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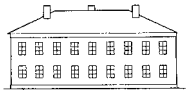

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Structural Change in the Swedish economy in the late nineteenth and early twentieth century
– The role of import substitution and export demand

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Structural Change in the Swedish economy in the late nineteenth and early twentieth century – The role of import substitution and export demand

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Abstract: The paper presents input-output tables for the Swedish economy for 1885, 1898 and 1913. These tables are used to explore structural change and to decompose Swedish economic growth in 1885–1898 and 1898–1913 into different demand sources: exports, import substitution and home market growth. While the 1890's was a decade of import substitution export demand was always important and a much more important source of demand growth than import substitution after the turn of the century 1900.

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1. Introduction: The debate on late nineteenth century Swedish industrialisation

The debate on Swedish industrialization in the late nineteenth century has circled much around the relative importance of export demand and the home market. Lennart Schön has concisely summarised the different positions in the debate (Schön, 1997). For a long time the predominating view of Swedish industrialisation was what Schön calls the "export model". A prominent exponent for this point of view was Lennart Jörberg. According to the "export model" Swedish industrialisation was driven by demand in the export markets for Swedish staples. The income emanating from the export industries created demand for consumer articles and thus stimulated the development of a consumer goods industry centred on the home market. Growing exports as well as growing home market industries also induced investments in new capacities and infra-structure. Ultimately, the growth of the home market industries from the 1890's onwards may be viewed as a Keynesian type accelerator-multiplier process resulting form the injection of export demand.[1]

Since several years back Schön has championed what he calls "the home market model". As the name indicates this line of thought gives a more prominent role to the home market and internal factors in Swedish industrialisation. The home market model does not deny that export demand and world market integration played a role in the industrialisation process, but the focus is on how external factors promoted structural change in the Swedish economy (Schön, 1997). Central to the internal integration of "world market influences" are, according to Schön, how they affect cyclical changes in the distribution of income between wages and profits, which is also a centrepiece of his theory of the structural cycle. Typically, at the end of the "rationalisation phase" of a structural cycle the wage share peaks. Pressed by increasing competition and falling prices and downwardly rigid money wages firms try to rationalise existing lines of production. Eventually the possibilities for rationalisation investments vanish and the rationalisation phase culminates in a structural crisis. Consequently, in "the home market model" changes in the income distribution stimulate structural change since the profitability of "old" industries are squeezed, and in the "transformation phase" of a new structural cycle, that follows upon the structural crisis,

[1] For an account of Jörberg's view on late nineteenth century Swedish industrialisation, see for example Jörberg (1966).

capital and labour is reallocated to "new" branches of production that can "afford to pay the higher wages" (Ljungberg, 1997, p. 161).

The role of wages and income distribution is somewhat contradictory in the home market model. On the one hand, wage increases lead to "transformations pressures", that stimulate a renewal of the economic structure and provide demand for the growth of new consumer industries. On the other hand a decline in the wage share enhances profitability and provides savings for investments in "new" industries in the transformation phase of a new structural cycle (Schön, 2004). In the late nineteenth century, capital imports mitigated this conflicting role of wages, since it made possible increased investments without a corresponding increase in domestic savings, thereby increasing the space for domestic consumption. According to Schön, "capital imports is clearly related to domestic demand in a model of explanation that gives comparatively less weight to the export sector. With a greater emphasis on internal markets and internal demand (for investment and consumption goods) follows a lesser emphasis on exports and domestic savings and, hence, a more prominent role for the inflow of foreign capital." (Schön, 1997, p. 211)

In Jonas Ljungberg's version of the home market model the role of wages is even more stressed. "Rising wages were important for the growth of the domestic market that formed a basis for growing consumption industries. Without these structural changes Sweden would have stuck to her stagnating export industries, and stayed dependent on low wages, thus remaining at the periphery of industrial Europe" (Ljungberg, 1996, p. 266-267). According to Ljungberg the "Domestic Market Model …emphasises increasing consumption and capital imports" and in this model "the increase of wages was not only a result of economic growth but also a stimulus to growth". The "Export Model" on the other hand "emphasises exports, low consumption and high savings", according to (Ljungberg, 1996, p. 161).

It is difficult to recognise Jörberg's view of the industrialisation process in Schön's and Ljungberg's account of the "export model". Reading Jörberg it is not clear that his "export model" is tied to a particular view of the distribution of income between wages and profits. Central to Jörberg's view is rather that the receipts from exports stimulated demand for consumer goods in the home market and it may be argued that the Keynesian multiplier process resulting form external demand injections, that Jörberg envisions, would have benefited from a high wage share. It is also fully possible to integrate capital imports in a model of export led growth.

A weakness in the debate on late nineteenth century Swedish industrialisation is that it lacks empirical estimates of the role of different demand sources. It is a purpose of this paper to provide such estimates. In the next section of the paper I present some descriptive statistics on the structural transformation and growth in output and foreign trade in the period 1885–1913. Thereafter I assess the relative roles of home market demand, exports and imports substitution by means of a decomposition methodology that make use of input-output models of the Swedish economy for the years 1885, 1898 and 1913. These tables are documented in an appendix to this paper.

2. The development of commodity production and foreign trade

The statistics presented in the following section are mainly based on data extracted from the censuses of manufacturing and foreign trade in Swedish official statistics.

2.1. *Output*

In table 1 the annual growth rates in gross output for the main sectors of the Swedish economy between 1885 and 1913 are displayed. Overall, the Swedish economy grew at the rate of 3.5 percent per annum between 1885 and 1913. Since there are some characteristic differences in the growth pattern between the 1890's and the 1900's, growth rates are also presented separately for the periods 1885–1898 and 1898–1913.

The forestry and the agricultural sector show clear signs of retardation in growth rates while the manufacturing industry grew at approximately 5 percent per annum both in the 1890's and the 1900's, although there may be some sign of growth retardation after the turn of the century. Within the manufacturing industry the growth rate of the capital goods industry was consistently slightly above 5 percent per annum. The typical home market oriented industries, the food industry and the consumer goods industry, showed markedly higher growth rates in the 1890's than in the 1900's. The export industry, on the other hand, grew at a much faster rate after the turn of the century than in the 1890's. As always broad aggregates conceal much useful information. For example, within the export sector the growth rate of sawmills were slow and retarding while the growth rate of the pulp and the paper industry was consistently higher than 10 percent per annum.

2.2. *Foreign trade*

In its broad contours the structure of Swedish foreign trade in the late nineteenth century is well known (Fridlizius, 1963) (Pettersson, 1984). Between 1850 and 1880 the foremost export articles were oats and above all timber and wood products. Later, in the 1890s, oats disappeared as an export article. On the other hand another product derived from agriculture, butter, gained importance. Timber and wood products were still the most important export articles, but their importance gradually diminished. Instead a large-scale export of pulp and iron ore started (Fridlizius, 1963). Around the turn of the century Sweden also succeeded in starting up an export of some engineering products (Kuuse, 1977), but overall Sweden still had a large import dependence in these products (Nilsson, 1978). By and large exports were based on domestic raw materials, but we can also discern a tendency of increased processing of these, exemplified by the fast growth of pulp and paper exports.

The commodity structure of imports was more differentiated than that of exports. During the period 1870–1890 agricultural and food products, textiles and clothes dominated it. In the 1890s the structure of imports was transformed; the import of fuel (coal) and other raw materials and inputs increased while the share of consumer goods in total import decreased drastically (Pettersson, 1984).

The development of Swedish foreign trade emerges more clearly in table 2 and table 3, where the changing composition of exports and imports are displayed. If we first look at exports it is clear that export growth was primarily driven by the export sector which increased its share of total exports. The capital goods industry also increased its export share, particularly in the1900's, while the share of consumer goods, food and agricultural products declined.

The composition of imports changed in a characteristic manner in the 1890s and 1900s. The share of consumer goods, including processed food, declined from over 40 percent of total imports in 1886/90 to about 25–30 percent in 1906/10. Agricultural goods more or less kept their share of total imports, and even increased somewhat. The import shares of capital goods, on the other hand, increased, particularly in the late 1890s.

