesund and Eda during this quarter is lower than the volume during the previous quarter. The flows from the other border stations

are still low. The bars for Gäddede, Idre, Strömstad and Örje are not visible implying that these border stations recorded very low flows during the season. From Table 10, it is clear that there were no flows from Örje during the season.

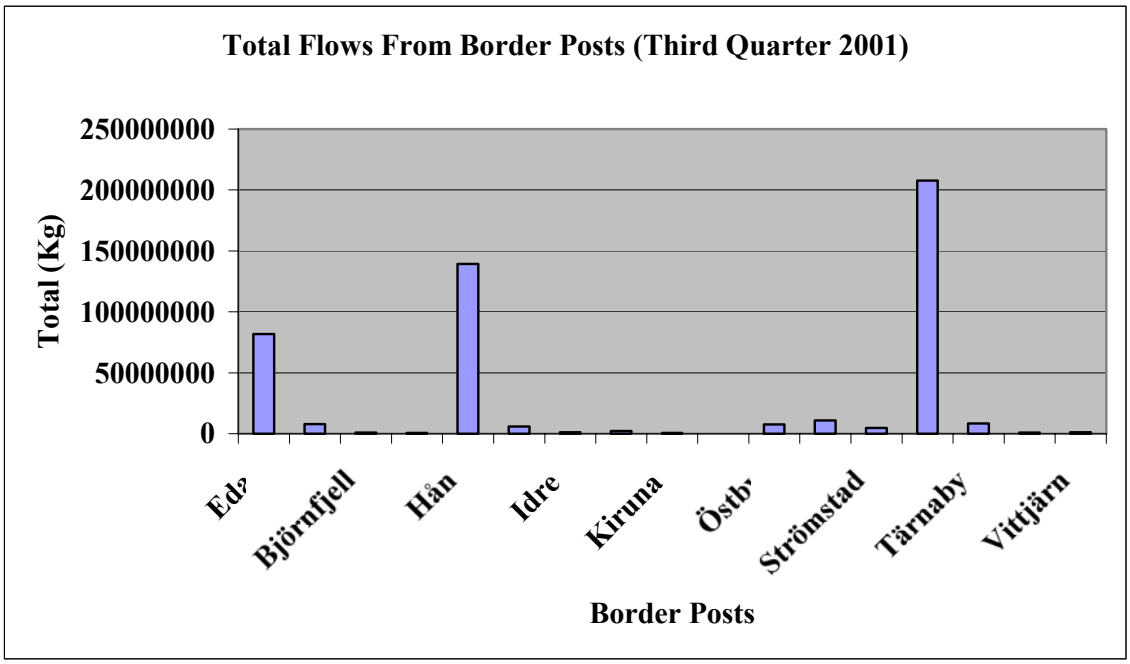
Figure 4: Total Flows From Border Posts (Second Quarter 2001)



THIRD QUARTER

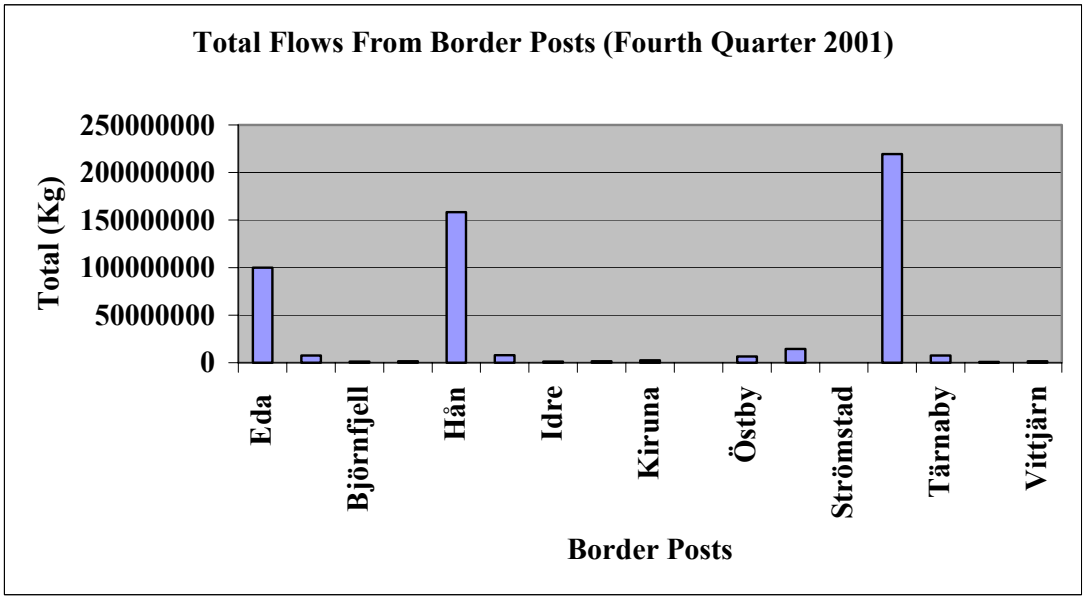
The pattern of the flows during this quarter (Figure 5) is not different from that of the first and second quarters. The rank as can be seen from the graph is in the same order (Svinesund, Hån and Eda). However, the flows from these border posts have decreased for this quarter. The border stations that do not have any visible bars imply that there were very low or no flows from these border posts.

Figure 5: Total Flows From Border Posts (Third Quarter 2001)



FOURTH QUARTER

Figure 6: Total Flows From Border Posts (Fourth Quarter 2001)

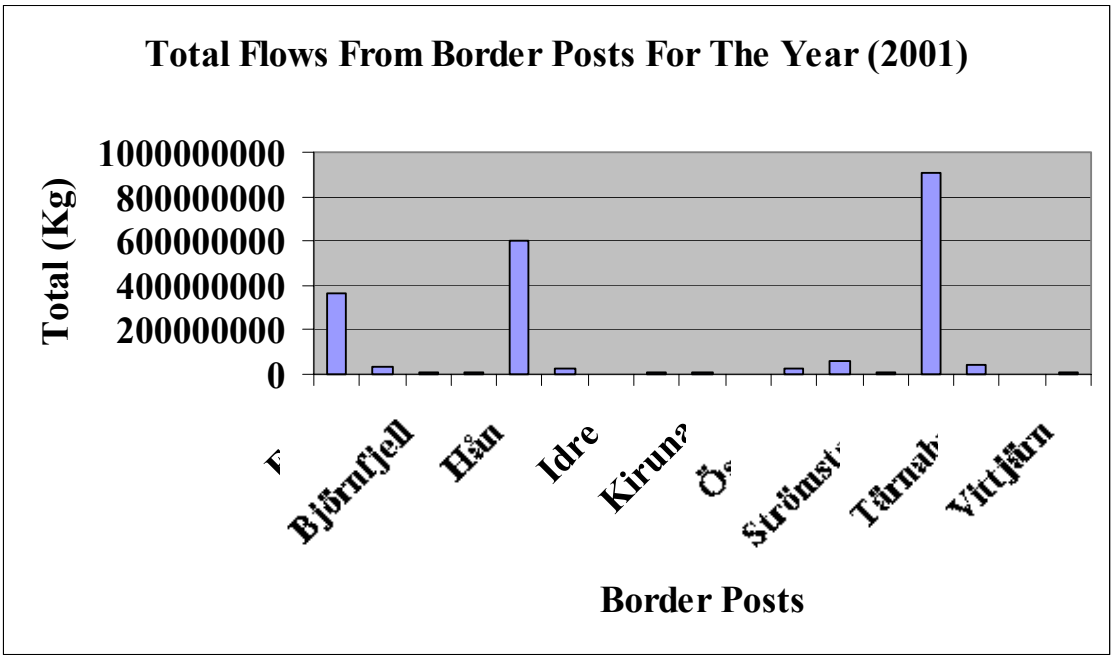


The flows follow the same pattern during this quarter (Figure 6) as in the other quarters. However, the total volume of flows is highest during this quarter than the previous (third) quarter. The bar for Eda that was below the 100 million kilograms level during the previous quarter is now at this level. The volume for Hån was below 150 million kilograms during the third quarter but over 150 million kilograms for this quarter. The flow for Svinesund has also increased.

Total Flows For The Year (2001)

Figure 7 summarizes the flows from the various border stations for the year. The graph indicates that the volume of flows from the border stations is ranked in the same order as the flows from the various quarters. The total volume of flows for the higher border posts are Svinesund (900 million kilograms), Hån (about 600 million kilograms) and Eda (over 350 million kilograms). A summary of the postcodes that are served by these border stations is presented in Table 5.

Figure 7: Total Flows from Border Posts (2001)

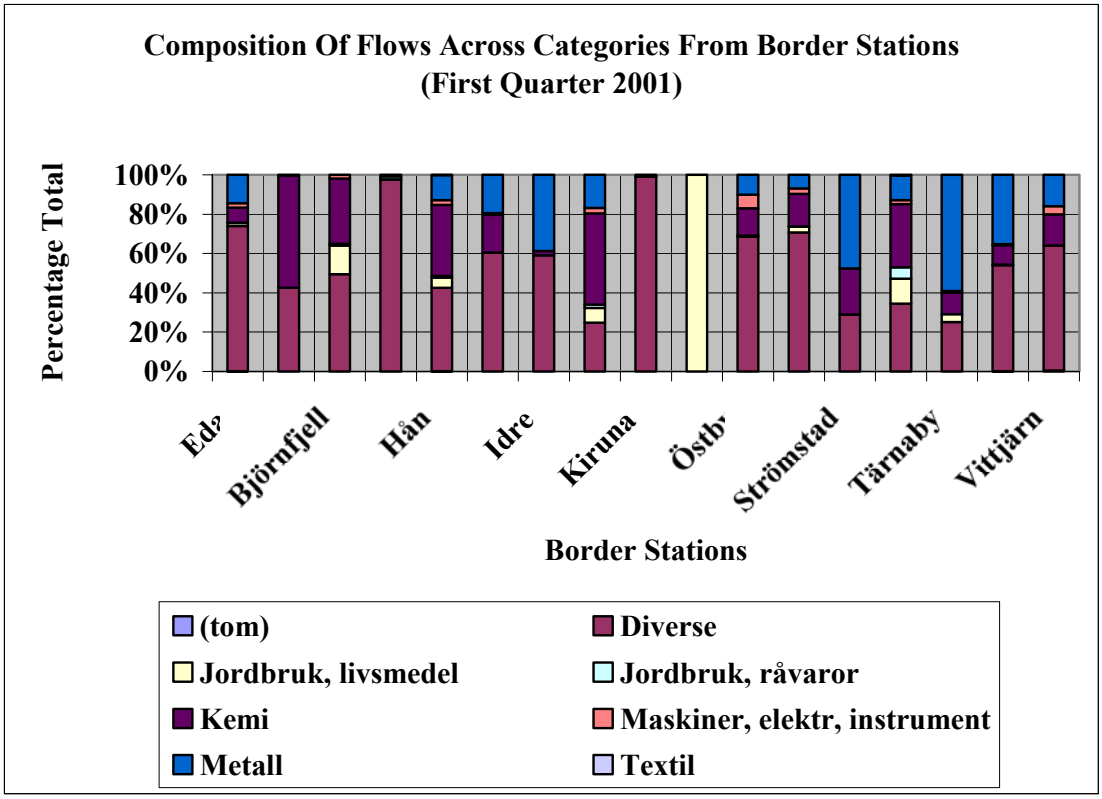


3.2.2 Composition And Proportion Of The Category Of Commodities From Border Stations

FIRST QUARTER

From the graph (Figure 8), the flows from Svinesund, Eda, Björnfjell, Hån, Tärnaby Vauldalen and Östby consisted of all types of commodities during the first quarter. Over 60% of the flows from Eda are Diverse. The proportion of flows for diverse (others/miscellaneous) is higher than all other types of commodities from these border stations except in Tärnaby, which has metals as the highest. Most of the flows from Åsnes, are diverse (others/miscellaneous) and kemi (chemicals) which constitutes over 95% of the total flows. Almost all the flows from Kiruna, and Gäddede are diverse (others/miscellaneous), and all the flows from Örje are jordbruk, livsmedel (agriculture, food). Metals also rank as the highest proportion of flows from Strömstad during this quarter.

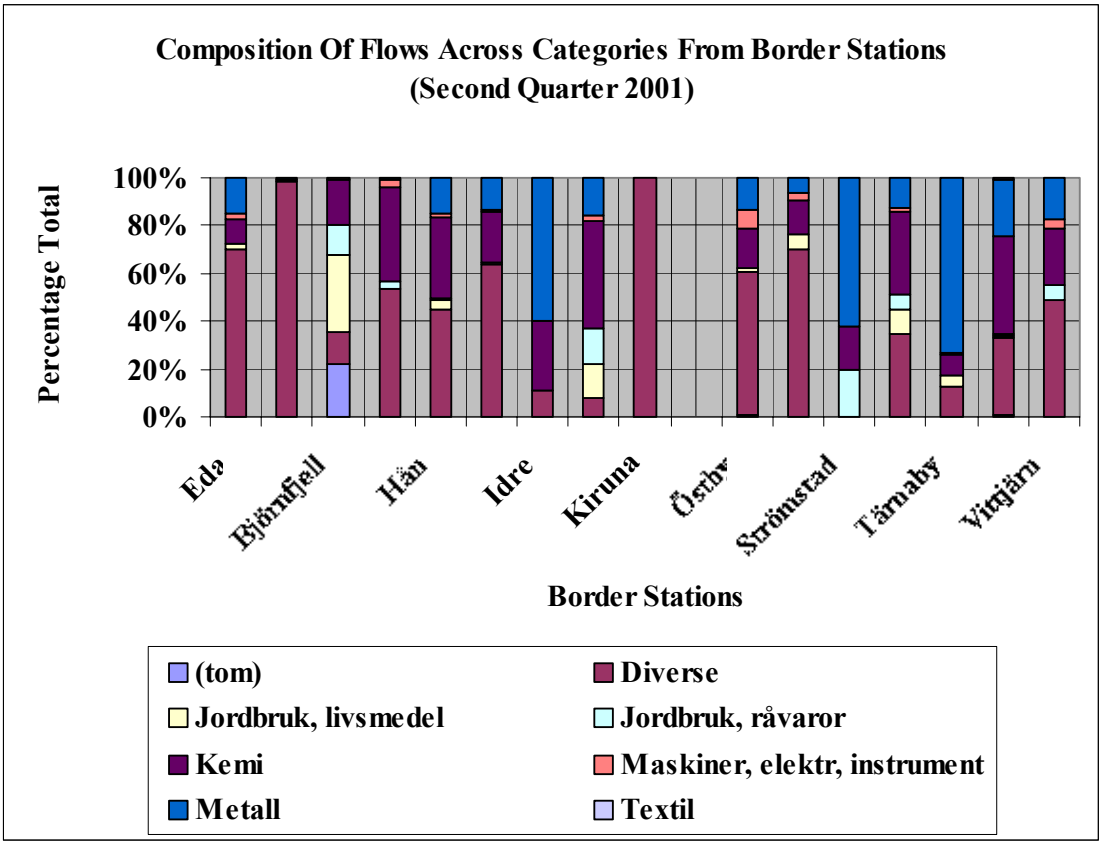
Figure 8: Proportion of Flows for Commodity Groups from Border Posts (First Quarter 2001)



SECOND QUARTER

The composition of flows for this quarter (Figure 9) is not different from that of the first quarter. However, the highest flow from Björnfjell is jordbruk, livsmedel (agriculture, food). Also, there were no flows for textiles from Björnfjell, Gäddede, Idre, Junkerdal, Kiruna and Strömstad. There is no bar for Örje implying that there were no flows from this border station during the quarter.

Figure 9: Proportion of Flows for Commodity Groups from Border Posts (Second Quarter 2001)

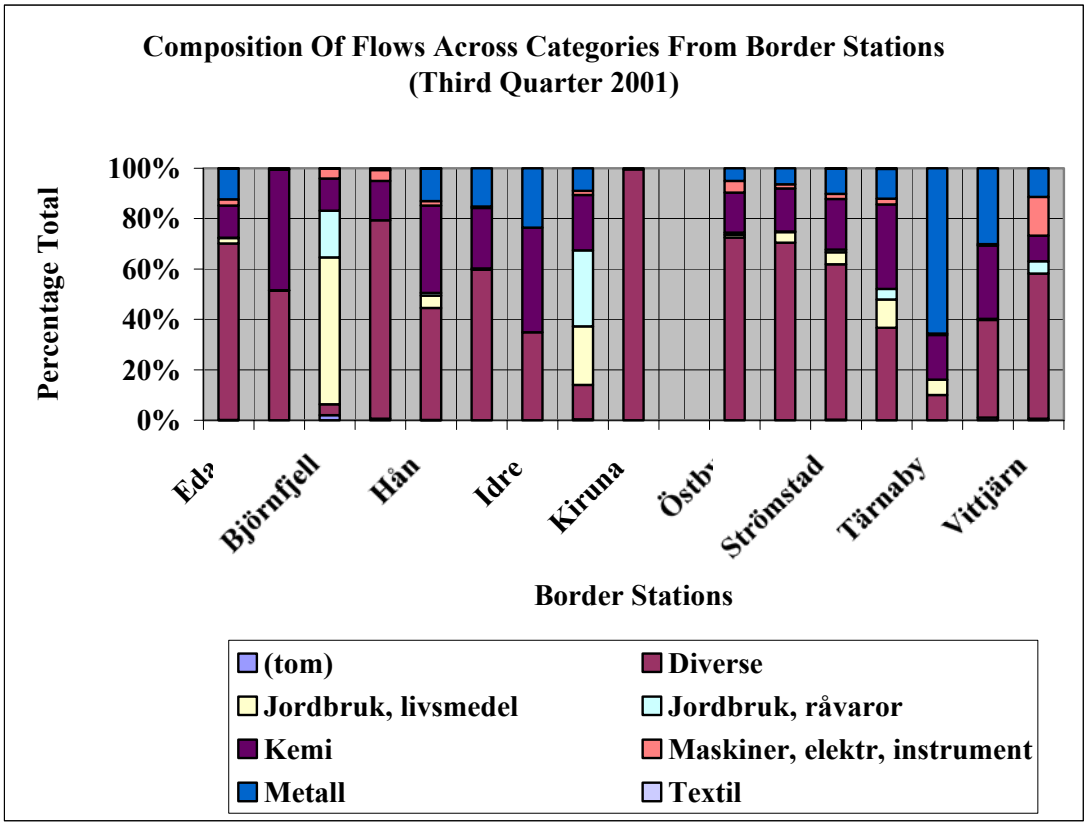


THIRD QUARTER

For this quarter (Figure 10), Björnfjell recorded a high flow of jordbruk livsmedel (agriculture, food) (over 55% of the total flows) compared to the

previous quarters. The proportion of flows for metals at Strömstad has reduced for this quarter in favour of diverse (others/miscellaneous). The composition of the flows for the category of commodities from the other border stations is in the same pattern as the previous quarters.

Figure 10: Proportion of Flows for Commodity Groups from Border Posts (Third Quarter 2001)

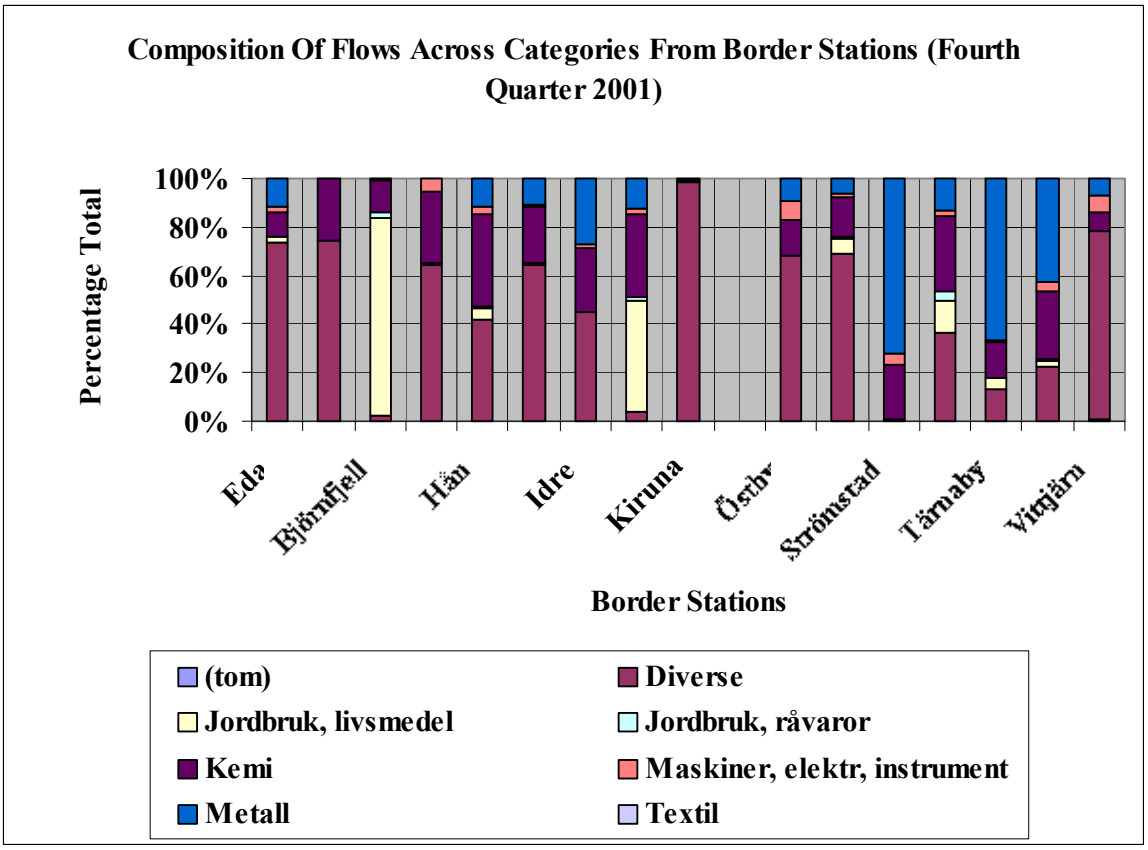


FOURTH QUARTER

The composition of the flows from Björnfjell (Figure 11) recorded an increase in the proportion of flows for jordbruk livsmedel (agriculture, food) (over 75% of the total flows) compared to 55% in the third quarter. At Strömstad, the proportion for metals, which reduced during the third quarter, has increased to over 65% of the total flows during this quarter. There is very little flows for diverse (others/miscellaneous) from this border station for this quarter, which

was over 60% of total flows during the third quarter. As in the third and second quarters, the flows from Kiruna follow the same pattern, which comprises flows for mainly diverse (others, miscellaneous), and no flows recorded at Örje.

