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Strukturberichterstattung
Nr. 60/3

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Case studies on bread, yoghurt, and cured ham

Katja Logatcheva,[1] Michiel van Galen,[1] Bas Janssens,[1] Marie Luise Rau,[1] Willy Baltussen, Siemen van Berkum, Stefan Mann,[2] Ali Ferjani,[2] Mariana Cerca[2]

1 Wageningen Economic Research
2 Agroscope

In cooperation with Kees de Roest (CRPA), Torsten Sundmacher (Sustain Consult) and Christian Renault (AND International)

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Wageningen Economic Research
Wageningen, January 2019

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Summary

Several factors explain higher prices of food products in Switzerland compared to the neighbouring countries. These include costs for input goods, higher wages and higher profit margins at some stages of the supply chain. Other factors also play a role, such as preferences, labelling requirements, private standards and quality differences, but those are less quantifiable. The Swiss import tariffs system effectively prevents large imports of food products that are also produced domestically.

In the study commissioned by the Swiss State Secretariat for Economic Affairs, three exemplary domestically produced food products in Swiss supermarkets are taken for the assessment of the factors contributing to consumer price differences between the comparable products in the supermarkets of the neighbouring countries: 1) non-organic mid-price segment wheat bread in Germany, 2) non-organic, low-to-mid price segment plain natural yoghurt in France, and 3) cured Parma ham from Italy versus Swiss cured *Rohschinken.* In reality, the characteristics of the chosen products are not perfectly identical between Switzerland and the benchmark countries. Although the choice for a product with certain features determines the magnitude of the outcomes, the analysis is able to provide insights into the mechanisms that drive price differences.

Bread
In Switzerland, the consumer price difference for a kilo of non-organic mid-price segment wheat bread in the supermarket channel is about 3 CHF, which is about twice as high as in Germany. Tariffs are found to protect some unprofitable stages in the value chain (like mills). Tariffs make sure that imports of wheat and flour to Switzerland are not attractive. The relatively small (although increasing) share of bread imports can be explained by the perishability of bread and the Swiss consumer preference for freshness.

About 10% of price differences are explained by the higher costs of farming. The other part is explained by the costs and margins in the downstream of the supply chain. Milling hardly adds any costs. But both the bakeries and the retail in Switzerland account for almost half of the bread price difference due to higher labour and non-labour costs. Market concentration in the retail and vertical integration with supplying industrial bakeries is higher in Switzerland than in Germany. Higher retail profits in Switzerland explain over about 12% of the price difference with German bread.

Yoghurt
The consumer price difference for plain natural yoghurt between Switzerland and France is 0.38 CHF for supermarket level, non-organic, low-to-mid price segment yoghurt. The tariff regime is large enough to keep prices high and to effectively prevent all imports, except for the expensive end-products. The price difference at consumer level is mainly caused by higher costs at farm level and higher gross margins of the retail. Market concentration of the retail and vertical integration with supplying dairy manufacturers in Switzerland are more present than in France.

Cured ham
The consumer price difference for dry-cured ham for the case study between Switzerland and Italy is only about 10 CHF per kg, or 20% in the retail stage. The tariff regime is not large enough to prevent the imports of this product. Still, the retailers choose to sell domestic products as well due to factors such as consumer preference for Swiss products and transport costs. A high level of integration with the retail in the Swiss meat supply chain allows preferred supply of Swiss products to retailers. The higher pig farming costs in Switzerland explain about a third of the price difference at retail level. Although the costs added at the retail level are lower than in Italy, higher gross margins of the processing industry and higher operational profits of the retail (2.40 CHF per kg of cured ham difference), contribute to the higher consumer price in Switzerland.

1 Introduction

1.1 Background of the study

Switzerland is a small country that has enjoyed a remarkable long and continuous tradition of independence and political neutrality. The Swiss society perceives its agricultural sector as an important element in maintaining food security, and as a provider of highly valued positive externalities such as maintaining the environment and animal welfare. Hence, agricultural policies and related agricultural support are an important part of the Swiss political landscape (OECD, 2017).

Switzerland is a relatively open economy that is enclosed by European Union (EU) member states.[1] At the same time, there are significant differences in price levels. Prices of all goods are on average 33% higher in Switzerland than in the EU-15 in 2016 (PPP adjusted price level indices, Eurostat). For food products, prices differ even more, with a Swiss price level of 66% above EU-15 average. Especially meat is a lot more expensive in Switzerland than in e.g. Germany and Italy (see Table 2.1 on page 12). The openness of the Swiss economy is particularly related to non-food products. About a third of all Swiss exports were related to chemicals and pharmaceuticals in 2017 (Eurostat). Food products were about 2.2% of the export value, while the food industry made up about 10.6% of the production value of the Swiss manufacturing industry in 2017 (Eurostat).

An explanation and, most probably a precondition, for the persistence of higher prices is border protection measures. Border protection measures prevent potentially cheaper competing products from entering the market, and at the same time limit the size of the potential market for Swiss producers if exports are also restricted. Switzerland has been known for protecting its agri-food sector through border protection measures, both primary production and processing (see e.g. HTW Chur, 2014; OECD, 2015; Loi et al., 2016; OECD, 2017, and Preisüberwachung, 2016). Border protection reflects either a system of tariff rate quotas (TRQs) or single tariffs on agriculture and food imports. By maintaining a price differential between domestic and international prices, border protection stimulates domestic production, raising farmers' incomes compared to a situation without border protection. However, border protection also imposes significant costs on the Swiss economy by increasing costs for domestic consumers and intermediaries, reducing consumer choice and economic welfare, and constraining growth in less protected and more efficient sectors, including of agriculture (OECD, 2015; Loi et al., 2016; OECD. 2017). While the TRQ system generates rents, since domestic prices are higher than international ones, they are largely captured by the downstream sectors – and retailers in particular – for most products, as a result of an uncompetitive market structure in downstream parts of the supply chain.

Another factor that may explain higher prices for food products is a less competitive market structure (see for example Ciapanna and Rondinelli, 2014). In Switzerland, two companies, Migros and Coop together occupy over 80% of the Swiss retail market (based on IGD data). At the same time, oligopolistic market structures in food retail are found in most European countries with lower food prices as well (e.g. in the Netherlands with two retailers covering over half of the food retail market). The border protection measures may also instigate a more concentrated market structure for traded goods if it limits the size of the market. The optimum scale of e.g. processing companies may be such that a limited market size does not allow more than one or a few companies to be active on the market.

Next to border protection and market structure, the other parts of the country's agricultural policy may affect Swiss price levels of agri-food products as well. Swiss farms receive on average 22% of

[1] According to Worldbank data, trade was equal to 119% of Swiss GDP in 2017; similar to e.g. Serbia 114% and Latvia 122%, but less than e.g. the Netherlands 161% and Belgium 169%. Trade in food and animals was about 2.2% of exports and 3.4% of Swiss imports in 2017. About 50-60% of Swiss agri-food exports are sold on the markets in EU countries, whereas approximately 75% of Swiss agri-food imports are from the EU (COMTRADE).

their earnings as direct payments (Dux et al., 2017). At the production branch or enterprise level direct payments contribute up to 46% of the rape and 66% of the suckler cow earnings (Hoop et al., 2017). The total protection of agriculture is high in comparison to the neighbouring EU countries: the OECD calculates a Producer Support Estimate (PSE, which includes border protection measures) of 21% in the European Union (OECD, 2017:205) and 58% for Switzerland (OECD, 2017:156). This indicator is a monetary value of all transfers to agriculture from consumers and taxpayers, expressed as share of (gross) farm receipts. Transfers include measures like direct payments, price support and input subsidies, among others.

Subsidies may be deemed necessary to sustain production and livelihood of rural areas. The effects of subsidies in economic terms may, however, be that prices decrease as (compared to no-subsidies) domestic production increases. But at the same time subsidies may induce inefficiencies: farmers may spend more money on inputs than necessary because of the subsidies, hence actually subsidising input suppliers and increasing average costs.

Input goods and services are a major cost factor and some inputs are much more expensive than in neighbouring countries (BAKBASEL, 2014). Less or none-mobile factors of production explain part of the differences, but also restrictions on imports of inputs are causing prices differences, as well as inefficiencies in size, transportation, and other factors.

In 2017, the Swiss Federal Council decided the following in order to address these issues:

a) It decided to work on a proposal reducing tariffs on agricultural products that are considered as being not sensitive in terms of Swiss agricultural policy as part of a package of measures to ease imports in order to address the high price level.
b) It decided to investigate more closely explicit and hidden industry protection for processed agricultural products.

1.2 Goal

The main goal of the investigation of the Federal Council is *to determine to what extent industry protection as a result of border protection is contributing to the abovementioned price difference and what costs or benefits the border protection brings* to actors along the chain and other stakeholders.

This study for the State Secretariat for Economic Affairs (SECO) contributes to this goal by investigating price structures in selected supply chains in Switzerland and comparing prices of similar products at different levels in the supply chain with those in selected neighbouring countries. The comparison and analysis of key drivers of price differences shall reveal the underlying causes explaining the relatively high Swiss prices and the role of import protection in that.

In this study three value chains – i.e. the production, processing, distribution and sales (retail) activities, of bread, yoghurt, and dry-cured ham - and the prevailing market structures in each of these stages of the chain are investigated and the reasons for the price difference in each stage of the supply chain with a comparable product in a neighbouring country are identified. For this purpose the following questions are addressed:

- Where are the rents, being the additional value added, in the Swiss value chain as result of border protection?
- What impact (in qualitative terms) does the market structure have on the price in Switzerland and neighbouring countries (via economies of scale, bargaining power, etc.)?
- To what extent does border protection influence market structure and what role does the size of the market play (given the Swiss market is small)?
- Are there any other trade barriers or regulations which are driving up the prices of (imported) input goods and services or prices of the end product?

1.3 Method and study design

1.3.1 Selection of the cases and benchmark countries

Products for the case studies are pre-selected with involvement of the SECO Steering Group using a combination of the following criteria:

i. The importance of the product to Swiss agricultural production and/or processing
ii. The importance of the specific product to Swiss consumers
iii. The existence of import measures

The pre-selection resulted in the following products and (neighbouring) benchmark countries: wheat bread in Germany, plain natural yoghurt in France and dry-cured ham in Italy.

1.3.2 Method of analysis and study design

A desk study has been performed to determine the number of actors and their activities and performance, linkages between actors in the chain, prices along the chain, existing support measures, international trade, non-tariff barriers, innovativeness and product differentiation. For retail prices, semi-structured online and in-store checks are performed. In addition, face-to-face interviews with actors from all stages of the specific value chains in Switzerland and neighbouring countries Italy and Germany have been conducted. This information is referred to as information from the industry because almost all interviewees did not want to be mentioned explicitly in the report. For each case study the analyses were conducted in in cooperation with sector experts who also performed part of the interviews, as follows: Torsten Sundmacher (Sustain Consult) for bread, Kees de Roest (CRPA) for cured ham, and Christian Renault (AND International) for yoghurt. For bread Sustain Consult delivered a non-public report about the bread chain in Germany for comparison with Switzerland. In France, no interviews have taken place due to unavailability of value chain actors. French dairy chain expert knowledge is added to the information collected in the desk study for the French case.

The method of analysis results in a study design that entails a descriptive part of the value chain structure, followed by descriptive/analytical sections on the production, prices, and (input) costs, trade/retail and consumption in each of the case study value chains. Each final section of the case study chapters includes a causal-comparative research in which prices and costs differences along the supply chain activities are presented and explained.

1.4 Report outline

Chapter 2 gives an overview of the literature on the factors driving up prices in the food value chain. Chapter 3 to 5 comprise the case studies of bread, yoghurt and cured ham, all covering chapters that investigate the costs and prices and other related factors along the entire supply chain of the respective sector. Chapter 6 concludes our report by summarising the main findings of the cases and insights in the price difference of the aforementioned products between Switzerland and the benchmark countries.

2 Literature and policy review

The principal question for this brief literature review is 'what factors are driving up prices in the food value chain (in Switzerland)?' As a first step, a literature review was performed to explore what factors may cause prices to be higher, and what is already known. Given the available time, the literature search was initially restricted to scientific articles published since 2010 in English in Scopus (an abstract and citation database of peer-reviewed literature) in the fields of economics, social sciences, agricultural sciences, and business and accounting. Next, a few relevant, often cited articles were added to the Scopus' sample and the search in the scientific literature was complemented by a short web search of news articles and policy reports, and public data.

This chapter is structured according to the price-affecting factors referred to in the literature collected. In addition to the literature review, in Section 2.6 an overview of existing policies and regulations is given, as these also affect the relative cost of production and distribution as well as the market structure and competitive forces that may lead to differences in prices between Switzerland and neighbouring countries.

2.1 Consumer prices and incomes

Average incomes in Switzerland are among the highest in the world, both in nominal terms and in terms of (international) purchasing power (or standard of living). Studer (2008) shows that although the Swiss economy was already among the most successful around 1900 in terms of GDP, the main increase in wealth of the working people has materialised after the first World War. He argues that political stability and neutrality, and the presence of leading financial institutions, were among the main drivers for a higher standard of living. Weder and Weder (2013) identify early internationalisation, open and flexible markets and a high degree of competition as sources of economic success in Switzerland, in addition to political stability. In contrast however, the openness of markets does not apply to many agricultural products. For agricultural and food products, Switzerland is among the countries with the highest protection rates in the world.

In Table 2.1 the price level indices of Switzerland, Germany and Italy, compared with EU-15 averages are given. These indices are derived as the Purchasing Power Parities (PPP) for the respective product groups, divided by the nominal exchange rate. They reflect the true price difference between the countries. The PPP is the amount of domestic currency necessary to buy the same amount of goods as can be obtained by spending one unit of foreign currency in the foreign country. By dividing the product-specific PPP by the exchange rate, a measure of differences in price levels remains that is not linked to currency exchange rates. Note that the products included in the basket of goods to determine the price levels can differ per country. Differences in quality may therefore be included in these price level estimates.

The data show that in 2016 the price level in Switzerland was about 44% higher than in the EU-15 (and 54% higher than in the EU-28 (not in the table), while in France, Germany and Italy the general price level is much lower. The prices of food are relatively much higher than that of non-food products, especially traded non-food products. E.g. the prices of products like transport equipment, audio-visual and information processing equipment and electrical equipment are actually not much higher and in some cases even lower than those in the benchmark countries. Also. the prices of non-tradeable products and services are generally higher than those of traded products. Housing (and construction), hospital services, and education are relatively expensive, but gasoline and fuels and cars are not. This observation indicates that the higher price levels are specifically related to the tradability of goods.

Wages are also higher in Switzerland than in the surrounding EU countries. According to Eurostat, wages in industry, construction and services, were about twice as high in Switzerland than in the EU-

15 in 2012 (90.7 thousand CHF versus 43.9 thousand CHF).[2] Purchasing-power adjusted wages were about 46% higher in Switzerland than in the EU-15, with 60% difference for France and Italy, and about 30% for Germany. This takes account of differences in the price level and exchange rates. Higher average wages in industry, construction and services do not, however, mean that everybody earns more money in Switzerland. The average PPP adjusted household disposable income is only about 35% higher than that in the EU-28 as a whole, 37% higher than in Italy, 20% higher than in France and just 6% higher than in Germany.

Table 2.1 *Price levels in Switzerland and selected countries compared to EU-15, for a selection of products and services, 2016 (index, EU-15 average = 100)*

	Switzerland	France	Germany	Italy
Gross Domestic Product	144	103	99	92
Total goods	133	105	105	93
Total services	169	96	91	100
Food and non-alcoholic beverages	161	105	99	104
Food	166	106	99	105
Bread and cereals	157	107	96	112
Meat	221	117	107	103
Fish	167	108	109	106
Milk, cheese and eggs	144	92	88	119
Oils and fats	174	102	104	96
Fruits, vegetables, potatoes	153	111	106	97
Other food	143	100	94	106
Clothing and footwear	138	102	102	102
Education	201	97	81	92
Hospital Services	228	103	103	98
Housing, water, electricity, gas and other fuels	161	96	81	100
Electricity, gas and other fuels	100	113	111	89
Transport	118	101	96	101
Transport equipment	102	97	91	106
Households appliances	117	99	105	103
Audio-visual, photographic and information processing equipment	97	97	104	111
Machinery and equipment	110	99	96	102
Electrical and optical equipment	105	99	96	100

Source: Eurostat; Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind].

In terms of the total domestic product, the PPP adjusted differences in GDP per capita were about 30% to 70% between Switzerland and the benchmark countries. In current CHF the gross domestic product per capita was about 80 thousand CHF in Switzerland in 2017, compared to around 32 thousand for Italy and 44 thousand for Germany. The difference has become a bit larger in recent years due to exchange rate appreciation of the Swiss Franc against the euro. In purchasing power standards (in euros that would buy the same basket of goods in both countries) the differences are lower; 47 thousand PPS per capita in Switzerland versus 36 thousand PPS in Germany, and 30 thousand in France and 28 thousand in Italy, 2016 (Eurostat).[3] Still, it shows that the GDP measures of income leads to a larger difference than the wage measure.

Although average household disposable income per capita is twice as high in Switzerland as in the EU-15, actual purchasing power is only about 35% higher due to higher prices and the current high valuation of the Swiss Franc. Nevertheless, Swiss people indeed have higher incomes, and higher incomes generally lead to higher consumption levels for normal goods. Normal goods are either necessities or luxury goods. For necessities (like potatoes, bread, and milk) the increase in

[2] Eurostat; Labour cost, wages and salaries (including apprentices) by NACE Rev. 2 activity - LCS surveys 2008 and 2012 [lc_ncostot_r2], calculations Wageningen Economic Research.
[3] Eurostat; Main GDP aggregates per capita [nama_10_pc], calculations Wageningen Economic Research..

consumption is generally less than proportional to the income increase and consumption generally decreases if incomes increase further. For luxury goods (like oysters, caviar, expensive champagne) the increase in consumption is generally larger than the increase in income (income elasticity of demand is greater than 1). Another type of product (e.g. inexpensive and low-quality food products) may exhibit a negative response of consumption levels to income increases. These goods are inferior goods.

Engel's law says that an increase in income generally decreases the proportion of income spent on food, even if absolute expenditure on food rises. It means that food products are – on average – normal goods with an income elasticity between 0 and 1. Clements and Si (2018) investigate the relationship for 155 countries in 2011. The study converted incomes in national currencies to per capita consumption at PPP prices, where income is the total consumption expenditure (households, non-profits serving households and individual government) on 132 food and non-food items, deflated by the costs of living.

The authors find an inverse relationship between average income and the share of income spent on food. Switzerland ranks 7th in terms of income and the average food budget share was 9.5%. We find no exceptional position of Switzerland in this respect. The findings confirm that additional increases in income lower the food budget share by less than the increase in income. When incomes increase, consumers tend to buy higher quality and more diverse types of food. Swiss people do not eat a lot more kilograms of food than most other people in Europe, but they might buy higher quality food or more different kinds of food, with higher prices.

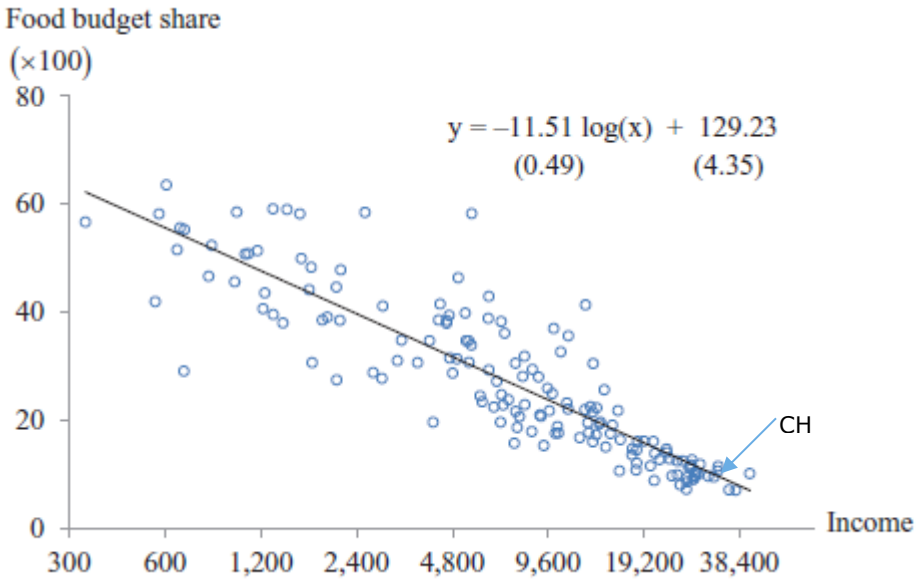


Figure 2.1 *Relationship between income in US dollar per capita and food budget share. Source: Clements and Si, 2018.*

2.2 Preferences of consumers and processors

Swiss consumers have the highest per capita expenditures on organic food. They spend 274 euros on organic food, which is high compared to e.g. Denmark (227 euros per capita) and Sweden (197 euros), the countries that are ranked second and third respectively. When the average food price differences are taken into account, the expenditures on organic food are more or less equal for these countries. Switzerland is the fifth largest market for organic food in Europe with 2.3bn euros sales, after Germany, France, Italy and the UK (FiBL, 2018). The market share of organic products in Swiss retail sales of food products was estimated at 8.4% in 2016 (FiBL, 2018; Götze et al., 2016). This shows that a relatively large number of Swiss consumers have a preference for organic products. The same holds for domestically produced products, which are also associated with high quality (Götze et

al., 2016). Götze et al. find among others that Swiss consumers prefer domestically produced organic products above imported ones.

Consumers in different countries may also react differently to price increases or price differences. Swiss consumers are price sensitive and do pay attention to the price premiums, according to Götze et al. (2016). However, the price premium only has a small effect on the level of the organic market share. This suggests that other factors than the price difference are also important in buying decisions. The findings by Götze et al. (2016) are consistent with those of Magnusson et al. (2001) and Kilcher et al. (2011) who find that consumers are willing to accept an organic price premium between 10 and 30% (on average).

The most recent literature on the relationship between consumer preferences for organic food and average food retail prices found is Yiridoe et al. (2005) that show that consumer prices of organic food products were about 10-40% higher than conventional products in Switzerland in 2005. This was in line with most other European countries the study lists. Recent data on Switzerland are lacking, but various studies in France[4] and the UK[5] reveal that organic products can be priced 80% and 90% higher than conventional products on average.

Processing companies may also have a preference for local sourcing, even when local supply is more expensive than imports. Based on qualitative interviews and surveys, Boesch (2014) derives product attributes for Swiss beef that determine the buying decision of processors. The latter form two distinct classes based on preferences. A smaller class emphasises traceability back to the birth farm and a low producer price, a larger class focuses on environmental effects and origin. Additionally, the study shows that larger companies are more price-sensitive and smaller companies are more sensitive to the origin of the animals. The results point at a segmented beef market where firms adopt differentiation strategies based on product characteristics.

The new 'Swissness' legislation that came into force on 1 January 2017, strengthens products produced/processed in Switzerland by the label of designation 'Made in Switzerland' and the 'Swiss Cross'. The label is applied domestically in Switzerland but is also enforced internationally by effectively fighting the unappropriated and wrong use under the Trade Mark Protection Act. Key criteria of 'Swissness' are for example that at least 80% of the weight of the raw materials used must come from Switzerland and essential processing steps should take place in Switzerland (Verordnung über die Verwendung von schweizerischen Herkunftsangaben für Lebensmittel).

2.3 Market integration

From a theoretical point of view, the law of one price states that prices of the same good on a perfectly integrated market will be equal. Remaining price differences may therefore – in theory – only reflect costs related to local specificities, such as transport costs in mountainous areas or differing value-added taxes (see: Lindenblatt and Feuerstein, 2015; Cecchini, Catinat and Jacquemin, 1988; Smutka et al., 2012). There are, however, also other reasons for sustained price differences than the ones mentioned above. For instance, retail prices include labour costs and profit margins (Lindenblatt and Feuerstein, 2015). Price differences for identical products are feasible as long as they do not exceed arbitrage costs (which may well be higher than mere transportation costs). Taking into account that retailing gives a value-adding service to consumers, arbitrage cost may be substantial (consumers may travel across border to do shopping but that applies to just a small part of consumers and the market as a whole) and price differences between retailers and between regions may persist over time even when all trade barriers have been removed (Lindenblatt and Feuerstein, 2015).

Price differences between (and even within) countries may also persist because of different mark-ups at the retail level, and the same holds for business-to-business transactions as long as products are

[4] https://www.quechoisir.org/action-ufc-que-choisir-fruits-et-legumes-bio-les-sur-marges-de-la-grande-distribution-n45900/

[5] https://www.foodnavigator.com/Article/2016/01/28/UK-shoppers-pay-89-more-for-organic-food-survey

not homogeneous. Bliss (1988; in Lindenblatt and Feuerstain, 2015) suggests that mark-ups to cover overhead costs will be set according to Ramsey-taxation rules, leading to higher mark-ups for goods with a lower elasticity of demand (i.e. demand does not change much following price changes). Consequently, retail prices for individual products will vary within a group of countries as long as demand patterns – and therefore elasticities of demand – differ, even in competitive markets. Such differences in product-specific profit margins can explain long-run price differences for individual products.

Relevant for price comparisons between Switzerland and the EU is the changing composition of the Union over time. Lindenblatt and Feuerstein (2015) explain that after the accession of 8 new member states into the EU in 2004 two countervailing effects on the average price level in the EU took place: at the one hand, competition increased in these countries and prices were lowered as a result and on the other hand a catching-up effect in the wages increased prices through the Balassa-Samuelson effect.

Another factor causing price differences between countries is related to non-tariff measures affecting trade which may include import licensing, customs administration, inspection certificates, phytosanitary checks and restrictions and other regulations (see e.g. Ghazalian et al., 2011). The recognition of inspection certificates may e.g. be an important lowering of trade costs, which may even be a larger gain from regional trade liberalisation than lowering tariffs, as was the case in NAFTA and CUSFTA agreements on the exports of beef and pork from Canada to the US (ibid).

Kohler and Ferjani (2018) study the effects of exchange rate changes on demand for Swiss agri-food exports. The authors find a relatively inelastic foreign demand for Swiss food products. This suggests that on average, no close substitutes for Swiss agri-food products are available to foreign customers. One explanation could be that Swiss producers are able to successfully differentiate their products based on quality (differences) and thus, avoid price competition abroad. The authors refer to Swiss agricultural policies that stimulate the sector to follow a quality-based strategy (labels and financial support of innovative projects). This study confirms that Swiss agri-food products have differentiated characteristics which may be a factor determining price differences of Swiss products compared to foreign.

2.4 Market structure and market power

The pricing behaviour of firms is affected by many factors, including input prices, costs, and also competition. The research of the relationship between pricing and market structure is fundamental to the study of industrial organisation and imperfect markets. It dates back to the origins of industrial organisation and most specifically the Structure-Conduct-Performance paradigm (or Bain-Mason paradigm) which postulates a relationship between the number of firms active in a market (or another measure of concentration), the conduct of the firms on the market, and their performance and includes feedback loops to also explain market structure from conduct and conduct from performance. A major implication is that firms may not be tempted to engage in price competition if the market structure is very concentrated (see Tirole, 1988). Changes in prices that competitors charge can influence a retailer's (or other firm's) profits by luring consumer away to the competition (Volpe et al., 2017). In general, supermarkets respond to one another's price changes (Dickson and Urbany, 1994; Leeflang and Wittink, 1996), but other factors like input prices are also important. Nijs et al. (2007) found that competitive pricing accounts for only 5.5% of retail price variation. Pesendorfer (2002) and Volpe (2013) studied competition in promotional prices, which are necessarily price decreases.

