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Coping with barriers to trade: Causes and consequences of the changing competitiveness of Swiss industries (1900-1950)¹

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1. Introduction

The first half of the twentieth century is recalled as an unstable period, marked by wars, economic crises and the progressive disintegration of the world economy. Especially for a small open economy like Switzerland restricted access to foreign markets caused major difficulties and entailed structural changes that influenced the country's further economic development up until the last decade of the twentieth century. The main theme of this paper is to analyse the different responses of the main Swiss industries to the challenges of the outer world and highlight the causes and consequences of such choices. We shall concentrate on the manufacturing sector, since during the period dealt with services trade was of minor importance and data on services exports and imports are not available.

In the next section we shall describe the pattern of trade with the main openness indicators, recurring on data of exports and imports and placing them into a comparative perspective. The most widely used measure of success or failure to internationalise is revealed comparative advantage (RCA), an index measuring a country's export specialisation. Its counterpart, a country's comparative import propensity (RMA), is often neglected, although it is an important indicator for evaluating to what extent an economy participates in gains from trade by exploiting the comparative advantages of other countries. Gains from trade are the result of specialisation, implying that a country abstains from manufacturing products that can be imported at more favourable conditions from other countries. On the basis of these indicators it is possible to pinpoint the industries that gained or lost competitive strength (in relative

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terms), but in a context marked by government interventions and regulated markets these figures are not necessarily the result of relative economic efficiency, as could be assumed in a world of open and competitive markets. Changing export specialisation and import propensity have to be placed into the historical context and understood as the result of decisions made by economic and political actors.

In section 3 we shall focus on the scope of the firms in coping with changing conditions for international trade as well as on the impact of economic policies and government interventions. Although the room for manoeuvre of the firms differed considerably, it was influenced by constraints, which were country-specific and therefore similar for all firms, but also industry-specific, shaped by common experience and shared views on future prospects. On the one hand, we distinguish responses that can be characterised as ‘exit options’: Firms try to escape from location-specific disadvantages for exports by establishing manufacturing subsidiaries in foreign countries or by downsizing and re-focusing their activities on the internal market. In order to succeed with FDI the firms needed some firm-specific endowments, which allowed them to compete with domestic firms in foreign countries. On the other, sticking to exports implied recurring on ‘voice options’ that somehow compensated location-specific disadvantages at home: by searching for new markets and creating new competitive products or by changing the national or industry-specific conditions for trade. If in some industries the large number of firms withdraws from foreign markets, export flows will give way to import flows and the national economy will reap the advantages of the international division of labour, unless the domestic firms recur on ‘voice options’ allowing them to shelter domestic firms through tariff protection and other means of market regulation, especially cartels.

2. The ‘openness’ of the Swiss economy and its competitiveness in world markets

2.1 An open economy with a pronounced dual structure

In comparison with other small European countries Switzerland was one of the most open economies before World War I, but in the subsequent decades the country’s openness declined (Table A1 in the Appendix): Total foreign trade in percent of GDP decreased to a third in 1938, from two thirds before World War I and recovered only slowly, and export quotas reached a minimum of 10% in the depression of the 1930s (Figure A1 in the

Appendix). Exports were usually lower than imports, except during the wars, and the balance of trade deficit was compensated by the surplus of services (mainly resulting from tourism and capital income).²

The Swiss industrial sector had a dual structure already in the 19th century with industries focusing either on foreign markets or on the domestic market. This dualism became more pronounced with the outbreak of WW I. From then on it became customary to distinguish between export industries and domestic industries with quite different and often conflicting views on trade policies and government interventions. According to the share of an industry's exports in its total output, watches (incl. jewellery) and chemicals were the most export-oriented industries (60% to 90% throughout the period). With about 40% of output exported at the beginning of the century, the machine industry was clearly less export-oriented, but this percentage increased continuously – except during World War II – and reached about 50% in the 1950s. The textile industry was highly export oriented (over 60%) at the beginning of the century, but subsequently the share of output exported declined to about a third in the 1930s and to less than a fourth in the 1950s. With the exception of embroidery (about 90% exported) and silk (about 60% exported) textiles converted into a domestic industry, with export shares around 20% in the 1950s. The 'leather, rubber and synthetics' industry was export oriented (50% of output) until WW I, later on this percentage varied between 15% and 25%. The other industries focused mainly on the domestic market throughout the period, with export shares of 15-25% (metals, clothing and footwear) and about 2-12% (food, paper, furniture, vehicles), with some extraordinary peaks of exported metals and wood during the period 1915-1922. The construction business was solely orientated towards the domestic market and so were the industries related to this sector - the wood, cement, bricks, glass and other building materials industries -, again with the exception of some years during the period 1915-1921, when exports increased considerably.

Measured by their share in total Swiss exports (Table 1 below), we can distinguish between rising - metals, machinery, chemicals, miscellaneous manufactures (in Switzerland mainly watches) - and declining – food, textiles, vehicles – export industries. Exports were higher than imports for miscellaneous manufactures, textiles and machinery, but lower for food, raw materials and metals throughout the period. Exports in chemicals were higher than imports from 1938 onwards, in vehicles only at the beginning of the period. In 1900 and 1913, over

² Halbeisen (2008), pp. 246 ff.

two thirds of imports consisted of food, raw materials and metals; this share declined somewhat, but in 1952 it was still about 60%.

2.2 Competitiveness and openness in a comparative perspective

The most widely used indicator for measuring the relative competitiveness of an economy's industries is revealed comparative advantage (RCA), an index measuring a country's export specialisation.³ In order to identify the comparative advantage of a particular industry (say textiles), its share in the 'world' textiles trade is compared with the share of total Swiss exports (all products) in total 'world' trade or – if we recast the formula – the share of textiles in total Swiss exports is related to the share of textiles in total 'world' exports:

$$RCA = [X_i^{CH} / X_i] / [X^{CH} / X] = [X_i^{CH} / X^{CH}] / [X_i / X]$$

If the index value is higher than 1, the export specialisation is above average, which means that the country has a *revealed comparative advantage* in this industry, if it is lower than 1, export specialisation is below average implying a revealed comparative disadvantage. The higher the RCA value of an industry in comparison with the other industries, the higher is an industry's competitiveness. The available estimates of RCA of the main commodity groups for a few years between 1913 and 1952, are evidence of a strong *comparative advantage or export specialisation* in machinery, chemicals, textiles and miscellaneous manufactures (mainly watches) throughout the period (Table 1).

The RCA in textiles declined until 1938 and recovered somewhat in 1952, mainly because the share of Switzerland in world exports of textiles increased, while the share of textiles in 'world' exports declined (or – according to the second term of the formula - because the share of textiles in total Swiss exports declined less than the share of textiles in total 'world' trade). For chemicals RCA indices increased at every benchmark year since 1913 and reached extraordinary high values since 1928. In effect, the share of Switzerland in 'world' chemical exports increased much more than the share of Switzerland in total 'world' trade (or the share of chemicals in total Swiss exports more than the share of chemicals in total 'world' trade). The RCA of machinery were rather stable, but declined somewhat in 1952. The share of Switzerland in 'world' exports of machinery declined – except in 1938 -, whereas the share of machinery in total 'world' trade increased more than fourfold. During the whole period, the share of machinery in total Swiss exports increased less than the share of machinery in total 'world' trade.

³ See, for example, Laursen, December 1998.

Table 1: RCA and RMA of main commodity groups 1900-1952

Commodity group	Year	RCA	RMA	Share in CH exports	Share in CH imports	Exports / Imports	CH exports / 'world' exports	CH imports / 'world' imports	Share in 'world' trade
Food, drink, tobacco	1900	0.6	0.9	12.4%	29.3%	0.3	1.7%	2.8%	21%
	1913	1.0	1.0	15.5%	29.4%	0.4	2.4%	2.9%	16%
	1928	0.7	0.8	10.8%	27.0%	0.3	1.6%	2.3%	15%
	1938	0.5	0.8	6.3%	27.8%	0.2	1.2%	2.3%	13%
	1952	0.5	0.8	5.9%	22.9%	0.2	1.2%	2.5%	11%
Raw materials	1900	0.4	0.8	9.3%	30.2%	0.2	1.1%	2.5%	24%
	1913	0.3	0.8	6.1%	29.9%	0.1	0.6%	2.2%	24%
	1928	0.3	0.7	7.1%	29.2%	0.2	0.7%	2.0%	23%
	1938	0.2	0.7	4.0%	27.0%	0.1	0.5%	1.9%	20%
	1952	0.3	0.6	5.5%	25.3%	0.2	0.8%	1.8%	19%
Metals	1900	0.3	2.2	3.1%	14.0%	0.2	0.9%	7.1%	10%
	1913	0.4	1.9	4.5%	13.5%	0.2	1.0%	5.6%	11%
	1928	0.7	2.2	7.4%	14.7%	0.4	1.6%	5.8%	11%
	1938	0.8	2.0	10.7%	15.5%	0.6	2.0%	5.7%	14%
	1952	1.0	2.0	13.2%	20.5%	0.6	2.6%	5.9%	12%
Machinery	1900	1.4	1.6	6.2%	2.8%	1.7	3.9%	5.0%	4%
	1913	1.3	1.3	8.0%	2.7%	2.1	3.1%	3.8%	6%
	1928	1.5	1.3	11.6%	3.4%	2.6	3.4%	3.4%	8%
	1938	1.6	1.2	19.7%	4.4%	3.7	4.0%	3.5%	12%
	1952	1.1	1.1	20.8%	6.5%	2.9	3.0%	3.2%	18%
Vehicles	1900	1.7	1.0	3.7%	0.5%	6.0	4.7%	3.3%	2%
	1913	0.4	0.9	1.1%	0.8%	1.0	0.9%	2.7%	3%
	1928	0.4	1.8	2.2%	3.0%	0.6	0.9%	4.8%	6%
	1938	0.3	2.0	2.7%	3.3%	0.7	0.8%	5.6%	8%
	1952	0.1	2.0	1.0%	5.7%	0.2	0.3%	5.7%	9%
Chemicals	1900	-	0.9	0.0%	3.3%	0.0	0.0%	2.8%	4%
	1913	1.1	0.8	4.5%	3.5%	0.9	2.7%	2.4%	4%
	1928	1.5	2.4	6.4%	5.8%	0.8	3.4%	6.5%	4%
	1938	2.0	2.4	12.0%	7.4%	1.3	5.0%	6.7%	6%
	1952	2.8	2.8	14.8%	7.3%	1.8	7.5%	8.2%	5%
Textiles	1900	2.3	1.6	46.0%	13.0%	2.6	6.5%	5.1%	20%
	1913	2.1	1.7	40.5%	11.6%	2.5	5.0%	5.1%	20%
	1928	1.7	1.7	30.0%	12.1%	1.9	3.7%	4.5%	18%
	1938	1.4	1.9	16.7%	7.9%	1.7	3.5%	5.4%	12%
	1952	1.6	1.8	13.7%	6.1%	2.0	4.4%	5.4%	8%
Miscell. manufact.	1900	1.5	0.9	19.9%	7.0%	2.1	4.1%	2.8%	13%
	1913	1.3	1.1	19.7%	8.6%	1.6	3.2%	3.2%	15%
	1928	1.8	0.7	24.1%	5.1%	3.6	3.9%	1.9%	14%
	1938	2.1	1.1	28.0%	6.5%	3.5	5.2%	2.9%	13%
	1952	2.0	1.2	25.1%	5.8%	4.0	5.4%	3.6%	12%

Computed by Mattia Regi. The 'world' consists of Belgium/Luxembourg, France, Germany, Italy, Sweden, Switzerland, UK, Canada, US, Japan.