In the quarter of a century preceding WWI Swedish exports grew faster than imports (table 4). Changing compositions of imports and exports are reflected in growth rates. It is illuminating to calculate growth rates separately for the 1890's and the 1900's. These decades

are mirror images of each other; in the 1890's imports grew faster than exports, while after the turn of the century the opposite was true.

In sum, the development of output and foreign trade show a characteristic pattern of change. The 1890s was primarily a decade of import substitution. In this decade the consumer goods industry expanded rapidly, stimulated by expanding demand growth in the home market, while imports of these types of goods were kept at bay by increased tariffs. The characterisation of the 1890s as a decade of import substitution may seem paradoxical, since in this decade the import volume grew faster than the volume of exports. It is however to be expected that an import substitution process at least temporarily leads to an increased import propensity (Little et al., 1970). The consumer goods industries (textiles, clothes, shoes and leatherwear, rubber goods etc.) were almost exclusively dependent on imported raw materials. Economic expansion and urbanisation also increased energy requirements and thus led to increased importation of coal. In addition, the starting up of new firms and the general upswing of investments led to increased imports of iron, machines and other capital goods, which the domestic producers were not able to supply. To this must be added the boom in railway construction in the late 1890s, which gave further impetus to imports (Jörberg, 1961, ch. 11).

A strategy of import substitution is founded on the securing of the home market for domestic producers. As such it necessarily starts in the final stages of production and thus leads to a changed composition of imports, of the kind experienced by Sweden in the 1890s. If import substitution in the consumer goods market is successful it may than later on lead to a second wave of import substitution within the capital goods sector (Little et al., 1970, p. 59-63). This partially happened in Sweden towards the end of our period. To an increasing extent Swedish firms were now able to furnish the home market with capital goods.

In order to get a clearer picture of the impact of import substitution it is helpful to present some numerical measures. Several such measures have been suggested in the literature. Here I shall use the so-called import penetration ratio:

$$\frac{M}{X - E + M}$$

where M = import, X = domestic output and E = export.

This measure is calculated for each sector and it shows how large a share of domestic consumption that is provided for by imports. Falling import penetration ratios thus indicate increased import substitution.

Table 5 shows the development of import penetration for our main sectors in 1885, 1898 and 1913. One marked tendency that emerges from this table is the declining import penetration in the consumer goods industry in the 1890s. The share of imports in the home market for consumer goods declined from over 40 percent in 1885 to about 25 percent in 1913. The same tendency can be observed in the food industry. In the capital goods sector import penetration does not decline until the first decade of the twentieth century. The rise of a consumer goods industry in the 1890s was obviously dependent on imports of capital goods in the 1890s. Then in the second half of the first decade of the twentieth century the domestic capital goods sector was able to start a process of import substitution (Nilsson, 1978).

Import penetration within agriculture from the 1890s to the First World War does not show any trend. Agricultural protectionism succeeded in stopping imports from taking a larger slice of the home market but it did not lead to any import substitution within the agricultural sector.

3. A decomposition of output growth from the demand side

3.1. *Sources of demand growth*

It may be argued that the summary statistics on import substitution and import penetration and export growth presented in the previous section only gives a partial view, since the linkages of a particular sector to other sectors are not accounted for. If for example import penetration declines in an industry, this particular industry may very well be strongly dependent on imported inputs so that the overall import dependency increases. It is fully possible to have declining import penetration in every industry and yet have an increased overall import dependency if the composition of output changes so that sectors highly dependent on imported inputs increase their weights. In the following I use input-output tables for 1885, 1898 and 1913 to investigate economic growth from the demand side. I employ a decomposition methodology developed by Chenery (Chenery, 1960; Chenery et al.,

1962). My presentation is based on Dervis et al. (1982). Domestic production must be equal to domestic demand for domestically produced goods plus exports:

(1) $X_i^d = d_i(F_i + V_i) + E_i^d$

where X_i^d=domestic production in sector i; F_i=final demand in sector i; V_i=intermediate demand in sector i; E_i^d=exports from sector i; and $d_i=(X_i^d - E_i^d)/(F_i+V_i)$, i.e. the ratio of domestic demand for domestically produced goods to domestic total demand.

If we assume a fixed coefficient (Leontieff) technology, the input-output coefficients for a given year are stable. It is also assumed that inputs also include imported inputs. The input from sector i into sector j per unit of output in sector j may be written as: $a_{ij}=X_{ij}/X_j$
Equation (1) can also be stated in matrix terms:

(2a) $X^d = DAX^d + DF + E^d$

where X^d=a column vector of domestic production; A=a square matrix of input-output coefficients a_{ij}, $V=AX^d$, a column vector of intermediate demands; D=a diagonal matrix of the d_i parameters; $V^d=DV = DAX^d$, i.e. a column vector of domestically produced intermediate demand; F=a column vector of final demand; F^d=DF, a column vector of domestically produced final demand, and E^d=a column vector of exports.
Equation (2a) may be rewritten as:
(2b) $X^d = (I - DA)^{-1}(DF + E^d)$

A change in domestic production between two periods is denoted as $\Delta X^d = X^d_t - X^d_{t-1}$. Using equation (2) it is possible to decompose the change in production in a period as emanating from different sources of demand change:

(3) $\Delta X^d = R_1 D_1(\Delta F)$ domestic demand expansion
+ $R_1(\Delta E^d)$ export expansion
+ $R_1(\Delta D)(F_2 + V_2)$ import substitution
+ $R_1 D_1(\Delta A)X^d{}_2$ change in input-output coefficients

where $R = (I - DA)^{-1}$ and the subscripts denote time periods.

Analysing the various demand sources in matrix terms give more information than could be gained from the ratio domestic output/domestic supply in a sector, equation (1), since the change in intermediate demand is also taken into account.[2]

A substantial share of Swedish imports in the period 1885–1913 consisted of non competitive goods, i.e. they were not produced domestically. These inputs are not included in the inverse domestic technology matrix, R, and in final demand in equation (3). Since non-competitive imports such as coal, coke, pig iron, cotton, wool, coffee beans etc. increased substantially in the period it is also of interest to decompose the growth of these imports into different demand sources. Let M^{nc} be a vector of non-competitive imports and F^{nc} a vector of final demand for non-competitive imports. Define B as a rectangular k*j matrix of input-output coefficients, where the inputs into the j sectors in X^d derive from the k rows of non-competitive imports. We may then decompose the growth of non-competitive imports by means of the following equation:

$$
\begin{aligned}
(4) \qquad \Delta M^{nc} &= B_1 \Delta X^d && \text{intermediate demand expansion} \\
&+ \Delta B X_2 && \text{change in input-output coefficients} \\
&+ \Delta F^{nc} && \text{domestic final demand expansion}
\end{aligned}
$$

As noted by (Dervis et al., 1982) there is an index number problem involved in the calculation of the decomposing equations (3) and (4), reminiscent of the distinction between Laspeyres and Paasche price and volume indices. The equations may be calculated using initial period structural coefficients (R_1, B_1 and D_1) and end period volume weights and prices (F_2, V_2 and X^d_2) or end period structural coefficients and initial period volume weights and prices. In the results reported below I report an average of these calculations.[3]

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[2] It should be noted that an important assumption behind equation (3) is that in the calculated input-output coefficients no distinction is made between domestic and imported inputs. Thus a change in an input-output coefficient is assumed to affect domestic and imported inputs alike, subject to the given domestic demand ratios, d_i. In other words d_i is assumed to be the same irrespective of whether demand is final or intermediate and any change in intermediate domestic supply ratios only shows itself in the d_i coefficients.

[3] To estimate the decomposition equations it is necessary to deflate sectoral output values in current prices to obtain values in fixed prices. I have used the following sources, weights are given in parentheses:
Export industry: iron ore (0.063), saw mills 0.682, Paper industry (0.09), Pulp (0.102), Stone quarrying industry (0.063). All prices are from Ljungberg (1990).
Capital goods industry: Metal industry (0.647) (Ljungberg, 1990), Joineries (0.105) (Ljungberg, 1990), Chemical industry (0.142) (Ljungberg, 1990), Cement and brick industry (0.034) (Ljungberg, 1990), imported investments goods (0.072) (Johansson, 1967).