Industrial organisational theory suggests that concentration is inversely related to overall price competition (Volpe et al., 2017; Smith, 2004; Ellickson, 2006; Kopalle et al., 2009). This observation is linked to the longstanding empirical generalisation that food prices and market concentration are positively related (Connor and Peterson, 1992).

2.5 Price transmission

One of the extensively researched questions related to prices in food value chains is the extent to which price (and cost) changes are transmitted through the supply chain, i.e. vertical price transmission (Frey and Manera, 2007; Meyer & Cramon-Taubadel, 2004). This relationship is important from several perspectives. First, changes in prices at different points along the marketing chain may have important consequences for the welfare of consumers and/or producers and are thus of concern to policy-makers (Sexton and Lavoie, 2001). Second, in line with long-established arguments, prices convey information about scarcity (Hayek, 1945; Stiglitz, 2000). As a consequence, investigating price movements along the marketing chain could be relevant to understanding whether resources employed in agri-food production are allocated efficiently. Third, the analysis of transmission of commodity price changes through to retail food prices can be informative for the discussion about price competition in the food sector and therefore of interest to competition authorities (McCorriston, 2002).

Some general conclusions from price transmission research in food supply chains is that prices generally react, but there might be asymmetries (specifically that price increases transmit faster and more complete than price decreases) and that local circumstances are behind these asymmetries. However, although a large amount of studies have been performed on price transmission of a broad range of products in many countries, the reasons for asymmetric price transmission remain largely unidentified. The findings from the review study of Bakucs et al. (2014) about the relationship between market structure and price transmission in the agri-food sector suggest that price transmission asymmetries are more likely to be found when farmers' bargaining power is low, i.e. when farmers are fragmented and small instead of more concentrated. And further, the results suggest that those sectors that get more political attention tend to have more symmetric price formation. Moreover, the authors also refer to studies showing a positive influence of retailers' market power as measured by a seller concentration index on symmetry of price transmission. For instance, asymmetric price transmission can also result from search costs (Miller and Hayenga, 2001). In such cases, customers, although having a finite choice of competing retailers, may not be able to find relevant price information because of search costs, enabling retailers to exercise local market power.

Other reasons for asymmetric price transmission include the so-called 'menu costs' argument (i.e. costs occurring with the re-pricing and the adoption of a new pricing strategy (see, for example, Bailey and Brorsen, 1989; Levy et al., 1997). Ray et al. (2006) e.g. show that at the wholesale level asymmetric price adjustment 'in the small' occurs for goods characterised by inelastic demand. This means that wholesalers are more inclined to quickly increase prices if their input costs increase a little bit, than they are to decrease prices when their input prices decrease. The reason is that retailers' menu costs do not cause retailers to adjust prices if price change are small. When wholesalers increase their prices this means a higher profit for the wholesalers; enforced by the fact that retailers do not adjust their prices and hence demand is not affected. When wholesalers decrease prices, however, profits are even more affected if retailers do not adjust prices accordingly because demand is not increased by a price decrease.

2.6 Food, agricultural and trade policies

The conditions of agri-food production and thus prices are first of all determined by domestic regulations in the respective countries that apply to the agri-food sector, next to trade policies. For the agri-food sector, these are the domestic regulations for agri-food production and processing. Across the EU member states, the agri-food regulations are by large harmonised such that EU regulations equally apply in all EU member states. Note that there can however be differences given the sovereignty of the EU members and the rule of subsidiarity for certain aspects that are best tackled at the national and/or even local level. In this case, the EU rules are defined in directives that set the goals of the regulations to be met by the individual policy measures that the EU member states choose to implement for the respective issues.

2.6.1 General food law

In Switzerland, a new General Food Law came into force in May 2017. With the revision, Swiss food regulations have become closer to those of the EU: Swiss and EU food law have become more alike with the same standards and requirements after Switzerland amended its food regulations towards and, in some instances, even harmonised them with the EU. The main changes have been:

- the abandoning of the 'positive list' principle. Now all food stuff is permitted which is not explicitly forbidden.
- stronger reliance on the principle of self-control.
- alignment with EU legislation except for declaration of origin.

Both the EU and Switzerland apply the obligation of self-control for businesses, with Switzerland introducing this principle in 1995 and the EU in 2002. Self-control means that business operators ensure their satisfactory control at all stages of production, processing, and distribution of foods and commodities, in particular regarding health protection, the protection against fraud, and the hygienic handling of food and commodities. This refers to the application of good manufacturing procedures, quality management systems according to the HACCP, traceability and the obligation of withdrawal and recall of unsafe food.[6]

Risk-based inspections are carried out both in Switzerland and the EU countries. After the introduction of the new General Food Law in Switzerland the frequency of inspections has been harmonised between cantons.[7] Non-compliance will lead to more and more stringent inspections, e.g. hygiene control, which will be immediately enforced and costly.

New regulations are introduced regarding novel food and food supplements for which authorisation procedures will remain in place, like in the EU. The changes can be considered being a consolidation of Swiss law. As summarised by Leatherhead Food Research (2017), the general rule for the requirements is a combination of Swiss and EU law: where the maximum levels are not covered in EU legislation but are established in the current Swiss law, the national provisions will be maintained. This means that the Swiss law remains stricter in some situations.

In the interviews with the sector experts, (origin) labelling requirements have been identified as different between the EU and Switzerland. Other requirements address societal concerns. In general, governments use control and command measures but may also use subsidies in order to provide monetary incentives and reimburse farmers and producers for producing certain products in a certain way that is acceptable for society and that does not have negative effects, or farmers are reimbursed in other ways for providing public goods and other goods that have a value to the society as a whole. In a comparison between Switzerland and EU countries, for example, Baur and Nitsch (2013) state that there are a large number of different regulations for the environment and animal welfare relevant for the agri-food sector that could be compared. For their detailed analysis, they however concentrate on a certain subset of regulations that are of particular relevance. Such a focus makes sense and we thus take their comparative analysis and summary as the basis for our comparison with the focus on the cases under review.

2.6.2 Labelling requirements

The labelling of food is regulated in the EU by regulation 1169/2011, and in Switzerland by the Ordinance of the Federal Council on Foodstuffs and Utility Articles (LGV SR 817.02) and the Ordinance of the Federal Department of Home Affairs on Information of Foodstuff (LIV SR 817.022.16). With the Swiss revision of food law in 2017, transitional measures have been established for labelling of foods placed on the market up to 2021, which constitutes a transition period of up to 4 years.

[6] For further details see the Swiss website https://www.admin.ch/opc/en/classified-compilation/20101912/index.html and the EU website of the general food law https://ec.europa.eu/food/safety/general_food_law_en

[7] https://www.blv.admin.ch/dam/blv/de/dokumente/lebensmittel-und-ernaehrung/rechts-und-vollzugsgrundlagen/lebensmittelrecht2017/lebensmittelrecht-2017-wichtigste.pdf

The major differences between the Swiss and EU labelling requirement are with regard to the contents and presentation of nutrition information, the origin labelling, information on allergens, and some additional mandatory information for specific products (for instance for eggs). The stricter regulations concerning the indication of the country of production and the origin of raw materials on food remained in Switzerland after the revision of the Swiss food law, and despite the application of mutual recognition.

- Obligation to indicate the country of production or provenance in Switzerland exists for all food (Art. 36 para. 1 Bst. e LGV SR 817.02). Furthermore, the indication of origin of the primary ingredient is also mandatory. In Switzerland, e.g. on the packaging of yoghurt, there will usually be a reference to 'made with Swiss milk', or 'milk (Swiss)' in the list of ingredients. For Swiss meat used as a primary ingredient (equal to or greater than 20% by weight), its origin has to be indicated In the EU, for beef (both unprocessed beef and beef products), mandatory origin labelling (birth, rearing and slaughter) has been in place since 2002.[8] Origin labelling is also mandatory for a number of other products, including fresh fruit and vegetables, eggs, honey, and since 2015, the country of origin or place of provenance needs to be indicated for fresh, chilled and frozen meat of swine, sheep, goats and poultry.[9] But that does not apply to cured ham which is not considered a fresh meat product. However, for Parma ham, the origin of the meat is limited to Italy anyway. For most other products, origin labelling is not mandatory. However, when the name of the product, or the information on the label or the label as a whole implies a certain origin or provenance, it is mandatory to indicate the origin of the main ingredient on the packaging. In a number of EU countries, including France and Italy, in 2016-2019 experiments were conducted with mandatory country of origin labelling for among others milk and milk products. Many dairy products in France, including yoghurt, currently have a reference to the origin of the milk on the packaging. The results of the pilots are not published yet.
- The provision of information of allergenic ingredients mixed without content (Art. 11 para. 5 LIV SR 817.022.16) is mandatory in Switzerland but not in the EU. However, the EU recommends to provide this information, which is why many producers provide this information voluntarily. In such a case no additional costs occur for imports.
- Furthermore, there is no harmonised regulation regarding voluntary references to production without genetic engineering, since there are no harmonised regulations in the EU either (Art. 7 para. 8 VGVL SR 817.022.51).
- Finally, there are product-specific differences in the EU labelling regulations, which are laid down in the Agricultural Declaration Ordinance (LDV SR 916.51). This includes the declaration of table eggs from chicken in cages not permitted in Switzerland (Art. 2 Para. 4 Letter b No. 2) as well as meat, meat preparations and meat products from type of farming not permitted in Switzerland (Art. 2 Para. 4 Letter b No. 1).

Some studies have been conducted that identify the costs of country of origin labelling (EC, 2013; Baltussen et al., 2014). The costs of mandatory origin labelling depends to a large extent on the degree of processing, the sourcing of the products, and the specific requirements (depending e.g. on whether the information only applies to the country of slaughtering, or also of birth and rearing, and whether it applies only to the main ingredients or all ingredients). In Baltussen et al. (2013), the additional costs of mandatory origin labelling of fresh, chilled and frozen meat of pigs, with an indication of the country of rearing and slaughtering, was estimated at just 2.3% of the total production costs. At the same time, the additional costs for individual firms can be much higher. For milk products, Baltussen et al. (2014) estimate an additional cost ranging from 0 to 8% of the production costs of milk. In EC (2013) the additional costs for the meat products manufacturers is estimated at 15% to 50% of the production costs, depending on the type of meat and the stage of the supply chain. In general, the costs depend on the type of origin labelling: indication of country of birth, rearing and slaughtering, or just country where the ingredient was obtained or the country of the last substantial transformation of the meat ingredient; and the degree of processing (simply

[8] Regulation (EC) No 1760/2000 of the European Parliament and of the Council of 17 July 2000 establishing a system for the identification and registration of bovine animals and regarding the labelling of beef and beef products and repealing Council Regulation (EC) No 820/97 (OJ L 204, 11.8.2000, p. 1).
[9] Commission Implementing Regulation (EU) No 1337/2013.

prepared like mechanically separated, meat products, or multi-product food products with meat as just one of the ingredients). These costs refer to the introduction of a mandatory country of origin labelling in the EU. Labels for other information are not looked at in the aforementioned study, and other studies on these labelling costs have not been found. In general, differences in labelling requirements constitute barriers to trade as re-labelling adds to the costs of supplying foreign market.

For this study, however, it is noted that the products under consideration - bread, yoghurt and cured ham - are either not much traded due to the Swiss system of tariff rate quotas (see Section 2.5.5). For bread, for example, the country of origin labelling requirements differ (not required in EU, mandatory in Switzerland. The same holds for the ingredients: For bread, imports of wheat and wheat flour are limited but increasing strongly.[10] Despite the increase, the different labelling requirements in Switzerland might cause trade costs, thereby keeping foreign products out of the Swiss market and hence protecting domestic products.

2.6.3 Environmental regulations

For environmental requirements, we consider the EU as one entity in order to provide an overview rather than looking at the requirement implemented in the different countries for the three cases. As mentioned, the EU brings about EU regulations but the members translate the EU law into their own legislation, whereby the EU law becomes part of the national legislation of the EU member states. As mentioned, the EU uses directives for some rules that allow for some interpretation in the application at the level of the member states, like for example environmental regulations that should reflect the local specificities of the member states while achieving the common goal set in the directive. Using the comparison by Baur and Nitsch (2013), the environmental requirements in Switzerland have not been found to be stricter than the environmental requirements of the EU.

However, cross-compliance, i.e. the proof of ecological performance in terms of adopting environmentally friendly production methods that ensures the support payments, can be considered as being stricter in Switzerland than in the EU. In particular, Switzerland's cross-compliance comprises a compulsory appropriate proportion of ecological compensation areas, rational use of fertilizers, crop rotation, soil protection, economic and specific use of plant protection and treatment products and animal welfare measures. The aim of the direct payments in Switzerland is to compensate farmers for the multi-functionality of agriculture, rather than controlling the production output. In the EU, one main aim of the direct payments is to keep farming in place throughout the EU territory by supporting and stabilising farmers' income, thus stimulating economic activity, indirectly helping to support growth and jobs and contributing to the vitality of rural areas.

2.6.4 Animal welfare

Baur and Nitsch (2013) compare the animal welfare requirements in Switzerland and EU member states. They find that animal welfare requirements are stricter in Switzerland than in the EU. For example, the space required per animal is larger than in the EU, and also requirements with regard to buildings are higher and thus compliance can be expected to be more costly. However, there are specific programmes that support farmers to meet certain animal welfare standards, both public and private sector initiatives. In this case, farmers get reimbursed by support within the respective programme and/or they receive a price premium for the products that they produced in an 'animal friendly way'.

2.6.5 Trade-related policies for agri-food products

With the alignment to the EU food law, a product can be sold if it is safe and complies with the Swiss General Food Law. This means that Switzerland applies the mutual recognition principle that is used within the EU since the 'Cassis de Dijon' case in 1979. This will make importing from the EU members easier. The application of the 'Cassis de Dijon principle' for foodstuffs is subject to specific provisions (authorisation process) and exceptions when the public interest is at stake, such as concerns over

[10] https://www.blw.admin.ch/blw/de/home/markt/marktbeobachtung/brot-und-getreide.html

public health, animal and plant health or life. Being particularly sensitive products, however, foods are subject to special regulations: food that is produced according to the EU regulations and that is lawfully marketed there and does not conform to the Swiss Foods Act are subject to approval (SECO, 2016).[11] If the food concerned does not pose a risk to the health and safety of consumers, and the product information requirements are met, the approval (general ruling) is granted.

Before being placed on the market for the first time, foodstuffs require a permit from the Federal Office for Food Safety and Veterinary Affairs (Art. 16c and 16d Federal Act on Technical Barriers to Trade (SR 946.51) as well as Art. 4-11 of the Ordinance on the Placing on the Market of Products According to Foreign Regulations (SR 946.513.8). The first import of such food requires an authorisation of the Federal Office of Public Health. This authorisation will be granted in the form of a general decree and is valid for all food of similar type. The authorisation is granted in the form of a general ruling and applies to all similar foodstuffs.

The authorisation of imports into Switzerland has been perceived as a technical barrier to trade and obstacle that added costs to Swiss agri-food producers, thereby potentially adding to prices. For example, BAKBASEL (2004) investigated inputs used in Swiss agri-food production and found technical barriers to trade being main factors that explain additional costs due to the specific registrations required, the associated formalities, time spent on administration and certificates. According to the study, these factors were a major reason for price differences for agri-food production in Switzerland and in EU member states. With the new provision in the Swiss General Food Law, the Federal Council has so far pursued the strategy of harmonising the requirements for the content of the product labelling as far as possible with the EU. The country of production for processed foods can also be indicated as a higher geographical area such as 'EU' or 'South America'. This can be considered as being the major facilitation under the new food law. The other divergences mentioned in Section 2.5.2 remain. However, various requirements are still different from the EU, compare Section 2.5.2. These requirements have to be fulfilled to enter food products on the market (also if the products is brought into the market via an authorisation through the cassis de Dijon principle).

With regard to trade policies, Table 2.2 presents the tariff rates applied in the EU and Switzerland. For all EU members the same tariff applies and hence we do not differentiate between the EU countries under review. As shown, the tariff rates are specific tariffs expressed as CHF/100kg, rather than ad valorem tariffs. The tariff rates for cured ham and yoghurt are out of quota tariff rates, and they are prohibitively high, as expected given the function of limiting the quantities of product imported. The rates for wheat and bread are also rather high. Grain for bread (under tariff headings 1001.9921, 1002.9021, 1007.9021, 1008.1021, 2921, 4021, 5021, 6031 and 9023) is traded in accordance with the Swiss Ordinance on the Importation of Agricultural Products (Agricultural Import Ordinance, RS 916.01). The TRQ system covers a number of basic agricultural and food products, in particular meat, milk products, potatoes, fruits, vegetables, bread cereals and wine (OECD, 2016). In general, TRQs are only released to supplement domestic production with imports when there is a shortage on the domestic market (Loi et al., 2016). TRQs are administered in different manners, such as auctioning; requirements on domestic purchases; historical imports; first come, first served; for details see Loi et al. (2016). For example, the tariff rate quota for bread is used by applying the 'first come, first served' principle. The quota granted amounted to 70,000 tonnes in the last years, and imports generally remained within the quota, with some years with higher imports.

Trade with the EU in general takes place under the free trade preferential agreement, as defined by the Swiss Free Trade Ordinance 1.

Table 2.2 *Tariffs and quotas for the products: bread, ham and yoghurt*

Product group	Product	Tariff number	Tariff	Unit
Wheat and bread	Wheat, for human consumption, within quota	1001.9921	18	CHF/100kg
	Wheat, for human consumption, outside quota	1001.9929	40	CHF/100kg
	Wheat flour	1101.0048	50.70	CHF/100kg
	Bread	1905.9039	38.40	CHF/100kg
Cured ham	Cured ham, unboned	0210.1999	935	CHF/100kg
Yoghurt	Yoghurt	0403.1099	686	CHF/100kg

Source: https://xtares.admin.ch/.

2.6.6 Support measures and subsidies

Agricultural and trade policies can have significant effects on domestic and even international price levels. Typically, farmers price support may both lift the domestic price above international prices while export subsidies may depress world food prices if the country is an important exporter of the product. For a long time, the EU agricultural and trade policies had the aforementioned price effects. However, the EU agricultural policy has been reformed over the last decades: EU export subsidies are no longer distorting world market prices. Note that not all agri-food products qualify for subsidies. In the EU, pig production does not receive direct payments, and also food processing in general is not part of the subsidy scheme. The same holds for export subsidies.

In Swiss trade policy under the so-called 'Schoggigesetz', export subsidies used to be paid for products made out of Swiss inputs and hence reduced the high price of Swiss agri-food products on the world market. In essence, the difference between the high Swiss price and the world market price was reimbursed. This system of export subsidies under the 'Schoggigesetz' is totally abolished by the end of 2018, based on WTO requirements. At the moment, the discussion is about measures to compensate for the loss of subsidies that made Swiss agri-food products more competitive on the world market. For example, a new product-based subsidy per litre of milk and per hectare of cereals has been decided in order to compensate for the abolishing of export subsidies. The new subsidies will be paid from 2019 on. Another compensation measure for abolishing export subsidies will be a simplification of the approval procedure for inward processing with certain raw materials based on milk and cereals.

We consider that the exports subsidies under the 'Schoggigesetz' do not much influence the price difference for the products under review in this study. Furthermore, we do not investigate them further since Switzerland does not export bread, ham and only very little yoghurt. Hence, the export subsidies under the 'Schoggigesetz' turn out to be irrelevant and we do not consider them for the cases under review.

Most agricultural subsidies are nowadays paid as direct income subsidies, with less production and trade-distortive effects. At the same time, the direct payments probably have a slowing effect on farm consolidation, and may hence slow down average productivity growth. For example, Rizov et al. (2013) find in their econometric analysis of data of the Farm Accountancy Data Network (FADN) that the EU subsidies under the EU Common Agricultural Policy (CAP) negatively affect the farm productivity in the period before the decoupling reform was implemented; after decoupling the effect of subsidies on productivity is more nuanced, with the effect being positive in some countries and negative in others. Kazukauskas et al. (2014) claim that the EU direct payments have actually enhanced agricultural productivity growth which in the long-run would either increase production and/or decrease prices within the EU.

In addition to the degree of support that will be elaborated below, one main difference between Switzerland and the EU is related to the goal of the direct payments for arable farmers. The aim of the subsidy programme in Switzerland is to promote the cultivation of crops since meadows/grassland is the normal and natural alternative for farmers. They use the grassland for fodder in animal production. In contrast, the EU pays subsidies to farmers for meadows/grassland in order to reduce the crop production in the EU and hence to stabilise crop prices and/or provide meadows/grassland for environment and landscape purposes.

Both Switzerland and the EU require that farmers comply with certain requirements in order to obtain the direct payments. Cross-compliance measures (see also Section 2.6.3), for example, cover requirements of the cultivation of the respective crops, including proportion of organic production, crop rotation and so on. In Switzerland, organic production methods or producing according to nature in a kind of organically integrated way of production ('Ökologische Leistungsbilanz') is part of the cross-compliance. Hence, Swiss products can be considered of a different 'intrinsic' quality, other than comparable EU products. The Swiss cross-compliance requirements have been mentioned as adding complexity and higher costs to the Swiss food production that uses Swiss agricultural inputs.

The OECD collects data on the support of farmers and calculates an indicator to measure the payment of subsidies to producers, called producer support estimate (PSE). For the EU, the PSE information is not provided for each EU member state and thus information for the countries under review can unfortunately not be provided. Overall, the OECD PSE estimates shows Switzerland pays the highest subsidies to farmers and provides the highest level of protection for the farmers (see OECD annual publications on the support measures, e.g. OECD, 2018). More and detailed information about the subsidies paid is provided for the products under review in the respective case studies.

In order to measure the level of protection of agri-food markets, the OECD provides the Producer Nominal Protection Coefficient (NPC) that is defined as the ratio between the average price received by producers (measured at the farm gate), including net payments per unit of current output, and the border price (measured at the farm gate). Figure 2.2 illustrates the producer NPC of Switzerland and the EU-28 for the inputs of the three products under review in this report, namely wheat (including wheat for fodder), pig meat and milk. For instance, an NPC of 1.10 means that farmers received prices that were 10% above international market levels. As shown, the NPC values for Switzerland are considerable higher than the ones for the EU, indicating a higher degree of protection and thus support in Switzerland. In order to provide an estimate of the support paid for the products in the different cases under review in this study, we use national data in the agricultural reports and/or FADN data if available, see the respective chapters for the case studies.

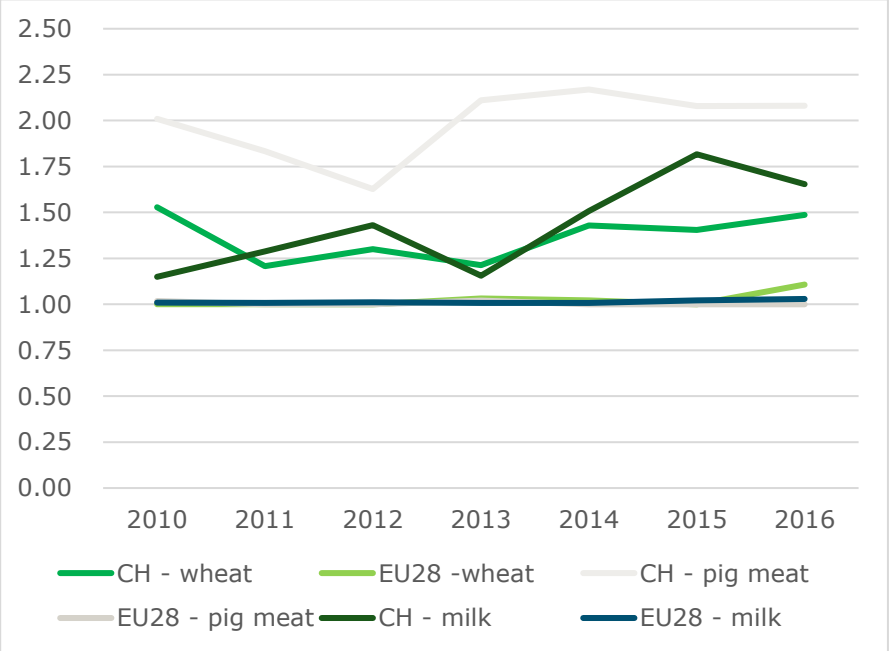


Figure 2.2 *Producer Nominal Protection Coefficient (NPC) by OECD, 2000-2016. Source: OECD.*

2.6.7 Taxes

There are different taxes applicable for the case studies in the countries under review. We focus on two main taxes that are relevant and have been identified by the experts: the value added tax (VAT) and the income tax for company profits. Details about the tax systems and special arrangements for the agricultural sector and different types of companies are beyond the scope of the study.

In Switzerland, the tax system contains three levels reflecting the federal decentralised structure of the country: national federal level (Bund), state/cantonal level (Kantone) and communal/municipality level (Gemeinden). A proportional tax on ownership equity for companies is levied by the cantons (at varying rates). The largest proportion of taxes result from the taxes imposed at the state/cantonal and communal/municipality level, with each Swiss state (Kanton) having its own tax law; for details see Federal Tax Administration. In general, the following tax rates are used as an indication: direct federal tax on profits of 8.5%, state/cantonal tax on profits: 5.9-16% and cantonal tax on capital: 0.05-0.3%. This sums up to a tax burden of between 14.5% and 25%. Cooperate taxes can be very low in Switzerland, depending on the canton and municipality. In Germany, Italy and France the taxes are, respectively, higher, about and just below 30%.

In Switzerland, the VAT rate for agri-food products is 2.5% (reduced rate). For Germany, Italy and France, the VAT tax is arranged but not harmonised at the EU level, with guidance on minimum rates as well as rules for exceptions for certain companies and sectors being provided. The VAT for agri-food products is 7% in Germany. In Italy, it is 4% and in France, it is 5.5% for most agri-food products (see Table 2.3).

Table 2.3 *Overview of taxes in Switzerland, Germany, France, and Italy*

Country	Corperate tax	Income tax (individuals)	VAT
Switzerland	16.55%	Average rate 34%, e.g. 22.5% (Kanton Zug, Gemeinde Walchwil) to 46% (Kanton Geneve); These taxes do not include social security, which is private and not income based	8%, reduced 2.5% (until 31.12.2017) 7.7% reduced 2.5% (from 01.01.2018
Germany	22.825% (few small villages) to 32.925% (in Munich)	45% income tax and 5.5% solidarity surcharge based on the total tax bill for incomes above €256,304. The entry tax rate is 14% for incomes exceeding the basic annual threshold of €9,000.	19%; reduced rate of 7% applies for certain food products
France	33.3% (36.6% above €3.5m, 15% below €38,000)	49%. (45% +4% for annual incomes above €250,000 for single taxpayers or above €500,000 for married couples) plus social security and social contribution taxes at various rates, for example 17,2 % for capital gains, interests and dividends	20%, reduced rate of 5.5% for food
Italy	27.9% (24% plus 3.9% municipal)	45.83% (43% income tax + 2.03% regional income tax + 0.8% municipal income tax)	22%, reduced rates for food: 4%

Sources: German Federal Ministry of Finance; Le portail de l'Économie et des Finances; The Italian Revenue Agency; Swiss General Tax Administration (https://www.estv.admin.ch/estv/de/home.html).

2.7 Conclusions

The literature review shows that many factors may explain price difference of agricultural commodities between two countries. Some of the major factors identified affecting demand side are consumer preferences (consumers are willing to pay more for specific attributes of the product) and income levels (high income consumers can be more discernible in choosing quality etc.). Other factors, like transport costs, labour costs, mark-ups or margins) determine the cost of production in (the next stage of) the supply chain. Government policies, such as support measures and import tariffs, may affect both demand and supply side factors causing domestic and international prices to differ.