Source: Robert E. Baldwin, The Commodity Composition of Trade: Selected Industrial Countries, 1900-1954a, The Review of Economics and Statistics, vol. 40, No. 1, Part 2. Problems in International Economics, Feb., 1958, pp. 50-68. EXPORTS OF SPECIFIC COUNTRIES BY COMMODITY GROUP, SELECTED YEARS, 1900-1954 (Millions of dollars).

In miscellaneous manufactures (mainly watches), RCA also increased continuously – except in 1913 and reached high values in 1938 and 1951. The share of Switzerland in ‘world’ exports of this commodity group declined in 1913, but increased in the other benchmark years, whereas its share in total ‘world’ trade increased between 1900 and 1913 and then declined. The fluctuations are mirrored in the relationship between the share of this industry in total Swiss exports and its share in total ‘world’ trade. In ‘food, drink and tobacco’, a slight comparative advantage was reached in 1913, but was rapidly lost later on; in ‘vehicles’ there was a rather strong comparative advantage at the beginning of the century, which had vanished by 1913, and in ‘raw materials’ the Swiss economy had a clear competitive disadvantage with very low RCA values throughout the period.

In comparison with other European countries and the US, the Swiss machine industry was able to maintain its position, with RCA indices equal to the United Kingdom and only slightly lower than Germany and the US; in chemicals and miscellaneous manufactures Switzerland moved into the first position, while in textiles it fell back from the first place before WWI to the fourth (behind Japan, Italy and the UK); in vehicles it shifted from the third to the last position (Table A2) in the Appendix). In ‘food, drink and tobacco’ Switzerland was in a middle position, mainly because RCA values for most of the other countries were also below 1, except for the US and Italy. In ‘raw materials’ Switzerland was always in the last position; in metals that was the case in 1900, together with Italy, but later on Switzerland was in a middle position.

Comparative import propensity (RMA) is measured by the share of a country’s imports in ‘world’ imports of a particular commodity group, say food, in relation to the share of total Swiss imports in total ‘world’ imports or – if we recast the formula – the share of food in total Swiss imports in relation to the share of ‘world’ imports of food in total ‘world’ imports.⁴

$$RMA = [M_i^{CH} / M_i] / [M^{CH} / M] = [M_i^{CH} / M^{CH}] / [M_i / M]$$

High RMA values indicate that a country relies heavily on imports and, consequently, foreign firms should have a comparative advantage in this commodity. In an open world economy, high RCA values for a particular industry should be paralleled by low RMA and vice versa. But this relationship is usually not that clear. The definition of a commodity group may be too broad, and thus fail to reveal the country-specific specialisation. Consequently, high RCA may be paralleled by high RMA due to a country’s specialisation within a particular

⁴ Directorates for Science, Technology and Industry, OECD, STAN INDICATORS (2005 ed.), p. 11.

commodity group. In effect, for several Swiss export industries – textiles, machinery, chemicals and miscellaneous manufactures - high RCA are paralleled by high RMA. It seems that high RCA and RMA were also the result of Swiss firms concentrating increasingly on higher stages of the production process, transforming imported intermediates into finished goods. The RCA values for commodity sub-groups listed in Table A3 in the Appendix suggest that this was the case for chemicals, textiles and ‘other (miscellaneous) manufactures’.⁵ In chemicals, the comparative advantage is at first in intermediates, but shifts to finished chemicals until 1957, and also the comparative advantage in ‘other manufactures’ was confined to finished goods. In accordance with Table 1 above, the RCA in textiles and clothing decline between 1913 and 1937 and recover somewhat in 1957, but comparative advantage shifts among the three subgroups: yarns, fabrics, made-up goods. The decline of comparative advantages in textiles after 1914 seems to have been countered, at first, by concentrating on yarns and made up goods. Subsequently RCA values declined, but were re-attained in all subgroups in 1957.

Low RCA paralleled by high RMA, the relationship prevailing for vehicles and metals, could be interpreted as resulting from differences in relative economic efficiency, but if there are barriers to trade, low RCA may be due to tariff barriers in foreign countries. Low RCA may also be paralleled by low RMA, because of a country’s low demand in a specific commodity or because of import barriers. In Switzerland this relationship can be observed for food and raw material, and it would make sense, if the domestic market was – at least to some extent - sheltered from imports or if demand was particularly low. As we can assume that the Swiss population did not have particularly low food requirements, barriers to imports should have prevailed, but on average the impact of import protection must have been rather weak, because the share of food in total imports declines only slightly. The combination of low RCA and low RMA for ‘raw materials’ makes sense, because – as mentioned above - firms focused increasingly on the last stages of production, transforming imported intermediate goods into finished goods, so that demand for raw materials in Switzerland was rather low. But as was the case for food, dependence from imported raw materials remained strong.

Further insights can be gained, if we consider the shares of a commodity group in total ‘world’ trade. Those with rising shares are metals, machinery, vehicles and chemicals - rather

⁵ Besides the countries considered in Table 1 the Netherlands and India. The values of the RCA are therefore lower than in Table 1. In effect, the RCA of machinery and chemicals are higher than 1 only from 1929 onwards. The commodity groups are roughly comparable.

the modern, technology-intensive sectors of the period - those with declining shares the traditional industries 'food, drink, tobacco', raw materials and textiles. But whereas the shares of machinery and vehicles increase considerably, those of metals and chemicals remain almost the same. Both rising and declining shares in 'world' trade may be distorted by constraints on free trade, because if import barriers or other forms of trade regulation are introduced by a large number of countries, the share of this industry in total 'world' trade will decline.

Export specialisation (RCA) and import propensity (RMA) are the outcome of path-dependent and highly interdependent processes, difficult to change deliberately and constantly exposed to changes taking place elsewhere. Institutions, in the sense of the 'rules of the game',⁶ economic policies, the strategies pursued by the firms, their experience and expectations and an industry's possibilities to influence economic policies and to change the rules have an impact too. In the next section we shall focus on the main Swiss industries and trace the interplay between changing external conditions for trade and the scope of economic and political actors in coping with these changes.

3. Responding to new constraints and opportunities

3.1 'Exit' versus 'voice' options

When confronted with increasing border barriers, firms had to face the threat of having to give up exporting products manufactured in Switzerland. To some extent, firms overcame barriers to trade by establishing subsidiaries in foreign markets. FDI may lead to the reduction of exports from the home country, but FDI may also have been paralleled by measures that promoted export. What were the main motives for FDI and what were the consequences for the further development of the parent companies in Switzerland and for their export activities?⁷ What kind of 'voice strategies' strengthened or weakened their export and/or FDI activities? Did policy makers influence firm behaviour through regulatory, legal, financial and other government intervention? Why did firms in some industries largely abandon foreign markets, and what were the consequences of withdrawal for the industry, on the one hand, and the Swiss economy, on the other?

⁶ North (1992).

⁷ According to empirical research, the impact of FDI on the firms' exports from Switzerland is ambiguous. Arvanitis et al. (2001), pp. 53 ff.; Giuseppe Nicoletti et al. (2003/1), based on OECD data.

Already at the beginning of the 20th century, Swiss firms invested heavily abroad and continued to do so, although conditions became increasingly hostile to international economic exchanges. In effect, trade in percent of GDP declined and export and import quotas reached a minimum in the depression of the 1930s and in the last years of World War II. In contrast, exports and imports had pronounced peaks and troughs in the war and post-war period 1914-1921 (Figure A1 in the Appendix). With regard to FDI the available data suggest that economic disintegration and increasing protectionism favoured the set-up of subsidiaries abroad: the decline of international trade was counteracted by another dimension of global integration.

Estimates of FDI in the late nineteenth century and up until 1919, taking into account the main Swiss MNE of the time, show that FDI were high in comparison with investments in Switzerland: In 1919, total FDI were almost twice the amount of investments at home and in 1900 this ratio had been only slightly lower (1.7 instead of 1.9). In 1919 (figures for 1900 in brackets) the shares of the main outward-oriented industries in total FDI were: food 38,9% (43,5%), textiles 16,5% (20,2%), machinery 8,5% (3,5%), electrical equipment 7,7% (3,1%), chemicals 2,3% (2,3%) and electro-chemicals 4% (14%).⁸ Clearly, the export industries food and textiles with the highest shares in total exports at the beginning of the century (besides miscellaneous manufactures, Table 1 above) were also those with the highest investments abroad.

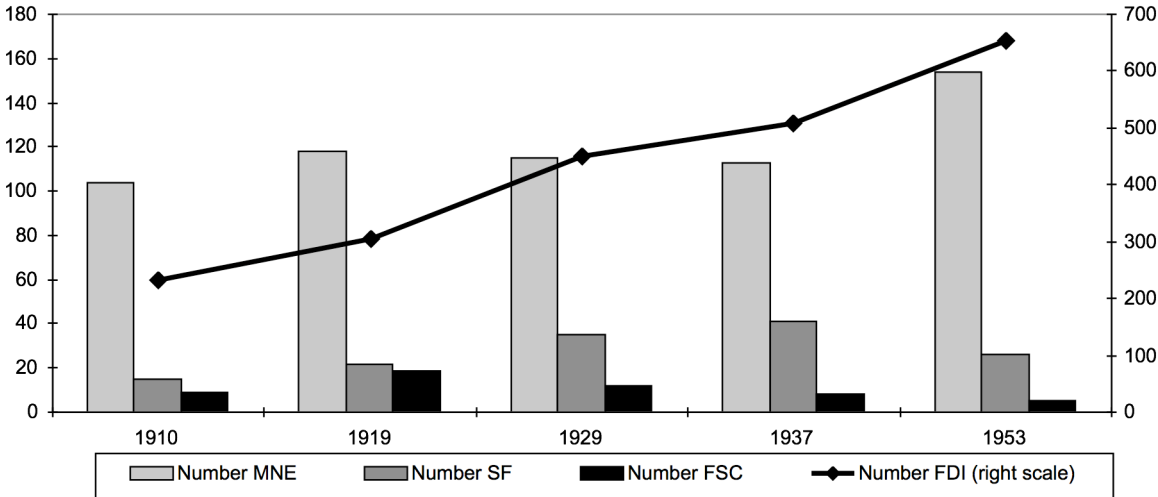
There are no comparable estimates of FDI of Swiss firms after 1919 and up until 1966, but within our research project we have established a database on the number of MNE and of their foreign subsidiaries at four benchmark years (1919, 1929, 1937, 1953) based on financial yearbooks containing balance sheets of the main Swiss companies and on some other sources.⁹ The definition of MNE and of foreign subsidiaries had to be modified compared with the analyses mentioned above, because our sources did not allow to systematically distinguish subsidiaries with manufacturing from those fulfilling other functions. This has only been possible for most of the larger MNE, where we could recur on case studies. The results show that the drive towards internationalisation – measured by the number of subsidiaries - clearly persisted and was hardly affected by the Great Depression of

⁸ Himmel (1922), pp. 117 ff.

