



Tariff protection in Sweden 1885–1914

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Abstract: This paper presents disaggregated estimates of nominal and effective rates of tariff protection for Sweden 1885–1914. In a methodological part of the article I argue that the proper way to measure tariff protection is an output weighted average of tariff rates for a representative sample of commodities. In the empirical part of the paper, I show that Swedish tariff protection increased substantially in the period even though tariff income as a proportion of total imports decreased slightly. This seeming contradiction is explained by the restructuring of Swedish imports that took place in the period under review; the share in imports of highly protected consumer goods declined while the share of capital goods with lower protection rates and duty free raw materials and input goods increased. The result stands in contradiction to some recent views expressed in the international literature.

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1. Introduction

After a period of free trade reforms that commenced in the 1850's Swedish trade policy made a protectionist turnaround in the late 1880's and early 1890's. In the 'free trade era' trade policy had been guided by the idea that food products, raw materials but also machines and other means of production should be exempted from custom duties. On other manufacturing products tariffs were lowered, although they were still quite high for certain products.

The principles that had guided trade policy in the preceding decades were overruled in 1888–1892. Free trade was still adhered to for most raw materials, but agrarian tariffs were reinstated in 1888 and at the same time tariffs were also reintroduced for certain iron products. In most cases, however, manufacturing tariffs were bound by existing international trade treaties until 1892. Thereafter Swedish authorities were free to raise tariffs on manufactures as well. Machines and other means of productions were now given tariff protection while existing custom duties were raised on most other goods. The remaining cracks in the tariff wall were tightened in 1895, when the Swedish-Norwegian interstate law was abolished, thus ending the possibility of transit trade via Norway. The tariff scale was revised on several occasions. These revisions usually implied higher tariffs. The main exceptions were the temporary lowering of agricultural tariffs in 1892–95 and the repeal in 1896 of the pig iron tariff that had been reintroduced in 1892.

The guiding principle of the Swedish tariff scale from the 1890s onwards was the 'solidaristic tariff system', inspired by the German tariff system under Bismarck. The idea was that tariff protection should be given to all sections of 'national labour' that needed it in order to compete with imports, but no industry was to be protected at the expense of other industries. Hence if tariffs were raised on inputs for some producers they were compensated by higher tariffs on their own products. In most cases, this led to higher tariffs upstream in the production chain. Typically, consumer goods were more protected than capital goods, which had higher protection than inputs. Raw materials were generally free of duties.

If the needs of special interests conflicted with what was perceived as the general interest the latter took precedence.¹ This is illustrated by the case of the pig iron tariff, introduced in 1892. It was repealed in 1896 since it proved impossible to stimulate home production of coke-based pig iron without raising the tariff to such a high level that it would unduly penalize other producers. Furthermore, Swedish charcoal pig iron producers were not threatened by imports because they competed in another market. They even exported a substantial portion of their output.² Heavy steel products such as rails and heavy beams were also duty-free, while lighter steel products were given substantial tariff protection.³ ⁴ The same arguments that led to the repeal of the pig iron tariff also kept tariffs on chemical products comparatively low or in many instances non-existent⁵.

For contemporaries, tariff policy was the most contentious industrial policy issue.⁶ In 1919, a public investigation committee was appointed to evaluate its effects. The committee produced a public report in two volumes⁷ and several studies on individual industries. One of the leading members of the committee was the doyen of Swedish economic history, Eli Heckscher. He was very critical of the protectionist system and his opinion clearly influenced the views expressed in the public report. According to Heckscher, the main effects of tariffs were that they stimulated the employment of factors of production in the protected home market industries to the detriment of their more useful employment in the export industries. Three decades later he reiterated his critical opinions, but now he did not think that tariffs were of any great importance:

“...it is probably justified to say that in peacetime protection was a somewhat retarding factor in the general growth of the Swedish economy because it imposed burdens on

¹ Kilander, Svenbjörn, *Den nya staten och den gamla. En studie i ideologisk förändring*. Stockholm: Almqvist & Wicksell, 1991; Kilander, Svenbjörn, *Staten byter ansikte – om statsuppfattning och samhällssyn i sekelskiftets Sverige. Vägen till planrike. Om stat, sektor och sammanhang*. K. Abrahamsson and D. Ramström, Eds. Lund: Studentlitteratur 1983.

² Stockman, Sven K., *Den svenska järnhanterings utveckling med särskild hänsyn till åren 1890–1913*. Stockholm: SOU 1922:52, 1922, p. 192.

³ Nilsson, Carl-Axel, *Järn och stål i svensk ekonomi: 1885–1912. En marknadsstudie*. Lund: Gleerup, 1972.

⁴ In this important respect the Swedish tariff scale differed from the German, that otherwise inspired Swedish tariff makers. In Germany the heavier steel products received the highest protection at the expense of lighter products. See: Webb, Steven B., *Tariff protection for the iron industry, cotton textiles and agriculture in Germany, 1879–1914. Jahrbücher für Nationalökonomie und Statistik* 1977:3–4

⁵ Montgomery, Arthur, *Svensk tullpolitik 1816–191*, Stockholm, 1921, p. 175.

⁶ Kilander, *Den nya staten och den gamla*. The principal work on the formation of Swedish protectionism is Montgomery, *Svensk tullpolitik*. See also Gårestad, Peter, *Industrialisering och beskattning i Sverige 1861–1914*, Uppsala: Uppsala Studies in Economic History, 1987.

⁷ *Betänkande angående tullsystemets verkningar i Sverige före världskriget del I*, Stockholm: SOU 1924:37; *Betänkande angående tullsystemets verkningar i Sverige före världskriget del II*, Stockholm: SOU 1924:38.

profitable branches of industry in favor of unprofitable ones....The main conclusion, nevertheless, is that, apart from the agricultural sector, the Swedish economy was probably not vitally affected in one direction or another. More frequently than either protectionists or free traders are usually inclined to admit, the consequences of foreign trade policies have probably been rather negligible.”⁸

Later generations of Swedish economic historians have taken little interest in the problem, which may seem strange since there is a lively international discussion on the subject.⁹ Despite exceptionally good source material, due not the least to publications of the above mentioned public investigation committee, we have less data about Swedish tariff rates than is the case for many other countries.¹⁰ The purpose of this article is to remedy this lack of knowledge.

2. The measurement of tariff protection

Custom duties can be levied in two separate ways, either as a certain percentage of import values, *ad valorem tariffs*, or as a given sum of money per unit, *specific tariffs*. Consequently the ad valorem equivalent of a specific tariff depends on the price per unit. In Sweden, as in most countries on the European continent at the time, tariffs were predominantly specific. The ad valorem tariff rate is a measure of *nominal* protection. In order to determine how domestic producers were affected by tariffs we also need to take into account that they had to buy inputs, whose prices were affected by tariffs. For a given industry or firm, *effective* protection measures the percentage increase in value added resulting from tariffs compared to what would have been the case under free trade.

⁸ Heckscher, Eli F., *An economic history of Sweden*, Cambridge Mass.: Harvard University Press 1954, p. 239.

⁹ Bairoch, Paul, European Trade Policy, 1815–1914. *The Cambridge Economic History of Europe Volume VIII The industrial economies: The development of economic and social policies*. P. Mathias and S. Pollard, Eds. Cambridge: Cambridge University Press, 1989; Bairoch, Paul, *Economics and world history. Myths and paradoxes*. Hertfordshire: Harvester Wheatsheaf, 1993; Capie, Forrest, Tariff protection and economic performance in the nineteenth century. *Policy and performance in international trade*. J. Black and L. A. Winters, Eds. London and Basingstoke: Macmillan 1983; Capie, Forrest, *Tariffs and growth. Some illustrations from the world economy 1850–1940*. Manchester: Manchester University Press, 1994; O'Rourke, Kevin H., Tariffs and growth in the late 19th century. *Economic Journal*, 2000: april; O'Rourke, Kevin H., Williamson, Jeffrey G., *Globalization and history: the evolution of a nineteenth century Atlantic economy*, Cambridge Mass.: MIT Press, 1999, ch. 6.