Figure 11: Proportion of Flows for Commodity Groups from Border Posts (Fourth Quarter 2001)

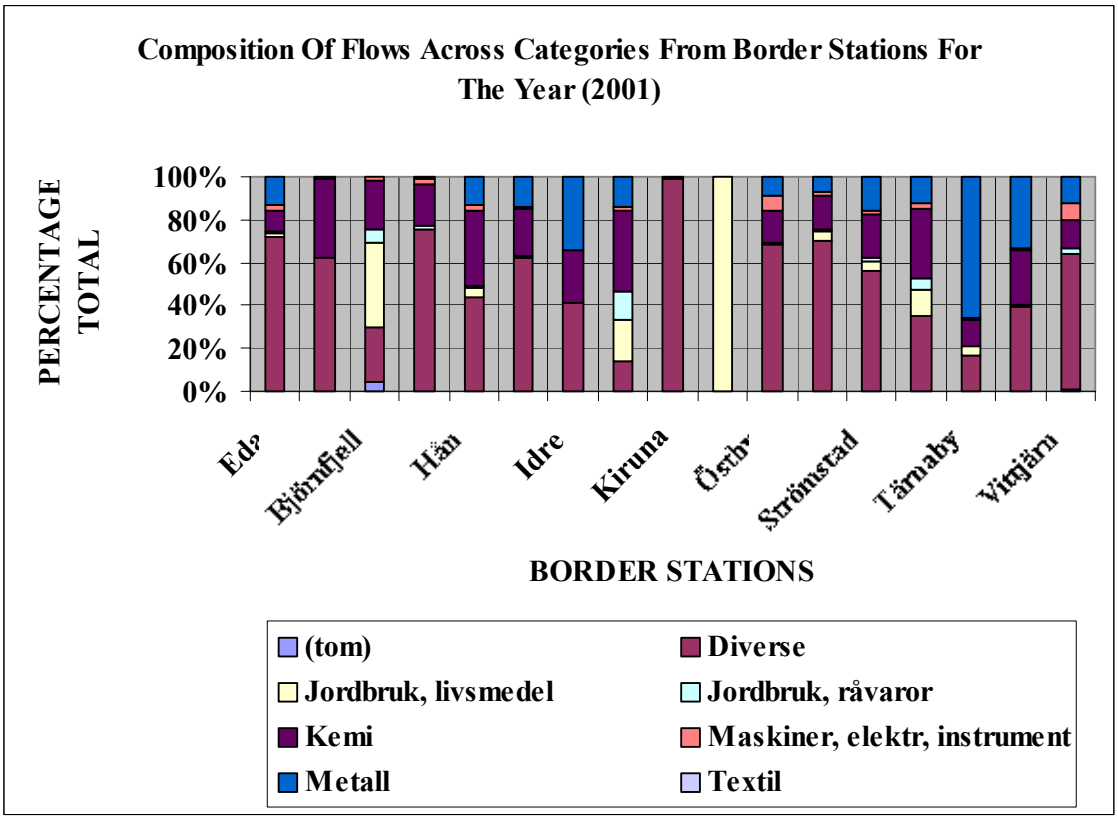


Composition Of Flows For The Year (2001)

Figure 12, which summarizes the freight flows from the various border stations for the year indicates that all the flows from Örje are jordbruk, livsmedel (agriculture, food). Almost all the flows from Kiruna are diverse (others/miscellaneous). Over 60% of the flows from Eda, Åsnes, Gäddede, Högen, Östby, Storlien and Vittjärn are diverse (others/miscellaneous). Also

more than 60% of the flows from Tärnaby are metals. Svinesund has high flows for all types of commodities with diverse (others/miscellaneous) and Kemi (chemicals), which together constitute over 60% of the total flows from this border station.

Figure 12: Proportion of Flows for Commodity Groups from Border Posts (2001)



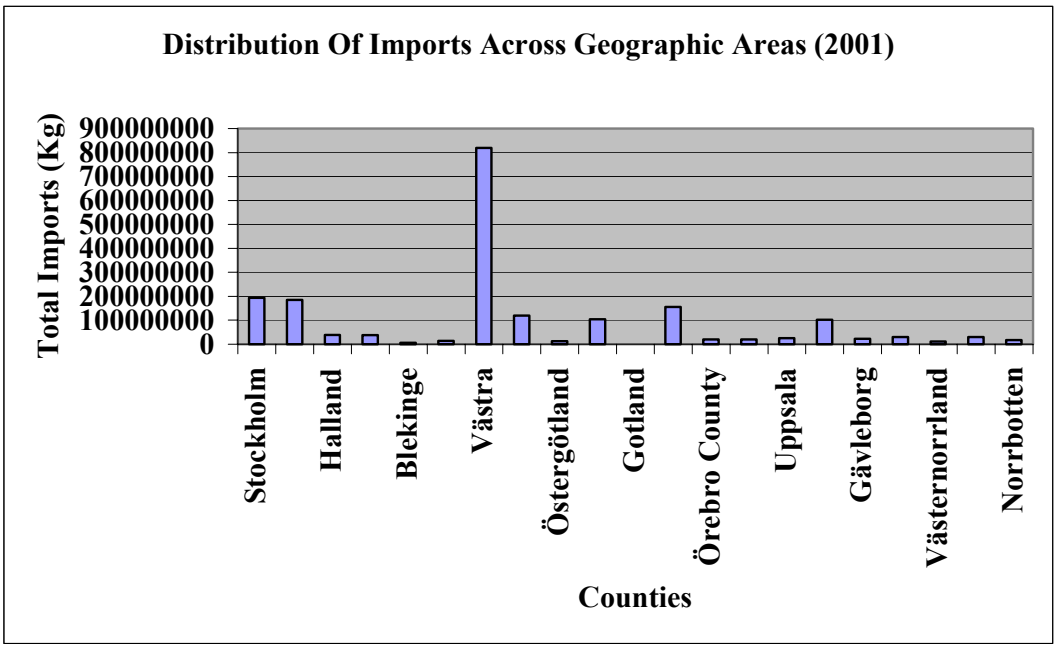
3.3 DISTRIBUTION OF IMPORTS BY GEOGRAPHIC AREAS

In this section, we aggregate the total imports by postcodes in Table 15 into the respective geographic areas or counties (Table 14), and analyze the distribution of the import according to the geographic areas in Sweden.

The distribution of the flows across the geographic areas presented in figure 13 indicates that most of the flows are imported by Västra Götalands region. The

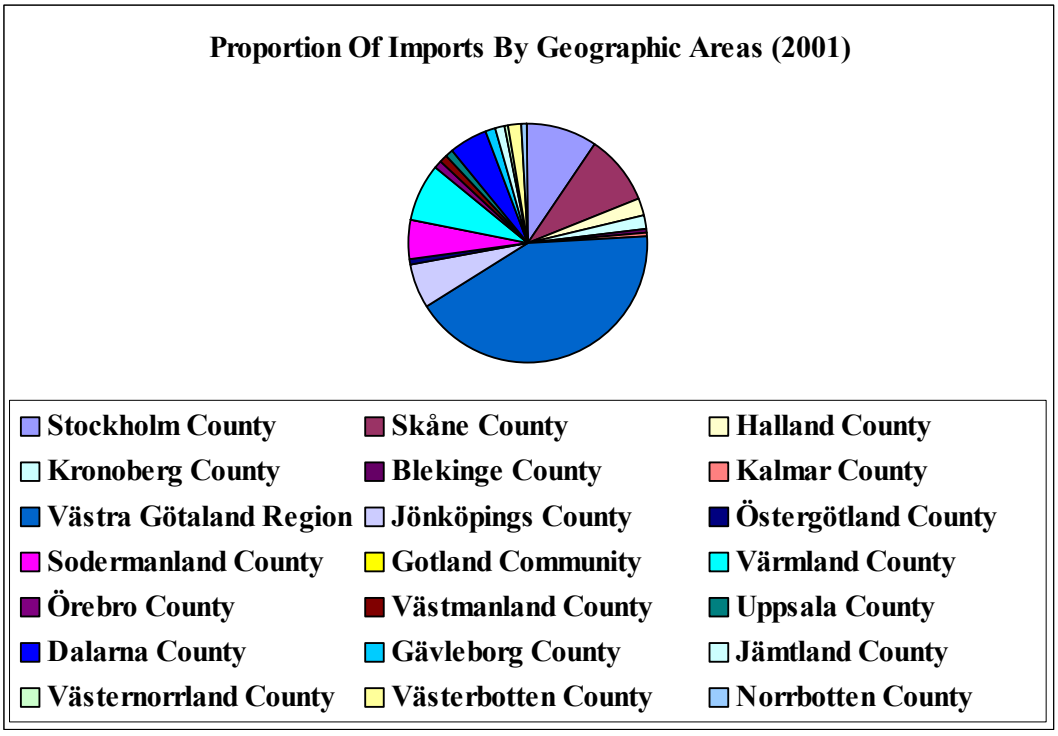
total imports for this region is over 800 million kilograms. This figure is more than three times the total flows to the other geographic areas. Stockholm and Skåne counties have total imports of over 180 million kilograms, and Värmland county over 150 kilograms. The total imports by Jönköping , Dalarna and Sodarmanland Counties are over 100 million kilograms. The other counties have imports of less than 100 million kilograms (Table 14).

Figure 13: Total Imports by Geographic Areas



The proportion of the imports by the geographic areas in the figure 14 shows that over 40% of the total flows are imported by Västra Götaland Region, 10% by Stockholm county, and the other counties with less than 10% of the total flows.

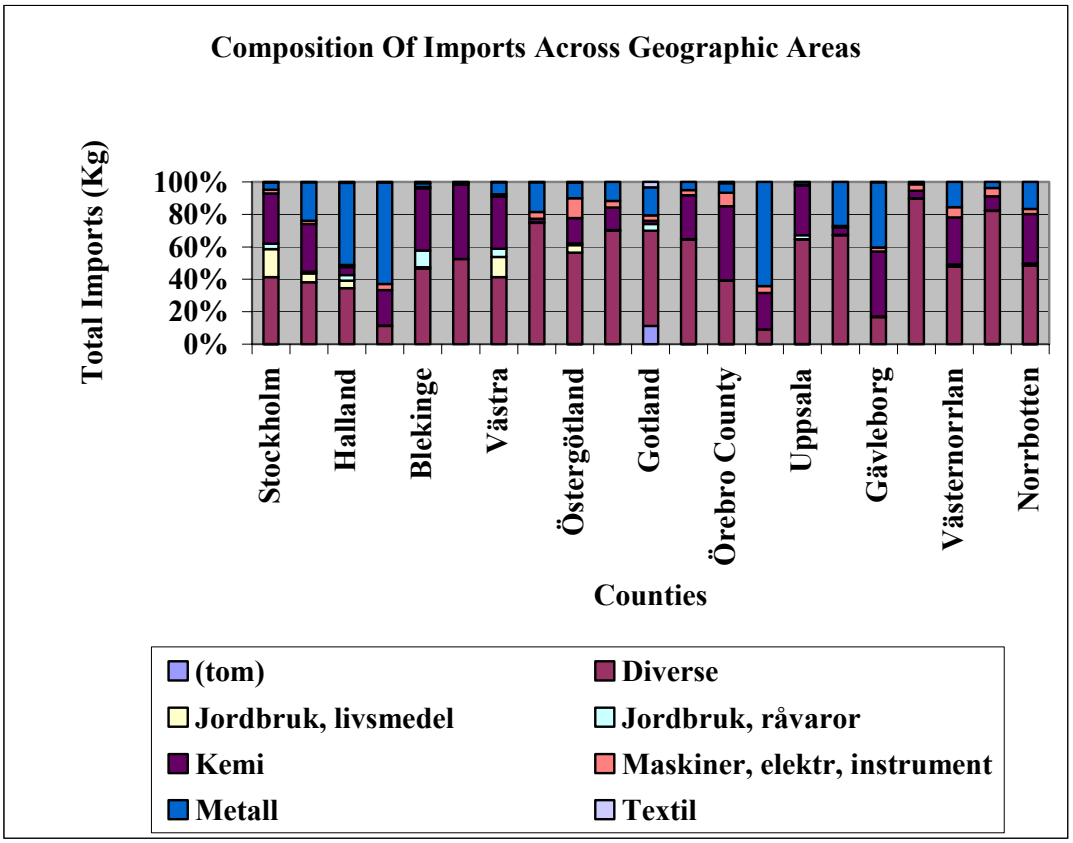
Figure 14: Proportion of Imports by Geographic Areas



3.3.1 Composition Of The Category Of Commodities For Geographic Areas

Figure 15 shows that diverse (others/miscellaneous) is imported to all parts of the country. However, diverse (others/miscellaneous) takes over 60% of the total imports by Jönköping, Södermanland, Värmland, Uppsala and Dalarna Counties; and over 80% by Jämtland and Västerbotten Counties. Metals and chemicals can be seen in all the bars implying that all the counties in Sweden import these commodities. More than 60% of the total imports by Kronoberg and Västmanland counties, and over 50% of the total imports by Halland County are metals. About 40% of the total imports by Stockholm, Skåne, Blekinge, Kalmar, Örebro and Gävleborg Counties are chemicals.

Figure 15: Proportion of Imports of Commodity Groups by Geographic Areas



Jordbruk livsmedel (agriculture, food) can be seen only from the bars for Västra Götaland Region, Stockholm, Skåne, Halland, Blekinge and Östergötaland Counties. This implies that the proportion of the total flows for this commodity group to the other areas is very low. Also, jordbruk råvaror (agriculture, primary goods) is only clearly seen in the Blekinge County, Västra Götaland Region, Halland and Stochkholm Counties implying that this group of commodities constitute very low proportions of the total imports by the other areas.

Maskiner, electr., instruments (machines, electronics, instruments) can be seen in almost all the bars but they constitute low proportions (less than 10%) of the total imports by all the areas in the country. Textiles cannot be seen in almost all the bars indicating that the proportion of textiles to the total imports by the areas in Sweden is nearly insignificant.

3.4 DISTRIBUTION AND COMPOSITION OF FLOWS FOR THE COMMODTY GROUPS

In this section, we analyse the total and proportion of the flows for the various commodity groups for the year.

The figures 16 and 17 show the distribution and proportion of the various commodity groups imported from Norway to Sweden. The total imports of chemical products are over 500 million kilograms constituting 26% of the total imports from Norway for the year 2001. Over 250 million kilograms of metals are transported into the country from Norway for the year representing 13% of the total imports. The bar for jordbruk livsmedel (agriculture, food) is over 100 million kilograms, which is also well represented in the imports by road constituting 8% of the total imports from Norway to the country. The total flows of the other commodity groups are less than 100 million kilograms constituting below 5% of the total imports by road. However, there are very high flows of diverse (others/miscellaneous) (over 900 million kilograms), representing 48% of the total flows.

Figure 16: Total Imports of Commodity Groups

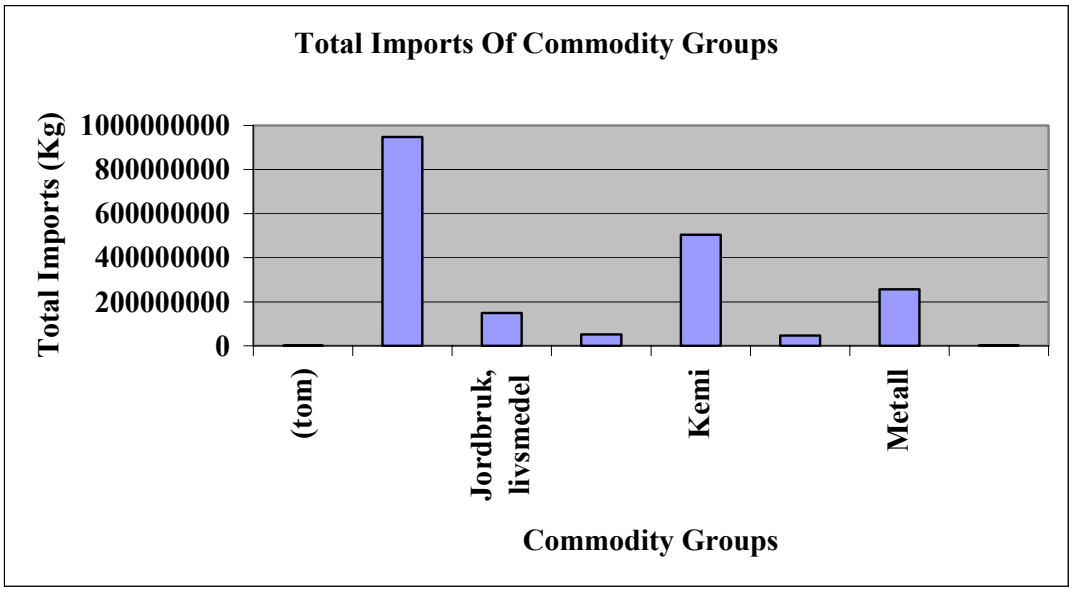
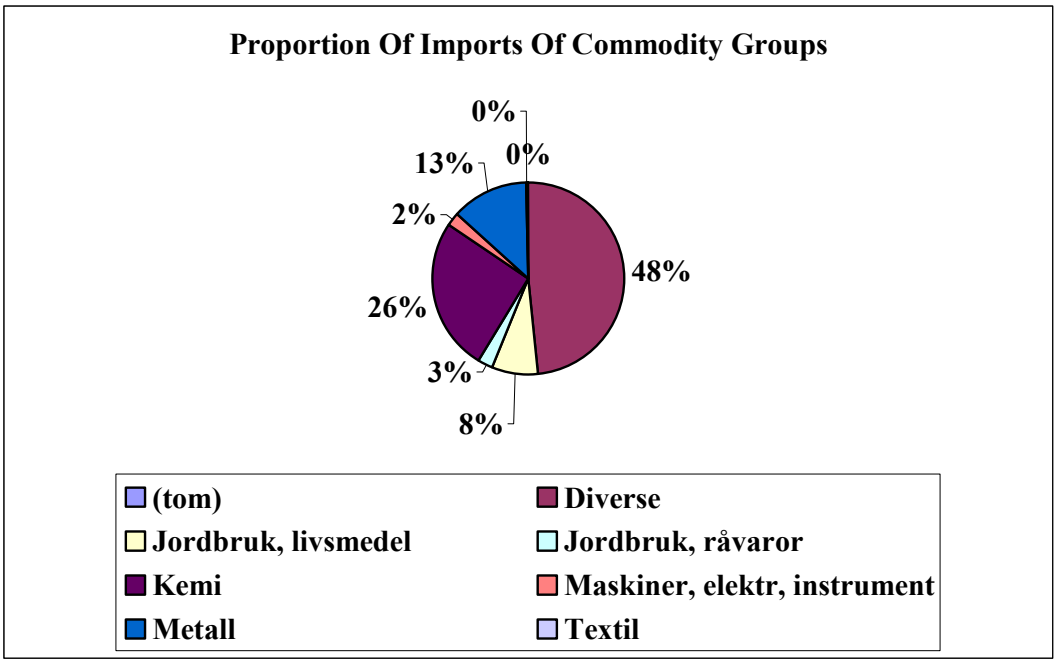


Figure 17: Proportion of Imports of Commodity Groups

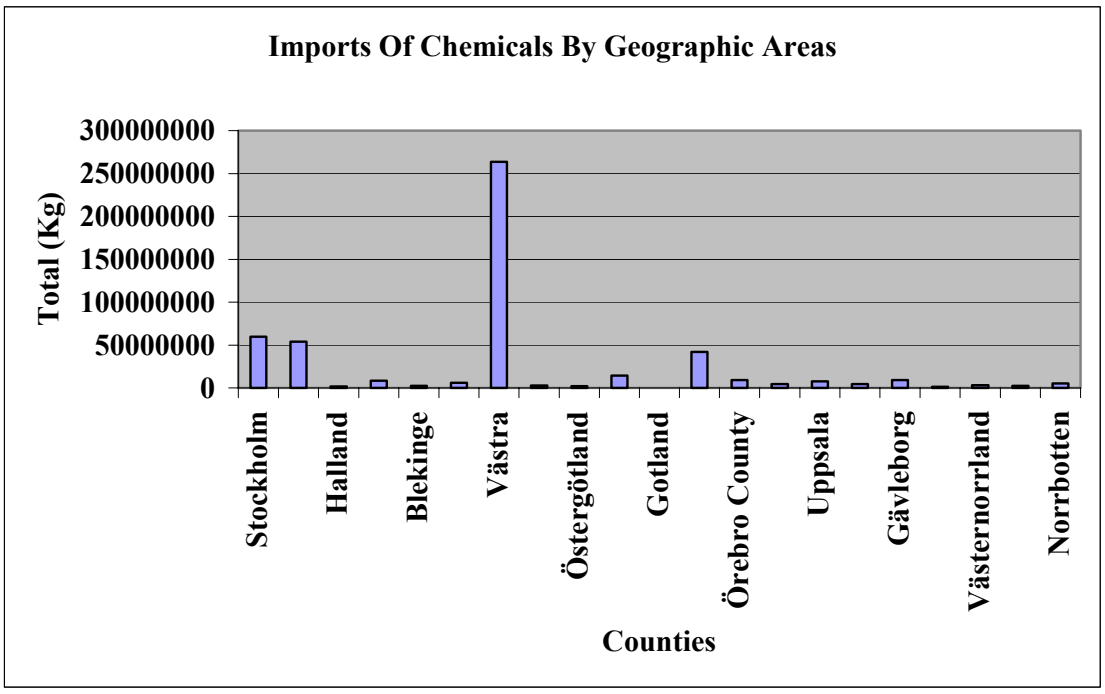


3.5 DISTRIBUTION AND PROPORTION OF CHEMICALS AND METALS TO THE GEOGRAPHIC AREAS

We now analyze the distribution and proportion of chemicals and metals to the geographic areas. We realized in the preceding part that diverse (others/miscellaneous), kemi (chemicals) and Metall (metals) are the highest imports from Norway into Sweden. We however choose chemicals and metals because even though diverse (others/miscellaneous) ranks highest among all the commodity groups, the description of this commodity group represents all other types of commodities that are not classified in the grouping of the commodities.

