



HÖGSKOLAN  
DALARNA

## **Degree Project**

Master

### **Economic growth in Sweden, 2000-2010**

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#### **The dot-com bubble and the financial crisis**

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# Abstract

Economic growth is the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. The total output is the quantity of goods or services produced in a given time period within a country. Sweden was affected by two crises during the period 2000-2010: a dot-com bubble and a financial crisis. How did these two crises affect the economic growth?

The changes of domestic output can be separated into four parts: changes in intermediate demand, final domestic demand, export demand and import substitution. The main purpose of this article is to analyze the economic growth during the period 2000-2010, with focus on the dot-com bubble in the beginning of the period 2000-2005, and the financial crisis at the end of the period 2005-2010. The methodology to be used is the structural decomposition method.

This investigation shows that the main contributions to the Swedish total domestic output increase in both the period 2000-2005 and the period 2005-2010 were the effect of domestic demand. In the period 2005-2010, financial crisis weakened the effect of export. The output of the primary sector went from a negative change into a positive, explained mainly by strong export expansion. In the secondary sector, export had most effect in the period 2000-2005. Nevertheless, domestic demand and import ratio had more effect during the financial crisis period. Lastly, in the tertiary sector, domestic demand can mainly explain the output growth in the whole period 2000-2010.

**Keywords:** Input-output data, Decomposition method, Swedish economy, Dot-com bubble, Financial crisis

## Table of contents

<b>1. Introduction.....</b>	<b>1</b>
<b>2. Literature review .....</b>	<b>2</b>
2.1 Economic growth in 2000-2010.....	2
2.2 Structural decomposition analysis.....	3
2.3 Other areas of the research using input-output data.....	5
<b>3. An overview of the Swedish economy .....</b>	<b>5</b>
<b>4. Methodology and data .....</b>	<b>8</b>
4.1 Structural decomposition method .....	8
4.1.1 Fundamentals of structural decomposition method .....	8
4.1.2 Input-output structural decomposition model .....	9
4.2 Input-output data .....	11
4.3 Input-output data for Sweden, 2010.....	12
<b>5. Investigation of the Swedish economic growth during the period 2000-2010.....</b>	<b>14</b>
5.1 Total economy.....	14
5.1.1 Period 2000-2005.....	14
5.1.2 Period 2005-2010.....	15
5.1.3 Demand and supply shock .....	16
5.1.4 Details of domestic demand.....	16
5.1.5 Export expansion versus import substitution. ....	18
5.1.6 Intermediate demand.....	18
5.2 Three sectors .....	18
5.2.1 Shares of total economy, 2000-2010.....	19
5.2.2 Primary sector .....	19
5.2.3 Secondary sector .....	20
5.2.4 Tertiary sector .....	20

5.3 Disaggregated level .....	21
<b>6. Conclusions .....</b>	<b>22</b>
<b>References .....</b>	<b>24</b>
<b>Appendix .....</b>	<b>27</b>

# 1. Introduction

Gross domestic product is the quantity of goods and services produced in a given time period. Economic growth is then the change in the value of output of goods and services measured in constant prices. Governments are interested in increasing economic growth, so research on how to promote economic growth is important.

The period 2000-2010 was, to some extent, a dramatic period and there were two crises during the period: dot-com bubble and financial crisis. The dot-com bubble was the speculative bubble that related to information technology and Internet in the beginning of the 21<sup>st</sup> century. Because of the investment of speculators, equity value rose rapidly from growth in the Internet sector and related fields. NASDAQ index reached a peak of 5048.6 on March 10, 2000. After that, NASDAQ index fell rapidly, the bubble burst. On March 20, 2000, the NASDAQ had lost more than 10 percent from its peak. On March 9, 2001, one year after the peak, NASDAQ index was only 2052.8. Some companies went bankrupt. Others lost market shares.

In 2008, a financial crisis swept over the world. This crisis started in the United States, but there are various views on the fundamental causes: imprudent mortgage lending, housing bubble, global imbalances, etc. (Jikling 2010). These two crises also affected the Swedish economy at the same time.

Input-output table is a kind of balance table that reflects the interrelation between different sectors. An input-output table can reveal the interdependence and restriction between the various economic units in the production process. Input-output tables include the output of each sector, and show how the sector's output is related to other sectors of the economy. On the other hand, it also shows how intermediate goods and services are allocated in the economy.

Lastly, by using the input-output table, we can divide the change of production into several parts. We can also analyze why and how the production changes over different periods of time.

The main purpose of the thesis is to analyze the economic growth during the period 2000-2010, with focus on the dot-com bubble in the beginning of the period and the financial crisis during the period 2009-2010. Input-output data will be used for this analysis. In the input-output table, we can see how resources have been used in different Swedish sectors but

also the production in different sectors. The change of domestic output can be divided into four parts: immediate demand, final domestic demand, export demand and import substitution. Here, I address the question why output changes in different sectors and the total economy. According to the result, government officials can, to some extent, adopt measures to stimulate economic growth. The main contribution of this thesis is that it is the first time to analyze the effects of dot-com bubble and financial crisis to Sweden by using structural decomposition method.

An outline of the rest thesis is as follows: the literature review is discussed in the next chapter. An overview of the Swedish economy is shown in Chapter 3. Methodology and data are presented in Chapter 4. The investigation of the Swedish economic growth is in Chapter 5, and the paper is concluded in Chapter 6.

## **2. Literature review**

### **2.1 Economic growth in 2000-2010**

Kraay and Ventura (2007) discussed the relationship between fiscal deficits and the stock market. According to the conventional view, the evolutions of the stock market and fiscal deficits are more or less unrelated events, with the former driven by sharp swings in U.S. productivity and the latter by shifting U.S. political consideration. Nevertheless, Kraay and Ventura proposed that the stock market and the fiscal deficits are closely linked. According to the benevolent view, the government reacts to the inefficient investments by running large budget deficits and expanding public debt sufficiently in order to raise the demand. Furthermore, the collapse of the stock market in 2000 was the outcome of coordination failure and changes in investor sentiment, as well as the rapid expansion of public debt.

The Economic and Commercial Counsellor's office of the Embassy of China in Sweden published an article "The impact of global financial crisis on the Swedish economy" in 2009. This article said that the decline of the Swedish economy was a consequence of the internal and external causes. The internal cause was that the Swedish economy was in a cyclical downturn, while the external cause was the financial crisis burst. Considering the internal cause, the price of food and energy and interest rates kept a rise in recent years, which placed a burden on the people. The worry about unemployment and the depression of the stock market, reduced the people's consumer confidence. Externally, bankruptcy of

Lehman Brothers reduced the people's confidence in the financial system. Banks tightened credit, and corporate borrowing became difficult. At the same time, the financial crisis pushed up household and corporate borrowing rates, which also affected the real economy. Another external cause was that the Swedish economy was a small open economy, which relied on Europe and the United States. The shrink on the market of Europe and America caused the decline of order form of Swedish corporate.

Swedish Prime Minister's Office published a progress report “The Swedish Reform Program for Growth and Jobs” in 2009. The Progress Report focused on the most important measures adopted by the government on account of the financial and economic crisis. It covered responsibility for public finances, for jobs and for the core welfare activities. The Swedish Prime Minister aimed to create room for increased welfare and met the challenges of the future. The integrated guidelines consisted of the Broad Economic Policy Guidelines and the Employment Guidelines. Within the framework of the overall target for sustainable development, the guidelines addressed the most critical challenges ahead, such as globalization, the aging population and environmental challenges. Moreover, they also focused on reforms to promote competitiveness and economic growth as well as more and better jobs.

