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# Quantifying the Swiss Custom Strategy and Its Impact on Economic Development from 1870 to 1913

by

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**Abstract:** The late 19th century witnessed a remarkable surge in globalization, resulting in a substantial flow of goods, labour, and capital across national and continental borders. Switzerland, despite its limited domestic market and resource constraints, capitalized on this era of globalization and transformed itself from a relatively impoverished agrarian state to one of the world's wealthiest nations. This paper provides a comprehensive overview of Switzerland's custom strategy from 1870 until 1913, focusing on specific industries and products. By examining the evolution of protectionist policies, analysing employment patterns, real value-added, and labour productivity, this study aims to reconcile the quantitative findings and discuss the suitability of Switzerland's customs strategy in the context of economic development and industrialization. The research findings indicate that Switzerland employed a nuanced system of protection, striking a delicate balance between preserving employment, promoting productivity, and fostering overall economic growth. Additionally, the Swiss approach to protection exhibited peculiarities within the European context, such as low tariff protection for crude metallurgy and cereals, while placing significant emphasis on safeguarding livestock products.

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Für miis chlinä Büsi Cesar. Ich vermiss dich.

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# 1. Introduction

Interesting parallels between the features of the world economy since 1970 characterized the economic dynamics in the late 19th century. Both periods are marked by rapid globalization: i.e., capital and labour flowed across national and continental frontiers in unprecedented quantities, and trade of different commodities boomed as transport costs decreased sharply. Furthermore, especially the late 19th century exhibited an impressive convergence in standards of living, at least among the group of nations we now call the OECD but what historians call the Atlantic economy (O'Rourke and Williamson, 1997; Williamson, 1998).

Switzerland emerged as one of the primary beneficiaries of 19th-century convergence; despite being a small alpine country without access to the sea or critical natural resources, by the mid-20th century, the state had become one of the wealthiest nations in the world (David and Mach, 2006). This remarkable transformation was not necessarily evident 150 years earlier. At the beginning of the 19th century, Switzerland was characterized as a relatively poor rural economy within Europe. The country faced net emigration and had comparatively low wage levels compared to other European nations during that period (Studer, 2008; Weder and Weder, 2012).

Stohr's (2014) most recent estimation of Swiss GDP per capita, integrating various data sources on value-added and GDP for Switzerland, suggests that Switzerland in the 19th century was notably less prosperous than the Maddison database implies, which is currently the principal point of reference for international comparisons of GDP per capita (Bolt and Van Zanden, 2014; Stohr, 2014a). These estimates show that the era spanning 1850 to 1910 was the most crucial growth phase for Switzerland's economy. During this period, the nation's GDP per capita underwent a noteworthy transition from a level beneath the European average to one that was equivalent to the United States, the most affluent country in the world at that time. In this sense, the estimations provide a fresh perspective on Switzerland's developmental path by redirecting attention from the proto-industrial and first-industrial revolutions to the second-industrial revolution (Stohr, 2014b, pp. 7–9).

Stohr's analysis further suggests that the remarkable economic growth experienced by Switzerland during the 19th and early 20th centuries was heavily influenced by its level of market integration and favourable geographical location. Specifically, periods of rapid growth corresponded with high levels of market integration. In contrast, slower growth occurred during times of relative isolation, understating the importance of world trade and globalization in Switzerland's economic success as a country which's domestic market was too small and resource-constrained to rely on autarky (Stohr, 2014a, pp. 2–4). In fact, the degree of global integration achieved by Switzerland during the late 19th century was comparable to that seen in modern times (Veyrassat, 2012, pp. 35–61).

Yet, rapid productivity increases, accompanied by structural changes, can adversely affect labour and capital owners in industries, occupations, or sectors that do not benefit from globalization or cannot compete with foreign competition. Consequently, different means of

protection and their implications on economic development have been extensively debated. Particularly the structure of customs policies has been a focal point of considerable scrutiny, primarily due to its fundamental role as a primary tool employed by governments to provide protection, shape trade dynamics, and exert influence over the allocation of resources (Bairoch, 1972; Dedinger, 2006; Dormois, 2006; Federico, 2006; Foreman-Peck, 1995; Lains, 2006; O'Rourke, 2000; Tena, 2006, 2010a).

In Switzerland, these protectionist policies were not uniformly targeted towards sectors and products. Instead, the Swiss government adopted purposively tailored policies that, in most cases, resulted from negotiations among different domestic interest groups through various political institutions (Humair, 2014, pp. 735–742). While prior research has delved into Swiss customs policies and scrutinized the socio-political factors that shaped their emergence, Humair's work stands out as particularly noteworthy in this regard; no quantitative study has yet attempted to compare the country's economic development with its customs strategy, nor has there been a definitive exposition of the Swiss customs strategy and its impact on specific industries and the country's overall industrialization patterns. Therefore, this paper aims to provide a quantitative overview of the development of the Swiss customs policy at the national and branch-specific levels and discuss its implications for economic development and industrialization. The analysis will compare the elaborated customs strategy to three critical determinants of economic growth that appear crucial in this context: employment structure dynamics, real value-added, and branch-specific productivity (real value added per worker).

The present study makes three valuable contributions to the existing literature on Swiss customs strategy between 1870 and 1910. Firstly, it offers a comprehensive overview of protection measures by branch and specific products, providing a detailed description of how protection evolved during the period under examination. Secondly, the paper presents concise estimates of employment development, real value-added, and productivity per worker taken from the Historical Statistics of Switzerland (HSSO)<sup>1</sup>. Finally, the analysis reconciles the quantitative findings and discusses the suitability of the Swiss customs strategy in the context of economic development and industrialization.

To do so, the paper employs the following structure: firstly, an overview of the features and evolution of the Swiss tariff system is provided. Secondly, the methodology and data utilized in this study are presented. Thirdly, the data and methods are applied to undertake an empirical analysis of the Swiss custom strategy, organized into three sections. The first section examines changes in employment, real value-added, and productivity. The second part of the paper outlines the Swiss Customs Strategy from 1870 to 1910, while the final section brings together the conclusions drawn from the preceding sections.

Based on my findings, it becomes evident that Switzerland did not adhere to a strict free trade policy during the examined period. Instead, the country employed a nuanced system of protection that aimed to strike a balance between safeguarding employment, promoting productivity, and fostering overall economic growth while keeping overall custom burden comparably low. The findings further indicate that the country directed its protectionist focus on value-added growth-intensive industries, contributing to its economic development during this period.

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<sup>1</sup> <https://hssso.ch/>

## 1.1 The Impact and Implications of Tariff Barriers in an International Perspective

The development of European trade policies from 1860 to 1913, particularly in the late 19th century, is widely recognized. The Franco-British trade agreement of 1860, also known as the Cobden–Chevalier Treaty, triggered a series of commercial treaties among the major European powers (Tena et al., 2012). These treaties incorporated the most-favoured-nation clause, which ensured that concessions were quickly extended, leading to the rapid adoption of free trade throughout Europe. The turnaround came in the late 1870s and 1880s. In a time when Europe experienced a surge in the importation of cheap grain from the New World and Russia, the calls of local producers for protection grew louder (Kindleberger, 1951; O'Rourke, 1997a).

The last quarter of the nineteenth century witnessed a significant resurgence of European tariff protectionism. Despite decades of expanding global trade and trade liberalization, which had previously lowered tariff barriers to historic lows, in the 1870s and 1880s, most continental countries implemented a first round of tariffs to combat the influx of cheap grain from the "new worlds" and shielded domestic farmers from foreign competition. However, these initial measures proved inadequate, and tariffs were subsequently increased and expanded in the following decades. Many countries that had previously committed to free trade eventually followed suit, except for a few examples, such as Denmark, Holland, and Britain, that stuck to their free trade guns (Dormois, 2006, p. 160; Kindleberger, 1951; O'Rourke, 1997a).

The reversal in trade policy was initially implemented to protect domestic agricultural production. However, industrialists quickly recognized the potential threat posed by the resulting rise in food and raw material prices to their economic interests. As a result, they promptly approached governments, seeking both protection for their industries and compensation for the higher prices. Indeed, this phenomenon of seeking tariff refuge, commonly referred to as the 'run-for-shelter' pattern, was commonly found among industrial producers, wherein alliances between agricultural and industrial entities proved instrumental in effectively advocating for tariff reforms (Dormois, 2006, p. 161; Lebovics, 1988).

In Germany, the influential rye-producing Junkers led to the adoption of protectionist measures for both agriculture and industry under Bismarck's 1879 'marriage of iron and rye'. In France, the Meline tariff of 1892, was commonly regarded as the breakthrough for protectionism and an emerging alignment of interests among the industrial bourgeoisie, large landowners, and peasant farmers (Clapham, 1936, p. 182). In some countries, including Germany and Switzerland, a division arose between smaller farmers who employed grain in animal husbandry and larger farmers who focused on grain production (O'Rourke, 1997a, p. 779).

Since the late 19th century, political economists such as Friedrich List, have advocated for implementing import tariffs to promote domestic manufacturing in countries that lag behind industrial leaders, such as the United Kingdom (List, 1856). Recently, there has been renewed interest in novel approaches to the role of international trade in economic development. Despite contemporary empirical studies predominantly demonstrating the advantages of free trade, the verdict regarding a more extended timeframe remains equivocal, with divergent conclusions being drawn concerning the macroeconomic, short- and medium-term ramifications of protectionist policies.



Bairoch's "tariff-growth paradox" in this notion challenges the conventional view that protectionist policies hinder economic growth. Instead, Bairoch argues that these policies, aimed at slowing down or impeding European industrialization, stimulated it (Bairoch, 1972). This argument is in line with the notion that the second wave of European industrialization was facilitated and flourished because of protectionist policies. Bairoch postulates that tariffs play a pivotal role in economic development and aligns with Listian ideology, which regards protectionism as a learning mechanism. He posits that protectionist policies facilitated the industrial power status attained by the United States and Britain, while continental countries utilized them for safeguarding their growth prospects against the 19th-century wave of globalization. Bairoch (1972) and Weiller (1971) further contend that the classical economists' advocacy of free trade was flawed and should be viewed as either a delusion or a manipulative strategy by supporters of the Manchester school (Bairoch, 1972; Weiller, 1971).

Moreover, Bairoch asserts that France and Germany experienced economic setbacks during the Free Trade era of the 1860s and 1870s, and the reintroduction of tariffs in the ensuing decades enabled them to sustain or enhance their positions during the "long depression" from 1873 until 1896. In contrast, Britain's unwavering commitment to free trade policies severely impeded its market share and competitiveness. Recent studies by O'Rourke (2000) and Clemens and Williamson (2001) have bolstered Bairoch's views by revealing a positive association between import tariffs and economic growth across countries from 1875 to 1914 (Clemens and Williamson, 2001; O'Rourke, 2000).

Yet, in the scholarly discourse on tariffs and economic growth, Irwin (2002) cautions against inferring a causal relationship based on correlation alone. He argues that interpreting Bairoch's tariff-growth correlation requires caution, given that land-abundant, labour-scarce countries such as Argentina and Canada imposed high tariffs primarily for generating fiscal revenue, not to protect domestic industries through import substitution industrialization. While it's true that countries with abundant land resources might have depended on customs duties as a means of generating government revenue and therefore had higher tariffs, it does not necessarily infer a causal relationship between protectionist policies and economic growth (Irwin, 2001, p. 169).

Dormois (2006), in this sense, further highlights the potential delayed effects of tariffs on a country's employment and production structure. While tariffs could result in short-term economic growth, they may hamper long-term growth by reducing competitive pressures and potentially leading to resource misallocation and disastrous consequences, as evidenced by the 1930s, despite supposedly supporting economic development before 1914 (Dormois, 2006, p. 185).

In his study of a larger set of countries than previous research by O'Rourke (2000) and Clemens and Williamson (2001), Tena (2010) found a global negative correlation between average tariffs and growth. However, Tena stresses that the relationship between tariffs and growth varies based on income level, factor endowment, and political independence. He also argues that regional asymmetry is better explained by different tariff structures rather than simply considering average levels of protection (Tena, 2010a).

Moreover, Tena suggests that high tariffs aimed at shielding domestic industries from foreign competition often result from rent-seeking policy competition among inefficient sectors rather than a governmental tariff import-substitution strategy. Developing countries, in particular, tend to have tariff structures that fail to support efficient, high-skilled industries, resulting in the

protection of globally uncompetitive and inefficient sectors because they are more interested in barring foreign competitors than promoting growth. Consequently, increasing tariffs often leads to less growth and more protection for unskilled and inefficient sectors. However, countries that protect skill-intensive sectors tend to have better growth performance than those that do not, especially in developing countries (Tena, 2010a, p. 121).

Tena's conclusions challenge the notion that tariffs were generally beneficial or harmful for long-term growth in the late nineteenth century. Instead, he suggests that the relationship between protection and growth is more complex and depends on multiple factors. Overall, Tena argues that different tariff structures better explain the regional asymmetry in the relationship between customs and growth rather than simplistic average levels of protection. (Tena, 2010a, pp. 131–133).

## 1.2 Protection, Productivity and Domestic Resource Allocation

As remarked, the paper aims to compare an elaborated protective measure with three critical determinants of economic development: real value added, productivity (real value added per worker), and dynamics in the employment structure. The significance of these variables in the context of assessing the custom strategy in Switzerland raises the question of why they are considered crucial.

The first variable is real value added, referring to the market value of the overall output generated through a transformation process minus the market value of the aggregate input or inputs utilized in that process and is, in this paper, either expressed on a branch or sectorial level. By itself, value-added has little meaning as it constitutes an absolute output level. Hence the second and more critical variable for economic development is labour productivity.

Labour productivity serves as a fundamental and easily interpretable measure for assessing national productivity levels. It is computed by dividing the value added by a measure of labour input, such as hours worked or the number of workers (in this paper, workers) and is given by the following formula:

$$\text{Labour Productivity}_{i,t} = \frac{\text{Real Value Added}_{i,t}}{\text{Employment}_{i,t}}$$

Within the framework of a Cobb-Douglas production function, labour productivity reflects the collective influence of capital inputs and total factor productivity (TFP), evaluated on a per-worker basis, thus providing a comprehensive view of the economy's overall productivity.

The relationship between trade protection and labour productivity is inherently indirect, influenced by a multitude of factors. Firstly, trade protection represents one among numerous determinants that impact the institutional environment and behaviour of economic agents.

Secondly, careful consideration must be given to the temporal aspect of this relationship. As value-added (nominator of labour productivity indicator) is based on market prices rather than factor costs, and customs are generally designed to inflate market prices, the immediate effect

of a tariff is to increase the turnover and value-added of a protected industry (Verdoorn, 1980). As a result, labour productivity, holding the workforce constant, is expected to be higher in the following year compared to the counterfactual scenario without the tariff. This suggests that the impact of a tariff, as anticipated by international trade theory, may only become evident over the medium or long term as buyers adapt to the increased prices and producers strive to improve their efficiency.

In this sense, custom policies are commonly acknowledged to influence productivity dynamics within a country through different mechanisms. Firstly, several authors have addressed the venerable argument that learning by doing meant that late 19th-century protection was good for growth on infant industry grounds. Friedrich List, 1856 argued that protectionist taxation is able to facilitate the start-up of new productions, which could not resist international competition from the outset. Early protection of such industries is thereby supposed to facilitate the development of such industries until they have reached the technological level or can benefit from productivity increase through the production of scale. This commercial privilege thus reassures entrepreneurs who must make major investments to regain competitiveness. The logic underpinning the argument is that trade protectionism is costly in the short run but leads to long-term benefits. (Juhász, 2018, pp. 3372–3374; List, 1856; O'Rourke, 2000, p. 475; Tena, 2010b, pp. 341–341).

Yet one has to be careful about being too euphoric about alleged economic growth and the protection of infant industries. High taxation may crowd out productive activity, and high tariffs discriminating against foreign goods may encourage the expansion of less-productive domestic activity and reduce the gains from trade. In this sense, industries might prosper under protective circumstances but remain uncompetitive internationally (Dedinger, 2006; Dormois, 2006; Irwin and Terviö, 2002).

This dynamic brings us to the second key dynamic through which state interventions in the form of custom measures may impact a country's economic development: by influencing domestic resource allocation. Kuznets' (1971) influential paper on contemporary economic growth brought attention to two recurring patterns: the lower output per worker in the agricultural sector compared to industry and services and the consistent shift of employment from agriculture to industry and services during periods of economic growth (Kuznets, 1971). A fundamental inquiry arises regarding the impact of tariff policies on facilitating or impeding this employment structure transformation.

Developing economies in the early nineteenth century often witnessed substantial differences in productivity rates between sectors, commonly attributed to the contrasting dynamics in urban (modern) and rural (traditional) sectors. While the traditional sector typically experienced limited growth, the modern sector capitalized on technological advancements and economies of scale, leading to significant gains in labour productivity (Irwin, 2002a; McMillan and Rodrik, 2011).

This perspective aligns with Broadberry's (1998) findings, indicating that the reallocation of resources from agriculture played a significant role in productivity growth in countries such as Germany, the United Kingdom, and the United States during the late 19th century (Broadberry, 1998). However, this simplified view of a stagnant rural/agricultural sector juxtaposed with a productive urban industrial sector requires further refinement. As revealed by my own calculations later in this paper, the distribution of productivity gains is more heterogeneous

among sectors than the dualistic perspective suggests. This heterogeneity exists not only between sectors but also within. Nonetheless, the logical consequence of such realizations is that to foster economic growth; custom policies should be designed to support industries that exhibit high levels of value added per worker.

Yet, it is worth noting that industries characterized by high value-added and technological advancement may not necessarily be effective in absorbing a significant amount of labour (McMillan and Rodrik, 2011, p. 3). This highlights the importance of recognizing that custom policies can be motivated by objectives beyond economic profitability alone. Political considerations, military interests, technological reasons, support for peripheral regions, and finally, social stability and employment preservation, are among the factors that can influence the decision to protect certain industries (Humair, 2014, pp. 26–34).