¹⁰ Hawke, Gary R., (1975). The United States Tariff and Industrial Protection in the Late Nineteenth Century. *Economic History Review* vol. XXVIII, 1975:1; Webb, Steven B., Tariff protection for the iron industry, cotton textiles and agriculture; Webb, Steven B., Tariffs, Cartels, Technology, and Growth in the German Steel Industry, 1879 to 1914. *Journal of Economic History* vol. XL 1980:2; Webb, Steven B., Tariffs, Cartels, Technology, and Growth in the German Steel Industry, 1879 to 1914. *Journal of Economic History* vol. XL 1982:2; Federico, Giovanni, Tena, Antonio, Was Italy a protectionist country? *European Review of Economic History* vol. 2 1998:1.

The degree of nominal tariff protection is often computed as total custom revenue divided by the value of imports. This measure is often used in international comparisons¹¹ probably because it is easy to compute, but it is nevertheless essentially flawed. It typically underestimates the degree of protection. If demand is price elastic the share of highly protected goods within total imports will shrink, which is after all the purpose of a protectionist tariff policy. In the extreme case where tariffs are prohibitive, deterring all imports, the average nominal tariff rate according to this measure will be zero. In order to compute a measure of nominal tariff protection it seems better to gauge the rate of protection for individual goods and industries and then combine them into a weighted average. This procedure raises the usual index number problem concerning the use of appropriate weighting schemes. Federico and Tena¹² discuss various weighting procedures.

i) No weighting; the computed average tariff rate would then be equal to a simple average of the tariff rates on the commodities ($i = 1 \dots n$) included in the index.

$$(1) \text{ UNT} = \sum t_i / n ;$$

where t_i is the nominal ad valorem tariff rate on the i th good and n is the number of goods in the sample.

ii) Particular commodities are weighted in accordance with their share of the total import value. If all imported goods are included, this measure equals the measure total custom revenue divided by total import value.

$$(2) \text{ NT} = \sum r_i t_i ;$$

where r_i is the share of total imports for the i th good.

¹¹ See for example: Capie, *Tariffs and growth*; O'Rourke, *Tariffs and growth in the late nineteenth century*; Nye, John V., The Myth of Free-Trade Britain and Fortress France: Tariffs and Trade in the Nineteenth Century, *Journal of Economic History* vol.51,1991:1, 23–46; Clemens, Michael A. and Williamson, Jeffrey G. (2001) Why the tariff-growth correlation changed after 1950. *NBER Working Papers*; McGillivray, Fiona, McLean, Iain., Pahre, Robert., Schonhardt-Bailey, Cheryl, *International trade and political institutions. Instituting trade in the long nineteenth century*, Cheltenham: Edward Elgar 2001; Foreman-Peck, James, Lains, Pedro, European economic development: the core and the southern periphery, 1870–1910, *The Mediterranean response to globalization before 1950*, Ed. S. Pamuk, J. Williamson. London:Routledge.

¹² Federico, Tena, Was Italy a protectionist country?

iii) Goods are weighted in accordance with their share of domestic output of tradable goods.

$$(3) \text{ NTWz} = \sum z_i t_i ;$$

where z_i is the share of the i th good in the total output of tradable goods.

iv) Goods are weighted by their share of domestic consumption of tradable goods.

$$(4) \text{ NTWc} = c_i t_i ;$$

where c_i is the share of the i th good in domestic consumption of tradable goods.

Among these alternatives, we can exclude UNT, since it would give equal weight to every commodity irrespective of its importance. However Liepmann¹³ and Loveday¹⁴, the architect behind the 1927 League of Nations study¹⁵, argued that an unweighted average will be reasonably accurate for international comparisons if the sample of commodities on which the average is calculated is sufficiently large and well-balanced. NT is easy to compute if we are prepared to accept the unit values of imported goods in the foreign trade statistics. However, in the majority of cases these are unreliable.¹⁶ Furthermore, we have the problem, referred to above, that the degree of protection is typically underestimated by NT because the share of price elastic goods within total import is diminished because of protective tariffs. Weighting by domestic output, NTWz, or consumption, NTWc, have been criticised since they lead to biased estimates of protection because the very existence of tariffs brings about a sectoral distribution of consumption and production that is different from what would have been the case under free trade. It seems likely that tariff protection stimulates the output of protected sectors and deters consumption of dutiable goods. Thus, NTWz would overestimate and NTWc would underestimate the average

¹³ Liepmann, Heinrich, *Tariff levels and the economic unity of Europe*. London: Allen and Unwin 1938.

¹⁴ Loveday, A., The measurement of tariff levels. *The Journal of the Royal Statistical Society* vol 92:4, 1929

¹⁵ *Tariff Level Indices. International Economic Conference, Geneva, May 1927*, Geneva: Publications of the League of Nations: II. Economic and Financial 1927. II. 34.

¹⁶ A perusal of the volumes of the Swedish trade statistic shows that for the most important goods in imports and exports, unit values were regularly updated. This may explain why Federico and Tena come to the conclusion that the aggregate figures on exports and imports are reasonably accurate. See: Federico, Giovanni and Tena, Antonio, On the accuracy of foreign trade statistics (1909–1935): Morgenstern revisited. *Explorations in Economic History* 1991: vol. 28:3, 259–273.

For the majority of the goods, however, the same unit price was kept for long periods, if not for the entire period from the early 1890s to WWI. Therefore we generally cannot use unit prices from the trade statistics.

nominal tariff rate. This is not necessarily so, however. In Sweden, the large export industries were generally unprotected. They would influence the average protection rate considerably less in NTWc than in NTWz. Arguing in a similar vein, oats, which was duty-free, had a larger share in agricultural output than in domestic consumption. In addition, fiscal tariffs on non-competing agricultural goods, which were typically quite high, do not influence NTWz. If our purpose is to analyse the effects of tariffs on economic development it is hardly a drawback that the average tariff rate is computed based on an economic structure that it has contributed to shape. Besides, it is not possible to know what the economic structure would have been like in a hypothetical world of free trade, unless we are willing to make truly heroic counterfactual assumptions.

In order to calculate an average nominal tariff rate I use a two-stage procedure. In the first stage commodities are allocated to the various industries and nominal tariff rates for the individual industries are calculated. In the second stage, these sectoral tariff rates are used to calculate the average nominal tariff rate for the manufacturing and mining industry and the agricultural sector respectively.

The starting point for my calculations of sectoral tariff rates is appendix I of the second volume of the public report on Swedish protectionism.¹⁷ From this source we have information on the tariff rates per unit of ‘important goods’ from 1882 to 1911, at which date the last revision of the tariff scale in our period took place. Important revisions of the tariff scale also occurred in 1888, 1892 and 1906 and for individual commodities changes in the tariff scale took place at other points in time. These are also shown in this source. Furthermore, it shows the import price per unit in 1914, according to the foreign trade statistics. From 1914, importers were required to report the unit value of imported goods, so import prices in the foreign trade statistics should be more accurate from this year onwards. By dividing the specific tariff for each commodity by its import price in 1914 the ad valorem tariff rate for that year is obtained. In cases where ad valorem tariffs were used, as were common in the engineering, iron and metal manufacturing industries, as well as in the chemical industry, I use these without any further calculations. The source gives information on 441 different commodities. For some industries it has been amended by information taken directly from the foreign trade statistics. The foreign trade statistics and the industrial census do not have the same classification by industries. Therefore, since I

¹⁷ SOU 1924:38, bilaga I.

want to analyse the degree of tariff protection for individual industries, it has been necessary to reclassify the trade statistics in accordance with the classification of the industrial census. The next step in my calculation was therefore to distribute the commodities in my sample into the various industrial sectors, for which purpose the commodity nomenclature in the industrial census is used. Many commodities are not to be found in this nomenclature, but it was nevertheless in most cases obvious to which industry they belonged. After having allocated the various goods in my sample to the different industries I calculated a weighted average of the tariff rates for each industry, mainly using weighting procedure NTWz. Weights for individual commodities were obtained from the census of the manufacturing and mining industry in 1913. For many goods such information is lacking, so in practise it was not always possible to implement this procedure strictly for the first stage of my estimation procedure. Where information is lacking I use simple averages, common sense reasoning and in a few cases also import shares to obtain weights.