In tables 6–9 my estimates of the decomposition equations 3 and 4 are shown for the periods 1885–1898 and 1898–1913. In 1885–1898 the overall most important source of demand was unsurprisingly the expansion of domestic demand. It accounts for about 70 percent of total output growth and is the most important source of demand in all sectors except for the export industry, where export expansion contributed about 70 percent of total demand growth. In addition to domestic demand growth, import substitution was of some importance for the growth of the consumer goods industry and the food industry, where it accounted for about 25 percent of output growth. In the agricultural sector on the other hand import substitution was marginal. Apparently the introduction of agricultural tariffs was sufficient to put a check on import penetration but they did hardly lead to a crowding out of imports.

Non-competitive imports grew by a much higher rate than domestic output in 1885–1898 (table 7). This is actually the other side of the fast growth of the manufacturing industry, which was heavily dependent on imported raw materials. The growth of non-competitive imports resulted primarily from the growth of intermediate demand. However, for non-competitive agricultural goods final demand expansion was the most important source.

There are some characteristic differences between the period 1898–1913 and the previous period. Compared to the period 1885–1898 the role of export expansion was much enhanced during the period 1898–1913. This is so especially if we look at the capital goods industry where export demand expansion now accounted for almost a third of total output growth. Import substitution, on the other hand, had run out of steam. It was only in the consumer goods industry that it still had some importance. The growth rate of non-competitive imports also weakened in this period.

Non competing capital goods: Coal (0.818), Pig iron (0.182) (Åmark, 1921).
Consumer goods: Glass industry (0,038), Textile industry (0,613), Leather ware industry (0.305), soap and detergent industry (0.044). All prices are from Ljungberg (1990).
Food industry, (Ljungberg, 1990).
Building and construction, (Krantz, 1997).
Services and transports, transports and communications (0.192), private services (0.453), Public services (0.115), Housing (0.24). All prices are from Krantz (1997).
Agriculture (incl. fishing and horticulture) (Schön, 1995).
Forestry, (Schön, 1995).
Consumer raw materials, textile raw materials (0.746)], raw hides (0.184), rubber (0.07). All prices from Åmark (1921).
Non competing agricultural products: coffee beans (0.493), tobacco (0.507). Prices from Åmark (1921).

The impact on economic growth from changing technical coefficients was generally small. There was an increased degree of processing of primary materials in this period of industrialisation and the change in technical coefficients resulted primarily from changing composition of output within sectors. In the export sector, for example, the relative role of saw mills declined while pulp mills and paper mills increased their share.

Between 1898 and 1913 the growth of non-competitive imports was almost exclusively dependent on intermediate demand (table 9). Declining importance of import substitution in consumer goods but also "change in technology", or rather structural change within sectors, counteracted the growth in imports of non competitive goods, which would otherwise have been larger.

3.2. *Deviations from balanced growth*

Economic growth is not balanced but accompanied by structural change; different sectors grow at different rates, hence the economic structure changes. In equation (3) we saw how output changes in different sectors were affected by changes in domestic demand, import substitution, export demand, and change in technical coefficients. In this section we shall explore how changes in the various sources of demand impacted structural change. It is possible to decompose growth into a proportional part and a sector specific part. For a given sector the deviation from balanced growth of domestic production, δX_i, is defined as:

(5 a) $\delta X_{i12} = X_{i2} - \lambda X_{i1}$

where $\lambda = \frac{\sum X_{i2}}{\sum X_{i1}}$ and the subscripts 1 and 2 stand for time periods.

It is readily seen that δX_i is simply the difference between the sector specific growth rate and the overall growth rate.

In the same manner as in eq. (5a) we may define the deviations from balanced growth of final demand components F and E.

(5b) $\delta F_{i12} = F_{i2} - \lambda F_{i1}$

(5c) $\delta E_{i12} = E_{i2} - \lambda E_{i1}$

The deviations from balanced growth of each sector can be decomposed into different sources of demand:

(6) $\delta X_{12} = R_1 D_1 \delta F$ domestic demand expansion

$+ \quad R_1 \delta E$ export expansion

$+ \quad R_1 \Delta D(F_2 + V_2)$ import substitution

$+ \quad R_1 D_1 \Delta A X_2$ change in input-output coefficients

In equation (6) the demand terms, domestic final demand and export demand, express the deviation from what would have occurred if demand had increased proportionally for all sectors. They combine relative price effects and changes emanating from varying income elasticities for the various sectors, so called Engel effects. The last two terms express the effects of changes in import substitution and "technology" (change in input-output coefficients). They are the same as in eq. (3). My estimates of this decomposition equation for the two periods 1885–1898 and 1898–1913 are shown in tables 10 and 11. In these tables the difference between the two periods are much more readily seen than in tables 6 and 8. Whilst the overall growth rate is approximately the same in both periods[4] the sources behind structural change are completely different. In both periods domestic demand growth had an overall negative effect on the deviation from balanced growth, i.e. if every other demand component had grown at the same rate, the overall growth rate would have been less than it was because of the slower growth of domestic demand. In the period 1885–1898 the less than average growth of domestic demand was compensated for by higher than average demand growth emanating from import substitution while in the period 1898–1913 this role was taken over by export demand.

If we look at individual sectors domestic demand expansion was crucial for the more than average expansion of the capital goods industry 1885–1898. At the same time it was the main demand source behind the less than average growth of the forestry and the agricultural sector. Domestic demand also contributed negatively to the deviation of the food industry from balanced growth. However, in the case of the food industry the negative contribution from the less than average growth emanating from domestic demand was overshadowed by

[4] The economy-wide growth rates in column 1 of table 10 and 11 are not exactly equal to the corresponding growth rates in table 6 and 8 since I have used end period prices in table 10 and 11 whereas in table 6 and 8 the growth rate is an average of the growth rate calculated in first and end period prices.

the positive contribution from "technology" and import substitution. The latter was also the predominating factor behind the above average growth rate of the consumer goods industry in the period 1885–1898.

Export demand had already in 1885–1898 lifted the growth rate of the export industry above the balanced growth rate. Its role was enhanced in the 1898–1913 period when it contributed decisively to the more than average growth rate in the export and capital goods sector. Import substitution still contributed positively to the higher than average growth rate of the capital goods sector and the consumer goods sector. For the latter, however, its importance had been much reduced compared to the earlier period.

Change in input-output coefficients play a considerable part in the decomposition equations especially for the forestry sector, particularly in the period 1898–1913. This result has not so much to do with changes in technology as with changing composition in the export industry. The export sector bought its inputs from the forestry sector to a substantial degree. In the exports sector the share of the sawmill industry declined whilst the share of the pulp and paper industry increased, which reduced the growth in demand for the forestry sector. This example only serves to illustrate that the input-output tables on which the decomposition equations are calculated is too aggregated to capture actual changes in technology.

4. Multiplier effects of import substitution and export demand

In tables 6 and 8 there are four separate sources of demand growth, domestic demand expansion, export growth, import substitution and change in "technology". If we look at eq (3) which supplies the formula for calculating tables 6 and 8 we see that the contribution of import substitution and export demand expresses firstly the direct effect of final demand growth and secondly the indirect effects on domestic output resulting from intermediate demand. In other words, how much domestic output expands depends not only on the change in the quantity of goods needed to supply the increase in final demand but also on the increase in the production of inputs required for the production of this level of final output. We may, for example, calculate the counterfactual output of these industries in the absence of "external demand injections" provided by import substitution and export demand. Calculating this necessitates the use of input-output analysis. We effectually ask by how much domestic gross output must increase following an increase in output by a unit in

one of them. These domestic Leontieff multipliers are provided by the columns in matrix R, the domestic Leontieff inverse.

Tables 12 and 13 give my estimates of the domestic Leontieff multipliers for 1898 and 1913. In each column of these tables the multipliers show the value of the inputs from other sectors a sector needed to buy in order to increase its own final output by one kr. For example, in the capital goods sector in 1913 an expansion of final output by 100 kr required own sector deliveries of inputs amounting to 50 kr. The capital goods sector would also have needed to buy inputs from the export sector amounting to 10 kr and the same amount from the services and transportation sector. The total increase in gross output would be 175 kr, of which 100 kr would be final sales from the capital goods sector.