Not surprisingly, the “protection of jobs” was always one of the main arguments for protection. This leads us to the final economic variable under examination, employment, which serves as the denominator in our labour productivity indicator. The premise is that tariffs function as a means to maintain or at least stabilise existing levels and structures of employment within a country. This perspective suggests that during periods characterized by significant technological advancements or intense international competition, such as the latter half of the 19th century and the turn of the 20th century, industries shielded by tariffs experienced a relatively stable workforce over the medium term when compared to industries without such protection (Dormois, 2006, pp. 182–186).

The advantages of maintaining a stable workforce are evident. A precipitous decline in employment within a specific sector or industry, without an adequate corresponding surge in job opportunities, can result in unemployment. Moreover, labour markets frequently exhibit inelastic characteristics owing to various factors such as geographical constraints or educational disparities. Hence, even when new employment opportunities emerge in particular regions or industries, they do not necessarily guarantee the mitigation of unemployment. Consequently, the enduring presence of unemployment may serve as a catalyst for individuals to actively pursue job opportunities in alternative regions, countries, or even continents where more favourable labour market conditions exist. Notably, the era of globalization, particularly at the turn of the century, was characterized by a notable surge in mass migration as a direct response to such circumstances (Williamson, 1998, pp. 59–66, 1997).

In this sense, a successful custom policy should strike a balance between incentivizing structural changes towards more productive sectors, protecting promising sectors (such as infant industries), and avoiding counterproductive societal instability in the form of unemployment. In this regard, employment, real value-added, and, most importantly, branch-specific productivity calculations are crucial indicators for evaluating the effectiveness of such policies.

### 1.3 Research Question

The recognition that a country's customs policy structure, rather than absolute levels of protectionism, plays a crucial role in fostering economic development shifts the focus towards a case-dependent view. Therefore, to evaluate the adequacy of a country's custom politics in

promoting economic growth, it is crucial to thoroughly scrutinize the specific nature of protectionism, including its orientation towards different industries and their development.

In this sense, my research aims to provide a comprehensive empirical overview of the Swiss customs strategy at a product and branch-specific level and examine its impact on economic development and industrialization from 1870 until 1913. The topic can thereby be divided into the following three sub-questions:

1. How has the structure of the Swiss customs strategy evolved over time in response to changing domestic and international economic conditions?
2. To what extent did the protective structure of Swiss customs policy contribute to the development of specific industrial sectors?
3. Did custom policy succeed in fostering long-term growth and competitiveness, or were there trade-offs between short-term gains and long-term sustainability?

## 2. Characteristics and Development of the Swiss Tariff System in the 19th Century

In the realm of customs, the federal pact of 1815 exemplifies the notion of the “Restoration” period in Switzerland. Following unsuccessful attempts of centralization during the Helvetic period (1810-1813) and a brief imposition of a federal tariff by France, the designers of the federal pact of 1815 returned customs sovereignty to the cantons, resulting in a patchwork of independent cantonal regulations. Despite provisions for a border tariff primarily intended to fund the federal war chest, the treaty granted significant autonomy to the cantons over trade and customs matters. The absence of coordination between the cantonal customs duties led to a large number of such customs, with over 400 local tariff structures in 1823 alone. Although some cantons attempted to establish customs associations modelled after the German Customs Union, no initiatives prior to 1848 were successful at centralizing customs administration or abolishing internal tariffs (Klöti, 1996; Rupli, 1949).

In 1847, the Sonderbund War, the last military conflict on Swiss soil, marked a turning point in the Swiss Tariff System. The liberal forces of Switzerland emerged victorious over the predominantly catholic conservative forces, resulting in the unification of the Swiss Confederation from a confederation of states to a federal state. The Federal Constitution formalized this transformation on September 12, 1848. Since tariffs played a significant role as a source of revenue for most cantons, the drafting of the Federal Constitution (FC) of 1848 made the reorganization of the customs system a contentious issue. Despite the difficulties faced during negotiations, proponents of centralization emerged victorious, as evidenced by the inclusion of Article 23 in the FC. This article granted the Confederation the power to enter into customs and trade agreements while leaving the cantonal consumption taxes largely unaffected. The Confederation was also empowered to collect duties at national borders, while the cantons were adequately compensated for abolishing internal tariffs (Klöti, 1996; Rupli, 1949).

The implementation of a unified monetary system in 1851 rendered the crude federal customs tariff of 1849 already obsolete, and it was subsequently replaced by a general tax that remained essentially unchanged for over two decades. This general tariff was purely fiscal in nature, which was in line with the tenets of free trade that dominated Swiss politics at that time (Humair, 2014, pp. 209–299).

The Constitution of 1874 granted the federal government new or expanded competencies in areas such as national defence and transportation infrastructure, increasing federal expenditures. As tariffs accounted for approximately three-quarters of federal revenue during this period, tariff increases were deemed necessary to meet the growing financial demands. The first such tariff revision occurred during the global economic depression of 1878. Despite most neighbouring countries having already embraced protectionist customs policies at this time, Switzerland maintained its commitment to the principle of free trade and correspondingly low tariff rates. Yet, despite Switzerland’s privileged position in the middle of Europe, the country

exhibited great difficulties in integrating into the European free trade agreements system, especially in the late nineteenth century (Humair, 2014, pp. 520–570). Due to its initially low tariff rates, it could offer little compensation to its trading partners.

From the mid-1870s, protectionist tendencies increased further in Germany, France and Italy. As "all trade-important neighbouring states" increasingly sacrifice the principle of free trade to protectionism and raise their tariffs, pressure also mounted in Switzerland to revise the customs tariff. In 1884, the tariff structure was finally renegotiated, prompted by a convergence of discontent among numerous representatives from the industrial, commercial, and agricultural elites, leading to a shift towards a more protectionist framework. The "deal" of 1884 was the first step towards reforming the framework conditions, which marked the beginning of a qualitative change in the intervention of the Swiss central state into its custom policies.

These new higher tariffs were not solely structured towards generating fiscal revenue and protecting domestic industries but also inhibited elements of a retaliatory custom policy. Such a combat policy consisted of protecting the internal market by an excessively high customs tariff (general tariff), intended to be lowered if the foreigner grants concessions to native exports (Humair, 2014, pp. 313–385). Access to foreign markets played a pivotal role in Switzerland's export-oriented industrialization model, benefiting the established industries of the initial industrialization period and paving the way for future growth in emerging industries during the subsequent industrialization periods.

Three years later with the Partial Tariff Revision of 1887, the custom structure was changed again. The main feature of the 1887 tariff is, however, the implementation of the first measures of agricultural protection, whereas many other branches remained untouched. As the revision of 1884 was still characterized by free trade, protectionist circles were able to push through their demands better in the law revision of 1887.

However, at the end of 1888, Parliament instructed the Federal Council to carry out a new review of the tariff in order to prepare Switzerland for upcoming trade negotiations. The two councils approved a tariff structure which was more strongly influenced by the protective tariff idea than ever before. Yet, for the first time in Swiss history, the fate of the future custom policies was decided by a popular vote (Humair, 2014, pp. 473–522).

A legislative referendum against the new law is taken up by the "League Against the Increase in the Cost of Living," commonly called the "Food League. The free trade position is thereby represented by trade, banking, and export interests, especially in western Switzerland. Views are also divided among workers. The Social Democrats representing the labour movement advocate for low tariffs and prices as defenders of consumer interests. In addition to consumer protection, opponents also brought up federalist arguments (Bolliger, 2010a).

On the other side, a strong alliance of agricultural organizations, domestic trade led by the trade association, and the majority of trade and industry, machinery, large parts of the textile industry, and domestic merchants, organized in the "Olten Committee", opposed the "food league" and supported the new tariff. They emphasized the necessity of protective tariffs and consideration for consumer interests. Many of the proposed tariff increases should be seen as bargaining tariffs designed to force foreign countries to provide more favourable access conditions to their markets in trade agreements. With a participation rate of 61.6%, the new customs tariff was approved by a majority of 58.1% yes votes in October 1891 (Bolliger, 2010a).

At the beginning of the 20th century, as several trade agreements became terminable and thus open to renegotiation, the Federal Council revised the general tariff schedule in 1898 to improve Switzerland's negotiating position again. The Swiss economy's most important interest groups succeeded in consolidating their industries' diverse interests. Under the impression of the protectionist policies of other countries, they also demanded a further increase in import tariffs. After intensive consultations, the Federal Council adopted its draft for the new general tariff in February 1902 to be presented to parliament. It referred to the tariff, which was increased on most positions, as an "act of reconciliation" between the various economic interests. Yet analogues to 1891, The opponents of the law organize themselves in the "League against the Tariff", a successor organization of the "Food League" from 1891 (Bolliger, 2010b).

In addition to the Social Democrats and trade unions, it included the Butchers' Association, the Hoteliers' Association, and export-oriented industries such as the watchmaking industry. The League collects 110,000 signatures against the proposal, thus forcing a popular vote. Conversely, similarly to 1891, a broad-based alliance of a large part of the domestic industry, agriculture and domestic trade supported the referendum. With a high turnout of 73.3%, 59.6% of Swiss voters again supported the new tariff schedule in March 1903 (Bolliger, 2010b).



## 3. Methodology and Data

In order to assess the influence of Swiss custom strategy on its economic development, several methodological aspects must be considered. First, an appropriate measure of protection must be found and analysed. Since tariffs were the primary protection tool in the 19<sup>th</sup> century, they are the obvious choice. However, for complementation, it is important to consider that other trade policy instruments can also form a protective nature. Such non-tariff barriers are a broad range of government measures that lead to discriminatory treatment of foreign goods, including import quotas, voluntary export restraints, domestic subsidies and cartels (Kinzius et al., 2019). However, since the inclusion of these variables would exceed the scope of this paper and further were comparably rarely employed during this period, they will not be incorporated into the analysis (Irwin, 2002b).

In the subsequent analysis, the implemented protective measure will be examined and compared to the afore-described three factors of economic development: changes in the employment structure, real value-added, and sector-specific productivity (real value added per worker).

### 3.1 Evaluating Protection

One of the most basic yet complex difficulties researcher faces is quantifying the level of protection in an economy. Indeed, evaluating the degree of protection a certain country exhibits is a widely discussed topic (Estevadeordal, 1997; Irwin, 1993; Nye, 2006; O'Rourke, 1997b). However, the advantage of this paper is that it focuses on a domestic, comparative approach rather than attempting to compare Switzerland's tariff structure and protective barriers with those of other countries. My protection measure must thus be adequate to compare domestic sectors and branches rather than be internationally comparable.

Given that most foreign trade statistics report data on the value of dutiable imports and the amount of import duties collected, the easiest method of measuring protection has been to express the duties collected as a percentage of dutiable imports. Yet, this method is not conducive to my studies, as it measures the domestic demand structure for imports rather than specific protection. A second problem is the endogenous nature of imports: as the tariff on a good increase, the weight of this particular good in the overall import structure declines. In the extreme case, if a tax is raised so high that imports are excluded, the weight drops to zero, and the tariff no longer contributes to the index.

Another approach is to compare absolute legislative levels of tariff protection on goods in a country. However, this approach has even more issues. Firstly, tariffs throughout the 19<sup>th</sup> and beginning of the 20<sup>th</sup> century have commonly been conducted on a per weight or per piece basis, rendering direct comparisons between different types of products worthless. Secondly, market prices of products are prone to frequent changes that are not parallel. The absolute level

of protection does not reflect such changes. Hence this paper will apply an alternative approach. To evaluate the Swiss custom strategy in the late nineteenth century, I will use applied ad valorem taxation of products, i.e. the degree of protection expressed as a percentage of the value of a product. Using ad valorem taxation rates solves the problem of time-dependent product prices and makes direct comparisons between different products feasible.

Yet, the utilization of applied ad valorem taxation has two potential limitations. Firstly, ad valorem taxation is susceptible to bias due to the prices prevalent during the year in which the absolute level of taxation on imports is assessed. As tariff reforms are infrequently updated, and policymakers have limited ability to forecast future prices, the measured level of ad valorem taxation may not perfectly reflect the Swiss custom strategy.

Secondly, it neglects the international protection context for a particular product group. In this sense, the level of taxation deemed appropriate for one product may differ from that for another product group. Trade agreements, the need to generate fiscal revenue or international differences in the protection of certain products may play a crucial role in determining a product's level of taxation. Therefore, the perception of what constitutes a high or low tariff on specific goods may vary. These two limitations must be born in mind when interpreting the findings presented in this paper.

The present study employs four distinct temporal segments, commencing in 1877 and spanning four decades until 1907 (1877, 1887, 1897 & 1907). This evaluative cadence mirrors well the tariff reforms that transpired in 1864, 1884, 1891, and 1902, along with their respective post-treaty tariff levels (Described in Chapter 2). The selection of the start year 1877 is particularly conducive for the current analysis, as it coincides with the culmination of the Swiss customs system's transformation process following the establishment of the federal state in 1848.

From 1851 to 1878, with the exception of minor modifications resulting from the Franco-Swiss Commercial Treaty of 1864, the applied tariff rate remained unchanged. Despite the efforts of various socio-economic interest groups to influence customs policy in their favour, the initial tariff policy in Switzerland was largely driven by fiscal considerations rather than protectionism (Humair, 2014, pp. 209–275). This historical context provides an ideal benchmark for future comparisons with later tariff structures that exhibit a more protective nature.

To assess the Swiss custom strategy accurately, this study utilized ad valorem tariff data from Humair's calculations, encompassing 95 distinct tariff positions (Humair, 2014, pp. 763–767)<sup>2</sup>. An average was calculated when multiple tariffs were assigned to a single product. Further, for products that did not have ad valorem taxation listed in certain years, such as all meat products in 1877 which only had per weight or piece tariffs available, adjustments were made to account for changes in the product's price to calculate the ad valorem taxation values for those years<sup>3</sup>.

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<sup>2</sup> Source used by Humair: RO, 1850-1851, vol. I, 2, pp. 527-569 (1851); FF, 1882, vol. 3, pp. 603-649 (1882); Zolltarifforderungen, 1887, pp. 2-49 (1884); Zolltarifforderungen, 1890, pp. 2-45 (1887); Commercial Statistics of Switzerland (1897/1907); The ad valorem protection rates are taken from the Commercial Statistics of Switzerland (1887/1897/1907); for 1877 The rate is calculated based on average values contained in AF, E 11, vol. 14, Proposal for a new toll tariff, Berne, 1877.

<sup>3</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. H.5. [hssso.ch/2012/h/5](http://hssso.ch/2012/h/5)  
Wholesale Index by Goods (Product Price Indexes) 1800–1928: Animal and Vegetable Foods (1914 = 100)

## 3.2 Employment, Real Value Added and Labour Productivity

My data for all three economic variables are taken from the Historical Statistics of Switzerland (HSSO), a comprehensive collection of data and statistics on Switzerland's social, economic, and political development. The HSSO covers topics such as population, employment, wages, prices, trade, industry, agriculture, finance, education, and culture. The data is compiled from various sources, including official government statistics, censuses, surveys, and historical documents.

### 3.2.1 Employment

In the process of estimating employment rates across various branches, this paper primarily relies on data acquired from HSSO 2012/F.10a<sup>4</sup>. This dataset provides information on employment in the first, second, and third sectors by Branches from 1860-1960. Additionally, to enhance the level of detail in employment classifications, the dataset was compared with HSSO 2012/F.02a<sup>5</sup>, which is identical as it is based on the same population census<sup>6</sup>. As certain job classifications differ between the two datasets, merging them yielded increased detail in employment classifications. Since population censuses are typically carried out at ten-year intervals (except 1888), the data available for this study is limited to five population censuses conducted between 1870 and 1910 (1870, 1880, 1888, 1900 and 1910).

Several issues must be acknowledged with regard to the population data utilized in this study. Firstly, the data records individuals based on their place of residence rather than their workplace. It is only after 1970 that employment data is also available based on the workplace. Hence the data does not include international commuters from or out of Switzerland. Yet, since my analysis is conducted at the national level, and in the period examined, the difference between international commuters and out commuters has only a tiny impact, this should not constitute any major distorting effect.

Secondly, there is significant underreporting of employment in specific sectors, particularly female and family labour in the agricultural industry. Thirdly, the population census only accounts for the primary job (the occupation generating the highest income) for individuals with multiple occupations, and no distinction is made between part-time and full-time work.

The two aforementioned data issues could exert a substantial influence, particularly in branches where workers were engaged in multiple occupations, such as agriculture or textiles. It remains, however, a challenge to estimate the direction of the employment bias. For instance, it was commonplace for farmers' wives to work in factories while contributing to farm work. Conversely, farmers often augmented their earnings by undertaking work in other sectors,

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<sup>4</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. F.10. [hssso.ch/2012/f/10](http://hssso.ch/2012/f/10)  
Employment in the First, Second, and Third Sector by Branches and Cantons 1860–1960 (Excluding Part-Time)

<sup>5</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. F.2a. [hssso.ch/2012/f/2a](http://hssso.ch/2012/f/2a)  
Employed Population by Sectors and Branches 1870–1960 (Excluding Part-Time) (in 1000)

<sup>6</sup> Federal Censuses 1860-1960

particularly during periods of decreased demand in agriculture (Barben et al., 1988; Brugger, 1979). However, due to the limited availability of alternate data sources and the inherent difficulty in determining the direction and magnitude of potential biases, this study will continue to utilize the original data provided by the HSSO."