⁹ The main source, Schweizerisches Finanz-Jahrbuch, contains information on 380 companies in 1919, 445 in 1930, 443 in 1937, 442 in 1953).

the 1930s or World War II. The number of MNE declined slightly between 1919 and 1937, mainly due to takeovers and mergers among Swiss firms (Figure 1).

Figure 1: Number of MNE, Free Standing Companies (FSC), Financial Companies (SF), and foreign subsidiaries (FDI)



Database, Sources: Schweizerisches Finanz-Jahrbuch, Ausgaben 1919, 1929, 1937 und 1953; Vade-mecum des Bourses de Zurich, Bâle et Genève, Ausgaben 1920/21 und 1929/30; Schweizer Börsenhandbuch für 1938; Manuel des Bourses Suisses pour 1953-54; company histories and annual reports.

Most MNE were manufacturing firms (68% in 1910 and 57% in 1953), but the share of MNE in services increased continuously from almost 30% in 1910 to over 40% in 1953. The services sector was important, because of finance (holding) companies, insurance companies, and trading firms. Swiss banks had very few subsidiaries abroad. In the following we concentrate solely on the manufacturing sector. The industries with the largest number of MNE throughout the period were textiles, machinery, chemicals/pharmaceuticals, food and electrical equipment (Table 2). The position ‘other industries’ consists of firms manufacturing building materials (cement, glass), paper, shoes and straw fabrics. In the 1910-1953 period, they made up between 10% and 20% of all MNEs and a somewhat lower, but also rising proportion of all subsidiaries. The number of subsidiaries increased in all industries, but in relative terms it was most pronounced in machinery. The shares of chemicals/pharmaceuticals, electrical equipment and processed food remained remarkably stable, showing either a small increase or decline from year to year, while the shares of the textile and metals industries were cut by half.

Table 2: Manufacturing MNE and their foreign subsidiaries by industry

	Number of firms					in %				
	1910	1919	1929	1937	1953	1910	1919	1929	1937	1953
Parent companies	-					-				
Chemicals/Pharmaceuticals	12	11	11	10	16	14.1	12.1	12.1	12.3	15.7
Processed food	11	12	10	8	8	12.9	13.2	11.0	9.9	7.8
Metals	10	8	6	6	7	11.8	8.8	6.6	7.4	6.9
Machinery	10	10	18	18	20	11.8	11.0	19.8	22.2	19.6
Electrical equipment	5	6	6	7	9	5.9	6.6	6.6	8.6	8.8
Textiles	28	31	26	18	23	32.9	34.1	28.6	22.2	22.5
Other industries	9	13	14	14	19	10.6	14.3	15.4	17.3	18.6
Total parent companies	85	91	91	81	102	100.0	100.0	100.0	100.0	100.0
Foreign subsidiaries	-					-				
Chemicals/Pharmaceuticals	31	36	59	75	82	16.8	15.5	17.2	20.2	18.5
Food processing	32	46	61	66	68	17.4	19.7	17.8	17.8	15.3
Metals	21	17	25	35	29	11.4	7.3	7.3	9.4	6.5
Machinery	21	30	69	65	91	11.4	12.9	20.1	17.5	20.5
Electrical equipment	20	26	31	38	57	10.9	11.2	9.0	10.2	12.9
Textiles	42	52	56	45	52	22.8	22.3	16.3	12.1	11.7
Other industries	17	26	42	47	64	9.2	11.2	12.2	12.7	14.4
Total foreign subsidiaries	184	233	343	371	443	100.0	100.0	100.0	100.0	100.0
Foreign subsidiaries by countries and regions	Number of firms					in %				
	1910	1919	1929	1937	1953	1910	1919	1929	1937	1953
Germany	52	49	64	63	60	28.3	20.2	18.2	16.4	13.1
France	46	68	71	60	80	25.0	28.1	20.2	15.6	17.5
Italy	22	24	32	34	55	12.0	9.9	9.1	8.9	12.0
Austria, Liechtenstein	10	13	19	22	22	5.4	5.4	5.4	5.7	4.8
Neighbouring countries	130	154	186	179	217	70.7	63.6	52.8	46.6	47.4
Great Britain	15	22	33	34	43	8.2	9.1	9.4	8.9	9.4
Belgium	1	7	22	18	23	0.5	2.9	6.3	4.7	5.0
Spain	4	7	12	13	17	2.2	2.9	3.4	3.4	3.7
Netherland, Scandinavia	4	5	14	18	24	2.2	2.1	4.0	4.7	5.2
Eastern Europe	8	13	24	41	1	4.3	5.4	6.8	10.7	0.2
other European countries	1	1	2	4	4	0.5	0.4	0.6	1.0	0.9
Europe	163	209	292	306	327	88.6	86.4	83.0	79.7	71.4
Northamerica	12	21	32	36	48	6.5	8.7	9.1	9.4	10.5
Southamerica	3	4	10	19	46	1.6	1.7	2.8	4.9	10.0
Asia, Africa, Oceania, n.s.	6	8	18	23	37	3.3	3.3	5.1	6.0	8.1
Total foreign subsidiaries	184	242	352	384	458	100.0	100.0	100.0	100.0	100.0

Sources: see Figure 1 above.

The foreign subsidiaries were concentrated in the large neighbouring countries Germany, France, Italy and in Great Britain. The neighbours Austria and Liechtenstein had a constant share of 5%. The nearby-effect must have been quite strong, but its importance clearly declined, and Great Britain was almost as important a location for foreign subsidiaries as Italy. The other European countries were clearly less important, but became more attractive during the interwar period. Before WWI Germany ranked first, after the war France was the preferred location and in 1953 her leading position was even more pronounced. France and Germany remained the countries with the largest number of subsidiaries throughout the period. The eastern European countries became clearly more important during the interwar

period, notwithstanding the loss of subsidiaries in Russia, but all had to be given up by 1953. Geographical expansion to overseas countries was considerable, but most subsidiaries were probably engaged in sales and services and not in manufacturing. The most important host country beyond Europe was the US. Australia and New Zealand hosted a small number of subsidiaries mainly of food processing firms.

Under the term ‘voice options’ we subsume strategies that strengthened the firms’ export positions in Switzerland as well as collective responses aiming at changing the overall or industry-specific conditions for international trade. Besides the impact of broad economic policies influencing all industries – for example the strict regulation of foreign trade during the wars, the conclusion of trade and clearing agreements with foreign countries with the objective to promote exports by linking them with import quotas or the monetary and fiscal policies pursued during the depression of the 1930s., especially no restriction on capital flows throughout the period and adhering to the gold standard until September 1936¹⁰ - the main ‘voice options’ available for industry-specific market regulation were tariffs and cartels.

In the nineteenth century, Switzerland was an open economy with low tariffs on imported goods. Any demand for protective tariffs was opposed by the dominant export industries, traditionally advocates of ‘free trade’ and against protecting the internal market.¹¹ The export industries were interested in importing raw materials and intermediate products as freely as possible and in keeping prices of agricultural products low, because of their impact on wages. Tariff protection was usually lower in small European countries than in the large ones, and that was still the case in the 1920s also for Switzerland (Table A4 in the Appendix)

In the 1920s tariffs were raised mainly to compensate the impact of inflation, but also with protective (agricultural products) and fiscal (luxury products: tobacco, fuel, automobiles) objectives. Tariffs in Switzerland were (and still are) based on weight. If prices rise, customs duties in proportion to the value of the imported goods decline. In the 1920s and 1930s the wholesale import price index declined from 86 in 1925 to 40 in 1935, and concomitantly the average percentage of customs duties on imports more than doubled (Table 3).¹² This was not the result of a protectionist policy, but rather the unintended consequence of deflation. Still,

¹⁰ Halbeisen (2008); Müller (2008) pp. 129 ff.

¹¹ Fretz (1923), pp. 50, 68 f.; Gürtler (1931), pp. 27 ff., 30, 34 f., 41 ff. and 60; Marbach (1937), pp. 11, 34 f.; Schweizerische Gesellschaft für Statistik und Volkswirtschaft (1955), p. 674.

¹² Gürtler (1931), p. 29; Lüthi (1947), pp. 88 f.

some industries were effectively sheltered from foreign competition during the depression of the 1930s. The general effect of tariffs based on weight is that low-priced goods are charged more in proportion than high-priced goods. The declared objective of weight-based instead of value-based tariffs was to hamper the inflow of cheap foreign mass-produced commodities.¹³

Table 3: Tariff burden in percent of imports

	total imports	imports (tobacco, fuel, vehicles excl.)	Metals, machinery, equipment	vehicles	Textiles, clothing	Food (excl. tobacco)	Wholesale price index (imports)
1900	4.3	4.1	2.9		2.5	4.1	
1913	4.4	4.2	3.5	2.5	2.7	3.8	
1918	1.7	1.6	1.4	1.6	0.9	2.5	
1925	8.1	6.8	4.8	10.2	3.6	8.0	86.2
1930	11.3	8.7	5.6	24.7	5.8	9.5	57.4
1935	22.2	15.3	8.0	37.5	7.7	22.8	40.4
1938	16.9	11.9	4.9	24.2	5.8	19.6	52.8
1945	8.3	6.3	3.7	10.1	1.3	7.4	131.9
1949	9.9	6.0	3.0	15.9	3.8	8.3	120.3
1954	9.9	6.1	3.6	16.0	4.8	9.9	124.1

Sources: Handbuch der Volkswirtschaft (1955), S. 676. Historical Statistics of Switzerland Online, Tab. H.10ab; Tab. L.3.