It is customary to discuss the input-output structure of an economy in terms of backward and forward linkages (Hirschman, 1958). As are readily seen from tables 12–13 the export sector has strong backward linkages to the forestry sector. The import dependency of this sector is also very weak.

The food industry is of course heavily dependent on inputs form the agricultural sector and it also buys inputs from itself. To a certain extent it is also dependent on imported inputs, such as wheat, coffee beans and tobacco. The construction sector has strong backward linkages to the capital goods industry (primarily steel products used in building) and the export sector (saw mills). The capital goods industry relies primarily on inputs from itself. For example metal manufacturers buy steel from steel mills, but it also is dependent on non-competitive imports such as coke-based pig iron and basic chemical materials. The consumer goods industry is dependent on own sector deliveries; e.g. weaving mills buy yarn from spinning mills and shoe factories buy sole leather from tanneries. Otherwise backward linkages of this sector to other sectors of the Swedish economy are weak. For its basic raw materials the consumer goods industry is heavily dependent on imports (wool, cotton, hides etc).

The forestry and the agricultural sector produce primary goods and consequently they do not have any strong backward linkages but strong forward linkages to the export sector and the food industry. The agricultural sector primarily produces its own inputs such as seed corn and fodder for the cattle and it is also dependent on inputs from the transport sector.[5]

[5] It should be noted, however, that in the latest vintage of Swedish HNA own sector deliveries in the agricultural sector have been netted out. Consequently the gross output figures for this sector do not include

Besides inputs from the service and transport sector the forestry sector hardly buys any inputs.

If we compare the structural links of the Swedish economy in 1898 and 1913, as they emerge from tables 12–13, we readily see that technical coefficients are pretty much stable between the years. There are some notable differences, however. One of these is that the importance of own sector inputs to the export sector is enlarged, while its inputs from the forestry sector is reduced. This change in the Leontieff multipliers is a reflection of the structural change in the Swedish economy in this period; the saw mill industry declined relatively while the pulp and paper industry expanded rapidly. Overall it resulted in a weakening of the backward linkages of the export sector.

Another appreciable change is the increased importance of own sector deliveries within the capital goods sector and the consumer goods sector. In both sectors this was caused by structural change and import substitution. It is also noteworthy that these two sectors were heavily dependent on imported raw materials and semi-manufactures.

Tables 6 and 8 only show the demand sources of economic growth in an accounting sense. Likewise the domestic Leontieff multipliers for the years 1885, 1898 and 1913 presented in tables 11–13 show the direct and indirect effects of a given increase in final demand for a particular sector. However, in an economy the different demand sources are not independent of each other. Import substitution and increased export demand also affected domestic demand. This is so because the increase in output stimulated by an increase in final demand created an income, a substantial part of which was spent, thus inducing additional output expansion, which in its turn stimulated additional output which led to further consumption and so forth. In other words to fully evaluate the output expanding effect of a particular injection of final demand we must also take into account the Keynesian income multiplier. Part of the output growth credited to domestic demand ultimately resulted from the income created by "injections" of import substitution and export growth. A crucial assumption behind a multiplier analysis is that idle or at least underemployed people are available. Otherwise increased output resulting from external

inputs such as seed-corn and fodder for the cattle. The input of transports to the agricultural sector has on the other hand been increased in the latest version of Swedish historical national accounts compared to earlier HNAs. This seems to be caused by Krantz's estimates of transport services provided by horses and oxen, which was disregarded by earlier HNAs. Since the transport inputs into agriculture was largely provided for by agriculturalists themselves the new HNA-estimates results in a transferring of value added from agriculture to the transport sector, without there being any concomitant transfer of value between different persons.

demand injections can only take place if employees are drawn from other activities, where output would decline as a result. Of the people employed in producing the output called forth by import substitution and export growth many would have been employed elsewhere had this growth not taken place and capital would have been accumulated in other lines of production. However, to the extent that "external demand injections" resulted in the transfer of factors of production from the traditional sector to activities with higher marginal productivity, total output increased.

5. Concluding remarks

In this paper I have tried to assess the role of import substation and export demand in Swedish economic growth in the period 1885–1913. The 1890's was the predominant decade of import substitution when Swedish producers were able to increase their market shares in the home market for consumer goods. After the turn of the century the phase of import substitution ended and the growth of the home market consumer goods industries was limited to the growth of demand in the home market. Export growth was always an important factor in the Swedish industrialisation process, especially after the turn of the century, but as a demand source it was more important than import substitution also in the 1890's. Arguably the income created by the "injections" of demand from import substitution and export growth was an important factor behind the growth of domestic demand in the decades leading up to WWI.

Economic growth is accompanied by structural change. In the 1890's the weight of home market oriented consumer goods industries increased in the Swedish economy, due to import substitution. After the turn of the century 1900 the export industry and the capital goods industry were the most fast-growing sectors. The predominant demand source behind their increased weight in the economy was export growth.

The results of this paper may have some significance for an ongoing debate in Swedish economic historiography on the relative importance of the home market and export growth in late nineteenth century Swedish industrialisation, and may be interpreted as bolstering the case of "the export model".

TABLE 1 *Average annual growth rates (%), grow output 1885–1913*

	1885–1898	1898–1913	1885–1913
Export industry	4.5	6.5	5.6
Capital goods industry	5.6	5.3	5.5
Consumer goods industry	6.6	4.1	5.2
Food industry	4.7	3.1	3.9
Building and construction	2.5	3.8	3.2
Services and transports	2.6	3.0	2.8
Forestry	1.5	0.4	0.9
Agriculture	2.4	1.7	2.0
Total gross output	3.5	3.5	3.5

Sources: Bidrag till Sveriges officiella statistik, serie D. Fabriker och manufakturer; Swedish Historical National Accounts.

TABLE 2 *Export shares (%)*

	1891/1895	1896/1900	1901/1905	1906/1910
Export industry	48	60	62	61
Capital goods industry	18	19	21	23
Consumer goods industry	8	5	5	4
Food industry	15	12	10	8
Agriculture	11	4	3	4

Sources: Bidrag till Sveriges officiella statistik, serie F. Handel.

TABLE 3 *Import shares (%)*

	1886/1890	1891/1895	1896/1900	1901/1905	1906/1910
Capital goods industry	16	20	23	20	19
Non-compet. cap. goods	10	16	19	19	20
Consumer goods industry	33	28	24	21	20
Food industry	14	9	7	8	8
Agriculture	8	9	9	12	11
Non-comp. agriculture	12	12	11	11	11
Raw materials for consumer goods	7	6	7	9	11

Source: Bidrag till Sveriges officiella statistik, serie F. Handel.

TABLE 4 *Average annual growth rates (%), imports and exports 1888/90–1911/13*

	1888/90–1898/00	1898/00–1911/1913	1888/90–1911/13
Imports	2.7	2.8	2.8
Exports	2.6	5.1	4.0

Source: Swedish Historical National Accounts.

TABLE 5 *Import penetration ratios (%) 1885, 1898 and 1913*

	1885	1898	1913
Capital goods ind.	23	22	18
Consumer goods ind.	44	34	27
Food industry	24	12	13
Agriculture	10	11	10

Source: Bidrag till Sveriges officiella statistik, serie D. Fabriker och manufakturer Bidrag till Sveriges officiella statistik, serie F. Handel. Swedish Historical National Accounts

TABLE 6 *Decomposition of gross output growth 1885–1898*

	Average yearly percentage change	due to: domestic demand growth	export growth	import substitution	change in technical coefficients	Weight
Export industry	4.5%	0.9%	3.5%	0.1%	0.0%	0.07
Capital goods industry	5.6%	4.5%	0.4%	0.2%	0.5%	0.11
Consumer goods industry	6.6%	4.7%	-0.1%	1.6%	0.4%	0.07
Food industry	4.7%	2.0%	0.5%	1.2%	1.1%	0.13
Construction and building	2.5%	2.8%	0.1%	0.1%	-0.5%	0.07
Services and transports	2.6%	2.2%	0.3%	0.0%	0.1%	0.33
Forestry	1.5%	0.3%	1.8%	0.0%	-0.7%	0.06
Agriculture	2.4%	2.4%	-0.2%	0.4%	-0.3%	0.16
Sum	3.5%	2.4%	0.6%	0.4%	0.1%	

Sources: Input-output tables: Table A2 and A3; Deflators: See footnote 3.