Figure 2.3 provides an overview of factors causing price differences among similar products in different markets. Three case studies are presented in the following chapters of this report: wheat/bread, natural yoghurt and cured ham. They reveal which factors play the most important role

in explaining the price differences of these products in Switzerland compared to the respective neighbouring countries. The cases were investigated by using different data sources, information found in the literature as well as expert knowledge of the sectors in the EU and Switzerland. For the latter, expert consultants interviewed the persons in the sector along the entire chain at key positions so as to obtain first-hand information about the prevailing business practises and costs that point towards and provide clues for explaining the price difference.

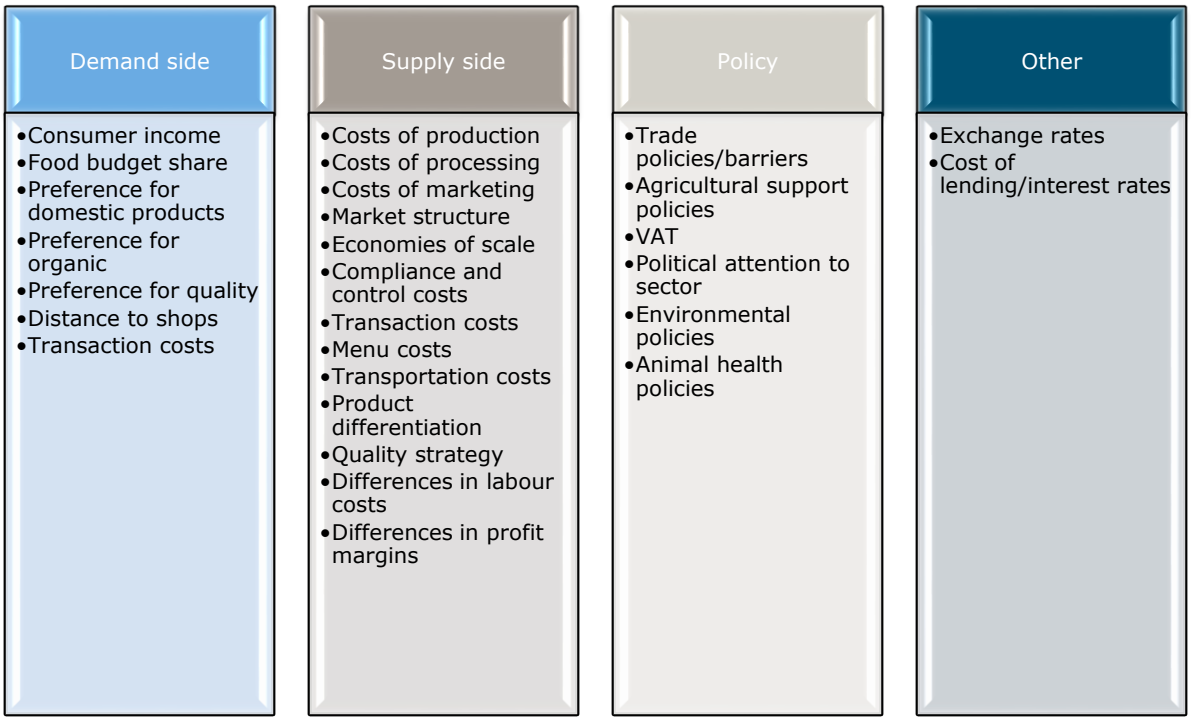


Figure 2.3 *Overview of factors found in the literature*

3 Bread in Switzerland and Germany

3.1 Introduction

Bread is one the most important food items in Europe. This holds for both Switzerland and Germany, and other countries neighbouring to Switzerland. In Switzerland and Germany the annual consumption of bread is about respectively 70 and 80kg per capita. Wheat and rye are the most important grains used for the production of bread. Wheat is also used for other bakery products like cakes, cookies and pizza. In addition to human consumption, a large part of the wheat production is used as animal feed.

This chapter focuses on the comparison of bread value chains in Switzerland and Germany (Section 3.2). The chapter starts with a description of the value chain for bread in Germany and Switzerland. In the next sections (3.3 to 3.8) per stage of the value chain price differences between the two countries will be described and explained. The information is summarised at the end of this chapter to show the price, margin and cost differences for the total bread value chain between Germany and Switzerland (Section 3.9). In Section 3.10 the conclusions concerning price and margin differences regarding the bread value chains in Germany and Switzerland are presented.

Looking to the world wheat production of 740m tonnes in 2014, Germany produced 27.8m tonnes (3.8%) and Switzerland 0.6m tonnes (0.1%). Globally, Switzerland is a small wheat producer. Germany is among the top 10 of wheat-producing countries.

3.2 Value chain map

To get insight into the costs and prices in the total value chain it is important to know what activities are performed by different chain participants. For the value chain of bread the main actors and their activities are:

- Growers: crop production, harvest, storage and selling of grain to miller or trader (or on farm use as feed);
- Traders: collection, drying, cleaning, storage and selling of grains;
- Miller: grinding grains into flour;
- Producer of bakery ingredients: putting together ingredients (e.g. flour, sugar, yeast, eggs) into ready for use bakery products (mixtures);
- Industrial and traditional bakeries: baking bread and pastry;
- Supermarkets: selling bread to consumers.

In Figure 3.1 an overview of chain participants is given including examples of companies in Switzerland.

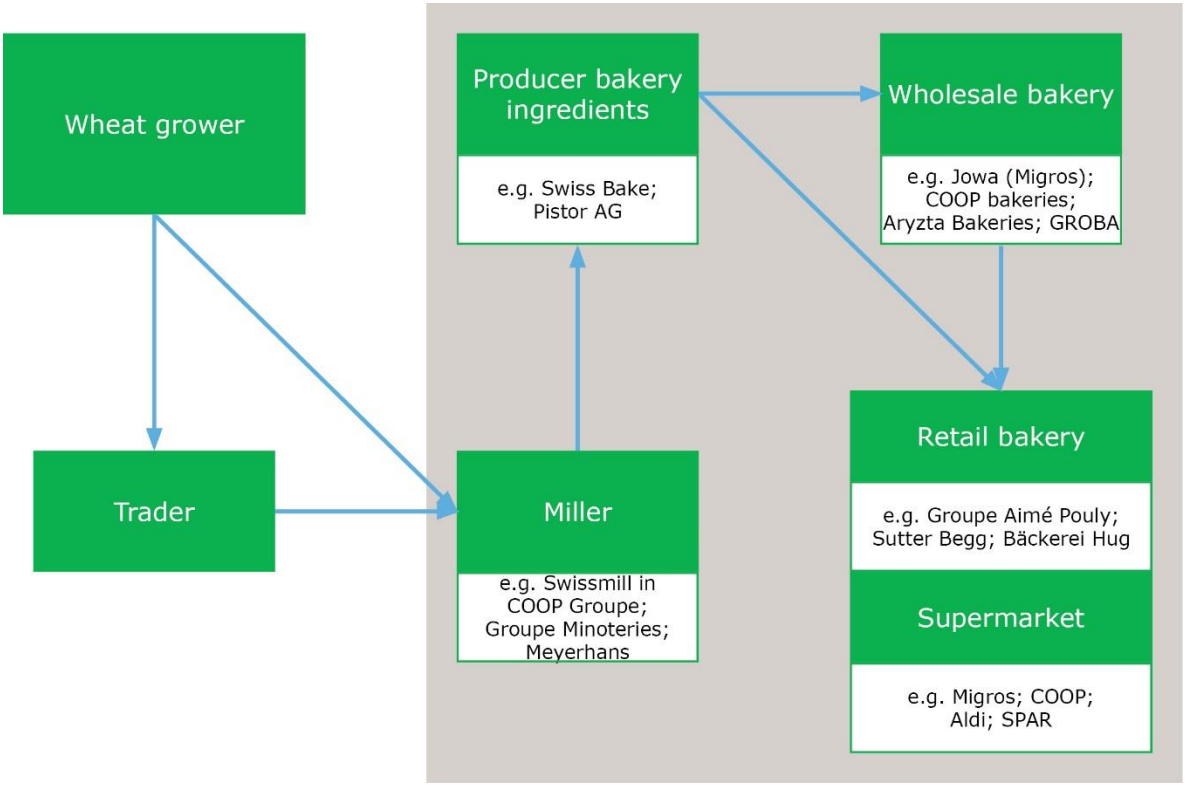


Figure 3.1 Overview of the value chain of bread including examples of companies in Switzerland

3.3 Agricultural production

3.3.1 Market structure of farms

As can be seen from Table 3.1, in 2010, there were slightly more than a thousand specialised cereals, oilseeds, and protein crops farms in Switzerland. Table 3.1 also indicates that the average farm size of specialised cereals, oilseed and protein crops farms is larger in Germany than in Switzerland. The total number of these specialised farms is low in Switzerland. This can be explained by the fact that most Swiss farms participate in the 'ecological proof of achievement' (ÖLN) programme to get direct payments from the government. One of the conditions to get these payments is that at least four crops should be cultivated each year. Smaller average farms and more crops in the production plan lowers the average productivity of Swiss cereal farms compared to Germany. The lower productivity is compensated by payments from the ÖLN, and by higher market prices resulting from border protection.

Table 3.1 *Number of specialised cereals, oilseed and protein crops farms, categorised by size (2010)*

	Germany	%	Switzerland	%
less than 2 ha	0	0	10	1
from 2 to 4.9 ha	0	0	80	7
from 5 to 9.9 ha	6,560	18	190	18
from 10 to 19.9 ha	9,620	27	440	41
from 20 to 29.9 ha	4,050	11	180	17
from 30 to 49.9 ha	4,460	13	140	13
from 50 to 99.9 ha	4,540	13	40	4
100 ha or more	6,370	18	0	0
Total	35,580	100	1,080	100

Source: Eurostat, calculations Wageningen Economic research.

The total number and the share of specialised cereal farms in the total number of farms with cereals is considerably higher in Germany than in Switzerland.

Table 3.2 *Number of specialised cereals, oilseed and protein crops farms*

	Germany		Switzerland	
	2010	2016	2010	2016
Specialised cereals, oilseed and protein crops farms	35,580	39,170	1,080	
Farms with cereals for the production of grain	194,008	174,825		21,300 a)
Farms with production of wheat	147,480	133,452		
Total farms	299,130	275,400	59,065	52,263
Specialised cereals, oilseed and protein crops farms in % of total farms	11.9	14.2	1.8	

a) 2014/2015 data from BFS 2017.

Source: BFS Farm Stucture survey, DEStatis, Eurostat; calculations Wageningen Economic research.

Table 3.3 shows that specialised farms in Germany have a larger size and realise higher output in CHF per farm compared to Swiss colleagues, but farms in Switzerland realize a higher output in CHF per ha, because of higher prices for the cereals.

Table 3.3 *Output per farm and per ha on specialised cereal farms in Germany, Switzerland and some neighbouring countries (2010)*

	Farm size (ha)	Output CHF per farm	Output CHF per ha
Germany	117	111,550	1,321
France	110	94,040	1,182
Italy	15	17,197	1,587
Austria	36	25,063	951
Switzerland	27	44,999	2,302

Source: Eurostat; calculations Wageningen Economic Research.

3.3.2 Production area, volume and prices

Swiss wheat production is about 0.1% of the total world wheat production. Swiss wheat production is very modest (Table 3.4) compared to large wheat-producing neighbouring countries, such as France and Germany, where wheat production per inhabitant is about 5 times higher than in Switzerland.

Table 3.4 *Production of wheat (including spelt) in Germany, Switzerland and other selected neighbouring countries (1,000 tonnes)*

	2010	2011	2012	2013	2014	2015	2016	2017
Germany	23,671	22,710	22,351	24,966	27,711	26,462	24,329	24,311
France	35,074	33,575	35,090	36,437	37,065	40,435	27,239	36,164
Italy	2,918	2,796	3,453	3,437	3,168	3,057	3,053	2,813
Austria	1,439	1,703	1,231	1,534	1,737	1,628	1,842	1,343
Switzerland	530	559	518	487	557	527	391[12]	540

Source: Eurostat

Both in Germany and Switzerland, most wheat grown is winter wheat (>98% of the total area). The wheat growing area in Germany is much larger than in Switzerland. The Swiss wheat production acreage is just about 3% of the German acreage (see Table 3.5).

[12] In 2016, Swiss wheat production was low due to adverse weather conditions

Table 3.5 *Wheat area (including spelt) in Germany, Switzerland and some neighbouring countries (1000 ha)*

	2010	2011	2012	2013	2014	2015	2016	2017
Germany	3,277	3,233	3,045	3,120	3,208	3,264	3,176	3,173
France	4,899	4,990	4,861	4,983	5,011	5,159	5,132	4,968
Italy	573	531	594	632	587	554	529	502
Austria	285	289	294	285	291	284	295	274
Switzerland	91	88	89	89	88	88	89	87

Source: Eurostat

Swiss wheat producers realise lower average yields in all years during the period 2010-2017 compared to large wheat producing countries France and Germany (Table 3.6). The yields in Switzerland are around six tonnes per ha and in Germany and France around seven to eight tonnes per ha. In each year during the period 2010-2017, the Swiss wheat yield per ha was between 9% and 42% lower than in Germany.

Table 3.6 *Wheat yields (including spelt) in Germany, Switzerland and some neighbouring countries (tonnes/ha)*

	2010	2011	2012	2013	2014	2015	2016	2017
Germany	7.2	7.0	7.3	8.0	8.6	8.1	7.7	7.7
France	7.2	6.7	7.2	7.3	7.4	7.8	5.3	7.3
Italy	5.1	5.3	5.8	5.4	5.4	5.5	5.8	5.6
Austria	5.0	5.9	4.2	5.4	6.0	5.7	6.3	4.9
Switzerland	5.8	6.4	5.8	5.5	6.3	6.0	4.4	6.2

Source: Eurostat; calculations Wageningen Economic Research

A part of wheat is grown as organic. In 2015, Germany had 83.1 thousand ha organic wheat and spelt, or 2.6% of total wheat and spelt acreage. In Switzerland, the organic area of all cereals is 6.7 thousand ha, which is about 5% of the total cereal area (FIBL).[13]

A large part of grain production will become an ingredient for feed. In Germany and Switzerland about 50% of produced grain is for bread and also 50% for feed. Germany exports wheat for bread and imports wheat for feed.

In terms of area, cereals are Switzerland's most important agricultural crop. In 2014, farmers cultivated cereals crops on over 143,000 hectares. This corresponds to around 14% of agricultural land in Switzerland. Eighty-four per cent of the bread flour ground to flour in Switzerland comes from local cultivation. For bread production, there are specific quality requirements for wheat. This means, for instance, that a limited number of wheat varieties are suitable for bread production and also that specific cultivation methods are required like lower nitrogen application according to 'ecological proof of achievement' (Ökologischen Leistungsnachweises; ÖLN) rules. Germany does not apply strict rules similar to ÖLN. The additional nitrogen requirements for bread cereals are not fully compensated in a higher price for bread grains compared to feed grains in Germany. Prices of wheat for bread were 4 to 6% higher than prices for wheat for feed in 2017-2018.[14] This means that farmers in Germany are not stimulated to grow wheat for bread. Swiss prices for wheat suitable for bread production were about 40% higher than for wheat suitable for feed (see Table 3.8). So, in Switzerland the production of wheat for human consumption is protected, while the production for feed is less protected. Obviously, farmers concentrate on the production for human production.

[13] https://www.organic-europe.net/country-info/switzerland/country-report.html
[14] https://www.agrarheute.com/wochenblatt/maerkte/getreide-raps-preisanstieg-ernte-2018-547333

Table 3.7 *Production of bread cereals in Switzerland in 2015/2016*

	Absolute figures	Percentage
Area bread cereals (ha)	81,984	100%
Of which bread wheat (ha)	76,030	93%
Of which organic wheat (ha)	5,240	6.4%
Production bread cereals (tonnes, excluding 53,067 tonnes of declassed bread wheat)	412,296	
Of which bread wheat	387,617	94%
Bread cereal producers (number)	15,280	
3,000 biggest producers have .. ha	37,371	45.6%
self-sufficiency level of bread cereals in Switzerland		83.6%

Sources: Fachbereich Marktanalysen (BLW), AGIS (BLW), Swiss granum.

Figure 3.2 presents the price development of common wheat (CHF per tonne) in Switzerland, Italy, France, Austria and Germany. It shows that the soft wheat price in Switzerland is constantly much higher than in all neighbouring countries. Wheat prices presented by Agroscope confirm the high Swiss price level compared to the neighbouring EU countries. In Switzerland, the average price of organic wheat (2014-2016) is twice as high as traditionally grown wheat, 1,010 versus 500 CHF per tonne. Given the fact that only 6% of the area is organic this only partly explain the price difference with other neighbouring countries.

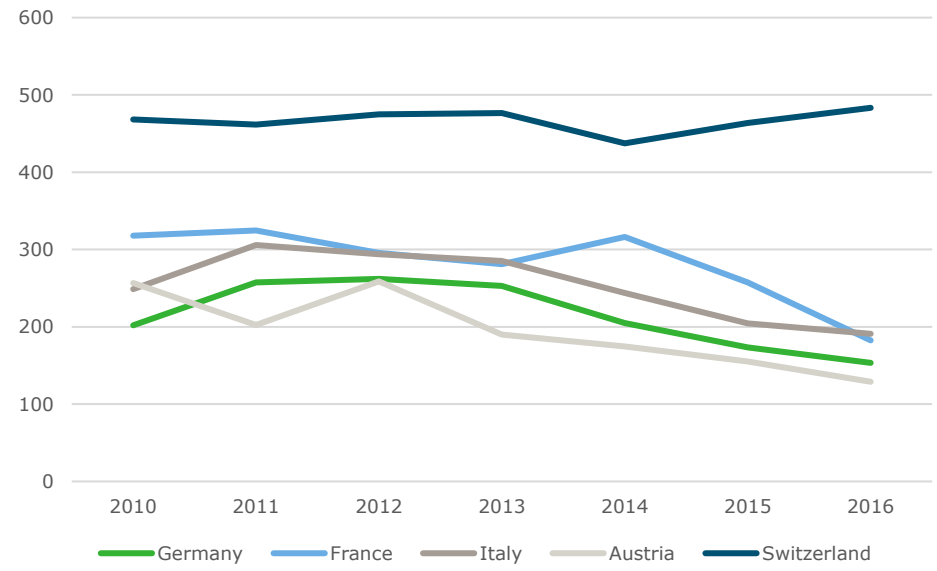


Figure 3.2 Soft-wheat price in Germany, Switzerland and some neighbouring countries, CHF per tonne. Source: Eurostat, calculations Wageningen Economic Research.

The basis for the Swiss farmers' prices for grains is the guiding price ('Richtpreise'). The values are fixed and determined by the sectoral organisation Swiss granum with the purpose to set the selling price for farmers. For cereals this are direct prices bound by quality. In CHF per tonne the guiding price did not fluctuate in the period 2013-2018 (see Table 3.8) while the realised prices went up in Switzerland in 2015 and 2016 compared to the period before (see Figure 3.2). Within the EU the differences in prices of wheat for bread and wheat for feed are relatively small. However in Switzerland the prices for wheat for bread are almost 40% higher than the prices for wheat for feed (at least for the guiding prices in Table 3.8).

Table 3.8 *Swiss guiding prices ('Richtpreise') for wheat qualities, in CHF per tonne*

	2013	2014	2015	2016	2017	2018
Wheat Top	520	520	520	520	520	520
Wheat I	500	500	500	500	500	500
Wheat II	490	490	490	490	490	490
Wheat III	450	450	450	450	450	
Wheat bisquit	490	490	490	490	490	490
Wheat feed	365	365	365	365	365	365

Source: Swissgranum. Converted from decitonnes to tonnes.

3.3.3 Input use and production costs

The production of winter wheat starts with ploughing the land after the last harvest or after a green manure crop has been on the land (a fertiliser consisting of plants), usually at the end of summer. Sowing of winter wheat takes place in autumn, while summer wheat is sown in early spring. In spring, the plants start growing and fertiliser and crop protection are applied if necessary. At the end of July harvesting starts. Usually sowing, applying fertiliser and crop protection, as well as harvesting is done by machines. Combine harvesters are used for mowing, separating the straw from the grain (threshing) and cleaning the grain (winnowing). The grain is then collected in silos of traders, because setting up own storage is relatively expensive, especially for the small farmers.

For wheat production, seeds, nutrients, and crop protection are the main variable inputs. In addition, labour, machinery like harvesters, and land are essential factors of production. Figure 3.3 shows the costs of important variable inputs for wheat cultivation. The costs for seeds are considerably higher (3 times higher per tonne of wheat produced) in Switzerland than in Germany. This can partly be explained by the lower yields per ha (less output per kg of seed with a comparable amount of seed per ha in Germany and Switzerland) and the lower quantities bought per farm (economies of scale). Fertiliser costs are about 10% higher while crop protection costs are 80% higher per tonne of wheat produced in Switzerland compared to Germany. Also other direct costs like packaging, drying, cleaning, hail insurance are much higher in Switzerland than in Germany (4.44 CHF per tonne versus 0.15 CHF per tonne).

Raaflaub and Genoni (2005) concluded that fertilisers in Switzerland's neighbouring EU countries are 9-52% cheaper (on common price basis). In addition, in Switzerland fertiliser is often purchased in smaller batches, and packed in smaller quantities, which represents a further increase in price, apart from the extra work involved in handling. Compared to Switzerland pesticides are 25%-30% cheaper in Germany and France (Raaflaub and Genoni 2005). It should be noted that new pesticides have entered the European (including Switzerland) market since 2005 and that this can influence the price differences. In Switzerland, pesticides are used much less, while other more expensive forms of crop protection are used (see Section 3.3.4). For grain production in Switzerland lower levels of nitrogen are authorised compared to Germany and this partly explains the lower yields in Switzerland compared to Germany.

Figure 3.3 also shows that the gross margin per tonne of wheat is three times higher in Switzerland than in Germany. The gross margin is the difference between the prices received by farmers (excluding subsidies like direct payment) and the total variable costs and shows the income left for farmers. This means that the costs like family labour, land and capital costs are still to be accounted for.

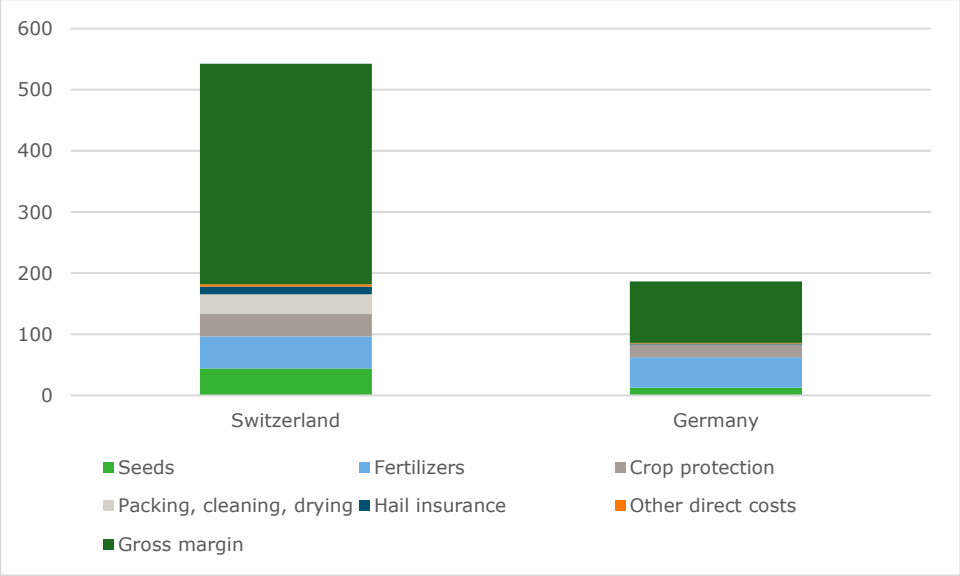


Figure 3.3 *Costs of bread wheat production, 2014-2016, in CHF per tonne. Source: KBTL and Agroscope 2014-2016, calculations Wageningen Economic Research, for Germany the average of the Euro/CHF exchange rate for 2014-2016 was used.*

Data about the level and division of the fixed costs (machines, buildings, land and labour) are not available for the period 2014-2016 and not presented in Figure 3.3. The total variable costs in Switzerland were estimated at about 200 CHF per tonne and the fixed costs at about 500 CHF per tonne of wheat (information from the Swiss industry for 2017). In Germany the total variable costs per tonne of wheat equal more or less the total fixed costs per tonne (Source: calculations of Sustain Consult). This would imply that German farmers have a fixed cost of about 90 CHF per tonne, and can cover fixed costs from the gross margin as indicated in Figure 3.3. Note that – considering these fixed costs - the total costs of production in Switzerland are higher than the prices paid (as in Table 3.8). In addition to the prices, farmers receive direct income support to overcome the difference.

Fixed costs per ha depend on farm size; on larger farms fixed costs per ha are generally lower (due to scale effects). Based on information from the Swiss industry and Sustain Consult the main difference in costs per tonne of wheat is related to differences in fixed costs (machinery, buildings) and not to the differences in variable costs (fertiliser, pesticides and seeds; see Figure 3.3).

Table 3.9 shows that the labour input per cereal farm is much lower in Switzerland compared to Germany. This can be expected given the difference in farm size (see Table 3.9). The labour input per ha is more or less the same as in Germany and in France and lower than in Austria (Table 3.9). Based on these figures it can be concluded that in Switzerland the labour productivity is high compared to neighbouring countries.

Table 3.9 *Labour input (per farm and ha) and labour productivity on specialised cereal farms in Switzerland, Germany and some neighbouring countries (2010)*

	Labour input per farm	Labour per ha	Productivity (euro per unit of labour input)
Germany	0.98	0.012	82,794
France	0.92	0.012	73,799
Italy	0.32	0.029	39,139
Austria	0.51	0.019	35,616
Switzerland	0.26	0.013	125,745

Source: Eurostat, calculations Wageningen Economic research.

3.3.4 Innovation and product differentiation

The main difference between Switzerland and Germany, in terms of production methods is in the use of fertilisers and crop protection. About, 60% of the wheat production for bread in Switzerland is under a quality scheme Extenso[15] (source: industry information). In the case of extensive production of cereals, the use of growth regulators, fungicides and insecticides is completely abandoned. However, herbicides are allowed. This means that these fields are treated only once or twice a year against weeds, any further use of pesticides is prohibited. The breads sold under the IP-Suisse label meet this production standard: https://schweizerbrot.ch/korn-und-brot/getreideanbau/.

3.3.5 Government regulations, support measures and taxes

The main influence of government support is via the direct income support in Germany and via the ÖLN in Switzerland. This support is at farm level and not directly related to the production of wheat. No subsidy per product has been granted in Germany, but German growers receive a direct income payment per hectare which varies per Bundesland (CAP, decoupled payments). Germany is the only EU Member State that has chosen not to have any 'coupled' payments. Since 2007 the basic payment scheme (the amounts paid per hectare) is based on a regional flat-rate payment system which will gradually change over to a national flat-rate by 2019. Also, in Switzerland no subsidy on product level has been granted. Swiss farmers also have the opportunity to receive direct payments. In that case they must at least fulfil the so-called 'ecological proof of achievement' (ÖLN).[16] This means that both Swiss and German wheat growers do not receive a subsidy per unit product but on a decoupled base.

Using FADN data, we calculate that in 2016 German cereal producers received subsidies worth about 26% of their output value. The comparable Swiss data are not available. The OECD PSE (Producer Support Estimate) for grains does only include payments that are directly related to the production of grains. Because the subsidies in Switzerland are not product specific, we cannot use this data. The total PSE for Swiss agriculture was 50.9% in 2017 (OECD).