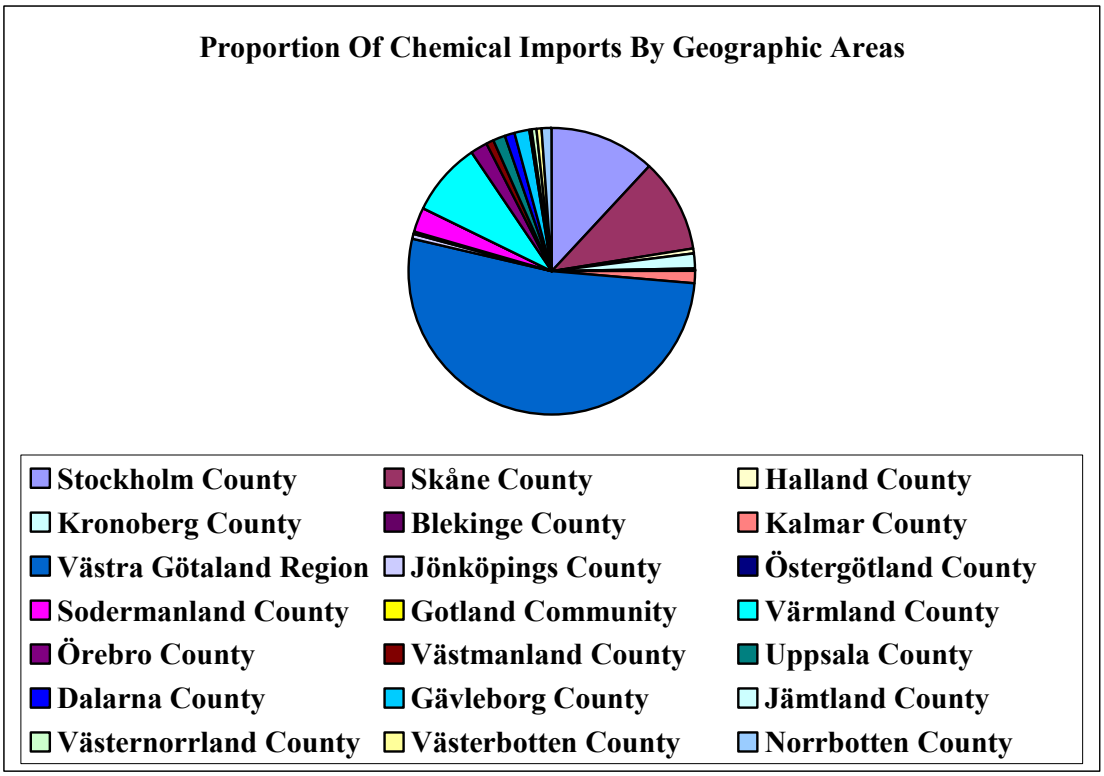
3.5.1 Chemicals

Figure 18: Total Imports of Chemicals by Geographic Areas



The distribution of chemicals imported by the geographic areas in Figure 18 above indicates that over 250 million kilograms of chemicals are from the Västra Götalands Region. This constitutes over 52% of the total imports of chemicals (Figure 19). Stockholm and Skåne counties have over 50 million kilograms of the total imports of chemicals constituting 12% and 11% respectively. The total import of chemicals by Varmalnd County is over 40 million kilograms, which represents 8% of the total imports of chemicals for the year. The other counties have very low proportions of the total imports of chemicals into the country.

Figure 19: Proportion of Imports of Chemicals by Geographic Areas



3.5.2 Metals

The total import of metals by the Västra Götaland region is over 60 million kilograms. This represents about 24% of the total imports of metal into the country. Skåne County imported over 40 million kilograms of metals for the year constituting about 17% of the total imports of metals. Kronoberg and Jönköping counties imported over 20 million kilograms of metals into the country, each representing about 9% of the total imports of metals into the country. Södermanlandand Västmanland imported more than 10 million kilograms metals into the country, each constituting about 5% of the total imports of metals. The other counties have low imports of metals into the country (Figure 20 and 21).

Figure 20: Total Imports of Metals by Geographic Areas

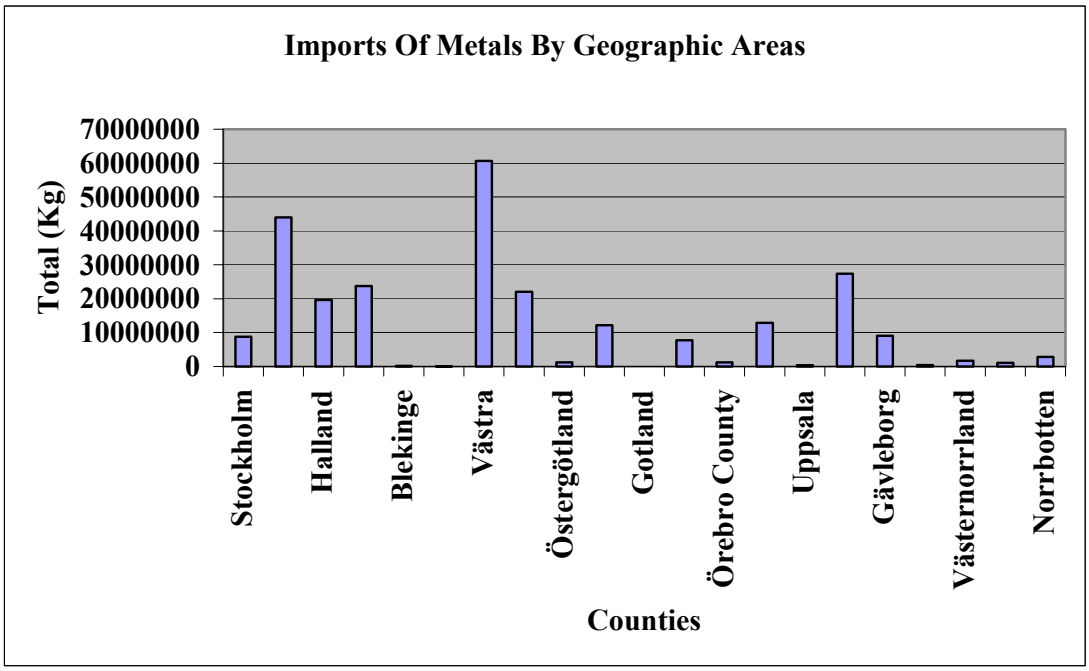
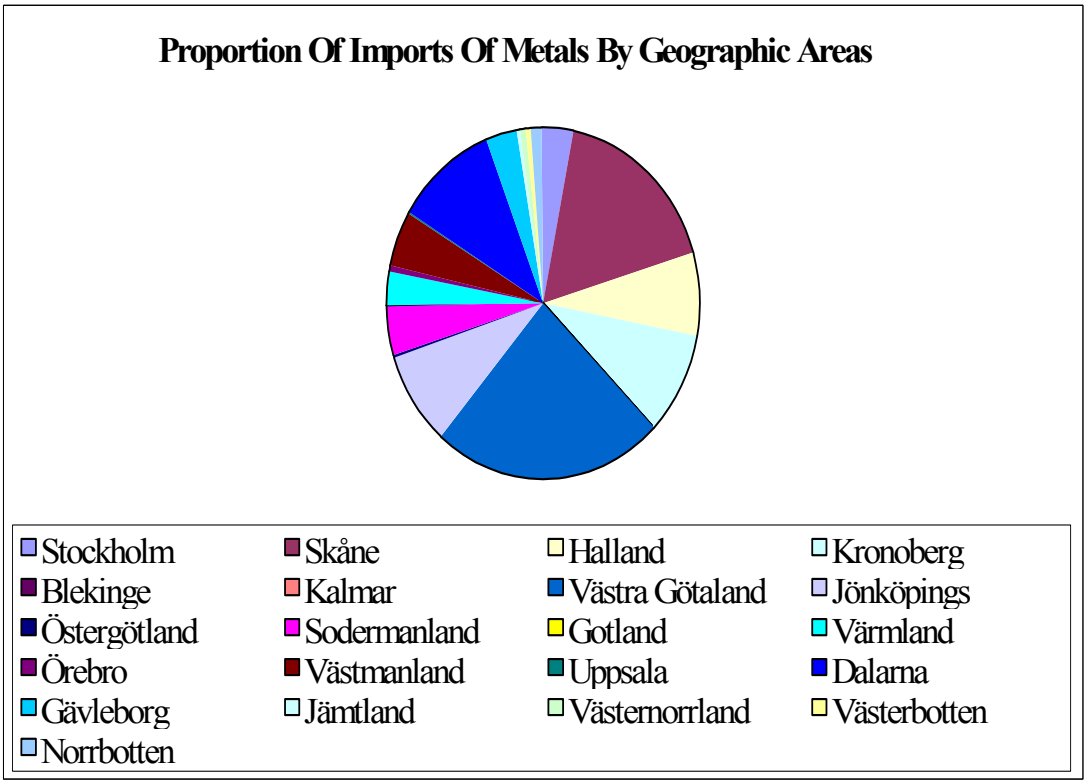


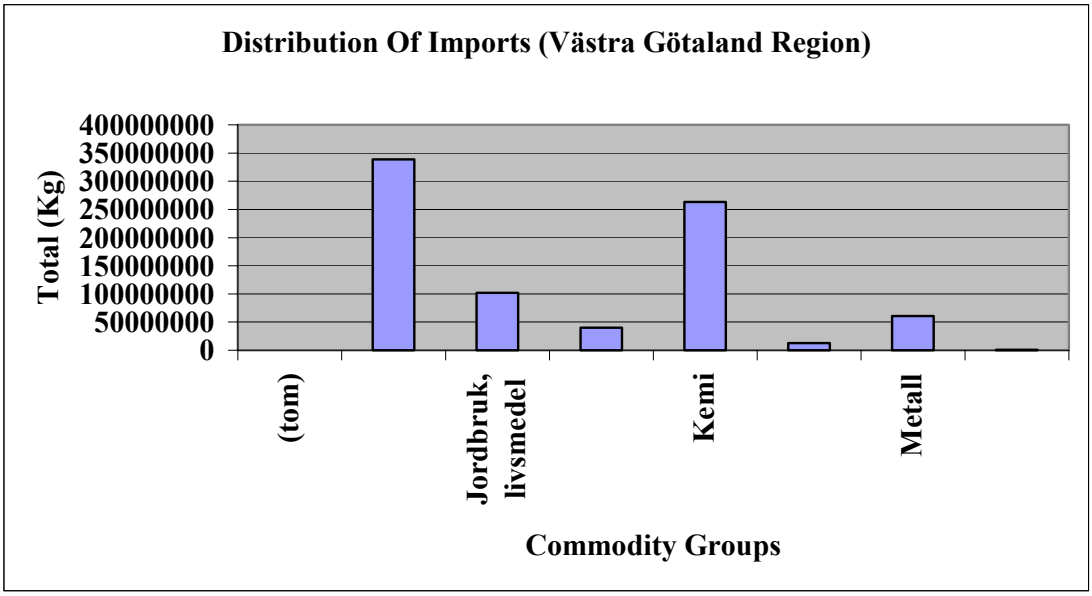
Figure 21: Proportion of Imports of Metals by Geographic Areas



3.6 IMPORTS BY VÄSTRA GÖTALANDS REGION

In the previous section, we realized that the Västra Götaland Region ranks high among the other geographic areas, importing over 40% of the freight from Norway into the country. In this section we analyse the composition and proportion of flows to this geographic area.

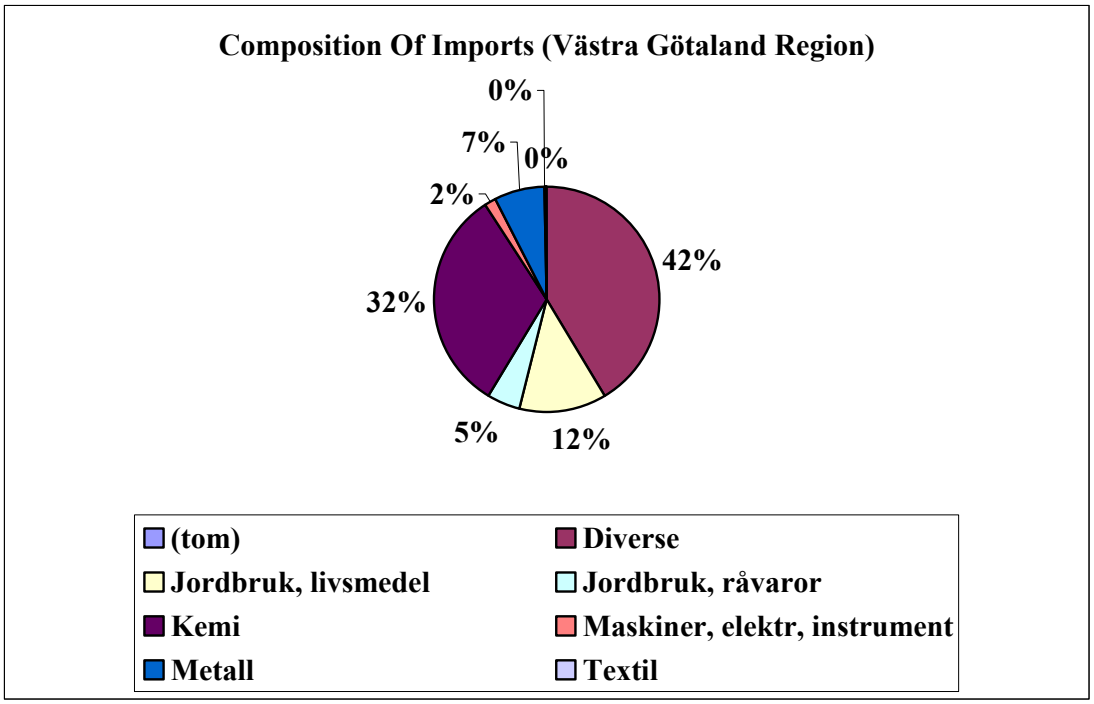
Figure 22: Total Imports of the Commodity Groups by Västra Götaland Region



The above figure shows the distribution of the total imports of the different commodity groups in the Västra Götaland Region. Apart from diverse (others/miscellaneous), chemicals are the highest imports to this region. The total import of chemical products is over 250 million kilograms and that of jordbruk, livsmedel (agriculture, food) is over 100 million kilograms. Metals are also well represented in the total imports from this region with over 50 million kilograms.

Figure 23 indicates the proportion of the commodities to the total imports by this region. Chemical products constitute 32% of the total imports in this region. The proportion of jordbruk, livsmedel (agriculture, food) and metals in this region are 12% and 7% respectively.

Figure 23: Proportion of Imports of the Commodity Groups by Västra Götaland Region



3.7 RANKING OF POSTCODES WITH HIGHEST VOLUME OF IMPORTS

This part takes a look at the postcodes with the highest total volume of flows as well as the total volume of flows for the various commodity groups.

Table 3.13: Rank Of Various Post Codes According To Commodity Groups

	Commodity Groups							
Rank	Diverse	J.L.	J.R.	Kemi	M.E.I	Metall	Textil	Total
1	45	45	53	45	40	20	17	45
2	60	19	17	44	51	45	51	66
3	79	41	42	10	63	77	45	79
4	66	16	45	68	26	57	44	60
5	56	13	26	46	55	36	31	40

Table 3.13 ranks the volume of flows for the year according to postcodes. Postcode 45 is highest in terms of total volumes, taking about 21.3% of the

total flows. This postcode is in the western part of Sweden within the Västra Götalands Region (county map in appendix 5). The proportion of the total flows to the other four postcodes is over 3%. Post code 45 also ranks highest for diverse (others/miscellaneous), jordbruk, livsmedal (agriculture, food) and kemi (chemicals).

In terms of maskiner, electr., instruments (machines, electronics, instruments), postcode 40 ranks high, which, also is in the Västra Götalands Region. This region appears in all the ranks of the different commodity groups. Postcode 17 in the Stockholm County mostly imports textiles. However, Stockholm County also appears in the ranks for kemi (chemicals), jordbruk, livsmedel (agriculture, food) and jordbruk, råvaror (agriculture, primary goods).


PART II

PART TWO: PLAN FOR FUTURE RESEARCH

CHAPTER FOUR: RESEARCH DESIGN

4.0 INTRODUCTION

The first part of this report analysed freight flows from Norway-Sweden border points to postcodes declared to the customs office. In this part, we present a methodological plan for future research in order to redistribute the flows to final destinations. Furthermore we compute a source-final destination matrix of redistribution. This part is divided into two sections. The first section presents a description of the research design to be used to collect the data and in the second section, we demonstrate how the data when obtained would be used to compute the source-final destination matrix of redistribution.

4.1 DATA COLLECTION METHODS

This part presents the research design to be used for collecting the data indicating the sources and types of the data, and the instruments for collecting the data.

4.1.1 Data Collection Sources and Types

Two alternative sources for data collection are as follows:

1. Secondary data from forwarders (if available)
2. Primary data collection at border stations
    - Arrangement with customs offices to collect the data for the researcher.
    - Face to face interview with truck drivers

The research design is presented in figure 24. In order to minimize cost and save time the first option is preferred. We only resort to the second option if the data cannot be obtained from the first option.

1. *SECONDARY DATA*

Since the forwarders are responsible for transporting the goods, secondary data could be obtained from both Norwegian and Swedish forwarders, if the forwarders have records on the areas or postcodes where the goods are finally delivered.

2. *PRIMARY DATA*

Our analysis of the imports in part one shows that about 90% of the flows pass through three border stations (Svinesund, Hån and Eda). As a last resort, primary data can be collected from the truck drivers from these border stations, which would be used for the research.

4.2 INSTRUMENTS FOR DATA COLLECTION

The following steps should be employed to collect the data.

Option 1

- Telephone forwarders to find out if they have data on delivery points of the goods transported from Norway (both Swedish and Norwegian forwarders).
- If they have data available, then a formal application would be made to obtain data. The forwarders would be asked to indicate the postcodes they declared to the customs and the actual postcodes where the goods are delivered.
- If the data is not available then the second option would be employed.

Option 2

There are two alternatives for this option:

- Alternative 1

An arrangement could be made with the customs to ask the truck drivers to indicate the postcodes where the goods would be delivered (if different from the importers' address).