After having calculated nominal tariff rates for the separate industries in 1914 it is possible, using weighting formula NTWz, to calculate an average nominal tariff rate for the manufacturing industry (incl. mining) and the agricultural sector. In order to construct time series of nominal tariff rates by industry we also need time series data on import prices and specific tariffs. Since in most cases the unit values in the trade statistics are unreliable I have relied on available price indices. I used 1913 weights to calculate indices for each industry of specific tariffs. For each year, I divide the tariff index number with the import price index and multiply the resulting number with the 1914 nominal tariff rate. Put formally, time series of nominal tariff rates by industry, NTWz, can be calculated according to the following formula:

$$(5) \text{NTWz}_{it} = \text{ST}_{it}/\text{ST}_{i1914} * \text{Pm}_{i1914}/\text{Pm}_{it} * \text{ST}_{i1914}/\text{Pm}_{i1914} ;$$

where ST_i is the specific tariff rate (kr per unit) for industry i , Pm_i is the import price (kr per unit) for industry i and t refers to the various years in the period 1885–1914. In eq. (5), $\text{ST}_{it}/\text{ST}_{i1914}$ is the specific tariff index number for industry i , $\text{Pm}_{i1914}/\text{Pm}_{it}$ is the inverted import price index for industry i and $\text{ST}_{i1914}/\text{Pm}_{i1914}$ is the ad valorem tariff rate for industry i in 1914.

If we can trust foreign trade statistics to give correct values of imported goods, the 1914 tariff rate should be the most reliable parameter in (5). However, we cannot trust that

imported goods, even if they are accurately valued, are representative of the goods typically produced by Swedish firms. If for example imported goods were more 'luxurious' than goods produced in Sweden, their monetary value per unit should be higher than the unit values of domestic goods. In that case, the rate of protection would be underestimated. This appears to be the case particularly in many consumer goods industries. In the cotton textile industry for example, Swedish producers specialized in coarse fabrics while light fabrics dominated imports. The same position in the tariff scale covered many different products of varying quality and price. The monetary value of a kilo of coarse fabrics was lower than for light fabrics, hence tariff protection was higher. For the cotton textile industry Swedish export prices have therefore been used to calculate the ad valorem tariff in 1914, which for this year result in a tariff rate of 25 percent for cotton weaving mills and 12 percent for cotton spinning mills. Still, these figures are probably too low since tariff protection for the most common textile fabrics produced by Swedish weaving mills was often in the order of 30–40 percent.¹⁸

Another example is provided by the shoe industry. In 1913/14, the most commonly imported shoes were given a unit price in the trade statistics of 24 kr per kg. At this time typical prices in Sweden for shoes in this category varied between 11 and 15 kr per kg. The specific tariff was 6 kr per kg, so nominal protection was in the order of 40–50 percent and not 25 percent, as one would have it from the import value in the foreign trade statistics. Therefore, for the shoe industry I have used Swedish export prices to calculate the average tariff rate for 1914.

The shoe industry also provides an interesting case of how technical development quickly made existing tariffs excessive. In 1897/98 two categories of shoes were defined; shoes made of materials other than leather or un-dyed leather, which received a specific duty of 2 kr per kg and other more 'luxurious' shoes with 6 kr per kg in duty. After a few years, the majority of the shoes that were produced and sold had become 'luxurious'.¹⁹ In 1913 approximately 75 percent of the shoes belonged to this category. In calculating the average tariff rate for the shoe industry I have used a simple average for these two categories of shoes, which yields an average nominal tariff rate of 34 percent in 1914. This figure is obviously too low. On the other hand, my weighting scheme probably over

¹⁸ SOU 1924:38, p. 219.

¹⁹ Smith, William, *Den svenska skoindustrien med särskild hänsyn till förhållandena före världskriget*. Stockholm: SOU:1925:3, p. 81 ff.

estimates the tariff protection for the shoe industry in the 1890s, which points to another critical aspect of the calculation procedure, namely the implicit assumption that the weights of the various goods stayed unchanged. In most cases, however, the calculation of industry specific tariff rates are based on quite a large number of goods and the spread in tariff rates between the goods within an industry is not too wide, so intra industry weight shifting should not be a big source of error for my estimates.

Of more concern is probably how well the price indices reflect the development of import prices in each industry.²⁰ Where appropriate import price indices are lacking I have used Ljungbergs price indices for Swedish industrial sectors²¹ under the somewhat unjustified assumption that the development of Swedish prices in these sectors mirrored world market prices. It should be borne in mind; however, that what is important in our formula is not the level but the general direction of change in import prices. Within reasonable margins of error, erroneous import prices should not decisively affect the time series of tariff rates presented in appendix 1.

3. Discussion of the results

A broad overview of the results of my calculations is shown in graph 1. The conventional measure of the rate of production, custom duties divided by total import value, does not increase at all as a result of the protectionist turnaround in trade policy. The trend is even pointing slightly downwards. This result is actually what can be expected from the changing goods composition of Swedish imports in the period under review. Table 1 shows that the composition of imports into Sweden changed significantly. The share of highly protected consumer goods and processed food fell whilst capital and input goods, which had lower tariff rates or were exempted from import duties, increased their share as did duty-free raw materials for the production of consumer goods. Sweden went through a period of intensified industrialization and import substitution in the 1890s. Import penetration fell in the heavily protected consumer goods industries. At the same time raw materials and inputs such as coal, cotton, pig iron and other bulky iron and steel products increased their share of imports. Most of these goods were not produced at all in Sweden and were generally free of duties. The growing share of duty free imports and of goods with

²⁰ These price indices are documented in appendix 2.

²¹ Ljungberg, Jonas, *Priser och marknadskrafter i Sverige 1885–1969. En prishistorisk studie*. Lund: Ekonomisk-historiska föreningen i Lund, 1990.

relatively low tariff rates more than compensated for heightened tariffs on other imports, resulting in a low tariff rate when measured by the quotient total custom revenue divided by total import value as displayed in graph 1. The other lines in the graph give a more accurate view of the effects of the new tariff policy. They show the weighted average of nominal tariff rates in the manufacturing and mining industry²² and in agriculture, where the weights are the shares of gross output in 1913.²³

(Graph 1 about here)

(Table 1 about here)

The nominal tariff rate for dutiable manufactured goods, excluding food products, increased from 5–10 percent to about 20 percent as a result of the new tariff policy, at which level it stayed for the rest of the period, since import prices on industrial products were quite stable.

If we include processed food in the manufacturing industry the nominal tariff rate for dutiable products were more volatile; it increased to 30–35 percent in the late 1890s, after which it fell to about 25 percent in the first decade of the twentieth century. This decline in the nominal tariff rate on processed food was caused by rising prices. As can be seen from graph 1 the tariff rate on processed food mirrored the agricultural tariff rate from the late 1890s, which fell because of rising agricultural prices.

The measures of protection displayed in graph 1 are weighted averages of many diverse goods and industries and much useful information is hidden in the aggregates. To evaluate Swedish protectionism it is useful to distinguish between agricultural goods, raw materials²⁴, capital goods²⁵ processed food²⁶ and other consumer goods²⁷, since they were treated differently by the new tariff policy.

²² Power stations, gas-works and waterworks are excluded from the estimate.

²³ The tariff rate for agriculture is a simple average of the tariff rates for animal food products (meat and pork) and grain.

²⁴ Iron ore mines, Other metal mines, Stone quarrying and stone works, Sawmills.

²⁵ Iron- and steel works, Metal works, Iron- steel and metal manufacturing, Machine and engineering industry, Electrical engineering, Shipbuilding, Cement factories, Brick works, Joineries and furniture factories, Pulp industry, Paper mills, Fertilizer industry, Paint manufacturing, Chemical industry.

²⁶ Slaughterhouses etc, Dairies, Fat factories, Flour mills, Bakeries, Sugar factories, Chocolate and sweet factories, Liquor factories, Breweries, Tobacco factories.