### 3.2.2 Real Value Added and Productivity

The estimates of value added by industry during the period 1870 to 1910 are derived from the Nationalfondsprojekt Geldmenge und Wirtschaftswachstum in der Schweiz 1851-1913 HSSO 2012/Q.1a<sup>7</sup>. This dataset provides information on the Real Gross Domestic Product and Gross Value Added by industry spanning the period from 1851 to 1913. Given that this dataset exhibits data aggregated to only a few major branches, I incorporated additional disaggregated sector-specific data that is consistent with the data already present in the dataset. This data was sourced from HSSO 2012/K.16a<sup>8</sup> for the industrial sector and HSSO 2012/I.24<sup>9</sup> for the agricultural sector.

HSSO 2012/Q.1a was the first attempt to establish a continuous series of value-added by industries for the period prior to the First World War (Stohr, 2014b, p. 145). Yet the continuous series has serious issues impeding its suitability to calculate real value added per worker on a branch level. Firstly, since the series was not linked to any benchmark production account, the reliability of individual and aggregate value-added series remains questionable. The authors of the project were cognizant of this limitation and acknowledged that the value-added series by industry were more dependable in terms of their progression over time rather than their absolute levels (Stohr, 2014a, p. 9). Secondly, although the series provides domestic aggregated Real Gross Domestic Product estimations, it does not offer any sectorial or branch-specific deflator. This has significant implications for inter-industry variations in value added per worker, as it makes comparing absolute branch level value added levels practically infeasible and productivity calculations impossible.

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<sup>7</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. Q.1a. [hssso.ch/2012/q/1a](https://hssso.ch/2012/q/1a)  
Nominal and Real Gross Domestic Product and Gross Value Added by industry 1851–1913 (in Million Swiss Francs): Estimates

<sup>8</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. K.16a. [hssso.ch/2012/k/16a](https://hssso.ch/2012/k/16a)  
Gross Production Value and Gross Value Added by Industry in the Second Sector 1851–1913 (in Million Swiss Francs): Estimates

<sup>9</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. I.24. [hssso.ch/2012/i/24](https://hssso.ch/2012/i/24)  
Value Added in the First Sector by “Branches” 1837–1945 (in Million Swiss Francs): Estimate of H. Ritzmann

Fortunately, the dataset HSSO 2012/Q.17b<sup>10</sup> provides provide estimations for the period 1890 to 1960 that are more accurate than HSSO 2012/Q.1a in terms of relative industry weight levels of value-added and are deflated on a sectorial and branch level (Ritzmann and David, 2012). Although this dataset does not cover the entire period under examination, it serves as a valuable benchmark to compare with HSSO 2012/Q.1a. Furthermore, the availability of sectorial deflators in HSSO 2012/Q.17b allows for more accurate adjustments of relative levels and deflation compared to previous aggregated national deflators. While it is theoretically possible to adjust the data set on an industry-per-industry basis, the paper refrains from doing so. This is in order to maintain the internal homogeneity of HSSO 2012/Q.1a due to the difficulty of harmonizing different industrial branch classifications.

To adjust for the period after 1890, the average value-added ratio between Q.1a and Q.17b from 1890 until 1913 is utilized. A sector-specific scalar is applied for the period before 1890, which is calculated again using the ratio between the two datasets from 1890 to 1913. Yet, in this case, an adjustment is made to the scalar to account for a trend in the ratio between the two datasets.

*Adjusted Value Added<sub>i,t</sub> after 1890*

$$= \text{Average} \left( \frac{\text{Value Added Q17b}_{i,t}}{\text{Value Added Q1a}_{i,t}} \right) * \text{Value Added Q1a}_{i,t}$$

*Adjusted Value Added<sub>i,t</sub> before 1890*

$$= \text{Average} \left( \frac{\text{Value Added Q17b}_{i,t}}{\text{Value Added Q1a}_{i,t}} \right) * \text{Value Added Q1a}_{i,t} \\ + \text{Trend in} \left( \frac{\text{Value Added Q17b}_{i,t}}{\text{Value Added Q1a}_{i,t}} \right) * (1890 - t)$$

Finally, calculating labour productivity involves dividing the real value added by the corresponding employment figures (See productivity equation in chapter 1.2). Yet, it is essential to note that the accuracy of the final productivity measures is subject to several limitations. Firstly, these measures may not be available for certain branches due to missing or unreliable employment or value-added data. Secondly, the comparability of value-added series across industries may be restricted to their temporal evolution rather than their absolute levels, rendering absolute productivity levels unreliable for inter-industry comparisons. Notwithstanding, the textiles industry stands out as an exception, with estimates of real value added that are highly comparable between the HSSO 2012/Q.1a and HSSO 2012/Q.17b datasets. Except for textiles, this paper refrains from making inter-industry comparisons of absolute productivity levels and instead focuses on analyzing their temporal trends.

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<sup>10</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. Q.17b. [hssso.ch/2012/q/17b](http://hssso.ch/2012/q/17b)  
Gross Domestic Product (Production Approach) 1890-1960: Real Value Added in 1926/1929 Prices by Sector and Industry (in Thousands of Francs) Estimates of Ritzmann and David (Wirtschaftsgeschichte der Schweiz im 20. Jahrhundert)

## 4. Empirical Analysis of the Swiss Custom Strategy

My empirical analysis consists of four distinct yet interconnected parts. Firstly, I present the development of the Swiss employment structure, real value-added, and productivity, primarily focusing on a sectorial level. Detailed branch-specific calculations can be found in Appendix A and will be occasionally utilized in the analysis.

Secondly, I provide a comprehensive overview of the Swiss customs strategy specific to each industry. This entails examining the nature of protectionism between 1877 and 1907 and exploring its orientation towards various product groups. This part is closely linked to the third part, which involves a comprehensive qualitative and quantitative assessment of the findings pertaining to the employment structure, real value-added, and productivity in the respective product groups.

In the final step, a pooled ordinary least squares (OLS) regression analysis is conducted to evaluate the potential quantitative relationship between the degree of protection and the economic development of different product groups.

### 4.1 Employment, Real Value Added and Labour Productivity

By 1870, more than 40.84% of the Swiss population was employed in the secondary sector, which accounted for approximately 35.94% of the country's real value added. Interestingly, despite Switzerland's advanced state of industrialization, nearly half of the population (46.4%) was still primarily engaged in agriculture, which accounted for 38.68% of the country's value added. Although a relatively minor employer, the service sector was high value-added, contributing to 25.37% of the country's total real value (Tables 4-1 & 4-2).

The period between 1870 and 1910 was characterized by rapid and dynamic structural changes in Switzerland, both within and between sectors. Notably, the second sector experienced a consistent expansion in employment and real value-added, except for a slight dip in the 1880s, likely due to the long depression. By 1910, the industrial sector had grown to encompass 45.72% of the country's workforce. Furthermore, real value added by the second sector grew more quickly and steadily than employment, reaching around 44.74% of the country's total. On the other hand, employment in the agricultural sector decreased from 38.68% in 1870 to 26.76% in 1910, and its contribution to the country's total income decreased even faster from 38.68% to 16.99%. On the contrary, the steepest ascend was observed in the service sector, emerging

as the most significant contributor of new employment, more than doubling its magnitude to 27.53% of total Swiss employment and generating 38.27% of the country's value-added.

Several noteworthy observations can be made upon initial examination of sectorial productivity patterns. Firstly, the common belief of a less productive rural (traditional) agricultural sector and a more productive urban (modern) sector is not supported by Swiss data for 1870 (Irwin, 2002a; Kuznets, 1971). In fact, the first and second sectors appear to have had comparable productivity levels at that time (Table 4.3 & 4.4). This unconventional finding may be attributed to Switzerland's early adoption of the first industrial revolution, which resulted in a disproportionately large industrial sector that was highly labour-intensive and did not exhibit particularly high labour productivity.

On the other hand, the relatively high productivity of Swiss agriculture may be explained by its topography and the early transition towards liberal legislation favouring capital-intensive, high-value-added livestock stock agriculture over labour-intensive cereal production. Finally, the average highest value-added activities were predominantly found in the service sector. In fact, in 1870, the value added per worker in the service sector was more than double that of industrial or agricultural workers. Yet, due to its comparatively small share of total employment, the service sector's impact on the overall economy was limited.

However, despite its initially high level of productivity and rapid growth in employment share, the service sector exhibited lower productivity growth than other sectors (Table 4-5). From 1870 to 1910, the service sector's productivity experienced an average annual growth rate of 0.75%, substantially lower than the overall domestic growth rate of 1.66%. In contrast, the manufacturing sector demonstrated the highest productivity growth at 1.93%, followed by the agriculture sector at 0.97%.

By 1910, the Swiss sectors saw a notable shift in productivity dynamics. The second sector, which experienced rapid productivity growth, reached a level of productivity that was essentially on par with the national average (Table 4-3 & 4-4). In contrast, productivity within the first sector declined to a mere 63.5% of the national average. Although the service sector remained the most productive sector, its productivity growth from 1870 to 1910 was relatively sluggish compared to the other sectors. As a result, the gap between the service sector's productivity and the national average narrowed significantly during this period.

The findings from the analysis of employment dynamics and value added per worker structure suggest that the manufacturing sector primarily drove productivity growth within industries in Switzerland from 1870 to 1913. This sector, which was already relatively large in 1870, continued to expand slightly. On the other hand, the rapid growth of the service sector, which more than doubled its relative employment weight during the same period, played a crucial role in enhancing overall productivity through structural changes. This shift involved transitioning from low-productivity activities in both the first and second sectors to high-productivity activities in the tertiary sector.

Hence, the commonly held notion that structural shifts from the first to the second sector were the driving force behind economic growth does not hold in the "Swiss Case". Instead, the combination of fast productivity growth within the second sector and the structural shift towards high-productivity activities in the tertiary sector fueled Swiss economic development at the turn of the 20th century.

In this notion, my analysis of Swiss structural and productivity dynamics finds similarities with the observations made by Broadberry (1998) in his analysis of Great Britain. Broadberry identifies that Britain's good productivity performance in agriculture during the nineteenth century was due to a high prevalence of livestock. Similarly to Switzerland, the country further exhibited a large industrial sector, which was labour-intensive and characterized by moderate to low labour productivity (Broadberry, 1998, pp. 379–380).

However, in contrast to Great Britain, Switzerland's employment structure was skewed towards agriculture, with the first sector accounting for over 46% of employment in 1870, compared to less than a quarter in Great Britain. Given the lower level of value added per employee in agriculture, Switzerland's later structural shift out of agriculture played a vital role in its economic growth. Yet, this economic growth pattern resembles the growth trajectories Broadberry attributed to Germany and the United States, where growth was due to shifts out of the less productive and sizeable agricultural sector (Broadberry, 1998, pp. 383–392).

In this sense, Switzerland appears to constitute a third case of economic growth trajectory, characterized by a high degree of industrialization and a large manufacturing sector from the first industrial revolution coupled with a still substantial agricultural sector and a minor service sector.

*Table 4-1: Sectorial Employment Development*

	1870	1880	1888	1900	1910
FIRST SECTOR	46.43%	42.13%	37.44%	30.97%	26.76%
SECOND SECTOR	40.84%	42.25%	40.70%	44.97%	45.72%
THIRD SECTOR	12.74%	15.62%	21.86%	24.06%	27.53%

*Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2*

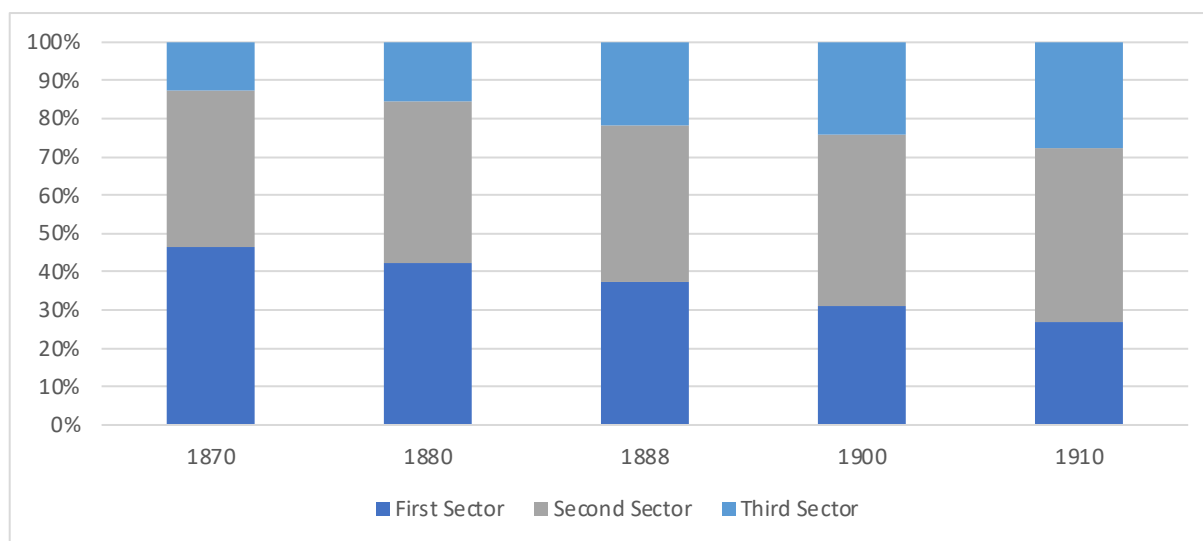
*Table 4-2: Sectorial Real Value-Added Development*

	1870	1880	1890	1900	1910
FIRST SECTOR	38.68%	31.58%	26.96%	22.65%	16.99%
SECOND SECTOR	35.94%	37.99%	39.40%	43.38%	44.74%
THIRD SECTOR	25.37%	30.42%	33.63%	33.96%	38.27%

*Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2*

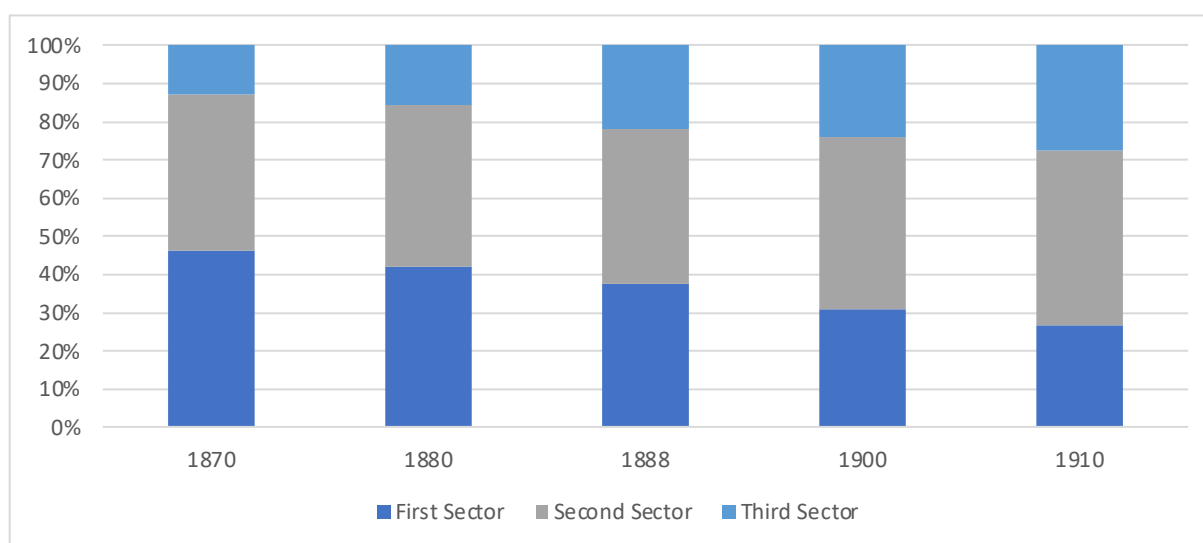


Figure 4-1: Sectorial Employment Development



Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2

Figure 4-2: Sectorial Value-Added Development



Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2

Table 4-3: Sectorial Labour Productivity Development

	NATIONAL	FIRST SECTOR	SECOND SECTOR	THIRD SECTOR	TEXTILES
1870	2.074	1.728	1.825	4.131	1.457
1880	2.359	1.769	2.121	4.594	1.581
1888	2.760	1.988	2.672	4.245	2.127
1900	3.469	2.538	3.347	4.897	2.526
1910	4.000	2.541	3.915	5.561	2.587

Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2

*Table 4-4: Sectorial Labour Productivity Development (National Average = 1)*

	NATIONAL	FIRST SECTOR	SECOND SECTOR	THIRD SECTOR	TEXTILES
1870	1.000	0.833	0.880	1.992	0.703
1880	1.000	0.750	0.899	1.948	0.670
1888	1.000	0.720	0.968	1.538	0.771
1900	1.000	0.732	0.965	1.412	0.728
1910	1.000	0.635	0.979	1.390	0.647

*Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2*

*Table 4-5: Sectorial Labour Productivity Growth*

	NATIONAL	FIRST SECTOR	SECOND SECTOR	THIRD SECTOR	TEXTILE
1870-1880	1.30%	0.23%	1.51%	1.07%	0.82%
1880-1888	1.98%	1.47%	2.93%	-0.98%	3.78%
1888-1900	1.93%	2.06%	1.89%	1.20%	1.44%
1900-1910	1.43%	0.01%	1.58%	1.28%	0.24%
1870-1910	1.66%	0.97%	1.93%	0.75%	1.45%

*Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2*

## 4.2 Reconciling the Swiss Custom Strategy with Structural and Productivity Development

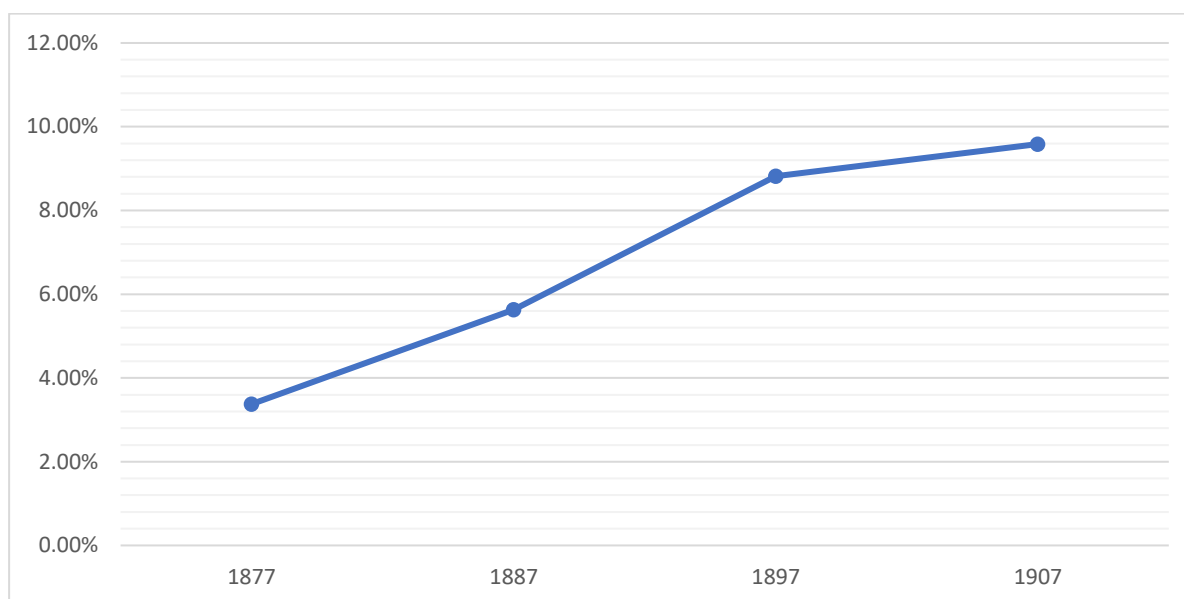
The analysis focuses on six product groups: “Textiles”, “Machinery, Metallurgy and Chemicals,” “Food Industry,” “Agricultural goods,” “Paper, Leatherwork, Glass, Wood, Stones and Earths,” and “Fiscal Goods”. The study provides a breakdown of the Swiss customs strategy for each product group.