## **2.2 Structural decomposition analysis**

Chenery (1960) and Chenery et al. (1962) provided the original development of the decomposition methodology. Syrquin (1976) extended it. In these papers, they gave the basic decomposition of the change in sectoral output into discrete sources, i.e., change in domestic demand, exports, import ratio and intermediate demand.

Melen (2006) analyzed the Swedish economy with input-output data by using structural decomposition method and by calculating total requirement coefficients. He found that the most important structural change during the period 1995-2000 was an increase in the manufacturing industries share of total production and a decline in the service sectors' share. The study also showed that the Swedish growth in production during the period to the largest extent can be attributed to growth in export and the change in domestic demand. Growth in export was also the main reason for the increase in primary and secondary sectors' production. Investigating total requirement coefficients, it was shown that the air transport sector had the largest output multiplier. The electricity sector had the smallest one.

An input-output analysis of the Swedish economy for the period 1995-2005 was performed by Lind (2010). The main conclusions of this investigation are that the share of domestic intermediary products has decreased and that the role of import has increased. An increased final demand implies therefore a larger share of intermediary goods, and the import leakage has increased.

During the last decade an increased interest in studying the effects of the globalization on service and labor markets can be noticed. Ekholm and Hakkala study the effects of offshoring on labor demand (2006), while Eliasson, Hansson and Lindvert (2012) investigate the effects of the increased world trade for the goods and services markets in Sweden. They observe that the employment has increased in tradable service, while it has fallen in the manufacturing sector since the middle of the 1990s.

The world's production structure has become more fragmented during the last decades, in the meaning that production has split into different tasks. The National Board of Trade (2010) conducted an analysis of the dependency of exports on imports and discussed the consequences for trade policy. The calculations were based on Swedish input-output table for 1995 and 2005. One of the conclusions was that Sweden is more dependent on service exports than what is shown by trade statistics.

Stocker at Sustainable Europe Research Institute made a speech in ConAccount Meeting in 2004. The title of the speech was "Modeling Changes in Resource Use of the Austrian Economy." Stocker used input-output analysis and decomposition analysis. And she parted the entire change of resource use into three effects: technology effect, structural effect and final demand effect. She found that the total resource use decreased from 1995 to 2000. The main reason for this decrease was the decrease in technology effect. Much reduction was achieved by decreasing the material use per unit of output. Since only domestic resource extraction was considered, the analysis did not provide a comprehensive picture of the Austrian resource use.

Li and Duan (2006) showed that both the intermediate input and intermediate consumption (the amount of the difference between gross output and GDP) were rising with the development of Chinese economy. Generally speaking, most of the industries tended to use more utilities-intensive (such as electricity and water) products while reducing the inputs share to the consumption manufacturing, mining product and service. The change of input coefficients indicated the change of Chinese economic system: (1) the proportion of the

secondary sector increased; (2) economic links between sectors became stronger; (3) Chinese economic growth relied on intermediate input and capital accumulation.

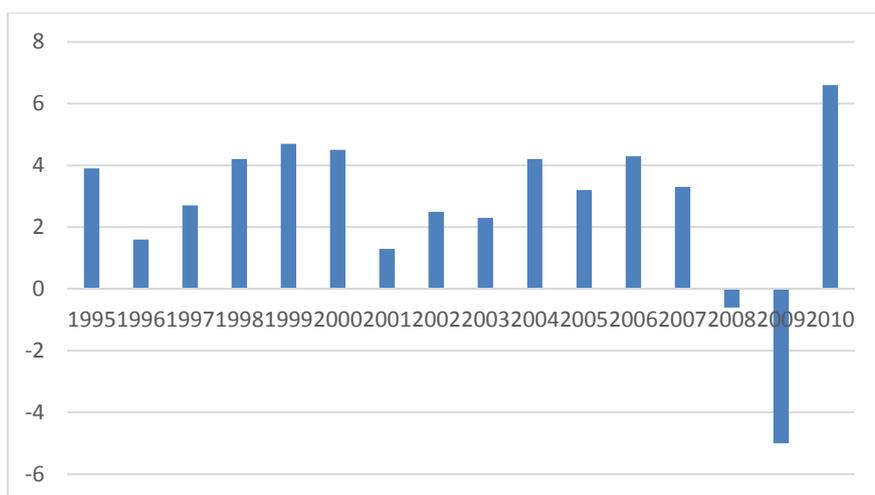
### **2.3 Other areas of the research using input-output data**

Munksgaard et al. (2005) showed how the input-output table can be utilized to enumerate the problem of sustainable consumption. They presented measures of the emissions of carbon dioxide at the different level: nation, city and household. Then, they took more environmental effects into account and introduced the concept of environmental efficiency by combining input-output modeling and data envelopment analysis. The article demonstrated that input-output modeling had a wide range of life-cycle oriented applications when combined with other data sources such as detailed trade statistics, foreign input-output and environmental statistics, and household expenditure data.

In the Indian context, while the authorities started to prepare a Tourism Satellite Account, the inter-linkages of tourism with other industries was not known, as tourism does not feature in the framework of the nation's input-output table as a separate industry. Munjal (2013) attempted to fill this void and analyzed the tourism industry's inter-linkages by placing it in the frame work of the Input-Output Transactions Table (IOTT) and quantifying its overall impact on other industries through multiplier analysis. The study showed that the expansion of industries such as air transport, surface transport, infrastructure, and hotels and restaurants benefited the tourism industry quite significantly. Furthermore, the tourism industry had strong backward linkages with numerals industries, particularly service industries.

## **3. An overview of the Swedish economy**

In this part, there will be a brief summary of the Swedish economic growth at the aggregated level as well as at a more disaggregated level. We discuss the aggregated level first.



**Figure 1.** Gross domestic production 1995-2012, percentage changes

Source: Statistics Sweden

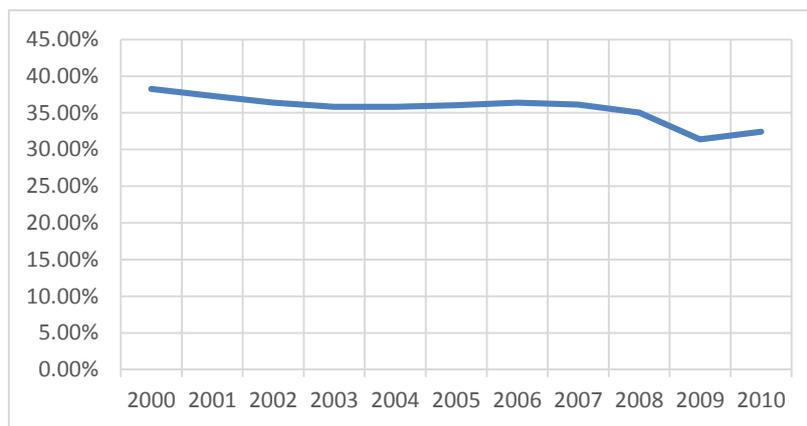
As can be seen in Figure 1, the economic growth over the period 1995-2010 was positive except for two years, 2008 and 2009. The growth rate was fairly strong during the periods 1998-2000 and 2004-2007. The growth rate was the strongest in the year 2010. We can see that the financial crisis made a huge influence in the Swedish economy.

We will first briefly consider the first part of the decade 2000-2010. Data from Statistic Sweden shows: In 2001, the growth rate of investment was 2.2%, growth rate of consumption was 1.1%, export decreased 3.3%, import decreased 3.1%, unemployment rate was 4%, and the inflation rate was about 3%. The Swedish economy is highly export-oriented economy. From foreign trade statistics, Swedish manufactured goods exports fell by a large margin. The reason was the decrease in demand for information communication technology (ICT) products and cars in the international market (The Economic and Commercial Counsellor's office of the Embassy of China in Sweden 2002). Bankruptcies of Internet companies caused a decline in the supply of ICT products. So dot-com bubble was part of the reasons that the growth rate of production decreased in 2001.