3.1. *Agricultural goods*

The introduction of tariffs on grain in 1888 marked the decisive break with the free trade era. A specific tariff of 2.5 kr per 100 kg was levied on wheat, rye and barley, corresponding to a rate of protection of approximately 25 percent for rye and barley and 20 percent for wheat. Oats was protected by a tariff of 1 kr per 100 kg, corresponding to a nominal protection of about 10 percent. Because of falling prices the tariffs on wheat, rye and barley were lowered in 1892 to 1.25 kr per 100 kg, while the tariff on oats was abolished. The lower tariffs had hardly been introduced before grain prices increased again. In order to improve the competitiveness of Swedish producers the tariffs on wheat, rye and barley were augmented to 3.7 kr per 100 kg in 1896, at which level they stayed for the rest of our period. This translated into an ad valorem tariff rate for wheat that fluctuated between 25 and 30 percent in the period 1896–1913. The average tariff rate on grain was roughly five percentage units lower since the most important cereal in Swedish agriculture, oats²⁸, was duty free from 1892 onwards.

The year 1888 also marked the introduction of tariffs on animal food products such as pork and meat. Pork was given a protection of 20 kr per 100 kg while the specific tariff on beef was 7 kr per 100 kg. The ad valorem equivalent of these specific tariffs was approximately 25 percent in 1888–90 and about 20 percent towards the end of our period.

Tariffs imposed on imports of non-competing agricultural products were of another character.²⁹ Custom duties had always been levied on these products; the motivation was exclusively fiscal. Among the non-competing agricultural products coffee was the most important followed by tobacco. The specific tariff on coffee beans was lowered in 1889 from 0,26 kr to 0,12 kr per kg; otherwise, specific tariffs on non-competing agricultural products stayed more or less the same. Lowered fiscal tariffs were in effect part of the protectionist programme. In order to compensate consumers for the rise in cost of living following the imposition of agricultural tariffs the protectionists advocated the reduction of

²⁷ Glass works, Potteries and earthenware works, Printing and allied industries, Textile industry, Clothing and garment industry, Boot- and shoe industry, Tanneries, Rubber goods industry, Soap and detergent industry, Match industry.

²⁸ The share of oats in the total value of production of grain was 47 percent in 1913. Lindahl, Dahlgren, Kock, *National Income, Part two*, table 65, p. 29.

²⁹ I have calculated the tariff rate on non-competing agricultural product as a weighted average of the following products: oranges, lemons, coffee beans, tobacco, and wine, using the import share of the respective commodities in 1913 as weights.

fiscal tariffs.³⁰ Because of the tariff reduction on coffee beans and price increases, fiscal tariffs sank from about 30–40 percent in 1885–88 to roughly 15 percent in the early 1890s, after which the tariff rate increased again when prices declined (table 2). Although still an important source of revenue, state income from fiscal tariffs hardly increased after 1890, and their share of total custom revenue declined.³¹ At the same time custom revenues declined as a share of total state taxes from about 35 percent in 1890 to roughly 20 percent in 1913–14.

(Table 2 about here)

3.2. *Raw materials and capital goods*

Most of the goods produced by the raw material and capital goods industries were duty free before 1888–92. The imposition of tariffs on capital goods was a clear violation of earlier free trade principles. When analysing tariff protection in the capital goods sector it is useful to make a distinction between the export industries and industries that were primarily oriented towards the home market. If we concentrate on the most important branches of industry we include the iron ore mines, saw mills, the pulp industry and the paper industry in the first category. In the latter category we have the iron- and steel industry³², and iron-, steel and metal goods manufacturers. The machine and engineering industry also produced primarily for the home market, although Sweden succeeded in starting up export of some engineering products around the turn of the century.³³ Nevertheless Sweden still had large import dependence on these products³⁴, so it seems reasonable to include the engineering and machine industry in the home market industries.

In general, export industries were unprotected while home market industries were protected. There is only one exception to this rule, the paper industry, which was heavily protected already in the free trade era. This protection was somewhat extended in the late 1880s, when specific tariffs were raised by about 10 percent. Since paper prices fell more or less continuously between 1885 and 1914, the average nominal tariff rate of the paper

³⁰ Montgomery, *Svensk tullpolitik*, p. 143.

³¹ Gårestad, *Industrialisering och beskattning*, p. 98–99.

³² This is not clear-cut since Sweden also had a substantial export of steel products, however, production for the home market was more important.

³³ Kuuse, Jan, Foreign trade and the breakthrough of the engineering Industry in Sweden 1890–1920. *Scandinavian Economic History Review* vol: XXV:1,1977, 1–36.

³⁴ Nilsson, Carl-Axel, Foreign trade and the breakthrough of the engineering Industry in Sweden 1890–1920: A comment. *Scandinavian Economic History Review* vol. XXVI:2, 156–63, 1978.

industry increased from about 25 percent to approximately 45 percent in 1914. The protection of the paper industry was partially inconsequential, however, since Swedish firms specialised to an increasing extent and with great success in coarse paper (for newspapers, wrapping paper etc.). In the years preceding WWI, the largest Swedish plants were technically up to date with the best US plants and Sweden was a major exporter of coarse paper.³⁵ Prices were accordingly set in the world market, so the tariffs were not utilized for these products.³⁶ The only influence tariffs may have had was to prevent dumping. In the production of finer quality paper, Swedish firms were not competitive and the substantial protection on these types of goods was at least halfway utilized.³⁷

(Table 3 about here)

For the home market oriented capital goods industries the new tariff policy made a big difference. A symbolic cornerstone of the new tariff policy was the imposition of tariffs on machines and instruments of various sorts. These were mostly ad valorem tariffs at 15 percent that had been imposed in 1888 and 1892. The average tariffs on the output of the iron and steelworks were raised from nothing to 20–25 percent in the early 1890s. As a consequence of the repeal of the pig iron tariff in 1896 the average tariff on iron and steel products was lowered to about 15 percent (Appendix1). On average, the tariff protection for the home market oriented capital goods industries increased from about 5 percent in 1885 to roughly 15 percent in the 1890s. If we look at capital goods industries producing primarily for the home market, i.e. capital goods excluding the pulp and paper industry, the tariff protection rose from roughly 2 percent in 1885 to 13 percent in the 1890's as a consequence of the new tariff policy (table 3).

3.3. Processed food and other consumer goods

Among consumer goods industries we may distinguish between different categories. Some of the commodities were highly protected even before the turnaround in commercial policy, due to fiscal reasons. The relatively high tariffs imposed on the miscellaneous food industry (roast coffee was an important item in this industry), the tobacco industry and the chocolate and sweet industry as well as the sugar industry (sugar factories and sugar

³⁵ SOU 1924:38, 183

³⁶ Bosæus, Elis, *Pappersindustriens produktionsförhållanden*, Stockholm: SOU 1922:36, p. 39.

³⁷ SOU 1924:38, p. 187–188.

refineries) can be considered as fiscal tariffs. However, tariffs in these industries were not raised as a consequence of the new tariff policy. Except for those sections of the food industry where tariffs had been imposed for fiscal reasons, the food industry was largely free of duties before the protectionist turnaround. When tariffs were imposed on agricultural products the food industry was compensated by even larger tariff increases in line with the principles of the 'solidaristic tariff policy'. The tariff levels on food products reflected the tariff increases on the agricultural inputs and the protection ranged from 15–20 percent in the case of the dairies and slaughterhouses to 30–45 percent for flour mills and bakeries. If we exclude fiscal tariffs, nominal protection on processed food on average increased from 10–15 percent to 30–35 percent following the imposition of the new tariff policy (table3).

If we exclude the food processing industry, the new tariff policy heightened the protection of the consumer goods industry by about 50 percent to an average nominal rate of 20–25 percent (table 3).

Outside the food industry, consumer goods industries that were heavily protected before the changeover in tariff policy had their tariffs increased only slightly in the 1890s. Among these we find the pottery industry, the glass industry and to a certain extent the textile industry. The tariffs on the products of the pottery industry were roughly unchanged, while protection in the glass industry increased by about 25 percent. According to my calculation, their tariff rate varied between 20 and 25 percent from the middle of the 1890s onwards. On textile products specific tariffs increased by about 15 percent in the early 1890s, which translated into an ad valorem tariff rate that fluctuated around 20 percent, depending on import prices.