However, a discussion comparing the respective customs strategy with the value-added, domestic employment, and productivity of the “Paper, Leatherwork, Glass, Wood, Stones and Earths” group is omitted. This exclusion is due to the significant heterogeneity within this product group and the lack of available or collected data on employment and value-added until the 1900s. Additionally, the study excludes “Fiscal Goods” since these products are not typically produced in Switzerland and therefore have no direct impact on domestic employment and productivity.

A cursory examination of the aggregated average taxation level, as depicted in Figure 4-4, indicates that ad valorem tariffs were at their lowest in 1877 and progressively increased until 1897, from which the increasing trend appears to slow down. Between 1877 and 1907, the overall direction of increasing custom taxation in Switzerland coincided with historical accounts. Whereas the initial tariff structure in 1877 was primarily motivated by fiscal considerations, the continuously rising average custom duties levied progressively reflected the deteriorating state of national accounts, which was caused by increasing federal expenses and declining income due to the prolonged depression of the 1870s and 1880s. The mounting protectionist tendencies within Europe and the internal stakeholder pressures for increased protection measures also contributed to the escalating protective taxation.

Table 4-6 offers a preliminary overview of the protection trend classification by product groups and single products based on the level of protection they were additionally afforded between 1877 and 1907.

Figure 4-4: Average Domestic Tariff Development



Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

Table 4-6: Protection Trend Classification

Brisk Expansion in Protection (>10%)	Fast Expansion in Protection (7%-10%)	Moderate Expansion in Protection (4%-7%)	Weak Expansion in Protection (1%-4%)	Minor Expansion or Contraction in Protection (<1%)
- Stones and Earth	- Cotton Products	- Chemistry	- Silk Products	- Linen Products
- Wine	- Paper	- Fats/Oils	- Wool Products	- Raw animal skins
- All Livestock	- Glass	- Processed Metallurgy	- Leather Products	- Crude Metallurgy
- Tobacco Products	- Colonial Goods	- Machinery	- Cheese	- Rag Paper
- Loose leaf tobacco	- Chocolate	- Wood Industry	- Butter	- Cereals
- Rearing	- Flour	- Veal and Beef	- Coffee	- Raw Material for Textil Production
- Cider	- Pork	- Ready-made Clothing		
- Beer	- Hard Alcohol			
- Colored or Printed Fabrics				

Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

## 4.2.1 Textiles

The term "textile industry" refers to the mechanized, factory-based production of textiles in various production sectors, including the linen industry (canvas, lace), wool, silk, cotton, and straw industry (straw weaving), as well as the hat and chemical fibre. Particularly, cotton was dubbed Switzerland's "white gold" due to its dominant position within the industry and its significant contribution to the country's early industrialization. In the early 18th century, cotton production started as a proto-industrial activity in Zurich's Oberland, with farmers spinning cotton by hand in a bid to supplement their meagre incomes. However, in just a few decades, cotton became a major player in the Swiss economy, alongside other textiles such as silk products and the embroidery industry (Bodmer, 1960).

### 4.2.1.1 Textiles: Custom Strategy

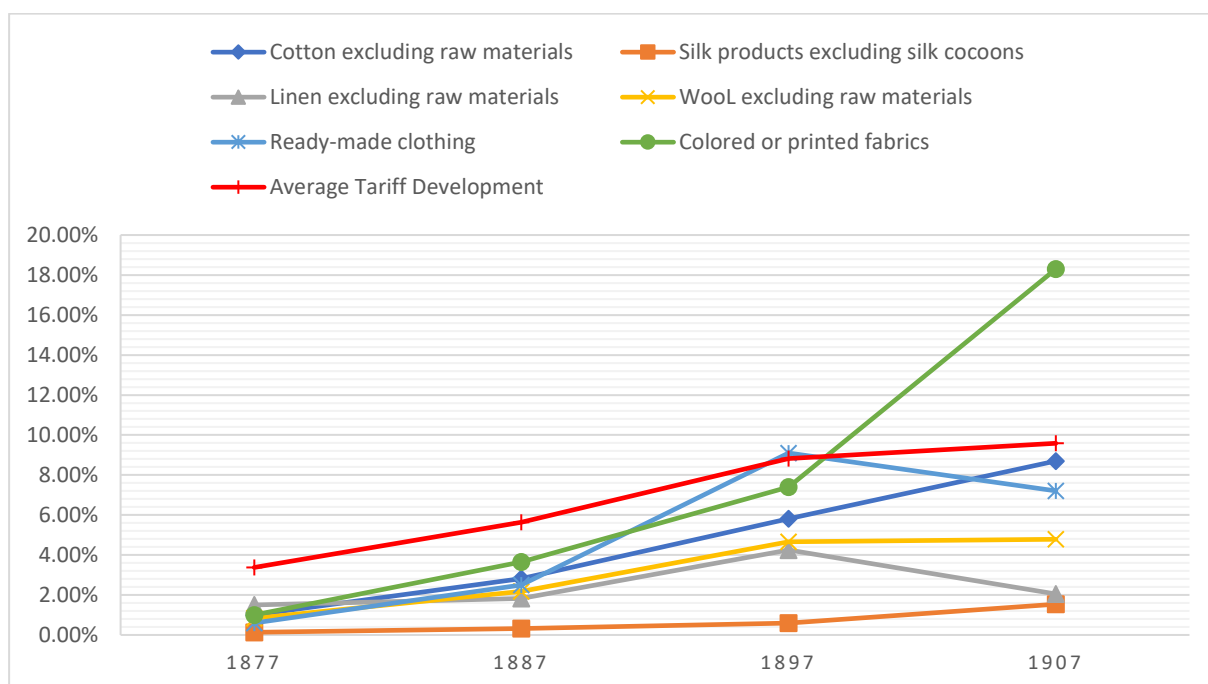
The textile industry's dominance in the pioneering role of industrialization appears to be reflected in its significant influence on Swiss custom politics, which resulted in a continuous increase in protection in favour of the branch (Figure 4-5). Yet, the increase in protection was heterogeneous among different textile branches. Notably, the protection of Swiss "white gold" (cotton) was particularly high, with the ad valorem tariff increasing continuously from a purely fiscal form in 1877 to a maximum of 8.7% in 1907, and hence classified as fast expanding. On the other hand, Linen products enjoyed comparably high protection between 1877 and 1897, contracting however rapidly thereafter. Silk and wool products finally enjoyed moderate protection. Further, the data presented in *Figure 4-6* indicates a trend towards decreasing tariffs on raw products used in textile production. Low protection on their raw materials benefited textile producers, as the cost of raw materials critically influences the price of their intermediate and finished products.

Overall, the Swiss custom strategy in the textile sector favoured the production of intermediate products such as spun cotton and finished fabrics. In 1907, the level of taxation varied significantly across different types of textile products, with linen products being subject to comparatively low tariffs, while silk and wool products faced moderate taxes, and cotton products enjoyed high tariffs. The strategy for intermediate products closer to the end of the supply chain, such as printing and embroidery or finished products, is more ambiguous. It is important to note that although taxation on dyed/coloured fabrics and ready-made clothing was comparably high, the high surcharge on intermediate products such as raw fabrics and spun cotton also increased production costs for such producers, i.e. embroiderers, printers, and cloth producers. Hence, the actual effect of Switzerland's custom strategy taxation on such products might be more ambiguous, and further research estimating the "effective" impact of taxation on such products would be valuable<sup>11</sup>.

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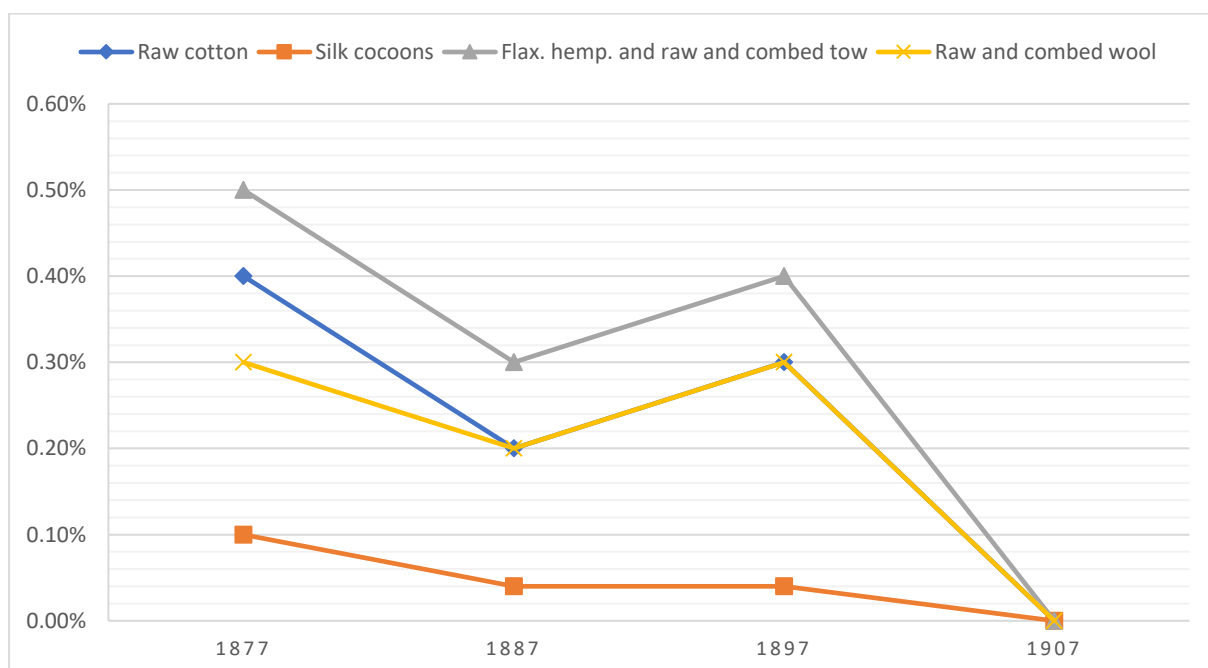
<sup>11</sup> For a discussion of the cascading effect of tariff protection i.e., the nominal protection rate on the final product net of the protection on its input see for example (Federico and Tena Junguito, 1998) and (Dormois, 2006).

Figure 4-5: Textiles ad Valorem Protection



Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

Figure 4-6: Raw Materials for Textile Industry ad Valorem Protection



Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

#### 4.2.1.2 Textiles: Custom Strategy and Structural and Productivity Development

By 1870, textile manufacturing accounted for 34.61% of second-sector employment and over 14.1% of overall domestic occupation. Yet, the textile industry exhibited a notable decline during our study period. From over a third of employment in the second sector in 1870, by 1910, this proportion had decreased to just 17.3% (Table 1, Appendix B).

Further, the textile industry exhibited considerably lower productivity levels compared to the first sector. It was not until 1910 that textile production surpassed the productivity levels of the first sector (Table 4-3). In 1870, the average worker in the textile industry generated approximately 70% of the average national value added. Despite experiencing a considerable growth rate of 1.45% in productivity per worker between 1870 and 1910, the industry could not keep up with the national average of 1.66% and started from a low level.

In order to counteract this ongoing decline of the textile industry, the Swiss custom strategy included considerable efforts to bolster protectionist measures and safeguard at least domestic consumption. Yet as my analysis shows, the increase in protection was heterogeneous among different textile branches. While cotton appeared particularly privileged with protection, wool and silk enjoyed only modest protection gains, and linen products even contracted.

Given the relatively low productivity and unfavourable employment prospects in the textile production industry, it is pertinent to question the justification of high levels of protection, particularly for cotton. This raises concerns about whether these protectionist measures hindered overall growth and productivity by impeding the effective allocation of resources towards more economically efficient industries. Consequently, it becomes crucial to explore whether the escalation of protectionist measures for the rapidly expanding textile industry was primarily driven by rent-seeking behaviour among textile elites or if it stemmed from the government's objective to prevent a swift industry decline and maintain social stability by safeguarding employment. It is important to note that these two explanations are not necessarily mutually exclusive.

Humair's research highlights the influential role played by the famous Zurich cotton barons in establishing a direct link to the capital city of Bern (Humair, 2014, pp. 473–620). Prior to 1870, cotton producers in Switzerland generally espoused free trade policies, aligning with the principles of Manchester liberalism, as a means to safeguard their export-oriented business model from retaliatory tariffs. However, the industry's decline in economic fortune during the late 1870s prompted various interest groups, including the "Schweizerischer Spinner-, Zwirner- und Weberverein" founded in 1879, to pursue federal power actively. Their objective was to prevent spinning mills' looming "crash" on Swiss soil with a particular focus on cotton (Humair, 2014, pp. 735–742).

However, it is important to consider that factors other than pure advocacy strength may have contributed to the differential treatments in taxation among various branches within the textile industry. The low taxation of silk products might be due to the fact that the sector was much more dependent on the exportation of their luxury products than the cotton sector. Domestic protection might, therefore, have had little influence on the economic development of silk producers and was also less sought after (Bodmer, 1960).

The decrease in protection for the linen industry in 1907 might be attributed to its comparatively labour-intensive processing. The mechanization of the spinning process for flax, which has much longer fibres than cotton, was only successful half a century later than for cotton, making it less suitable for mechanization than other branches within the textile industry (Bodmer, 1960). Indeed, linen production appeared to have been in a free-fall situation, with the workforce reduced by more than 70% from 1870 until 1910.

On the other hand, the wool industry was minor in size by 1870 and had a relatively low economic impact. In light of the presented evidence, the preferential treatment of cotton within the textile sector appeared to be a logical consequence due to the unsuitability of the other textile branches as a tool for the protection of employment.

In this context, it is further crucial to acknowledge that the cotton industry held significant importance in the Swiss employment structure, accounting for over 9% of total second-sector employment in 1880. And as mentioned earlier, the protectionism of cotton was the only feasible tool for safeguarding the textile industry. However, despite the implementation of protective measures, employment numbers continued to decline. This raises the question of whether the decline would have been even more severe in the absence of protection or not. Determining whether other sectors could have absorbed the lost jobs in the Swiss textile industry or if they would have resulted in higher unemployment, emigration, or both cannot be definitively answered using the empirical methods employed in this research. Nevertheless, it is important to consider the economic climate of the period under examination, characterized by a prolonged economic crisis that persisted well into the 1890s.

Hence it is certainly debatable whether the jobs lost in the textile industry could have been successfully transitioned to other branches or if they would have resulted in a significant increase in overall unemployment and/or emigration. Consequently, the privileged protection of the cotton industry does not seem entirely unreasonable or detrimental to the country's economic development, whether motivated by the preservation of societal stability or the rent-seeking interests of cotton barons. Yet, the continuous increase in protection from 1897 to 1907, after the economic crisis has ended, seems to be, alongside this economic reasoning, inexplicable and may have been detrimental to the country's overall economic development.

#### 4.2.2 Machinery, Metallurgy, Chemicals

Mechanical engineering had already been present in Switzerland before 1800. Craftsmen had designed spinning wheels and looms for the home industry. However, the seed for modern machinery emerged from the dominant textile industry. Due to the exorbitant cost of importing entire textile machines, mainly coming from England, with the transportation means of that era and the machines' inherent need for maintenance, repair, and improvement, spinning mills began integrating mechanical workshops. These workshops, at the beginning, focused on maintenance but quickly switched to building their own machines or at least machine parts by replicating foreign models (Hofmann, 1962).

The metal industry, on the other hand, can be divided into its various stages along the supply chain, based on the degree of production depth, from the production of raw metals to semi-finished products (crudely processed metallurgy) to the production of finished products like



tools or locks (processed metallurgy). Unlike the machine industry, the metallurgy industry was not highly export-oriented, as it primarily supplied semi-finished products to other industries, particularly the machine and construction industries (Degen, 2009; Fehlmann, 1932).