Tariff protection in the US and the large European countries was a major barrier to exports for Swiss firms and an incentive to invest in these countries. The contemporary literature usually assumes that firms were forced to become multinationals because of barriers to trade and that they would have preferred to stick to manufacturing in Switzerland and export their goods. But some authors were quite aware of the fact that for many Swiss firms investing heavily abroad was part of a well-planned strategy of growth.

With regard to market regulations, there were no legal obstacles for the formation of cartels in Switzerland, but given the large number of small and medium-sized firms and the divergent interests of the larger ones, early forms of cartelisation were rather ineffective and short lived.¹⁴ Market regulation by national cartels became a common objective when the firms' international competitiveness declined, inducing them to withdraw to the small domestic market. In such a context, cartelisation became attractive, because it was the only means to avoid internal competition and reap the benefits of tariff protection; if tariff protection was not

¹³ Gürtler (1931), pp. 32 f., 46.

¹⁴ A law on cartels did not exist in Switzerland at the time, and for that reason international cartels established their headquarters in Switzerland, even in branches where there were no Swiss firms at all. The first law on cartels was implemented in 1964. Cartels were allowed as long as they had a positive net effect on general welfare. The law was revised in 1985, but only in the 1996 revision cartels were forbidden.

granted, national cartels could function as an indirect barrier to imports.¹⁵ International cartels had a mixed effect: in some cases national cartels were strengthened and exports further reduced, in other cases they were useful for export-oriented industries, because they allowed to safeguard supplies or foreign sales outlets. The impact of international cartels on inward and outward FDI has - to our knowledge - not been analysed yet.

3.2 The scope of the firms in the main manufacturing industries

According to their share in total 'world' trade industries can be divided into rising (modern) and declining (traditional) industries (Table 1 above). In the rising industries Swiss firms were able to establish a strong comparative advantage in chemicals, maintain a good position in machinery and miscellaneous manufactures (mainly watches) and gain a somewhat better one in metals, but they lost their initial advantage in vehicles before WW I. Measured by their share in total Swiss exports the importance of chemicals, machinery and metals increased, the share of watches was largely sustained, but vehicle exports were practically nullified. In the declining (traditional) industries, textile firms were able maintain a comparative advantage, notwithstanding increasing competition in a narrowing world market, but the rapid decline of the share of textiles in total Swiss exports dropped from about 55% until 1919 to 18% in the 1930s and 1940s, whereas in processed food the low comparative advantage achieved in 1913 was lost, and the share in total Swiss exports decreased from a maximum of about 15% in the years 1912-1915 to about 6% in the early 1950s. In the following sections we shall focus on the main industries and describe how the firms responded to changes within Switzerland and the challenges of the outside world.

3.2.1 Chemicals-pharmaceuticals

Given the moderate increase of its share in 'world' trade, the 'world' market for chemicals must have been rather restricted. In contrast, measured by the share of chemicals in total Swiss exports, the chemical industry was the most rapidly rising export industry: from about 3% in the late 19th century, to about 15% in the early 1950s. Revealed comparative advantage increased from year to year, and import propensity was considerable already in the 1920s (Table 1 above). This relationship - high RCA and high RMA – together with the rising shares of Switzerland in 'world' exports and imports of chemicals - suggests that for chemicals the openness of the Swiss market was above average.

¹⁵ Fretz (1923), pp. 12, 18, 21, 34, 37, 47, 50, 93, 104 ff.; Lüthi (1947), pp. 87; Gürtler (1931), pp. 56 f.; Jaccard (1925), pp. 41 ff.

With regard to FDI, the ratio between foreign and domestic investments (figures for electrochemicals in brackets) was 0.7 (2,2) in 1900, 0.5 (1,4) in 1910 and 0,9 (0,4) in 1919.¹⁶ Consequently, the Swiss chemical firms must have invested heavily in foreign countries almost from the start. From 1910 until 1937, the number of MNE was fairly stable, in 1953 it had increased by more than half; the number of foreign subsidiaries increased throughout the period (Table 2 above). The MNE in chemicals/pharmaceuticals made up between 12%-16% of all MNE in the manufacturing sector, and most companies survived the period analysed here. Their share in the total number of subsidiaries varied between 16% and 20%. The foreign subsidiaries fulfilled various functions: besides manufacturing and sales activities also R&D since the interwar period.

The Swiss chemical-pharmaceutical industry is generally perceived as having been dominated by a small number of large firms located in Basle: Ciba, Geigy and Sandoz, the main dyestuff manufacturers, and the pharmaceutical company Roche. The largest electrochemical firm Lonza was also located in Basle. But as was the case in all Swiss industries, most firms were of small and medium size, and several middle-sized enterprises had foreign manufacturing subsidiaries, for example Wander and – since the interwar period – the electrochemical firm Sika, Gaba and Plüss-Stauffer as well as - in the post-WW II period - Cilag and Siegfried.

Around 1910 the subsidiaries of the chemical-pharmaceutical firms were situated in Germany and France, just over the border near Basel. At the time the neighbouring countries hosted more than half of the subsidiaries, in 1953 their share had declined to 40%. Wander had a subsidiary in GB, where Ciba joined in 1911. Ciba, Geigy and Roche also had manufacturing units in eastern Europe. The Russian market was lost after the 1917 Revolution, but eastern Europe continued to be an attractive area for Swiss firms. Besides Ciba's Polish plant in Pabianice, Roche, Wander and Sandoz had subsidiaries in Czechoslovakia, Romania, Poland and Hungary in the interwar period. The US became an attractive host country for FDI of the four Basle firms and Wander only since the 1920s. In 1910 the US was a comparatively minor host country with only four Swiss subsidiary companies. In 1937 and 1953 Germany, France, the US, Italy and Great Britain were still the preferred host countries. In the less important ones there was more change: The 18 subsidiaries in eastern Europe in 1937 were all lost after

¹⁶ Himmel (1922).

1945, but new subsidiaries were established in smaller European countries and in overseas regions, mainly in South Africa and in Asian countries.

By 1953 about a quarter of all foreign subsidiaries belonged to smaller firms. Among the large firms we can distinguish two patterns of multinationalisation:

- The four Basle firms tended to have a few large foreign manufacturing subsidiaries, some smaller plants and a large number of sales offices in foreign countries. Some of the large foreign plants were held jointly by the 'Interessengemeinschaft' (IG), a cartel formed by Ciba, Geigy and Sandoz in 1918, with the objective to coordinate the production and sales of dyes, especially in foreign countries. In 1929 the three firms joined, albeit reluctantly, the German-French cartel set up in 1927.¹⁷ Lonza only had a handful of factories abroad, mainly in Germany. In all cases, the production facilities in and around Basel (including those in the neighbouring French and German regions) remained the most important ones.
- Wander and Sika created a large number of plants in interesting market, where they manufactured more or less the same products. Rather than substantially enlarging existing plants, the firms, and particularly Sika, continued to create new subsidiaries in new countries.

The point to be stressed is that establishing manufacturing subsidiaries abroad certainly substituted exports from Switzerland to some extent, but the industry remained highly export-oriented, and its share in total Swiss exports increased considerably. Withdrawing from foreign markets was no option for the firms in this industry. Even those producing for the domestic market were, to a considerable extent, sub-suppliers of the large export-oriented firms.

The most important 'voice strategies' favouring exports were expanding sales to new markets, product diversification and innovation. Only between 30-40% of total exports of pharmaceuticals went to the large purchasing countries (Germany, France, Great Britain, Italy, US), the other 60-70% were distributed to an increasing number of other European and overseas countries. In dyes the share of the large purchasers was 40-50%, except during WW II, when it dropped to 20%; in the post war years it increased to 60% and 80%.¹⁸ Given Switzerland's monetary and fiscal policies mentioned above, competing with foreign firms in mass products was no viable strategy. The firms resorted on imports (Table A3) or shifted the

¹⁷ Müller (2008), pp. 125 ff.

¹⁸ Historical Statistics of Switzerland Online, Tab. L.28a. – L.43b.

manufacture of intermediates and bulk products to foreign countries. Consequently, import protection and market regulation was no option, except for mass-produced dyes. During the depression of the 1930s the international cartel had a positive effect on the large dyes manufacturers Ciba, Geigy and Sandoz mainly for two reasons: firstly, prices for what was still the main export product were stabilised and major losses avoided and, secondly, R&D, innovation and product diversification (especially into pharmaceuticals and chemical specialities) were intensified in order to escape the constraints imposed by the international cartel. With the outbreak of WWII the international cartel broke down. The cartel among the Swiss firms was formally dissolved after WWII, but it lost its effectiveness already in the late 1930s.¹⁹

3.2.2 Machinery, electrical equipment, metals and vehicles

Machinery and vehicles were the commodities with the fastest increase in total ‘world’ trade (more than fourfold), while the share of metals in ‘world’ trade increased slowly and was highest in 1938 (Table 1 above). The ratios of Switzerland in total ‘world’ exports of machinery vary between 3% and 4%, which means that the firms were able to defend their share in an expanding ‘world’ market. RCA values even increased during the interwar years, whereas import propensity declined slightly. Machinery (incl. electrical equipment) was an important export industry in Switzerland.²⁰ The ratio of machinery exports in total Swiss exports increased more than threefold, although the ratio of exports in total output (35% to 55%) was rather low in comparison with chemicals. It seems plausible, that quite a number of firms without export activities were sub-suppliers of export-oriented firms.

In metals, the share of exports in total output was much lower (15% to 25%). The firms focused mainly on the internal market, but placing the firms in the category of the domestic industries may be misleading, because of their linkages with the export-oriented firms. Further more, with regard to FDI, distinguishing machinery, electrical machinery and metals manufacturers is difficult because firms in these industries were usually diversified: firms producing machinery of various kinds were often engaged in metal working, and the only firm substantially engaged in exporting vehicles (trucks and busses) was also the most important manufacturer of embroidery machines. We shall therefore discuss these industries together

¹⁹ Müller (2007).

²⁰ Electrical equipment forms a separate category in the Swiss statistics, but we only have RCA and RMA indices for machinery, probably including electrical equipment.

and point to main differences by recurring on information available for the most important firms.

The early estimates of FDI distinguish between machinery and electrical equipment, but there are no figures on metals. The ratio of investments abroad and at home in the machine industry was 0,6 in 1900, 0,5 in 1910 and 1919; in the electrical equipment industry investments increased more rapidly abroad than at home: the ratio was 0,6 around 1900, 1,1 in 1910 and 1,3 in 1919.²¹ Together the metals, machinery and electrical equipment industries had by far the largest number of MNE (roughly 26% in 1910, 35% in 1953, Table 2, above). But whereas the share of MNE and subsidiaries in metals declined, those in the machine and electrical equipment industries increased; in the machine industry they almost doubled. The subsidiaries of metal manufacturers were concentrated in the neighbouring countries France, Germany and Italy; those of the machine industry in the same countries, but also in Great Britain and the US as well as in a number of other European and overseas countries. The foreign locations of the electrical equipment industry were similar: the most important ones were France, Germany, Great Britain, Italy, Belgium, Austria and Spain; some isolated subsidiaries were located in the Netherlands, Norway, Eastern Europe, the US and Argentina. Clearly, also the process of multinationalisation was more advanced in the machine and electrical equipment industries than in the metal industry.