The latter part of the decade is largely influenced by the financial crisis of that time. Prime Minister's Office (2008) indicated that during the first half of 2008, GDP growth slowed as a result of the moderation of the rate of growth in both external and domestic demand. The conditions for household consumption had worsened partly due to the continuing international financial turmoil. For 2008 and 2009, weaker global growth was supposed to cause a drop in demand for Swedish exports and a moderation in export growth.

The sharp productivity slowdown in Sweden in 2007 and the beginning of 2008 helped increase cost pressures, making it more difficult for Swedish firms to compete in global markets.

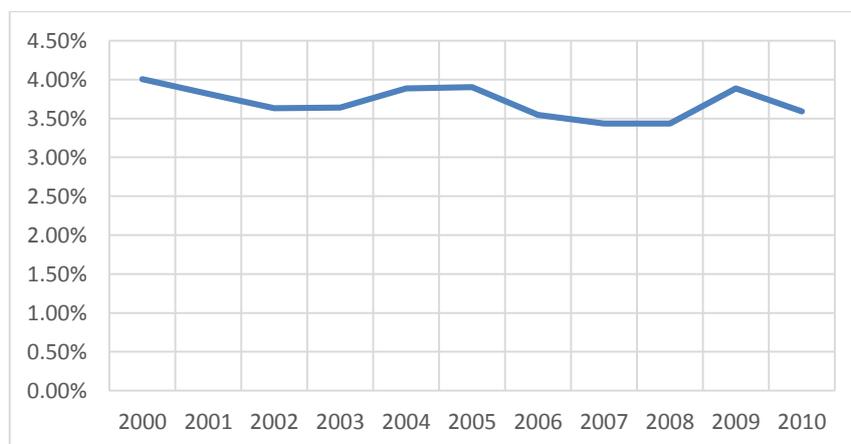
After this brief overview of the economic growth changes in real GDP, we now present the development of shares of production of the total market in the manufacturing and the financial sector. These two sectors are important in the Swedish economy, and they will be discussed more thoroughly below.



**Figure 2.** Development of share of manufacturing production to total market producer production

Source: Statistics Sweden

The development of the manufacturing share slightly decreased in 2000-2003, while the share was fairly stable in 2003-2008. A large decrease appeared in 2009, the time that the financial crisis broke out. However, in 2010, the sector recovered to some extent.



**Figure 3.** Development of share of financial production to total market producer production

Source: Statistics Sweden

In Figure 3, we can see that the share of financial sector presented a cyclical fluctuation. The period 2000-2005 was the first cycle, and the period 2005-2009 was the second one. In each cycle, shares of financial sector decreased at the beginning and then increased later. The shares' rise in 2008-2009 looks strange. During a financial crisis, how can shares of financial sector still increase? We will analyze this growth pattern in a later chapter.

## 4. Methodology and data

A market economy at a general level consists of only two sets of actors, "producers" using inputs and delivering products and "households" consuming products and delivering factor services. There are three markets: factor markets, product markets and the international market. Households only provide factor service to producers in the factor market. However, in product markets, there are three sets of customers. Producers not only deliver final goods to households, but also deliver intermediate goods to other domestic producers and for export. Foreign countries will as well deliver the goods into the product market for domestic final use and intermediate use. Here, we may introduce some rudimentary concept of input-output table first. An input-output table contains intermediate use matrix, final use matrix and value added matrix. In this research, we only consider the first two matrixes.

### 4.1 Structural decomposition method

#### 4.1.1 Fundamentals of structural decomposition method

The core idea of structural decomposition method is to decompose the change in the dependent variable to several independent factors and measure the contribution of each factor. For example, if the change of one economic variable X can be affected by two factors, R and Y, i.e.

$$X=RY \tag{1}$$

Denoting the change of variables X, R and Y are  $\Delta X$ ,  $\Delta Y$  and  $\Delta R$ , which are  $\Delta X = X_2 - X_1$ ,  $\Delta R = R_2 - R_1$  and  $\Delta Y = Y_2 - Y_1$ .

We now have

$$\begin{aligned} \Delta X &= X_2 - X_1 = R_2 Y_2 - R_1 Y_1 = (R_2 - R_1) Y_1 + R_1 (Y_2 - Y_1) + (R_2 - R_1) (Y_2 - Y_1) \\ &= \Delta R Y_1 + \Delta Y R_1 + \Delta R \Delta Y \end{aligned} \tag{2}$$

At the same time, we have

$$\begin{aligned}\Delta X &= X_2 - X_1 = R_2 Y_2 - R_1 Y_1 = (R_2 - R_1) Y_2 + R_2 (Y_2 - Y_1) - (R_2 - R_1) (Y_2 - Y_1) \\ &= \Delta R Y_2 + \Delta Y R_2 - \Delta R \Delta Y\end{aligned}\quad (3)$$

$\Delta R Y_1$  or  $\Delta R Y_2$  is the initial effect of variable R,  $\Delta Y R_1$  or  $\Delta Y R_2$  is the initial effect of variable Y and  $\Delta R \Delta Y$  is the reciprocal effect of R and Y. In order to remove the reciprocal effect. We average the equation (2) and (3).

$$\Delta X = \frac{1}{2} (\Delta R) (Y_1 + Y_2) + \frac{1}{2} (R_1 + R_2) (\Delta Y) \quad (4)$$

The first part on the right hand is the effect of R and the second part is the effect of Y

#### 4.1.2 Input-output structural decomposition model

Dervis et al. (1982) provided a model for an open economy. Define the following variables:

$Q_{ij}$  = flow of intermediate goods from sector i to sector j

$Q_i$  = production in sector i

$D_i$  = final demand for sector i

$W_i$  = intermediate demand in sector i

$E_i$  = export demand for sector i

$M_i$  = import demand for sector i

Assuming a fixed coefficient technology, the input-output coefficients are constant and are given by

$$a_{ij} = \frac{Q_{ij}}{Q_j} \quad (5)$$

The output is delivered to other sectors, consumer market and foreign market. Foreign countries also deliver their goods to our product market. So the rows of the nominal input-output accounts can be written as

$$Q_i = \sum_j Q_{ij} + D_i + E_i - M_i \quad (6)$$

Plugging (5) into (6):

$$Q_i = \sum_j a_{ij} Q_j + D_i + E_i - M_i \quad (7)$$

In matrix notation, we get

$$Q = AQ + D + E - M \quad (8)$$

$\sum Q_{ij}$  is the intermediate use of production  $i$ , which is  $W_i$ . So,  $AQ = W$

The import ratio is

$$m_i = \frac{M_i}{D_i + W_i} \quad (9)$$

We can structure a diagonal matrix with coefficients  $m_i$ ,  $\mathbf{m}$ .