The NPC (nominal protection coefficient) is the ratio between the average price received by farmers (at farm gate), and the border price (measured at farm gate) (see OECD outlook methodology). While several years are presented in Figure 2.2, we focus on the most recent year: In 2016, the Swiss NPC for wheat amounted to 1.49 and the EU NPC amounted to 1.11. This means that in Switzerland, wheat producers received prices that were 50% above international market levels, and in the EU, they received prices that were about 10% higher.

The trade in plant protection products and fertilisers between EU and Switzerland is not taxed (no tariffs). With regard to regulations and standards that apply to arable farming, there were no major differences identified between Switzerland and Germany. In addition, the regulation for inputs like plant protection products differ, as elaborated by Areté et al.:

1. The EU authorisation applies to a larger region and not only for a single country. For Switzerland an extra authorisation is necessary. Consequently the costs of the authorisation have to be covered through higher prices in Switzerland;
2. In the EU there are no requirements for ÖLN regarding the use of pesticides and fertilisers. The ÖLN requirements are very complex in Switzerland an require consultancy of farmers. Such consultancy services are included in the price of fertilisers and pesticides, which render them more expensive;
3. Additional explaining factors related to specific Swiss regulatory requirements are the lower maximum level of cadmium allowed for mineral phosphate fertilisers in Switzerland (which results in the need to import more expensive mineral phosphate fertilisers) and the obligation to hold mandatory stocks for some fertilisers (which may force some operators to purchase fertilisers even when price dynamics are unfavourable).

[15] Jäggi, E., 2003. Support schemes and agriculture in Switzerland. Paper presented at the Concerted Action Seminar: Potential for environmental cross-compliance matters. Roskilde, Denmark 24–25.11.2003.

[16] https://www.schweizerfleisch.ch/wieso-schweizer-fleisch/oekologie/oekologischer-leistungsnachweis.html ; The ÖLN was introduced in 1997.

As shown in the case for wheat, but also the other cases, prices also differ because the margins at the wholesale level differ as well as because the quantities sold per farmer are much lower in Switzerland and probably the way of packaging differs (more trade in bags than loose). All these factors lead to higher prices of inputs in Switzerland compared to Germany. Raaflaud and Genoni (2005) and more recently BAKBASEL (2014) analyse the price difference of inputs in agricultural production, including wheat in Switzerland and Germany, and confirm the higher input prices in Switzerland compared with Germany.

According to our calculations using FADN data, wheat farmers in Germany paid about 2% in income taxes (FADN, calculations Wageningen Economic Research). This means that wheat farmers receive more subsidies than they pay in taxes, and are net receivers of tax money in Germany. A comparable calculation could not be conducted for Switzerland due to lack of information.

3.4 Trade in wheat

3.4.1 Market structure of wheat traders

In Germany about one third of the total German bread grain production (mostly wheat) is delivered directly to the miller by the grower. The remaining part is delivered to the mills via the agricultural wholesalers (source: die Bedeutung der Mühlenwirtschaft in der Wertschöpfungskette in Deutschland (WJ 2014/2015)). The wholesale and international trade category comprises approximately 500-600 companies in Switzerland and 2600 in Germany (Source: Bureau van Dijk, Orbis database, estimations Wageningen Economic Research). In Switzerland, most farmers deliver the cereals to collecting points where the cereals are dried, cleaned and stored before they are delivered to the mills. Based on information from the industry there are about 160 collection points in Switzerland for cereals. The main reason for delivering the cereals to collection points is the small quantities produced per farm in Switzerland.

3.4.2 Imports of wheat

About 84% of the bread is produced with cereals produced in Switzerland. In addition, a relatively small proportion is imported within the tariff quota. The tariff quota number 27 was temporarily increased in 2015 at the request of the industry by 20,000 to 90,000 tonnes of bread grain (see Table 3.10). In 2016, the regular quota volume of 70,000 tonnes was again used.

Table 3.10 *Imports of wheat in Switzerland, in tonnes*

	2010	2015	2016	2017
1001.9100 - Wheat and meslin (excl. durum wheat), for sowing	188	276	428	196
1001.9921 - Wheat and meslin (excl. durum wheat), for human consumption, within the limits of the tariff quota (Q. No. 27)	76,359	85,999	67,711	96,365
1001.9929 - Wheat and meslin (excl. durum wheat), for human consumption, out of tariff quota	32,998	50,555	47,733	49,124
1001.9939 - Wheat and meslin (excl. durum wheat), for animal feeding, (excl. those containing other cereals of Chapter 10)	141,382	183,508	273,333	282,107

Source: Swiss IMPEX database.

As shown in Table 3.10, wheat for human consumption is also imported outside of the tariff quota. Focusing on wheat for bread, trade that falls outside of the quota amounted to about 20,000 tonnes (Source: BLW). The quota is usually filled, and fills rather fast when they become available (see Marktbericht Getreide, BLW). The Swiss tariff rates for imports out of the quota are high such that imports out of the quota are too expensive. Hence the out-of-quota trade is rather limited, with about more than three times as much is imported within the tariff quota each year.

Figure 3.4 presents the import prices without tariffs, which could be added as specific charges to the price. As shown, the price difference for wheat imported within and out the tariff quota is about 0.1

CHF/kg in 2016 and 2017. For out-of-quota imports, the prices were a bit higher in recent years, probably indicating a higher demand for bread wheat in Switzerland – due to lower yields of cereals in 2016.

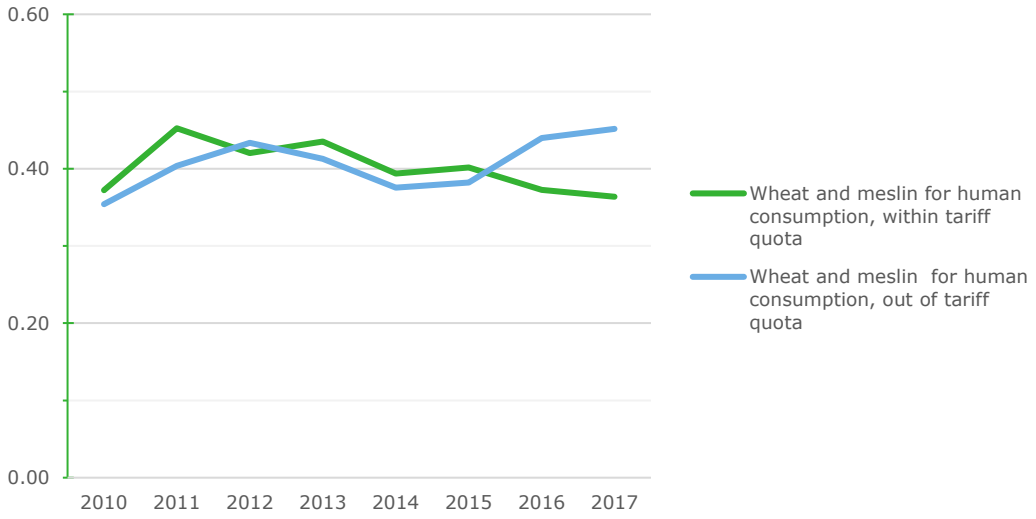


Figure 3.4 *Import prices of wheat in Switzerland, in CHF/kg. Source: Swiss IMPEX database.*

Exports of wheat for human consumption from Switzerland are negligible compared to the import and to the production, in total less than 200 tonnes per year in 2017 (Source: Swiss IMPEX database).

3.4.3 Input use and costs

In this stage of the supply chain costs are made for cleaning, storage and transport. Information from the Swiss Industry shows that the relative costs at this stage of the supply chain are low compared to the value of the cereals. For example the storing costs are 0.20-0.30 CHF/100kg per month. Relating to a product value of about 70 CHF per 100kg, the storing costs are relatively small.

3.4.4 Government regulations, support measures and taxes (tariffs)

Import of wheat is subject to tariffs and tariff rate quota (TRQs). As shown in Section 3.4.2, the tariff quota in combination with the tariffs protects the Swiss production of wheat from imports. Looking at the Swiss data, the tariff rate for wheat imports within the quota (70,000 tonnes) amounts to 18 CHF/100kg, the one for wheat outside the quota is 40 CHF/100kg. The Swiss TRQ system limits the imports sold on the Swiss market, and hence ensures the high price level on the Swiss market. Areté (2016) investigated the TRQ system and its effectiveness. They find that the TRQ system has a quantity effect and with limited supply the high prices can be maintained. As mentioned, the tariff rate quota is expressed like a specific tariff that can be considered as a cost position per imported tonne that traders and Swiss importers face.

No additional taxes or subsidies are applicable for this stage of the supply chain, except for the contribution to the Guarantee Fund. A contribution of 5 CHF/100kg is paid for soft wheat for grinding, to the fund that keeps crisis reserves of essential products including wheat. For soft wheat for human consumption the 5 CHF contribution is only applicable to within quota imports and only for soft wheat for grinding, and not for re-exporting or other types of processing.[17]

For the trade-related policies and other regulatory difference between the EU and Switzerland, see Section 2.6.

[17] https://www.reservesuisse.ch/en/goods/bread-grains/guarantee-fund-contributions/complete-list/

3.5 Milling, bakery ingredients and bakeries

For this study we focus on the supply chain of bread delivered in supermarkets. This bread is mostly processed by the bigger companies while the smaller companies in the processing supply chain focus on the specialised bakeries that supply special products to the consumer. In Germany and Switzerland a considerable part of bread (up to 30%; estimate by the authors of this study) is still supplied by the small specialised bakeries. This supply chain is not analysed in this study.

3.5.1 Market structure of millers and bakeries

Mills

The grinding industry processes grain into flour. Cereals are purchased from the collection centres and possibly mixed on the basis of quality and grinded into various types of flour like white flour, half white flour, export flour, wholegrain flour and meal and baking meal, and semolina and haze. Table 3.11 provides an overview of the grinding industry in Switzerland and Germany. The table shows that the number of mills is 10 times higher in Germany than in Switzerland. However wheat production is about 50 times higher in Germany than in Switzerland (See Table 3.11). This means that the production per mill is about five times higher in Germany than in Switzerland.

Table 3.11 *Key figures of the grinding industry in Germany and Switzerland*

	Germany		Switzerland	
	2010	2014	2010	2014
Number of mills		550	70	54
Number of mills (> 1,000 tonnes per year)	261	214	n.a.	n.a. (30 e)
Bread grains (tonnes) per mill		38,800	6,800	8,700
Flour production (tonnes) per mill		31,000	5,440 (e)	6,960 (e)

Sources: BLE (Bundesanstalt für Landwirtschaft und Ernährung), BMEL, VDM, 2015, https://schweizerbrot.ch: Zahlen und Fakten zu Mühlen und Vermahlung. (e: estimated on basis of German efficiency).

There are signs that the number of mills is decreasing in Switzerland and in Germany (see also Table 3.11). Especially the small mills are disappearing. The costs for milling is expected to be higher in Switzerland than in Germany, because the capacity per mill is relatively low in Switzerland (8,700 tonnes per mill) compared to Germany (39,000 tonnes per mill). This will increase the fixed costs per tonne of milling in Switzerland (depreciation of the mill). Next to that, also the costs per labour unit are higher in Switzerland than in Germany (Source: Sustain Consult) and it can be expected that labour use per unit of flour will be higher in Switzerland than in Germany because of the lower capacity of the mills. There are no reasons to expect that the efficiency of the mills (quantity of flour per kg of grain) will differ much between Switzerland and Germany, although in both countries different types of milling exist. The average milling-efficiency of German milling companies is about 80%, no information is available for Switzerland.

Bakery ingredients

Manufacturers of bakery ingredients are suppliers to the (industrial) bakeries. In the last few years, the food service industry and other large customers have gained importance according to information from the Swiss industry. In the bakery ingredients industry, there are a few big companies in Germany (IREKS; PFAHNL Backmittel) and Switzerland (Swiss Bake, Pistor AG) that supply most of the bakery ingredients (Association of the Manufacturers of Bakery Ingredients/Backzutaten Verband;[18] BFS, (2017)).

A concentrated bakery ingredients industry may have two countervailing effects on prices. First, concentration improves efficiency and lowers costs and prices. Second, concentration decreases competitive pressure and consequently leads to higher profits and higher prices of the industry. This

[18] https://backzutatenverband.de/

case study, however, could not provide any conclusive information about the size of the effect. Note that this value chain accounts for just a small part of the total value added of the chain.

Bakeries

Bakeries produce bread and bread products. Bakeries are distinguished in the smaller traditional bakeries (most local bakeries which are not covered in this study) and larger industrial bakeries that deliver bread to supermarkets, out of home services, etc. Wholesale or industrial (system) bakeries sell their product nationwide to supermarkets, hypermarkets and discounters. The other group of the German bread and bakery industry are the smaller branch bakeries. They supply their own, mostly regional, network of sales outlets and branches, in some cases also in franchise or partner systems.

Calculations based on data of the German Statistical Office (Destatis, 2018a)[19] made by Sustain Consult show that the group of bakeries with more than 500 employees in Germany grew substantially in the period 2010-2016. With the exception of Aldi Nord and Aldi Süd all other supermarkets have their own bakeries. The supply of the food retail, the catering and other bulk consumers in Germany is largely accounted for by the six largest supply bakeries in Germany (Harry-Brot GmbH, Lieken AG, Aryzta Bakeries Deutschland GmbH, Glockenbrot Bäckerei GmbH, Mestemacher-Gruppe, Kronenbrot KG Franz Mainz). Table 3.12 gives an overview of the bakeries in Germany. About 40 bakeries out of 12,500 have a total market share of 32% in 2014 (see Table 3.13). And this market share is increasing continuously.[20] The market share of large bakeries seems to be increasing while big supermarkets cooperate with one or just a few suppling bakeries.

Table 3.12 *Structure of bakeries inrmany in 2014*

Size class (million euros)	Number of holdings	Turnover (million euros)	Market share, %
<1	10.299	3.114	16
1-50	2.287	10.014	52
>50	42	6.293	32
All	12.558	19.422	100

Source: http://www.grossbaecker.de/daten-und-fakten-zur-branche.html

In Table 3.13 the number of bakeries in Switzerland are listed for 2015/2016. Also in Switzerland there are mainly small bakeries and a few big bakeries that deliver the supermarkets. JOWA is an example of a big bakery delivering to Migros which is 100% subsidiary of Migros. This means that at least one big supermarket cooperate closely with its own supplier and make internal arrangements about volumes and prices in Switzerland.

Table 3.13 *Bakeries in Switzerland in 2015/2016*

	2015/2016
Number of establishments for the production of baked goods and long-life bakery goods	1535
Number of bakeries, pastry shops, tea rooms and retail trade of pastries and confectionery	2313

Source BFS, 2017

3.5.2 Production volume, value and prices

About 75% of the total German grain production is not grinded by millers: this 75% is sold as seed, feed, energy or export. In Switzerland more or less all wheat production is grinded by Swiss millers. In Table 3.14 an overview is given of the milling industry in Germany and Switzerland. The turnover in value (not in volume) of the milling industry is 7 to 10 times higher in Germany than in Switzerland. The milling companies are much smaller in Switzerland than in Germany.

Table 3.14 *Turnover of the industry Switzerland and Germany, in million CHF, 2010-2016.*

	2010	2012	2014	2016

[19] Statistisches Bundesamt, Produzierendes Gewerbe – Kostenstruktur der Un-ternehmen des Verarbeitenden Gewerbes sowie des Bergbaus und der Ge-winnung von Steinen und Erden 2016, Wiesbaden, 2018. (Destatis 2018a)

[20] http://www.grossbaecker.de/daten-und-fakten-zur-branche.html

C106 - Manufacture of grain mill products, starches and starch products	Switzerland	675	813	901	943
C107 - Manufacture of bakery and farinaceous products	Switzerland	2,997	3,144	4,287	4,224
C106 - Manufacture of grain mill products, starches and starch products	Germany	7,485	8,025	8,160	6,827
C1061 - Manufacture of grain mill products	Germany	5,055	5,402	5,632	n.a.
C107 - Manufacture of bakery and farinaceous products	Germany	30,629	28,181	28,177	25,842
C1071 - Manufacture of bread; manufacture of fresh pastry goods and cakes	Germany	25,559	23,994	23,658	n.a.

Source: Eurostat, calculations Wageningen Economic Research.

In Germany, the production value of wheat flour was estimated at about 5.4m tonnes in 2017, for a total value of about 1.5bn euros (1.6bn CHF). The average price of wheat flour from the German industry was fluctuating around 0.3 CHF per kg between 2015 and 2017. The production of bread in Germany was just below 5m tonnes, with an average unit value of 2.28 CHF per kg in 2017. This means that almost half of the turnover of the German Manufacturing of bread, fresh pastry goods and cakes, came from fresh bread. (Source: Eurostat Prodcom, Sold production; calculations Wageningen Economic Research). Detailed data on industrial production for Switzerland was not available.

3.5.3 Input use and costs

In Figure 3.5 the cost structure of the German and Swiss bread and bakery processing industry is given. From Figure 3.5 it can be concluded that the cost structure of each sector in Germany and Switzerland is more or less the same. This also means that higher input prices go hand in hand with higher production costs which increases the price of bread in Switzerland compared to Germany. For the milling industry the costs for the purchase of goods (mostly grain) equals about 80% of the turnover. Most of the other costs are wages and social security costs (labour costs). Given the fact that the prices for the grain are twice as high in Switzerland compared to Germany and the fact that their share is at 80%, the output price for the millers will also be roughly twice at high. In the bakery sector the costs of the purchases of goods are about 60% of the total turnover and wages and social security costs amount to 26 to 30% of the turnover. The output price in Switzerland will also exceed the one in Germany.

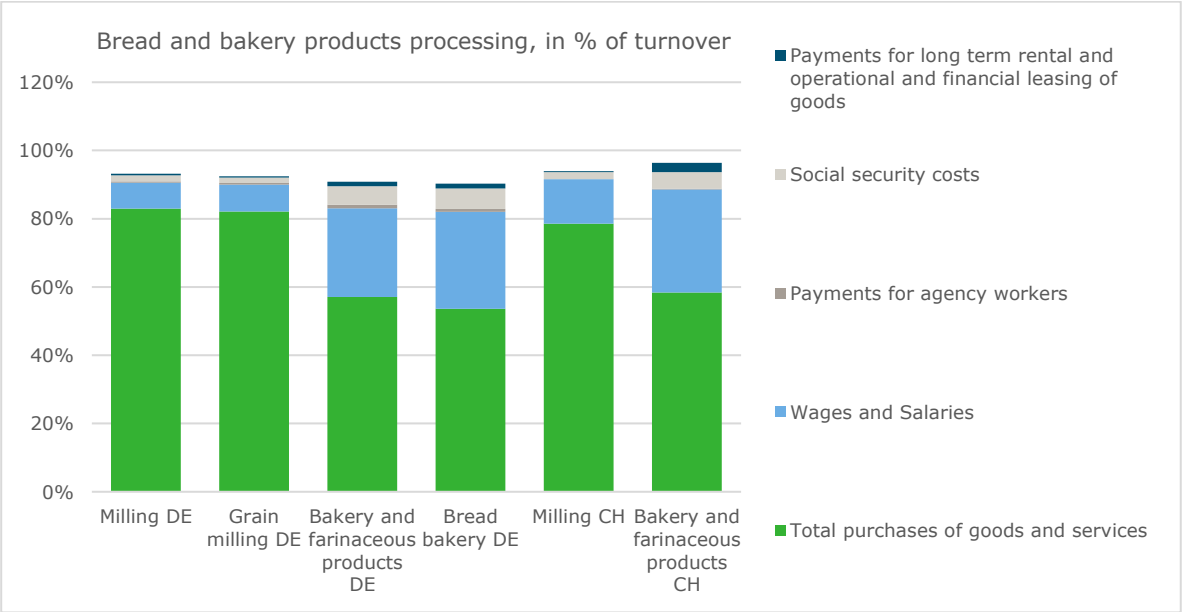


Figure 3.5 *Cost of bread and bakery products industry in Germany and Switzerland in percent of turnover, 2013-2015. Source: Eurostat, calculations Wageningen Economic Research.*

Another conclusion from Figure 3.5 is that the operational profit margins for the milling and bakery industry are 5-10%. After deduction of the costs for purchases of goods and services and labour costs the costs for buildings and capital need to be paid. It can be expected that the costs for buildings etc. will be higher in Switzerland than in Germany because of the lower capacity per company. This could

explain why the profit margins relative to the turnover in Switzerland are lower in the milling and bakery sector.

3.5.4 Innovation and product differentiation

For the milling and bakery sector most innovations have an international character. This means that modern bakeries in the EU and Switzerland use the same technical equipment. Since also retail organisations are working cross border, the in-store innovations quickly are applied in several countries. For example, Bühler is an international leading company from Switzerland in grain technology. Applying innovations in bigger companies and stores takes place in Germany and Switzerland making the competition hard for smaller bakeries. Of course the average lower capacity per mill and per bakery in Switzerland makes it less efficient to introduce innovations than in Germany. The reality is that modern technologies are applied in both countries. The differences in innovation and product differentiation between Germany and Switzerland are limited and will hardly impact price differences between countries.

3.5.5 Government regulations, support measures and taxes

For the milling and bakeries, the relevant regulations of food safety are similar in Switzerland and the EU. Difference exist in the labelling requirements, as described in Section 2.6.2. The differences regarding the country of origin labelling of cereal based products like bread might be an impediment to trade. According to industry sources the requirement to list the country of origin makes imports more expensive, partly because of the additional labelling and partly because exporters from the EU are not always able to determine the origin of the wheat for each batch of bread. This also limits the availability of products for the Swiss market. For taxes see Section 2.6.7 and Section 3.7.5.

3.6 International trade in flour and bread

The international trade in flour and bread in Switzerland is small compared to total production. The flour production in Switzerland is estimated at about 350,000 tonnes in 2014, with imports of flour for human consumption ranging from 900 tonnes to 5,300 tonnes and exports ranging from 4,000 tonnes to 7,000 tonnes in the period 2010-2017. The import and export of flour is between 0.3% and 2% of total flour production. The import of bread in Switzerland reaches levels of 20,000 to 29,000 tonnes of bread per year. This equals about 5% of the bread consumption in Switzerland. Exports of bread from Switzerland are negligible. In recent years between 2010 and 2018, imports of bread have been slightly increasing, from about 12 thousand tonnes (bread put up or retail sale and bread not put up for retail sale; Source: Swiss Impex) to about 16 thousand tonnes. The average unit value of imports remained stable between 1.5 and 2.5 CHF per kg. Part of the explanation could be in fluctuating harvests of wheat in Switzerland; particularly in 2016, which lower the supply of bread wheat and consequently bread from Switzerland.

3.7 Retail

3.7.1 Market structure of retail

The food retail market in Switzerland is quite concentrated with Coop and Migros together having 86% of the market share of sales in supermarkets (see Figure 3.6).

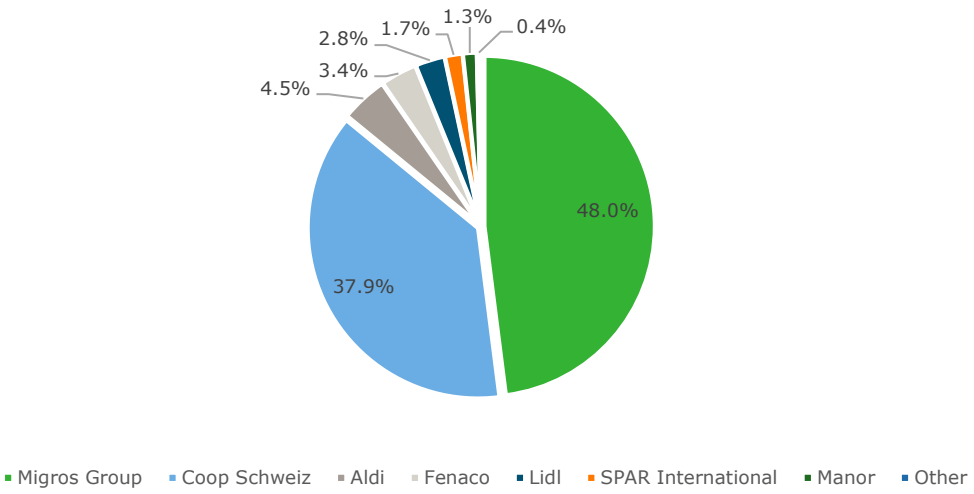


Figure 3.6 *Retailers' market shares in Switzerland, 2017. Source: IGD. Calculations Wageningen Economic Research*

The market is less concentrated in Germany, where the top 5 retailers have more or less the same share as the two biggest retailers have in Switzerland, see Figure 3.7. So in both countries a few retailers are supplying a big part of the market, but there is more competition in Germany. Of specific interest is the competition from low price discount supermarkets like Aldi and LIDL which are important supermarkets in Germany. Such competition is almost absent in Switzerland. In both countries, next to the supermarkets, there are small bakery shops supplying consumers with variety of (artisan) bread at a different (often higher) price.

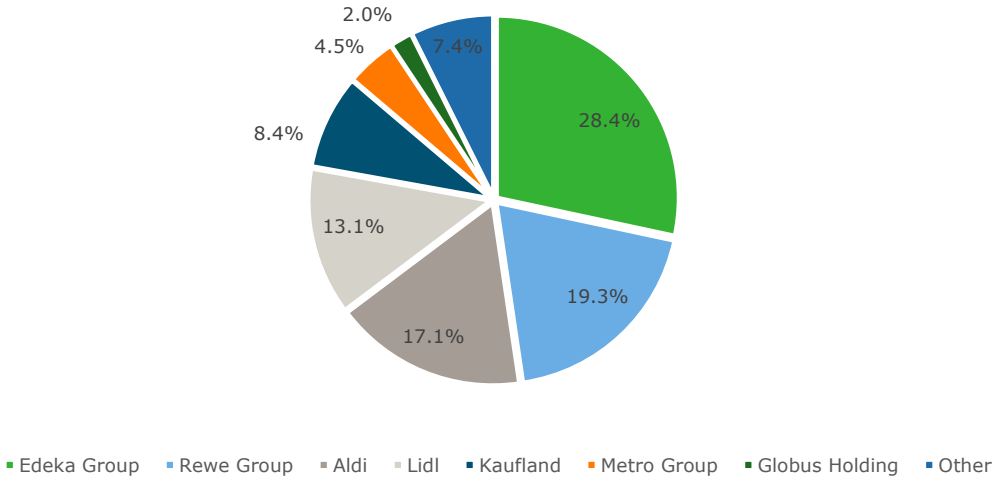


Figure 3.7 *Retailers' market shares in Germany, 2017. Source: IGD, calculations Wageningen Economic Research.*

3.7.2 Sales volumes

In Switzerland, in particular the discount supermarkets Lidl and Aldi were growing in recent years. While these discounters were also growing in Germany, some other retailers like Rewe and Edeka, as well as discounter Kaufland were also growing in Germany (See Figure 3.8 and Figure 3.9 for the supermarket channel sales growth). The market share of the supermarkets in the total sales of bread (in supermarkets and other outlets) for bread in Switzerland is estimated at 70 to 75% (based on information from the industry).

The data in the charts in this section refer to the turnover of all goods in supermarkets. No information could be found on the total sales volumes and values of bread in Switzerland and Germany. The larger supermarkets in Germany and Switzerland have their own (industrial) bakeries. Because of this in many cases selling prices for bakeries and buying prices for retail are not available at all or are not

transparent. Good information about prices and margins of these bakeries linked to supermarkets and supermarkets themselves is lacking.