- Alternative 2

Design Questionnaire, which should be precise, taking about 2-3 minutes to answer. The questionnaire could be administered in person by the researchers to the truck drivers at the customs checkpoints.

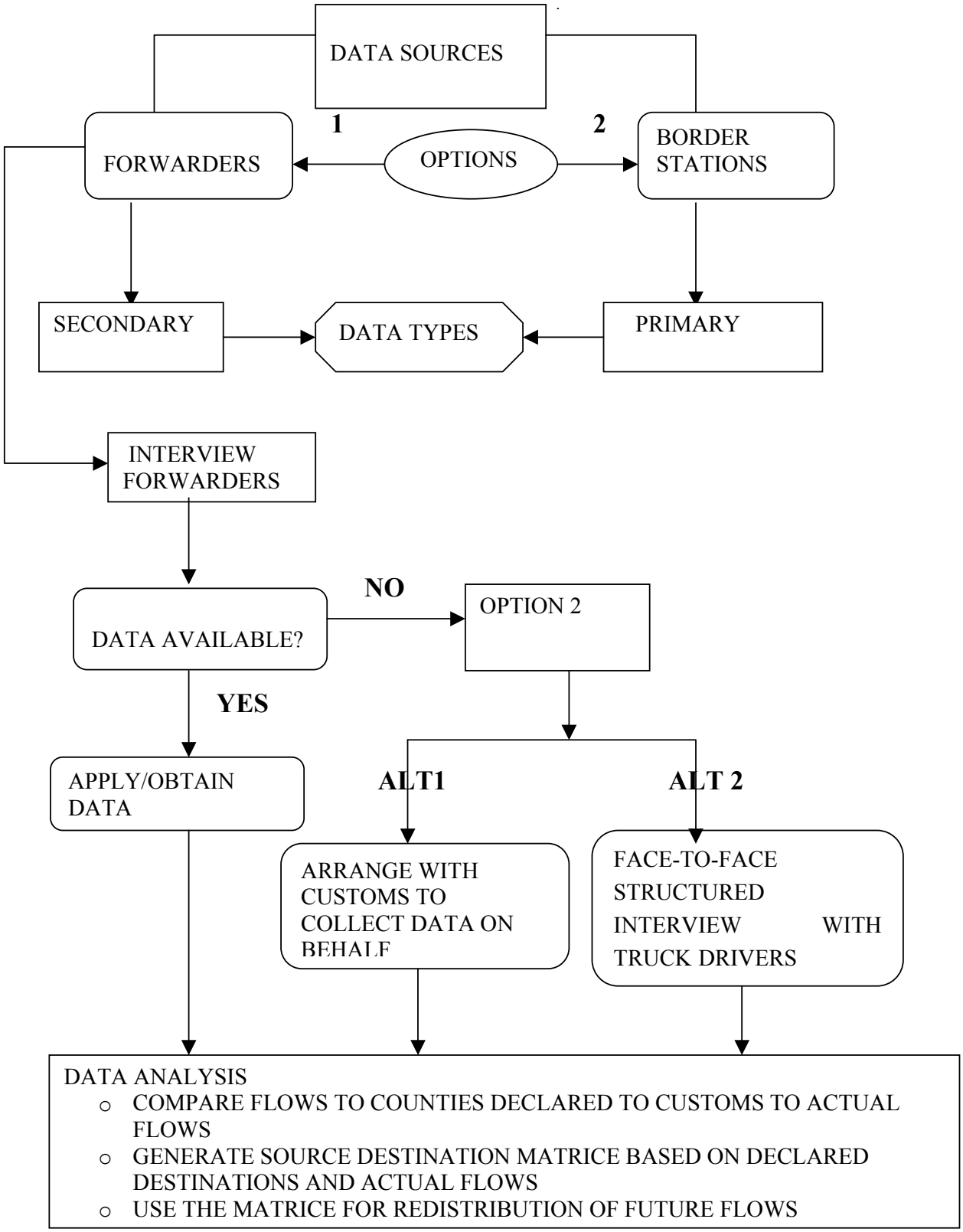
4.3 METHODS FOR DATA ANALYSIS

The following methodological steps in Figure 24 would be employed in the data analysis.

Step 1: Compare Flows to Counties Declared to Customs to Actual Flows

Once we are able to collect data indicating the geographic areas/postcodes declared to the customs and the actual geographic areas/postcodes where the goods are delivered, we compare these actual destinations to the destinations declared to the customs. Hence, we find the difference between the counties declared to the customs and the actual counties where the goods are delivered.

Figure 24: Research Model



Step 2: Generate Source Destination Matrices Based on Declared Destinations and Actual Flows

In this step, we calculate the proportion of the flows to the geographic areas declared to the customs that are sent to other geographic areas. Thus, we calculate the proportion by dividing the actual destination (AD) by the declared destination to customs (DD) multiplied by 100. The formula is given by:

$$P_j = \frac{AD}{DD} * 100$$

where

P_j = Proportion of declared flows sent to destination j

AD = Actual destination

DD = Declared destination to customs

For example, if we have the destination of 300 kilograms of metals declared to the customs to be Stockholm County, but the actual data collected indicates only 120 kilograms delivered in Stockholm, 80 kilograms delivered in Halland County and 100 kilograms delivered in Uppsala County, we calculate the proportion of the 300 kilograms for Stockholm that are sent to Halland and Uppsala.

Table 4.1: Imports of 300 kilograms of Metals from Norway to Sweden

Declared Destination	Total	Actual Destinations	Total
Stockholm County	300	Stockholm County	120
		Halland County	80
		Uppsala County	100

Hence the proportions of metals by Stockholm to the other counties is calculated as:

$$\text{Halland County} = \frac{80}{300} * 100 = 26.7\%$$

Uppsala County = $\frac{100}{300} * 100 = 33.3\%$

This implies that 60% of the imports by Stockholm County are delivered in Halland and Uppsala counties, with 40% remaining in Stockholm County.

This method would be employed to generate Source-Destination matrices for the various commodity groups. In these matrices, the source is referred to as the geographic areas/postcodes declared to the customs and the other areas where the goods are delivered to are the destinations.

Step 3: Use the Matrices for Redistribution of Future Flows

The generated matrices would be used to redistribute future flow data collected from the customs if the pattern of flows is stable over time.

CHAPTER FIVE: DATA ANALYSIS II

5.0 INTRODUCTION

The analysis in Part one focused on the imports of the various commodities to Sweden. The flows do not necessarily represent the actual flow data because the postcodes declared could represent the administrative addresses of the importers. However, this research is to find out the delivery areas in Sweden. In this section we explore ways of redistributing the flows to the actual destinations in the country. Since we do not have any actual flow data, we try to compare the industrial structures of the country to the import flow data. We then compute data to redistribute the flows using the industry concentration ratios.

5.1 COMPARING THE INDUSTRIAL CONCENTRATION IN SWEDEN TO THE FLOW DATA

This section compares the industrial concentration of counties in Sweden using number of employees as proxy for the import flow data. We are using number of employees per industry as proxy because the number of employees at the firm level is indicative of the size of the firm. In the previous sections we realized that chemical and metal products were the most significant in volume of imports from Norway to Sweden, hence we are limiting our analysis to these commodity groups. In this regard we compare the concentration of chemical and metal industries in the counties to the distribution of the imports of chemicals and metals by counties. The current available information on the employee data was for 2000 and the import flow data we have is for 2001. We are however comparing these two different years with the assumption that there has not been a variation on the industrial employment based on the fact that the share of industrial production has been consistent for these two industries over the years (Table 8). The analysis would be based on the following assumptions:

1. All industries in Sweden import their raw materials or intermediate goods from Norway.
2. The raw materials or intermediate goods imported from Norway by the industries are transported by road.

CHEMICALS

We now investigate whether there is a relationship in the flow of chemicals imported by the geographic areas and the concentration of chemical industries in these geographic areas. Thus we compare the proportion of imports of chemicals by counties to the concentration of chemical industries at county level using number of employees as proxy.

Figure 25: Flow of Chemicals and Industrial Concentration of Chemicals

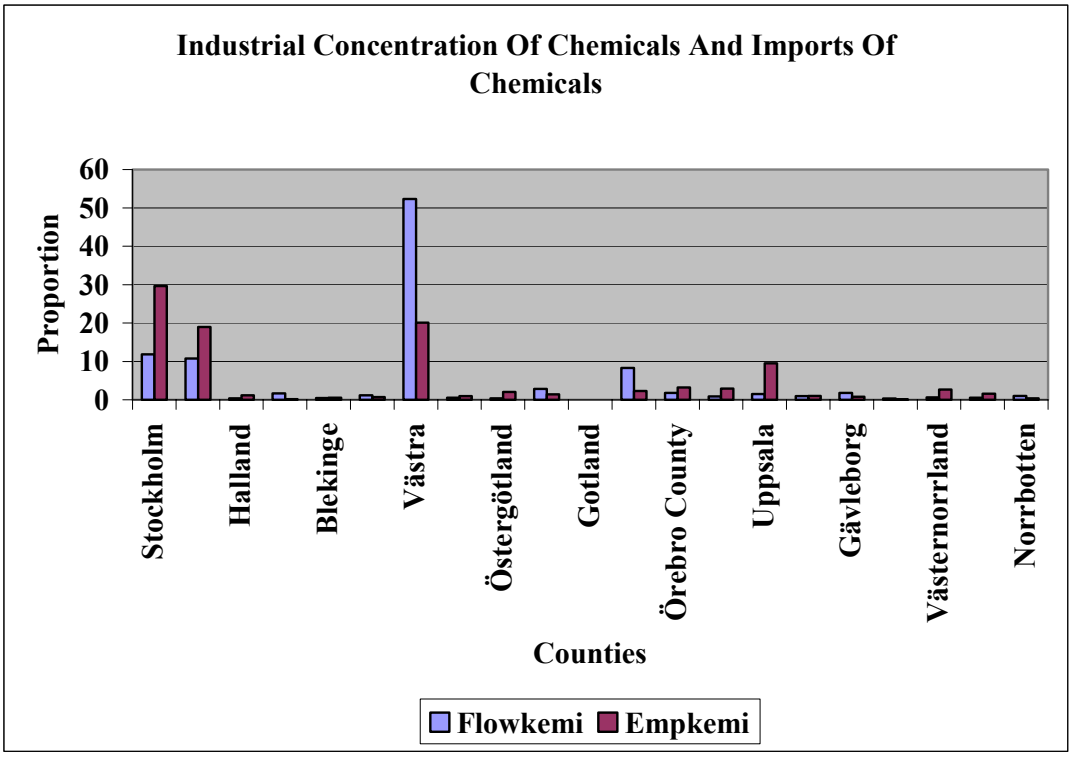


Figure 25 compares the proportion of flow of chemicals imported by the various counties to the proportion of chemical industries per county using number of employees as proxy in the various counties. It is clear from the

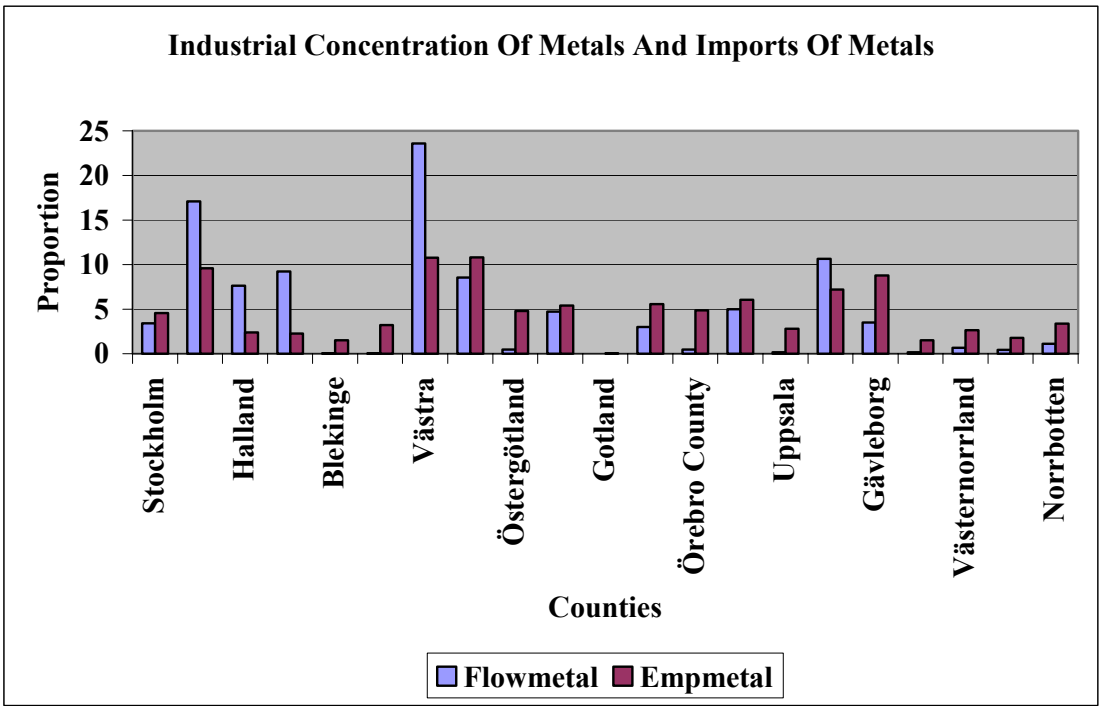
figure that chemical industries are mostly concentrated in the Stockholm County, Västra Götalands Region and Skåne County. Stockholm County has the highest concentration of chemical industries taking 30% of the total employment by chemical industries. However, the proportion of flow of chemicals imported by the Stockholm County is 12%. On the other Hand, the proportion of flow of chemicals imported by the Västra Götalands Region is more than half of the total imports of chemicals (52%), but the proportion of chemical industries in this region is 20%. This indicates that there is at most a weak relationship between the industrial concentration of chemical industries in these areas and the imports of chemical inputs by these geographic areas. The same pattern is noticed for the other counties.

METALS

In this part, we also investigate whether there is a relationship in the flow of metals imported by the geographic areas and the concentration of metal industries in the geographic areas. We compare the proportion of imports of metals by the counties to the concentration of metal industries at the county level using number of employees as proxy.

The proportion of flow of metals imported by the various counties is compared to the proportion of metal industries per county using number of employees as proxy in the various counties in Figure 26.

Figure 26: Flow of Metals and Industrial Concentration of Metals



The distribution of metal industries is wide-spread among the counties. Jönköping County, and Västra Götaland region takes 11% each of the total employment by metal industries in the country. The proportion of total employment in the metal industries by the counties of Skåne and Gävleborg are about 10% and 9%, respectively and about 7% for the Dalarna County. This implies that metal industries are mainly concentrated in these areas in Sweden. However, there is at most a weak relationship with the industrial concentration of metals and the flows. Whereas the proportion of imports of metal by the Västra Götalands region is about 24% of the total imports, the proportion of metal industries is only 11%. On the other hand, the proportion of imports of metal by the Jönköping County (about 9%) is lower than the industrial proportion of metals (11%) in this region.

5.2 CORRELATION BETWEEN IMPORTS AND INDUSTRY CONCENTRATION

In the preceding section, we compared the industry concentration at county level to the import flow data. As a further step, we investigate whether there is correlation between the imports per county and the industry concentration. The results of the correlation coefficients are presented in Table 5.1.

The correlation coefficients of 0.64523 for chemicals and 0.7144 for metals is quite strong indicating that there is a relationship between the import flows of chemicals and metals at county level and the industrial concentration of the counties for these commodities. But the correlation figure for metals is higher than that of chemicals. This means that the import flows of metals and the industry concentration is more correlated than that of chemicals. Even though the correlation statistics are good, they are not perfect which supports the idea that some proportion of the goods are not delivered at the areas declared by the forwarding agents to the customs.

Table 5.1: Correlation Coefficient Of Employment And Flows Of Chemicals And Metals

	Chemials (Flow)	Chemicals (Emp)	Metals (Flow)	Metals (Emp)
Chemicals (Flow)	1	0.6423		
Chemicals (Emp)	0.6423	1		
Metals (Flow)			1	0.7144
Metals (Emp)			0.7144	1

Source: Own Computation

However we are aiming at, at least near perfect correlation, hence we want to know the proportion of the flows that do not end up at the postcodes declared to the customs and find a way of redistributing them. We thus went further to regress the import flow ratio per county on the industry concentration ratio in Table 5.2. The t-statistics in the two regression results show that industrial concentration per county is significant in explaining import flows to counties, at an alpha (significance) level of 0.01. The R-squared figures indicates the

proportion of variability of the flows that is explained by industrial concentration and the intercept. These figures, which are 48.5% and 38% for metals and chemicals, respectively, are fairly low and confirm the low correlation coefficients.

Table 5.2: OLS Regressions Of Flows On Industry Concentration In Counties

	Regressand: Flow (Metals)	Regressand: Flow (Chemicals)
Employment (Metals)	1.427062 (**4.45**)	
Employment (Chemicals)		0.2485237(**3.65**)
Constant	-2.033629(-**1.12**)	0.4385614(**0.19**)
Adjusted R-squared	0.4846	0.3817

The t-statistics in the parentheses

5.3 GENERATION OF DATA

We now generate data to be used for the data analysis. We multiply the ratio of industry concentration (I) per county for the two selected commodity groups by the import flow data (M) for the two commodities. We then calculate the excesses (E) by subtracting the actual flows (R) for every county from the imports (M) by county. Thus the actual flow data (R) and the excesses (E) are generated as:

R = I*M
And
E = M-R

The results are reported in Tables 5.3 and 5.4.

Table 5.3: Flow Data For Chemicals

Counties	Chemical Imports (M)	Share % (I)	Actual Flow (R)	Excess (M-R = E)
Stockholm County	59804651	29,67263225	149591125,2	-89786474,17
Västra Götaland Region	263545644	20,11290243	101396858,9	162148785,1
Skåne County	53996857	19,00606419	95816862,6	-41820005,6
Uppsala County	7606598	9,505497214	47920858,91	-40314260,91
Örebro County	9137248	3,234235567	16305022,53	-7167774,533
Västmanland County	4521990	2,940886457	14826137,1	-10304147,1
Västernorrland County	3171494	2,635211754	13285113,63	-10113619,63
Värmland County	41933057	2,238327664	11284268,64	30648788,36
Östergötland County	1942099	2,004141399	10103645,82	-8161546,823
Västerbotten County	2609874	1,565350293	7891531,485	-5281657,485
SödermanlandCounty	14412024	1,444559483	7282578,662	7129445,338
Halland County	1828987	1,166001085	5878258,886	-4049271,886
Dalarna County	4633018	0,981117192	4946188,238	-313170,2378
Jönköpings County	2675752	0,904698516	4560932,37	-1885180,37
Gävleborg County	8980828	0,769116995	3877413,895	5103414,105
Kalmar County	6047026	0,744465809	3753137,809	2293888,191
Blekinge County	2335685	0,5176749	2609797,814	-274112,8139
Norrbotten County	5189861	0,387023616	1951134,556	3238726,444
Kronoberg County	8359201	0,125721047	633808,0405	7725392,959
Jämtland County	1405609	0,044372134	223696,9555	1181912,045
Gotland Community	869	0	0	869
Grand Total	504138372	100	504138372	0

Source: Own Computations

Table 5.4: Flow Data For Metals

Counties	Metal Imports (M)	Share % (I)	Actual Flow	Excess (M-R)
Stockholm County	8751178	10,80137301	27775217,51	-19024039,51
Västra Götaland Region	60670560	10,76653809	27685641,18	32984918,82
Skåne County	43960732	9,600842835	24688111,21	19272620,79
Uppsala County	392985	8,782647114	22584159,79	-22191174,79
Örebro County	1214914	7,18618838	18478942	-17264028
Västmanland County	12900035	6,032387976	15511999,08	-2611964,082
Västernorrland County	1696829	5,571887373	14327843,66	-12631014,66
Värmland County	7722274	5,414705433	13923657,77	-6201383,767
Östergötland County	1208352	4,851399344	12475142,92	-11266790,92
Västerbotten County	1102346	4,804669578	12354979,55	-11252633,55
SödermanlandCounty	12199367	4,574419276	11762901,84	436465,1613
Halland County	19646415	3,378137267	8686719,486	10959695,51
Dalarna County	27354799	3,20226342	8234468,245	19120330,76
Jönköpings County	22005205	2,819079339	7249128,585	14756076,42
Gävleborg County	9051624	2,621964689	6742257,629	2309366,371
Kalmar County	78240	2,403609237	6180766,958	-6102526,958
Blekinge County	143354	2,278713317	5859603,033	-5716249,033
Norrbotten County	2831426	1,796122279	4618643,107	-1787217,107
Kronoberg County	23758660	1,531037061	3936989,063	19821670,94
Jämtland County	449096	1,509796258	3882369,348	-3433273,348
Gotland Community	6858	0,072218729	185707,0313	-178849,0313
Grand Total	257145249	100	257145249	0

Source: Own Computations

5.4 REDISTRIBUTION OF THE FLOWS

In this section, we redistribute the surplus flows to the deficits and then generate source destination matrices for the two commodities (Chemicals and Metals). We employed an algorithm, which is based on cost minimization assumption and also assumption that counties with surplus flows are the locations of the administrative addresses. Due to the assumption of cost savings, surpluses are redistributed to the nearest county of deficit flows using the county map as a guide (Appendix 4).