Now equation (8) can be formulated:

$$Q = AQ + D + E - m(D + AQ) \quad (10)$$

Solving for matrix  $\mathbf{Q}$ , we can get

$$Q = (I - (I - m)A)^{-1}((I - m)D + E) \quad (11)$$

In the equation (11), we can see that the change of  $Q$  is affected by the change of  $A$ ,  $m$ ,  $D$  and  $E$ . The first multiplier on the right hand side, is the total requirement coefficient  $R$ . We define

$$R = (I - (I - m)A)^{-1} \quad (12)$$

So, we can simplify equation (11) to

$$Q = R((I - m)D + E) \quad (13)$$

Denoting the change in a variable by  $\Delta$  [ $\Delta Q = Q_{t+1} - Q_t$ ]. After some algebraic manipulation given by Chenery, Kubo and Robinson (1979), the change in total domestic demand can be written as

$$\Delta Q = R_2(I - m_2)\Delta D + R_2\Delta E + R_2(I - m_2)(\Delta A)Q_2 + R_2(\Delta(I - m))(A_1Q_1 + D_1) \quad (14)$$

The four parts on the right side can be divided into:

$R_2(I - m_2)\Delta D$	-effect of domestic demand expansion
$R_2(I - m_2)(\Delta A)Q_2$	-effect of changes in intermediate demand
$R_2\Delta E$	-export expansion
$R_2(\Delta(I - m))(A_1Q_1 + D_1)$	-import substitution

This equation means that the change in output is the sum of the effects of domestic demand expansion, changes in intermediate demand, export expansion and import substitution. Equation (14) is the formula for the year 2. For the year 1, we can also get the formula which is similar to the year 2:

$$\Delta Q = R_1(I - m_1)\Delta D + R_1\Delta E + R_1(I - m_1)(\Delta A)Q_1 + R_1(\Delta(I - m))(A_2Q_2 + D_2) \quad (15)$$

The results from equation (14) and equation (15) will be a little different. In practice, we use the average value of these two results (Dietzenbacher and Los 1997).

R, which we talked on the preceding paragraph, is the total requirement coefficients matrix. We also call it Leontief inverse. Its economic meaning is: when we want to increase one-unit final demand of one sector, how much intermediate production will be needed from other sectors. The elements of R,  $r_{ij}$ , means the total requirement for sector i when one-unit demand increase in sector j. The sum of each column in matrix, R, is the output multiplier. The output multiplier shows the sensitivity of production in a sector when other productions change. From the equations (12) and (13), we can see that the output multiplier only depends on the import ratio and value added shares. The higher import ratio and value added shares, the lower output multiplier.

## 4.2 Input-output data

The input-output tables used here are produced by Statistics Sweden. They are all symmetric input-output tables, which have been produced as an integrated part of the National Accounts (NA). The Swedish NA was adapted from the European System of National Accounts (ESA95) and is fully consistent with the worldwide guidelines on national accounting (System of National Accounts, SNA93). These three tables contain the input-output data for 2000, 2005 and 2010, in current prices. All these tables are derived from the supply and use tables (annual GDP calculations). They are product-by-product tables created

under the assumption of industry technology. The industry technology assumption assumes that industries produce both primary and secondary commodities with the same fixed industry input structure, no matter what type of commodity (Almon 2000).

These input-output tables contain 60 products and 60 industries for the year 2010, and 53 products and 53 industries for the year 2000 and 2005. The tables contain input-output data for total supply, domestic output and imports. These products and industries will be aggregated to a 10\*10 matrix.

**Table 1.** Structure according to Swedish Standard Industrial Classification 2007

Aggregated sector	Includes
1.Agriculture	Agriculture, forestry and fishing
2.Mining	Mining and quarrying
3.Manufacturing	Food, wearing, wood, paper, printing etc.
4.Electricity and water	Electricity, gas ,water, recycling
5.Construction	Constructions and construction works
6.Trade	Wholesale, retail
7.Transport	Land, water and air transport, postal
8.Finance	Finance service, insurance, pension
9.Private sector	Telecommunication, computer program etc.
10.Public sector	Public administration, education, health etc.

Source: Statistics Sweden

### 4.3 Input-output data for Sweden, 2010

Before analysis, we need to change the data in 2005 and 2010 to constant prices. We deflate data in Table 2010 by a CPI (Consumer Price Index) equal to 1.164, and the data in Table 2005 by 1.076 (Statistics Sweden). In order to make it more briefly, we use serial number 1, 2, 3... 10 to replace sector agriculture, mining, manufacturing, electricity and water, construction, trade, transport, finance, private service and public service.

**Table 2.** Aggregated input-output table for Sweden, 2010

## Intermediate flows

Sector	1	2	3	4	5	6	7	8	9	10
1	7727	81	52448	617	602	1573	363	8	4313	1796
2	312	1905	86640	4092	5529	1114	1557	0	1850	92
3	13872	5111	446949	19799	67590	42730	35768	1390	109278	52606
4	1433	2174	42772	13805	2106	5610	4204	706	36406	12750
5	1192	504	4526	4038	2722	3581	4324	1862	68556	9302
6	3844	1497	53565	5063	11523	12586	12367	296	23368	13195
7	815	2714	63199	4465	6492	33066	119117	1457	39204	16453
8	2486	212	10748	2807	2710	4734	3741	17446	45035	5012
9	2086	3240	145739	19081	59191	94991	47543	27759	373974	141346
10	326	216	11273	2247	2425	4014	5777	1759	21960	36559
Total	34094	17653	917860	76012	160892	203998	234760	52684	723944	289111

## Final demand

Sector	Intermediate use	Consumption and investment	Export	Import	Total output
1	69527	25545	14778	31541	78310
2	103091	337	19074	79515	42986
3	795092	422504	872932	782713	1307814
4	121965	55618	10831	17049	171365
5	100607	194900	0	0	295506
6	137303	235250	126611	8649	490516
7	286981	101636	75946	71262	393302
8	94933	58478	13860	11052	156218
9	914951	529332	210070	151806	1502547
10	86557	828605	4954	1515	918601
Total	2711008	2452204	1349056	1155102	5357165

Source: Statistics Sweden

The use of different goods was quite different. Output of agriculture, mining, electricity and water, transport, and private service was mainly used for intermediate input. Output of construction, trade, and public service was used primarily for consumption and investment. Output of manufacturing was mainly used for export.

Table 2 shows the aggregated input-output table for 2010, and input-output tables for 2000 and 2005 can be found in the appendix.

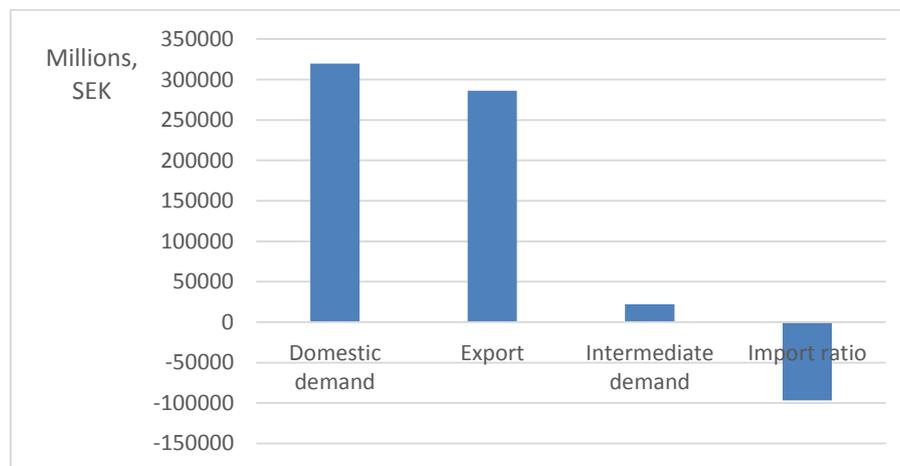
## 5. Investigation of the Swedish economic growth during the period 2000-2010

The structural decomposition method will now be used in order to investigate the Swedish economic growth at three different levels: total economy level, three sector level and disaggregated level. The period 2000-2010 is divided into two periods: 2000-2005 and 2005-2010.

### 5.1 Total economy.

#### 5.1.1 Period 2000-2005

Dot-com bubble burst in the beginning of this period. Using the decomposition method to analyze the data of input-output tables for 2000 and 2005, we get more information about output growth. The total output increased SEK 531422 million from 2000 to 2005. The effect of domestic demand expansion was 319790, the effect of changes in intermediate demand was 22206, the effect of export effect was 286178, and the effect of import substitution was -96750.