Finally, the emergence of the modern chemical industry, which brought high added value, can be traced back to the production of artificial dyes and the synthesis of natural dyes, especially in the region surrounding Basel. This location was ideal due to several advantages, such as a favourable market for domestic silk. Additionally, Switzerland lacked patent legislation until 1907, allowing Basel companies to copy products and gain a competitive advantage over foreign rivals (Hansen, 2007).

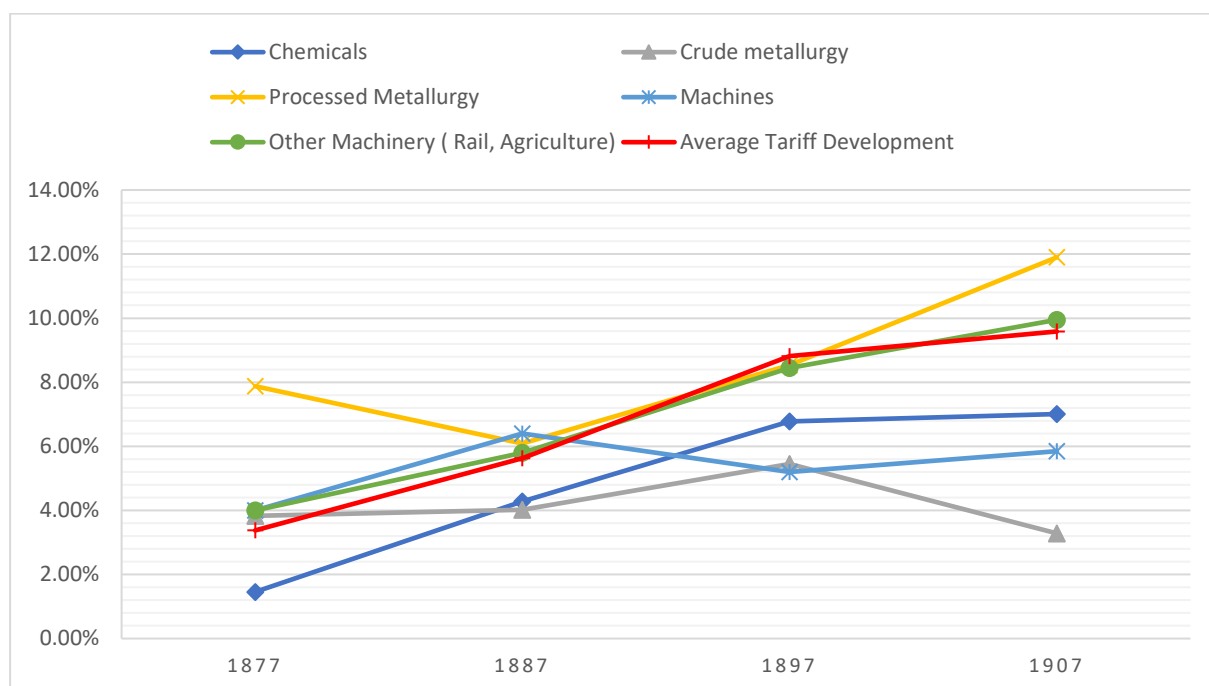
#### 4.2.2.1 Machinery, Metallurgy, Chemicals: Custom Strategy

In 1877, the Swiss customs system provided already relatively high level of protection for processed metallurgy, while chemicals were given the lowest level of protection. Meanwhile, machinery and crudely processed metallurgy were placed somewhere in the middle. Between 1877 and 1907, machinery, chemicals, and processed metallurgy experienced a moderate increase in their respective levels of protection. However, crude metallurgy appears to have bucked this trend, with its ad valorem protection declining compared to its 1877 level.

This decline is surprising in a European context, as many other European countries, such as Germany under Otto von Bismarck, specifically protected their domestic raw and crude metal production (Dedinger, 2006). In this sense, Switzerland's approach appears to have been distinct from its larger neighbours. The moderate increase in protection for relatively new industries, such as chemicals, machinery, and highly processed metallurgy, compared to the more mature crudely processed metallurgy, may further suggest an attempt at infant protectionism in the Swiss case.

Overall, it appears that Switzerland's customs strategy in this sector was mainly focused on manufactured goods that were at the end of the supply chain, i.e. finished goods, as opposed to raw and intermediate products such as crude metallurgy, which ended up with deficient levels of protection, especially after 1897. Despite a general increase in taxation over the studied period, protection remained at comparably moderate levels.

Figure 4-7: Machinery, Metallurgy, and Chemicals ad Valorem Protection



Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

#### 4.2.2.2 Machinery, Metallurgy, Chemicals – Custom Strategy and Structural and Productivity Development

In 1870, machinery, which later emerged as a key driver of the second wave of Swiss industrialization, held a relatively modest position. The branch employed approximately 9,300 individuals, constituting less than 2% of the total workforce in the second sector. In contrast, metallurgy played a considerably more significant role, accounting for 4.49% of employment. Meanwhile, although the chemical industry's contribution remained relatively minor, it experienced dynamic growth throughout the period. The sector's workforce expanded from 1,100 to 8,300 employees by 1910, representing approximately 1% of the second sector's total employment (Table 1, Appendix B). By 1910 the tide between metallurgy and machinery had turned. Machinery now provided 7.01% of the second-sector employment, whereas metallurgy increased its share only marginally to 5.12%. Machinery was hence the quickest expanding branch regarding employment growth and a mitigating measure to compensate for the job losses in the stumbling textile industry.

In terms of productivity growth, on the other hand, metallurgy played a leading role in growing by 5.58% per annum (Table 3, Appendix B). Machine production grew slower, however, by a considerable 1.87%. Due to lacking value-added data, productivity growth within the chemical industry cannot be calculated, yet, it was probably due to the industry's capital-intensive nature comparably strong as well.

The significant increase in metallurgy productivity in Switzerland can be attributed to a peculiar aspect that sets it apart from its European counterparts. Unlike neighbouring countries, Switzerland did not protect the production of raw or crude metallurgy. Instead, it favoured more

processed forms of metallurgy. This led to a rapid decline in the production of crude metal producers. For example, by 1910, only a single blast furnaces producer of raw metal was still active in Switzerland (Degen, 2009). Despite the decline in crude metallurgy production, the number of workers employed in the overall metallurgy industry steadily grew from 21,900 to 41,700. Although specific data on the employment structure within metallurgy is unavailable, a significant structural change likely occurred within the industry.

Switzerland's protectionist policies towards the metallurgy, machinery, and chemical industries were instrumental in the country's industrialization efforts. The strategic implementation of moderate protection levels on chemicals and machinery gave domestic producers a competitive edge over global competition, particularly in serving the dominant domestic textile industry while still allowing for an international competition to drive productivity gains necessary for export-oriented growth. For instance, the share of exported machinery increased significantly from less than 2% in 1879 to around 10% in 1912 (Bosshardt and Nydegger, 1964, pp. 302–327).

In this sense, the machinery industry was pivotal in absorbing jobs from the declining textile sector and redirecting them to a sector with faster productivity growth. This not only ensured societal stability but also contributed to overall economic development. Similarly, the low level of protection on crude metallurgy production incentivized structural changes that favoured the development of more efficient and highly processed metallurgy. The absence of significant trade barriers on raw or crude metallurgy products further positively impacted the overall manufacturing sectors by reducing material costs. With low trade barriers in place, Switzerland could access basic metallurgy products from international markets at competitive prices.

### 4.2.3 Food Industry

The food and beverage industry is a broad sector that covers a wide variety of products, ranging from the industrial production of foodstuffs, oils and fats, and alcoholic beverages like beer, wine, and spirits to the processing of tobacco. This industry exhibits a significant variance in producers' size and structure across different products and within them, ranging from small-scale artisanal production to large factories. While most products in this sector are consumed domestically, certain products like chocolate, cheese, and tobacco are also commonly exported (Guzzi-Heeb, 2009).

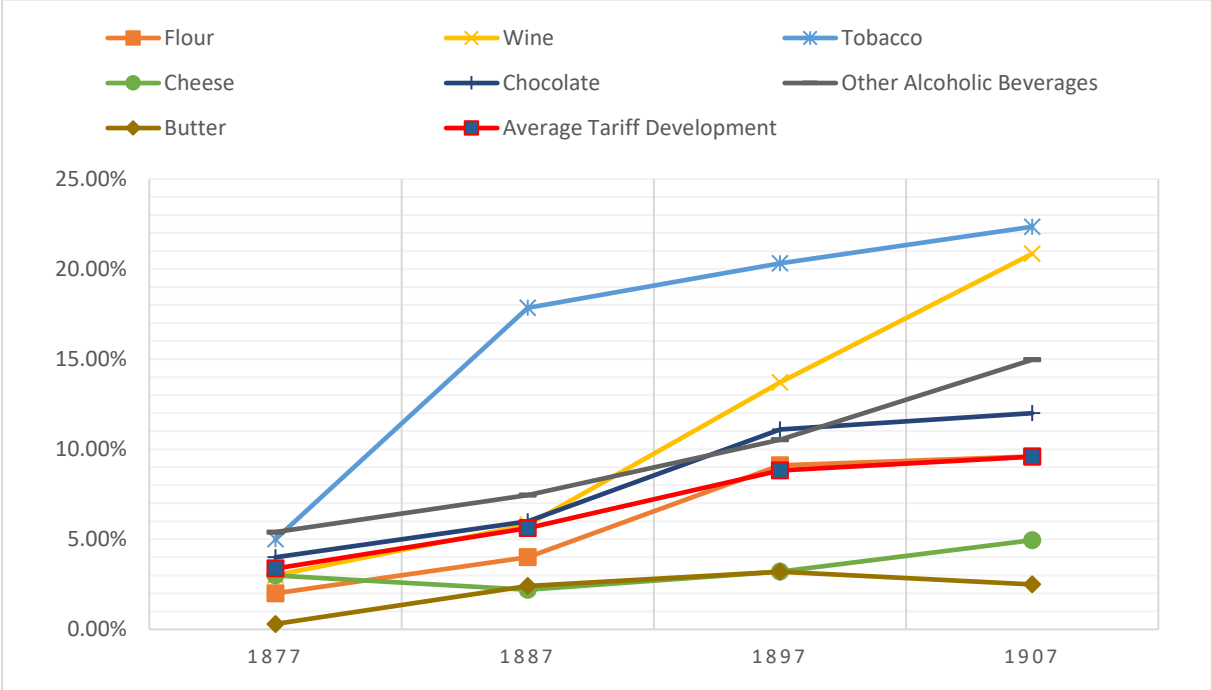
#### 4.2.3.1 Food Industry: Custom Strategy

During the fiscal period of Swiss customs policies in 1877, food, beverages and tobacco, i.e. products in the food industry, received taxation levels similar to the national average. Among the food products, alcoholic beverages and tobacco received the highest protection, consistent with their classification as fiscal products.

From 1877 to 1907, however, a significant divergence in protection levels within the industry occurred. Three distinct patterns can be observed in this context. Food products with a fiscal component, such as alcoholic beverages and tobacco, experienced a brisk ascend in protection. Commonly, large-scale facilities that produced products such as chocolate and flour

experienced a fast expansion in protection. Finally, relatively small-scale decentralized production of cheese and butter only witnessed a weak increase in protection.

Figure 4-8: Food Industry ad Valorem Protection



Source: author’s computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

#### 4.2.3.2 Food Industry: Custom Strategy and Structural and Productivity Development

Between 1870 and 1910, the food industry in Switzerland demonstrated a steady growth pattern, expanding its relative sectorial share in the manufacturing sector from 6.68% to 8.44% and creating employment opportunities from 32,500 to approximately 68,800 jobs (Table 1, Appendix B). The average growth rate in productivity was with a yearly average of 1.12% less convincing. Yet due to the relatively pronounced heterogeneity within the branch, it is likely that productivity growth patterns might have been widely dispersed.

Assessing the effectiveness of Swiss protectionism in the food industry for promoting industrialization and enhancing welfare presents a challenging task, primarily due to its heterogeneous nature and the limited availability of sector-specific data. However, certain conclusions can be drawn from the existing evidence.

Switzerland's policy of offering extensive protection to large-scale processing facilities and moderate protection for decentralized small-scale producers appears to have yielded positive results. In this sense protection of large-scale processing facilities has contributed to the establishment of thriving industries, such as chocolate production, which experienced remarkable growth in export volumes over a relatively short period. While chocolate exports were negligible in 1870, Switzerland produced 26,000 tons for export by 1900 and a staggering

1,560,000 tons by 1913<sup>12</sup>. Somewhat more critical appears the protection of flour, which may have increased living costs domestically, and it did not develop an export-oriented character.

At the same time, the policy of providing moderate protection to decentralized small-scale producers has also proven beneficial. The example of cheese production illustrates this point, as it flourished without significant protectionism. The consistent growth in cheese exports, from 15,287 tons in 1870 to 24,548 tons in 1885 and 36,129 tons in 1913, might suggest that the moderate taxation levels for cheese were appropriate.

The analysis of high-custom products like wine and tobacco requires a nuanced approach, considering both the protectionist and fiscal aspects involved. The protection of tobacco products proved relatively successful in generating employment opportunities, with the number of workers employed in the industry increasing from 3,000 to over 9,100 between 1870 and 1910, particularly in regions affected by the decline of the textile industry (Steigmeier, 2002). Despite being relatively labour-intensive, the successful export of tobacco products indicates that Switzerland's customs strategy did not protect an entirely inefficient and failing industry. In fact, tobacco exports increased from 120.9 tons in 1870 to 624.8 tons in 1913. An interesting exception to the Swiss custom strategy is the comparably high level of protection afforded to loose-leaf tobacco. This stands out as one of the few instances where a "raw" product experienced a substantial increase in protection. While the protectionist measures for other industries often favoured processed or value-added products.

In contrast, the protection of wine production did not yield positive results. Despite extensive protection, the industry's contribution to agricultural income declined from approximately 14% to a mere 3.29% between 1870 and 1910 (Table 2, Appendix B). The spread of phylloxera, labour shortages in viticulture due to workers migrating to better-paying industries, competition from other beverages such as beer, spirits, and the availability of cheaply transported imported wines via rail all contributed to the overall decline of the wine industry. Thus, the extensive protection provided through the Swiss customs strategy did not appear economically viable for wine production, which was labour-intensive and inefficient.

In summary, the Swiss protection strategy regarding the food, beverages, and tobacco product group presents an ambiguous picture in terms of fostering industrialization and welfare in the country. While the overall branch did not exhibit exceptional productivity growth or rapid employment expansion, it provided a relatively stable source of employment nationwide. The policy of offering extensive protection to large-scale processing facilities, coupled with moderate protection for decentralized small-scale producers, appears sensible and likely contributed to the emergence of a successful export product. On the other hand, particularly the extensive protection of wine seems to have been detrimental to the country's industrialization attempts and overall economic development. The industry was marginal in terms of employment, labour-intensive, and despite increasing protection efforts, inevitably on a failing path without any future expectations of promising economic prospects.

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<sup>12</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. L.2. [hssso.ch/2012/1/2](http://hssso.ch/2012/1/2)  
Exports by Type of Goods and Export Volume Indexes 1851–1913 (in 1000 Hundredweights and Units)

#### 4.2.4 Agricultural Goods

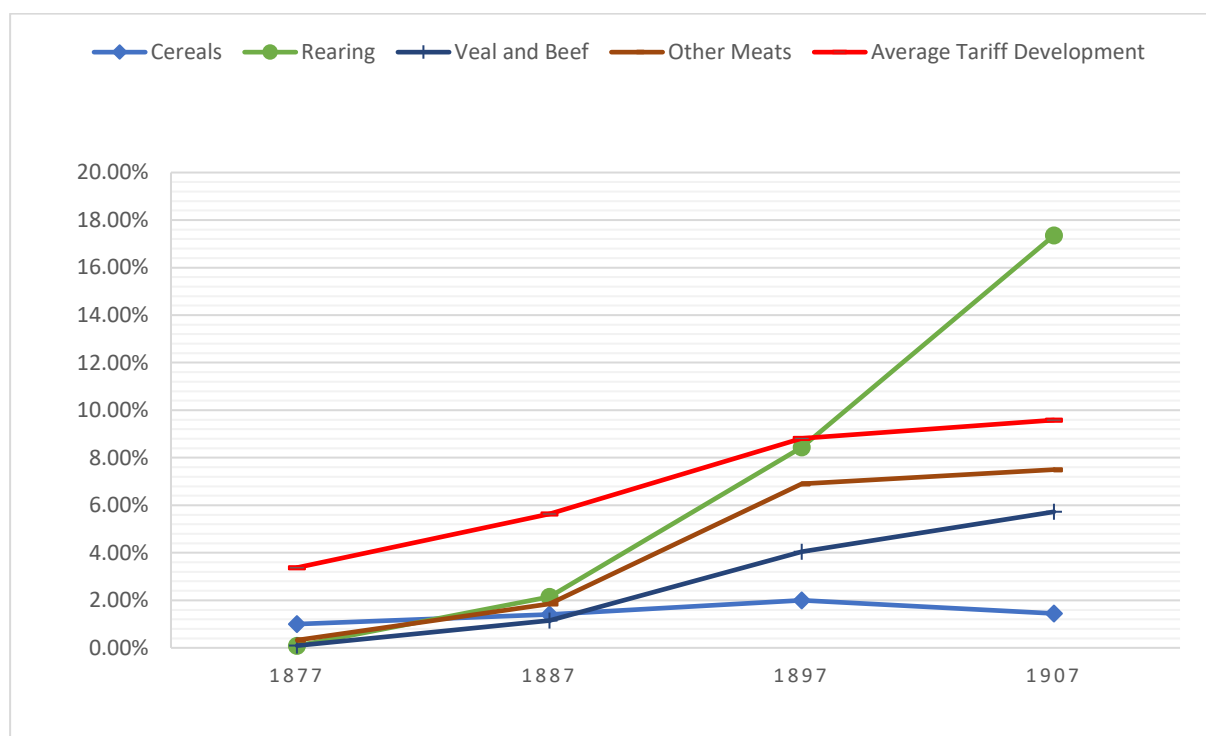
The category of agricultural products consists of primary goods, such as livestock, that serve either as a source of meat production or for rearing purposes, i.e., the cultivation of livestock for various food products and cereals. In this matter, it seems important to note that the direct importation of meat during the late 19th century and early 20th century was limited due to technical reasons. The underlying explanation is that the necessary advances in refrigeration technology only emerged towards the end of the century (O'Rourke and Williamson, 1999, p. 15). Despite this technical innovation, they did not significantly impact Swiss meat consumption at the beginning of the 20th century. In 1912, frozen meat imports represented a mere 7.3% of foreign beef and veal consumed and 2.4% of total consumption (Humair, 2014, p. 724). Hence, during this period, the taxation of living animals was the crucial instrument of protection of domestic meat production.