5.4.1 Source-Destination Matrix For Chemicals

From Table 5.3 the counties with surplus flows (assumed to be where most administrative addresses are located) are the Västra Götaland Region, Värmland County, Södermanland County, Gävleborg County, Kalmar County, Norrbotten County, Kronoberg County, Jämtland County and Gotland Community. The surpluses of these counties are distributed to the other counties. Each county of surplus is distributed to take care of the deficits of the nearest county until the entire surplus has been distributed. If the surplus of a particular county is exhausted but the last county that received the surplus still has a deficit, another county with a surplus supplies to this county and so on. In that manner, we can have a particular county taking supplies from more than one of the counties with surpluses. The Source–Destination matrix indicating the proportion of flows from the source to the destinations for chemicals is shown in Table 5.6. The respective figures (Kg) for the allocation from each source of excess flows of chemicals to destinations are presented in Tables 22-30. The following abbreviations are used in the matrices:

Table 5.5: Abbreviation Of Counties In Sweden

Counties	**Abbreviations**
Stockholm County	AB
Uppsala County	C
Södermanland County	D
Östergötland County	E
Jönköpings County	F
Kronoberg County	G
Kalmar County	H
Gotland Community	I
Blekinge County	K
Skåne Region	L-M
Halland County	N
Västra Götalands Region	O-R
Värmland County	S
Örebro County	T
Västmanland County	U
Dalarna County	W
Gävleborg County	X
Västernorrland County	Y
Jämtland County	Z
Västerbotten County	AC
Norrbotten County	BD

Source: County Map (Appendix 4)

Table 5.6: Source-Destination Matrix for Chemicals

SOURCE	DESTINATION (%)											
		AB	L-M	C	T	U	Y	E	AC	N	W	F	K
	O-R	34.1	9.5	12.6				3.1		1.5		0.7	
	S			16.7	17.1	24.6	14				0.8		
	D		47.6										1.9
	X						47.2		9.6				
	H		37.9										
	BD								62.4				
	G		92.4										
	Z								84.1				
	I		100										

Source: own computation

The Source–Destination matrix indicates the proportion of the goods that are sent from the source (administrative addresses) to the other counties. Table 5.6 shows that 61.5% of chemical imports by the Västra Götalands Region are delivered to the counties of Stockholm (34.1%), Skåne (9.5%), Uppsala (12.6%), Östergotland (3.1%), Halland (1.5%) and Jönköping (0.7%). 73.2% of the imports of chemicals by Värmland County are delivered to Uppsala (16.7%), Örebro (17.1%), Västmanland (24.6%), Västernorrland (14%) and Dalarna (0.8%). Of the total imports of chemicals by Södermanland County, 49.5% are delivered at Skåne (47.6%) and Blekinge (1.9%), and 56.8% of the total imports by Gävleborg County are sent to Västernorrland (47.2%) and Västerbotten (9.6%). 37.9% of the total imports by Kalmar County, 92.4% by Kronoberg County, and 100% by Gotland Community are delivered to Skåne County. on the other hand, 84.1% of the total imports by Jämtland County and 62.4% by Västerbotten County are delivered to the Norrbotten County.

5.4.2 Source-Destination Matrix For Metals

Table 5.4 shows that the counties with surpluses representing the locations of most of the importers of metals are the Västra Götalands Region, Skåne County, SödermanlandCounty, Halland County, Dalarna County, Jönköping County, Gävleborg County and Kronorberg County. The source-destination

matrix for metals is shown in Table 5.7. The imports of metals by the Västra Götalands Region are delivered to Örebro County (28.5%), Västmanland County (3.8%), Västernorrland County (11.9%) and Värmland County (10.2%). This means that only 46.6% of the total imports of metals by the Västra Götalands Region goes to this Region, the rest (54.4%) are delivered to these other counties. The proportion of imports of metals by Skåne County that ends up at this county is 56.2%. The remaining imports (43.8%) are delivered in the counties of Östergötaland (16.5%), Kalmar (13.9%), Blekinge (13%) and Gotland Community (0.4%). 96.4% of the total imports of metals by SödermanlandCounty remains there, and the remaining 3.6% are delivered in Stockholm County.

The destinations of imports by Halland County are Stockholm (16.3%) and Uppsala (39.5%). This means that 44.2% of the total imports by the Halland County ends up at this county. For Dalarna County, the destinations of their imports of metals are Västernorrland (18.1%), Västerbotten (39.2%) and Jämtland (12.6%). Of the total imports by Jönköping County, 65.6% and 1.5% are delivered at Uppsala and Västmanland counties respectively. Gävleborg County has 25.5% of its imports of metals delivered at Västerbotten (5.8%) and Norrbotten (19.7%), and Kronoberg County delivers 84.4% of its imports of metals at Stockholm (66.6%) and Östergotland (16.8%). The respective figures (Kg) for the allocation from each source of excess flows of metals to destinations are presented in Tables 31-38.

Table 5.7: Source-Destination Matrix For Metals

	DESTINATION (%)												
SOURCE		AB	C	T	U	Y	S	E	AC	H	K	BD	Z	I
	O-R			28.5	3.8	11.9	10.2							
	L-M							16.5		13.9	13			0.4
	D					3.6								
	N	16.3	39.5											
	W					18.1			39.2				12.6	
	F		65.6		1.5									
	X								5.8			19.7		
	G	66.6						16.8						

Source: own computation

A very important benefit of these Source-Destination Matrices is that, if flows are stable overtime, the Source-Destination Matrices could be used to redistribute annual flows using the data from the customs offices.

PART III

PART THREE: CONCLUSION

CHAPTER SIX: CONCLUSION

In this chapter, we present the conclusions from the findings of the research.

In part one of this report, our analysis of the variations in the quarterly volume of flows indicates that there are significant variations in the proportion of flows for all the commodity groups from all the border stations for all the quarters. The third quarter however shows low volume of flows. This is the holiday periods when most industries/companies shut down for the summer holidays especially in July.

Almost all the flows pass through three border stations, Svinesund and Hån and Eda. The commodity groups mostly transported into the country are diverse (others/miscellaneous), kemi (chemicals), and metall (metals). The major counties that import the goods are the Västra Götaland Region and Stockholm County. However there is a weak relationship between the industrial concentration of chemicals and metals and the imports of chemicals and metals into the country.

Since there is a weak correlation between the industrial concentration of chemicals and metals and the imports of these commodities, this implies that some of the goods are not delivered at the administrative addresses declared at the customs offices. In our opinion, postcodes in Sweden indicate very small geographic areas, and since all the 10-98 postcodes were declared to the customs office, we could conclude that most of the goods could be delivered to the same postcodes declared. However, there is the need to find the discrepancy and redistribute the flow, which this research proposed as further research and used hypothetical data for flows to final destinations to redistribute the flows. Using these data, we computed a source-final destination matrix, which could be used to redistribute flows data from customs if the flow is stable overtime. It is important to note that if actual data on destinations are collected over time

and the matrix computed, means and variances of the redistribution rates could be estimated. This will nonetheless enhance the reliability of the redistribution. In order to know the final destinations for the flows, we recommend that some survey must be done. A questionnaire should be designed and administered to truck drivers who transport goods from Norway to Sweden by road.

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Table 1

Carriage Of Goods By Lorry Across National Border, By Country Of Registration And Customs Office. Number Of Lorries Departed (2nd Quarter 2002).

Customs office	All Nationalities	Norway	Sweden	Denmark	Finland	Other countries
Svinesund	31 692	16 289	9 644	3 028	45	2 686
Högen	1 053	805	248	0	0	0
Hån/ Örje	13 952	5 499	6 327	25	1 462	639
Eda	9 395	5 354	3 382	188	281	190
Vittjärn	200	132	59	3	2	4
Åsnes	1 107	451	656	0	0	0
Östby	949	574	323	23	19	10
Idre	51	38	9	0	2	2
Vauldalen	84	47	12	0	22	3
Storlien	1 637	627	566	20	299	125
Gäddede	27	6	21	0	0	0
Tärnaby	580	325	163	6	69	17
Björnfjell	861	471	98	95	144	53
Junkerdal	310	123	118	25	33	11
Karigasniemi	339	133	11	14	164	17
Polmak	82	38	0	0	44	0
Kivilompolo	1 311	774	149	153	215	20
Helligskogen	1 254	691	126	84	298	55
Neiden	320	148	16	9	133	14
Utsjok	390	211	37	57	78	7
	78	2	0	0	7	69
Total	65 672	32 738	21 965	3 730	3 317	3 922

Source: Statistisk sentralbyrå- Central Bureau of Statistics Norway

Table 2

Carriage Of Goods By Lorry Across National Border, By Country Of Registration And Customs Office. Tonnage Carried (2nd Quarter 2002).

Customs office	All Nationalities	Norway	Sweden	Denmark	Finland	Other countries
Svinesund	507 072	260 629	154 317	48 410	712	43 004
Högen	19 450	14 490	4 960	0	0	0
Hån/ Örje	209 280	82 485	94 905	375	21 930	9 585
Eda	140 925	80 310	50 730	2 820	4 215	2 850
Vittjärn	3 874	2 934	898	18	11	13
Åsnes	28 782	11 726	17 056	0	0	0
Östby	18 141	11 945	5 379	372	323	122
Idre	1 171	900	192	0	56	23
Vauldalen	1 366	773	93	0	493	7
Storlien	26 935	10 252	9 900	300	4 206	2 277
Gäddede	675	150	525	0	0	0
Tärnaby	14 633	8 431	4 017	100	1 769	316
Björnfjell	16 546	9 194	1 504	1 419	3 440	989
Junkerdal	4 254	2 084	1 004	372	629	165
Karigasniemi	3 143	1 360	68	153	1 377	85
Polmak	62	59	0	0	3	0
Kivilompolo	13 632	8 735	1 036	1 919	1 794	148
Helligskogen	17 559	9 630	1 151	1 554	4 859	365
Neiden	1 560	902	149	139	210	160
Utsjok	6 575	3 613	445	1 132	1 236	149
Storskog	754	15	0	0	88	651
Total	1 036 289	520 617	348 329	59 083	47 351	60 909

Source: Statistisk sentralbyrå- Central Bureau of Statistics Norway

Table 3: Goods Transports By Lorry Across National Border (Norway), By Country Of Registration. Number Of Lorries Departed.

	2000	2001	2002(1st quarter)	2002 (2nd quarter)
All nationalities	247 062	239 758	62 249	65 672
Norway	125 291	120 186	31 818	32 738
Sweden	**82 496**	**79 998**	**20 261**	**21 965**
Denmark	13 290	13 791	3 515	3 730
Finland	12 451	11 744	3 028	3 317
Other countries	13 532	14 039	3 627	3 922

Source: Statistisk sentralbyrå- Central Bureau of Statistics Norway

Table 4: Goods Transports By Lorry Across National Border (Norway), By Country Of Registration. Tonnage Carried. (1000 Tons)

	2000	2001	2002(1st quarter)	2002 (2nd quarter)
All nationalities	3 872 474	3 737 563	982 500	1 036 289
Norway	1 981 407	1 880 187	506 146	520 617
Sweden	**1 277 616**	**1 244 748**	**317 734**	**348 329**
Denmark	212 680	220 900	56 670	59 083
Finland	188 170	172 351	44 134	47 351
Other countries	212 601	219 377	57 816	60 909

Source: Statistisk sentralbyrå- Central Bureau of Statistics Norway

Table 5: Summary Of Destinations (Post Codes) From The Border Posts (2001).

Border Station	Post Codes
Eda	All
Åsnes	00, 10-14, 19-21, 34, 35, 40-44, 52-57, 59, 60, 63-68, 71-74, 76-79, 89-92, 95
Bjornfjel	00, 10, 12, 15, 17, 18, 26, 28, 30, 31, 36, 40-45, 51, 58, 63, 69, 71, 77, 80, 82, 83, 89-98
Gäddede	00, 10-87, 89-98
Hån	All
Högen	00, 10-21, 23, 25-36, 39-46, 50-60, 63, 65-74, 77-81, 90
Idre	00, 10, 15, 17, 19, 45, 55, 64, 66, 76, 77, 79, 81, 84, 88, 90, 92
Junkerdall	00, 10, 12, 17, 19, 22, 26-30, 33, 34, 37, 40-45, 47, 53, 59, 66-68, 71, 75, 78, 80-83, 85, 87, 89, 90-95, 97
Kiruna	00, 16, 80, 93, 95, 98
Örje	15
Östby	00, 10-13, 15-22, 25, 26, 28, 30-33, 38, 40-45, 50-58, 60, 61, 63-75, 77-95, 97
Storlien	00, 10-26, 28-30, 33, 35-47, 50-75, 77-98
Strömstad	00, 12, 13, 18-21, 24, 25, 28, 30, 33, 37, 40-42, 44-46, 51, 54, 55, 57, 58, 69, 74, 77
Svinesund	All
Tärnaby	00, 10, 11, 16-20, 25, 26, 29, 30, 37, 41-45, 57, 60, 61, 63, 64, 68, 70, 73, 77, 78, 81, 83-85, 87, 89-94, 96-98
Vauldalen	00, 10-21, 26, 30-33, 39-41, 43, 45, 52-53, 55, 57, 61, 64, 70, 72, 74, 75, 77-81, 83-85, 87-91, 98
Vittjärn	00, 10-14, 16-21, 25, 26, 33, 35, 40-45, 53, 54, 59, 60, 61, 63-68, 71-73, 77-80, 82, 83, 85-87, 89-91, 93, 97

Table 6: Imports From 30 Largest Countries Of Consignment (SEK Million)

Ranking		Country	Value Jan-May		Share %	Change %
2002	2001		2002	2001	2002	2002/2001
		Total	268, 688	284,578	100.0	-6
1	1	Germany	50,857	49,746	18.9	2
2	3	Denmark	23,693	24,322	8.8	-3
3	2	United Kingdom	23,234	25,757	8.6	-10
4	4	Norway	20,384	23,635	7.6	-14
5	5	Netherlands	18,760	19,934	7.0	-6
6	6	France	15,414	17,078	5.7	-10
7	8	Finland	14,300	15,985	5.3	-11
8	7	USA	14,215	16,951	5.3	-16
9	9	Belgium	10,319	10,560	3.8	-2
10	10	Italy	9,222	9,507	3.4	-3
11	11	Japan	6,060	6,683	2.3	-9
12	13	Ireland	4,760	5,198	1.8	-8
13	14	Spain	4,692	4,474	1.7	5
14	15	Poland	4,492	4,034	1.7	11
15	12	China	4,053	5,236	1.5	-23
16	25	Russia	3,977	1,475	1.5	170
17	16	Switzerland	3,792	3,861	1.4	-2
18	17	Hong Kong	3,299	3,436	1.2	-4
19	18	Austria	3,042	3,120	1.1	-3
20	19	Estonia	2,554	2,714	1.0	-6
21	22	Taiwan	1,974	2,183	0.7	-10
22	23	South Korea	1,861	1,613	0.7	15
23	21	Latvia	1,647	2,414	0.6	-32
24	27	Czech Republic	1,511	1,391	0.6	9
25	24	Portugal	1,460	1,596	0.5	-9
26	20	Iran	1,340	2,587	0.5	-48
27	26	Turkey	1,124	1,438	0.4	-22
28	30	Hungary	1,048	1,100	0.4	-5
29	28	Canada	1,007	1,205	0.4	-16
30	34	Brazil	1,003	806	0.4	24

Source: SCB Statistics, Sweden

Table 7: Imports Of Important SITC Commodity Groups (SEK Million)

Commodity Group	**Value Jan-May**		**Share %**	**Change %**
	2002	2001	2002	2002/2001
Total	**268 688**	**284 578**	**100.0**	**-6**
Wood and Paper Products	**9,374**	**9,502**	**3.5**	**-1**
Minerals	**22,449**	**22,901**	**8.4**	**-2**
Iron and steel	9,764	10,022	3.6	-3
Non-ferrous metals	5,014	5,640	1.9	-11
Metalliferrous ores, metal scrap	3,102	2,711	1.2	14
Chemicals, Rubber Products	**33,432**	**34,174**	**12.4**	**-2**
Organic/inorganic chemicals	6,891	7,912	2.6	-13
Pharmaceutical products	7,041	6,459	2.6	9
Plastics	6,993	7,490	2.6	-7
Crude rubber, rubber products	3,900	3,724	1.5	5
Mineral Fuels, Electric Current	**21,159**	25,264	**7.9**	**-16**
Crude petroleum oils	13,511	16,890	5.0	-20
Petroleum products	5,244	6,113	2.0	-14
Machinery, Transport Equipment	**125,634**	**138,275**	**46.8**	**-9**
Manufacture of metals	8,093	8,254	3.0	-2
Industrial machinery	33,399	34,045	12.4	-2
Electronics, telecommunication	45,911	56,968	17.1	-19
Road vehicles	26,885	26,073	10.0	3
Passenger cars	9,842	10,471	3.7	-6
Parts and accessories	12,221	11,103	4.5	10
Other Transport Equipment	**2,371**	**3,099**	**0.9**	**-23**
Instruments, photo/optical equip	8,976	9,835	3.3	-9
Other Products	**56,641**	**54,462**	**21.1**	**4**
Food, beverages, tobacco	21,500	19,228	8.0	12
Textiles, clothing, footwear	15,879	16,416	5.9	-3
Furniture	4,814	4,388	1.8	10

Source: SCB Statistics

Table 8: Industrial Sectors In Sweden And Their Share Of Production Value

Näringsgren	Andel av produktionsvärde, %				
	SNI 92	**1997**	**1998**	**1999**	**2000**
Industrin totalt	10 - 37	100	100	100	100
Gruvor och utvinning	10 - 14	1	1	1	1
Livsmedalsindustri	15 - 16	10	9	9	9
Textilindustri	17 - 19	1	1	1	1
Trävaruindustri	20	5	5	5	5
Massa-och papperindustri	21	8	8	8	8
Förlag och grafisk industri	22	5	5	5	5
Kemisk industri	**23 - 24**	**8**	**8**	**8**	**8**
Gummi-och plastindustri	25	2	3	2	2
Jord- och stenindustri	26	2	2	2	2
Stäl- och metallindustri	27	7	6	6	6
Metallvaruindustri	**28**	**6**	**7**	**6**	**6**
Maskinindustri	29	11	11	11	10
Electronikindustri	30 - 33	16	17	18	19
Transportmedelsindustri	34 - 35	15	15	16	16
Övring tillverkningsindustri	36 - 37	2	2	2	3

Source: SCB Statistics

Table 9: Composition Of Total Flows From Border Stations (Kg): First Quarter

Border Points	**Commodities**								
Gränsstation	(tom)	Diverse	J L	J R	Kemi	MEI	Metall	Textil	Grand Total
Eda	102577	69080739	1368327	190772	7134472	2228313	13383993	47295	93536488
Åsnes	800	4447496	3253	1200	5957390	6813	30714	23	10447689
Björnfjell	450	1410670	416264	24000	948933	50957	120	59	2851453
Gäddede		1269620	1663	21000			9400		1301683
Hån	161010	63916303	7856715	1051266	54446811	3773755	19064723	212816	150483399
Högen	1700	3626706		1400	1144937	57261	1164860	92	5996956
Idre		693675			24700		453686		1172061
Junkerdal		691881	209161	46880	1298875	74359	472085	535	2793776
Kiruna		2891955	2328				22904		2917187
Örje			3564						3564
Östby	0	4491896	24480	6450	915805	447900	663410	500	6550441
Storlien	837	13143154	556229	29300	3070002	499836	1286813	3407	18589578
Strömstad	0	107788			87080		176831		371699
Svinesund	43759	84976130	31197821	14174981	79212802	5213251	30906427	609511	246334682
Tärnaby	6562	3921115	628190	4	1724508	107204	9237834	7289	15632706
Vauldalen	2000	703947	405	3300	127291	8320	459659	176	1305098
Vittjärn	4000	519958		140	130079	34668	129970	9	818824
Grand Total	323695	255893033	42268400	15550693	156223685	12502637	77463429	881712	561107284