**Figure 4.** Structural decomposition, total economy from 2000 to 2005

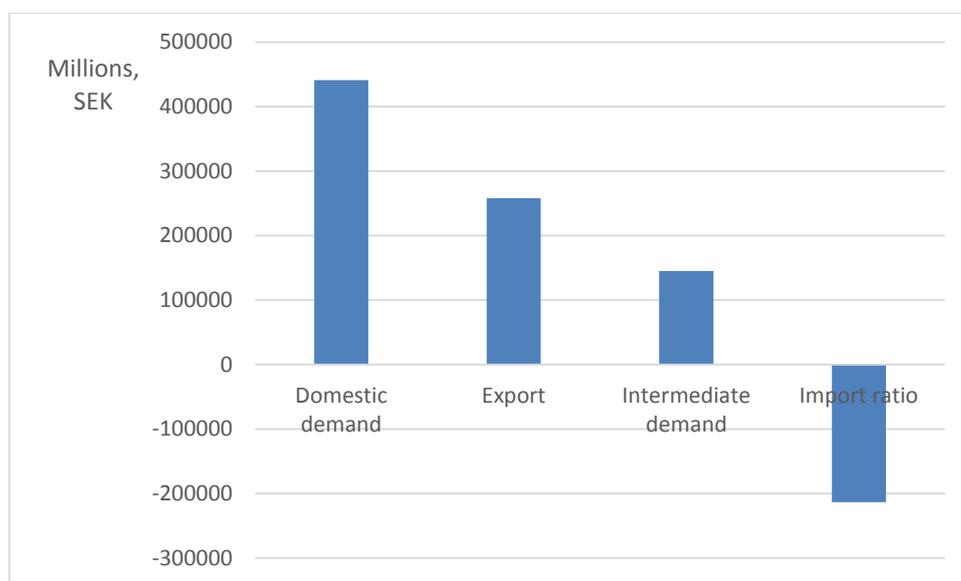
Source: Own calculations based on the Swedish input-output tables 2000 and 2005

Changes in domestic demand, export and intermediate demand made a positive effect on production growth, while changes in import ratio made a negative effect on production growth. The negative effect was smaller than the positive effect, so the total output increased 2000-2005. Changes in domestic demand and export explained most of the change in output growth in the period 2000-2005.

As we mentioned above, dot-com bubble reduced the export of ICT production in 2001, but despite the dot-com crisis, the effects of changes in export were quite large during the period 2000-2005. So at the aggregated level, the dot-com crisis appears to have had limited effects on economic growth in a medium-term period (2000-2005). However, we will also investigate the effects of the dot-com bubble at a more disaggregated level.

### 5.1.2 Period 2005-2010

At the end of the period 2005-2010, the financial crisis came. Total output increased SEK 630419 million from 2005 to 2010, and the main contribution to this increase was the changes in domestic demand. The effect of domestic demand expansion was 440915, the effect of changes in intermediate demand was 145021, the effect of export effect was 257869, and the effect of import substitution was -213386.



**Figure 5.** Structural decomposition, total economy from 2005 to 2010  
Source: Own calculations based on the Swedish input-output tables 2005 and 2010

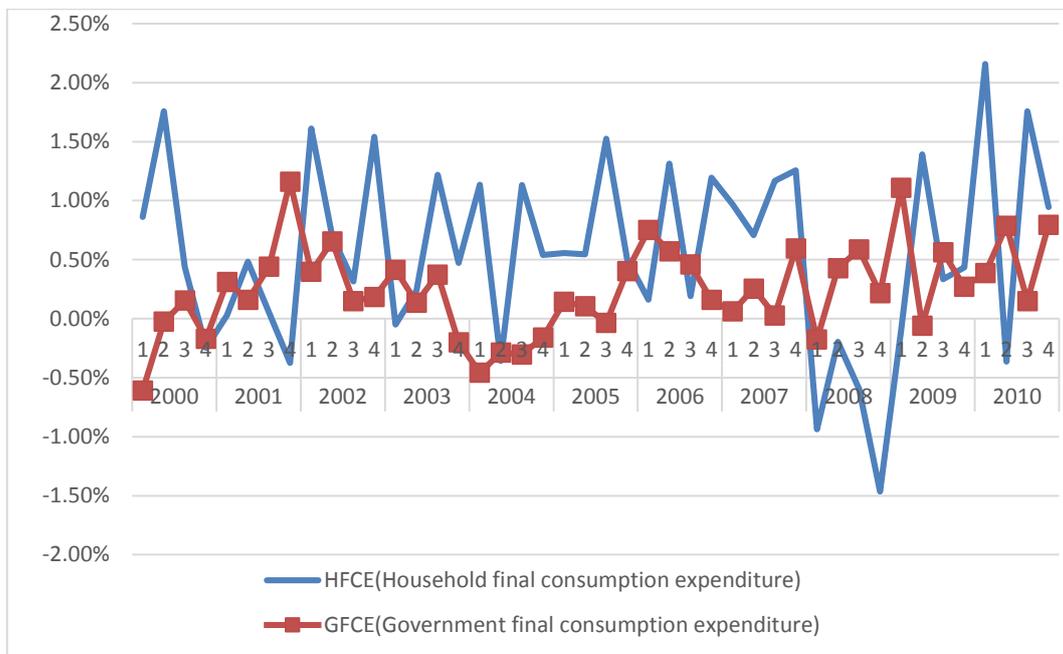
Similar to the period 2000-2005, changes in domestic demand, export and intermediate demand made a positive effect on production growth, while changes in import ratio still made a negative effect on production growth. However, there was some difference between these two periods: in the period 2005-2010, domestic demand, export and import ratio had more effect on output growth. Contrary to the period 2000-2005, the effect of export was lower. The shock of finance crisis restrained the export and enhanced other three factors. Reasons for these differences were various. Demand shock, details of domestic demand, export expansion and import substitution can explain them.

### 5.1.3 Demand and supply shock

Financial crisis can be regarded as negative demand shocks. In economics, a demand shock is a sudden event that increases or decreases demand for goods or services temporarily, while a temporary change in the supply of goods can be seen as a supply shock. During the global financial crisis of 2008, a negative demand shock in the United States economy was caused by several factors that included falling house prices, the subprime mortgage crisis, and lost household wealth, which led to a drop in consumer spending (Thomas 2008). This demand shock had also a major impact on Swedish export in the period 2008-2009.

### 5.1.4 Details of domestic demand

Here we want to investigate the details of changes in domestic demand. Domestic demand contains household consumption, government consumption and investment.



**Figure 6.** Swedish consumption expenditure, change in percent

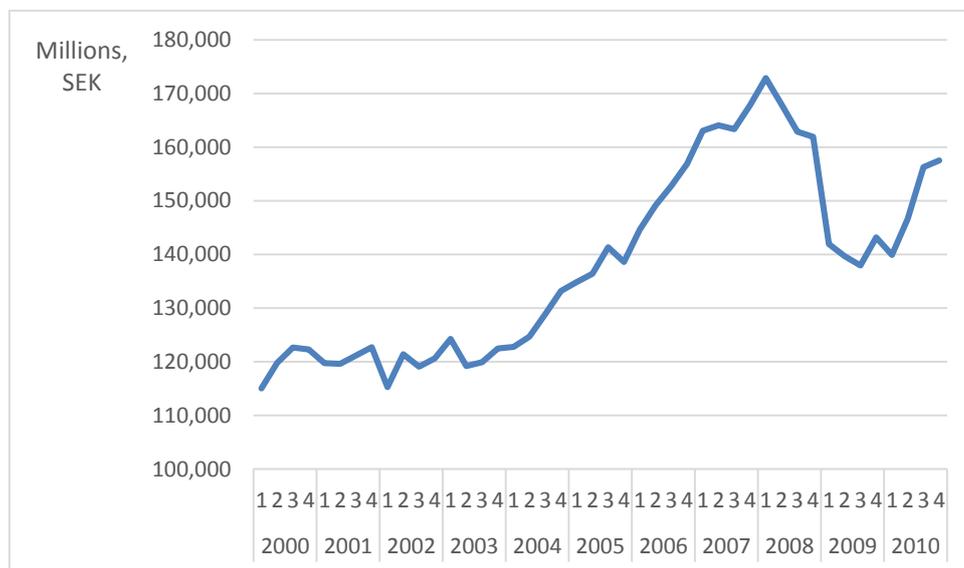
Source: Own calculation based on the Swedish GDP data

In the figure 6, HFCE is the household final consumption expenditure and GFCE is the government final consumption expenditure. Let's investigate the change of real household consumption expenditure. Its growth rate diminished in 2000 as well as in 2001. However, household consumption expenditure grew well in 2002-2007.