##### 4.2.4.1 Agricultural Goods: Custom Strategy

During the "fiscal period" of Swiss custom policies in 1877, only minimal protection was granted to the products under scrutiny, although cereals received some degree of protection. The livestock production in the alpine region was seemingly completely disregarded for any domestic protection. However, a shift in policy occurred in 1887, with some level of protection now offered to the livestock industry.

Subsequently, the Swiss custom strategy underwent a radical change. Between 1887 and 1907, animal-based agricultural protection in Switzerland increased rapidly, surpassing any other product category. Within two decades, the cost of importing animals for rearing purposes rose from 2.15% ad valorem to approximately 17.35%, making it part of the "brisk expansion" group. Pork and meat from cattle experienced a fast and moderate expansion, respectively. Overall, livestock experienced a brisk increase in its protection, especially from 1887 onwards. In stark contrast to livestock products stands the development of protection for cereals. From its fiscal base in 1877 until 1907, the level of protection for grains remained at low levels of ad valorem taxation.

Figure 4-9: Agricultural Goods ad Valorem Protection



Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

#### 4.2.4.2 Agricultural Goods: Custom Strategy and Structural and Productivity Development

Despite Switzerland's position as a forerunner of the first industrial revolution, agriculture remained the largest employer, with 46.43% of the population engaged in the sector, and the most significant contributor to the country's value-added, accounting for 38.68% in 1870 (Tables 4-1 & 4-2). However, significant transformations occurred over the period. By 1910, the proportion of people primarily engaged in agriculture dropped to 26.76%, and the sector's contribution to domestic value added dwindled to a mere 16.99%.

The agricultural sector exhibited remarkable productivity levels comparable to the second sector. This was likely due to a high prevalence of capital-intensive livestock industry. However, the sector's overall growth rate of 0.97% was considerably below the national average. Yet, from 1880 to 1900, known as the time of the long depression, agricultural productivity experienced growth rates similar to or even surpassing the national average (Table 4-3). Conversely, the decades before and after this period witnessed stagnant productivity levels in agriculture.

Despite the overall increase in agricultural protection observed across Europe, Switzerland's custom strategy diverged from its larger neighbouring countries such as Germany, France, and Italy (Dedinger, 2006; Federico, 2006; O'Rourke, 1997a). In contrast to these nations, Switzerland made a distinct decision not to extend customs protection to cereal production. While the domestic market for animal products remained largely shielded from European competition, the market for cereals remained open. This led to increased market integration and

the influx of inexpensive grains from the New World and Russia, drastically reducing local cereal prices (Frey, 2008).

The prioritization of livestock product production over labour-intensive cereal production profoundly impacted the relative prices of cereals compared to meat (Figure 4-10). Switzerland's decision not to extend custom protection to cereal production led to a significant decline in the relative price of cereals. Consequently, domestic cereal production experienced a rapid and substantial decrease between 1870 and 1910. During this period, the value added from cereal production witnessed a staggering decline, plummeting by over 70% from its previous level<sup>13</sup>.

This decline in cereal production had far-reaching consequences, leading to the redistribution of labour from cereal cropping to more productive areas within and outside the agricultural sector. Specifically, between 1870 and 1910, the proportion of total value added in the agricultural-sector attributed to cereal cropping experienced a sharp decline, dropping from 16.2% to 2.57% (Table 2, Appendix B). In contrast, the share of value-added attributed to livestock agriculture saw a remarkable increase, rising from 48.6% to 77.03%. Moreover, the contribution of various plant-based agricultural production alternatives (including cereals) also declined significantly. Their share of value added in the primary sectors decreased from 41.77% in 1870 to 15.1% by my calculations.

Although divergent from the European context, the Swiss custom strategy regarding agriculture presented several advantages. One of the positive externalities was the impact on living costs, as they are closely linked to the price of cereals, which, in turn, positively affected overall economic real wages. In this sense, the cost reduction extended to producing intermediate or final products derived from cereals, such as flour or bread. Additionally, the lower prices of cereals favoured livestock production costs, as cereals are commonly used as animal feed. The preferential treatment of livestock further accelerated productivity-enhancing structural changes within the agricultural sector. This is evident from the data, which shows that the period between 1880 and 1900, characterized by increased protection for livestock, coincided with the most rapid growth in labour productivity within agriculture.

Indeed, to arrive at a conclusive assessment, it is necessary to consider a counterfactual scenario with low protection for both livestock and plant-based agriculture. While the transition from the less productive agricultural sector was crucial for Switzerland's overall economic growth during the late 19th century, it remains uncertain whether a situation with minimal agricultural protection would have yielded more favourable outcomes.

Several factors come into play in this alternative counterfactual, where livestock and plant-based agriculture face reduced protection. Firstly, the shift towards more productive livestock-based practices may have been slower or less pronounced. Without the comparative advantage provided by protectionist measures, the incentives for farmers to invest in and expand livestock production might have been diminished. Secondly, the decline in plant-based agriculture could have been less drastic preserving some level of competitiveness for plant-based products, potentially leading to a more balanced agricultural sector. Thirdly, considering the potential

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<sup>13</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. I.24. [hssso.ch/2012/i/24](http://hssso.ch/2012/i/24)  
Value Added in the First Sector by “Branches” 1837–1945 (in Million Swiss Francs): Estimate of H. Ritzmann



impact on living costs in a scenario with cheaper imported livestock resulting from reduced agricultural protection is worth considering.

Yet, it is important to acknowledge the potential downsides of reduced agricultural protection. A significant challenge would have been the increased exposure to foreign competition, particularly in the context of a rapidly changing global agricultural market. In this sense, it must be kept in mind that the agricultural sector served as a significant source of employment. Further, between 1880 and 1888, the relative share of the second sector, which until then was the main source of employment for workers leaving the agricultural sector, even contracted slightly by 1.56%. The economic downturn in the 1880s, coupled with the decline of the textile industry, which previously provided labour for the surplus agricultural population, would have made job creation challenging to compensate for the rapid decline in the agricultural population.

It further appears unlikely that despite the success of the cheese and chocolate industries fostering local demand for livestock products (mainly milk production), would have generated enough demand to prevent an overall decline in livestock production. The previously important exportation of animals in livestock agriculture declined from 113,830 animals in 1880 to 20,300 in 1913. Cattle, dominant in animal exportation, dropped from 81,030 animals to 15,350 in the same time frame<sup>14</sup>. Nonetheless, real domestic value added from meat production grew by 79.5%, which hence must have been driven by increased domestic demand for animal products<sup>15</sup>.

In this sense, it appears plausible that high taxation on livestock production prevented a rapid decline in the meat industry and, as a result, successfully averted widespread unemployment or mass emigration from the agricultural sector, as was experienced in other continental countries during this period. Yet, the continuous increase in agricultural protection from 1897 to 1907, following the end of the economic crisis, appears to be perplexing from an economic standpoint and may have had adverse effects on Switzerland's overall economic development.

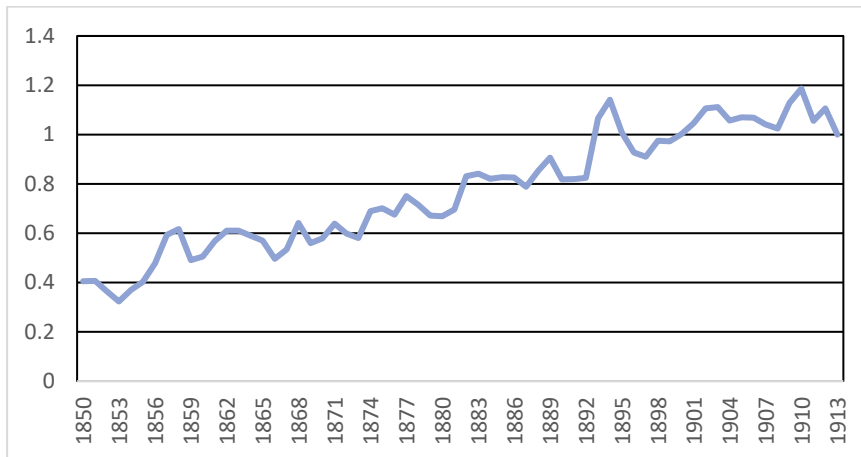
In this context, the protectionist measures implemented to safeguard animal husbandry can be perceived as a reasonably effective compromise to preserve agricultural employment from an abrupt decline while simultaneously stimulating productivity through incentivizing structural transformations within the sector. However, the persistent escalation of agricultural protection between 1897 and 1907, despite the conclusion of the economic crisis, warrants scrutiny regarding its economic justification and possible adverse effects.

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<sup>14</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. L.2. [hssso.ch/2012/l/2](http://hssso.ch/2012/l/2)  
Exports by Type of Goods and Export Volume Indexes 1851–1913 (in 1000 Hundredweights and Units)

<sup>15</sup> Historical Statistics of Switzerland HSSO, 2012. Tab. I.24. [hssso.ch/2012/i/24](http://hssso.ch/2012/i/24)  
Value Added in the First Sector by “Branches” 1837–1945 (in Million Swiss Francs): Estimate of H. Ritzmann

Figure 4-10: Price Ratio Meat/Cereals, 1913= 1 both



Source: author's computation with data from HSSO, 2012. Tab. L.2.

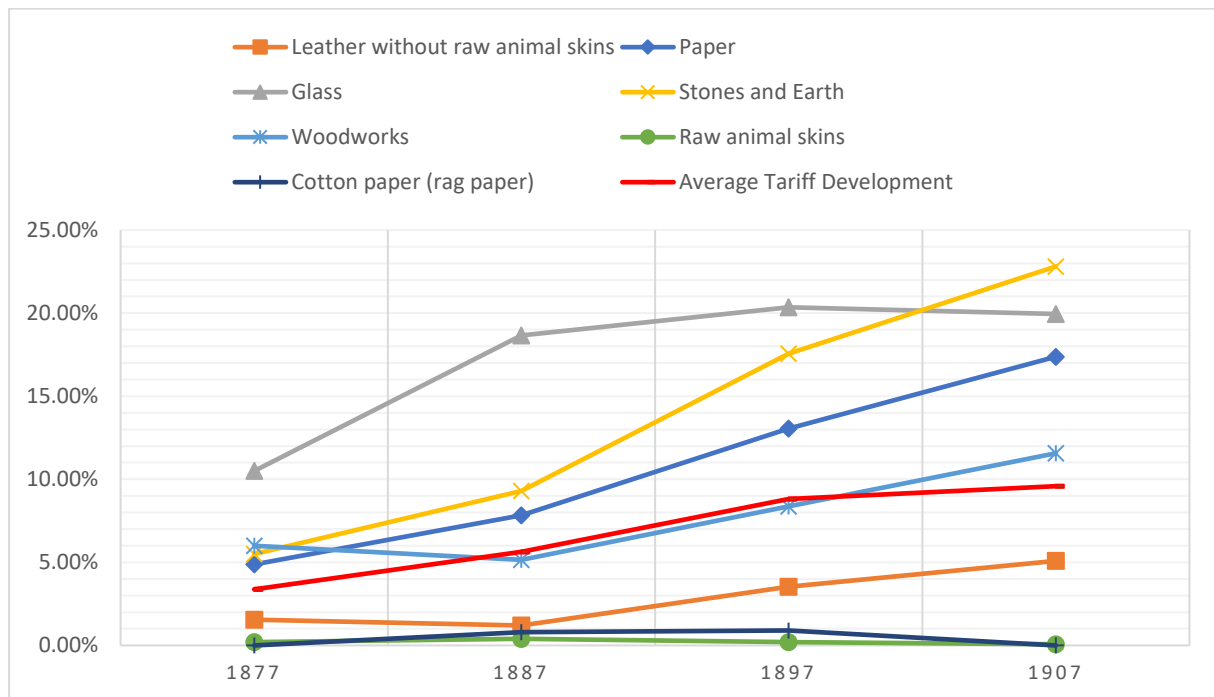
#### 4.2.5 Paper, Leatherwork, Glass, Wood, Stones and Earths

This product category encompasses a diverse range of goods, including those with a long production history preceding the industrial revolution. However, the onset of industrialization brought about significant changes in the production methods for several products, resulting in a heterogeneous group of goods. While some products, such as paper, glass, shoes (part of leatherworks), stones, and earths (mainly lime, cements, bricks, and pipes) were commonly produced in capital-intensive large-scale factories, others, such as leather products and woodworks remained primarily confined to artisanal small-scale production facilities (Hubler, 2015; Hürlimann, 2008; Keller, 2020; Stettler, 2008; Tschudin, 2010). As aforementioned, owing to the limitations imposed by incomplete data and this product group's inherent heterogeneity, I refrain from providing an analysis of the custom strategy's influence on structural and productivity development.

##### 4.2.5.1 Paper, Leatherwork, Glass, Wood, Stones and Earths: Customs Strategy

The present analysis of this products group suggests that the primary beneficiaries of the 1877 tariff were producers of glass, paper, wood, and stones and earth materials, such as cements, limes, bricks, and others. Conversely, craftsmen and small industrialists in the leather sector, such as tanners, shoemakers, and saddlers, were less protected. Between 1877 and 1907, these disparities became even more pronounced. The commonly large-scale producers of paper, glass and particularly stones and earths enjoyed a fast or even brisk expansion of protection on their products. On the other hand, woodwork and leather products did only moderately or even weakly expand in their respective protection levels. Yet, similarly as already observed for the textiles sector, the level of taxation on raw products, such as raw animal skins and rag papers, was continuously reduced. In summary, Swiss customs policies in this product group again favoured large-scale industrial producers over craftsmen and small industrialists, resulting in continued disadvantages for the latter group.

Figure 4-11: Paper, Leather, Glass, Wood, Stones and Earths ad Valorem Protection



Source: author's computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

## 4.2.6 Fiscal Goods

This particular product group encompasses a diverse range of goods, united mainly by the fact that they are subject to tariff-based taxation to generate revenue. However, it is important to note that distinctions must be made between domestic goods and those that cannot be produced within the country. Goods such as coffee, sugar, tea, and fats/oils fall into the latter category, and tariffs on these goods are primarily intended to raise revenue rather than protect domestic producers. Conversely, tobacco, wine, and other alcoholic beverages are domestically produced; thus, tariffs on these goods can serve fiscal and protectionist purposes. Considering this perspective, tobacco, wine, and other alcoholic beverages are also discussed within the “food-industry” category. As aforementioned, owing to the fact that these products are not typically produced in Switzerland, I refrain from analysing the custom strategy's influence on structural and productivity development.

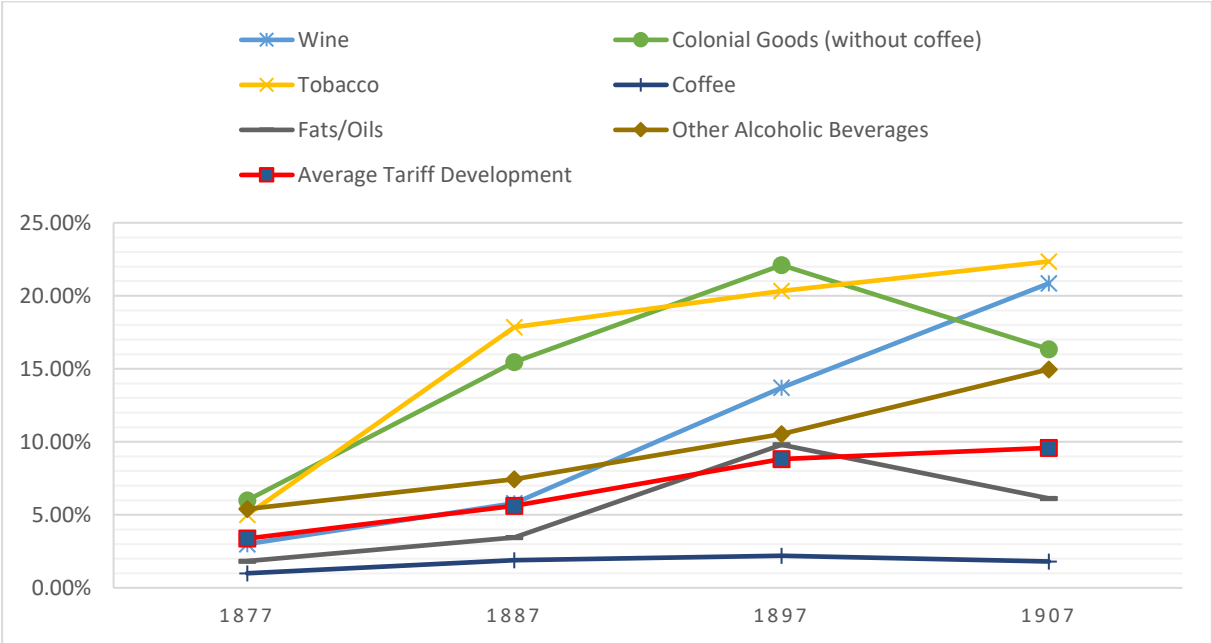
### 4.2.6.1 Fiscal Goods: Custom Strategy

It is noteworthy that the trend in taxation for fiscal goods tends to follow the financial needs of the federal government. Even though the overall expansion of tariffs on colonial goods and petroleum was fast at the beginning of the period, it decreased after 1897, which coincided with the end of the long depression. On the other hand, tariffs on domestically produced goods with a strong domestic “lobby”, such as alcoholic beverages and tobacco, increased steadily and were among the highest protected goods in 1907. These goods were traditionally produced and processed in Switzerland and played a significant role in the rural economy. An interesting

exception to this trend is the category of coffee, which was not subject to increased taxation despite being a typical colonial good. One possible reason for this is that coffee was considered a staple of everyday consumption, and raising taxes on it would have increased the cost of living.