TABLE 7 *Decomposition of growth in non-competitive imports 1885–1898*

	Average yearly percentage change	due to: growth in intermediate demand	change in technical coeffcients	final demand	Weight
Non-competitive capital goods	4.6%	4.6%	0.5%	-0.5%	0.47
Raw materials for consumer goods	4.6%	6.5%	-2.1%	0.1%	0.19
Non-competitive agricultural goods	5.5%	1.5%	0.9%	3.1%	0.34
Sum	4.9%	3.9%	0.1%	0.9%	

Sources: See table 6.

TABLE 8 *Decomposition of gross output growth 1898–1913*

	Average yearly percentage change	due to: domestic demand growth	export growth	import substitution	change in technical coefficients	Weight
Export industry	6.5%	0.9%	4.4%	0.1%	1.1%	0.09
Capital goods industry	5.3%	2.2%	1.8%	0.4%	0.9%	0.13
Consumer goods industry	4.1%	2.9%	0.2%	0.9%	0.1%	0.08
Food industry	3.1%	2.6%	0.5%	-0.1%	0.1%	0.13
Construction and building	3.8%	4.5%	0.1%	0.0%	-0.9%	0.07
Services and transports	3.0%	2.4%	0.6%	0.0%	0.0%	0.32
Forestry	0.4%	0.5%	3.1%	0.1%	-3.1%	0.05
Agriculture	1.7%	2.0%	0.4%	0.0%	-0.7%	0.13
Sum	3.5%	2.3%	1.1%	0.1%	-0.1%	

Sources: Input-output tables: Table A3 and A43; Deflators: See footnote 3.

TABLE 9 *Decomposition of growth in non-competitive imports 1898–1913*

	Average yearly percentage change	due to: growth in intermediate demand	change in technical coeffcients	final demand	Weight
Non-competitive capital goods	2.5%	4.8%	-2.6%	0.3%	0.53
Raw materials for consumer goods	1.9%	4.2%	-2.2%	-0.1%	0.19
Non-competitive agricultural goods	1.9%	1.2%	0.7%	0.0%	0.29
Sum	2.2%	3.7%	-1.6%	0.1%	

Sources: See table 8.

TABLE 10 *Deviation from balanced growth 1885–1898*

	Average yearly percentage change	Deviation from balanced growth	due to: domestic demand growth	export growth	import substitution	change in technical coefficients
Export industry	4.5%	1.0%	0.1%	0.9%	0.1%	-0.1%
Capital goods industry	5.6%	2.1%	2.0%	-0.6%	0.3%	0.4%
Consumer goods industry	6.6%	3.1%	1.2%	-0.3%	1.7%	0.4%
Food industry	4.7%	1.2%	-0.9%	0.0%	1.1%	1.0%
Building and construction	2.5%	-1.0%	-0.5%	0.0%	0.1%	-0.5%
Services and transports	2.6%	-0.9%	-1.0%	0.0%	0.1%	0.1%
Forestry	1.5%	-2.0%	-1.4%	0.1%	0.1%	-0.8%
Agriculture	2.4%	-1.1%	-0.7%	-0.6%	0.5%	-0.4%
Sum	3.5%	0.0 %	-0.4%	-0.1%	0.4%	0.1%

Sources: See table 6.

TABLE 11 *Deviation from balanced growth 1898–1913*

	Yearly percentage change	Deviation from balanced growth	due to: domestic demand growth	export growth	import substitution	change in technical coefficients
Export industry	6.5%	3.2%	0.1%	1.8%	0.0%	1.2%
Capital goods industry	5.3%	1.9%	-0.3%	0.8%	0.4%	0.9%
Consumer goods industry	4.1%	0.7%	-0.3%	0.1%	0.8%	0.1%
Food industry	3.1%	-0.2%	-0.2%	0.0%	-0.1%	0.1%
Building and construction	3.8%	0.4%	1.2%	0.0%	0.0%	-0.9%
Services and transports	3.0%	-0.4%	-0.6%	0.2%	0.0%	0.0%
Foresty	0.4%	-2.9%	-1.0%	1.3%	0.1%	-3.2%
Agriculture	1.7%	-1.7%	-1.1%	0.1%	0.0%	-0.6%
Sum	3.4%	0.0%	-0.4%	0.4%	0.1%	-0.1%

Sources: See table 8.

TABLE 12 *Domestic Leontieff multipliers 1898*

	Export industry	Capital goods industry	Consumer goods industry	Food industry	Building and construction	Services and transports	Forestry	Agriculture
Export industry	1.06	0.02	0.04	0.01	0.17	0.03	0.00	0.01
Capital goods industry	0.01	1.28	0.02	0.03	0.23	0.03	0.00	0.05
Consumer goods industry	0.00	0.01	1.22	0.01	0.00	0.01	0.00	0.00
Food industry	0.00	0.00	0.03	1.23	0.00	0.00	0.00	0.05
Building and construction	0.00	0.00	0.00	0.03	1.01	0.05	0.00	0.05
Services and transports	0.10	0.07	0.06	0.08	0.14	1.08	0.05	0.05
Forestry	0.45	0.04	0.02	0.01	0.08	0.01	1.00	0.01
Agriculture	0.00	0.00	0.02	0.52	0.00	0.00	0.00	1.02
Sum	1.63	1.41	1.40	.1.91	1.64	1.21	1.06	1.24

Sources: Table A3; deflators: see footnote 3.

TABLE 13 *Domestic Leontieff multipliers 1913*

	Export industry	Capital goods industry	Consumer goods industry	Food industry	Building and construction	Services and transports	Forestry	Agriculture
Export industry	1.13	0.10	0.04	0.01	0.14	0.02	0.00	0.01
Capital goods industry	0.03	1.50	0.03	0.03	0.24	0.02	0.02	0.04
Consumer goods industry	0.00	0.00	1.32	0.01	0.00	0.00	0.00	0.00
Food industry	0.00	0.00	0.02	1.21	0.00	0.00	0.00	0.08
Building and construction	0.01	0.01	0.01	0.02	1.00	0.01	0.00	0.04
Services and transports	0.08	0.09	0.06	0.08	0.15	1.09	0.07	0.05
Forestry	0.34	0.05	0.01	0.01	0.00	0.01	1.00	0.00
Agriculture	0.00	0.00	0.04	0.53	1.64	0.00	0.00	1.03
Sum	1.60	1.75	1.54	.1.91	1.58	1.16	1.09	1.26

Sources: Table A4; deflators: see footnote 3.

Appendix 1. An input-output table for the Swedish economy for 1913

1. Introduction

Ever since Leontieff (1951), published his path-breaking study on the structure of the American economy,where he presented input-output tables of the US economy for 1919 and 1939, input-output analysis has been the preferred tool for investigating the structure of a national economy. Stimulated by Leontieff's study considerable resources were invested in the1950's in many countries to construct input-output tables. The first Swedish input-output table was constructed for the year 1957 (Höglund and Werin, 1964b; Höglund and Werin, 1964a). It has been analysed by Östblom (1986) together with input output tables for 1968, 1975 and 1980. Before 1957 we only have very rudimentary data on input-output relationships for Sweden emanating from historical national accounts (Bohlin, 2003).

Today, input-output tables are constructed by official statistical agencies for selected years only. Neither sources nor resources permit the construction of as detailed and accurate tables on historical data[6]. It is probably therefore that input-output tables are used only rarely in historical studies. However, input-output tables that are less detailed than modern tables are also powerful tools for analysing many problems in economic history[7]. Besides, more aggregate tables should be less error prone than a table with many sectors.

The primary purpose of this appendix is to document the construction of an input-output table for the Swedish economy for 1913. The input-output table is then used to analyse the interdependence and linkages of the Swedish economy on the eve of WWI.