In another group we find consumer goods industries that received sharply higher protection in the 1890s. In this category we include the tanneries, the boot and shoe factories and the rubber goods industry. The tariffs of the tanneries and the boot and shoe industry were only slightly increased in the early 1890s. They proved insufficient to make the Swedish producers competitive with imports. In order to remedy this situation their tariffs were roughly doubled in the late 1890s.

4. Effective protection

In evaluating a tariff system, it is also necessary to take into account that firms and industries buy inputs from other industries, whose prices are marked up by tariffs. The rate of effective protection of an industry is computed by the following formula:

$$(6) \quad g_j = \frac{t_j - \sum a_{ij} t_i}{1 - \sum a_{ij}} ;$$

where g_j is the rate of effective protection in industry j , and a_{ij} is the share of costs for inputs from industry i in the output of industry j .³⁸

The effective protection rate is calculated on the following strong assumptions: that the country is “small” in the world market, i.e. it faces an infinitely elastic supply curve for its imports and an infinitely elastic demand curve for its exports; that all produced inputs are traded and that technical input coefficients are fixed, that is they are the same irrespective of trade political regime. It shows the percentage degree of change in value added resulting from a protectionist trade system compared to free trade, i.e. an effective tariff rate of 20 percent signifies that the value added produced by an industry is 20 percent larger than would have been the case under free trade. The purpose of calculating effective tariff rates is to show how resource allocation is affected by tariffs, the idea being that factors of production are attracted to an industry whose value added increases relative to other industries. Equation (6) shows that the effective tariff rate in an industry depends on its own tariff rate, the weighted average of input tariffs and the share of value added. If the own rate of tariff is larger/smaller than input tariffs the effective rate of protection is positive/negative. The difference between nominal and effective tariff rates becomes larger the smaller is the share of value added. It is also evident from equation (6) why a protectionist tariff system, such as the Swedish in the late nineteenth century, imposes low or non-existent tariffs on raw materials, somewhat higher tariffs on produced inputs and the highest tariffs at the further end of the production chain. This escalation in tariff rates is typical for a protectionist trade policy and follows from an endeavor to equalize effective tariffs between industries. Accordingly, the highest tariff rates are to be found in the food processing and consumer goods industries.

³⁸ See for instance Corden, Werner M., *The Theory of Protection*. Oxford: Clarendon Press, 1971.

(Table 4 about here)

I have calculated effective tariff rates for the manufacturing and mining industry for 1913, the only year where we have reasonably accurate input-output data³⁹ (Appendix 1). The general picture of the protective structure that emerges from nominal tariff rates is not changed by the calculation of effective tariffs. In other words, the industries that had the highest nominal tariff rates also had the highest effective tariff rates. Spearman's rank-order correlation coefficient between nominal and effective tariff rates is 0.86 in 1913.

Effective tariffs did not equalize the rate of protection between industries. The spread in effective tariff rates were greater than for nominal tariff rates; the coefficient of variation for effective tariffs was 1.31 for effective tariffs and 0.89 for nominal tariffs. The tariff system was apparently not constructed to equalize effective protection but to ensure the existence of firms producing for the domestic market. In many cases, a high rate of effective tariffs was necessary for the viability of an industry, in others high effective tariffs probably made possible profit rates above the average. It should also be kept in mind that the effective tariff rates are calculated on the assumption that all tariffs were fully utilized, which was not the case.

The results of my calculations of effective tariff rates are summarized in table 4. It shows that the highest effective tariff rates are to be found in the food processing industry, followed by the consumer goods and capital goods industries. The unprotected export industries (iron ore mining, stone quarrying, saw mills and pulp mills) even had marginally negative protection.⁴⁰

5. Tariff heights and the utilization of tariffs

How well do my estimates square with other measurements of tariff protection? My estimate for 1913 is close to the one for Sweden in the often-cited League of Nations tariff index.⁴¹ This index was constructed as an average of the ad valorem tariffs of a sample of 78 commodities deemed important in international trade. In another frequently cited study Liepmann⁴² calculated tariff rates for 144 different types of products. A simple average of

³⁹ The input-output coefficients are constructed from cost data for individual industries and will be published in a forthcoming work of mine.

⁴⁰ Negative effective protection can also be seen in the shipbuilding industry. In this and other unprotected industries the firms were reimbursed for the tariffs they paid on imported inputs, but this could of course not compensate for price increases, as a result of tariffs, on domestically produced inputs.

⁴¹ League of Nations, *Tariff level indices*.

⁴² Liepmann, *Tariff levels and the economic unity of Europe*.

these, as reported in Bairoch⁴³, shows much higher protection than the League of Nations study.⁴⁴

Compared to some countries that adhered to the import substitution industrialization (ISI) strategy in the twentieth century⁴⁵ and to contemporary high protectionist countries in eastern and southern Europe, or for that matter the USA, Swedish tariffs were moderate. However, they were high enough to have substantial impact on the volume of imports. From 1890 to the first decade of the twentieth century, the import share of the home market for consumer goods declined from roughly 50 percent to about 25 percent. In many cases, imports were virtually shut out from the home market. In the shoe industry, for example, the import penetration was over 50 percent in 1890, if we exclude handicraft production, whilst it had virtually disappeared after the turn of the century. In the textile industry the import penetration ratio sank from about 50 percent in the early 1890s to approximately 20 percent in 1913 and in the clothing and garment industry the decline in import share was even more pronounced. Domestic producers had a large share of the market for processed food already in the early 1890s; by 1913, the import penetration ratio had decreased by more than fifty percent compared to the early 1890s. In the glass industry, which was always highly protected, the import share of the domestic market remained more or less the same in the period under review. In the capital goods sector, on the other hand, the import penetration ratio rather increased in the 1890's.⁴⁶

For many goods tariffs were so high that they were effectually prohibitive. Hence, home producers seldom needed to utilise them fully in order to capture the home market. Given the data at hand it is, except for a few standardized commodities, not possible to compare domestic prices with world market prices on comparable goods. It is therefore generally not possible to gauge the degree to which tariffs were utilised. However, the monographs over individual industries, commissioned by the public investigation committee on the effects of the protectionist system, often gave tentative judgements. In the following I review some of these judgements.

⁴³ Bairoch, *European Trade Policy, 1815–1914*.

⁴⁴ This result is caused partly by a different sample than in the League of Nations study and partly because Liepmann in his calculation of ad valorem tariffs used f.o.b. prices from the main exporters as proxies for world prices in the denominator, while the League of Nations study used a simple average of import and export prices.

⁴⁵ Balassa, Bela, *The structure of protection in developing countries*. Baltimore and London: John Hopkins Press, 1971.

⁴⁶ Calculations performed on the foreign trade statistics. Bohlin, Jan, *Export demand and import substitution in Swedish industrialization 1888–1913*. Paper presented to the III Conference of the European Historical Economics Society, Lisbon, October 29–31, 1999.

Capital goods producers that did not compete in the world market probably utilized the tariffs more or less fully. I have already mentioned that the paper tariff was not utilized for the most important export products, coarse paper, but for finer paper that had to compete with imports the very high tariff was probably utilized to 50 percent in 1913.⁴⁷ In the iron and steel industry tariffs were not utilized for export products, but for other products they probably were.⁴⁸ The same goes for iron and steel manufacturers.⁴⁹

In the consumer goods industries the degree of tariff utilization often varied depending on competitive conditions in the home market. After the raise of tariff protection for the shoe industry in the late 1890s, tariffs were probably fully utilised only in the first few years when the industry was established. Since the capital requirement for setting up a shoe factory was small, barriers to entry were consequently low and the home market was competitive. After domestic firms had captured the home market, tariff protection was no longer fully utilized.⁵⁰ In the rubber ware industry, that was established in the wake of the heightened tariff protection in the late 1890s, cartel agreements made it possible for Swedish firms to pocket the tariffs.⁵¹ The tariff protection for the textile industry was 22 percent in 1914 (Appendix 1), which does not seem particularly high, but as already has been mentioned my estimate for the textile tariff rate is probably too low. In the coarse fabrics that Swedish firms specialized in, the tariffs were virtually prohibitive and in many cases not fully utilized.⁵²

Tacit or open collusion in the potteries and glass industry seems to have led in most cases to full utilization of the high tariffs. In the food processing industry the tariff protections was also prohibitive for many goods. World market prices often fluctuated to a substantial degree while domestic prices were more stable, so the degree of tariff utilization varied over time in industries such as the sugar industry and the flourmills. It was high when world market prices were low and lower when world market prices were high.