In conclusion, while this product group may be characterized by its fiscal nature, there are substantial differences between goods that can be produced domestically and those that cannot. Protectionist tendencies can be observed in the steady increase in tariffs on domestically produced goods with strong domestic lobbies, such as tobacco, wine, and cider. However, the trend in fiscal goods taxation generally follows the financial needs of the federal government, with tariffs increasing during times of economic hardship and decreasing during periods of prosperity.

Figure 4-12: Fiscal Goods ad Valorem Protection



Source: author’s computation with data from (Humair, 2014, pp. 763–767). See descriptions in Chapter 3.1

### 4.3 Quantitative Analysis

Following the comprehensive analysis of the Swiss customs strategy involving a comparison of the levels of protection with developments in employment, real value-added, and productivity at a product group level, this final chapter seeks to evaluate a possible quantitative connection between the degree of protection and the economic development of various product groups on a national scale. This is a crucial aspect of the investigation as it enables the study to make inferences about overall trends and tendencies in the relationship between protection levels and economic development in Switzerland throughout the period under scrutiny.

It is important to note that the empirical results presented herein reflect a measurement of correlation rather than causality. Given that the independent and dependent variables are endogenous in nature, it cannot be assumed that the observed relationships are causal. Indeed, this study operates on the premise that Swiss custom policies were not a random occurrence but a deliberate intervention by the government. As such, the goal of this analysis is not to measure the specific quantitative impact of protectionism on the economic development of a given industry but rather to examine possible evidence that the Swiss custom policies had a strategic orientation toward the objectives of economic development and industrialization. In this notion, it would also not be sensual to control for possible other confounding factors.

Recognizing that the relationship between the level of protectionism and the economic variable in question may not be strictly linear, a squared variable will be introduced in a subsequent step. In the final stage, the quantitative analysis will address the potential bias arising from the overrepresentation of textile industry products in the selected sample. This precautionary measure is taken to avoid the findings being exclusively influenced by the trends and patterns observed within a single industrial sector. Accordingly, the model will incorporate a dummy variable for "Textiles" to adjust for this potential source of bias.

My quantitative analysis thereby has the following forms:

*Employment Growth*<sub>*i,t*</sub>

$$= \alpha + \beta * Protection_{i,t} + \beta 2 * Protection_{i,t}^2 + \beta 3 * Textiles_{i,t} + \delta * TFE_t$$

*Real Value Added Growth*<sub>*i,t*</sub>

$$= \alpha + \beta * Protection_{i,t} + \beta 2 * Protection_{i,t}^2 + \beta 3 * Textiles_{i,t} + \delta * TFE_t$$

*Labour Productivity Growth*<sub>*i,t*</sub>

$$= \alpha + \beta * Protection_{i,t} + \beta 2 * Protection_{i,t}^2 + \beta 3 * Textiles_{i,t} + \delta * TFE_t$$

Where dependent variables are given as a yearly average growth in percentage for product *i* in time period *t*. I further run pooled regressions with Time Fixed Effect (TFE) to account for a potential time effect in the growth of my dependent variables.

### 4.3.1 Results

Regarding employment growth, the analysis results reveal that the level of tariffs on a specific product in a given period is positively correlated with employment growth during the same period (Table 4-7, Column 2). Conversely, the squared variable of protection exhibits a negative association, indicating that very high levels of protection are linked to lower employment growth rates. Both independent variables are statistically significant at the 1% and 5% levels, respectively.

The picture is similar for real value added, whereas higher levels of protection are hence associated with greater growth in real value-added, although the correlation becomes negative

for very high degrees of protection as well. In this case, both independent variables are significant on the 1% level (Table 4-8, Column 2).

In terms of productivity, the results indicate a statistically significant linear relationship at the 5% level between the degree of protection and improvements in productivity (Table 4-9, Column 1). Unlike the previous findings on value-added and employment, there is no statistically significant evidence of a negative relationship between productivity growth and high levels of protection.

In the final stage of analysis, a control dummy variable for the textile industry was introduced to mitigate the potential bias towards this specific sector in the sample. The inclusion of this variable did not significantly alter the magnitude of the coefficients or the statistical significance of the independent variables in relation to both real value added and productivity growth. However, the control for textiles had a remarkable effect on the explanatory power of the customs level in relation to employment growth, rendering it statistically insignificant (Table 4-8, Column 3).

*Table 4-7: Relationship between Tariff Protection and Growth in Employment*

<b>VARIABLES</b>	<b>(1) Growth in Employment</b>	<b>(2) Growth in Employment</b>	<b>(3) Growth in Employment</b>
Tariff	0.00157** (0.021)	0.00599*** (0.004)	0.00282 (0.188)
Tariff_squared		-0.000214** (0.017)	-0.000134 (0.108)
Textiles			-0.0314*** (0.000)
Time Fixed Effecs	Yes	Yes	Yes
F-Statistic	4.10	5.01	8.73
Observations	55	55	55
R-squared	0.230	0.287	0.484

p-value in parentheses using robust standard errors  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*Source: author’s computation with data from HSSO and (Humair, 2014, pp. 763–767, See Chapter 3*

Table 4-8: Relationship between Tariff Protection and Growth in Real Value Added

<b>VARIABLES</b>	<b>(1) Growth in Value Added</b>	<b>(2) Growth in Value Added</b>	<b>(3) Growth in Value Added</b>
Tariff	0.00159 (0.228)	0.00935*** (0.000)	0.00857*** (0.000)
Tariff_squared		-0.000461*** (0.000)	-0.000439*** (0.000)
Textiles			-0.00970 (0.211)
Time Fixed Effects	Yes	Yes	Yes
F-Statistic	2.17	6.81	5.60
Observations	84	84	84
R-squared	0.098	0.210	0.227

p-value in parentheses using robust standard errors  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: author's computation with data from HSSO and (Humair, 2014, pp. 763–767, See Chapter 3

Table 4-9: Relationship between Tariff Protection and Labour Productivity Growth

<b>VARIABLES</b>	<b>(1) Growth in Productivity</b>	<b>(2) Growth in Productivity</b>	<b>(3) Growth in Productivity</b>
Tariff	0.00242** (0.015)	0.00461* (0.060)	0.00328 (0.227)
Tariff_squared		-0.000148 (0.221)	-8.66e-05 (0.534)
Textiles			-0.00989 (0.352)
Time Fixed Effects	Yes	Yes	Yes
F-Statistic	3.78	3.18	2.59
Observations	41	41	41
R-squared	0.318	0.329	0.346

p-value in parentheses using robust standard errors  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: author's computation with data from HSSO and (Humair, 2014, pp. 763–767, See Chapter 3

### 4.3.2 Interpretation

Due to the endogenous nature of the dependent and independent variables, two explanations of the found correlation between the level of protection employment and value-added are possible. Firstly, the pronounced positive linear correlation suggests that the Swiss government's protection strategy successfully stimulated economic growth and the creation and protection of employment. However, it could also be interpreted in the way that the custom strategy focused on protecting promising industries that already had, by their very nature, positive growth prospects. Interestingly, controlling for textiles only affected the explanatory power of the customs level concerning employment growth, rendering it statistically insignificant. This might imply that the positive effect of protective taxation on domestic employment was mainly driven by the textile industry and not significant for other industries.

On the other hand, the non-linear quadratic function's negative coefficient appears to somewhat contradict the findings of a generally positive protection effect on economic growth. One plausible explanation for this phenomenon is that high levels of protectionism may have encouraged firms to invest in labour-saving technologies, leading to a decline in overall employment. However, this explanation fails to account for the concurrent negative correlation between protectionism and value-added. Hence it is suggested that the Swiss custom strategy may have, in some instances, targeted industries with poor growth prospects in terms of employment and value-added with the highest levels of protection. Specifically, the protection of quickly declining sectors, such as certain parts of the textile industry or wine production, could have been examples of such a pattern.

In the final regression analysis, the relationship between the level of protection and growth in productivity was examined. It is worth noting that productivity or real value added per worker is a composite variable that represents the ratio between the change in employment and real value added. Therefore, for productivity growth to be positive, the change in real value added must exceed that of employment. A negative relationship with productivity growth would be expected if a protection strategy prioritized employment protection over fostering real value added.

However, the correlation analysis conducted reveals a positive relationship between productivity and the level of protection. This suggests that Switzerland directed its protectionist focus towards value-added growth-intensive industries rather than solely protecting employment. Nonetheless, it is essential to acknowledge that the productivity regression analysis was biased towards second-sector activities due to the lack of specific data from the agricultural sector. Therefore, caution must be taken when interpreting these results.

The interpretation of the magnitude of the correlation is since dependent and independent variables are in percentages relatively straightforward. In this sense, an increase of 1% in protection is associated with a 0.599% increase in employment (Table 4-7, Colum 2), a 0.935% increase in value added (Table 4-8, Colum 2) and finally, a 0.242% increase in value added per worker (Table 4-9, Colum 1).



## 5. Conclusion

As we reach the culmination of this comprehensive examination of Swiss customs development, it is incumbent to interconnect and interweave the various threads meticulously crafted throughout this analysis. Over the period from 1877 to 1907, Switzerland's customs regime underwent a notable transformation, transitioning from a homogeneous and evenly distributed fiscal system to a heterogeneous and targeted regime. This shift encompassed several key aspects, including the protection of intermediate and finished goods at the expense of raw products, the prioritization of large-scale industries, and the increasing emphasis on safeguarding livestock agriculture. These elements collectively contributed to the economic development trajectory of Switzerland during the examined period.

Finally, in order to elucidate the dynamics within the Swiss Custom System, it seems necessary to trace the threads back to where they are spun: the textile industry. From luxury silk production in Zurich and Basel to cotton weavers in eastern Switzerland, embroiderers from St. Gallen, printers from Glarus, and finally, Zurich's large-scale cotton manufacturers, the textile industry played a pivotal role in the history of the first Swiss industrialization. However, as the 1870s came to a close, the once-leading textile industry began to lag behind in the race of economic development. While their productivity suffered from an accumulated technological lag during previous good years, the long depression exacerbated competition and provoked a protectionist retreat throughout Europe. Swiss white gold and other textiles were chased away from external markets and even hunted down in their own lair, the domestic market.

In response to these challenges, interest groups, particularly those representing the domestically-oriented cotton industry, sought federal support to prevent the potential collapse of spinning mills within Swiss borders. However, the free trade tradition in Switzerland led to staunch resistance against protectionist measures. Trade representatives, banking institutions, export-oriented industries, and even the labour movement, as represented by the social democratic party, were reluctant to embrace protectionism due to concerns about international retaliation, increased living costs, and higher production expenses.

The textile barons resolved this resistance by collaborating with their old sworn enemies - the rural conservative peasantry interested in protecting their livestock production. This "alliance of cotton and cattle," in tandem with other prominent industrialists interested in state intervention, shook the federal state and gradually steered it away from the stagnant waters of Manchester liberalism. In 1884 and 1887, agreements were reached in the Swiss parliament, in 1891 and 1902, the newfound Protectionist League of Olten demonstrated its significant mobilization power, solidifying the new custom strategy through popular polls.

Yet, this unlikely alliance pushing for higher protection to secure a safe haven for their products might not have been necessarily diametral to the economic development of Switzerland. While it may appear challenging to estimate the exact magnitude and patterns of a counterfactual scenario based on free trade, it is crucial to consider the economic climate of the time, characterized by a prolonged crisis.

For example, the privileged protection of the cotton industry, aimed at averting a rapid decline of such, does not appear entirely unreasonable or detrimental to the country's economic development, whether driven by the preservation of societal stability or the rent-seeking interests of textile barons.

In the realm of agriculture, Switzerland's customs strategy provided several advantages. Implementing lower tariffs on cereals resulted in a reduction in living costs and promoted productivity-enhancing structural changes within the agricultural sector. In this sense, the protection of animal husbandry proved to be a practical trade-off between safeguarding rural employment, which still held significant importance during the examined period and economic development.

The customs strategy regarding the food industry displayed a more nuanced and product-specific outcome. Initial protectionist measures aimed at supporting large-scale chocolate manufacturers demonstrated a notable contribution to establishing and growing a prosperous export-oriented industry. Likewise, moderate protection policies such as cheese production did not hinder its engagement in international trade or disrupt its export capacity. Conversely, the extensive protection of wine appears to have had detrimental effects on Switzerland's industrialization endeavours.

Against the backdrop of emerging forces driving industrialization, a departure from Manchester liberal policies, which favoured the first wave of industrialization, became imperative. An organized capitalist approach was deemed necessary to support the ascent of machinery, chemicals, and selected food industries as the new driving forces of industrialization. The strategic implementation of moderate levels of protection on chemicals and machinery facilitated effective competition among domestic producers while allowing international competition to drive productivity gains crucial for export-oriented growth. The absence of high levels of protection on crude metallurgy production played a pivotal role in stimulating structural changes that fostered the emergence of more efficient and advanced forms of metallurgy, reducing raw material costs for manufacturing. And finally, the pursuit of access to European markets necessitated a departure from free trade policies in favour of a combative approach aimed at pressuring neighbouring countries to dismantle their protectionist barriers.

In contrast to the commonly held perception of Switzerland as a prime example of a highly liberal federalist political system characterized by limited intervention in customs matters, my research suggests that the reality is more nuanced (David and Mach, 2006; Dormois, 2006, p. 164). While Switzerland's absolute taxation remained relatively modest compared to other European countries, it would be inaccurate to classify Switzerland as a pure free trade economy. Instead, evidence suggests that the Swiss state actively shaped and promoted economic growth through its customs policies, exhibiting a complex and highly heterogeneous tariff structure that appeared to align well with its industrialization and economic development efforts.

## 5.1 Research agenda

Several qualifications and areas for further research emerge from the analysis conducted. Firstly, it is important to acknowledge the limitations of the branch-specific calculations used

to measure value added and productivity. The absence of linkage to benchmark production accounts raises concerns about the reliability of individual and aggregate value-added series. Future studies could establish direct connections between data sources, such as HSSO 2012/Q.1a and HSSO 2012/Q.17b, on a branch-by-branch basis and harmonise them with comprehensive employment data to create a more robust and structured dataset.

Secondly, the evaluation of effective protection has not been extensively explored in the Swiss context. This assessment would be particularly relevant for industries like textiles involving complex production processes and pronounced cascading effects. Investigating the effective degree of protection for different sectors could provide insights into the actual impact of protection measures on the economy.

Thirdly, the significance of mass migration in the late 19th century Atlantic economy has been widely examined in various countries. According to Williamson (1998), mass migration may account for up to 70% of the real wage convergence in the late 19th-century Atlantic economy (Williamson, 1998, p. 60). However, its specific influence on Switzerland's economic landscape has been relatively understudied in terms of concrete quantitative measurements. Considering the significant migration flows to and from Switzerland during that period, there is a need to delve into the intricate dynamics between custom policies, the dynamic composition of the labour force, and the subsequent effects of migration (Gruner, 1987).

Finally, a thorough examination of the underlying dynamics behind the Swiss alliance of "Cotton and Cattle" is warranted, as it presents an intriguing phenomenon. While alliances between agricultural producers and industrialists were commonly observed in other European countries, the convergence of the historically adversarial conservative livestock farmers and liberal urban industrialists in Switzerland appears relatively unique. Furthermore, the prevalent "run-for-shelter" trend among industrial producers, commonly observed in other countries, was not apparent in Switzerland. Contrary to many European states that employed a scattergun approach to tariff protection, Switzerland adopted a highly targeted and nuanced strategy tailored to specific privileged industries. Nonetheless, the overall level of customs protection remained comparably low from a global perspective.

To better understand the underlying factors contributing to Switzerland's distinctive approach in this matter, a thorough examination is required, considering various elements, including the country's political system, topographical considerations, historical developments, and pronounced federalism. Additionally, unlike in other countries where industrial protection often resulted from agricultural protection, Switzerland displayed a reverse pattern, wherein agricultural protection emerged from the textiles producer initiative. In this vein, exploring hypothetical scenarios, such as the absence of the cotton and cattle alliance, through the utilization of Computable General Equilibrium (CGE) models appears to hold value. Such analyses may yield insights into potential influences on Switzerland's economic development and illuminate the distinct roles played by various factors.