Besides many small and medium-sized firms there were several large ones with different, but partly overlapping fields of activity. Strategies of multinationalisation depended mainly on firm size:

- The middle-sized firms had few foreign manufacturing subsidiaries (1 to 3) and served the rest of the world with exports through a dense network of sales offices or independent sales agents. Rieter, for example, created its first foreign manufacturing subsidiaries only in the 1950s, but was present in many countries with its own sales offices, providing also technical assistance. Other middle-sized firms established similar sales and services companies abroad, for example Maschinenfabrik Bühler Uzwil or Maschinenfabrik Rüti. Exports remained a

²¹ Himmel (1922) classified the metals/machinery group of firms into: machinery (Sulzer, Georg Fischer, Saurer, Dubied, Escher-Wyss and some smaller firms), electrotechnical (Alioth, BBC, MFO, Sécheron, Cortaillod, Gardy), and electrochemical (AIAG, Girod) industries. We distinguish metals (e.g. AIAG, Georg Fischer), machinery (Sulzer, Maschinenfabrik Rüti etc.), electrical equipment (BBC, MFO, Landis&Gyr etc.), and subsume the electrochemical firms either as metals (AIAG, Girod) or chemicals (Lonza). He ignored a number of family firms, which already had foreign subsidiaries (for example Landis&Gyr, Schindler).

good option for these firms, because it seems that the machine industry was less hampered by protective tariffs in foreign countries.

- The large firms – BBC, Escher Wyss, Sulzer, Schindler, Landis&Gyr (machinery and electrical equipment), Georg Fischer, AIAG (metals) – soon began to establish foreign manufacturing subsidiaries, some firms (Escher-Wyss, Sulzer, Georg Fischer) already in the 19th century. However, with the exception of AIAG, also the large firms remained highly export-oriented. Their foreign plants manufactured only some and often technically less sophisticated products, while R&D and the production of high-quality and specialised products remained in Switzerland. In some cases (like Cortailod), FDI were short-lived or marginal, and other firms, like SLM (Schweizer Lokomotiven und Maschinenfabrik Oerlikon) continued to concentrate manufacturing in Switzerland.

- The aluminium producer AIAG was one of the few large and vertically integrated Chandlerian type of MNE: its foreign subsidiaries either secured access to raw materials (mainly in France) or were manufacturing units (mainly in Italy and Germany). Expansion to the US was discussed in the 1930s, but rejected as being too risky.²² From the 1960s onwards, AIAG expanded beyond its historically grown, Europe centred structures and created new units in developing and other overseas countries. The main steel producer Von Roll concentrated entirely on the domestic market.

Because of their enduring export orientation, the firms in the machine and electrical equipment industries pursued ‘voice strategies’ in order to continue their manufacturing activities in Switzerland similar to those of the firms in the chemical industry. They ventured into new and more distant markets, and the number of countries all over the world purchasing between 1-3% of total machinery exports increased considerably. The share of the main sales outlets (Germany, France, Great Britain, Italy, USA) was around 70% up until the early 1920s, it declined to about 40% in the subsequent decades, with the exception of almost 60% during WWII. Sales to these countries became highly unstable: sales to Germany, for example, varied between 6% and 15%, with exceptional peaks of 23% and 45% during WWI and WWII. France was the most important destination throughout the period and especially during WWI (39%) and after WWII (17%).²³

The firms also intensified their efforts in R&D in order to move into higher-priced market niches, they also engaged in some rationalisation of production, but introducing mass

²² Rauh-Kühne (2001).

²³ Historical Statistics of Switzerland Online, Tab. L.28a. – L.43b.

production techniques contrasted with their main strategy of specialisation, based on what they perceived as their main comparative advantage. In their efforts to re-establish location-specific advantages at home they were supported by their business association, the politically influential Association of the Swiss Machine Industrialists (VSM): both export promotion schemes (export subsidies to sustain employment and the insurance for export payment risks) introduced by the federal government in the early 1930s were mainly intended to support the machine industry.²⁴ In order to understand this preferential treatment, we have to take into account the large number of employees in this industry and its broad distribution within Switzerland. Given their pronounced export orientation, the firms were reluctant to introduce protective tariffs. Tariffs were partly increased, partly reduced, depending on tariff policies in other countries. On average, tariff burdens on metals, machinery and equipment remained low (Table 3 above): around 2-3% until the 1920s, between 5 and 7 percent in the 1920s, with a maximum of almost 9% in the 1930s, and again about 3% later on.²⁵ Efforts to regulate the internal market were rather ineffective, because of diverging interests and the large variety of specialised products.²⁶ Even the few initiatives to establish cartels during the depression of the 1930s were not successful. A few firms joined international cartels, and the effect was similar to the chemical industry: prices for the cartelised products were stabilised, losses due to price competition in narrowing markets avoided and strong incentives for moving into non-cartelised innovative products were strengthened.²⁷

The firms in the metal industry can be divided into firms focusing increasingly on the internal market and interested in protecting their domestic market, firms shifting to FDI (like AIAG, co-founder and major player in the international aluminium cartel) and firms that remained export oriented and therefore opposed to protective policies. In effect, only the iron manufacturing industry was able to receive considerable tariff protection and the market for iron goods became highly cartelised. The main opposition against protective tariffs for metals came from the export-oriented firms of the machine and metals industry. These firms successfully defended their right to import the needed metal supplies from abroad. The mixture of inward and outward oriented firms within the same branch may explain that RCA in metals increased during the period while import propensity remained high (Table 1 above).

²⁴ Müller (2008), pp. 129 ff.

²⁵ Historical Statistics of Switzerland, Online Database, Table L.3, Bilanz des Aussenhandels und Zollerstragnisse nach Warenarten 1886-1992.

²⁶ Fretz (1923), pp. 68 f., 98.

²⁷ Müller (2008), pp. 122 ff.

The development of the *vehicles industry* in Switzerland was atypical in the sense that it was one of the few export industries that in the interwar period turned from an initially export-oriented industry into a domestic industry sheltered by tariffs, but nonetheless heavily dependent on imports. The other one was the ‘rubber and synthetic’ industry, where we lack further information, apart from the fact that its export shares dropped drastically since WWI and that tariff burden in the 1920s were low (Table A4 in the Appendix). Why did the Swiss vehicles industry choose the ‘exit option’ withdrawal from foreign markets instead of investing in foreign countries? The car industry was a highly protected industry in the large European countries, making exports from Switzerland increasingly difficult. The internal market was not protected until the 1920s, and tariff burden remained comparatively low in the 1920s. Foreign competition was strong in mass produced cars, and the Swiss vehicles industry began to specialise on trucks and busses already before WW I.²⁸ As the main manufacturers (especially Saurer) were incapable or unwilling to adopt mass production techniques, FDI were no option and instead firms continued to specialise on less contested market segments and lobbied for tariff protection.²⁹ Tariff burden in percent of imports increased to almost 40% in 1936, partly because tariffs were raised, partly because of deflation, subsequently they declined to less than 20%, mainly because of devaluation in 1936 (Table 3).³⁰ Domestic demand for automobiles was entirely covered by imports or cars assembled by foreign firms in Switzerland.

3.2.3 Watch-making (miscellaneous manufactures)

The *watch-making industry*, although a traditional industry, remained one of the most important export industries in Switzerland, with a share of about 15% in total Swiss exports in the interwar period and about 20% in 1950. The high RCA values in ‘miscellaneous manufactures’ were mainly due to the extraordinary comparative advantage of this industry.

Among the firms taken into account by Himmel there are no watch-making companies and, consequently, no estimates of FDI are available. According to our database, a few watch companies had foreign subsidiaries in France and in Great Britain, and there were also some scattered subsidiaries in the US, in Argentina and in Austria. The firms with the highest number of foreign subsidiaries were Zénith (with sales subsidiaries in Argentina, France, the

²⁸ Asséo David, La place de la Suisse dans l’industrie automobile mondiale d’avant 1914, in Paul Bairoch, Martin Körner (ed.), La Suisse dans l’économie mondiale (15e-20e s.), Zurich: Chronos, 1990, pp. 37-56.

²⁹ Jacquemart (1997).

³⁰ Historical Statistics of Switzerland, Online Database, Table. L.3.

US and Great Britain), SSIH (with sale subsidiaries in the US and in Great Britain in 1953), and Obrecht (with subsidiaries in Argentina, Italy and Romania in 1919). It seems that the foreign subsidiaries of the watch-making companies were engaged in sales and possibly repairs activities, but not in manufacturing. The bulk of watch-making remained located in Switzerland, partly because establishing manufacturing subsidiaries abroad was made difficult by the cartelisation of the whole watch-making industry. The main objectives were to impose restrictions on output and prevent that firms moved productive capacities and qualified labour abroad.³¹ But the impact of these rules, although implemented with the support of the federal government, should not be overvalued, because their effectiveness is difficult to prove. It seems more plausible, that firms deliberately abstained from shifting manufacturing capacities abroad, because their firm-specific advantages were closely tied to location-specific advantages or network externalities, difficult to displace or re-establish in foreign countries. After the devaluation of the Swiss franc in 1936 exports almost immediately recovered.

The cartel of the watch-making industry was export-oriented and, therefore, the firms were not interested in protecting the internal market. Their main concern were tariff increases in foreign countries. Also in this industry, sales to their main foreign markets became highly unstable: Before WWI Germany and the UK were the main market with a share of 20% and 15% of total exports. The share of the US and France were around 5% and 4%. In the 1920s the US became the main sales outlet. Its share of about 20% in the late 1920s increased to over 30% in the 1930s and 1940s. The share of the main European destinations (Germany, France, UK, Italy, with varying importance) and the US was usually over 50%.³²

3.2.4 Textiles

Textile products accounted for the largest share in total 'world' trade until the late 1920s, but subsequently the importance of textiles dropped rapidly (Table 1 above). Also in Switzerland, the *textile industry* was the dominant export industry, but its share in total exports declined from almost 50% in 1900 and still 30% in 1928 to about 14% in 1952. According to its share of exports in total output it converted from an export-oriented into a domestic industry. In fact, the various branches within the textile industry reacted quite differently to the changing conditions for international trade. Some branches concentrated more on the internal market and joined other domestic industries in asking for tariff protection, others remained

³¹ Müller (2008), pp. 119 ff.; Head-König (2008), pp. 226 ff.