⁴⁷ SOU 1924:38, p. 188 ; Bosæus, *Pappersindustriens produktionsförhållanden*, p. 97.

⁴⁸ SOU 1924:38, p. 275.

⁴⁹ SOU 1924:38, p. 295.

⁵⁰ Smith, *Den svenska skoindustrin*, p. 81–82; SOU 1924:38, p. 172–173.

⁵¹ Ohlin, Bertil, *Den svenska kautschukindustriens utveckling 1890–1913 med särskild hänsyn till dess ställning åren närmast före världskriget*. Stockholm: SOU 1922:38, 1922, p. 25–27; SOU 1924:38, p. 249.

⁵² SOU 1924:38, p. 220–221, 210.

6. Concluding remarks

Late nineteenth century protectionism is a contested issue in economic historiography in general. Recently O'Rourke⁵³ and Clemens and Williamson⁵⁴ have argued that the positive correlation between growth and various indicators of openness that has been demonstrated for the period after 1950 does not hold up for the late nineteenth century. Bairoch has long since argued that the alleged beneficial effect of free trade is one of the myths of economic history. Basing himself on comparative growth calculations he shows that the 'protectionist' countries had the fastest growth rates in late nineteenth century Europe while free-trade Britain stagnated. On the other hand continental Europe grew slowly in the previous decades when their home markets were open to superior British competition⁵⁵. One may of course argue that there is no causal connection between economic growth and trade policy and that the rapid growth of some countries in continental Europe in the late nineteenth century was merely coincidental with the adoption of a protectionist stance in trade policy. A less convincing argument is to deny that there was a substantial shift in trade policy. Capie, who appears to take this position, uses two kinds of evidence. First he shows that the average rate of custom duty, i.e. total duties divided by total import value, increased only slightly or not at all for the major countries in continental Europe. His second argument is that the import ratio, imports divided by GNP, did not fall.⁵⁶ The second argument is only persuasive if one can show that the composition of imports did not change. In the Swedish case the share of imports even increased, but its composition changed. Import penetration in the heavily protected consumer goods industries declined substantially, while imports of duty-free raw materials such as coal and cotton as well as capital and input goods such as pig iron, bulky steel products and machines increased. In fact, it should come as no surprise that a phase of import substitution at least temporarily leads to an increased import propensity.⁵⁷ This is illustrated by Swedish development in the 1890s. Home market industries were largely dependent on imported raw materials,

⁵³ O'Rourke, Tariffs and growth in the late 19th century;

⁵⁴ Clemens, Williamson, Why the tariff-growth correlation changed after 1950.

⁵⁵ Bairoch, *Economics and world history*; Bairoch, Paul, Free trade and European economic development in the 19th century. *European Economic Review* 1972:3, 211–245; Bairoch, Paul, *Commerce extérieur et développement économique de l'Europe au XIX siècle*. Paris: Mouton, 1976.

⁵⁶ Capie, Tariff protection and economic performance; Capie, *Tariffs and growth*, p. 39–46.

⁵⁷ Little, Ian, Scitovsky, Tibor, Scott, Maurice, *Industry and trade in some developing countries*. London: Oxford University Press, 1970.

machines and other capital goods and the general economic expansion in the 1890s also required more energy, which led to increased imports of coal.

The changing composition of imports also explains why Capie's first argument is wide off the mark. The average tariff rate as measured by Capie declined in Sweden, simply because the composition of imports changed.

International comparisons of trade regimes are marred by the coexistence of incompatible estimates and of a lack of agreement on the proper way to measure tariff rates. Since late nineteenth century tariffs were specific in the overwhelming majority of cases, we must translate them into ad valorem tariff rates. This raises the traditional index number problem regarding which weights to use in order to calculate the average tariff rate. In this article I have argued for the use of output shares of the individual goods and industries as weights. This weighting procedure leads to an estimate of how much the actual economy was protected. By measuring tariff protection in this manner, it can be shown that the average rate of protection increased substantially for many sectors of the Swedish economy. These results contrast with some recent characterisations of Swedish commercial policy in the late nineteenth century.

Some of the current literature on globalisation in this period characterise Sweden as a free trade country.⁵⁸ This position is difficult to reconcile with previous estimates⁵⁹ and with the opinion of contemporaries. If Sweden did not change her tariff policy in a protectionist direction, despite well-documented introductions of specific tariffs on numerous goods which were previously free of duty and heightening of existing specific tariffs, it is difficult to understand why contemporaries debated the issue so intensely – a debate which led to the reshaping of the Swedish political party system. It is even more difficult to understand why the Swedish government in 1919 commissioned the writing of several reports to investigate the effects of something that did not take place according to some recent works on the history of late nineteenth century globalisation! My own estimates, on the other hand, accord well with the views of contemporaries and previous estimates. The new revisionist literature on late nineteenth century protection invariably relies on measuring protection by the quotient total customs duties divided by total import value, presumably

⁵⁸ See for example O'Rourke, Williamson, *Globalization and history*, p. 61. When discussing land prices these authors include Sweden along with Britain and Denmark in the "free-trading old world" in contrast to the "protectionist old world" countries Germany and France, although in chapter 6 of the same book they acknowledge that Sweden introduced tariffs on wheat, rye and barley at about the same level as France and Germany.

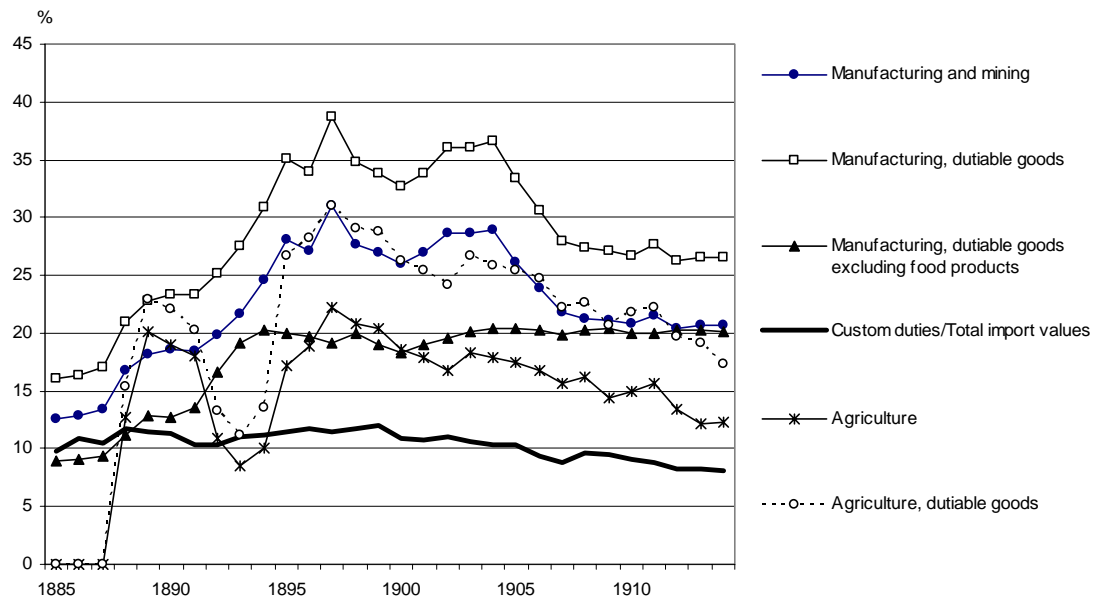
⁵⁹ Liepmann, *Tariff levels*; League of Nations, *Tariff level indices*.

hoping that the bias is not too large, although it is generally acknowledged that such a measure gives a downward bias.⁶⁰ It is my contention that at least for the Swedish case the bias is substantial.