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## 7. Datasets

Historical Statistics of Switzerland HSSO, 2012. Tab. H.5. [hssso.ch/2012/h/5](https://hssso.ch/2012/h/5) - Wholesale Index by Goods (Product Price Indexes) 1800–1928: Animal and Vegetable Foods (1914 = 100)

Historical Statistics of Switzerland HSSO, 2012. Tab. F.10. [hssso.ch/2012/f/10](https://hssso.ch/2012/f/10) - Employment in the First, Second, and Third Sector by Branches and Cantons 1860–1960 (Excluding Part-Time)

Historical Statistics of Switzerland HSSO, 2012. Tab. F.2a. [hssso.ch/2012/f/2a](https://hssso.ch/2012/f/2a) - Employed Population by Sectors and Branches 1870–1960 (Excluding Part-Time) (in 1000)

Historical Statistics of Switzerland HSSO, 2012. Tab. Q.1a. [hssso.ch/2012/q/1a](https://hssso.ch/2012/q/1a) - Nominal and Real Gross Domestic Product and Gross Value Added by industry 1851–1913 (in Million Swiss Francs): Estimates

Historical Statistics of Switzerland HSSO, 2012. Tab. K.16a. [hssso.ch/2012/k/16a](https://hssso.ch/2012/k/16a) - Gross Production Value and Gross Value Added by Industry in the Second Sector 1851–1913 (in Million Swiss Francs): Estimates

Historical Statistics of Switzerland HSSO, 2012. Tab. I.24. [hssso.ch/2012/i/24](https://hssso.ch/2012/i/24) - Value Added in the First Sector by “Branches” 1837–1945 (in Million Swiss Francs): Estimate of H. Ritzmann

Historical Statistics of Switzerland HSSO, 2012. Tab. Q.17b. [hssso.ch/2012/q/17b](https://hssso.ch/2012/q/17b) - Gross Domestic Product (Production Approach) 1890-1960: Real Value Added in 1926/1929 Prices by Sector and Industry (in Thousands of Francs) Estimates of Ritzmann and David (Wirtschaftsgeschichte der Schweiz im 20. Jahrhundert)

Historical Statistics of Switzerland HSSO, 2012. Tab. L.2. [hssso.ch/2012/l/2](https://hssso.ch/2012/l/2) - Exports by Type of Goods and Export Volume Indexes 1851–1913 (in 1000 Hundredweights and Units)

# Appendix A

## All Tariff Positions

As percentage of total value (Ad valorem tariffs)					
Year	1877	1887	1897	1907	Difference 1877 to 1907
<b>Cotton</b>	<b>0.88</b>	<b>2.30</b>	<b>4.71</b>	<b>6.96</b>	<b>6.08</b>
Cotton excluding raw materials	1.00	2.83	5.81	8.70	7.70
Raw cotton	0.40	0.20	0.30	0.00	-0.40
Raw spun cotton	1.00	2.50	3.20	5.10	4.10
Raw cotton fabrics	1.00	2.30	8.50	4.65	3.65
Dyed cotton threads	1.00	2.85	4.15	6.75	5.75
Colored or printed fabrics	1.00	3.65	7.40	18.30	17.30
<b>Silk</b>	<b>0.13</b>	<b>0.27</b>	<b>0.49</b>	<b>1.23</b>	<b>1.11</b>
Silk products excluding silk cocoons	0.13	0.33	0.60	1.54	1.40
Silk cocoons	0.10	0.04	0.04	0.00	-0.10
Raw silk (spun)	0.10	0.03	0.05	0.15	0.05
Raw silk mouliné (plied or twisted)	-	0.07	0.15	0.30	-
Silk sewing thread (mouliné or plied)	0.10	1.00	2.00	3.60	3.50
Silk fabrics	0.20	0.20	0.20	2.10	1.90
<b>Linen</b>	<b>1.17</b>	<b>1.32</b>	<b>2.97</b>	<b>1.37</b>	<b>0.20</b>
Linen excluding raw materials	1.50	1.83	4.25	2.05	0.55
Flax. hemp. and raw and combed tow	0.50	0.30	0.40	0.00	-0.50
Linen thread	1.00	1.80	2.80	1.60	0.60
Linen fabrics	2.00	1.85	5.70	2.50	0.50
<b>Wool</b>	<b>0.68</b>	<b>1.85</b>	<b>4.68</b>	<b>4.31</b>	<b>3.63</b>
Wool excluding raw materials	0.83	2.18	4.67	4.78	3.95
Raw and combed wool	0.30	0.20	0.30	0.00	-0.30
Unbleached wool yarns	0.50	0.85	1.65	1.20	0.70
Unbleached wool fabrics	1.00	3.00	5.45	5.35	4.35
Wool blankets	1.00	2.70	6.90	7.80	6.80
Ready-made clothing	0.60	2.50	9.10	7.20	6.60
<b>Chemicals</b>	<b>1.46</b>	<b>4.28</b>	<b>6.78</b>	<b>7.01</b>	<b>5.55</b>
Drogueries	2.24	5.90	5.20	8.00	5.76
Pharmaceutical products	0.48	5.00	9.80	5.10	4.63

Perfumeries and cosmetics	0.82	10.75	16.25	7.15	6.33
Artificial colors derived from tar	0.79	1.45	1.10	1.50	0.71
Madder extract. Alzarine	1.58	1.25	1.50	2.80	1.22
Chrome green and yellow	2.50	2.30	4.70	12.50	10.00
Varnish	1.79	3.30	8.90	12.00	10.21
<b>Fats/Oils</b>	<b>1.83</b>	<b>3.45</b>	<b>9.80</b>	<b>6.13</b>	<b>4.29</b>
Common oil for the use of factories	0.50	1.20	1.70	0.60	0.10
Soap	2.00	2.50	9.80	8.30	6.30
Tallow candles	3.00	4.40	16.50	7.30	4.30
Petroleum	-	5.70	11.20	8.30	-
<b>All Metallurgy</b>	<b>6.14</b>	<b>5.20</b>	<b>7.21</b>	<b>8.21</b>	<b>2.06</b>
<b>Crude metallurgy</b>	<b>3.83</b>	<b>4.02</b>	<b>5.45</b>	<b>3.28</b>	<b>-0.55</b>
Sheet metal	2.50	5.05	9.40	4.55	2.05
Raw pig iron in ingots	5.00	1.20	1.20	0.90	-4.10
Rolled and drawn iron	4.00	5.80	5.75	4.40	0.40
<b>Processed Metallurgy</b>	<b>7.88</b>	<b>6.09</b>	<b>8.54</b>	<b>11.90</b>	<b>4.03</b>
Iron wire	3.00	7.30	10.50	11.30	8.30
Rough iron and steel works	14.00	5.00	9.55	13.10	-0.90
All kinds of wrought iron works	9.50	6.35	8.40	18.40	8.90
Ordinary cutlery	5.00	5.70	5.70	4.80	-0.20
<b>Machinery</b>	<b>4.00</b>	<b>5.92</b>	<b>7.80</b>	<b>9.13</b>	<b>5.13</b>
Machines	4.00	6.40	5.20	5.85	1.85
Other Machinery ( Rail, Agriculture)	4.00	5.80	8.45	9.95	5.95
Locomotives	4.00	3.40	5.60	6.90	2.90
Wagons	4.00	8.00	10.50	10.30	6.30
Agricultural machines and vehicles	4.00	6.00	9.25	12.65	8.65
<b>Metall &amp; Machines</b>	<b>5.07</b>	<b>5.80</b>	<b>6.21</b>	<b>7.03</b>	<b>1.96</b>
<b>Leatherproducts</b>	<b>1.28</b>	<b>1.04</b>	<b>2.86</b>	<b>4.08</b>	<b>2.80</b>
Leather without raw animal skins	1.55	1.20	3.53	5.09	3.54
Raw animal skins	0.20	0.40	0.20	0.07	-0.13
Ordinary leather	1.00	0.90	1.70	5.10	4.10
Ordinary leather goods	2.00	1.40	3.90	4.70	2.70
Fine workmanship (shoes)	3.00	2.30	7.10	8.55	5.55
Leather gloves	0.20	0.20	1.40	2.00	1.80
<b>Paper</b>	<b>4.88</b>	<b>6.42</b>	<b>10.62</b>	<b>13.90</b>	<b>9.03</b>
Paper without rag paper	4.88	7.83	13.05	17.38	12.50
Cotton paper (rag paper)	-	0.80	0.90	0.00	-
Wrapping paper	4.00	7.50	13.40	16.40	12.40
Ordinary cardboard	4.00	10.00	17.50	18.20	14.20
Printing and writing paper	6.00	5.80	10.10	13.80	7.80
Colored paper	5.50	8.00	11.20	21.10	15.60
<b>Glass</b>	<b>10.50</b>	<b>18.65</b>	<b>20.35</b>	<b>19.95</b>	<b>9.45</b>

Window glass	10.00	28.00	37.80	30.70	20.70
Bottle glass	10.00	15.30	20.00	19.40	9.40
Drinking glass	9.00	15.10	10.85	14.00	5.00
Mirrors and glass	13.00	16.20	12.75	15.70	2.70
<b>Stones and Earth</b>	<b>5.50</b>	<b>9.29</b>	<b>17.57</b>	<b>22.81</b>	<b>17.31</b>
Hydraulic lime	-	9.00	25.00	29.60	-
Portland cement	-	11.70	16.60	21.70	-
Cement works	-	5.00	24.00	23.20	-
Bricks. tiles	-	2.50	12.10	14.90	-
Pipes. culverts	-	11.40	15.50	36.55	-
Porcelain	5.50	16.15	12.20	10.90	5.40
<b>Woodworks</b>	<b>6.00</b>	<b>5.15</b>	<b>8.37</b>	<b>11.57</b>	<b>5.57</b>
Sawn cabinetmaking wood	2.00	1.00	2.90	5.60	3.60
Finished. coarse woodwork	6.00	5.90	11.50	14.20	8.20
Fine woodworking. furniture	10.00	8.55	10.70	14.90	4.90
<b>Tobacco</b>	<b>5.00</b>	<b>17.85</b>	<b>20.33</b>	<b>22.35</b>	<b>17.35</b>
Processed Tobacco	4.67	16.23	20.33	23.63	18.97
Loose leaf tobacco	6.00	22.70	20.30	18.50	12.50
Twist tobacco	6.00	22.00	31.30	36.60	30.60
Smoking and snuff tobacco	5.00	20.00	17.70	17.20	12.20
Cigars. cigarettes	3.00	6.70	12.00	17.10	14.10
<b>Beverages</b>	<b>4.71</b>	<b>6.98</b>	<b>11.44</b>	<b>16.65</b>	<b>11.93</b>
Wine in barrels	4.00	10.00	11.80	33.40	29.40
Wine in bottles	2.00	1.60	15.60	8.30	6.30
Cider	5.00	7.00	8.80	17.70	12.70
Beer	4.00	12.70	14.60	16.70	12.70
Hard Alcohol	6.00	5.85	9.75	13.48	7.48
Brandy in barrels	7.00	6.80	7.90	14.80	7.80
Bottled liqueurs	5.00	4.90	11.60	12.15	7.15
<b>Colonial Goods</b>	<b>4.75</b>	<b>12.08</b>	<b>17.13</b>	<b>12.70</b>	<b>7.95</b>
Colonial Goods (without coffee)	6.00	15.47	22.10	16.33	10.33
Coffee	1.00	1.90	2.20	1.80	0.80
Raw sugar	7.00	18.00	25.20	15.80	8.80
Refined sugar	7.00	20.40	31.10	25.60	18.60
Tea	4.00	8.00	10.00	7.60	3.60
<b>Food Products produced in Switzerland</b>	<b>2.87</b>	<b>4.00</b>	<b>10.30</b>	<b>5.68</b>	<b>2.82</b>
Cereals	1.00	1.40	2.00	1.45	0.45
Flour	2.00	4.00	9.10	9.60	7.60
Fine oils for the table	0.50	7.00	16.70	8.85	8.35
Cheese	3.00	2.20	3.20	4.95	1.95
Butter	0.30	2.40	3.20	2.50	2.20
Lard	1.00	1.50	7.40	4.30	3.30
Chocolate	4.00	6.00	11.10	12.00	8.00
Fine Fruits	8.00	4.00	32.50	0.00	-8.00

Salt	6.00	7.50	7.50	7.50	1.50
<b>Livestock</b>	<b>0.18</b>	<b>1.67</b>	<b>6.23</b>	<b>10.71</b>	<b>10.52</b>
Livestock excluding Goat/Horse	0.11	1.84	6.69	12.69	12.58
Veal	0.09	2.50	11.05	10.95	10.86
Young cattle. heifer	0.15	1.30	5.10	6.85	6.70
Cow	0.07	1.40	5.20	7.95	7.88
Bull	0.05	1.40	6.40	13.70	13.65
Fattened beef	0.04	1.00	3.00	4.60	4.56
Suckling Pig	0.13	3.30	11.10	36.80	36.67
Fattened pig	0.24	2.00	5.00	8.00	7.76
Goat	0.41	1.70	8.80	7.00	6.59
Horse	0.48	0.40	0.40	0.50	0.02
Pork	0.19	2.65	8.05	22.40	22.21
<b>Raw Materials for Textiles</b>	<b>0.33</b>	<b>0.19</b>	<b>0.26</b>	<b>0.00</b>	<b>-0.33</b>
<b>Intermediate Materials Textiles</b>	<b>0.87</b>	<b>1.79</b>	<b>3.83</b>	<b>4.27</b>	<b>3.40</b>
Wine	3.00	5.80	13.70	20.85	17.85
Other Alcoholic Beverages	5.40	7.45	10.53	14.97	9.57
Processed Milk Products	2.43	3.53	5.83	6.48	4.05
Veal and Beef	0.09	1.15	4.05	5.73	5.63
Other Meats	0.32	1.85	6.90	7.50	7.18
Rearing	0.09	2.15	8.44	17.35	17.26
Textiles	0.87	1.79	3.83	4.27	3.40
<b>Average Tariff Development</b>	<b>3.38</b>	<b>5.63</b>	<b>8.82</b>	<b>9.59</b>	<b>6.21</b>

# Appendix B

Table 1: Branch-Specific Employment Development Second Sector

	1870	1880	1888	1900	1910
Food Industry	6.68%	7.15%	8.31%	8.48%	8.44%
Clothes and Shoes	19.92%	19.38%	20.38%	18.96%	18.59%
Textile	34.61%	32.27%	31.55%	23.47%	21.91%
Cotton Industry	na	9.11%	8.26%	5.47%	4.72%
Silk Industry	na	11.67%	11.43%	8.36%	6.16%
Embroidery	2.76%	6.59%	8.50%	7.19%	8.86%
Machinery	1.91%	2.61%	3.13%	5.02%	7.01%
Metall	4.49%	4.17%	3.94%	4.67%	5.12%
Watchmaking, Biojoutery	7.73%	7.91%	8.31%	7.54%	6.53%
Construction industry	22.07%	21.09%	20.22%	26.61%	24.93%

*Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2*

Table 2: Branch-Specific Real Value-Added Development First Sector

	1870	1880	1888	1900	1910
Plant Production	41.77%	34.70%	27.12%	26.70%	15.10%
Plant Production national Level	16.16%	10.96%	7.31%	6.05%	2.57%
Cereals	13.20%	8.04%	4.90%	3.03%	2.54%
Wine	14.05%	9.21%	8.80%	6.11%	3.29%
Livestock	48.62%	55.94%	65.03%	65.07%	77.07%
Livestock national Level	18.81%	17.67%	17.53%	14.74%	13.10%
Milk Production	25.19%	28.06%	30.48%	29.94%	35.16%
Veal and Beef	10.02%	11.49%	14.52%	13.80%	16.01%
Other Meats	9.18%	9.26%	12.49%	14.06%	14.06%

*Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2*

Table 3: Branch-Specific Employment Development Third Sector

	1870	1880	1888	1900	1910
Commerce and Trade	32.22%	29.87%	19.12%	19.96%	20.53%
Financial Services	na	3.71%	3.27%	2.87%	2.50%
Hospitality	13.60%	16.42%	11.41%	15.19%	15.92%
Rail	3.22%	12.11%	6.39%	7.91%	8.74%
Public Services	21.33%	18.44%	12.90%	14.34%	15.46%
Freight and Post Service	6.37%	6.33%	5.01%	6.76%	6.89%
Healthcare	3.78%	3.06%	3.52%	4.18%	4.96%

Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2

Table 3: Branch-Specific Labour Productivity Growth

	METALLURGY	WATCHMAKING, BIOJOUTERY	CONSTRUCTION INDUSTRY	COMMERCE AND TRADE	FINANCIAL SERVICES (1880-1910)	HOSPITALITY	RAIL	PUBLIC SERVICES
1870-1880	7.93%	-6.61%	6.94%	1.07%	na	3.51%	-10.10%	1.85%
1880-1888	8.37%	7.36%	-2.30%	3.00%	0.79%	2.64%	8.70%	3.97%
1888-1900	4.09%	2.07%	3.10%	0.90%	4.16%	-2.70%	-0.07%	0.47%
1900-1910	2.89%	-0.30%	3.80%	0.71%	3.97%	1.37%	0.94%	-0.14%
1870-1910	5.58%	0.25%	3.11%	1.42%	2.21%	1.18%	-0.36%	1.52%

Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2

Table 4: Branch-Specific Labour Productivity Growth

	Food Industry	Clothes and Shoes	Textile	Cotton Industry (1880-1910)	Silk Industry (1880-1910)	Embroidery	Machinery	Metall and Machinery
1870-1880	4.93%	-1.43%	0.82%	na	na	-1.78%	-2.71%	1.44%
1880-1888	1.13%	7.68%	3.78%	1.31%	3.25%	5.64%	6.81%	8.20%
1888-1900	-1.14%	1.50%	1.44%	2.12%	0.25%	1.47%	3.19%	4.09%
1900-1910	0.10%	1.14%	0.24%	-3.93%	0.38%	1.15%	1.13%	2.07%
1870-1910	1.12%	1.87%	1.45%	-0.11%	0.81%	1.38%	1.87%	3.71%

Source: author's computation with data from HSSO, 2012. See descriptions in Chapter 3.2