³² Historical Statistics of Switzerland Online, Tab. L.28a. – L.43b.

internationally competitive and export-oriented, albeit in a narrowing world market.³³ The large European countries increasingly sheltered their textile industries from import competition, foremost France and Germany, followed in the interwar years by the US and Great Britain as well as a number of smaller European countries. For the Swiss textile industry, tariff barriers were an important incentive for FDI, because they seriously hampered exports. The other important motive was lower labour costs.

The silk processing industry differed considerably from the firms in cotton processing (cotton spinning and weaving, embroideries) and, consequently, in his estimates of FDI Himmel distinguished between two categories of textile firms: silk and non-silk. The ratio of foreign and domestic investments in the silk industry was 1,4 in 1900, 3,2 in 1910 and 2,6 in 1919. In the cotton industry (incl. embroideries) it was 0,7 in 1900, 1,4 in 1910 and 5,3 in 1919. Between 1910 and 1919, the total amount of investments of textile firms in Switzerland declined slightly, while abroad they increased fourfold between the years 1911 and 1912.³⁴

According to our database, textile firms accounted for a third of all MNE and over a fifth of all foreign subsidiaries in 1910; in 1937 and in 1953 these shares were still quite high: 22% of the parent companies and 12% of the subsidiaries. The cotton processing firms had few foreign subsidiaries in comparison with the silk industry, although the relationship between domestic and foreign investments of the silk industry were lower than in the cotton industry. The most important firm was Sastig (Schweizerisch-Amerikanische Stickerei-Industrie-Gesellschaft).³⁵ The other large embroidery firm with foreign subsidiaries was Stickereiwerke Arbon, liquidated in 1926. There were several smaller firms in cotton processing with foreign subsidiaries already in the nineteenth century,³⁶ but we do not know whether they still existed in 1910, 1919 or later. Among the cotton processing firms that survived throughout the period or began to establish foreign subsidiaries in the twentieth century the most important ones were Heberlein, Hesta, Sefar, Reichenbach, and Stoffel. The cotton industry consisted of many small and medium-sized family firms. There were few large corporations and, as a rule, even those firms had only one or two foreign manufacturing subsidiaries located in regions close to Switzerland and – before the 1917 Revolution - in Russia. Also the US was a host

³³ Fretz (1923), pp. 45, 51, 53 und 67 ff.; Lüthi (1947), pp. 57 f. und 102.

³⁴ This extraordinary increase must have been mainly due to the creation of SASTIG (Schweizerisch-Amerikanische Stickerei-Industrie Gesellschaft) in the USA, Head-König (2008), p. 224.

³⁵ According to Head-König (2008), p. 24, SASTIG contributed with its three huge factories in the US to the progressive exclusion of embroideries made in Switzerland from the American market.

³⁶ Himmel (1922).

country for some of the cotton manufacturers, especially of embroidery firms (Stickereiwerke Arbon/Heine, Sastig, Heberlein, Sefar, Stoffel). In the interwar period, the number of foreign subsidiaries declined together with the general decline of the textile industry in Switzerland, and especially of embroideries. Only firms that managed to develop new products or technologies (artificial silk or new dyeing procedures) managed to survive for some time (Sastig) or even expand (Heberlein, Abegg).

The silk industry consisted of two main groups of firms: one located in Basel, specialised in silk ribbon (with subsidiaries in southern Germany) and chappe silk (with subsidiaries mainly in France), the other group of firms was located in Zurich and specialised in silk fabrics (Bally & Gasser, Schetty, Gebr. Sarasin, R. Sarasin, Stehli and Weidmann). While the fate of some of the large firms is known (at least up until the date of some anniversary publication), it is difficult to trace the development of the smaller firms after 1910/1919. The companies included in our database had a limited number of foreign subsidiaries mainly in France and Germany (near the Swiss border), in Austria and Italy. The total number of subsidiaries increased somewhat when Alsace was integrated into France after WWI and firms had to open new subsidiaries in Germany. Schwarzenbach/AGUT with subsidiaries in four countries (Germany, France, Italy and the US) was rather the exception.³⁷ There were more large firms in the silk industry than in the cotton industry. Schwarzenbach or Stehli belonged to the largest firms in Switzerland (Schwarzenbach even considered itself, around 1929, as one of the largest textile firms worldwide). Both firms were still controlled and managed by a small number of individuals (family members). Although tariff protection was a strong motive initially to shift manufacturing to their main foreign markets, later on FDI became a deliberate strategy of growth: For the Schwarzenbach company it was clear that large-scale manufacturing in the US was necessary for a 'world company'.

The divergent interests of the main branches of the textile industry are mirrored in different attitudes towards 'voice strategies'. Protective tariffs for the cotton spinning and weaving industry were introduced already at the beginning of the twentieth century with the effect that production costs at the subsequent stages of production increased, making exports of finished goods more difficult. Re-establishing competitiveness in world markets was important for the export-oriented firms, and consequently they opposed tariff protection. Some effectively managed to specialise in high quality and innovative products: RCA values declined until

³⁷ Schwarzenbach (2008).

1938 and then increased again in all subgroups (Table 3 in the Appendix). With regard to mass-produced articles, firms turned either to the domestic market or shifted production abroad. On average tariff protection remained weak throughout the period (Table 3 above) and reached an exceptional 10% only in the year 1932.³⁸ But as far as embroideries were concerned, customs tariffs were raised on intermediate products in order to protect the domestic workforce from external competition after WWI, with the effect that the intricate network of outward processing with German and Austrian manufacturing centres collapsed and competitiveness of Swiss embroideries declined.³⁹ Initiatives to establish cartels in the cotton processing industries were not very effective, except during periods of economic crises in the early 1920s and in the 1930s.⁴⁰

3.2.5 Food, beverage and tobacco

Measured by its share in total Swiss export, the food industry was quite important at the beginning of the period: 15% of total Swiss exports in 1913. In the 1920s and especially in the 1930s export shares declined drastically. But already at the beginning of the twentieth century, the food industry was predominantly an inward oriented industry, and that was the case also for the beverage industry. The traditional tobacco industry was export-oriented, but it was a very small industry in Switzerland.⁴¹ Only the canned food (especially condensed milk) and chocolate industries were export-oriented. In the canned food industry some firms had shifted the bulk of their manufacturing activities to foreign countries already in the late 19th century: The ratio between FDI and investments in Switzerland was the highest of all industries: 3,6 in 1900, 2,6 in 1910 and 6,1 in 1919. For the chocolate industry this ratio was much lower: 0,3 in 1910 and 1,1 in 1919. In 1910 and 1919 about 13% of all MNE were in the food industry, in 1953 only about 8%. The marked decline of food processing firms was due to several mergers and acquisitions. Their share in the total number of subsidiaries was more stable: about 18% in 1910 and 15% in 1953.

The dominant company in the canned food industry was Nestlé; other important manufacturers were Maggi⁴², Hero Lenzburg⁴³ and Saxon. According to our sources, these four firms were the only MNE in this industry in 1910, later on joined by another few, mainly

³⁸ Historical Statistics of Switzerland Online, L.3.

³⁹ Head-König (2008), pp. 221 ff.

⁴⁰ Fretz (1923), pp. 29, 51 f., 67; Lüthi (1947), pp. 57 ff.; Jaccard (1925), p. 37.

⁴¹ Gürtler (1931), pp. 35, 57 ff.

⁴² Seifert (2008).

⁴³ Lütolf (2008).

Inga (Interfranck), Knorr, and Ursina; some of these firms were taken over by Nestlé (Maggi in 1947, Ursina and Interfranck around 1970). In the chocolate industry, the main firms were Tobler, PCK, Suchard, Klaus (already considered by Himmel) as well as Lindt & Sprüngli and Villars. However, Klaus only had one foreign subsidiary in France (just across the border), and Villars had to give up its foreign subsidiaries in the 1920s; Tobler also had difficulties with its foreign subsidiaries, and with its business in Switzerland as well; PCK was taken over by Nestlé in 1927, since then the only multinational chocolate producer besides Suchard.⁴⁴

Most subsidiaries were located in European countries. Besides the neighbouring countries - Germany, France and Italy - Spain, Great Britain, and the Netherlands were also important host countries. The US was an important market for some of the firms. The smaller firms had only a few subsidiaries in European countries (Tobler, Saxon, Ursina, Klaus). Hero established subsidiaries in countries where agricultural product (fruit, vegetables) were cheap. Some large firms (Maggi, Nestlé, PCK, Suchard, Inga) opened subsidiaries in many European and overseas countries. Nestlé was the dominant firm in the European market of condensed milk, and its manufacturing capacities in Switzerland were relatively small already in 1910. They were minimized even further during and after WWI and in the 1930s, when not only new foreign subsidiaries were established, but also some Swiss units were closed. The main reason for the reduction of the previously important manufacturing capacities in Switzerland was the shortage of milk during WWI and the subsequent protection and cartelisation of the domestic milk market. Instead, the firm expanded rapidly in the US and continued to do so in the late 1920 and 1930s, despite the failure of the US business in the 1920-22 crisis.⁴⁵ Unlike the textile firms and similar to the chemical firms, the survival rate in the food processing industry was very high; except the firms that were taken over by larger competitors, most firms survived, and their history is well known. And like some of the chemical firms, Nestlé began in the 1930s to transfer R&D activities to foreign countries.

It seems that there were no efforts whatsoever to re-establish competitiveness of the food industry as an export industry in Switzerland. In the 1920s, tariff protection on agricultural products increased from very low levels (3-4%) to about 9% and to over 20% in the 1930s (Table 3 above). Producing canned food in Switzerland implied paying customs duties twice:

⁴⁴ Rossfeld (2008).

⁴⁵ Fenner (2008), pp. 326 ff.

on imported agricultural products and when processed food was imported into foreign countries. For the large MNE the internal market largely lost its importance, and their main interest was to obtain government support for protecting their investments abroad and assure the transfer of profits and dividend payments from the foreign subsidiaries to the Swiss parent company. Agricultural production was increasingly sheltered from foreign competition and highly cartelised since the depression of the 1930s. The internal market for processed food was progressively dominated by a few large retail cooperatives, which vertically integrated backwards into production and focused solely on the internal market.⁴⁶ Not surprisingly, RCA values did not increase and also import propensity remained at a low level (Table 1 above).

3.2.6 Some links with foreign markets in the ‘domestic industries’

Throughout the period there were some industries, in which firms concentrated almost exclusively on the internal market, but some did have FDI: The building materials industries cement and bricks and the paper industry.