Things became worse in the year 2008 and 2009. The growth rate of household's consumption was negative from the 1st quarter of 2008 to the 1st quarter of 2009, while the

consumption grew at a fairly high rate during 2009 and 2010. The change of household consumption explains to some extent the effect of domestic demand on output during the period 2005-2010.

The situation of government expenditure is significantly different from the household expenditure. The government expenditure shows a negative trend in the period 2002-2004, while the growth rate fluctuates during 2008-2010. But the government spending increases during the latter period. We can find that government expenditure decrease in the dot-com bubble, but not in the financial crisis. It seems that the government met the effects of the financial crisis in a slightly different way than of the effects of the dot-com bubble. There is thus indication that the government has performed a more Keynesian policy late in the period 2005-2010 than in the beginning of the period 2000-2005.



**Figure 7.** Swedish total gross fixed capital formation

Source: Statistics Sweden

Lastly, we will study the change in investment. Gross fixed capital kept constant in 2000-2003. It began to increase by the year 2004. When the financial crisis erupted in 2008, it decreased. The effect of investment on output was fairly weak during the period 2000-2005. The growth rate of investment was then strong in the period 2005- 2007 but decreased sharply during 2008-2009. The total effect of investment changes on output during the whole period 2005-2010 is however ambiguous.

### 5.1.5 Export expansion versus import substitution.

**Table 3.** Swedish export and import in the period 2000-2010 in index, year 2000=100

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total imports, SEK million	100	98.56	97.67	101.03	109.89	124.00	139.72	153.85	163.28	135.53	159.01
Total exports, SEK million	100	100.29	100.20	102.69	112.47	121.52	136.58	141.72	148.52	123.75	141.53

Source: Statistics Sweden

In the period 2000-2003, export and import almost held constant, only a slight increase in this period. The data indicate that the period 2003-2008 could be seen as a free-trade period. Export as well as import increased at a rapid rate. The period 2008-2010 showed an opposite picture: export as well as import declined. Import increased 24.00% in the period 2000-2005 and increased 28.23% in the period 2005-2010, while export increased 21.52% in the period 2000-2005 and increased 16.46% in the period 2005-2010. The growth of import substitution is faster than the growth of export expansion. This is why import ratio had more effect in the period 2005-2010.

### 5.1.6 Intermediate demand

The effect of the change in intermediate demand is more difficult to interpret, since the intermediate demand is affected by changes in technology, as well as the effects of substitution in production caused by changes in the relative prices. It can be mentioned that out-sourcing implies a higher intermediate demand. According to Lind (2010) many sectors in the Swedish economy are characterized by higher use of intermediate use of good in production in the period 1995-2005. Large effects of changes in intermediate demand, in the period 2005-2010 indicate that the process of outsourcing continues and that the production of final goods decreases. Ekholm (2008) shows that offshoring, which is the intermediate use of imported goods and services, slightly increased during the period 1995-2003. In summary, increases in outsourcing and offshoring imply a higher intermediate demand.

## 5.2 Three sectors

The total economy can be separated into three sectors: primary sector, secondary sector and the tertiary sector. Primary sector includes agriculture and mining, secondary sector includes manufacturing, electricity and water and construction, and the tertiary sector, lastly,

includes trade, transport, finance, private services and public services. The output of these three sectors may be very different.

### 5.2.1 Shares of total economy, 2000-2010

I calculate the shares of the total economy in 2000, 2005 and 2010.

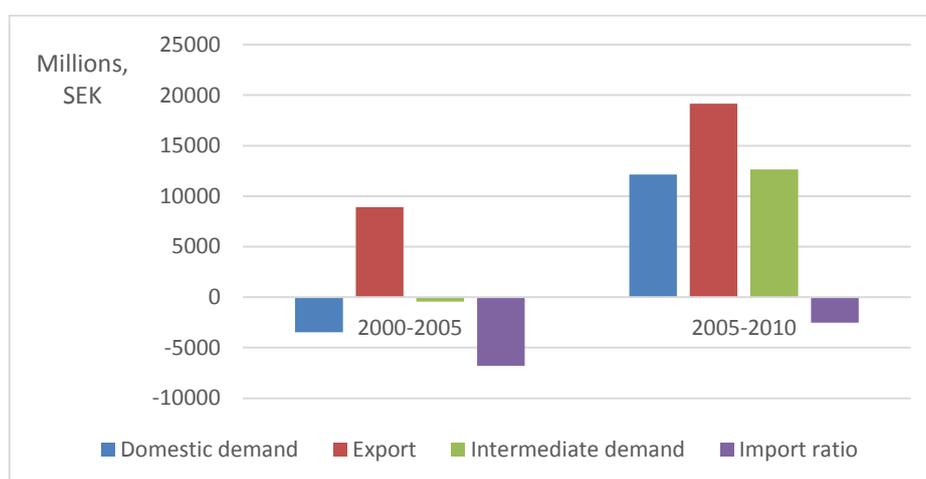
**Table 4.** Shares of total economy in 2000, 2005 and 2010

	2000	2005	2010
Primary	1.94%	1.69%	2.26%
Secondary	36.57%	35.52%	33.11%
Tertiary	61.44%	62.75%	64.58%

Source: Own calculations based on the Swedish input-output tables 2000, 2005 and 2010

The primary sector is quite small, only about 2% of total output. Because Sweden is in high latitudes, it is hard to crop here. Tertiary sector is the largest one, like the other developed countries. There are significant changes in shares of both these three sectors. Share of the primary sector decreased in the period 2000-2005 and increased in the period 2005-2010. Share of the primary sector kept declining in the entire period 2000-2010. However, share of the tertiary sector was growing in 2000-2010. The decomposition method will give a picture of the structural change in the sectors.

### 5.2.2 Primary sector



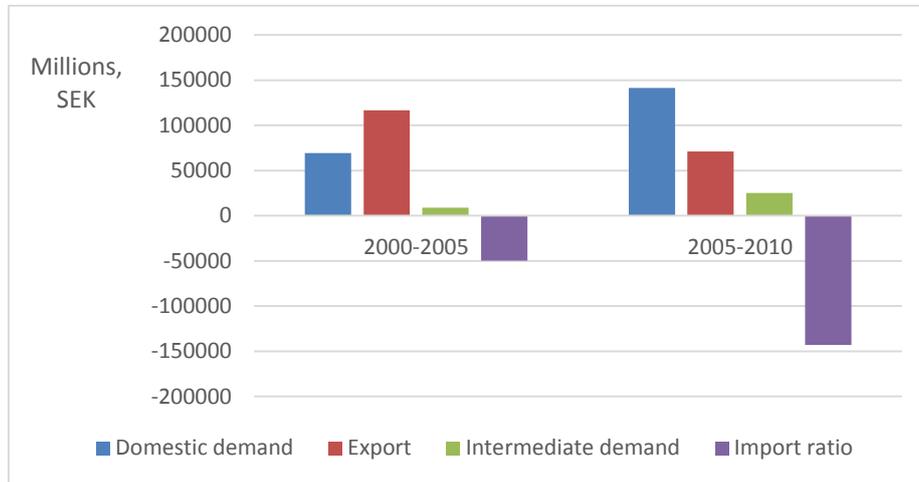
**Figure 8.** Decomposition of primary sector in 2000-2010.