2. Method and sources for constructing an input-output table for the Swedish economy for 1913

In constructing an input-output table for an open economy a decision must be made on how to treat imports. In setting up the input output table for 1913 I have treated imported inputs

[6] For example, the 1957 Swedish input-output table was the result of a well funded research project that involved several researchers. Apart from official statistics, much of the information contained in the table resulted from questionnaires sent out to firms and other institutions.
[7] Some examples are: Meyer (1955), Thomas (1983), Horrell et al. (1994).

so that they appear in the same row along with domestically produced goods in the same sector. It is for many sectors simply not possible to tell from available sources, and also not analytically necessary for my purposes, to what extent a particular cell in an input-output table consists of domestically produced or imported goods. The sum of domestic output and imports in a sector ends up as inputs into other sectors and final demand in the form of consumption, investments and exports. However, a substantial share of Swedish imports consisted of goods that did not compete with the goods produced by Swedish firms. Non-competing imports therefore appear as separate "sectors" in the input-output table. To draw a line between competing and non-competing imports is of course to a certain extent arbitrary. For example, I have treated coal as a non-competitive import although coal was produced in Sweden as were some other "non-competing" goods, but in these cases the share of total domestic supply provided by Swedish producers was insignificant. I distinguish three groups of non-competitive imports: non-competing capital and input goods[8], raw materials for consumer goods[9] and non-competing agricultural goods[10]. Except for the latter group non-competing imports were free of custom duties.

An input-output table must be internally consistent. For example, an estimated value added share on the basis of cost data must be consistent with input-output flows. Since it enforces consistency, the unified framework of national accounting can be used for "source criticism". In practice this is easily said than done. I have reconciled contradictory pieces of information in a manner that appeared most likely. For example, where input-output data in the historical national accounts are at odds with estimated value added share in a sector the former have usually been preferred in the construction of estimates.

It is not possible to describe in detail how each and every cell in the input-output table for 1913 has been constructed. In this appendix I only describe the main sources and methods used. Important sources for the construction of an input-output table for Sweden in 1913 are Swedish historical national accounts (henceforth HNA).[11] In constructing the input-output table I employ the same sectoral division as in the historical national accounts,

[8] In this group I include coal, coke, pig iron, other metals such as copper and aluminium, rails, beams and 25 percent of section 20 of the foreign trade statistics (chemical raw materials etc.) excluding coal.
[9] Raw materials for consumer goods, which were all duty-free, consists of raw materials for the textile industry such as cotton, wool, silk, bber, hides and furs.
[10] Non-competitive agricultural consist of section 17 of the foreign trade statistics, tropical fruits and spices, coffee, tobacco, rice and wine.
[11] Lindahl et al., 1937a; 1937b), Johansson (1967), Schön (1988; 1995), Pettersson (1987), Krantz (1986; 1987; 1991).

except that the agricultural sector has been sub-divided into agriculture and forestry. For the manufacturing industry I use the same division into branches as in the historical national accounts.[12]

For all sectors, except the manufacturing industry where additional information has been used, information on inputs emanates primarily from the published historical national accounts (HNA) and foreign trade statistics. For each sector in the HNA we have estimates on how outputs are distributed as inputs to the manufacturing sector and to other sectors or to exports and domestic final uses. For the manufacturing sector we also have the same information for the various industrial branches in the manufacturing sector. From the HNA it is possible to construct a rudimentary input-output table showing the commodity flows between the main sectors. However existing HNA data only give information on inputs to manufacturing and mining as a whole. In order to arrive at a useful input output table it is necessary to break down these inputs into the various branches of the manufacturing industry. In the following section I describe the sources and methods used for gaining knowledge on inputs to the different manufacturing branches and the inter-sectoral commodity flows between these industries.

2.1. *Inputs to the manufacturing and mining industry*

Available sources permit the construction of a quite detailed input-output table for the Swedish manufacturing industry around 1913. A special investigation on manufacturing costs for 1913 (SOU 1923:37, 1923) gives data on the percentage shares of sales value for raw material costs and fuel and energy costs. The same source also gives information for each industry on the share of imports in total raw material costs.[13] There are also several monographs on numerous branches of the manufacturing industry, most of them emanating from the investigations of the public committee evaluating Swedish tariff policy before WWI, that give information on the amount and cost of various raw materials consumed by the industries concerned and sometimes also information on to what extent these raw

[12] The input-output table has been consolidated from a table with a more detailed division of the manufacturing industry. All in all, there are 41 sectors of the manufacturing industry in that table. For each sector I also give estimates on final demand in the form of consumption (private and public), investments and exports. I use the same sectoral division as in existing Swedish HNA, see for example Ljungberg, 1988; 1990).
[13] The data is summarized in Lindahl et al. (1937b) together with similar investigations for 1918 and 1926.

materials were furnished by Swedish suppliers or imported.[14] I have tried to reconcile the cost data from the various monographs on particular industries with the information on cost shares given in the aforementioned special investigation on manufacturing costs. Since the latter is based on a much larger sample of firms it should be given precedence when it conflicts with evidence on cost shares from the monographs, which often are based only on data from a few firms.

Data on imports by commodity in the foreign trade statistics give information on imports of raw materials and other inputs, which combined with other information, such as the special investigation on manufacturing costs for 1913 (SOU 1923:37, 1923), enable plausible guesses on the distribution of these imports to the various industries.

Where detailed cost information is entirely missing for an industry it has nevertheless been possible to make a reasonable guess on the likely magnitude of the principal inputs. For example, if we know the share of raw material costs of the sales value of saw mills and if we also know deliveries of the forestry sector to the manufacturing sector it is possible to estimate the cell showing the value of output from the forestry sector ending up as input into sawmills. The sources used for calculating the inputs to the different branches within the manufacturing industry are listed in appendix 1b. In practice it was necessary to reconcile these pieces of information with the information on cost shares in the special investigation on manufacturing costs (SOU 1923:37, 1923).

2.2. *Fuel and energy inputs to the manufacturing industry*

From the investigation on manufacturing costs we have approximate estimates on how much fuel and power that were consumed in the manufacturing industry (SOU 1923:37, 1923) (Lindahl et al., 1937b, table 107–108), but from this source we do not get any information on how these costs were distributed between various kinds of fuel and energy inputs such as firewood, coal and coke, electrical energy. The amount of firewood consumed by the manufacturing industry can be estimated as the input from forestry to manufacturing remaining after the consumption of forestry products by sawmills, pulp mills and charcoal makers have been accounted for. The approximate amount of coal and coke consumed by the manufacturing industry is given by Lindahl et al. (1937b, appendix D). The amount of

[14] Some of the information from these studies have been used by Schön (1988) for construction of input price indices for the various branches of industry.

firewood, coal and coke consumed by the manufacturing industry in 1913 must be distributed to its various branches. For that purpose I have used a special investigation carried out by the Swedish board of Trade (Kommerskollegium, 1918).

Most of the electrical energy used by the manufacturing industry was at this time produced by the firms themselves. The amount of electrical energy bought by the manufacturing industry is reported in the census of the manufacturing industry. In order to distribute it to the various branches of manufacturing I have used an investigation of industrial costs in 1926 (Kommerskollegium, 1927). This source gives the costs for purchased electrical energy as a percentage share of sales values for the various industries of the manufacturing industry. In order to estimate the amount of energy purchased in 1913 I have multiplied this percentage with sales values in 1913 and on this basis calculated the percentage share of the total amount of purchased electricity per industrial branch.

2.3. *Transport and communication inputs to the manufacturing industry*

Data on transport inputs to the manufacturing sector, decomposed on different kinds of transports, generally emanate from Krantz (1986). These inputs must be distributed to the various branches in the manufacturing industry.

Railways. The estimate of railway transports by Krantz is the same as in the first Swedish HNA, *National Income of Sweden* (henceforth NI) (Lindahl et al., 1937b). Krantz also uses NI's distribution of railway transportation outputs until 1910, after which he inexplicably deviates from NI. Since my main interest is in the period before 1910 I have used NI's distribution throughout.

In order to distribute railway output I have used information on the value of railway goods transports divided on various types of goods (Mårtensson, 1994, p.. 242 and table 2.3). By combining this information with data on inter-industrial deliveries and imported inputs it is possible to distribute railway transports to the different manufacturing sectors.

Domestic shipping. Krantz (1986, table 13) gives information on the distribution of domestic shipping to final consumption and inputs to other sectors. In order to distribute transport inputs to the manufacturing industry between the different branches of the manufacturing industry I have used information on freighted tonnage by commodity groups in Thorburn (1958).