Source: Own Computations

Table 10: Composition Of Total Flows From Border Stations (Kg): Second Quarter

Border Points	**Commodities**								
Gränsstation	(tom)	Diverse	J L	J R	Kemi	MEI	Metall	Textil	Grand Total
Eda	153773	59549479	1815998	203913	8738693	2151661	12586903	84903	85285323
Åsnes	800	5521401	3436		14051	5601	65922	8	5611219
Björnfjell	249451	156155	373228	136300	223760	2350	3280		1144524
Gäddede	500	345634		23470	252000	19800	6590		647994
Hån	205458	67243429	6334242	1363736	50647196	2947241	22408235	138919	151288456
Högen	7000	4221983	25608	31620	1377802	68484	856683	24400	6613580
Idre		62128		1088	166230	1725	345041		576212
Junkerdal		179490	321410	347228	1013827	54901	351545		2268401
Kiruna		1559220	3619			55			1562894
Örje									
Östby	33060	2714706	61260	7655	772112	330869	622044	600	4542306
Storlien	7797	10922646	910206	48860	2215375	435279	1003581	4267	15548011
Strömstad				30000	27500		95940		153440
Svinesund	62214	79861602	25236542	13200181	80528658	4794518	28314081	473369	232471165
Tärnaby	6700	1520957	610617	800	1097789	22794	9093560	3614	12356831
Vauldalen	4000	274844	2306	7400	347192	638	197931	5698	840009
Vittjärn	1700	431003	2754	55449	208331	38687	153847	177	891948
Grand Total	732453	234564677	35701226	15457700	147630516	10874603	76105183	735955	521802313

Source: Own Computations

Table 11: Composition Of Total Flows From Border Stations (Kg): Third Quarter

Border Points	**Commodities**								
Gränsstation	(tom)	Diverse	J L	J R	Kemi	MEI	Metall	Textil	Grand Total
Eda	136298	57123839	1769011	100531	10472502	2017372	9989846	50556	81659955
Åsnes		4131181	7492	400	3847436	3849	32089	364	8022811
Björnfjell	21425	46222	628650	198725	138549	42342	283	529	1076725
Gäddede	4085	598341			118708	32625	5060		758819
Hån	238569	61932170	6803148	1467821	48266960	2493270	17973162	205384	139380484
Högen	1300	3489430	24169	400	1404298	36591	886571	25	5842784
Idre		412178		1000	490500		278981		1182659
Junkerdal	7500	297053	506490	658200	477021	36868	195162	527	2178821
Kiruna		706444	3427						709871
Örje									
Östby	0	5565692	80617	65046	1212799	357181	386197	1096	7668628
Storlien	3021	7672576	458897	24850	1866641	175648	690943	4552	10897128
Strömstad	11001	2904655	224828	49481	946940	94292	473014	4869	4709080
Svinesund	15782	76120869	23543400	8696705	69622670	4672852	24604271	582771	207859320
Tärnaby	2500	849328	516599	400	1494950	56833	5556540	5019	8482169
Vauldalen	10000	370795	313	4100	278778	5297	288033	342	957658
Vittjärn	6260	651690	612	54900	115659	173874	128524	353	1131872
Grand Total	457741	222872463	34567653	11322559	140754411	10198894	61488676	856387	482518784

Source: Own Computations

Table 12: Composition Of Total Flows From Border Stations (Kg): Fourth Quarter

Border Points	**Commodities**								
Gränsstation	(tom)	Diverse	J L	J R	Kemi	MEI	Metall	Textil	Grand Total
Eda	99628	73765601	2116108	131163	9560782	2463614	11761189	47953	99946038
Åsnes		5636689	5868	400	1950408	178	382	396	7594321
Björnfjell	4600	26306	1103138	28700	174757	15185	80	83	1352849
Gäddede		1017339		6555	468050	83308			1575252
Hån	132949	66388026	7485566	1087230	59398872	4867446	18643217	127442	158130748
Högen	3400	5074169	29320	30300	1823551	41217	866386	483	7868826
Idre		513386			293143	19150	307074	333	1133086
Junkerdal	3000	49602	676098	27400	499578	38220	181400	252	1475550
Kiruna	2000	2472000	16518		25000				2515518
Örje									
Östby	2885	4460408	23163	5405	956319	475890	633469	1612	6559151
Storlien	13476	10188626	894946	38979	2466847	145574	960267	2819	14711534
Strömstad		643			31551	6975	99691	116	138976
Svinesund	25999	80143820	28306154	9260854	66742221	5183857	29011417	552642	219226964
Tärnaby	2500	1034331	309560	400	1151406	53955	5101427	2475	7656054
Vauldalen		194754	22544	800	242380	34770	368963	753	864964
Vittjärn	7775	1164527		500	112601	100922	105874	409	1492608
Grand Total	298212	252130227	40988983	10618686	145897466	13530261	68040836	737768	532242439

Source: Own Computations

Table 13: Composition Of Total Flows From Border Stations (Kg): 2001

Border Points	**Commodities**								
Gränsstation	(tom)	Diverse	J L	J R	Kemi	MEI	Metall	Textil	Grand Total
Eda	492276	259519658	7069444	626379	35906449	8860960	47721931	230707	360427804
Åsnes	1600	19736767	20049	2000	11769285	16441	129107	791	31676040
Björnfjell	275926	1639353	2521280	387725	1485999	110834	3763	671	6425551
Gäddede	4585	3230934	1663	51025	838758	135733	21050		4283748
Hån	737986	259479928	28479671	4970053	212759839	14081712	78089337	684561	599283087
Högen	13400	16412288	79097	63720	5750588	203553	3774500	25000	26322146
Idre		1681367		2088	974573	20875	1384782	333	4064018
Junkerdal	10500	1218026	1713159	1079708	3289301	204348	1200192	1314	8716548
Kiruna	2000	7629619	25892		25000	55	22904		7705470
Örje			3564						3564
Östby	35945	17232702	189520	84556	3857035	1611840	2305120	3808	25320526
Storlien	25131	41927002	2820278	141989	9618865	1256337	3941604	15045	59746251
Strömstad	11001	3013086	224828	79481	1093071	101267	845476	4985	5373195
Svinesund	147754	321102421	108283917	45332721	296106351	19864478	112836196	2218293	905892131
Tärnaby	18262	7325731	2064966	1604	5468653	240786	28989361	18397	44127760
Vauldalen	16000	1544340	25568	15600	995641	49025	1314586	6969	3967729
Vittjärn	19735	2767178	3366	110989	566670	348151	518215	948	4335252
Grand Total	1812101	965460400	153526262	52949638	590506078	47106395	283098124	3211822	2097670820

Source: Own Computations

Table 14: Composition of Imports by County (kg)

Counties	**COMMODITY GROUPS**								
	(tom)	Diverse	JL	JR	Kemi	MEI	Metall	Textil	Total
Stockholm County	466516	79566365	33246018	6459356	59804651	4156541	8751178	653046	193103671
Skåne County	42076	70731996	9937476	2141261	53996857	3927157	43960732	234204	184971759
Halland County	231	13443567	1759032	1395279	1828987	543348	19646415	251693	38868552
Kronoberg County	3941	4295288	35090	20659	8359201	1391157	23758660	122430	37986426
Blekinge County	4350	2832456	61332	619176	2335685	54068	143354	43469	6093890
Kalmar County	3957	6949466		2100	6047026	135591	78240	12561	13228941
Västra Götaland Region	194484	338650085	102204743	39989708	263545644	12624834	60670560	1185174	819065232
Jönköpings County	7004	89001147	13020	317200	2675752	4792073	22005205	121735	118933136
Östergötland County	22233	7009328	590407	125503	1942099	1529233	1208352	47771	12474926
SödermanlandCounty	92112	73074004	142806	218925	14412024	4271537	12199367	72112	104482887
Gotland Community	4500	23414		1600	869	1318	6858	1345	39904

Table 14: Composition of Imports by County (kg) Continued

Counties	**COMMODITY GROUPS**								
	(tom)	Diverse	JL	JR	Kemi	MEI	Metall	Textil	Total
Värmland County	377400	99829758	529050	60329	41933057	4898458	7722274	120185	155470511
Örebro County	41751	7784509	61966	11620	9137248	1651236	1214914	135794	20039038
Västmanland County	31916	1789694		2896	4521990	861279	12900035	5947	20113757
Uppsala County	29307	15937322	88831	572737	7606598	144713	392985	5669	24778162
Dalarna County	53170	68110627	116436	5368	4633018	1109171	27354799	22730	101405319
Gävleborg County	14390	3733244	64322	22623	8980828	540499	9051624	26454	22433984
Jämtland County	9611	26919236	23703	51765	1405609	1129735	449096	8809	29997564
Västernorrland County	7954	5243601	132187	4505	3171494	690798	1696829	4312	10951680
Västerbotten County	34570	24554940	14738	1860	2609874	1547948	1102346	18974	29885250
Norrbotten County	34581	8208982	172096	35603	5189861	526566	2831426	2204	17001319
Total	1476054	947689029	149193253	52060073	504138372	46527260	257145249	3096618	1961325908

Source: Own Computation

Table 15: Total Imports by Postcodes (kg)

POST CODES	**COMMODITY GROUPS**								
	(tom)	Diverse	J L	J R	Kemi	M E I	Metall	Textil	Total
00	336047	17771071	4333009	889565	86367706	579135	25952475	115204	136344212
10	269229	10629204	1080577	45357	22403488	205806	716727	2365	35352753
11	51001	3908322	50723	121721	3731134	120896	170245	9408	8163450
12	20951	6354081	3843927	153	3181694	678096	495673	2218	14576793
13	27134	5217923	5091682	21185	1537615	273700	209136	13644	12392019
14	7001	1083597	1062	5472	745878	164699	211904	2492	2222105
15	3000	2722344	124117	400	251544	90475	62282	2262	3256424
16	14856	6253579	6755088	3400	8983367	347807	590909	140921	23089927
17	7072	29010770	3843964	6258052	5867982	838149	5821370	308788	51956147
18	49164	397227	1111707	1840	7387571	298947	74367	122084	9442907
19	17108	13989318	11343171	1776	5714378	1137966	398565	48864	32651146
20	5569	9702884	85097	30247	6405758	440922	37938406	98553	54707436
21	2177	3656827	591512	938	11527432	157170	1169674	34822	17140552
22	2071	84729	42824	50	2009763	202251	88535	233	2430456
23	7550	3070557	284234	1350	1109272	190126	405058	20783	5088930
24	5106	1288492	3126431	479378	476882	44508	25298	6090	5452185
25	9684	35010950	3461448	14071	13188621	195673	1382988	11049	53274484
26	7310	2378790	878543	1610019	14026914	2258871	1908552	35732	23104731
27	72	1270835	32960	930	120023	42187	26758	212	1493977
28	1137	13237509	6912	3878	3501599	363812	875836	3298	17993981

Table 15: Total Imports by Postcodes (kg) Continued

POST CODES	**COMMODITY GROUPS**								
	(tom)	Diverse	J L	J R	Kemi	M E I	Metall	Textil	Grand Total
29	1400	1030423	1427515	400	1630593	31637	139627	23432	4285027
30	100	1889256	874403	1386522	1325524	418124	18986369	57337	24937635
31	131	11554311	884629	8757	503463	125224	660046	194356	13930917
33	248	603387			1866422	150757	2821732	13105	5455651
34	3339	2414181	34990	3390	6117369	733236	872471	15054	10194030
35	325	122916			88635	210987	10418	167	433448
36	29	1154804	100	17269	286775	296177	20054039	94104	21903297
37	4350	2832456	61332	619176	2335685	54068	143354	43469	6093890
38	3871	6671704		2100	5853856	50701	41681	424	12624337
39	86	277762			193170	84890	36559	12137	604604
40	682	37877917	715511	4026	4482594	3710120	18076217	40219	64907286
41	7241	2273000	8824038	449	7226912	649748	1738651	20057	20740096
42	23259	7342288	216145	4791732	11098248	440015	4907362	30256	28849305
43	1618	15689215	1246767	11038	8358349	1216004	602516	82863	27208370
44	32913	6575401	969147	278196	41789451	446513	4232572	224382	54548575
45	2951	166959069	86086791	2048442	165792763	1757566	23387884	278108	446313574
46	30344	12011335	16483	583405	15051976	849489	523773	13195	29080000
47	390	392224	2551046	1350	52034	38939	23991	4	3059978
50	562	3553260	7823	16	947088	163356	28275	164745	4865125

Table 15: Total Imports by Postcodes (kg) Continued

POST CODES	COMMODITY GROUPS								
	(tom)	Diverse	J L	J R	Kemi	M E I	Metall	Textil	Grand Total
51	839	11322694	6	401959	2147527	2800239	1132774	298531	18104569
52	1520	18279208	8855	4800	2106591	46217	102491	26637	20576319
53	35665	23220208	93996	31863934	1137522	361039	1453025	1458	58166847
54	56500	33154266	1468135	361	3354589	145589	4461029	4719	42645188
55	0	26652264			245022	2026826	1188845	3745	30116702
56	2100	53334146	12149	316800	151521	1883897	600080	102955	56403648
57	4904	9014737	871	400	2279209	881350	20216280	15035	32412786
58	9962	4377242		123403	653421	89647	26539	32299	5312513
59	12271	2632086	590407	2100	1288678	1439586	1181813	15472	7162413
60	7185	67938254		215622	1744931	187818	60271	51380	70205461
61	19840	2397910	26065	1000	5519015	1333181	7514270	2213	16813494
62	4500	23414		1600	869	1318	6858	1345	39904
63	58401	705978	3216	253	2563756	2652781	1534219	265	7518869
64	6686	2031862	113525	2050	4584322	97757	3090607	18254	9945063
65	35344	11815545	35626	7310	461357	1111904	2942880	2166	16412132
66	92111	61419966	29829	10458	10186418	1029712	1681017	76808	74526319
67	199471	19070227	239423	39350	13843493	1424408	1398723	37845	36252940
68	50474	7524020	224172	3211	17441789	1332434	1699654	3366	28279120
69	7524	1014324	465	5400	647659	745981	470747	67985	2960085
70	19290	3970006	45254	1720	484616	644536	339279	63667	5568368

Table 15: Total Imports by Postcodes (kg) Continued

POST CODES	COMMODITY GROUPS								
	(tom)	Diverse	J L	J R	Kemi	M E I	Metall	Textil	Grand Total
71	14937	2800179	16247	4500	8004973	260719	404888	4142	11510585
72	14441	234863		2046	1170569	516211	6887579	109	8825818
73	17475	1554831		850	3351421	345068	6012456	5838	11287939
74	6000	12236928	1478	7473	1161099	88998	55822	4833	13562631
75	23199	2024478	87353	564864	6239313	18712	182672	836	9141427
76	108	1675916		400	206186	37003	154491		2074104
77	3718	247026		750	1845521	742868	20803418	12478	23655779
78	35493	1696223	54153	1980	795526	192126	558201	3312	3337014
79	13959	66167378	62283	2638	1991971	174177	5993180	6940	74412526
80	500	583635	60557		4969029	49335	58826	5971	5727853
81	1795	565359	765	2050	3512663	41709	7050237	11613	11186191
82	12095	2584250	3000	20573	499136	449455	1942561	8870	5519940
83	9511	25237225	10117	48365	1314291	324821	205639	8545	27158514
84	100	1682011	13586	3400	91318	804914	243457	264	2839050
85	2000	3910776		1600	1486008	239673	1420460	2127	7062644
86	4340	43463		1850	15819	29037	2824	2087	99420
87	655	97698	31313	400	229051	30361	521	40	390039
88		433492		155	14	2297	50300	44	486302
89	959	758172	100874	500	1440602	389430	222724	14	2913275
90	16800	14290669		1350	1946192	165303	3185	59	16423558

Table 15: Total Imports by Postcodes (kg) Continued

POST CODES		**COMMODITY GROUPS**							
	(tom)	Diverse	J L	J R	Kemi	M E I	Metall	Textil	Grand Total
91	4966	6367878	48	500	530408	518723	5338	1	7427862
92	7150	2613664	13022	10	44363	599565	29010	18122	3324906
93	5654	1282729	1668		88911	264357	1064813	792	2708924
94	2000	22429	8674		10832	60446	875	159	105415
95	2050	22999		2	2903275	243939	7691	664	3180620
96	450	55976	26657	150	32733	783	296659	66	413474
97	25075	1173302	64338	24000	1523842	53464	2523768	1036	5388825
98	5006	6934276	72427	11451	719179	167934	2433	279	7912985
UK							400		400
S-		300							300

Table 16: Chemical Industry Employment (Sweden) and share per County

COUNTY	**2000**	**2000 TOTAL**	**Share %**
Stockholm County	12037	40566	29,67263225
Västra Götaland Region	8159	40566	20,11290243
Skåne County	7710	40566	19,00606419
Uppsala County	3856	40566	9,505497214
Örebro County	1312	40566	3,234235567
Västmanland County	1193	40566	2,940886457
Västernorrland County	1069	40566	2,635211754
Värmland County	908	40566	2,238327664
Östergötland County	813	40566	2,004141399
Västerbotten County	635	40566	1,565350293
SödermanlandCounty	586	40566	1,444559483
Halland County	473	40566	1,166001085
Dalarna County	398	40566	0,981117192
Jönköpings County	367	40566	0,904698516
Gävleborg County	312	40566	0,769116995
Kalmar County	302	40566	0,744465809
Blekinge County	210	40566	0,5176749
Norrbotten County	157	40566	0,387023616
Kronoberg County	51	40566	0,125721047
Jämtland County	18	40566	0,044372134
Gotland Community	..	40566	0

Source: SCB Statistics

Table 17: Metal Industry Employment (Sweden) and share per County

COUNTY	**2000**	**2000 TOTAL**	**Share %**
Stockholm County	12713	117698	10,80137301
Västra Götaland Region	12672	117698	10,76653809
Skåne County	11300	117698	9,600842835
Uppsala County	10337	117698	8,782647114
Örebro County	8458	117698	7,18618838
Västmanland County	7100	117698	6,032387976
Västernorrland County	6558	117698	5,571887373
Värmland County	6373	117698	5,414705433
Östergötland County	5710	117698	4,851399344
Västerbotten County	5655	117698	4,804669578
SödermanlandCounty	5384	117698	4,574419276
Halland County	3976	117698	3,378137267
Dalarna County	3769	117698	3,20226342
Jönköpings County	3318	117698	2,819079339
Gävleborg County	3086	117698	2,621964689
Kalmar County	2829	117698	2,403609237
Blekinge County	2682	117698	2,278713317
Norrbotten County	2114	117698	1,796122279
Kronoberg County	1802	117698	1,531037061
Jämtland County	1777	117698	1,509796258
Gotland Community	85	117698	0,072218729

Source: SCB Statistics

Table 18: Food Industry Employment (Sweden) and share per County

COUNTY	**2000**	**2000 TOTAL**	**Share %**
Stockholm County	15097	55447	27,22780313
Västra Götaland Region	10857	55447	19,580861
Skåne County	8152	55447	14,70232835
Uppsala County	2321	55447	4,185979404
Örebro County	2003	55447	3,612458744
Västmanland County	1641	55447	2,959583025
Västernorrland County	1544	55447	2,784641189
Värmland County	1477	55447	2,663805075
Östergötland County	1362	55447	2,456399805
Västerbotten County	1337	55447	2,411311703
SödermanlandCounty	1316	55447	2,373437697
Halland County	1246	55447	2,247191011
Dalarna County	1217	55447	2,194888813
Jönköpings County	1028	55447	1,85402276
Gävleborg County	924	55447	1,666456256
Kalmar County	874	55447	1,576280051
Blekinge County	718	55447	1,294930294
Norrbotten County	688	55447	1,240824571
Kronoberg County	682	55447	1,230003427
Jämtland County	563	55447	1,01538406
Gotland Community	400	55447	0,721409634

Source: SCB Statistics

Table 19: Machine Industry Employment (Sweden) and share per County

COUNTY	**2000**	**2000 TOTAL**	**Share %**
Stockholm County	17160	94922	18,07800088
Västra Götaland Region	11244	94922	11,84551527
Skåne County	9116	94922	9,603674596
Uppsala County	7684	94922	8,095067529
Örebro County	6560	94922	6,910937401
Västmanland County	6155	94922	6,484271296
Västernorrland County	6010	94922	6,331514296
Värmland County	4564	94922	4,808158277
Östergötland County	3915	94922	4,124439013
Västerbotten County	3358	94922	3,537641432
SödermanlandCounty	2969	94922	3,127831272
Halland County	2945	94922	3,102547355
Dalarna County	2827	94922	2,978234761
Jönköpings County	2565	94922	2,702218664
Gävleborg County	2502	94922	2,635848381
Kalmar County	1481	94922	1,560228398
Blekinge County	1226	94922	1,291586777
Norrbotten County	1200	94922	1,264195866
Kronoberg County	872	94922	0,918648996
Jämtland County	531	94922	0,559406671
Gotland Community	38	94922	0,040032869

Source: SCB Statistics

Table 20: Transport Industry Employment (Sweden) and share per County

COUNTY	**2000**	**2000 TOTAL**	**Share %**
Stockholm County	42417	94396	44,93516674
Västra Götaland Region	8299	94396	8,791686088
Skåne County	5996	94396	6,351964066
Uppsala County	5476	94396	5,801093267
Örebro County	5008	94396	5,305309547
Västmanland County	3972	94396	4,207805415
Västernorrland County	3950	94396	4,184499343
Värmland County	3158	94396	3,345480741
Östergötland County	2859	94396	3,028730031
Västerbotten County	2844	94396	3,012839527
SödermanlandCounty	2516	94396	2,665367177
Halland County	1574	94396	1,667443536
Dalarna County	1537	94396	1,62824696
Jönköpings County	1350	94396	1,430145345
Gävleborg County	1256	94396	1,330564854
Kalmar County	1030	94396	1,09114793
Blekinge County	432	94396	0,45764651
Norrbotten County	249	94396	0,263782364
Kronoberg County	198	94396	0,209754651
Jämtland County	33	94396	0,034959108
Gotland Community	..	94396	0