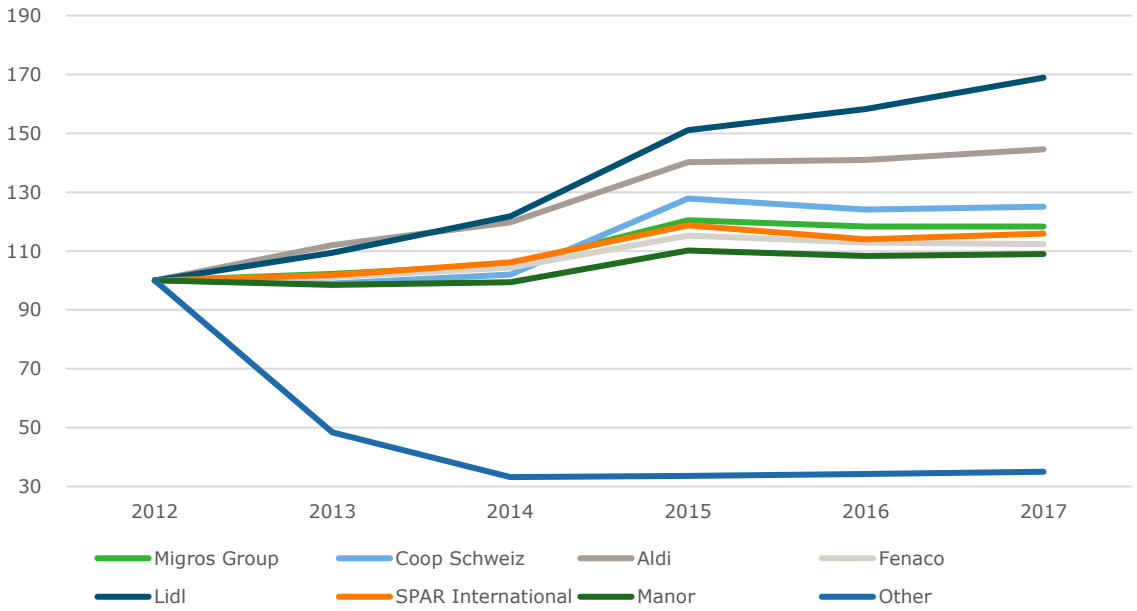


Figure 3.8 *Retailers' sales growth in Switzerland, supermarket channel, 2012-2017 (2012=100). Source: IGD, calculations Wageningen Economic Research.*

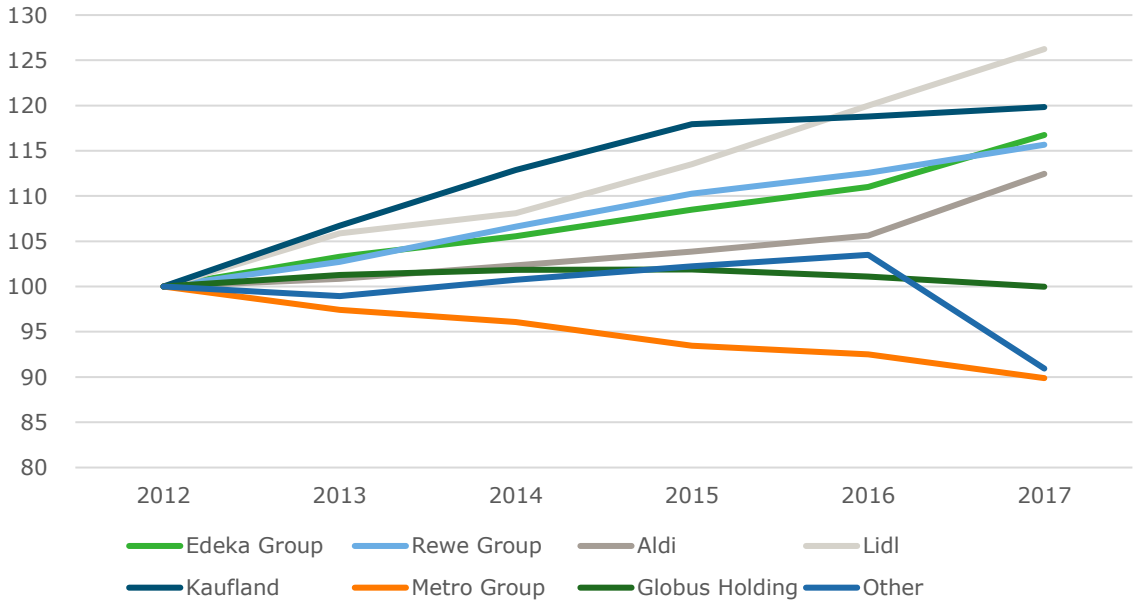


Figure 3.9 *Retailers' sales growth in Germany, 2012-2017 (2012=100). Source: IGD, calculations Wageningen Economic Research.*

3.7.3 Input use and costs

In Figure 3.10 the cost structure of retail companies in Switzerland and Germany is described for the period 2014-2016, being relatively stable over these years. For Switzerland, the same data is used as in the cases of yoghurt and ham in Sections 4.6.3 and 5.6.2.

The main differences between the Swiss and German retailers are:

- Material and services costs (75% of the turnover in Switzerland and 90% in Germany). It is estimated that the costs of material purchases are about 60% of turnover in Switzerland and

70% in Germany (Source: Orbis database Bureau van Dijk; calculations Wageningen Economic Research);
- Labour costs (15% of the turnover in Switzerland and 10% in Germany);
- Depreciation is estimated by Sustain Consult at about 4% of the turnover in Switzerland and 2% in Germany) (this is not described in Figure 3.10);
- Operational profit (defined here as turnover minus purchases of goods and services, labour costs, and depreciation) is estimated at about 6% in Switzerland. The costs are almost equal to the revenues in German retailing, leaving little or no profits (based on Eurostat data for 2014 and 2015).

In Swiss retail, labour costs are representing a larger share of total cost (Figure 3.10). But the higher profit margins are also noteworthy. With a 6% average profit margin, this factor adds another 0.35 CHF to the price of bread, more than all the extra costs at farm level (Source: Orbis database Bureau van Dijk; calculations Wageningen Economic Research).

Figure 3.10 *Cost structure of non-specialised retailers with food and beverages predominating, in Switzerland and Germany, in % of turnover, 2014-2016. Sources: Eurostat, Orbis database Bureau van Dijk; calculations Wageningen Economic Research.*

The study of BAKBASEL (2017) shows that the costs (purchases of goods and services and labour costs) of food retailing are about 82% higher in Switzerland than in Germany. The cost difference is shown to be primarily driven by (inland) purchasing costs which are calculated to be 150% higher in Switzerland (for all food). In the current study, data for the absolute cost differences of retailers for the distribution of specific products (like bread in this case) were not obtained. The average cost structure of retailing in Switzerland and Germany was applied to the respective gross price spreads (see Section 3.8). The cost structure of the total retail sector in Switzerland and Germany as shown in the BAKBASEL study (including non-food) is largely similar to the structure shown here in Figure 3.10, with the exception that the relative costs of material is somewhat higher and the relative costs of services a little bit lower for food retailing.

3.7.4 Innovation and product differentiation

The larger retail companies in Germany and Switzerland are reasonably comparable in terms of size and assortment. They offer a large variety of bread and pastry products reflecting the preferences of local consumers. Within the countries the retailers compete with one another for the consumer. Some of the retailers like Lidl and Aldi operate in several European countries and innovation and product differentiation will spread rapidly within and over countries. A relative large share of bread compared to other fresh products like meat, vegetables and fruit, still is sold by small bakeries. Therefore, supermarkets increasingly offer bread with added value, like 'artisan', gluten-free, or fresh baked in

the supermarket, in order to compete with small bakeries channels that traditionally sell high value bread products.

3.7.5 Government regulations, support measures and taxes

Within Germany and Switzerland no specific governmental support is given to the retail sector. With regard to taxes, we conclude that overall the income tax of companies is lower in Switzerland (net taxation is about 8% in the period 2014-2016) than in Germany (net taxation is about 18%) (Source: calculations Wageningen Economic Research on the basis of Bureau van Dijk Orbis database). General information about the income tax for companies is provided in Section 2.6.7.

There are no relevant (differences in) subsidies for the milling and bakeries industry in Germany and Switzerland. No support measures that influence the price difference between bread in Switzerland and Germany were identified in the case study, including the interviews of the private sector partner.

With regard to regulatory requirements, the differences in labelling requirements between Switzerland and the EU have to be considered here. As elaborated in Section 2.5.2, country of origin labelling is mandatory for bread in Switzerland but not in the EU. Thus according to the trade rules, this means that Swiss imports of bread are subject to country of origin labelling, which adds trade costs.

3.8 Consumption

Germany and Switzerland are both countries with a high bread consumption per capita. Different figures about bread consumption exists depending on the raw data. In Switzerland and in Germany the annual consumption of bread and bakery products is about 70 and 80kg per capita respectively. Consumption of bread is somewhat decreasing in both Switzerland (BSF, 2017) and Germany (Source: Zentgraf, 2017). Consumers have a strong preference for fresh bread. Most bread is baked, bought, and consumed on the same day or within a few days. Long distance transportation is not an option for fresh bread. Therefore, fresh bread is hardly traded between countries (see Section 3.6).

Prices for bread increased less than the prices of other consumption goods in Switzerland: bread increased in 2015 to about 150% of the price level of 1982 and consumer prices increased to about 160%. The lower increase of prices for bread specifically relates to the period 2010-2015 (BFS, 2017). The prices for pastry and confectionery products increased in the same period with 70 to 80%. The VAT rates differ for Switzerland and Germany. The VAT in Switzerland has a lower tariff of 2.5% compared to 7% in Germany (Source: https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/ documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf). Note that in both countries these are reduced rates for agri-food products.

There are subsidised private marketing campaigns to stimulate the consumption of bread in Switzerland.[21] In addition to those, there are no other general support programmes from the government for the consumption of bread.

3.9 Prices and costs along the chain

Different types of bread are available in both Switzerland and Germany. For comparability reasons, the studied products have more or less similar characteristics in terms of marketing segment and product quality. Wheat bread, of approximately 500 gr, non-organic, from mid-price segment available in the supermarket channel is taken as a standard product, with an average retail price of 6.00 CHF and 3.00 CHF in Switzerland and Germany respectively. For the analysis, conversion factors are used to define the transformation of raw materials and intermediate products like flour into the end

[21] https://schweizerbrot.ch/ueber-uns/

product: for 1 kg wheat bread 0.63 kg wheat flour is needed which is milled out of 0.85 kg wheat (sources are information from the Swiss industry combined with literature).

In this section the prices and costs at the various stages of the supply chain are combined to show how the various actors in the chain add costs and value to the end product. The numbers in Table 3.15 and Figures 3.11 to 3.14 are calculated on the basis of the information that is contained in Sections 3.3 to 3.8.

For 1 kg of bread 0,85 kg of wheat is needed. The wheat costs 0.48 CHF per kg, so 1 kg of bread contains 0.41 CHF of wheat (see Table 3.15). Given a price of 0.80 CHF per kg of wheat flour, about 0.50 CHF of flour is needed to produce a kg of bread. For Germany these figures are 0.14 CHF of wheat per kg of bread and 0.21 CHF of wheat flour per kg of bread. These numbers do not represent prices but actually are estimates of the shares of the various actors in the total costs or unit value of the end product. The unit in this case is a kg of 500gr of non-organic wheat flour breads sold in the supermarket.

Table 3.15 *Unit value along the bread supply chain, average estimates for the 2013-2016 period, in CHF per kg of end product*

	Unit value, in CHF		Difference in unit value, in %	Added value, in CHF		Difference in added value, in CHF	Difference in added value, in % of total unit value difference (3.01)
	Switzerland	Germany	CH/DE	Switzerland	Germany	CH - DE	CH/DE
Wheat, Farm gate	0.41	0.14	193	0.41	0.14	0.27	9
Wheat flour, Milling	0.50	0.21	138	0.09	0.07	0.02	1
Bread, Bakery	4.00	2.27	76	3.5	2.06	1.44	48
Bread, Retail excl. VAT	5.85	2.78	110	1.85	0.51	1.34	45
VAT	0.15	0.21	-29	0.15	0.21	-0.06	-2
Bread consumer price, incl. VAT	6.00	2.99	101				

Sources: Eurostat, Sustain Consult, SBC, retail price data from online and in-store checks. Calculations: Wageningen Economic Research.

The table shows that the consumer prices are twice as high in Switzerland as in Germany. VAT is a little bit lower in Switzerland, making the bread about 0.06 CHF less expensive compared to Germany. The largest differences in absolute terms of value added are found in the bakery and the retail level of the supply chain. These parts of the chain contribute the most to making bread more expensive in Switzerland than in Germany. However, it should be noted that in relative terms of the unit value, the farm level is where Switzerland is particularly more expensive than Germany. In relative terms the largest differences are found on wheat and flour level. Farm-gate prices are 193% higher in Switzerland. Nevertheless, this can only explain about 9% of the total price difference.

Figure 3.11 shows the differences in the costs and margins per value chain stage in Switzerland and Germany for the standard bread product in more detail. For comparison between supply chain stages, the shares of production costs shown in the previous chapters are proportionally transferred to the differences in their added value between Switzerland and Germany. Cost structures of total retail and bread manufacturing industry are used to estimate the costs per kg of end product. Although the specific costs of distribution for bread may differ from the costs of other products found in the supermarket, one can readily assume that the cost structure of selling bread is quite comparable to that of the average supermarket product. Especially since input costs are a major part of the costs incurred by supermarkets. Nevertheless, the reader should understand that these estimates are based on the costs of retailing for all products and not just bread.

The differences in price level per kg of end product at farm gate are mainly caused by higher gross margins, as explained in Section 3.3.3. The figure shows, as already mentioned above that the cost differences at the farm level are not what ultimately drives up the price the most. Although the farm costs are three times as high in Switzerland as in Germany, the differences in costs are much more pronounced in the bakery and retail level. The milling industry costs are just slightly higher than in Germany, mainly due to higher costs of inputs and higher labour costs. The non-labour costs that are not related to wheat are actually a bit lower in Switzerland than in Germany, although the differences are very small. In the bakeries and the retail the differences are larger. Especially labour and non-labour costs are adding to the prices in these stages of the supply chain. Although the bakeries are adding a lot of extra costs, their profit margins are slightly lower than in Germany. This is different for the retail level, where profit margins are estimated to be higher than in Germany.

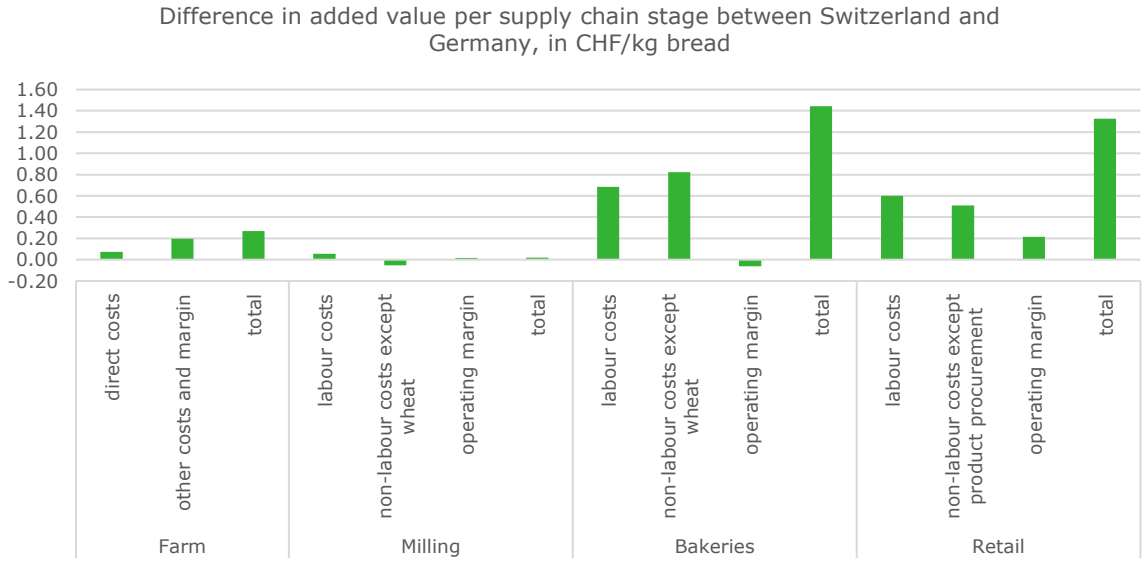


Figure 3.11 *Difference in added value per chain stage between Switzerland and Germany, in CHF per kg of bread. Sources: Eurostat, Sustain Consult, estimates Wageningen Economic Research based on Eurostat and interviews with industry sources. Calculations: Wageningen Economic Research.*

In Figure 3.12, Figure 3.13 and Figure 3.14 a slightly different approach to explaining price differences is taken. In this stylised value chain example, the farm, milling, bakery and retail gross margins, and the VAT sum up to the retail price per kg of bread paid by consumers. On the left the subsequent stages of the supply chain in Germany are shown in yellow. In red, the supply chain stages in Switzerland are shown. The end product price difference is shown in grey on the right (this might be the consumer price, the wholesale price or the manufacturer price depending on the specific chain that is being depicted). In the middle of the figures, in black, the difference between the price in Switzerland and in Germany at the border (at the importer level) is explained from the differences in VAT, the import tariffs, and other factors. If prices in Germany plus tariffs and other costs of trade were lower than domestically produced products, a positive margin would remain for any potential importer. The absence of imports would then reveal that other factors than the tariff and costs of trade alone explain the absence of imports and/or the prevalence of price differences. These factors can include a preference for Swiss products, legal requirements like labelling requirements, or private standards and quality differences. These factors could not be quantified in this study.

In the Figure 3.12, the bread supply chain is examined from the point of view of an importer of wheat for the production of wheat flour. It depicts the situation where the quota is already filled, hence with tariffs and without Guarantee Fund contribution. It shows the estimated costs (and gross margins) of each stage in the wheat flour value chain in the two countries, for producing a kg of our standard bread. Starting from the farm gate price in Germany of 0.14 CHF, the import tariff of 40 CHF per 100kg will add 0.34 to the price. The difference in VAT at the border is very small. Transportation

costs are estimated to be about 0.01 to 0.02 CHF per kg.[22] This will leave no remaining importer margin. The tariff is effective in preventing imports of wheat for the production of flour. From Section 3.4 it is noted that imports are limited to about 70 thousand tonnes within the quota (for which a lower tariff of 18 CHF/100kg applies). Imports outside of the quota are increasing but relatively limited. If prices in international markets are decreasing this could certainly increase incentives for millers to import wheat from abroad. On the other hand, millers and bakeries are to a large extent integrated into the supermarket supply chains, and the preference for domestically produced wheat will warrant that imports of wheat are mostly a necessity in times of shortage rather than an alternative.

In Figure 3.13 and Figure 3.14 the costs of importing wheat flour and bread are compared with the costs of buying wheat flour and bread that is domestically produced. In these figures, first the bakery and next the retail (supermarket) stage of the supply chain are included. For importers of wheat flour, with the prices and costs used in our study (which may obviously fluctuate over time), the tariff of 50.70 CHF/100kg is just about effective. There is no remaining margin for the importer (see Figure 3.13).

In the last figure, the whole chain is shown, and the tariffs on the imports of bread (for retail sale) of 38.40 CHF/100kg are shown to be not enough to explain the price difference (ignoring the non-quantified factors such as preferences, legal requirements, standards and quality differences). Swiss consumers pay a lower VAT rate of 2.5% compared to 7% in Germany. This means that they will pay 0.10 CHF less over the bread value of 2.27 CHF generated in Germany. This amount is shown as 'Difference in VAT at border' in the figure. There is a remaining gross margin for the importer which is rather substantial. Therefore, other factors have to explain the absence of imports despite of the margin and the prevalence of a price difference. The transportation costs of 0.05 CHF (see footnote 22) are higher than for wheat or wheat flour, but cannot explain the price difference. A preference for Swiss bread among consumers with specific characteristics of the fresh bread, and integrated supply chains, especially with Coop and Migros both owning their own milling and bakeries, and the production standards agreed with farmers, will prevent imports and hence sustain the price differences.

[22] Estimations of Wageningen Economic Research based on public quotes of cargo companies like https://della.eu/price/local/ and on Cerca et al., 2018 and several older public reports.

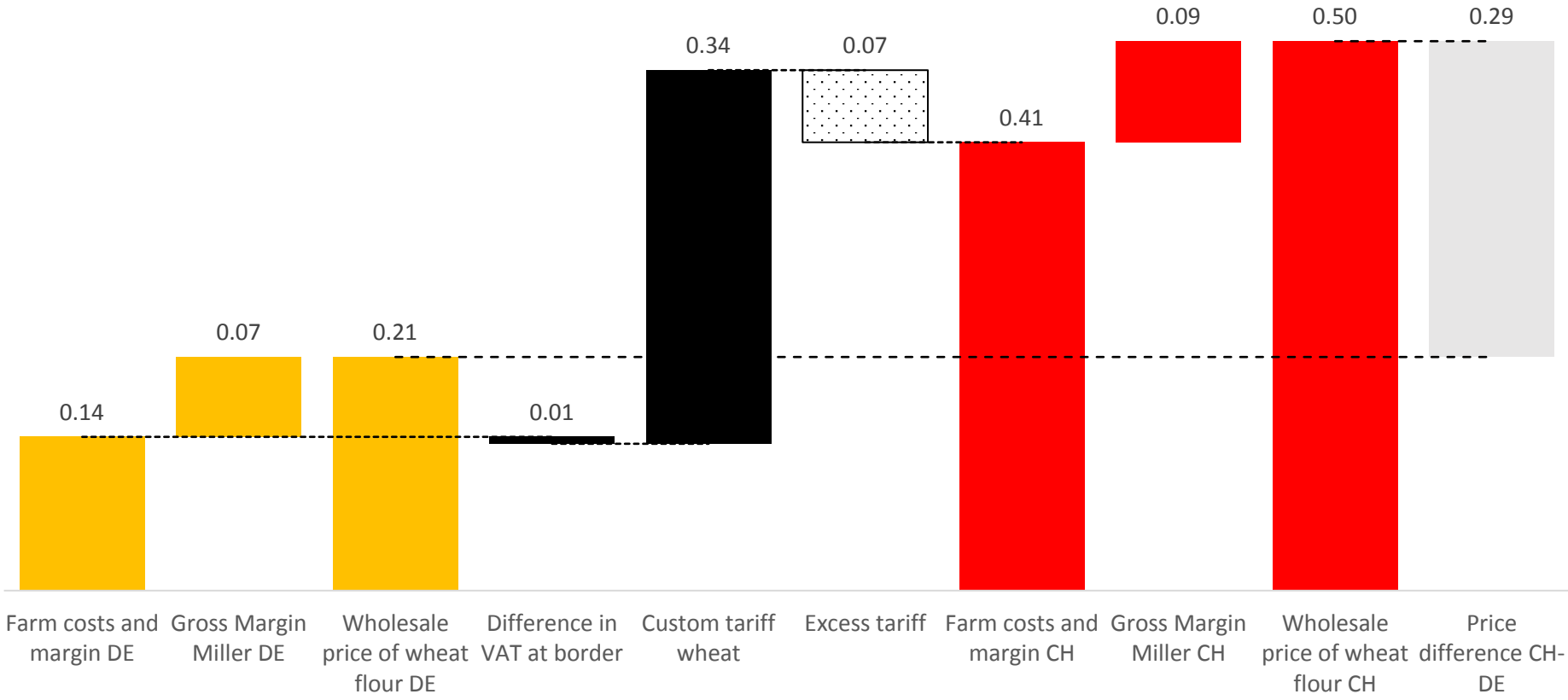


Figure 3.12 *Factors explaining higher price level for wheat flour in Switzerland compared to Germany, in CHF per kg of bread. Sources: Eurostat, Sustain Consult, estimates Wageningen Economic Research based on Eurostat and interviews with industry sources. Calculations Wageningen Economic Research.*

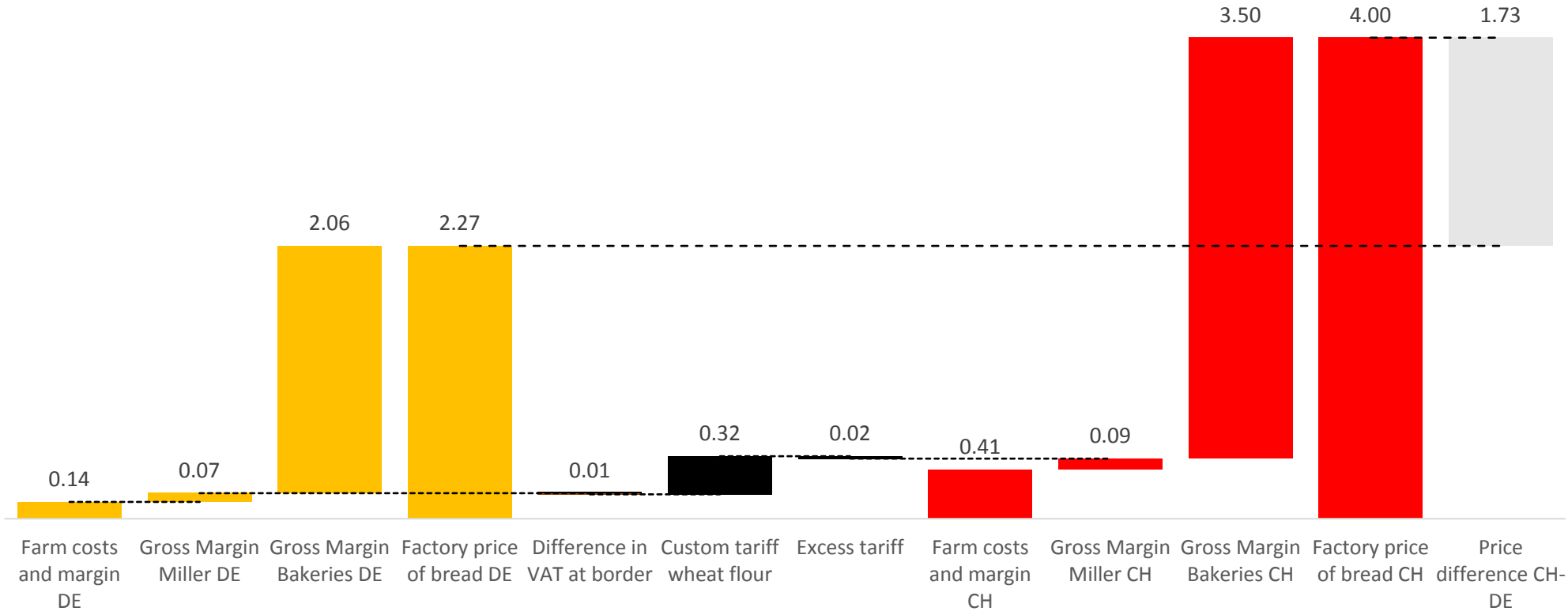


Figure 3.13 *Factors explaining higher price level for bread from industrial bakery in Switzerland compared to Germany, in CHF per kg of bread. Sources: Eurostat, Sustain Consult, estimates Wageningen Economic Research based on Eurostat and interviews with industry sources. Calculations Wageningen Economic Research.*