In the building materials industry the share of exports in total output was usually around 10% except in the period 1913-1921, when exports increased to on average of about 30% with peaks of over 40% during WWI. Since the late 1920s export share dropped below 10%. Besides transport costs and high tariff burdens, national and international cartels constituted formidable barriers to trade. In such a context, only very few Swiss firms managed to internationalise successfully by the means of FDI. Besides Amiantus (the Swiss cement asbestos (Eternit) producer) and some smaller firms with a subsidiary in a neighbouring country (for example Ziegelfabriken Thayngen und Rickelshausen), almost all foreign subsidiaries in 1937 and 1953 belonged to Holderbank, founded in 1930 in a merger with Likonia, a Swiss firm with then six foreign subsidiaries.⁴⁷ Most foreign subsidiaries were located in European countries, in France, Austria and Belgium, but already during the interwar period Holderbank (and its predecessor Likonia) invested into cement mills in middle-eastern countries, like Lebanon, Syria, Egypt and South Africa.⁴⁸ Around 1953, Holderbank expanded to South America, Canada and the US. The internal market of the cement industry in Switzerland was highly cartelised, and the international cement cartel largely eliminated any competition from foreign firms.

⁴⁶ Moser (2007).

⁴⁷ Verein für wirtschaftliche Studien (Pollux) 1946.

⁴⁸ Verein für wirtschaftliche Studien (Pollux) 1946, pp. 35f.

In the paper industry only a small number of firms had foreign subsidiaries (Holzstoff, Papier-Industrie St. Moritz) with a limited number of factories in Germany, France and Italy. The industry had been export-oriented up until the 1880s (with export shares between 30% and 40% of total output), but was pushed back to the internal market until the end of the century, probably because of tariff barriers in their main foreign markets. Cartelisation and tariff protection resulted in a very effective control of the domestic paper and cardboard market. Exports declined from an average of about 12% of total output until the late 1920s to about 4% in the 1930s and 1940s.⁴⁹

4. Changing comparative advantage revisited

We can distinguish four different strategies of the firms in coping with constraints for international trade and their changing competitiveness during the first half of the twentieth century:

- (1) Direct investments in foreign countries combined with exports
- (2) Direct investments in foreign countries as substitutes for exports
- (3) Exports without FDI
- (4) Focus on the internal market

All reactions were – in principle – available to all firms, but their choices were heavily influenced by internal and external conditions, which were country-specific and industry-specific. Responses (1) and (2) were dependent on the possibility to export capital freely and – given the monetary policy pursued by the Swiss National Bank - this ‘exit’ option was available to all Swiss firm. Only in the case of the watch industry it was made difficult since the 1930s, but the impact of these restrictions should not be overvalued, because they were implemented in an industry, in which firms had deliberately chosen reaction (3) before and for other reasons, mainly non transferable location-specific advantages or network externalities.

The firms in the other export industries chose either the exit option (1) or (2), and the question is: What influenced their choice? The industry-specific analysis presented in section 3.2 suggests that whether firms continued to view their home country as a promising location for manufacturing goods to be exported depended less on barriers to trade in foreign countries than on import barriers and market regulations at home as well as on rather demanding firm-

⁴⁹ Jaccard (1925), pp. 41 ff.; Fretz (1923), pp. 53, 6 ff.; Lüthi (1947), p. 96.

specific endowments allowing the firms to remain internationally competitive notwithstanding pronounced location-specific disadvantages.

Remaining internationally competitive was certainly not an easy task, and the broad economic policies pursued by the federal government during the depression of the 1930s – adherence to the gold standard in the 1930s and the failure to compensate the high exchange rate of the Swiss franc with a deflationary policy - made this task even more difficult. But for some export industries – food, textiles, paper -, the course towards the second of the two ‘exit’ options was set long before the Great Depression, when the firms began to point on protecting the internal market by raising customs duties and cartelisation.

In order to remain competitive with exports from Switzerland, firms had to specialise in innovative high-quality products. Such a strategy was promising in expanding, technology intensive sectors of the world market (machinery, vehicles, chemicals), but less appropriate in shrinking low-technology sectors (food, textiles, metals). And even where it was appropriate, it was not always successful (vehicles) or it entailed a particular type of specialisation that pushed internal production to higher stages in the production process and increased import propensity (chemicals, machinery, metals). It then became essential to maintain low import barriers for complementary intermediate products. For the chemicals, machinery and metals industries this condition was threatened, but only temporarily, during the depression of the 1930s, when tariff burdens increased for all imported commodities. On the demand side, geographical diversification of sales was extremely important for sustaining a pronounced export-orientation, because demand from the main purchasing countries – the large European countries, especially Germany and France – was highly unstable. In all export-oriented industries – combined with or without FDI – the firms pursued a strategy of sales diversification and the importance of overseas regions clearly increased. Disposing of the capabilities to succeed in meeting demand in very different and often distant markets was an important asset for the firms, a necessary complement to their technical know how. In metals dependence on the nearby markets was more pronounced for most firms, and consequently they focused increasingly on the internal market.

Import barriers and market regulations in Switzerland were both causes and consequences of losing specific advantages as a location for exports. Import restrictions were usually implemented when similar barriers were raised in the large European countries, but such

measures unleashed – as far as exports were concerned – a vicious circle, most pronounced in the food industry, but also important in the textile industry. Once an industry had lost its international competitiveness, it was practically impossible to regain it on a large scale. Of course, also in the declining export (or rising domestic) industries there were some particularly innovative firms, which managed to remain export-oriented, and some firms even succeeded in establishing an important position in foreign markets solely by the means of FDI and with little exports from Switzerland. In many cases, the links with the home country were sooner or later dissolved. If the firms kept some important functions within the home country (like Nestlé), they were still considered important Swiss firms and continued to be politically influential, although the kind of location-specific advantages they were interested in were quite different compared with the concern of the export-oriented firms.

Where foreign markets were protected by international cartels, exports inevitably declined and so did the number of firms that managed to survive by concentrating on the home market. Others became truly multidomestic companies (Porter), producing in Switzerland and in various foreign countries solely for the respective home market. Only very few Swiss firms were capable to sustain successfully such a type of internationalisation (Holderbank, AIAG).

Although we have not been able to deal explicitly with the impact of the wars, the continuous pattern of expansion to or withdrawal from foreign markets suggests that in the long term the industry-specific paths of development was only exceptionally disrupted by the special conditions prevailing during WWI (food processing) or WWII (loss of foreign subsidiaries in eastern Europe).

5. Conclusions

For the national economy, the different responses to internal and external constraints for trade had important consequences that continued to shape the further path of development up until the 1990s: The domestic sector increased in size – in proportion to the export sector – and it was able to influence economic policies to its advantage. In contrast with what could be expected for a small open economy highly dependent on international trade both for exports and imports, the competitive export sector failed to exert a strong enough pressure on internal wages and prices, instead it gave up mass production and chose a strategy of specialisation in high-quality / high-technology market segments. Since the domestic sector was usually unable

to fulfil internal demand (except for some building materials), imports remained high, but so did the prices of imports, partly because of tariff barriers and partly because foreign suppliers were themselves able to participate and take advantage of regulated domestic markets. Consequently, the upward pressure on prices was reinforced. As a host country, Switzerland was attractive for sales subsidiaries, but only exceptionally foreign firms established manufacturing subsidiaries.

The period analysed here was crucial for the Swiss economy, because it laid the ground – on a broad scale - for Switzerland's export specialisation in the high-priced, high-technology segments of international trade, and this specialisation was compatible with an expanding domestic sector, largely sheltered from foreign competition and often cartelised. In this period choices were made which contributed to the exceptional prosperity and high standard of living within Switzerland, but also to the pronounced and enduring disequilibrium between the internal levels of prices and wages and those of the surrounding European trading partners.

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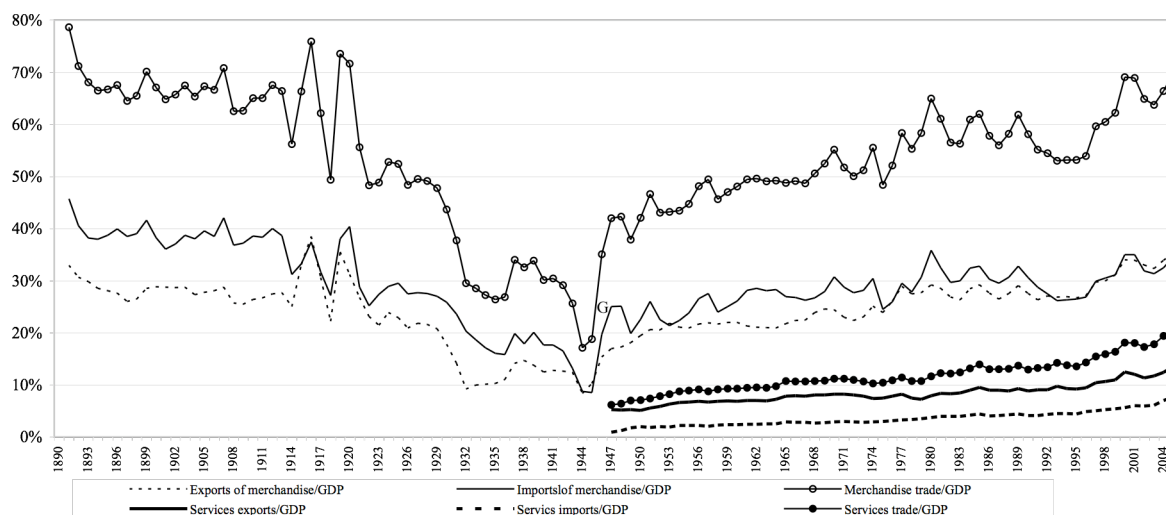
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Appendix

Figure A1: Percentage of trade, exports and imports in Swiss GDP 1891-2005 (nominal values)



GDP 1891-1989: Computed by Heiner Ritzmann-Blickenstorfer, based on: Ritzmann-Blickenstorfer, Heiner (ed.), Historische Statistik der Schweiz, Zurich 1996, Table Q.1.a, p. 866.
 GDP 1990-2005: SNB, Statistisches Monatsheft Februar 2008, Table P1 M1A.
 Merchandise imports and exports 1896-1989: Ritzmann-Blickenstorfer, Historical Statistics, Tables L.3, pp. 668-669.
 Goods imports and exports 1990-2005: SNB, Statistisches Monatsheft Februar 2008, Table P1 M1A.
 Services imports and exports 1947-1990: SNB, Statistisches Monatsheft, Oktober 2006, Tables Q1 M1A and M2A. 1990-2005: Statistisches Monatsheft Febr. 2008, Table P1 M1A.

	merchandise						merchandise and services				
	1900	1913	1928	1938	1958	1966	1974	1982	1990	1998	2006
Austria (1)	n.s.	n.s.	n.s.	n.s.	38	39	63	67	75	82	107
Belgium (1)	n.s.	n.s.	n.s.	n.s.	60	77	119	133	137	145	172
Denmark	53	61	59	42	54	50	67	74	70	74	101
Finland	48	56	52	34	36	36	56	58	46	68	84
Netherlands (2)	108	120	74	47	73	71	103	110	109	120	139
Norway	43	51	40	34	51	51	83	78	74	73	75
Sweden	41	42	36	33	37	37	65	66	60	80	95
Switzerland (3)	(2)67	(2)66	(4)49	(5)33	(5)46	(5)49	(6)63	(5)67	(5)71	(5)76	(5)97
United Kingdom	49	60	49	29	35	34	59	51	50	54	60
Germany	32	40	11	31	29	32	40	48	50	56	85
France	27	31	32	19	18	21	42	46	44	50	55
Italy	23	29	26	14	20	26	42	45	38	47	56
USA (2)	12	11	10	6	7	7	17	18	21	24	28

Note: (1) 1958-1966: trade in percent of GNP; (2) 1900-1938: trade in percent of NNP; (3) ranking in brackets.