Source: Own calculations based on Swedish input-output tables in 2000-2010

In the primary sector, output decreased SEK 1757 million in 2000-2005, and increased SEK 41431 million in 2005-2010. Comparing these two periods, the effects of four factors were different. In the period 2000-2005, only export had a positive effect, and export and import ratio were the main influence factors. In the period 2005-2010, the main explanation

for the strong export increase was due to the expansion of the mining sector. The large effect of intermediate demand indicates that the higher production was met by higher demand for intermediate goods.

### 5.2.3 Secondary sector

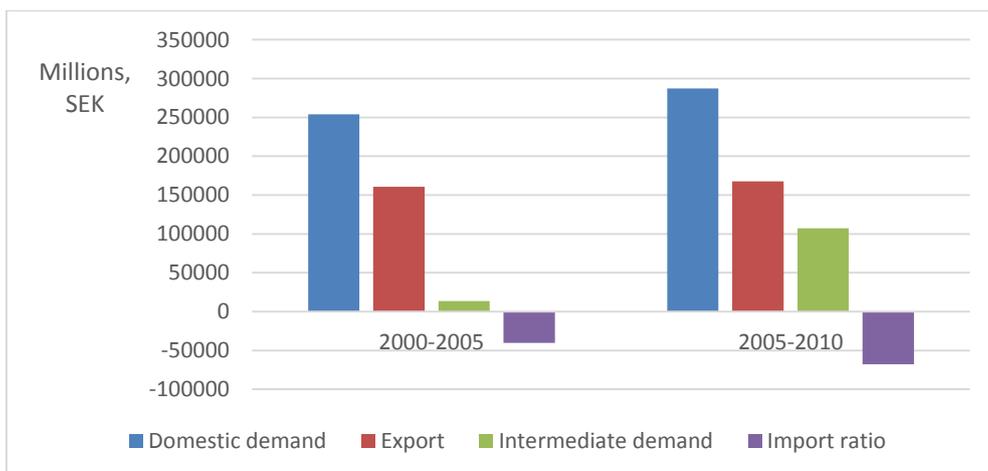


**Figure 9.** Decomposition of secondary sector in 2000-2010.

Source: Own calculations based on Swedish input-output tables in 2000-2010

In the secondary sector, output increased SEK 144938 million in 2000-2005, while the increase was SEK 94605 million in 2005-2010. It is interesting that this figure is similar to the figure of the total economy: domestic demand, export and intermediate demand had a positive effect and import ratio had a negative effect. Export had more effect in the period 2000-2005 and domestic demand and import ratio had more effect in the latter period.

### 5.2.4 Tertiary sector



**Figure 10.** Decomposition of tertiary sector in 2000-2010.

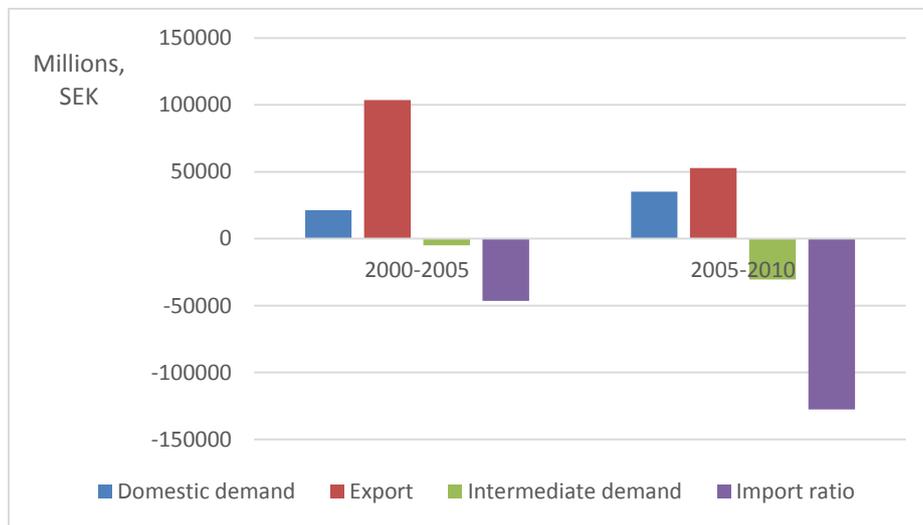
Source: Own calculations based on Swedish input-output tables in 2000-2010

In the tertiary sector, output increased SEK 388243 million in 2000-2005, and increased SEK 494383 million in 2005-2010. The histograms of these two periods are almost same. Domestic demand, export and intermediate demand had positive effect and import ratio had a negative effect. The difference is that in the period 2005-2010, intermediate demand had much more effect than in the period 2000-2005.

Despite the crises in the beginning and the end of the decade, the tertiary sector shows a fairly rapid growth rate, 15.05% in the period 2000-2005 and 16.59% in the period 2005-2010, which is promoted by especially domestic factors. The primary sector goes from a negative change into a positive, explained mainly by robust export expansion. Lastly, the secondary sector displayed an increase in production, and this expansion is mainly explained by the domestic factor. Manufacturing is the largest industry in the secondary sector and we will discuss the manufacturing and finance in more in detail in the next part.

### 5.3 Disaggregated level

Manufacturing is the pillar industry of Sweden. It has the largest shares of output. The importance of the financial sector has increased, due to the need to have an efficient system for finance, payment intermediation and risk management in an economy. First, I investigate the manufacturing sector.

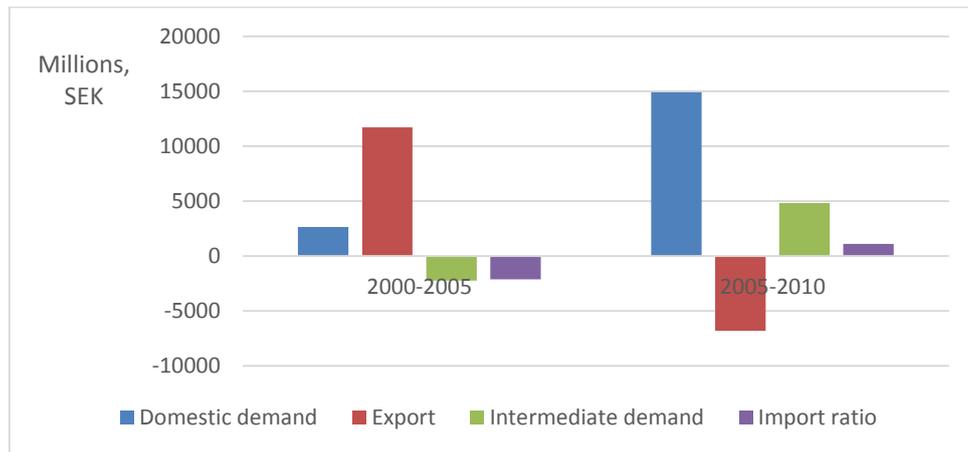


**Figure 11.** Decomposition of manufacturing in 2000-2010

Source: Own calculations based on Swedish input-output tables in 2000-2010

In manufacturing sector, output increased SEK 73556 million in 2000-2005, and decreased SEK 69791 in 2005-2010. In the period 2000-2005, the effect of export mainly explained the output growth in the manufacturing sector. The effects of domestic demand and intermediate demand were little. In the period 2005-2010, effect of import ratio implied most

of output decrease. From the input-output table, we can see that manufacturing output was mainly delivered to the international market. So, in general, manufacturing is relied on export. Dot-com bubble just had a little effect on the period 2000-2005 thanks to the high effect of export. In the financial crisis, things were different. There is a huge effect of the import ratio. The government did not make enough measures to protect domestic manufacturing.