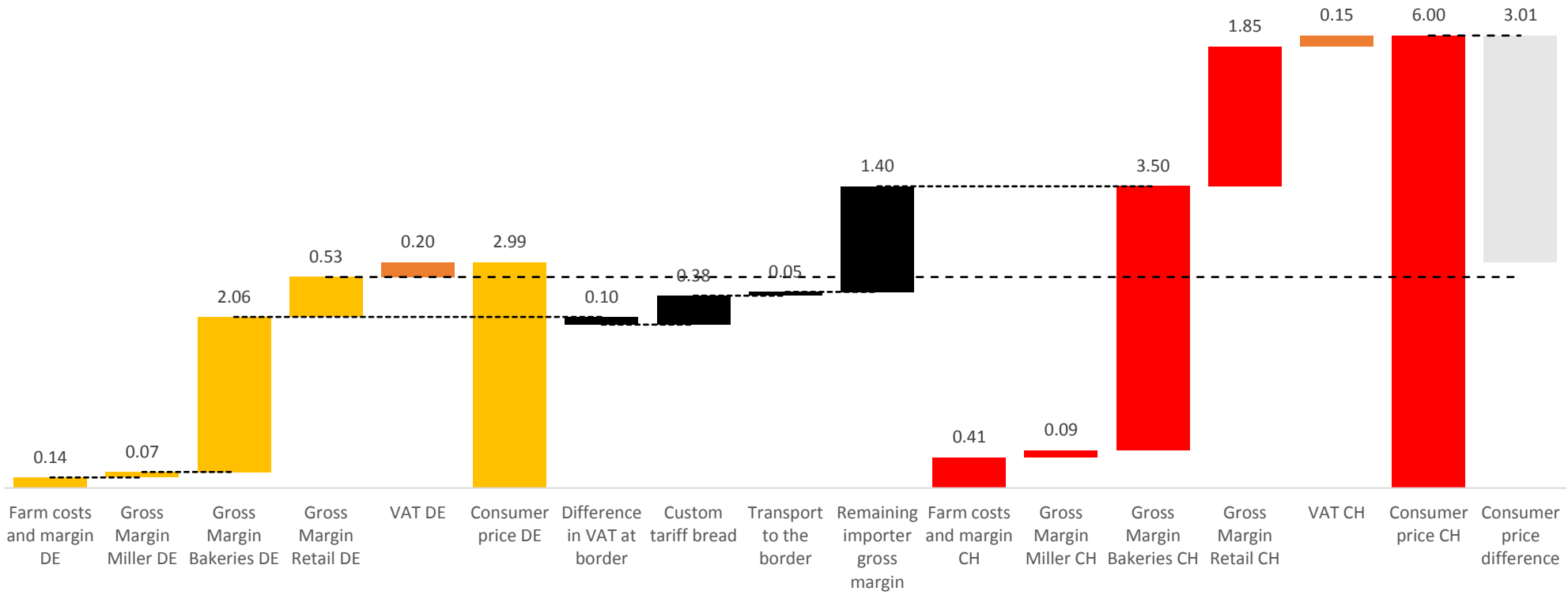


Figure 3.14 *Factors explaining higher price level for bread at retail level in Switzerland compared to Germany, in CHF per kg of bread. Sources: Eurostat, Sustain Consult, estimates Wageningen Economic Research based on Eurostat and interviews with industry sources. Calculations Wageningen Economic Research.*

3.10 Conclusions

1. The price difference for bread between Switzerland and Germany is about 3 CHF for a kilo of non-organic mid-price segment wheat bread in the supermarket channel. This means that the product is twice as expensive in Switzerland as in Germany. The prices can be maintained because of the import tariffs that restrict the imports of wheat, wheat flour and bread, as well as transportation costs, and a preference for fresh and local bread.
2. Imports of wheat flour for bread are mostly limited to the import quota, although they are increasing in recent years. Given the high tariff outside of the quota, outside quota imports are a limited part of the total supply of wheat for human consumption in Switzerland.
3. The amount of wheat necessary to produce one kg of bread (0.85 kg) will cost an equivalent of 0.14 CHF to be produced in Germany and 0.41 CHF to be produced in Switzerland. The difference in the costs is thus 0.27 CHF/kg bread. This is about 10% of the total price difference at the retail level. Hence, stricter regulations, smaller farms, higher input costs and other factors relating to the farm level of the supply chain only explain a small part of the price difference.
4. The wholesale price of wheat flour in Switzerland is about 0.50 CHF per kg. This means that the tariff on wheat is almost covering the full difference between production costs in Switzerland and in Germany. Imports are therefore not profitable and the mills are protected by the tariff.
5. For the imports of bread the tariff cannot fully explain the difference between the prices of Swiss produced bread and imported bread. However, importing bread is not very convenient as the product is highly perishable and hence fresh bread is hardly tradable. Other reasons for the low imports in bread and the prevalence of higher prices for bread in Switzerland are standards set by retailers and their vertical integration with the bakeries and millers in combination with the high market concentration in the retail sector. In recent years between 2010 and 2018, imports of bread have been slightly increasing, from about 12 thousand tonnes (bread put up or retail sale and bread not put up for retail sale; Source: Swiss Impex) to about 16 thousand tonnes. Part of the explanation could be in fluctuating harvests of wheat in Switzerland; particularly in 2016.
6. When 10% of the price difference is explained by higher costs at the farm level, the remaining 90% is due to higher costs and margins in the downstream part of the chain. Milling hardly adds any costs, but both the bakeries and the retailers in Switzerland account for almost half of the price difference at retail level. In comparison to Germany, Swiss bakeries face higher labour and non-labour costs, with the difference for non-labour costs being slightly more important. Swiss retailers also face higher labour and non-labour costs, with a lightly higher price difference for labour costs. However, bakeries are much more labour-intensive than retailers.
7. The market structure of the German retail sector is less concentrated than in Switzerland. This also holds for the (integrated) bakeries in Switzerland. Profit margins in Swiss retailing are also found to be larger than in Germany, with an average profit of 6% in Switzerland and almost 0 in Germany, it adds about 0.35CHF to the price of bread in Switzerland. An operational profit margin of 6% in Switzerland can be considered quite high in comparison to neighbouring countries. This factor adds more to the price of bread than all the additional costs at farm level combined.
8. To conclude, there are several factors explaining the higher prices in Switzerland, including costs for input goods, higher wages and higher profit margins on some stages. Further factors play a role, but could not be quantified, such as preferences, labelling requirements, private standards and quality differences. Tariffs have been found to make sure that imports to Switzerland are not attractive, except at the retail level. This allows to keep the Swiss price level high. Tariffs therefore protect some otherwise unprofitable stages in the value chain, like

the mills, and allow the retailers to benefit from rather substantial profit margins and from imports (although there are little imports of bread).

4 Yoghurt in Switzerland and France

4.1 Introduction

Yoghurt is a dairy food that is made by controlled bacterial fermentation of milk. In the first place, raw milk that arrives at dairies is standardised. This process includes reducing fat content by centrifugation and separating fat from milk. The solid contents of milk that is destined for yoghurt manufacture is increased by evaporation or addition of concentrated milk or milk powder. After adjusting the milk composition, stabilisers are added. After, the milk is pasteurised by heating to destroy the microorganisms that may interfere with the controlled fermentation process, and to denature the whey proteins. The standardised milk substance is fermented by adding yoghurt cultures until it becomes yoghurt. The type of yoghurt depends on the fat content of milk, the type of yoghurt cultures, the fermentation temperature (between 30 and 40 °C) and time (between 8 and 15 hours). For flavoured types of yoghurt, fruits and other flavourings, such as sugar, salt, and syrups, are added before packaging.

This study focuses on the comparison of the natural plain yoghurt value chain in Switzerland and compares it to the natural plain yoghurt value chain in France in order to explain the price differences of this type of yoghurt in the Swiss and French retail. This chapter continues with a description of the value chain for plain natural yoghurt in Switzerland and France (Section 4.2). In Sections 4.3 to 0 structural value chain characteristics and the value chain environment are explained for each chain segment and compared between the two countries. The differences in value chain characteristics and environment lead to different costs, margins and prices. Costs, margins and prices of yoghurt are summarised and compared in Section 4.8. In this section, factors causing the retail price differences of plain natural yoghurt are presented. Section 4.9 gives some concluding remarks.

4.2 Value chain map

Dairy farmers, dairy processors and retail are the most important actors, who add value to yoghurt sold in supermarkets. These are presented in Figure 4.1. Raw milk and (semi-)finished products are mostly traded between these actors. Dairy farmers deliver raw milk to the dairy processing industry that transforms milk into different products, including yoghurt. Yoghurt products are sold on domestic markets through the retail to consumers. Other actors, like transportation sector and marketing agencies, are involved in adding value as well. Their activities are often outsourced by the main actors, or performed by the in-house departments and are therefore included in the main actors' activities.

Yoghurt products are also exported or sold on other domestic markets like food service (e.g. restaurants), these are out of scope of this study.

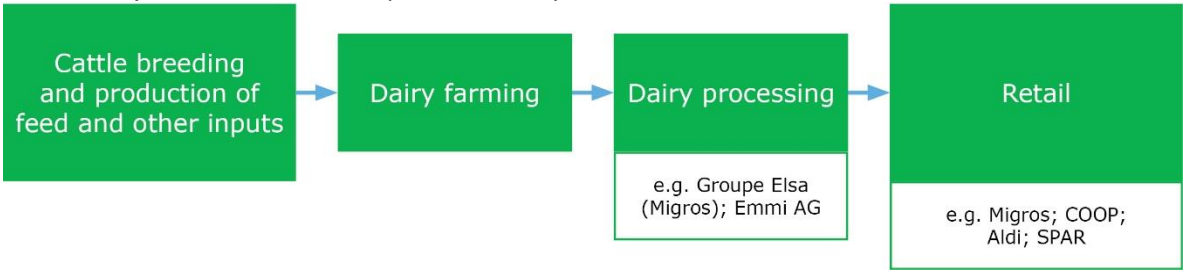


Figure 4.1 Overview of the value chain of yoghurt including examples of companies in Switzerland.

4.3 Agricultural production

4.3.1 Market structure of dairy farming

France has three main dairy areas: lowland dairy areas mainly in the North (Brittany, Normandy, other Northern France) with 45% of all farms and 49% of milk; crops and livestock areas with 29% of all farms and 32% of milk, mainly in the East (e.g. Lorraine); and mountains and piedmonts with 23% of all farms and 16% of milk (Alpes, Vosges, Jura and Massif Central) (IDELE, 2017). About 55% of Swiss farmers accounting for 64% of milk production are located in the valley regions; the other part is located in the mountainous regions (Swissmilk, 2018).

In Switzerland, the number of specialised dairy farms significantly decreased between 2005 and 2016. In 2005 there were about 30 thousand dairy farms in Switzerland, whereas in 2016, one third of these farms stopped operating or merged activities. In France, the picture is not different: in 2005 there were 62,350 specialist dairy farms, whereas in 2016 this number dropped to 39,950 farms (see Table 4.1).

Table 4.1 *Number of specialised dairy farms in Switzerland and France*

	2005	2007	2010	2013	2016
Switzerland	30,163	27,991	26,097	23,490	20,211
France	62,350	56,120	50,930	45,810	39,950

Source: Eurostat [ef_m_farmleg]; TSM Jahresstatistik Milchmarkt 2017

Compared to Swiss dairy farms, French farms are very large. In 2016, French farms had 92 dairy cows on average, whereas Swiss farms had 28 dairy cows. Within France, farms in mountainous areas have smaller herds, comparable to the Swiss average or less. During the past decades, French farms have faced ongoing consolidation trends with economies of scale and agglomeration (higher density production areas) leading to major cost efficiency gains, especially compared to Switzerland. The trend of consolidation and agglomeration of farms has been reinforced by the abolishment of the EU milk quotas in 2015, as French farmers have faced stronger competition, forcing weaker farmers to exit the business.

4.3.2 Production volume, value and prices

In 2017, Swiss dairy farms delivered 3.4m tonnes of raw cow milk to dairies. In France this volume amounted to 24.6m tonnes (Table 4.2).

Table 4.2 *Raw cow milk delivered to dairies in Switzerland and France, thousand tonnes*

	2013	2014	2015	2016	2017
Switzerland	3,383	3,512	3,457	3,407	3,410
France	23,989	25,309	25,375	24,453	24,606

Source: Eurostat [apro_mk_cola].

The yearly average milk delivery per cow is somewhat lower in Switzerland compared to France when all types of milk and holdings are considered (see Table 4.3). The yields of non-organic milk are higher compared to organic in Switzerland. Switzerland produces relatively more organic milk (7%) than France (2.2%) (Swissmilk, 2018; IDELE, 2017).

Table 4.3 *Yearly average milk production per dairy cow in Switzerland and France, tonnes per head*

	2014	2015	2016	2017
Switzerland (all types of milk, all holdings)	n.a.	5.96	5.95	6.01
Switzerland (non-organic only, based on a sample)	7.74	7.76	7.01-8.35	n.a.
France (all types of milk, all holdings)	6.84	6.93	6.74	6.84

Source: Eurostat; Agroscope Grundlagenbericht 2016. Calculation: Wageningen Economic Research.

Farm-gate milk prices differ significantly between the two countries, as shown in Table 4.4. The price of milk delivered to dairies is 53% to 89% higher in Switzerland than in France. In Switzerland, target prices for raw milk are set by dairy branch sector organisations.[23] There is price segmentation for milk by its quality and destination, e.g. milk for Swiss cheese specialties, or Käsereimilch, milk for other milk products, like yoghurt, or Molkereimilch, and organic milk. The price of non-organic Molkereimilch has been somewhat lower than the average price of all milk during the period 2013-2017 (Table 4.4). Käsereimilch is sometimes sold on the Molkereimilch market, mainly in cases of oversupply. The average milk price also includes all other differentiated milk types, like organic, which has been more expensive than conventional milk in both countries. In France the share of organic milk is relatively small and therefore will not significantly affect the average price (see also Section 4.3.4).

In France, like in the whole EU, world demand and supply for dairy have a large impact on the developments of prices the EU dairy farmers get for their milk. Price and market segmentation exists between e.g. organic and non-organic. After the abolishment of the quota, French farmers experienced competitive pressure on milk prices in two ways. First, there has been increasing EU competition in the dairy sector from other EU member states, which gives little space for the French dairy industry to pay higher prices for raw milk than its EU counterparts. Second, a new internal competition has arisen between lowland dairy specialised areas in the North, the Eastern areas and the mountainous areas. Some farms in the mountains areas succeeded in joining high quality cheese production chains, which allows them to get a milk price sufficient to cover extra charges due to the geographic conditions.[24] Other farmers are not able to valorise their milk adequately, and, in some cases accept an even lower milk price than elsewhere, due to their worse accessibility for milk collectors.[25]

Table 4.4 *Yearly average farm milk prices in France and Switzerland, in Swiss Franc per 100kg*

	2013	2014	2015	2016	2017
Switzerland: all milk	66.30	68.23	61.87	60.64	62.36
Switzerland: non-organic milk 'Molkereimilch, konventionell'	63.08	65.15	57.09	54.51	56.42
France: all milk	41.49	44.58	33.75	32.05	39.19
Price difference Switzerland versus France, all milk	60%	53%	83%	89%	59%

Source: Eurostat [apri_ap_anouta], Federal office for Agriculture, FranceAgriMer (for France 2017). Calculations: Wageningen Economic Research

The total production value of dairy farming in Switzerland is 2bn CHF and has been more or less stable in the period 2010-2017. In France, the production value has increased in the same period from 7.8bn euros in 2010 to 9.3bn euros in 2017. Although when converted to Swiss Francs, the French production value decreased from 10.8bn CHF in 2010 to 10.3bn CHF in 2017.

[23] https://www.swissmilk.ch/de/produzenten/
[24] A good example is the Comté area, see https://www.inao.gouv.fr/produit/3387
[25] With the Massif Central area being the most significant example (http://www.lafranceagricole.fr/actualites/elevage/massif-central-la-valorisation-du-lait-est-insuffisante-1,5,181399113.html)

Table 4.5 *Total production value of dairy farming in France and Switzerland, in million CHF*

	2010	2011	2012	2013	2014	2015	2016	2017
Production value at basic prises in Switzerland	2,110	2,152	2,075	2,200	2,378	2,120	2,044	2,067
Production value at basic prises in France	10,798	10,894	10,131	10,925	12,052	9,477	8,900	10,332

Source: Eurostat, eaa. Calculation: Wageningen Economic Research.

4.3.3 Input use and production costs

In dairy farming, the main inputs are feed and livestock supplies, veterinary treatment, milking and feed machinery and farm labour.

Figure 4.2 presents an overview of costs of milk production per litre of milk. Variable costs include feed and other variable costs, such as bedding for animals and veterinary assistance. Fixed costs include costs of machinery and buildings and rented land resources. Labour costs include paid labour costs only. The difference between milk price plus subsidies (orange star) and costs is farmers income per litre of milk.

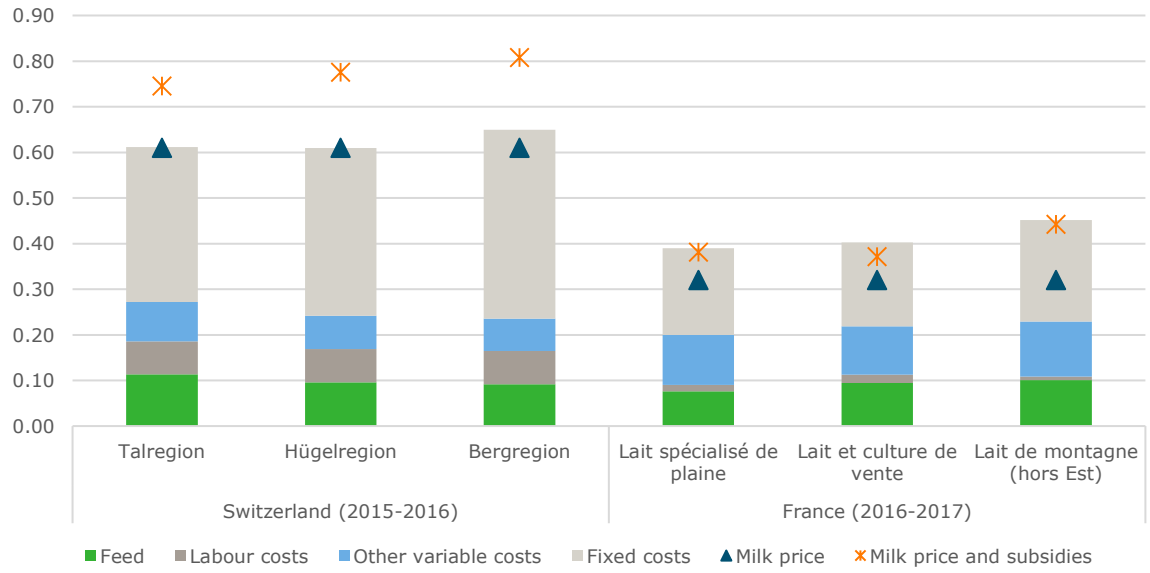


Figure 4.2 *Costs of milk production, subsidies and average milk price (all milk), in CHF per kg of raw milk. Source: Agroscope Betriebszweige & Grundlagenbericht 2016, FranceAgriMer Observatoire de la formation des prix et des marges des produits alimentaires 2016, Eurostat [apri_ap_anouta], Federal office for Agriculture. Calculations: Wageningen Economic Research.*

In Switzerland, the total costs vary per litre of milk per production region (Figure **4.2**). These differences are mainly due to differences in the fixed costs component. In mountainous regions, these fixed costs per litre of milk are relatively high due to smaller farm scales and more challenging geographical conditions. On the other hand, intensive livestock farming with indoor forage systems are often located in the valley regions, leading to higher costs of forage. In France, there are differences in costs between regional production systems (lowland, crop-livestock combined, and mountains and piedmonts) as well as differences with mountain milk, which has the highest per litre costs and the highest fixed costs component.

The total variable costs of inputs, excluding paid labour, for the three production systems are higher in France than in any of the three regions in Switzerland as shown in the figure. Especially veterinary costs and other variable costs are higher in France. The costs of feed per kilogram of milk are comparable or somewhat lower in France.

Switzerland has high sustainability farming standards. However, the costs of performing in a more ecologically friendly way has impacts on costs. Animal welfare considerations, such as smaller herds and bigger housing, impact efficiency. The requirements for concentrate feed composition are stricter than in the EU. Given that the prices of concentrate animal feed are about 2.5 times higher in Switzerland than in surrounding countries, it is estimated that per kg of milk Swiss cows consume about 2.5 times less concentrate animal feed, assuming that most feed costs are related to concentrate. Hence, Swiss farms more often apply pasture-feeding. The higher feed costs are in this way compensated by a higher use of own feed.[26]

Paid labour costs per litre of milk are about 0.06 CHF higher. But since the average farm in Switzerland is much smaller than in France, specifically the fixed costs differ a lot from France. Fixed costs are about 0.20 CHF per litre of milk higher in Switzerland than in France, even when compared with smaller scale French mountainous area farms. About 67% of the differences in total costs of dairy farms in valley regions between the two countries were attributed to fixed costs.

Remarkable are differences in average subsidies Swiss and French farmers receive per litre of milk. At the same time, these differences are expected. Apart from the differences in the EU and Swiss farm subsidy payment systems, and given that providing an acceptable farm income is an objective of policy makers in both countries, in a country with much smaller farm size and higher production costs, like Switzerland, the share of subsidies in the revenue per litre of milk is expected to be higher. Within the both countries, these differences exist between the mountainous regions and other regional production systems.

4.3.4 Innovation and product differentiation

In Switzerland, there is a certain degree of differentiation in raw milk destined to milk products, like yoghurt. Milk is produced and sold by different private farm- or retailer-initiated sustainability systems and programmes. Examples are pasture milk (Heumilch-Label),[27] and grassland milk (Wiesenmilch[28] under IP-Suisse label). These systems can lead to above-average cost of farming. The idea is that the consumer eventually will reward the sustainability efforts by paying a higher price for products with a certain sustainability logo.

Industry sources noted that farm-to-retailer vertical sustainability initiatives can lead to less switching of farmers from supplying to one retail chain to supplying to another. The requirements can differ per system, which involves higher transaction costs of switching for farmers.

In France, non-price competition is possible due to a high degree of farming diversity. There is a strong and old link between territory, typicality and image, which is used to attract consumers. About 15% of milk is differentiated by its origin, in which regional labelling and identities play a major role. Of all milk, almost 10% of milk has a Protected Designation of Origin mark (IDELE, 2017).

In addition, both countries produce milk with the Mountain label ('Lait de montagne'). 'Lait de montagne' is an administrative quality brand, which is known in Switzerland, France and Italy. In France, 16% of milk is produced in the mountainous areas (IDELE, 2017). In Switzerland this share is 36% (Swissmilk, 2018).

Both countries produce organic milk, although organic dairy farming is more popular in Switzerland than in France. In Switzerland, 7% of all milk is produced as organic (Swissmilk, 2018). In France, organic milk accounts for 2.2% of all milk (IDELE, 2017). The most recent numbers show, however, that organic dairy farming is growing fast in France. According to Agence Bio (2018), in 2017 the number of dairy cows under organic farm system (certified or in conversion process) was 27% higher

[26] Swiss Federal Office for Agriculture reports that up to 70% of fodder for cows comes from the meadows. See: https://www.cbd.int/financial/pes/swiss-pesagriculturalpolicy.pdf
[27] http://www.coop.ch/de/labels/heumilch.html
[28] https://www.ipsuisse.ch/richtlinien-wiesenmilch/

than in 2016. This means an expected increase of the share of organic cow milk to 5.4% when fully certified.

4.3.5 Government regulations, support measures and taxes

In Switzerland and the EU, milk producers receive support payments in terms of direct payments. Using available information of the latest Swiss agri-food report, and of FADN data for France, we calculated the degree of support in terms of the share in total production income. In Switzerland, about 33% of the production income of milk producers came from support measures in 2016. In France, it was only 18% in 2016. This means that the support of milk production is more pronounced in Switzerland than in France.

In order to show the level of protection of the milk market, we present the OECD estimates of nominal protection, see Figure 2.2: According to the OECD, the price difference between the domestic and international prices is rather large for Switzerland (between 1.15 and 1.81 in 2010-2016) compared to the EU (about 1.00 in the same time period) that also imposes measures to protect farmers and producers and can thus be considered as rather protectionist in comparison to other countries. With regard to border protection, Switzerland protects its domestic market, which is shown by the high values of the PSE estimates.

As described in Section 2.6.6, the 'cross-compliance' requirement is an important aspect for receiving direct payments in Switzerland. The 'cross-compliance' is more complicated and strict in Switzerland than in other countries, including the EU and thus also France. Every Swiss farmer who wants to receive direct payments must at least fulfil the so-called 'ecological proof of achievement' (ÖLN). The requirements of the ÖLN correspond to those of the Integrated Production in the year 1996, with some possible updates. The ÖLN was introduced in 1997. The Swiss cross-compliance based on ÖLN might influence the efficiency of dairy farms since particular requirements need to be followed and this might in turn lower the yields. Note that the subsidy paid under for ÖLN aims to compensate for the compliance costs caused.

Table 4.6 *Overview of relevant regulations applying to dairy farming in Switzerland and France, with an indication of their effect on prices*

Topic	Regulation/requirement in Switzerland	Regulation/requirement in FRANCE	Effect on relative price
Feed with GMO	Not allowed to be produced in Switzerland under moratorium, but can be imported. However, Swiss importers have been importing GMO-free products. [29]	The EU applies the precautionary principle by demanding a pre-market authorisation for any GMO to enter the market and post-market environmental monitoring. All food (including processed food) or feed which contains greater than 0.9% of approved GMOs must be labelled	Lowering costs of feed in EU; for an indication of the costs of GMO-free soy see Mann (2013)
Tariff Rate Quota	Import tariff on feedstuffs	No import tariffs in the EU internal market	Increasing price of feedstuffs in Switzerland by limiting supply and competition in the Swiss market

[29] Keeping Switzerland GMO-free, as envisioned in some areas already, would of course come at a costs. Mann and Venus (2015) conducted a cost-benefit analysis to investigate the situation of GMO-free milk in Switzerland. They estimated a welfare loss per consumer of about 1 to 5 euros. In their study, they also found that the private sector in Switzerland actually supports the idea of GMO-free production and for example does not import GMO feed for dairy cows, despite the additional costs due to higher feed costs.

Food safety, animal and plant health	• General Food Law with an orientation to the EU • Difference in animal health regulations are not expected: There is a Veterinary Agreement between Switzerland and the EU, which governs the control of animal diseases, trade in animal products/animals and which creates the basis for the common veterinary area. In the common veterinary area, border controls for animal health were abolished, with shipments from other countries being inspected when they enter the Swiss-EU veterinary space. higher costs for animal pharmaceuticals, however it can be expected that dairy costs need less given the size of the holdings, and husbandry.	• General Food Law • Animal Health regulations	Differences in labelling leading to additional costs, relabelling (see Section 2.5.2)
Animal welfare	Farmers receive payments if they participate in programmes like animal welfare programmes, and private labels. These result in additional costs of production. Similar animal transport regulations	Directives on the protection of calves, pigs and animals kept for farming purposes Private labels for quality and animal welfare Similar animal transport regulation	Stricter in Switzerland for the same production systems, but production systems/scales are different, and reimbursement for additional production costs and thus negligible price effect
Direct payments and subsidies	Producer Single Commodity transfers (OECD): about 40%. Using national statistics of 2016, direct payments made up for 33% of output value of milk production in Switzerland. The payments are subject to cross-compliance based on an 'ecological proof of achievement (ÖLN).	Subsidies amounted to about 18% of the output value of milk in specialised dairy farms in France in 2016. Direct payments are subject to EU cross-compliance that is less pronounced than in Switzerland.	
Taxes	Reduced VAT rate for food (instead of 7%): 2.5%	Reduced VAT rate for dairy (instead of 20%): Taxes are minimal, just 1% of output value	

Source: Expert and industry interviews, OECD, FADN. Estimations Wageningen Economic Research

4.4 Dairy processing industry

4.4.1 Market structure

In Switzerland, over 500 companies are active in the manufacturing of dairy products (including ice cream) as their primary economic activity (see Table 4.7). In addition, there are companies that manufacture dairy along with other activities like farming. Swissmilk (2018) reports about 600 Swiss cheese specialty makers ('Käsereien') and 90 other milk product manufacturers ('Molkereien') being active in the Swiss dairy making. From 90 other milk product manufacturers, which together process over two thirds of all collected milk, four companies use 90% of the raw milk supply: Emmi (3.4bn CHF turnover), ELSA (1.0bn CHF turnover), Cremo (607m CHF turnover) and Hochdorf (428m CHF turnover).