Source: SCB Statistics

Table 21: Textile Industry Employment (Sweden) and share per County

COUNTY	**2000**	**2000 TOTAL**	**Share %**
Stockholm County	5443	11431	47,61613157
Västra Götaland Region	933	11431	8,162015572
Skåne County	832	11431	7,278453329
Uppsala County	624	11431	5,458839997
Örebro County	549	11431	4,80272942
Västmanland County	548	11431	4,793981279
Västernorrland County	548	11431	4,793981279
Värmland County	493	11431	4,312833523
Östergötland County	246	11431	2,152042691
Västerbotten County	163	11431	1,425946986
SödermanlandCounty	157	11431	1,37345814
Halland County	132	11431	1,154754615
Dalarna County	122	11431	1,067273204
Jönköpings County	106	11431	0,927302948
Gävleborg County	99	11431	0,866065961
Kalmar County	99	11431	0,866065961
Blekinge County	96	11431	0,839821538
Norrbotten County	81	11431	0,708599423
Kronoberg County	68	11431	0,594873589
Jämtland County	66	11431	0,577377307
Gotland Community	26	11431	0,227451667

Source: SCB Statistics

Table 22: Destinations of Imports of Chemicals By the Västra Götalands Region

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Västra Götalands Region	**263545644**	Västra Götalands Region	101396858,9
		Stockholm	89786474,17
		Skåne	24944522,91
		Uppsala	33321788,94
		Östergotland	8161546,82
		Halland	4049271886
		Jönköping	1885180,37

Source: Own Computation

Table 23: Destinations of Imports of Chemicals By Värmland County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Värmland County	**41933057**	Värmland County	11284268,64
		Uppsala County	6992471,97
		Örebro County	7167774,53
		Västmanland County	10304147,1
		Västernorrland County	5871224,52
		Dalarna County	313170,24

Source: Own Computation

Table 24: Destinations of Imports of Chemicals By SödermanlandCounty

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
SödermanlandCounty	**14412024**	SödermanlandCounty	7282578,622
		Skåne County	6855332,54
		Blekinge County	274112,8

Source: Own Computation

Table 25: Destinations of Imports of Chemicals By Gävleborg County

Declared Destination	Total (kg)	Actual Destination	Total (Kg)
Gävleborg County	**8980828**	Gävleborg County	3877413,895
		Västernorrland County	4242395,11
		Västerbotten County	861019

Source: Own Computation

Table 26: Destinations of Imports of Chemicals By Kalmar County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Kalmar County	**6047026**	Kalmar County	3753137,809
		Skåne County	2293888,19

Source: Own Computation

Table 27: Destinations of Imports of Chemicals By Norrbotten County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Norrbotten County	**5189861**	Norrbotten County	1951134,556
		Västerbotten County	3238726,44

Source: Own Computation

Table 28: Destinations of Imports of Chemicals By Kronoberg County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Kronoberg County	**8359201**	Kronoberg County	633808,041
		Skåne County	7725392,96

Source: Own Computation

Table 29: Destinations of Imports of Chemicals By Jämtland County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Jämtland County	**1405609**	Jämtland County	223696,955
		Västerbotten County	1181912,05

Source: Own Computation

Table 30: Destinations of Imports of Chemicals By Gotland Community

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Gotland Community	**869**	Skåne County	869

Source: Own Computation

Table 31: Destinations of Imports of Metals By Västra Götalands Region

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Västra Götalands Region	**60670560**	Västra Götalands Region	27685641,18
		Örebro County	17264028
		Västmanland County	2281530,68
		Västernorrland County	7237976,37
		Värmland County	6201383,77

Source: Own Computation

Table 32: Destinations of Imports of Metals By Skåne County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Skåne County	**43960732**	Skåne County	24688111,21
		Östergötaland County	7274995,75
		Kalmar County	6102526,96
		Blekinge County	5716249,03
		Gotland Community	178849,05

Source: Own Computation

Table 33: Destinations of Imports of Metals By SödermanlandCounty

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
SödermanlandCounty	**12199367**	SödermanlandCounty	1176290,84
		Västernorrland County	436465,16

Source: Own Computation

Table 34: Destinations of Imports of Metals By Halland County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Halland County	**19646415**	Halland County	8686719,49
		Stockholm County	3194163,74
		Uppsala County	7765531,7717

Source: Own Computation

Table 35: Destinations of Imports of Metals By Dalarna County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Dalarna County	**27354799**	Dalarna County	8234468,336
		Västernorrland County	4956573,13
		Västerbotten County	10730484,29
		Jämtland County	3433273,35

Source: Own Computation

Table 36: Destinations of Imports of Metals By Jönköping County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Jönköping County	**22005205**	Jönköping County	7249128,578
		Uppsala County	14425643,02
		Västmanland County	330433,40

Source: Own Computation

Table 37: Destinations of Imports of Metals By Gävleborg County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Gävleborg County	**9051624**	Gävleborg County	6742257,647
		Västerbotten County	522149,26
		Norrbotten County	1787217,11

Source: Own Computation

Table 38: Destinations of Imports of Metals By Kronorberg County

Declared Destination	Total (Kg)	Actual Destination	Total (Kg)
Kronorberg County	**23758660**	Kronorberg County	3936989,062
		Stockholm County	15829875,77
		Östergotland County	3991795,17

Source: Own Computation

APPENDIX 1

TESTING EQUALITY BETWEEN MEANS OF QUARTERLY FLOWS

Mean of DiverseQ1=DiverseQ2

Table 39: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Diverse~1	17	1.51e+07	6774052	2.79e+07	692181.9	2.94e+07
Diverse~2	17	1.38e+07	6470908	2.67e+07	80210.62	2.75e+07
Diff	17	1254609	669010.9	2758403	-163630.6	2672849

Ho: mean (DiverseQ1 - DiverseQ2) = mean (diff) = 0

Mean of DiverseQ1=DiverseQ3

Table 40: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Diverse~1	17	1.51e+07	6774052	2.79e+07	692181.9	2.94e+07
Diverse~3	17	1.31e+07	6093979	2.51e+07	191487	2.60e+07
Diff	17	1942386	893380.4	3683502	48504.7	3836268

Ho: mean (DiverseQ1 - DiverseQ3) = mean (diff) = 0

Mean of DiverseQ1=DiverseQ4

Table 41: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Diverse~1	17	1.51e+07	6774052	2.79e+07	692181.9	2.94e+07
Diverse~4	17	1.48e+07	6839406	2.82e+07	332296.5	2.93e+07
Diff	17	221341.5	523128.7	2156915	-887641.7	1330325

Ho: mean (DiverseQ1 - DiverseQ4) = mean (diff) = 0

Mean of DiverseQ2=DiverseQ3

Table 42: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Diverse~2	17	1.38e+07	6470908	2.67e+07	80210.62	2.75e+07
Diverse~3	17	1.31e+07	6093979	2.51e+07	191487	2.60e+07
Diff	17	687777.3	511236.3	2107881	-395995.2	1771550

Ho: mean (DiverseQ2 - DiverseQ3) = mean (diff) = 0

Mean of DiverseQ2=DiverseQ4

Table 43: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Diverse~2	17	1.38e+07	6470908	2.67e+07	80210.62	2.75e+07
Diverse~4	17	1.48e+07	6839406	2.82e+07	332296.5	2.93e+07
Diff	17	-1033268	838828.7	3458579	-2811505	744969.8

Ho: mean (DiverseQ2 - DiverseQ4) = mean (diff) = 0

Mean of DiverseQ3=DiverseQ4

Table 44: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Diverse~3	17	1.31e+07	6093979	2.51e+07	191487	2.60e+07
Diverse~4	17	1.48e+07	6839406	2.82e+07	332296.5	2.93e+07
Diff	17	-1721045	1027363	4235928	-3898958	456868.1

Ho: mean (DiverseQ3 - DiverseQ4) = mean (diff) = 0

Mean of Jordbruk LivsmedelQ1=Jordbruk LivsmedelQ2

Table 45: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord L~Q1	17	2486376	1851798	7635161	-1439261	6412014
Jord L~lQ2	17	2100072	1493585	6158210	-1066187	5266331
Diff	17	386304.4	362083.2	1492907	-381277.7	1153886

Ho: mean(Jordbruk LivsmedelQ1 – Jordbruk LivsmedelQ2) = mean(diff) = 0

Mean of Jordbruk LivsmedelQ1=Jordbruk LivsmedelQ3

Table 46: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord L~Q1	17	2486376	1851798	7635161	-1439261	6412014
Jord L~Q3	17	2033391	1401944	5780361	-938596.2	5005379
Diff	17	452985.1	456094.9	1880528	-513892.9	1419863

Ho: mean(Jordbruk LivsmedelQ1 – Jordbruk LivsmedelQ3) = mean(diff) = 0

Mean of JordbruklivsmedelQ1=JordbruklivsmedelQ4

Table 47: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord L~Q1	17	2486376	1851798	7635161	-1439261	6412014
Jord L~Q4	17	2411117	1677592	6916889	-1145220	5967453
Diff	17	75259.82	190491.2	785415.2	-328563.4	479083.1

Ho: mean(Jordbruk LivsmedelQ1 – Jordbruk LivsmedelQ4) = mean(diff) = 0

Mean of Jordbruk LivsmedelQ2=Jordbruk LivsmedelQ3

Table 48: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord L~Q2	17	2100072	1493585	6158210	-1066187	5266331
Jord L~Q3	17	2033391	1401944	5780361	-938596.2	5005379
Diff	17	66680.76	111411.2	459360.1	-169500.4	302861.9

Ho: mean(Jordbruk LivsmedelQ2 – Jordbruk LivsmedelQ3) = mean(diff) = 0

Mean of Jordbruk LivsmedelQ2=Jordbruk LivsmedelQ4

Table 49: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord L~Q2	17	2100072	1493585	6158210	-1066187	5266331
Jord L~Q4	17	2411117	1677592	6916889	-1145220	5967453
Diff	17	-311044.5	191212.3	788388.3	-716396.4	94307.33

Ho: mean(Jordbruk LivsmedelQ2 – Jordbruk LivsmedelQ4) = mean(diff) = 0

Mean of Jordbruk LivsmedelQ3=Jordbruk LivsmedelQ4

Table 50: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord L~Q3	17	2033391	1401944	5780361	-938596.2	5005379
Jord L~Q4	17	2411117	1677592	6916889	-1145220	5967453
Diff	17	-377725.3	280401.2	1156124	-972149.2	216698.6

Ho: mean(Jordbruk LivsmedelQ3 – Jordbruk LivsmedelQ4) = mean(diff) = 0

Mean of Jordbruk RåvarorQ1=Jordbruk RåvarorQ2

Table 51: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord R~Q1	17	914746.6	831040.3	3426467	-846980.1	2676473
Jord R~Q2	17	909276.5	772310.3	3184317	-727948.2	2546501
Diff	17	5470.176	65181.85	268751.	-132709.2	143649.5

Ho: mean(Jordbruk RåvarorQ1 – Jordbruk RåvarorQ2) = mean(diff) = 0

Mean of Jordbruk RåvarorQ1=Jordbruk RåvarorQ3

Table 52: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord R~Q1	17	914746.6	831040.3	3426467	-846980.1	2676473
Jord R~Q3	17	666032.9	509970.9	2102664	-415057.2	1747123
Diff	17	248713.8	329634.2	1359116	-450079.4	947507

Ho: mean(Jordbruk RåvarorQ1 – Jordbruk RåvarorQ3) = mean(diff) = 0

Mean of Jordbruk RåvarorQ1=Jordbruk RåvarorQ4

Table 53: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord R~Q1	17	914746.6	831040.3	3426467	-846980.1	2676473
Jord R~Q4	17	624628.6	543457.2	2240731	-527449.2	1776706
Diff	17	290118.1	289041.1	1191747	-322621.7	902857.8

Ho: mean(Jordbruk RåvarorQ1 – Jordbruk RåvarorQ4) = mean(diff) = 0

Mean of Jordbruk RåvarorQ2=Jordbruk RåvarorQ3

Table 54: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord R~Q2	17	909276.5	772310.3	3184317	-727948.2	2546501
Jord R~Q3	17	666032.9	509970.9	2102664	-415057.2	1747123
Diff	17	243243.6	267087.8	1101231	-322957.2	809444.4

Ho: mean(Jordbruk RåvarorQ2 – Jordbruk RåvarorQ3) = mean(diff) = 0

Mean of Jordbruk RåvarorQ2=Jordbruk RåvarorQ4

Table 55: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord R~Q2	17	909276.5	772310.3	3184317	-727948.2	2546501
Jord R~Q4	17	624628.6	543457.2	2240731	-527449.2	1776706
Diff	17	284647.9	229616.5	946733	-202117.3	771413.1

Ho: mean(jordbrukrvarorQ2 - jordbrukrvarorQ4) = mean(diff) = 0

Mean of Jordbruk RåvarorQ3=Jordbruk RåvarorQ4

Table 56: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
Jord R~Q3	17	666032.9	509970.9	2102664	-415057.2	1747123
Jord R~Q4	17	624628.6	543457.2	2240731	-527449.2	1776706
Diff	17	41404.29	56615.28	233430.8	-78614.74	161423.3

Ho: mean(Jordbruk RåvarorQ3 – Jordbruk RåvarorQ4) = mean(diff) = 0

Mean of KemiQ1=KemiQ2

Table 57: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
KemiQ1	17	9189629	5391665	2.22e+07	-2240191	2.06e+07
KemiQ2	17	8684148	5373637	2.22e+07	-2707453	2.01e+07
Diff	17	505480.5	435841	1797018	-418461.1	1429422

Ho: mean (KemiQ1 - KemiQ2) = mean (diff) = 0

Mean of KemiQ1=KemiQ3

Table 58: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
KemiQ1	17	9189629	5391665	2.22e+07	-2240191	2.06e+07
KemiQ3	17	8279671	4753769	1.96e+07	-1797869	1.84e+07
Diff	17	909957.3	706225.3	2911842	-587173.5	2407088

Ho: mean (KemiQ1 - KemiQ3) = mean (diff) = 0

Mean of KemiQ1=KemiQ4

Table 59: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
KemiQ1	17	9189629	5391665	2.22e+07	-2240191	2.06e+07
KemiQ4	17	8582204	5014006	2.07e+07	-2047014	1.92e+07
Diff	17	607424.6	854077.2	3521450	-1203138	2417987

Ho: mean (KemiQ1 - KemiQ4) = mean (diff) = 0

Mean of KemiQ2=KemiQ3

Table 60: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
KemiQ2	17	8684148	5373637	2.22e+07	-2707453	2.01e+07
KemiQ3	17	8279671	4753769	1.96e+07	-1797869	1.84e+07
Diff	17	404476.8	720694.7	2971501	-1123328	1932281

Ho: mean (KemiQ2 - KemiQ3) = mean (diff) = 0

Mean of KemiQ2=KemiQ4

Table 61: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
KemiQ2	17	8684148	5373637	2.22e+07	-2707453	2.01e+07
KemiQ4	17	8582204	5014006	2.07e+07	-2047014	1.92e+07
Diff	17	101944.1	999182.5	4119735	-2016228	2220116

Ho: mean (KemiQ2 - KemiQ4) = mean (diff) = 0

Mean of KemiQ3=KemiQ4

Table 62: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
KemiQ3	17	8279671	4753769	1.96e+07	-1797869	1.84e+07
KemiQ4	17	8582204	5014006	2.07e+07	-2047014	1.92e+07
Diff	17	-302532.6	709217.1	2924177	-1806006	1200940

Ho: mean (KemiQ3 - KemiQ4) = mean (diff) = 0

Mean of Maskiner Elektr. InstrumentQ1=Maskiner Elektr. InstrumentQ2

Table 63: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MEIQ1	17	735449.2	372117.4	1534279	-53404.33	1524303
MEIQ2	17	639682.5	330196.5	1361435	-60302.69	1339668
Diff	17	95766.71	52044.75	214586	-14563.24	206096.7

Ho: mean (MEIQ1 - MEIQ2) = mean (diff) = 0

Mean of Maskiner Elektr. InstrumentQ1=Maskiner Elektr. InstrumentQ3

Table 64: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MEIQ1	17	735449.2	372117.4	1534279	-53404.33	1524303
MEIQ3	17	599934.9	310416.2	1279879	-58118.06	1257988
Diff	17	135514.3	81599.42	336443	-37468.75	308497.3

Ho: mean (MEIQ1 - MEIQ3) = mean (diff) = 0

Mean of Maskiner Elektr. InstrumentQ1=Maskiner Elektr. InstrumentQ4

Table 65: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MEIQ1	17	735449.2	372117.4	1534279	-53404.33	1524303
MEIQ4	17	795897.7	411854.7	1698120	-77195.25	1668991
Diff	17	-60448.47	70050.52	288825.7	-208948.9	88052

Ho: mean (MEIQ1 - MEIQ4) = mean (diff) = 0

Mean of Maskiner Elektr. InstrumentQ2=Maskiner Elektr. InstrumentQ3

Table 66: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MEIQ2	17	639682.5	330196.5	1361435	-60302.69	1339668
MEIQ3	17	599934.9	310416.2	1279879	-58118.06	1257988
Diff	17	39747.59	33848.04	139559.1	-32007.06	111502.2

Ho: mean (MEIQ2 - MEIQ3) = mean (diff) = 0

Mean of Maskiner Elektr InstrumentQ2=Maskiner Elektr InstrumentQ4

Table 67: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MEIQ2	17	639682.5	330196.5	1361435	-60302.69	1339668
MEIQ4	17	795897.7	411854.7	1698120	-77195.25	1668991
Diff	17	-156215.2	115647.2	476825.7	-401376.3	88945.96

Ho: mean (MEIQ2 - MEIQ4) = mean (diff) = 0

Mean of Maskiner Elektr. InstrumentQ3=Maskiner Elektr. InstrumentQ4

Table 68: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MEIQ3	17	599934.9	310416.2	1279879	-58118.06	1257988
MEIQ4	17	795897.7	411854.7	1698120	-77195.25	1668991
Diff	17	-195962.8	141897.3	585057.4	-496771.5	104846

Ho: mean (MEIQ3 - MEIQ4) = mean (diff) = 0

Mean of MetallQ1=MetallQ2

Table 69: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MetallQ1	17	4556672	2130233	8783176	40779.95	9072565
MetallQ2	17	4476775	2106259	8684327	11706.82	8941844
Diff	17	79896.82	262395.7	1081885	-476357.3	636150.9

Ho: mean (MetallQ1 - MetallQ3) = mean (diff) = 0

Mean of MetallQ1=MetallQ3

Table 70: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MetallQ1	17	4556672	2130233	8783176	40779.95	9072565
MetallQ3	17	3616981	1755795	7239329	-105138.8	7339101
Diff	17	939691.4	435990.2	1797634	15433.44	1863949

Ho: mean (MetallQ1 - MetallQ3) = mean (diff) = 0

Mean of MetallQ1=MetallQ4

Table 71: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MetallQ1	17	4556672	2130233	8783176	40779.95	9072565
MetallQ4	17	4002402	1995964	8229572	-228853.4	8233658
Diff	17	554270.2	261558.7	1078434	-209.4721	1108750

Ho: mean (metallQ1 - metallQ4) = mean (diff) = 0

Mean of MetallQ2=MetallQ3

Table 72: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MetallQ2	17	4476775	2106259	8684327	11706.82	8941844
MetallQ3	17	3616981	1755795	7239329	-105138.8	7339101
Diff	17	859794.5	385661	1590121	42229.67	1677359

Ho: mean (metallQ2 - metallQ3) = mean (diff) = 0

Mean of MetallQ2=MetallQ4

Table 73: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MetallQ2	17	4476775	2106259	8684327	11706.82	8941844
MetallQ4	17	4002402	1995964	8229572	-228853.4	8233658
Diff	17	474373.4	318102.5	1311570	-199973.8	1148721

Ho: mean (metallQ2 - metallQ4) = mean (diff) = 0

Mean of MetallQ3=MetallQ4

Table 74: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
MetallQ3	17	3616981	1755795	7239329	-105138.8	7339101
MetallQ4	17	4002402	1995964	8229572	-228853.4	8233658
Diff	17	-385421.2	277686.6	1144931	-974090.5	203248.1

Ho: mean (metallQ3 - metallQ4) = mean (diff) = 0

Mean of TextilQ1=TextilQ2

Table 75: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TextilQ1	17	51865.41	37049.55	152759.2	-26676.13	130407
TextilQ2	17	43291.47	28399.99	117096.1	-16913.81	103496.8
Diff	17	8573.941	9547.868	39366.87	-16913.81	28814.52