Tranports by horses and oxen. A novelty in the latest vintage of Swedish historical national accounts is Krantz´s estimates of transports with horses and oxen. Previous historical national accounts did not account for these transports since their importance were considered too small to make it worthwhile to estimate them. However, according to Krantz the value of the gross output of transports by horses and oxen were more than twice the value of domestic shipping in 1913 and almost half the value of railway transports. According to Krantz even this figure is probably to low an estimate of the transports provided by horses and oxen. Be that as it may, it is probably the case that much of the short distance transport input provided by horses and oxen to the manufacturing industry is already implicitly accounted for in the estimates of manufacturing costs and output. Despite these reservations I have nevertheless used Krantz estimates of inputs emanating from horses and oxen. In absence of other information I have assumed that the input from this form of transports to the branches of the manufacturing industry has the same percentage distribution as railway inputs.

Stevedoring and timber floating. Stevedoring inputs have been distributed between foreign and domestic shipping in accordance with their respective value of outputs. The entire value of timber floating is counted as input to the sawmill industry.

Telecommunications and postal services. The input of telecommunications and postal services to the manufacturing and mining industry has been distributed to the various branches in accordance with their respective value of output.

Exports from the transports and communications sector. Some of the output from the transport and communications sector is allocated to exports in NI and Krantz (1986). Apart from the output of foreign shipping which in its entirety is counted as exports, it is obviously the case that other "exports" from this sector should be counted as inputs to the service provided by commerce in the exportation of goods. The exports and hence the output of commerce is commensurately increased.

2.4. *Private services*

Private services in Swedish historical national accounts consist of the output of professional services, domestic services, commerce, banking and insurance, hotel and restaurants. Of these commerce is quantitatively most important. In all vintages of Swedish HNA it is assumed that commercial intermediaries were not involved in inter-industry deliveries, so

there are no inputs from commerce to the manufacturing sector. NI and Östen Johansson (1967) (henceforth ÖJ) calculated the output of commerce by applying margins to the value of marketed consumer goods and exported goods (Krantz, 1986). The difference between NI and ÖJ was that the latter also calculated margins on the output of handicrafts and small industry. Krantz followed ÖJ in this respect. In addition he also calculated a margin on investment goods supplied to the domestic market, domestically produced as well as imported, which he added to the gross output of commerce. This and the fact that the value of agricultural and industrial output on which Krantz calculates margins have been revised upwards by Schön should lead to considerably higher gross output figures for commerce than in ÖJ, but on the contrary ÖJ's figures are much higher. This oddity is explained by the treatment of transport costs. The calculated commercial margins include transport costs, so Krantz deducts estimated transport costs in order to arrive at the gross output of commerce, as did NI and ÖJ. In Krantz's case, however, we are left in the dark as to where these transport costs derive from. They are generally not compatible with the stated distribution of output from the transport sector. I have calculated the output of commerce according to Krantz's prescriptions in his volume on private services (Krantz, 1991, p. 84–89) for the years 1885–1913 and deducted the gross output figures presented in table P16 in the same volume. The remainder should be transport costs. Their share of gross output was 25–35 percent until the middle of the 1890's and 16–20 percent in the years preceding WWI. The transport input to commerce is considerably lower in ÖJ, which explains why the latter's gross output figures are larger than Krantz's. In order to calculate the value added of commerce Krantz furthermore deducts 28 percent from his estimated gross output of commerce. To whom these costs are paid is completely unclear. Presumably they are costs for renting premises etc., but there is no real estate sector in Swedish HNA besides the housing sector.[15]

Since according to Krantz his estimated gross output figures for commerce tallies reasonably well with figures on employment from population censuses (ibid. p. 89–91) I have decided to use his gross output figures despite the above mentioned reservations about his estimates.

[15] This deficiency has been remedied by Edvinsson (2005)

The input from professional services and banking and insurance to the manufacturing industry is distributed to the various manufacturing sectors in accordance with their respective shares of total gross output.

3. Summary input-output tables for 1885, 1898 and 1913

The input-output table for 1913 is presented in table A1. Many of the sectors in table A1 are aggregates of quite diverse industries whose only common denominator is that they process similar raw materials. The stone and earthenware industry, for instance, contain industries that primarily supply inputs to other sectors, e.g. stone quarrying and stone works, and consumer goods industries such as potteries and glass works. The latter industry in fact supplied consumer goods as well as input goods (window glasses for construction and bottles for breweries). The paper and pulp industry supplies input goods as well as consumer goods such as newspapers. The various industrial branches within the manufacturing industry also differ with respect to the degree to which their final sales were primarily oriented towards the home market or exports. I have rearranged the manufacturing and mining industry in four sectors with respect to the end use of the products, whether they were consumer goods or primarily used as inputs and capital goods and whether final demand primarily stemmed from the home market or exports. The following sectoral division of the manufacturing and mining industry is used: an export sector, a capital goods sector, a consumer goods sector and the food industry. I have also aggregated transports, private services and housing into the sector "services" which was exclusively oriented to the home market and did not meet foreign competition.[16] [17]

To be able to analyse structural change I have also constructed similar input-output tables for 1885 and 1898. These years have been chosen partly out of practical considerations, we have better data for these years than for many others, and partly out of substantial considerations; 1885 is the first year in my period of investigation and 1898 is situated in the middle of the period at the end of a period of fast growth and import substitution in the 1890's. Since data on input-output relationships are much scarcer for 1885 and 1898 than for 1913, the input-output tables for these years should also be more error prone. The main

[16] For purposes of the analysis in section 3 of the paper I have also added public services to the 'services' sector.

[17] Shipping services were exported, but this export must be seen as an appendage to commodity exports.

sources for the tables are existing HNA data and statistics on output and imports. In some cases I have also made use of the calculated coefficients for 1913 under the assumption that technical coefficients are stable over time[18]; input-output coefficients can then be found by taking into account relative price changes in inputs and outputs. In order to make the tables internally consistent it was also necessary to hand adjust the numbers for some cells. The aggregated tables for 1913, 1898 and 1885 are presented in tables A2, A3 and A4.

[18] If input-output tables are sufficiently disaggregated technical coefficients only change slowly. For example, in his study of Swedish input-output tables Östblom shows that technical coefficients changed only slowly over the years while utilisation of labour and capital for a given level of output, i.e. total factor productivity, changed vigorously. Also, import penetration among inputs changed notably (Östblom, 1986). The changes in technical coefficients that did occur have much to do with changes in the production structure, i.e. that the commodities produced by a sector change over time.

Appendix 1b. Sources used for calculating the inputs to different branches of the manufacturing industry

1. Mining and metal industries

Iron ore mines (Kommerskollegium, 1917, table 9, 26, 31 and 34)
Iron and steelworks, (Stockman, 1922, p. 90–91)
Iron, steel and metal manufacturing, (Delling, 1923, p. 158–159, 164–172)
Machine and engineering industry, (Linder, 1923)
Shipbuilding industry, (Kuuse, 1983, p. 22)

2. Stone, Clay and Glass industries

Potteries and earthenware works, (Tillberg, 1925, p. 32–39)
Cement industry, (Edström, 1925, p33 34)
Brick works, (Ohlin, 1924, p. 40–43)
Glass works, (Ohlin, 1922a, p. 59–64)

3. Wood product industries

Saw mills, (Schön, 1995, table J3), (Lindahl et al., 1937b, p. 154–157)
Furniture and wooden-fitting factories (SOU_1924_38, 1924, p.175–178)

4. Paper and printing industries

Pulp mills, (Bosaeus, 1949), (Schön, 1995, table J3), (Lindahl et al., 1937b, 154–157)
Paper mills (Bosæus, 1922, p. 32, 69–73), (Hilgerdt, 1925, p. 113-120, 72–74)

5. Food product industries

Flour mills, (SOU_1924_38, 1924, p. 102, 126)
Chocolate and sweets factories, (SOU_1924_38, 1924, p. 144–145)
Breweries, (Lilienberg, 1923, p. 9, 25)
Fat factories, (Lublin, 1922, p. 120–121)
Sugar refineries (SOU_1924_38, 1924,p. 138)

6. Textile industry,

Textile industry, (Kommerskollegium, 1914)

Clothing and garmament factories, (Kommerskollegium, 1914)