Vertical integration in the dairy processing is significant. ELSA is part of Migros group and a large-scale supplier of dairy products to the retailer Migros. Most products are sold under the Migros brand. Migros group is the leading retailer with almost half of the retail market (based on IGD). This makes ELSA the leading dairy processing company delivering to the supermarket channel. The second supermarket chain in Switzerland, Coop (38% of the retail market based on IGD), has different suppliers, of which Emmi is by far the most important domestic one. The majority of Emmi's products is sold under private label of its customers in Switzerland.

In France, there is quite some consolidation in the dairy processing market as well. However, the scale of full vertical integration between dairy processors and supermarkets like in the case of Swiss Migros Group is absent. There are almost 900 firms active in the French dairy industry (Eurostat sbs) (Table 4.7), but only a small number of large dairy cooperatives and private companies dominate the French dairy processing market. There are five prominent French dairy groups with international activities: Lactalis (world leader in the milk and milk product market, a family-owned company); Danone (world leader in the yoghurt market and waters market, quoted company); Savencia (cheese processor, quoted company); Bel (cheese processor, quoted company) and Sodiaal-Yoplait (cooperative involved in yoghurt processing, bottled milk, cream and butter, powdered milk). Other important players in the French yoghurt market are Yeo (a subsidiary of the cooperative Maitres Laitiers du Cotentin), Mamie Nova (Andros Group, national leader in the jam market) and Eurial (Agrial Group – the main Norman cooperative, also a dominant actor in the European market of fresh cut vegetables).

Danone and Yoplait lead in yoghurt and sour milk products. Lactalis Nestlé Produits Frais joint-venture also has some significant share in the yoghurt market. Information specifically containing the yoghurt market shares for the processing industries in France and Switzerland is not available. But given the fact that ELSA supplies Migros, its market share in yoghurt in Switzerland is not far from Migros' market share (see Section 4.6).

Table 4.7 *Number of enterprises, 2010-2016*

		2010	2011	2012	2013	2014	2015	2016
C105 - Manufacture of dairy products, including ice cream manufacturing	Switzerland	519	511	519	536	518	500	503
C105 - Manufacture of dairy products, including ice cream manufacturing	France	1,292	1,958	1,204	1,273	1,269	1,316	1,325
C1051 - Operation of dairies and cheese making	France	938	1,550	858	921	861	893	n.a.

Source: Eurostat sbs, calculations Wageningen Economic Research.

For the French processors, the private retailer brands market is important. However, the magnitude is different compared to Switzerland. The market share of private label products in the dairy market was about 35% in 2017 (source: Lineaire), including the production of 'Laiterie de St Père', a subsidiary of the Intermarché group. In 2017, Systeme U revealed a new partnership with a newcomer in France, the American company Shreiber, which will be the only private label processor for the Systeme U group in 2019. Apart from these players, three French processors compete in the French yoghurt private label

market; Yeo-MLC, Mamie Nova -Andros and Eurial. But there is more competition. A study by the FIMIF in 2017 ('Fédération Indépendante du Made in France') ranked the retailers depending on the share of products made in France, including yoghurt. Dairy products were ranked second with 71% of the products made in France (for comparison, fruit juices performance was only 34%). For the retailers' brands: Intermarché obtains all its dairy from France, Carrefour 96%, Auchan 47%, Systeme U 100%, Leclerc 44%, Cora 50% , Casino 44%, Aldi 58%, Monoprix (Casino Group) 38% and Lidl 100%. These figures show that a part of the private label dairy products is made outside of France. French processors face the competition on the French retail private label market from abroad as well.

4.4.2 Production volume, value and prices

According to Eurostat Structural Business Statistics (sbs), the turnover of the Swiss dairy industry, including ice cream manufacturing, increased from 7bn CHF in 2010 to almost 8bn CHF in 2016 (see Table 4.8). Specific data for dairy products and cheese making, excluding ice cream, are not available for Switzerland. The dairy and cheese making industry in France increased its turnover in euros, but in Swiss francs the industry went from 34bn CHF turnover in 2010 to 31.0bn CHF turnover in 2015.

Table 4.8 *Turnover of the industry, in million CHF, 2010-2016.*

		2010	2011	2012	2013	2014	2015	2016
C105 - Manufacture of dairy products, including ice cream manufacturing	Switzerland	6,945	6,644	6,865	7,259	7,625	8,026	7,776
C105 - Manufacture of dairy products, including ice cream manufacturing	France	35,242	33,550	33,347	36,639	38,708	32,052	31,021
C1051 - Operation of dairies and cheese making	France	33,989	32,445	32,192	35,446	37,515	30,990	n.a.

Source: Eurostat sbs, calculations Wageningen Economic Research.

In 2017, Swiss manufacturers used about 116 thousand tonnes of raw milk for 144 thousand tonnes of different yoghurt products (TSM Mehrjahresvergleich 2017). In France, the volume of curdled milk, cream, yoghurt and other fermented products manufactured in 2017 was 575 thousand tonnes, with a value of 668m euros (Eurostat Prodcom).

4.4.3 Input use and costs

Raw materials, such as raw milk and additives, are the main inputs of the dairy processing sector. The profitability of both the Swiss and the French dairy processing industries is comparable and accounts up to 5% on average (see Figure 4.3). Note, that these are profits before depreciation, amortisation and interest payments and taxes. Changes in stocks of finished products are not included, but these changes are negligibly small compared to the total costs.

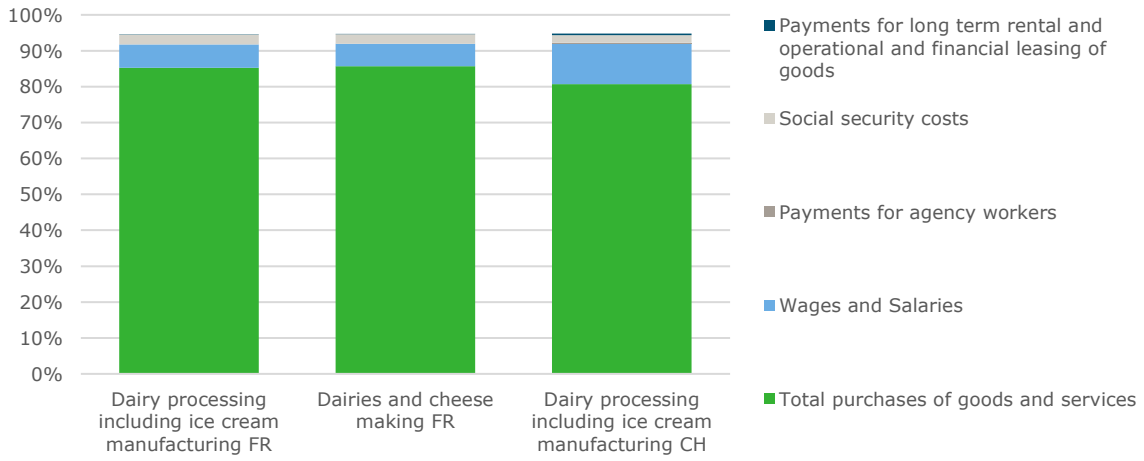


Figure 4.3 Costs of dairy processing in % of turnover, 2013-2015. Source: Eurostat, calculations Wageningen Economic Research.

Yoghurt processing technology is advanced and comparable between Switzerland and surrounding countries, but the cost structures differ. In the Swiss dairy industry, the costs of total purchases of goods and services accounted for 80% of the total turnover in the 2013-2015 period (See Figure 4.3). Its French counterparts (with and without ice cream manufacturing) had the total costs of purchases of goods and services of about 85% of the turnover in the same period.

According to the industry sources in Switzerland, the costs for raw milk account for 40-45% of conventional natural plain yoghurt industry price.[30] In France, the calculated share for the period 2010-2016 is about 28% (calculated from the data of FranceAgriMer). This means that the processing industry in Switzerland is efficient in the sense that they add relatively less costs in comparison to the French industry. On the other hand, it must be noted that in vertically integrated chains like in case of Swiss ELSA and Migros, it is less clear which agreements are made about the division of costs between the retailer and the processor, but the supermarkets are expected to bear a larger part of costs of marketing. The share of labour costs in France is 6%, which is significantly lower than 11% in Switzerland (see Figure 4.3).

4.4.4 Innovation and product differentiation

In absolute terms, France has more different processed dairy products than Switzerland, but this is mainly due to the difference in the market size. Both Swiss and French dairy processing industries are involved in product development, with on the one hand products differentiated by origin of milk, e.g. organic, and on the other hand, differentiation at processing level, like adding other ingredients and branding.

In Switzerland, yoghurt products 'aus der Region' are gaining in importance, but these are still a niche. Their production is covered by smaller regional dairy manufacturers. In general, Suisse Garantie[31] claim is basic for all dairy products in the Swiss consumer market.

Swiss industry indicates that, especially in case of yoghurt for the retail, product development is strongly linked to the developments in demand of retailers, and especially the two larger ones: Coop and Migros. Generally, in both Switzerland and France, product development for the retail label segment is aligned with the needs and demands of the supermarkets. Their demands can include quality and sustainability requirements for raw milk supply. This means that processors, who focus on products with different types of origin and sustainability schemes, have to manage different raw milk flows in their factories to start with. However, in the case of Switzerland, and especially for larger processors, product differentiation in limited markets reinforces lower capacity utilisation. In France, the retail market for processors brands is larger than in Switzerland due to the larger size and a larger number of retail operators competing by differentiating their yoghurt assortment. In addition, French processors have good access to export markets and sell large volumes of their production in other countries (see Section 4.5.2). For French products with processors brands, the focus of agreements between the retailer and the dairy processor lies more on volume and price, and consumer marketing strategy e.g. shelf space.

4.4.5 Government regulations, support measures and taxes

Food safety requirements can be considered to be the most relevant governmental regulations at this processing stage. According to the experts and the information by Baur and Nitsch (2013), they do not seem to differ much between Switzerland and the EU, more specifically France. We conclude that there is hardly any price effect that can be attributed to governmental food safety regulations.

[30] These figures are consistent with the results of Agridea (2012) study, see https://www.agridea.ch/publications/publications/marches-cooperation-internationale/marches-filieres/formation-des-prix-dans-les-filieres-agricoles-de-larc-lemanique/

[31] https://www.swissmilk.ch/de/produzenten/milchmarkt/dossiers-milchmarkt/suisse-garantie/

However, it should be noted that the 'Swissness' regulation and the associated label 'Made in Switzerland' could have an impact on the costs, and thus the higher prices in Switzerland. As inputs originating from Switzerland tend to be more expensive, given the market structure and protection in Switzerland, While dairy processors, and in our case study yogurt producers will be compensated for the additional costs by the price premium that consumers in Switzerland, and possibly elsewhere, are willing to pay for Swiss products, including dairy products like yoghurt.

Furthermore, the labelling of the country of origin could also affect prices due to additional costs of identity preservation for the processing industry. Baltussen et al. (2014) show that introducing country of origin labelling for milk products, would add about 0% to 8% to the costs of dairy processors. However, in recent years (2017-2018) in France experiments have been conducted with origin labelling of milk and milk products. Many of the French yoghurts already have the origin of the milk indicated on the packaging. The price effect is difficult to determine and may be revealed with the evaluation of country of origin labelling experiments in France. The additional costs of labelling will be analysed in an upcoming evaluation. Overall, we conclude that the price effect of country of origin labelling at the producer level can be expected to be negligible with mainly domestic and/or local milk being used in dairy processing. However, differences in labelling requirements are likely to cause higher costs for imports. Such costs occur however at the retail level (see Section 4.6.5).

4.5 International trade in yoghurt

4.5.1 Imports

Raw milk for processing is hardly traded between countries. The processing of raw milk starts as soon as possible after the delivery from farms. Long-distance transportation is not an option, as costs of assuring the quality of raw milk during the transport are very high. Therefore, most dairy processing industries get their raw milk supply from dairy farmers in the region. Within the EU there is some raw milk cross-border traffic in border regions, but this is very limited when related to the total amounts of raw milk destined for domestic dairy industries. Yoghurt products differ in their shelf live, but generally, processing makes them more suitable for long-distance trade.

Imports of yoghurt in Switzerland are limited due to the tariff regime (see Table 4.9). Outside of the tariff quota No. 7 a tariff of 686 CHF per 100kg is applicable. Within the limits of the tariff quota No. 7 a tariff of 18 CHF per 100kg applies. The average import value is around 4 CHF per kg (see Figure 4.4). This means that the tariff corresponds to an ad-valorem equivalent of roughly 170% which proves to be rather prohibitive considering the nearly absent imports of plain yoghurts. The imports are just 0.15% of the total yoghurt production. Imported yoghurt are mostly specialities, e.g. Greek yoghurt, that are destined for the Swiss foodservice sector.

Table 4.9 *Imports of yoghurt in Switzerland, 2010 and 2015-2017, in tonnes*

	2010	2015	2016	2017
0403.1091 - Yoghurt, whether or not containing added sugar or other sweetening matter (excl. yoghurt flavoured or containing added fruit, nuts or cocoa), within the limits of the tariff quota No. 7	175	168	165	157
0403.1099 - Yoghurt, whether or not containing added sugar or other sweetening matter (excl. yoghurt flavoured or containing added fruit, nuts or cocoa), out of tariff quota	16	22	21	22

Source: Swiss IMPEX database.

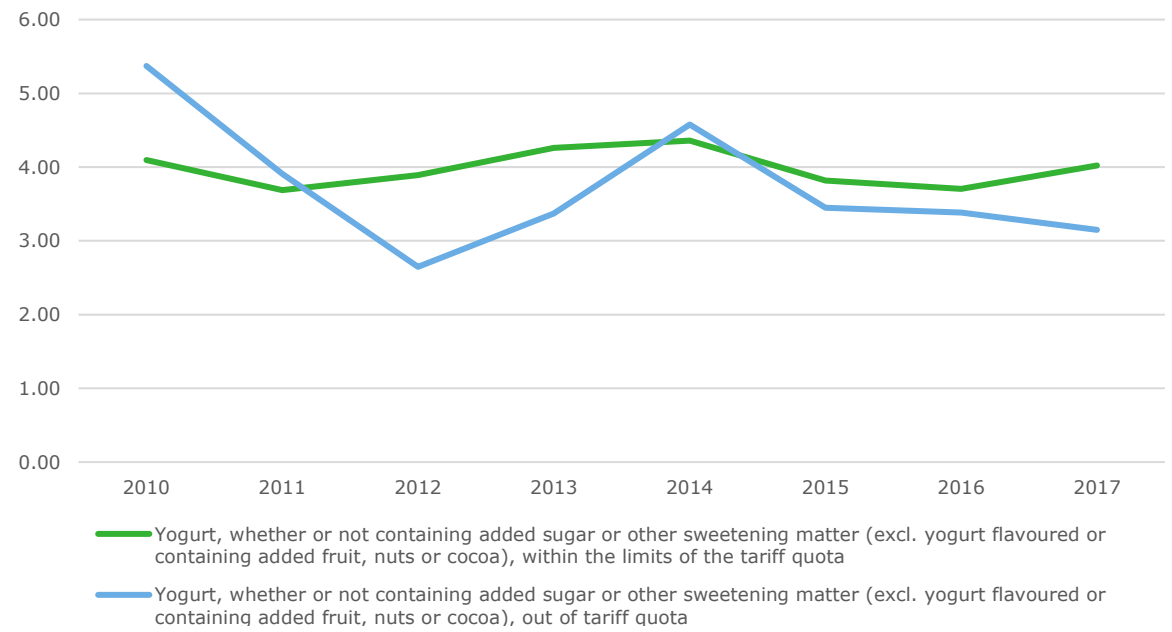


Figure 4.4 *Import value of yoghurt in Switzerland, 2010-2017, in CHF/kg. Source: Swiss IMPEX database.*

France imported yearly 83 thousand tonnes of curdled milk, cream, yoghurt and other fermented products on average in the period 2014-2016, with an average import value of 1.22 euros per kg, or 1.37 CHF. French import of these products is about 14% of own production.

4.5.2 Exports

The Swiss yoghurt production is almost completely destined for the domestic market. In 2017, Switzerland exported 779 tonnes of yoghurt, which is only 0.5% of the total production (Table 4.10). The high price of Swiss milk products and price pressure on the European markets due to own large milk supply are the main reasons for the absence of exports by the industry. Exported volumes are Swiss branded yoghurt specialties sold in the high price segment on foreign markets.

In contrast, France exports almost two-thirds of its production of curdled milk, cream, yoghurt and other fermented products. France exported on average 421 thousand tonnes of these products yearly in the period 2014-2016, with an average import value of 1.30 euros per kg, or 1.46 CHF.

Table 4.10 *Exports of yoghurt from Switzerland, 2010 and 2015-2017, in tonnes*

	2010	2015	2016	2017
0403.1099 - Yoghurt, whether or not containing added sugar or other sweetening matter (excl. yoghurt flavoured or containing added fruit, nuts or cocoa), out of tariff quota	598	887	930	841

Source: Swiss IMPEX database.

4.5.3 Government support measures, taxes and other external factors

In Switzerland, imports of most agri-food products that are also produced domestically are regulated either by single tariffs or, for a number of products, by a combination of relatively low in-quota tariffs and high out-of-quota import tariffs within a system of Tariff Rate Quotas (TRQ). For plain natural yoghurt an out-of-quota tariff of 686 CHF per 100 kilo is applied (tariff code 0403.1099) (2018 status).

4.6 Retail

4.6.1 Market structure

In France, there is some degree of retail market concentration, with the four biggest retail groups having over two-thirds of the retail market share. However this is nowhere near the Swiss retail market structure with Coop and Migros together having 86% of the supermarket share. In France, this market share is divided at least among six larger retailers.

In Switzerland, Migros group is leading in the sour milk and yoghurt market given its retail market share. Given the popularity and the number of stores of Coop, its position in the yoghurt market is close to Migros. No information about the shares in yoghurt sales is available for each French supermarket, but these are not expected to lie far from the total sales shares.

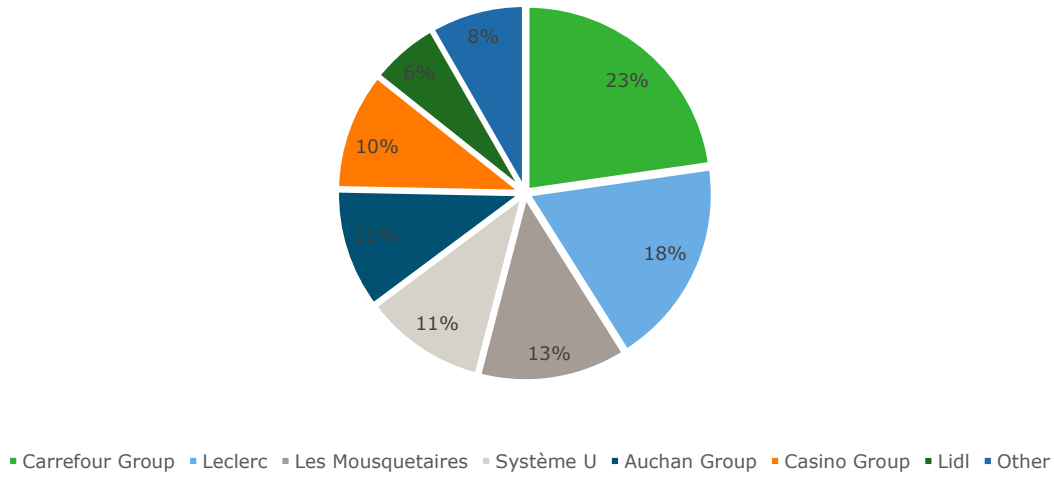


Figure 4.5 *Retailers' market shares in France, 2017. Source: IGD; calculations: Wageningen Economic Research.*

In France, to compensate the rather low level of concentration and to strengthen the negotiation position with suppliers, French retailers organise the so-called super purchasing groups ('super centrales') with up to one third of the buying market.[32]

4.6.2 Sales value

While the strong market concentration in Switzerland has remained stable over the last decade, the retail market in France observed a consolidation among the three main actors and a continuous loss in market share by the other actors. In Switzerland, the dominance of Coop and Migros stabilised. In France, the slow and regular progression of E.Leclerc, Intermarché (Les Mousquetaires group), Systême U and Lidl, was accompanied by the slow and regular decrease of Auchan, Casino, and Carrefour[33] during the period 2012-2017 (Figure 4.6)

The trend towards further consolidation in France is very modest; large market movements occurred more than 10 years ago. The only remarkable event is the ongoing success of the soft-discounter Lidl, which is gaining popularity among French consumers given its sales growth of over 40% between 2012 and 2017 to a market share of 6% in 2017. Lidl's low-price strategy has turned out to be successful in several EU countries, which means that other retailers are expected to experience

[32] Process Magazine estimated in May 2018 that the market was controlled by 3 'super-centrales': Carrefour-Système U-Cora, with a 34.2% market share, Auchan + Casino with a 21.8% market share, while E.Leclerc has a 21% market share. Some comments suggest that Leclerc is about to make an alliance with Intermarché to get a 35% market share.

[33] The most recent developments include the disappearance of Carrefour's DIA retail brand

competitive pressure on their prices in France.[34] At the same time Lidl succeeds to attract consumers by diversifying its assortment with cheaper premium products such as champagne or organic vegetables, often underling the French origin of its products to be able to appeal to different consumer niches.

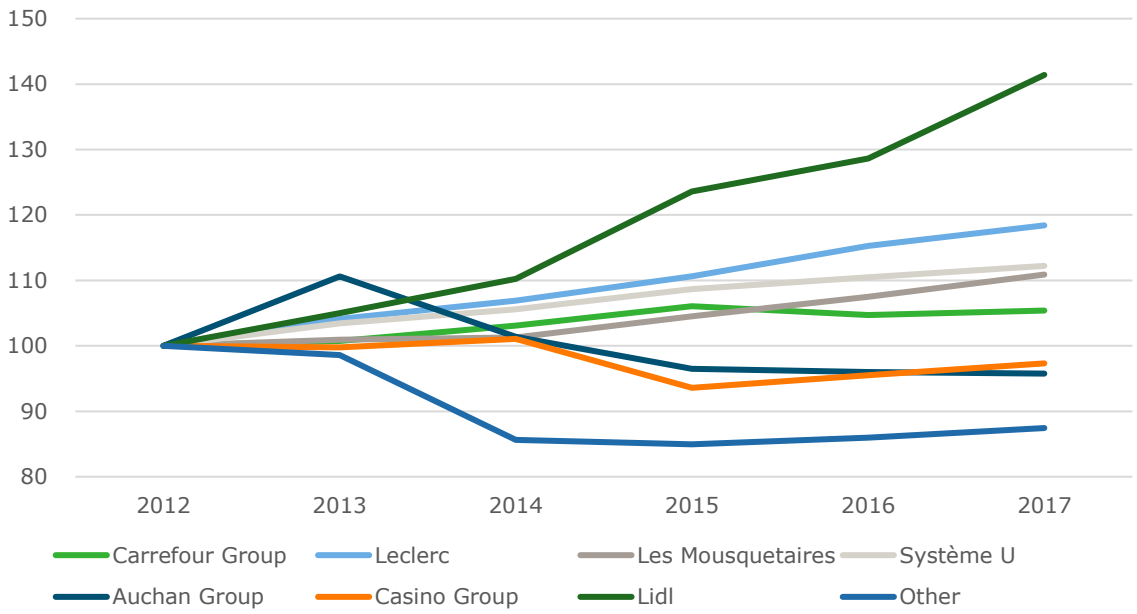
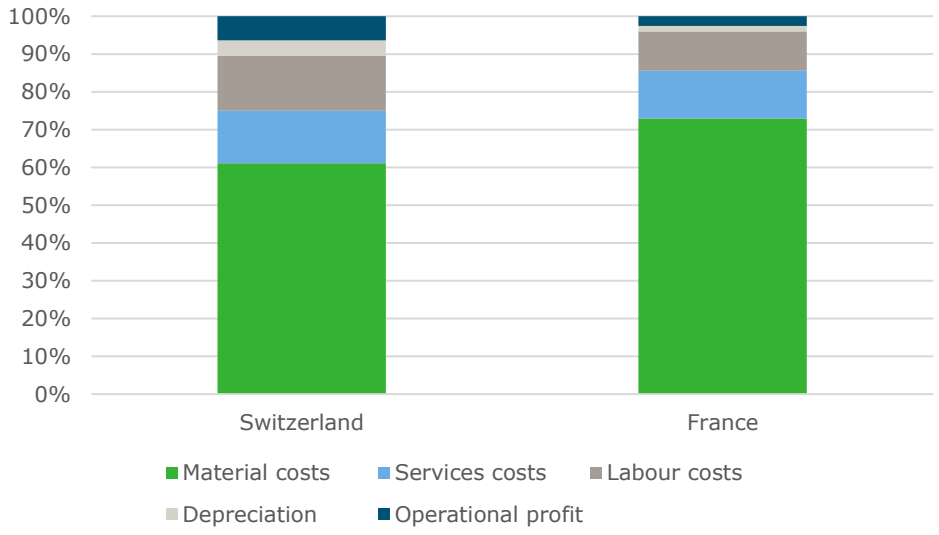


Figure 4.6 *Retailers' sales growth in France, 2012-2017 (2012=100). Source: IGD, calculations Wageningen Economic Research.*

According to data from IRI, the value of the yoghurt market in France was 2.2bn euros at consumer level (modern retailers, excluding organic retailers, traditional groceries, food service market), with a little contraction compared to 2016 (-0.1%). For Switzerland, this information is not available.

4.6.3 Input use and costs

Purchased goods and services, mostly goods for the re-sale in the stores, and labour are the most important inputs in the retailing business.



[34] On the other hand, new retail formulas are currently starting to emerge in the high-value niches as well: organic specialised chains, new concepts such as 'Grand Frais' (an integrated retail chain, specialised in fresh products: meat, fish, fruits and vegetables, dairy). These companies account, all together, for sales up to 5bn euros, that is to say a 3% market share.

Figure 4.7 *Cost structure of non-specialised retailers with food and beverages predominating, in Switzerland and France, in % of turnover, 2014-2016 average. Orbis database Bureau van Dijk; calculations: Wageningen Economic Research.*

In Figure 4.7, the data for the retail cost structure are presented. For Switzerland, the same data are used as in the cases of bread and ham in Sections 3.7.3 and 5.6.2. In Switzerland, the costs of purchased materials were around 60% of the turnover in the 2014-2016 period, whereas in France these costs accounted for around 72% (Figure 4.7). At around 14%, the share of costs for services is comparable. The share of labour costs is significantly higher in Switzerland (15%) than in France (10%). Operational profit is lower in France (3%) than in Switzerland (6%), with comparable profit taxes paid.

The study of BAKBASEL (2017) shows a cost difference for the combined costs of purchases of goods and services and labour in food retailing between France and Switzerland. The total costs of purchasing and labour (which is the majority of costs for retailers) are about 42% higher in Switzerland than in France. The cost difference is shown to be primarily driven by a difference in purchasing costs (60% higher in Switzerland). In the current study, data for the absolute costs difference of retailers for the distribution of specific products (like yoghurt in this case) were not obtained. The average costs structure of retailing in Switzerland and France was applied to the respective gross price spreads. The cost structure of the total retail sector as shown in the BAKBASEL study (including non-food) is largely similar to the structure shown here in Figure 4.7, with the exception that the costs of material is somewhat higher and the relative costs of services a little bit lower for food retailing.