Ho: mean (TextilQ1 - TextilQ2) = mean (diff) = 0

Mean of TextilQ1=TextilQ3

Table 76: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TextilQ1	17	51865.41	37049.55	152759.2	-26676.13	130407
TextilQ3	17	50375.71	35422.41	146050.3	-24716.44	125467.9
Diff	17	1489.706	1687.087	6956.038	-2086.759	5066.171

Ho: mean (TextilQ1 - TextilQ3) = mean (diff) = 0

Mean of TextilQ1=TextilQ4

Table 77: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TextilQ1	17	51865.41	37049.55	152759.2	-26676.13	130407
TextilQ4	17	43398.12	32762.2	135082	-26054.64	112850.9
Diff	17	8467.294	5856.798	24148.2	-3948.563	20883.15

Ho: mean (TextilQ1 - TextilQ4) = mean (diff) = 0

Mean of TextilQ2=TextilQ3

Table 78: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TextilQ2	17	43291.47	28399.99	117096.1	-16913.81	103496.8
TextilQ3	17	50375.71	35422.41	146050.3	-24716.44	125467.9
Diff	17	-7084.235	7989.537	32941.7	-24021.3	9852.825

Ho: mean (TextilQ2 - TextilQ3) = mean (diff) = 0

Mean of TextilQ2=TextilQ4

Table 79: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TextilQ2	17	43291.47	28399.99	117096.1	-16913.81	103496.8
TextilQ4	17	43398.12	32762.2	135082	-26054.64	112850.9
Diff	17	-106.6471	5551.342	22888.77	-11874.97	11661.67

Ho: mean (TextilQ2 - TextilQ4) = mean (diff) = 0

Mean of TextilQ3=TextilQ4

Table 80: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TextilQ3	17	50375.71	35422.41	146050.3	-24716.44	125467.9
TextilQ4	17	43398.12	32762.2	135082	-26054.64	112850.9
Diff	17	6977.588	4772.36	19676.94	-3139.363	17094.54

Ho: mean (TextilQ3 - TextilQ4) = mean (diff) = 0

Mean of tomQ1=tomQ2

Table 81: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TomQ1	17	19040.88	10891.37	44906.27	-4047.79	42129.55
TomQ2	17	43085.47	19333.08	79712.32	2101.18	84069.76
Diff	17	-24044.59	14638.96	60357.98	-55077.8	6988.623

Ho: mean (tomQ1 - tomQ2) = mean (diff) = 0

Mean of tomQ1=tomQ3

Table 82: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TomQ1	17	19040.88	10891.37	44906.27	-4047.79	42129.55
TomQ3	17	26925.94	15366.3	63356.89	-5649.164	59501.05
Diff	17	-7885.059	5287.104	21799.29	-19093.22	3323.101

Ho: mean (tomQ1 - tomQ3) = mean (diff) = 0

Mean of tomQ1=tomQ4

Table 83: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TomQ1	17	19040.88	10891.37	44906.27	-4047.79	42129.55
TomQ4	17	17541.88	9264.946	38200.35	-2098.926	37182.69
Diff	17	1499	2194.5	9048.154	-3153.131	6151.131

Ho: mean (tomQ1 - tomQ4) = mean (diff) = 0

Mean of tomQ2=tomQ3

Table 84: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TomQ2	17	43085.47	19333.08	79712.32	2101.18	84069.76
TomQ3	17	26925.94	15366.3	63356.89	-5649.164	59501.05
Diff	17	16159.53	13896.64	57297.33	-13300.04	45619.1

Ho: mean (tomQ2 - tomQ3) = mean (diff) = 0

Mean of tomQ2=tomQ4

Table 85: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TomQ2	17	43085.47	19333.08	79712.32	2101.18	84069.76
TomQ4	17	17541.88	9264.946	38200.35	-2098.926	37182.69
Diff	17	25543.59	14777.87	60930.74	-5784.107	56871.28

Ho: mean (tomQ2 - tomQ4) = mean (diff) = 0

Mean of tomQ3=tomQ4

Table 86: Paired t test

Variable	Obs	Mean	Std. Err	Std. Dev.	[95% Conf. Interval]	
TomQ3	17	26925.94	15366.3	63356.89	-5649.164	59501.05
TomQ4	17	17541.88	9264.946	38200.35	-2098.926	37182.69
Diff	17	9384.059	6580.108	27130.48	-4565.146	23333.26

Ho: mean (tomQ3 - tomQ4) = mean (diff) = 0

APPENDIX 2

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Jordbruk, Råvarår (Agriculture, Primary Goods)	1, 5-6, 10, 12-15, 23	Live Animals, Products of Animal Origin, Not Elsewhere Specified or Included. Live Trees and other Plants; Bulbs, Roots and the Like; Cut Flowers and Ornamental Foliage. Cereals. Oil Seeds and Oleaginous Fruits; Miscellaneous Grains, Seeds and Fruit; Industrial or Medicinal Plants; Straw and Fodder. Lac; Gums, Resins and Other Vegetable saps and Extracts. Vegetable Plaiting materials; vegetable Products Not Elsewhere Specified or Included. Animal or Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes. Residues and Waste From the Food Industries; Prepared Animal Fodder.

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	**CHAPTERS IN HS CLASSIFICATION**	**TYPES OF COMMODITIES**
Jordbruk, Livesmedel (Agriculture, Food)	2-4, 7-9, 11, 16-22, 24	Meat and Edible Meat Offal. Fish and Crustaceans, Molluscs and Other Aquatic Invertebrates. Dairy Produce; Bird's Eggs; Natural Honey; Edible Products of Animal Origin; Not Elsewhere Specified or Included. Edible Vegetables and Certain Roots and Tubers. Edible Fruit and Nuts; Peel of Citrus Fruit or melons. Coffee, Tea, Maté and Spices. Products of the Milling Industry; Malt; Starches; Insulin; Wheat Gluten. Preparations of Meat, of Fish or of Crustaceans, Molluscs or Other Aquatic Invertebrates. Sugars, and Sugar Confectionery. Cocoa and Cocoa Preparations. Preparations of Cereals, Flour, Starch or Milk; Pastrycooks' Products. Preparations of Vegetables, Fruit, Nuts or Other Parts of Plants. Miscellaneous Edible Preparations. Beverages, Spirits and Vinegar. Tobacco and Manufactured Tobacco Substitutes.

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Kemi (Chemicals)	25-40	Salt; Sulphur; Earths and Stone; Plastering Materials, Lime and Cement. Ores, Slag and Ash. Mineral Fuels, Mineral Oils and Products of Their Distillation; Bituminous Substances; Mineral Waxes. Inorganic Chemicals; Organic or Inorganic Compounds of Precious Metals, of Rare-Earth Metals, of Radioactive Elements or of Isotopes. Organic Chemicals. Pharmaceutical Products. Fertilizers. Tanning or Dyeing Extracts; Tannins and Their Derivatives; Dyes, Pigments and Other Coloring Matter; Paints and Vanishes; Putty and Other Mastics; Inks. Essential Oils and Resinoids; Perfumery, Cosmetics or Toilet Preparations. Soap, Organic Surface-active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, Prepared Waxes, Polishing or Scouring Preparations, Candles and Similar Articles, Modeling Pastes, "Dental Waxes" and Dental Preparations with a Basis of Plaster. Albuminoidal Substances; Modified Starches; Glues; Enzymes. Explosives; Pyrotechnic Products; Matches; Pyrophoric Alloys; Certain Combustible Preparations. Photographic or Cinematographic Goods. Miscellaneous Chemical Products. Plastics and Articles Thereof. Rubber and Articles Thereof.

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Textil (Textiles)	50-67	Silk. Wool, Fine or Coarse Animal Hair; Horsehair Yarn and Woven Fabric. Cotton. Other Vegetable Textile Fibers; Paper Yarn and Woven Fabrics of Paper Yarn. Man-Made Filaments. Man-Made Staple Fibers. Wadding, Felt and Nonwovens; Special Yarns; Twine; Cordage, Ropes and Cables and Articles Thereof. Carpets and Othertextile Floor Coverings. Special Woven Fabrics; Tufted Textile Fabrics; Lace; Tapestries; Trimmings; Embroidery. Impregnated, Coated, Covered or Laminated Textile Fabrics; Textile Articles of a Kind Suitable for Industrial Use. Knitted or Crocheted Fabrics. Articles of Apparel and Clothing Accessories, Knitted or Crocheted. Other Made Up. Textile Articles; Sets; Worn Clothing and Worn Textile Articles; Rags. Footwear, Gaiters and the Like; Parts of Such Articles. Headgear and Parts Thereof. Umbrellas, Sun Umbrellas, Walking Sticks, Seat-Sticks, Whips, Riding-Crops and Parts Thereof. Prepared Feathers and Down and Articles Made of Feathers or of Down; Artificial Flowers; Articles of Human Hair

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Metall (Metals)	72-83	Iron and Steel. Articles of Iron or Steel. Copper and Articles Thereof. Nickel and Articles Thereof. Aluminum and Articles Thereof. Lead and Articles Thereof. Zinc and Articles Thereof. Other Base Metals; Cements; Articles Thereof. Tools, Implements, Cutlery, Spoons and Forks, of Base Metal: Parts Thereof of Base Metal. Miscellaneous Articles of Base Metal

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Maskiner, Electr, Instruments (Machines, Electronics, Instruments)	84-85, 90	Nuclear reactors, Boilers, Machinery and Mechanical appliances; Parts thereof. Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and ‘accessories of Such Articles. Optical, Photographic, Cinematogrphic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Parts and Accessories Thereof.

Harmonized Commodity Description and Coding System (HS Classification)

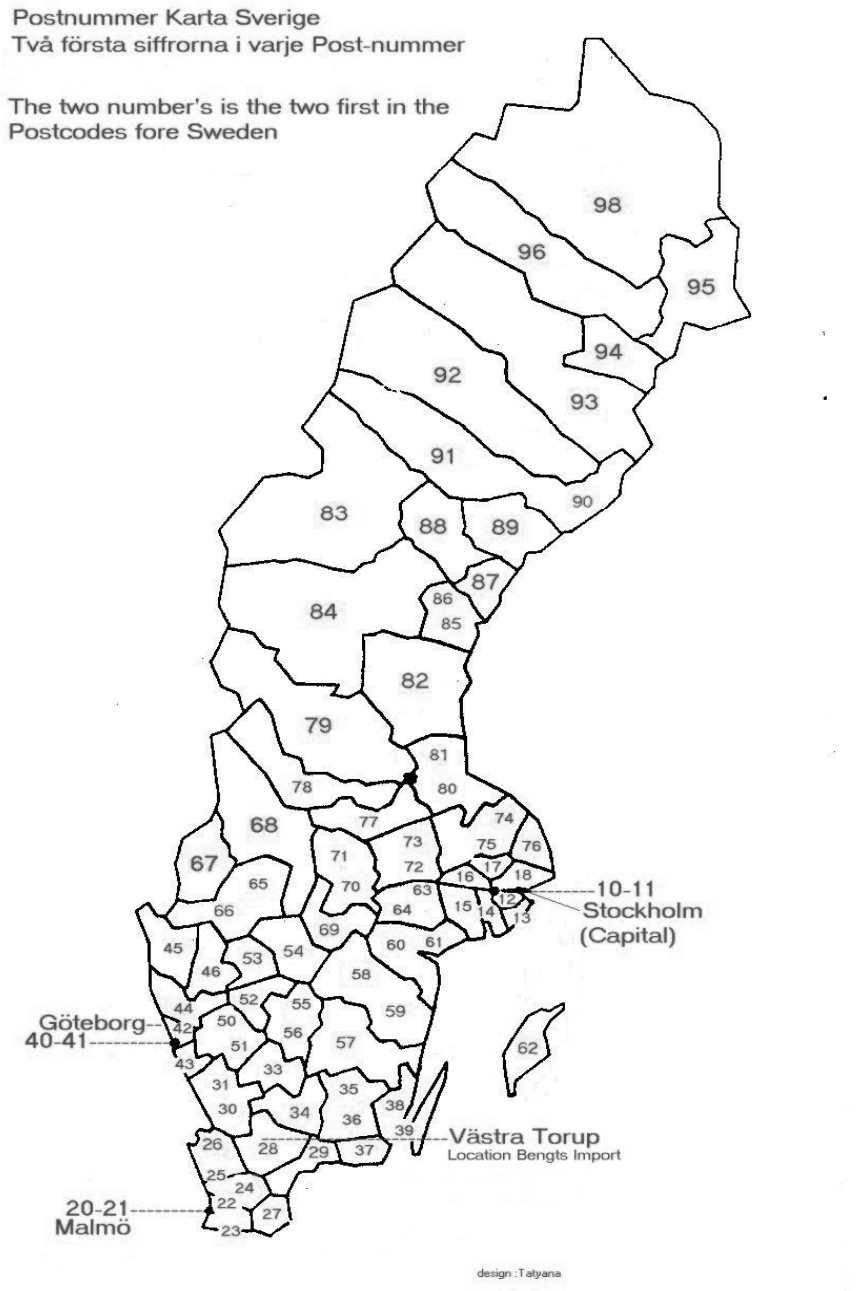
COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Diverse (Others/Miscellaneous)	41-49, 68-71, 86-89, 91-96	Raw Hides and Skins (Other Than Furskins) and Leather. Articles of Leather; Saddlery and Harness; Travel Goods, Handbags and Similar Containers; Articles of Animal Gut (Other Than Silk-Worm Gut). Furskins and Artificial Fur, Manufactures Thereof. Wood and Articles of Wood; Wood Charcoal. Cork and Articles of Cork. Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware Wickerwork. Pulp of Wood or of Other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard. Paper and Paperboard; Articles of Paper Pulp, of Paper or of Paperboard. Printed Books. Newspapers, Pictures and Other Products of the Printing Industry; Manuscripts, Typescripts and Plans. Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials.

Harmonized Commodity Description and Coding System (HS Classification)

COMMODITY GROUP	CHAPTERS IN HS CLASSIFICATION	TYPES OF COMMODITIES
Diverse (Others/Miscellaneous) (continued)	41-49, 68-71, 86-89, 91-96	Ceramic Products. Glass and Glassware. Natural or Cultured Pearls, Precious or Semi-precious Stones, Precious Metals, Metals Clad with Precious Metal, and Articles Thereof; Imitation Jewelry; Coin. Railway or Tramway Locomotives, Rolling Stock and Parts Thereof; Railway or Tramway Track Fixtures and Fittings and Parts Thereof; Mechanical (Including Electro-Mechanical) Traffic Signalling Equipment of all kinds. Vehicles Other Than Railway or Tramway Rolling Stock, and Parts and Accessories Thereof. Aircraft, Spacecraft, and Parts Thereof. Ships Boats and Floating Structures. Clocks and Watches and Parts Thereof. Musical Instruments; Parts and Accessories of Such Articles. Arms and Ammunition; Parts and Accessories Thereof. Furniture, Bedding; Mattresses, Mattress Supports, Cushions and Similar Stuffed Furnishings; Lamps and Lighting Fittings, Not Elsewhere Specified or Included; Illuminated Signs, Illuminated Name-Plates and the Like; Prefabricated Buildings. Toys, Games and Sports Requisites; Parts and Accessories Thereof. Miscellaneous Manufactured Articles.

APPENDIX 3

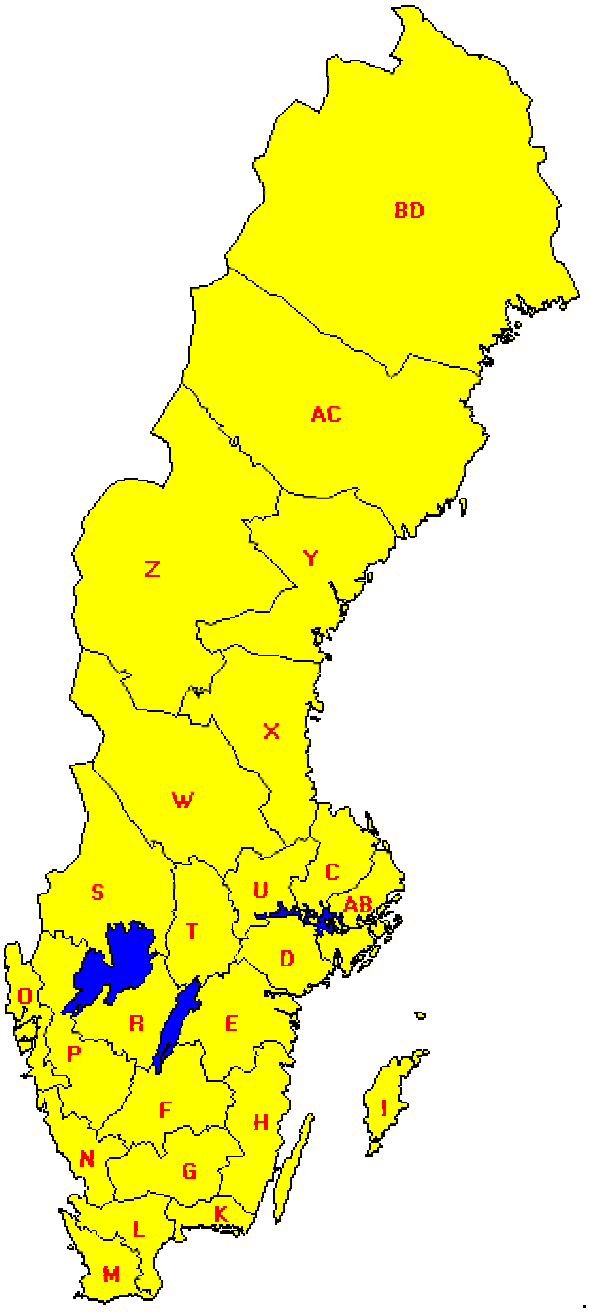
POSTCODES MAP (SWEDEN)



Source: http://www.bengts.com/postnr.jpg

APPENDIX 4

COUNTIES OF SWEDEN

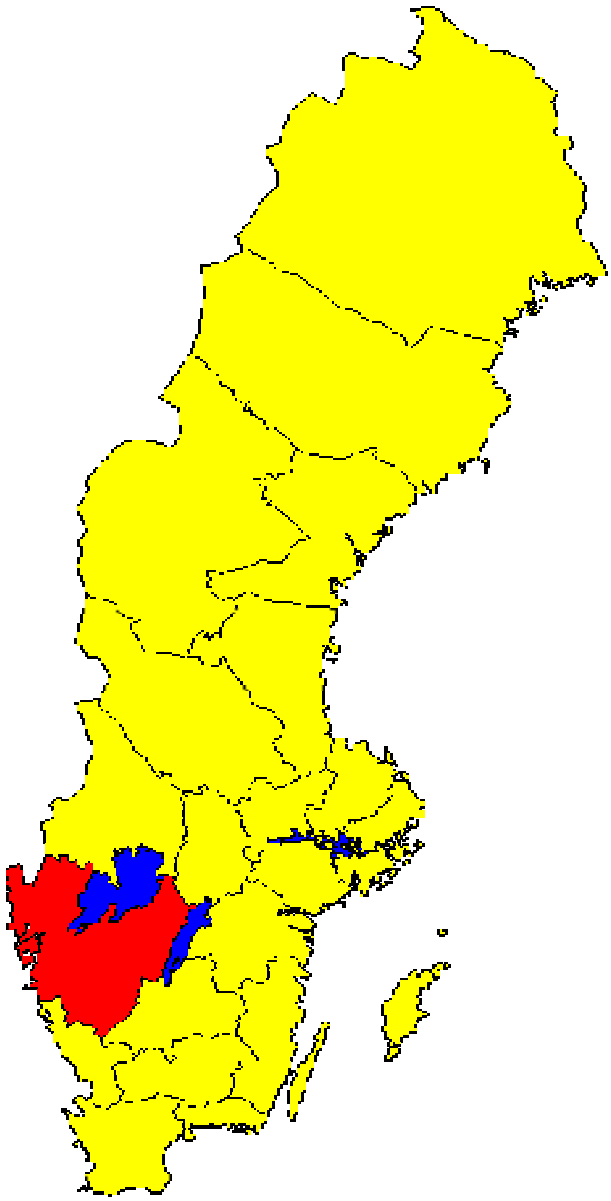


AB - Stockholm County
C - Uppsala County
D - Södermanland County
E - Östergötland County
F - Jönköpings County
G - Kronoberg County
H - Kalmar County
I - Gotland Community
K - Blekinge County
L-M - Skåne Region
N - Halland County
O-R - Västra Götalands Region
S - Värmland County
T - Örebro County
U - Västmanland County
W - Dalarna County
X - Gävleborg County
Y - Västernorrland County
Z - Jämtland County
AC - Västerbotten County
BD - Norrbotten County

Source: http://www.smittskyddsinstitutet.se/English/archive/counties/counties.htm

APPENDIX 5

COUNTY MAP (Västra Götaland Region)



Source:
http://www.smittskyddsinstitutet.se/English/archive/counties/counties.htm