**Figure 12.** Decomposition of finance in 2000-2010

Source: Own calculations based on Swedish input-output tables in 2000-2010

In the financial sector, output increased SEK 9993 million in 2000-2005, increased SEK 13991 million in 2005-2010. Effects of four factors in these two periods were very different. In the period 2000-2005, domestic demand and export had positive effect, and export explained most of the output growth. In the period 2005-2010, export had a negative effect, and this is caused by the financial crisis. Domestic demand, intermediate demand and import ratio had a positive effect, but the effect of domestic demand can mainly explain the output change.

## 6. Conclusions

At the aggregated level, domestic demand and export were the main contribution to output growth in the period 2000-2005. When the financial crisis came, the effect of domestic demand became larger, because household consumption as well as government spending increased during 2009 and 2010. The import substitution grew faster than the export expansion in the period 2005-2010, which had a negative effect on output growth in that period.

The output of the primary sector goes from a negative change into a positive over the period 2000-2010, explained mainly by strong export expansion. In the tertiary sector, dot-

com bubble and financial crisis had a similar effect. Domestic demand can mainly explain the output growth.

The dot-com crisis seems to have had a small effect on manufacturing export in the period 2000-2005. Export still had a largest effect on output growth on this period. During the financial crisis, manufacturing export decreased a lot. The huge increase of effect of import ratio and the weak export growth address the question whether the government took enough measures to limit the effects of the financial crisis for the manufacturing industry in the period 2005-2010. Financial crisis affected the financial sector to a large extent. The effect of export changed from positive to negative, and the main reason of output growth was due to the change in domestic demand.

According to the results, we find that the domestic demand played an important role for stabilizing the economy both in period when the financial crisis occurred as well as when the dot-com crisis affected the economy.

At the disaggregated level the manufacturing sector was hit especially by the financial crisis. The share of manufacturing production to total market production has dropped during the period 2000-2010 and there was a sharp decline in the share in 2009. The manufacturing sector seems to be vulnerable to large worldwide economic crisis which eventually should be of some concern for the government.

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## Appendix

**Table A1.** Ten aggregated categories of Swedish industries

Sector	Order number (2000 and 2005)	Order number (2010)
Agriculture	C01-C03	R01, R02, R03
Mining	C10-C14	RB
Manufacturing	C15-C37	R10_12-R33
Electricity and water	C40-C41	RD-R38_39
Construction	C45	RF
Trade	C50-C52	R45-R47
Transport	C60-C64	R49-R53
Finance	C65-C67	R64-R66
Private services	C55, C70-C74	RI-R62_63, R68B-R80_82
Public services	C75-C95	R84-RU

Source: Statistics Sweden

**Table A2. Aggregated input-output table for Sweden, 2000****Intermediate flows**

Sector	1	2	3	4	5	6	7	8	9	10
1	4800	15	48321	242	352	1674	358	24	1880	1612
2	381	643	45694	1711	3135	218	503	0	953	185
3	12166	2827	471480	8902	46765	42667	32054	2770	89213	54352
4	625	493	14176	4281	507	2544	2164	418	13592	7267
5	1221	264	4604	2770	1833	1760	4196	952	37706	9881
6	2886	762	52873	1104	7148	6498	10506	252	17378	13861
7	1110	1940	72055	1044	4941	28170	125927	3839	29000	28207
8	1107	237	17560	1601	1557	4941	6744	12182	22705	4976
9	1326	1147	147877	4184	12327	56904	46528	21362	169100	93186
10	503	118	14144	665	998	3275	7613	1653	27269	30020
Total	26125	8h446	888784	26504	79563	148651	236593	43452	408796	243547

**Final demand**

Sector	Intermediate use	Consumption and investment	Export	Import	Total output
1	59278	18702	7525	18,153	67352
2	53423	555	5358	45,013	14323
3	763196	388460	757936	604,951	1304641
4	46067	27991	354	1,788	72624
5	65187	93412	0	0	158599
6	113268	178243	75742	4,939	362314
7	296233	94704	63090	49,461	404566
8	73610	52229	18398	11,815	132422
9	553941	403443	79972	92,091	945265
10	86258	648994	3111	2,490	735873
Total	2110461	1906733	1011486	830,701	4197979

Source: Statistics Sweden

**Table A3.** Aggregated input-output table for Sweden, 2005

## Intermediate flows

Sector	1	2	3	4	5	6	7	8	9	10
1	6311	58	43797	198	314	1836	312	18	1882	2244
2	462	1003	68364	2029	3564	910	589	0	1052	229
3	11927	4500	504372	10718	59525	43254	36412	1988	97329	56025
4	1213	640	19328	5448	871	3467	2968	489	16773	8952
5	1386	229	5071	3350	2332	1909	4009	1499	50542	10473
6	3283	1140	53770	1438	8979	7279	12562	216	19728	14555
7	1192	2071	82517	1568	6008	34434	141790	2937	31700	28557
8	1235	207	16536	2004	1569	4698	6310	9905	32119	5036
9	1939	1281	151237	7264	16168	70586	57599	22074	198251	113819
10	649	131	14683	1143	1542	4722	9244	1395	34813	32644
Total	29597	11260	959674	35160	100872	173095	271796	40520	484188	272536

## Final demand

Sector	Intermediate use	Consumption and investment	Export	Import	Total output
1	56971	12732	8622	21,704	56620
2	78201	-1071	9155	63,029	23256
3	826049	394840	836005	678,761	1378132
4	60149	35903	5094	3,409	97736
5	80798	124074	0	0	204873
6	122949	208418	98208	4,817	424758
7	332775	110771	81363	69,751	455157
8	79620	50580	25076	12,870	142406
9	640218	441158	117914	106,238	1093052
10	100966	750137	5318	3,143	853279
Total	2378697	2127541	1186754	963,723	4729269

Source: Statistics Sweden

**Table A4.** Decomposition, total economy in 2000-2010

	Period 2000-2005	Period 2005-2010
Domestic demand	319789.9	440915.4
Export	286177.5	257868.5
Intermediate demand	22205.55	145020.5
Import ratio	-96750.1	-213386
Domestic output	531422.8	630418.8

Source: Own calculation based on input-output tables for 2000-2010

**Table A5.** Decomposition, primary, secondary and tertiary industries in 2000-2010

Primary sector		2000-2005	2005-2010
	Domestic demand		-3469.24
Export		8925.632	19174.34
Intermediate demand		-420.703	12648.49
Import ratio		-6791.17	-2520.1
Secondary sector		2000-2005	2005-2010
	Domestic demand		69166.23
Export		116575.1	70951.05
Intermediate demand		9017.297	25225.54
Import ratio		-49821.2	-143063
Tertiary sector		2000-2005	2005-2010
	Domestic demand		254092.9
Export		160676.7	167743.1
Intermediate demand		13610.96	107146.5
Import ratio		-40137.8	-67802.5

Source: Own calculation based on input-output tables for 2000-2010

**Table A6.** The development at a disaggregated level in 2000-2010

Manufacturing		2000-2005	2005-2010
	Domestic demand		21371.34
Export		103590.8	52914.02
Intermediate demand		-4858.04	-30379.3
Import ratio		-46547.7	-127573
Finance		2000-2005	2005-2010
	Domestic demand		2648.634
Export		11717.09	-6812.96
Intermediate demand		-2241.28	4813.225
Import ratio		-2131.09	1093.903

Source: Own calculation based on input-output tables for 2000-2010