Even if one measures the tariff rate in a more appropriate way one may of course argue that the rate of protection was not 'high', however it was apparently high enough in the majority of cases to achieve its aim of deterring imports. It seems obvious that the protectionist system had effects, good or bad, on individual industries and thus also on Swedish economic development in general.

⁶⁰ See for example Capie, Forrest, Commercial policy. Tariffs (*The Oxford Encyclopedia of Economic History, vol I.*, p. 483–488). New York: Oxford University Press 2003

Graph 1 Nominal tariff rates 1885–1914, %



Source: Appendix 1

Table 1 Import shares (shares of total import value) 1886/90–1906/10

	1886/90	1891/1895	1896/1900	1901/1905	1906/1910
Consumer goods	0.33	0.28	0.24	0.21	0.20
Capital and input goods	0.27	0.35	0.41	0.39	0.39
Share of which were duty free*	0.42	0.42	0.44	0.49	0.52
Processed food	0.14	0.09	0.07	0.08	0.08
Competitive agricultural goods	0.08	0.09	0.09	0.12	0.11
Non-competitive agricultural goods**	0.12	0.12	0.11	0.11	0.11
Raw materials for consumer goods***	0.07	0.06	0.07	0.09	0.11
Sum of duty free imports	0.18	0.21	0.25	0.28	0.31

Source: Bidrag till Sveriges officiella statistik, serie F, handel 1885–1914

Remarks: For definitions of the various groups of industries see note 25, 26 and 27.

* The demarcation line between commodities that were duty-free for the entire period and other goods is difficult to draw; therefore, for consistency it is necessary to apply some criteria. Among duty-free capital and input goods I have included 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.

** Non-competitive agricultural consist of section 17 of the foreign trade statistics, tropical fruits and spices, coffee, tobacco, rice and wine.

*** Raw materials for consumer goods, which were all duty-free, consists of raw materials for the textile industry such as cotton, wool, silk etc., rubber, hides and furs.

Table 2 Agricultural tariffs 1885-1914

	1885	1888/90	1891/95	1896/00	1901/05	1906/10	1911/14	1914
Rye	0	25	21	40	37	30	32	34
Wheat	0	18	17	30	29	26	25	25
Barley	0	27	20	38	34	30	26	30
Oats	0	12	2	0	0	0	0	0
Grain tariffs, 1890 weights	0	18	12	21	19	17	16	17
Grain tariffs, 1913 weights	0	17	11	18	17	15	14	15
Pork	0	25	18	33	26	23	16	11
Meat	0	10	12	12	11	10	10	9
Tariffs, animal products	0	17	15	22	18	17	15	10
Tariffs, non competing agricultural products	42	17	14	21	27	27	19	21

Source: (SOU 1924:38 1924, appendix 1) BISOS F

Table 3 Nominal tariff rates (%), manufacturing and mining, 1885-1914

	1885	1888/90	1891/95	1896/00	1901/05	1906/10	1911/14	1914
Manufacturing and mining	13	18	23	28	28	22	21	21
Manufacturing, dutiable goods	16	22	28	35	35	28	19	27
Raw materials	0	0	0	0	0	0	0	0
Dutiable capital and input goods, excl. paper industry*	2	7	13	13	14	14	13	13
Food industry	30	43	50	66	66	44	40	40
Food industry, excluding financial tariffs	12	26	30	37	37	36	36	36
Consumer goods, excluding food industry	14	15	19	21	20	20	21	20

Source: Appendix 1.

Remark: * Industries enumerated in footnote 25, except Metal works, Shipbuilding, Pulp industry and Paper mills.

Table 4 Nominal and effective tariffs 1913, %

	Nominal tariff rate	Effective tariff rate
Food industry	39	108
Consumer good industry	21	47
Dutiable capital goods industry (excl. paper industry)	13	25
Unprotected export industries*	0	-3

Source: Appendix 1.

Remark: * iron ore mining, stone quarrying, saw mills, pulp mills.

Appendix 1, Nominal tariff rates 1885–1914 and effective tariff rate for 1913, manufacturing and mining industry, %

	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Iron and steelworks	0	0	0	8	13	12	13	15	21	22	23	20	15	14	12	11
Metal works	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron, steel and metal manufacturing	3	4	4	5	5	5	5	9	11	12	12	11	11	11	10	9
Machine and engineering industry	2	2	2	4	6	6	5	11	15	15	15	15	15	15	15	15
Electrical engineering	0	0	0	0	0	0	0	8	12	12	12	12	12	12	12	11
Shipbuilding industry	0	0	0	5	10	10	10	0	0	0	0	0	0	0	0	0
Mining industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stone quarrying and stone works	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cement works	0	0	0	6	11	11	13	16	15	15	15	21	20	18	18	22
Brick works	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Potteries and earthenware works	28	28	28	28	24	25	26	32	30	31	31	27	23	25	25	28
Glassworks	15	15	15	18	22	20	20	22	26	28	24	26	25	22	19	20
Saw mills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Furniture and wooden-fitting factories	5	6	6	9	12	13	14	16	15	15	15	15	15	15	15	14
Pulp mills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper mills	26	27	27	27	30	31	35	34	35	36	36	36	37	37	38	35
Printing and allied industry	1	1	1	1	1	1	1	2	4	4	4	4	4	4	3	4
Flour mills	1	1	1	26	29	28	23	18	18	22	56	51	46	40	44	44
Bakeries	23	26	27	26	21	18	16	16	20	27	25	25	22	20	18	17
Sugar factories	75	78	84	81	75	84	86	83	82	105	129	116	188	141	136	127
Sugar refineries	114	119	128	123	114	128	131	126	125	159	195	176	285	214	206	193
Chocolate and sweets factories	40	40	40	40	40	40	40	42	43	43	53	53	53	53	50	44
Liquor factories	38	37	37	41	45	46	46	43	46	47	48	46	45	46	50	52
Breweries	22	22	22	22	20	24	17	35	45	52	41	51	49	46	38	40
Tobacco factories	41	44	40	51	62	64	53	55	59	62	62	62	62	60	60	61
Dairies	1	1	2	10	16	17	17	16	16	17	18	18	17	17	17	16
Fat factories	0	0	0	15	29	31	31	31	31	34	38	38	39	35	31	28
Slaughter-houses etc.	11	11	11	22	34	35	36	24	21	27	31	43	43	41	39	33
Misc. Food industry	35	35	35	35	35	21	23	31	42	45	45	45	43	40	40	40
Textile factories	10	10	9	10	9	9	9	10	11	14	14	14	14	13	12	12
Clothing and garmament factories	11	10	10	11	11	12	13	19	23	24	23	20	19	23	20	20
Boot and shoe factories	9	9	10	10	10	10	10	11	11	12	10	12	12	22	22	21
Tanneries	6	7	10	10	9	9	9	10	10	10	9	10	10	15	15	15
Fur and leatherware industries	1	1	3	3	3	3	3	5	8	8	7	8	8	9	8	9
Rubber goods factories	11	11	11	13	13	12	12	17	21	21	21	21	20	13	13	16
Paint manufacturing	20	20	20	20	20	24	24	15	14	15	15	15	15	20	18	18
Fertilizer industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
Chemical industry	6	6	6	7	8	7	7	10	11	11	11	11	11	11	11	10
Soap and detergent industry	20	20	20	20	21	21	21	24	27	27	28	28	28	27	26	24
Match industry	7	7	7	7	7	7	7	7	7	8	8	8	8	8	10	8

(cont.)