Computed by Mattia Regi.

Sources: GDP 1900-1970 in current value and national currency: B. R. Mitchell, International Historical Statistics 1750-2000, fifth edition, Palgrave Macmillan, 2003; Trade 1970-2006 in current value and national currency: OECD, National Account Statistic, 2008; Trade of the Netherlands in 1900 and 1913 in current value and national currency: Jan-Pieter Smits, Edwin Horlings and Jan Luiten van Zanden, Dutch GNP and its components, 1800-1913, pp. 50, 182, Research Monograph No. 5, <http://www.ggdc.net/index-publ.html>.

Table A2: RCA of Switzerland in comparison with her main competitors

Commodity group	Year	Belgium-Luxembourg	France	GermanyC	Italy	Japan	Sweden	US	UK	Switzerland	Ranking
Food, drink, tobacco	1900	0.8	1.0	0.6	1.3	0.5	0.6	2.0	0.2	0.6	4
	1913	0.9	0.9	0.7	1.9	0.6	0.8	1.5	0.4	1.0	3
	1928	0.6	0.8	0.4	1.5	0.6	0.6	1.2	0.5	0.7	4
	1938	0.4	1.1	0.1	2.6	0.9	0.6	1.5	0.6	0.5	7
	1952	0.3	1.0	0.2	1.7	0.6	0.3	1.3	0.5	0.5	5
Raw materials	1900	1.4	0.9	0.8	1.6	1.6	1.9	1.3	0.7	0.4	9
	1913	0.9	0.8	0.7	1.3	1.7	1.9	1.7	0.6	0.3	9
	1928	0.6	0.7	0.6	0.9	1.9	1.8	1.5	0.5	0.3	9
	1938	1.2	1.0	0.6	0.6	0.9	2.3	1.2	0.7	0.2	9
	1952	0.8	0.9	0.8	0.8	0.5	2.5	1.0	0.4	0.3	9
Metals	1900	1.2	0.4	1.3	0.3	0.7	1.7	1.0	1.4	0.3	8
	1913	1.3	0.4	1.4	0.1	0.5	1.2	1.1	1.1	0.4	7
	1928	2.2	1.0	1.6	0.1	0.2	1.1	0.9	1.1	0.7	7
	1938	1.8	1.0	1.4	0.3	0.6	0.9	0.8	0.8	0.8	5
	1952	3.2	1.2	1.5	0.5	2.1	0.8	0.6	0.8	1.0	5
Machinery	1900	0.7	0.4	1.1	n.a.	n.a.	0.6	1.1	1.6	1.4	2
	1913	0.4	0.3	1.6	0.2	0.1	1.2	1.0	1.3	1.3	2
	1928	0.4	0.5	1.7	0.2	0.1	1.8	1.1	1.2	1.5	3
	1938	0.3	0.4	1.6	0.3	0.5	1.0	1.1	1.2	1.6	2
	1952	0.4	0.6	1.5	0.8	0.3	0.8	1.3	1.1	1.1	3
Vehicles	1900	2.0	0.5	0.8	n.a.	n.a.	n.a.	0.5	2.0	1.7	3
	1913	1.3	1.3	0.8	0.6	0.1	0.2	0.8	1.6	0.4	7
	1928	0.5	0.7	0.3	0.6	0.1	0.5	2.0	1.0	0.4	7
	1938	0.4	0.5	1.0	0.8	0.4	0.5	1.7	1.1	0.3	9
	1952	0.5	0.8	1.0	0.8	0.3	0.9	1.0	1.9	0.1	9
Chemicals	1900	1.8	0.8	1.8	0.9	0.5	n.a.	0.5	1.1	n.a.	
	1913	1.2	1.0	2.0	0.5	0.4	0.3	0.3	1.0	1.1	3
	1928	1.0	1.0	2.6	0.6	0.4	0.2	0.6	0.9	1.5	2
	1938	1.3	1.2	2.1	0.4	0.6	0.2	0.6	0.8	2.0	2
	1952	1.2	1.1	1.5	1.1	0.5	0.3	0.9	1.0	2.8	1
Textiles	1900	0.6	1.1	1.0	0.9	1.5	0.0	0.1	1.9	2.3	1
	1913	1.5	1.2	0.7	1.1	1.7	0.0	0.1	1.9	2.1	1
	1928	1.1	1.6	0.7	1.9	1.8	0.1	0.2	2.0	1.7	5
	1938	0.9	1.2	0.7	2.2	3.0	0.1	0.2	1.8	1.4	4
	1952	1.2	1.5	0.7	2.5	3.7	0.1	0.5	1.8	1.6	4
Miscell. manuf.	1900	1.0	1.6	1.7	0.6	0.7	1.6	0.5	0.8	1.5	4
	1913	0.7	1.4	1.5	0.8	0.6	1.2	0.8	0.8	1.3	3
	1928	1.6	1.1	1.5	0.8	0.7	1.4	0.7	0.9	1.8	1
	1938	1.4	1.1	1.3	0.8	0.9	1.1	0.7	1.1	2.1	1
	1952	0.7	1.0	0.9	0.7	0.9	1.0	1.2	1.2	2.0	1
Share in total world exports (in percent)											
	1900	6.3	13.8	18.2	4.4	1.7	1.8	23.8	24.6	2.8	
	1913	6.2	12.1	21.9	4.4	2.8	2.0	22.1	23.2	2.4	
	1928	4.8	11.3	15.9	4.2	4.8	2.3	27.8	19.4	2.2	
	1938	6.1	7.4	18.0	4.6	6.0	3.9	25.6	19.0	2.5	
	1952	5.7	9.1	9.4	3.3	3.0	3.7	35.3	17.2	2.7	

Computed by Mattia Regi. Source of data: Robert E. Baldwin, The Commodity Composition of Trade: Selected Industrial Countries, 1900-1954, The Review of Economics and Statistics, Vol. 40, No. 1, Part 2. Problems in International Economics. (Feb., 1958), pp. 50-68. EXPORTS OF SPECIFIED COUNTRIES BY COMODITY GROUP, SELECTED YEARS, 1900-1954 (Millions Of dollars)

Note: The individual classes may not add exactly to the totals in this table and in Table A-6 because of rounding.

Table A3: RCA of selected commodities

Commodity group	1899	1913	1929	1937	1950	1957
METALS AND ENGINEERING	0.3	0.4	0.6	0.7	0.7	0.6
..Metals	0.1	0.2	0.4	0.4	0.1	0.1
..Machinery	0.9	1.0	1.2	1.1	1.4	1.2
..Passenger road vehicles	-	-	0.2	0.3	0.1	0.1
..Other transport equipment	-	0.7	0.1	0.1	0.1	0.1
..Other metal goods	0.1	0.3	0.7	0.9	0.6	0.9
CHEMICALS	0.6	0.7	1.2	1.6	1.5	1.6
..intermediates	0.6	0.8	1.4	1.5	1.5	1.1
..finished chemicals	0.4	0.7	1.0	1.6	1.5	2.5
TEXTILES AND CLOTHING	1.5	1.5	1.2	1.0	0.7	1.3
..Yarns	1.7	1.8	1.8	1.4	1.0	1.6
..Fabrics	1.8	1.7	1.0	0.9	0.6	1.1
..Made-up goods	0.8	0.8	1.4	0.9	0.9	1.5
OTHER MANUFACTURES	1.2	1.2	1.3	1.5	2.1	1.8
..Intermediates	0.3	0.3	0.3	0.4	0.3	0.4
..Finished goods	1.4	1.5	1.8	2.1	3.0	2.7

Source: Alfred Maizels, *Industrial Growth and World Trade*, Cambridge At the University Press 1963, pp. 426-516. The 'world' consists of Belgium, France, Germany, Italy, Netherlands, Sweden, Switzerland, United Kingdom, Canada, USA, India and Japan.

Table A4: Tariff burden of the main commodity groups in some European countries

Customs duties in percent of import value	Deutsches Reich'	France (minimal tariff)	Italy	Poland	Austria	Belgium	Denmark	Czechoslovakia	Switzerland
Agricult. products, food	26.9	13.3	27.4	27.5	16.6	8.6	21.4	34.1	17.0
Chemical products	15.5	24.1	28.1	29.3	22.8	9.1	8.9	42.9	14.1
Textiles	24.0	21.2	18.6	49.6	14.6	14.1	14.3	28.6	10.9
Rubber goods	19.5	16.6	16.0	39.5	14.2	10.5	11.4	20.9	7.5
Leathr, leather goods	13.5	17.9	18.7	34.5	10.8	9.6	10.9	20.9	10.6
Wood, wooden goods	13.2	16.4	8.9	38.6	10.9	7.2	15.8	20.3	24.0
Paper, paper goods	19.4	18.4	25.6	63.1	16.1	8.7	12.2	31.9	37.4
Stone and earthenware	31.0	25.7	42.6	77.6	18.8	7.5	23.8	44.8	37.1
Glass and glassware	51.1	65.5	39.8	70.2	18.2	13.5	28.5	31.5	45.7
Iron and ironware	16.9	40.1	60.7	56.2	30.8	12.4	8.8	53.3	29.7
Metal goods	13.2	18.2	13.0	28.8	18.2	10.0	9.3	27.9	9.2
Machinery, equipment	10.9	40.4	25.4	41.6	25.6	13.2	7.1	46.2	12.5
Vehicles	43.5	34.6	43.0	10.6	43.9	19.2	12.8	50.5	26.5
Watches, instruments	24.1	29.9	50.5	55.8	22.6	22.6	12.6	32.4	12.3

Source: Gürtler (1931), Table 11, p. 83.