7. Leather, hair and rubber industry

Tanneries, (Smith, 1923, p. 69 ff.), (Kommerskollegium, 1915)

Fur and leatherware industries (Kommerskollegium, 1915)

Shoe industry (Smith, 1925, p. 56–67), (Kommerskollegium, 1915)

Rubber goods (Ohlin, 1922b)

TABLE A1: *Input-output table, Sweden 1913, mill. Kr. current prices.*

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Invest-ment**	**Con-sump-tion**	**Exports**	**Imports**	**Gross output**
1	335	3.7	2.8	0	0.5	0.4	1.3	0.3	0	41	19	1	0	13	4	12	153	123.2	208	127.2	791
2	3	3	0.5	1.5	3	0	0	1	0.1	50	1	1	0	3	0	4.4	0	36.1	30	25.2	112.4
3	3.1	2.2	38.9	0	1.9	1	0.1	0.5	0	50	1	1	0	3	0	4.4	3	38	165	9.1	304
4	0	0.5	0.2	45	2.3	0	1	0.5	0	4	0	24	0	10	0	0	0	35.6	138	10.1	251
5	0	0	0	0	145.8	0	7.2	0	0	0	0	0	0	0	0	28	0	593.1	82	86.1	770
6	0	0	0.7	0	3.8	98	10	0	0	0	0	1	0	9	0	1	1	260.6	9	98.1	296
7	0	0	0	1.1	0	2	65	0	0	1	1	0	0	4	0	0	2	117.7	5	41.8	157
8	20	0	0.3	3	0.3	1.3	0.4	17	0	5	3	2	0	13	0	10	0	45.8	31	26.1	126
9	6.3	0.6	0.7	1.4	1.1	0.7	0.2	0.7	1.2	0	2	2	0	2	0	0	0	22.1	0	0	41
10	3.5	0.5	1.3	1.4	2.4	2.5	0.7	0.5	0.3	0	16	0	47	27	0	27	321.9	0	0	0	452
11	19.4	5.8	15	10.4	20	5.2	3.4	3.9	0.7	47	16.5	49.6	0	4.1	11.2	9.5	0	126.6	138.7	0	487
12	11.2	1.8	5	4.4	10.9	4	1.9	1.9	0.9	7	5.5	14.5	7	3	6	18	0	750	87	0	940
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0	360
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	264	0	0	264
15	1	1	120	63	0.5	0.5	0	7	2	0	0	0	0	0	0	0	0	68	29	16	276
16	0	0	0	0	374.8	12.2	0	0	0	0	0	0	0	0	0	0	0	553.6	21	138.6	823
17	60	10.7	5	20	5.6	6.2	4.1	20	5	11.4	39	9	0	4.7	0	0	0	0	0	200.7	0
18	0	0	0	0	0.5	53.5	23	0	0	0	0	0	3	0	0	0	0	11.7	0	91.7	0
19	0	0	0	0	29.6	0.5	0	8.2	0	0	0	0	0	0	0	0	0	31.2	0	69.5	0
Value added	328.5	82.6	113.6	99.8	167	108	38.7	64.5	30.8	235.6	383	834.9	303	168.2	254.8	708.7	–	–	–	–	–
Gross Output	791	112.4	304	251	770	296	157	126	41	452	487	940	360	264	276	823	–	–	–	–	–

Remark: 1= Metal and and iron ore mining industry, 2= Stone- and earthenware industry, 3= Sawmills and joineries etc., 4= Paper, pulpand graphical industry, 5= food industry, 6='Textile and clothing industry, 7= Leather ware and rubber ware industry, 8= Chemical industry, 9=Power stations, waterworks and gasworks, 10=Building and construction, 11= Transports and communication, 12=Private services, 13=Housing, 14 = Public services, 15=Forestry, 16=Agriculture (including fishing and horticulture), 17= Non-competitive capital and input goods, 18=Raw materials for consumer goods, 19=Non competitive agricultural goods.

TABLE A2: *Input-output table for 1885, mill. Kr. current prices*

	Food industry	Consumer goods industry	Construction and building	Capital goods industry	Export industry	Forestry	Agriculture	Services and transports	Import	Export	Gross output
Food industry	10.9	3	0	0	0	0	11.4	0	66	32.2	244.7
Consumer goods industry	0.7	25.3	1.8	0	0	0	0.2	8.4	86.4	8.2	117.2
Construction and building	0.7	0.5	0	1	0.8	0	10	40	0	0	146
Capital goods industry	0.1	4.1	6.9	57.3	4	0	14.1	11.8	43.5	49.6	191.4
Export industry	0	0.9	19.6	12.9	7.6	0	0	4.6	0	88.1	133.6
Forestry	0	0	0	10.6	61	0	0	0	0	14.8	143.7
Agriculture	167	0	0	0	0	0	3	0	38.5	30.4	371.8
Services and transports	10.3	5.6	16.6	10.2	11.3	6	10.3	33	0	48.3	709.7
Non competing capital goods	2.7	3.6	7.5	24.5	2.5	0	2.1	4.4	47.3		
Consumer goods raw materials	0	25.9	0	0	0	0	0	0	25.9		
Non competing agricult. goods	8	0	0	0	0	0	10.6	0	18.6		
Value added	44.3	48.3	93.6	74.5	137.7	310.1	607.5				
Gross Output	244.7	117.2	146	133.6	143.7	371.8	709.7				

TABLE A3: *Input-output table for 1898, mill. Kr. current prices*

	Food industry	Consumer goods industry	Construction and building	Capital goods industry	Export industry	Forestry	Agriculture	Services and transports	Import	Export	Gross output
Food industry	86.1	5.3	0	0	0	0	19	0	53	51.3	449.7
Consumer goods industry	4.3	72.4	0.2	1.8	0	0	0	12.8	131.9	5.6	266.6
Construction and building	0	0	0	0	0	0	23	47	0	0	225
Capital goods industry	1.2	3.4	50.9	113.6	1.2	0	16.2	20	97.7	62.7	409.7
Export industry	1	7.7	35.4	6	14.1	0.2	0.9	15.5	0	176.2	257.1
Forestry	0	0	0	10	109.3	0	0	0	0	17.6	188.6
Agriculture	214.2	2	0	0	0	0	0	0	53	8.9	443.8
Services and transports	17.7	10.6	24.3	18.3	17.2	9	14.3	72.1	0	78.8	1059.6
Non competing capital goods	8.2	12.4	4.1	47	12.9	0	3	14.9	102.4		
Consumer goods raw materials	0	34.2	0	0	0	0	0	0	34.7		
Non competing agricult. goods	10	0	0	0	0	0	16.4	0	61.6		
Value added	107	118.6	110.2	213.1	102.4	179.4	351	877.4			
Gross Output	449.7	266.6	225	409.7	257.1	188.6	443.8	1059.6			

TABLE A4: *Input-output table for 1913, mill. Kr. current prices*

	Food industry	Consumer goods industry	Construction and building	Capital goods industry	Export industry	Forestry	Agriculture	Services and transports	Import	Export	Gross output
Food industry	155	7.4	0	0	0	0	28	0	103.8	90	770
Consumer goods industry	7	181.3	0	1.8	0.2	0	0	4.1	193.1	16.2	549.5
Construction and building	2.4	3.6	0	4.2	2.8	0	27	90	0	182	452
Capital goods industry	3	9.9	86.3	374	10.9	4	22.5	58.5	160.2	379.8	925.5
Export industry	2.8	13.2	48	53	67.2	0	4	35	0	21	603
Forestry	1	0	0	13	181	0	0	0	0	29	276
Agriculture	374.8	12.2	0	0	0	0	0	0	89.9	186.2	823
Services and transports	31	20.5	54	44.1	30.2	17.2	27.5	100.1	0		2051
Non competing capital goods	5.6	13.2	11.4	94.2	25.4	0	0	47	208.8		
Consumer goods raw materials	0	76.5	0	0.5	0	0	0	0	77		
Non competing agricult. goods	29.5	8.8	2.1	0	0	0	0	0	104.8		
Value added	157.9	203	250.2	340.7	285.4	254.8	714	1716.3			
Gross Output	770	549.5	452	925.5	603	276	823	2051			

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