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1913eff
Iron and steelworks	13	14	14	15	14	12	12	12	12	12	12	11	10	10	27
Metal works	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron, steel and metal manu- facturing	10	10	10	11	12	10	10	12	12	12	11	12	13	13	20
Machine and engineering industry	15	15	15	16	16	16	15	15	15	16	16	15	16	16	20
Electrical engineering	10	10	12	13	13	13	13	12	13	14	14	11	11	11	20
Shipbuilding industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-6
Mining industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
Stone quarrying and stone works	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
Cement works	28	28	28	27	26	21	20	19	20	28	29	22	21	20	38
Brick works	1	1	1	1	1	4	8	8	8	8	8	10	10	10	13
Potteries and earthenware works	29	29	27	28	29	28	26	27	27	26	27	27	28	27	39
Glassworks	18	20	21	19	19	21	21	22	24	23	23	25	24	23	35
Saw mills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-4
Furniture and wooden-fitting factories	15	17	21	20	20	21	19	21	18	15	14	14	16	16	27
Pulp mills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3
Paper mills	38	41	43	46	48	50	48	48	45	45	45	45	46	46	144
Printing and allied industry	3	3	3	3	3	3	3	3	3	3	4	8	8	8	-5
Flour mills	45	44	44	45	45	46	40	40	37	38	37	37	36	36	85
Bakeries	14	16	16	16	17	36	33	29	30	30	31	29	29	27	23
Sugar factories	138	161	150	151	116	76	55	47	46	44	45	30	33	35	118
Sugar refineries	210	245	228	229	177	117	86	74	73	68	72	62	70	73	223
Chocolate and sweets facto- ries	49	49	48	45	45	44	42	42	41	37	37	37	37	37	50
Liquor factories	54	56	68	69	64	67	69	71	70	69	66	62	65	68	311
Breweries	37	38	40	39	35	39	31	26	29	30	59	55	53	53	89
Tobacco factories	58	59	61	64	65	65	59	57	61	59	55	51	47	37	24
Dairies	16	17	17	16	16	16	15	15	15	14	13	13	13	13	13
Fat factories	25	22	23	26	21	22	22	20	21	19	21	14	14	13	56
Slaughter-houses etc.	30	27	27	32	30	26	28	30	24	23	26	20	18	19	19
Misc. Food industry	39	40	43	41	40	38	38	42	41	43	42	34	34	34	80
Textile factories	20	19	19	18	18	17	19	19	19	18	19	22	22	22	52
Clothing and garmament factories	24	23	23	23	22	23	19	22	28	26	25	27	25	25	35
Boot and shoe factories	45	44	41	40	38	38	39	40	42	40	39	38	37	34	93
Tanneries	14	14	13	12	12	12	12	13	13	13	13	12	12	11	62
Fur and leatherware indus- tries	10	10	8	8	8	8	7	7	8	7	7	9	8	8	14
Rubber goods factories	26	27	24	23	23	21	23	24	25	24	24	27	27	27	60
Paint manufacturing	18	19	18	17	17	16	15	16	15	15	15	15	15	15	21
Fertilizer industry	3	4	4	5	5	4	4	4	4	4	4	4	4	5	7
Chemical industry	11	11	12	11	11	11	11	11	12	12	12	14	13	12	7
Soap and detergent industry	27	29	30	32	32	31	29	27	28	28	27	18	16	16	72
Match industry	10	10	10	9	9	9	9	10	10	10	10	10	10	10	14

Source: SOU 1924:38 1924, Bidrag till Sveriges officiella statistik, serie F, handel 1885–1914. SOS Industri 1913. Unpublished work of my own on a Swedish input-output table for 1913. For import prices used see appendix 2.

Remarks: The tariff rate in 1914 for the clothing industry has been calculated from information on prices and tariffs given in SOU 1924:38, 1924. For the boot and shoe industry the tariff rate for 1914 has been calculated on export prices.

Appendix 2. Sources for import price indices

Manufacturing and mining

Iron and steelworks, Åmark, Karl, En svensk prisindex för åren 1860–1913. *Kommersiella meddelanden* vol. VIII, 1921:18, p. 1259–1287 (Sauerbeck wholesale price index, pig iron prices); Nilsson, Carl-Axel, *Järn och stål i svensk ekonomi 1885–1912. En marknadsstudie*, Lund: Ekonomisk-historiska föreningen, 1972 (import price index); Burn, Duncan, *The economic history of steelmaking*, Cambridge: Cambridge University Press, 1961, p. 103 (British rail prices, fob).

Metal works, Ljungberg, Jonas, *Priser och marknadskrafter i Sverige 1885–1969. En prishistorisk studie* 1885–88, appendix 2, Lund: Ekonomisk-historiska föreningen, 1990; Hoffmann, Walther G., *Das Wachstum der deutschen Wirtschaft seit der Mitte der 19. Jahrhundert*, Berlin, Heidelberg, New York: Springer-Verlag, 1965, p. 606 ff (Indices der Exportpreise, Waren aus Metall).

Iron, steel and metal manufacturing, Hoffmann, *Das Wachstum* (Indices der Exportpreise, Waren aus Metall, p. 606 ff).

Machine and engineering industry, Hoffmann, *Das Wachstum*, p. 607 (Exportpreise, Maschinen), *ibid.* p.572–573 (Investitionsgüter); Ljungberg, *Priser och marknadskrafter*, appendix 2.

Electrical engineering, *ibid.*

Shipbuilding industry, Ljungberg, *Priser och marknadskrafter*, appendix 2

Mining industry, import prices, Swedish foreign trade statistics, import prices.

Stone quarrying and stone works, Åmark, En svensk prisindex (coal prices from Sauerbecks wholesale price index).

Cement works, Edström, Olof, *Den svenska cementindustrien med särskild hänsyn till förhållandena före världskriget*, Sockholm: SOU 1925:4, 1925 (German cement prices, p. 31).

Brick works, Ljungberg, *Priser och marknadskrafter*, p. 353.

Potteries and earthenware works, Ljungberg, *Priser och marknadskrafter*, appendix 2, implicitly calculated from other price index series in the stone and earthenware industry.

Glassworks, Ohlin, Bertil, *Den svenska glasindustriens utveckling med särskild hänsyn till dess ställning åren närmast före världskriget*. Stockholm: SOU 1922:53, 1922, p. 81 (Belgian export prices, window glasses); Ljungberg, *Priser och marknadskrafter*, appendix 2.

Saw mills, Ljungberg, *Priser och marknadskrafter*, appendix 2

- Furniture and wooden-fitting factories*, Hoffmann, *Das Wachstum*, p. 606 (Indices der Exportpreise, Waren aus Holz).
- Pulp mills*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Paper mills*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Printing and allied industry*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Flour mills*, Import prices, Swedish foreign trade statistics, import prices.
- Bakeries*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Sugar factories*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Sugar refineries*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Chocolate and sweets factories*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Liquor factories*, Ljungberg, *Priser och marknadskrafter*, appendix 2; Mitchell, B.R., *British historical statistics*, Cambridge: Cambridge University Press, 1988, p. 728 (wholesale price indices, foreign wine and spirits).
- Breweries*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Tobacco factories*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Dairies*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Fat factories*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Slaughter-houses etc.*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Misc. food industry*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Textile factories*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Clothing and garment factories*, Hoffmann, *Das Wachstum*, p. 607 (Indices der Exportpreise, Kleidung).
- Boot and shoe factories*, Smith, *Den svenska skoindustrien*, p. 98.
- Tanneries*, Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Fur and leatherware industries*, Hoffmann, *Das Wachstum*, p. 606 (Indices der Exportpreise, Lederwaren und Pelze), Ljungberg, *Priser och marknadskrafter*, appendix 2.
- Rubber goods factories*, Hoffmann, *Das Wachstum*, p. 606 (Indices der Exportpreise, Waren aus Gummi).
- Paint manufacturing*, Ljungberg, *Priser och marknadskrafter*, appendix 2.

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Fertilizer industry, Ljungberg, *Priser och marknadskrafter*, appendix 2.

Chemical industry, Ljungberg, *Priser och marknadskrafter*, appendix 2.

Soap and detergent industry, Ljungberg, *Priser och marknadskrafter*, appendix 2.

Match industry, Ljungberg, *Priser och marknadskrafter*, p. 489–90.

Agriculture

Grain, Swedish foreign trade statistics, import prices.

Non-competing agricultural products, Åmark, *En svensk prisindex* (coffee and raw tobacco).

Animal food products, Swedish foreign trade statistics, import prices.

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