4.6.4 Innovation and product differentiation

Two incentives can attract consumers: lower prices or a more attractive assortment. Both in France and in Switzerland, the yoghurt category within retail is diverse, reflecting the preferences of local consumers and the ability of industry and retail to meet consumer needs. In both countries, supermarket and manufacturer labels are available. However, for Migros most yoghurt products are supermarket label products, which are developed and marketed within Migros group. Both in Switzerland and in France, the yoghurt retail market is not expected to grow.

There are a remarkably large number of high added value products on the supermarket shelves in both countries. High added value products are launched in order to attract consumer niches that are willing to pay more for products with certain characteristics and high quality. In the natural plain yoghurt group, products with a profile of 'authenticity' (e.g. regional specialities), 'naturalness', 'convenience' (yoghurt snack, breakfast yoghurt), health (protein, lactose free) and organic products have higher per kg prices.

Retailers brands play an important role for the French and Swiss retailers as they give an extra margin to the retailers (low buying costs) and generate more 'traffic' in the shops, or attract more consumers to visit the retailers' shops, since the retailer brands are often competitively priced.

An important feature of the French retailing market, which reinforces product differentiation in France, is the importance of hypermarkets. Hypermarkets are very large shops (> 2,500 square meters with an average of 5,260 square meters) with a share of about 44% in the food retailing.[35] The shop sizes allow retailers and processors to offer a very large range of products. Even retailers' brands may be segmented, with premium products and low-end offers.[36]

[35] http://www.lineaires.com/

[36] The yoghurt product list in a French hypermarket is very long with many brands and many specialties: zero fat, low fat, high protein, with different bacteria (lactobacillus bulgaricus, streptococcus thermophilus, bifidobacterium longum, bifidobacterium lactis lactobacillus acidophilus.) with fruits and classical flavours, made from ewes and goats' milk, organic, 'bleu-blanc-coeur', 'old style', 'regional', 'direct from the farm', 'with premium ingredients', 'low cost', etc.

4.6.5 Government regulations, support measures and taxes

For yoghurt, differences exist in the labelling requirements regarding country of origin, as described in Section 2.6.2. If labelling requirements exceed the requirements in the EU this limits Swiss retailers in the possibility of their imports as not all suppliers in the EU can provide the necessary information or it is simply too costly for the importers. Labelling requirements can therefore present a significant trade barrier and limit competition in the already relatively small and concentrated market for food stuff in Switzerland.[37] For dairy processing this argument is less relevant as most of the raw milk used in the dairy processing industry is sourced locally. Natural yoghurt is produced mainly from French milk in France.

There are no relevant subsidies in France and Switzerland on yoghurts. No other measures are found that are directly aimed at affecting plain natural yoghurt sales at the retail. For taxes on profits see Section 2.6.7 and Section 4.7.4.

In general, the French food retail sector has low profit rates due to the high level of rivalry and because competition is mainly done on the basis of prices. Relationships between retailers and processors are often tense. The recent governmental action called 'Etats généraux de l'alimentation' (food national convention) can be seen as an umpteenth attempt to moderate the harshness of the relationships between farmers, processors and retailers and put down a new act that aims to build a new basis for commercial negotiations, which would be grounded on production costs rather than market prices. It is uncertain how much impact this initiative will have on trade relations along the chain.

4.7 Consumption

4.7.1 Consumption volume

Yoghurt is an important dairy product. In 2016, the consumption of yoghurt products in Switzerland was almost 17 kg per capita per year, as shown in Table 3.1. In France, the consumption of yoghurt, soft white cheeses and dairy desserts is about 28 kg per year, of which yoghurt accounts for about 20kg per capita per year. Each Frenchman eats 230 cups of ultra-fresh milk product a year (this includes fresh milk sweets, cottage cheese and all kinds of yoghurts).[38] This higher consumption of yoghurt in France is consistent with findings in Section 4.6.4, where it is shown that the French retail market has a broader range of cheaper low added value products in larger packaging.

Table 4.11 *Consumption of dairy products in Switzerland, 2014-2016, in kg per capita*

Product	2014	2015	2016
Consumer milk	56.7	54.3	53.3
Milk drinks	9.4	9.9	9.6
Yoghurt	**17.4**	**17.0**	**16.6**
Cream	8.3	8.2	7.9
Butter	5.3	5.2	5.2
Cheese and cheese specialties	21.0	21.6	22.0

Sources: TSM, SMP, SCM, Agristat Milchstatistik 2016

4.7.2 Consumer prices

The prices for natural plain yoghurt in the Swiss supermarkets varied from 1.70 CHF per kg (budget segment) to 11.50 CHF per kg in 2018 as follows from semi-structured online and in-store checks performed for this study. The price range of supermarket brands was 1.70 CHF per kg to 8.40 CHF per

[37] See for instance chapter D of the 2012 World Trade Report of the WTO for an overview. https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report12_e.pdf

[38] LSA magazine – January 2010 'Le yaourt à la peine'

kg. In France, the price range of natural plain yoghurt was 0.88 CHF per litre (bulk products, budget segment) to 5.63 CHF per kg in the same year. Supermarket brands varied from 0.88 CHF per kg to 3.16 CHF per kg.

4.7.3 Consumer preferences

Considering yoghurt, there are some differences in consumer preferences between Swiss and French consumers.

In Figure 4.8 the share of natural plain yoghurt articles for each of the five price categories in Switzerland and in France is presented in a histogram. Two leading supermarket formulas are taken in each country and assessed for their product range of natural plain yoghurt. In all supermarkets, articles vary from products with low added value and low per kilo price, to high added value, high quality, and high per kilo price. The natural plain yoghurt price range for each of the two countries is equally divided into five price categories: lowest, low, medium, high, highest. The results show that in France, over 75% of the articles in the natural plain yoghurt group fall into the two lowest price categories. For Switzerland, this share is 48%. Half of all yoghurts in Switzerland fall into the 'medium', 'high' and 'highest' price categories. This difference in price positioning of articles between the two countries is an indication of higher consumer preference for natural plain yoghurt products with added value and high quality in Switzerland. Relatively fewer articles in lower price ranges are also an indication of less competition in the lower price segment, putting less price pressure on the bottom of the market.

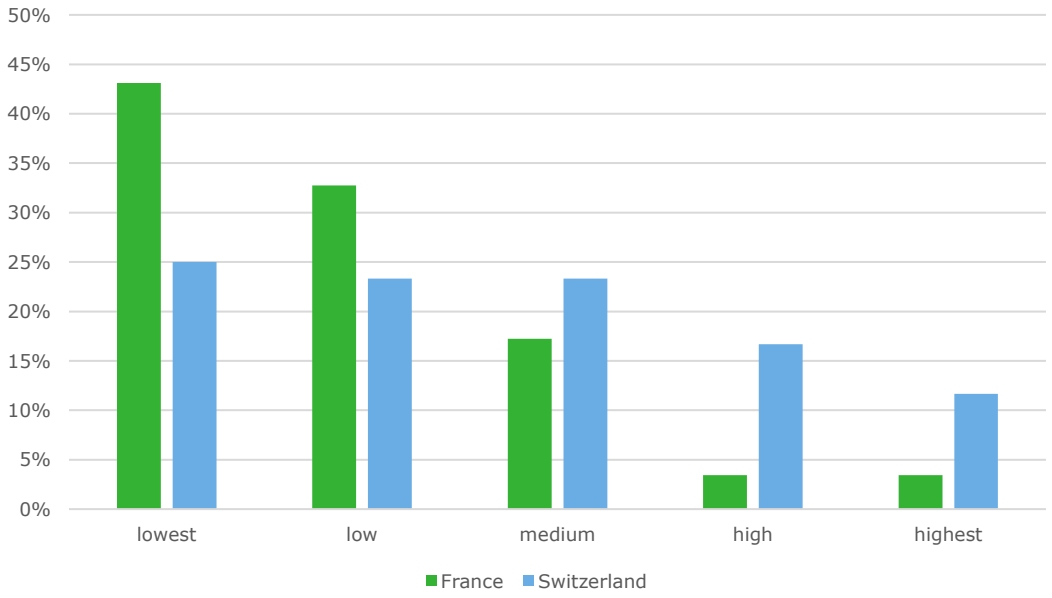


Figure 4.8 Share of plain yoghurt articles in five price categories, Switzerland and France, two large supermarkets per country, 2018. Price data from online and in-store checks. Calculations: Wageningen Economic Research.

4.7.4 Government regulations, support measures and taxes

VAT rates differ for this product. The VAT in Switzerland has a lower tariff of 2.5% compared to 5.5% in France. For both countries, this is a reduced VAT rate. General information about the income tax for companies is provided in Section 2.6.7. No other evidence for policy measures aimed at yoghurt consumption in general is found.

4.8 Prices and costs along the chain

In this section the results of comparing prices and costs for yoghurt in the Swiss and French value chains are presented. Different types of flavoured and non-flavoured yoghurt are available in various types of packaging in both France and Switzerland. For reasons of comparability, yoghurt that has more or less similar characteristics in both countries is the focus of this study (further referred to as the standard product). Plain yoghurt, supermarket label, non-organic, low-to-mid price segment is taken as a standard product as it is widely available in both France and Switzerland.

Preferably, compared products do not differ much in terms of packaging content, product quality and marketing segment between the two countries. In practice, however, there are small differences. Plain natural yoghurt with a fat content of 3-3.5% in packaging of 180 gr, marketed by one, two or four cups is seen most often across the Swiss retail. Other packaging contents are available as well. In France, plain natural yoghurt has a fat content of around 2%. The product is often sold in 125 gr cups marketed by four (500 gr), eight (1 kg), twelve (1.5 kg) or sixteen (2 kg) cups, or other packaging contents. For this study, the low-to-mid priced products with packaging content up to 500 gr in total are compared.

Table 4.12 gives the estimated unit value of the standard yoghurt product (or used raw milk) per kg of end product for the three stages of the value chain in Switzerland and France. For example, in Switzerland, from 2.22 CHF paid by consumers for a kilo of standard yoghurt product, 0.05 CHF is VAT. The retailer gets 2.17 CHF and pays 1.46 CHF to the dairy industry for the yoghurt. The dairy industry pays 0.62 CHF to farmers for raw milk.

The retail price for one kg of standard product is obtained from online and in-store checks.[39] The industry price for one kg of standard product in Switzerland is estimated from the milk cost share in the industry price as described in Section 4.4.3. For France, the average industry price for the product is based on FranceAgriMer data. The value of raw milk used for obtaining one kg of yoghurt is estimated using the average 2013-2016 milk price: the conventional non-organic Molkerei milk price in Switzerland and the all milk price in France shown in Section 4.3.2 are used. In addition, a conversion factor of 1.03 litre of raw milk per 1 kilo of yoghurt is applied.[40]

[39] For France the retail price for this type of yoghurt is consistent with FranceAgriMer data (see https://observatoire-prixmarges.franceagrimer.fr/resultats/Pages/ResultatsFilieres.aspx?idfiliere=6). For Switzerland, the price is consistent with the consumer price data from BLW (see https://www.blw.admin.ch/blw/de/home/markt/marktbeobachtung/milch.html).

[40] Since the fat content in the chosen standard products differ between France and Switzerland with 1%-2%, a way to correct the purchasing costs of raw milk is to subtract the calculated revenue for the French dairy processors for this amount of fat on alternative markets, e.g. butter market. However, this amount of revenue for 1-2 grams of butter is negligible when expressed in costs of raw milk per one kilo of end product.

Table 4.12 *Unit value along the value chain of standard yoghurt product used for the calculation in the study, average 2013-2016, in CHF/kg of end product at retail level*

	Unit value, in CHF		Difference in unit value, in %	Added value, in CHF		Difference in added value, in CHF	Difference in added value, in % of total difference in consumer price (0.38)
	Switzerland	France	CH/FR	Switzerland	France	CH – FR	CH/FR
Raw milk, Farm gate	0.62	0.39	59%	0.62	0.39	0.23	61%
Yoghurt, Processing	1.46	1.38	6%	0.84	0.99	-0.15	-39%
Yoghurt, Retail excl. VAT	2.17	1.74	25%	0.71	0.36	0.35	92%
VAT	0.05	0.1	-50%	0.05	0.1	-0.05	-13%
Yoghurt consumer price incl. VAT	2.22	1.84	21%				

Source: Eurostat [apri_ap_anouta], Federal office for Agriculture, FranceAgriMer; retail price data from online and in-store checks. Calculation: Wageningen Economic Research

From Table 4.12 it is clear that the retail price of this standard yoghurt product in Switzerland is 0.38 CHF per kg higher than in France. Also the unit values for yoghurt paid by the retail to the industry, and for raw milk paid by the industry to farming are respectively 0.43 CHF (25%) and 0.23 CHF (59%) higher than in France.

The results show that the value added per kg of standard end product is mainly higher in two stages: farming and retail. The dairy processing stage in the Swiss supply chain actually has lower value added than in France. The difference in retail value added accounts for 92% of the final price difference, while higher milk price in the farming stage account for 61% of the price difference.

Figure 4.9 shows the calculated differences in costs and margins incurred per value chain stage in Switzerland and France for 1 kg of the standard yoghurt product.

So far, the relative share of each cost component at sector level was presented for the processing and retail as seen in Sections 4.4.3 and 4.6.3. For calculating the absolute costs differences per value chain stage for the standard product, sector level cost structures of the processing and retail as described in Figure 4.3 and Figure 4.7 are used to estimate the absolute levels of different costs. The calculated added value of each of the two value chain stages from Table 4.12 is divided between the different cost items according the shares given in in Figure 4.3 and Figure 4.7.

As shown in Figure 4.9, the differences in price level per kg of end product at farm gate are mainly caused by higher per litre milk labour costs, and higher other fixed costs including the farm income without subsidies, as explained in Section 4.3.3. At industry level – besides the costs of purchasing milk – the costs are actually lower in Switzerland. Although labour costs per litre are higher in Switzerland, non-labour costs of processing per litre are much lower. The Swiss dairy industry confirms in the interviews that production is quite efficient. Another reason for the relatively low costs of dairy processing is the integrated nature of the value chain, where some costs of marketing (promotion and product development) may be covered by retailers instead of processors. However, in this study no specific data could be obtained with respect to these costs. Profit margins are comparable in CHF per kg of yoghurt. At retail level higher per kg labour and non-labour costs as well as profit margins cause the difference.

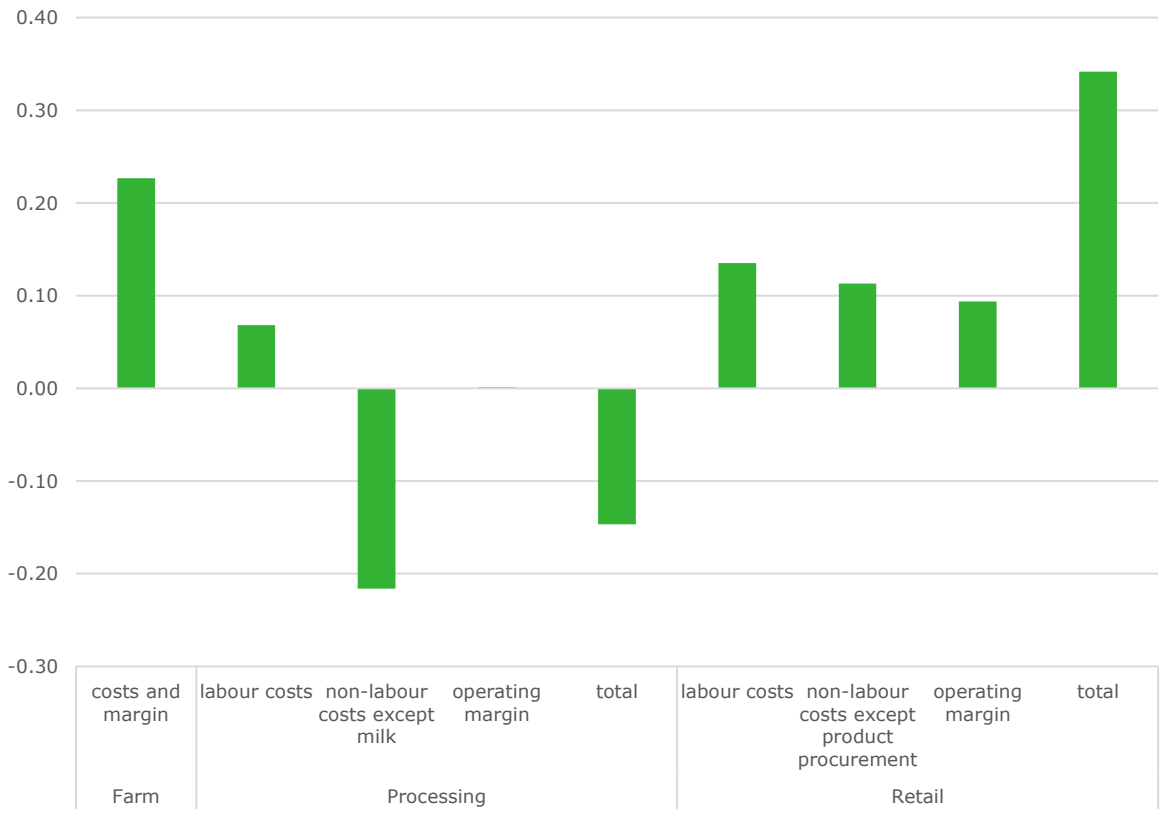


Figure 4.9 *Difference in added value per stage between Switzerland and France, in CHF per kg of standard yoghurt product chosen for this study. Sources: Eurostat, Federal office for Agriculture, FranceAgriMer. Calculations: Wageningen Economic Research.*

Figure 4.10 shows the gross margins per value chain segment and the consumer price for one kg of the standard yoghurt product. The gross margins of farm, processor and retail, and the VAT add up to the retail price paid by consumers. In the figure, these components are given in yellow for France and in red for Switzerland. The retail price difference is indicated in grey. Factors that explain the price difference between Swiss and French yoghurt are given in black.

In a situation without border protection measures for own agricultural products, Swiss retailers would tend to buy comparable cheaper yoghurt from abroad, particularly France in this example. Swiss consumers pay a lower VAT rate of 2.5% compared to 5.5% in France. This means that they will pay 0.04 CHF less over the yoghurt value of 1.38 generated in France. This amount is shown as '*Difference in VAT at border*' in the figure. On the other hand, yoghurt from abroad has to be transported to Switzerland, which increases the total purchasing costs of yoghurt for the importer with about 0.05 CHF per kg, shown in the figure as '*Transport to border*'.[41] The yoghurt produced in France is still 0.07 CHF per kg cheaper than the price of the yoghurt produced in Switzerland (1.46 CHF per kg).

In case of plain natural yoghurt, an out-of-quota tariff of 6.86 CHF per kilo is applied (tariff code 0403.1099). The tariff is effective and prevents from large-scale importing, which is consistent with findings in Section 4.5.1. If this tariff is applied, retailers will prefer to buy more expensive domestic yoghurt at 1.46 CHF per kg. Given the fact that the Swiss retail gross margin is almost two times the French, Swiss consumers will end with the per kg price of 2.17 CHF excluding VAT. The tariff therefore allows to keep Swiss prices high and mostly prevents imports.

In addition, the figure also shows that for the chosen standard yoghurt product, an excess out-of-quota tariff barrier of 6.79 CHF is identified in this case. The custom tariff system does not

[41] These per kg transport costs are estimated using current (October 2018) rates of cooled road transportation in 20t trucks provided by several road transportation companies online.

discriminate between high added value and low added value natural plain yoghurt products. The excess custom tariff for this particular product is consistent with the idea that a single tariff barrier is aimed to protect the whole natural yoghurt market, including the higher price segment. The small high-value import figures from Section 4.5.1. concern products that can be sold at a very high price. Prices of up to 11.50 CHF per kg can be found in the Swiss retail as shown in Section 3.7.4 or even higher in other sales channels like restaurants.

Even for within quota imports with an applied tariff rate of 18 CHF per 100kg of yoghurt, the tariff is effective for this case, although the remaining excess tariff barrier is only 0.11 CHF per kg of yoghurt.

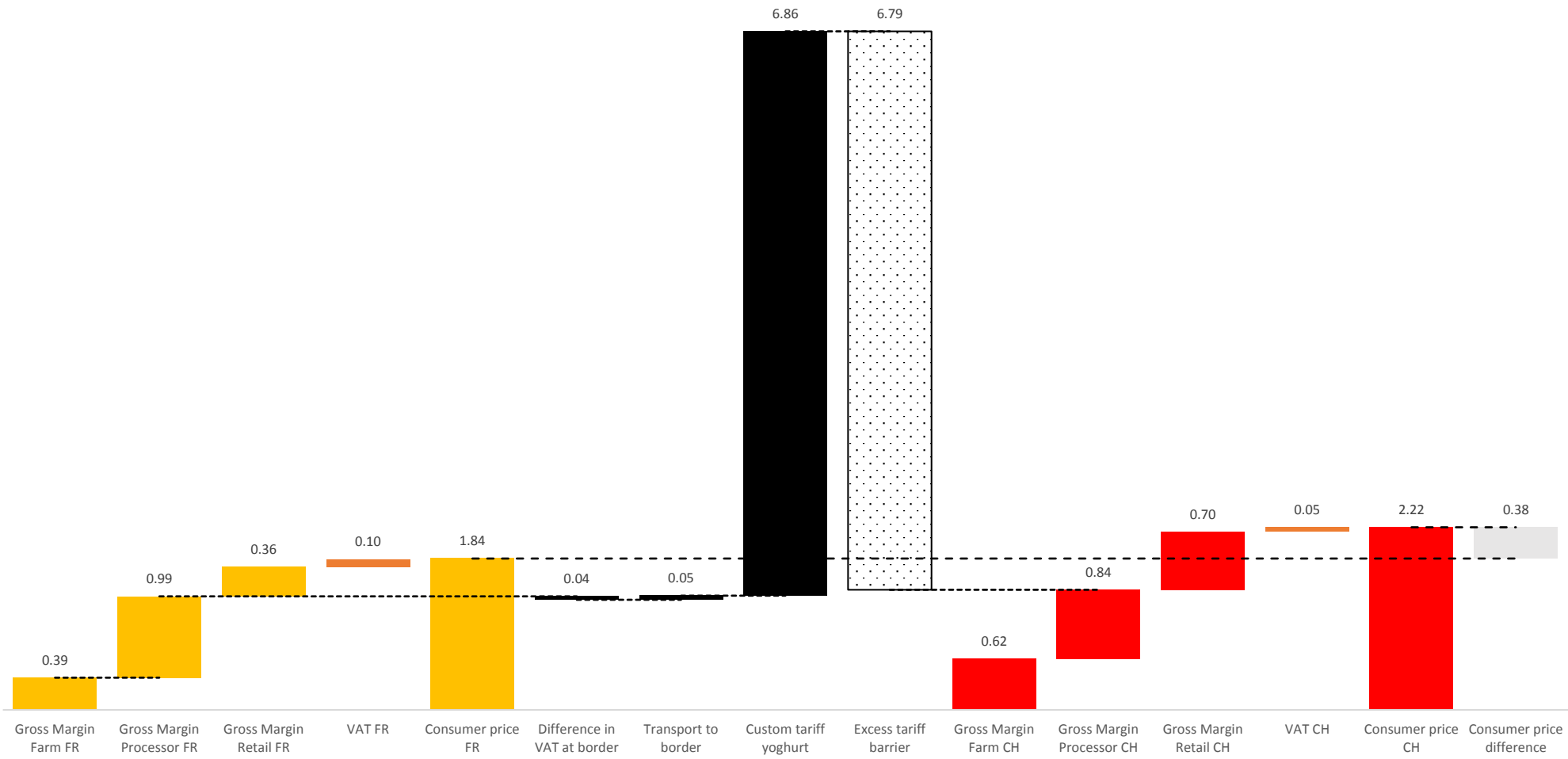


Figure 4.10 *Prices and gross margins for yoghurt in Switzerland compared to France, in CHF per kg of yoghurt at consumer prices. Sources: Agroscope, Eurostat, FranceAgriMer. Calculations Wageningen Economic Research.*

4.9 Conclusions

1. The price difference for plain natural yoghurt between Switzerland and France is 0.38 CHF for supermarket label, non-organic, low-to-mid price segment yoghurt.
2. The in-quota import tariff for plain natural yoghurt is 686 CHF per 100kg or 6.86 per kg of standard yoghurt. This tariff is large enough to keep Swiss prices high and to effectively prevent all imports, except for the expensive high-end yoghurts. The wholesale price of yoghurt in France is about 1.38 CHF per kg. When the tariff rate is added, a price of 8.24 CHF per kg results. Another reason for the absence of imports and the prevalence of a higher price in Switzerland are retailers standards and integration with the dairy processors, as well as a preference for Swiss products among consumers.
3. The difference in farm-gate prices of raw milk was about 0.26 CHF. This results in a difference of 0.23 CHF per kg of yoghurt. Differences in cost levels of farms and high standards for sustainable farming induce higher costs for milk in Switzerland. The average dairy farm in Switzerland is smaller than in France. The small scale of the farms is causing some inefficiencies that increase the costs.
4. Notwithstanding the import tariffs, the price difference at consumer level is mainly caused by higher costs at farm level, and higher gross margins of the retail. The processing industry in Switzerland is efficient in the sense that they add less costs in comparison to the French industry. In terms of the relative profit margins the French and Swiss dairy industries are comparable. The French companies are however much larger, much more export oriented and have strong brands. In Switzerland, retailers and milk processors are to a large extent vertically integrated. It is therefore probable that the supermarkets bear a larger part of the costs of marketing. For example, at Migros, nearly all natural plain yoghurts are sold under own private label brands.
5. The market structure of French retailing is less concentrated than in Switzerland. French retailers have some buying market power through the purchasing organisations, but on the whole their organisation is less efficient and they are less powerful vis à vis suppliers. Profit margins in Swiss retailing are more than twice as high as in France.
6. Swiss processors and retailers work together or are vertically integrated to reduce costs and create more value. French supply chain actors on the other hand have a more conflictual relationship and are less cooperative to save costs and create value.
7. The yoghurt assortment in Switzerland indicates a higher consumer preference for high added value and quality products than in France. The number of low-priced yoghurt articles in Switzerland is relatively low, which indicates less competition in this price segment than in France. Higher incomes in Switzerland allow consumers to pay a price premium for an additional quality.

5 Cured ham in Switzerland and Italy

5.1 Introduction

Hams are made of pork legs. They include both wet-cured and dry-cured cuts or slices of pork, and can either be smoked or not. The curing as well as the smoking is done both to preserve the meat and to create a specific taste. In this case study we look at dry-cured hams specifically. Dry-curing involves covering the meat with salt (and in some cases nitrates) and pressing to extract the moisture from the ham. Afterwards the hams are hung to dry for anywhere between five to six months and 2 years, depending on the type of ham. Enzymatic processes from lacto-acid bacteria cure the meat and give it its typical flavour. The age, weight, and origin of the pigs varies depending on the type of ham.

Some of the dry-cured hams, such as the Italian Prosciutto di Parma and San Daniele, have EU Protected Designations of Origin (PDO), which are meant to protect names of products that are made according to specific high-quality traditions that can be linked to a region. This makes these special hams unique in their production processes and associated costs. In Switzerland, a similar system of PDO and PGI quality labels exists. One of the cured hams that is registered as 'indication géographique protégée' (PGI) is Jambon Cru du Valais. Although production requirements differ it is possible to compare dry-cured hams from Switzerland and Italy and discuss the potential sources of differences in prices between them. More specifically – as much as possible - we will compare air-dried ham from Switzerland (typically defined as 'Rohschinken' in the Swiss retail) with Italian Parma Ham.

Supermarket prices of cured ham are about 40% higher in Switzerland than in Italy. This difference in prices will be explained by looking at the costs of production and distribution. Specific attention is paid to the role of market structure and trade barriers.

5.1.1 Value chain map

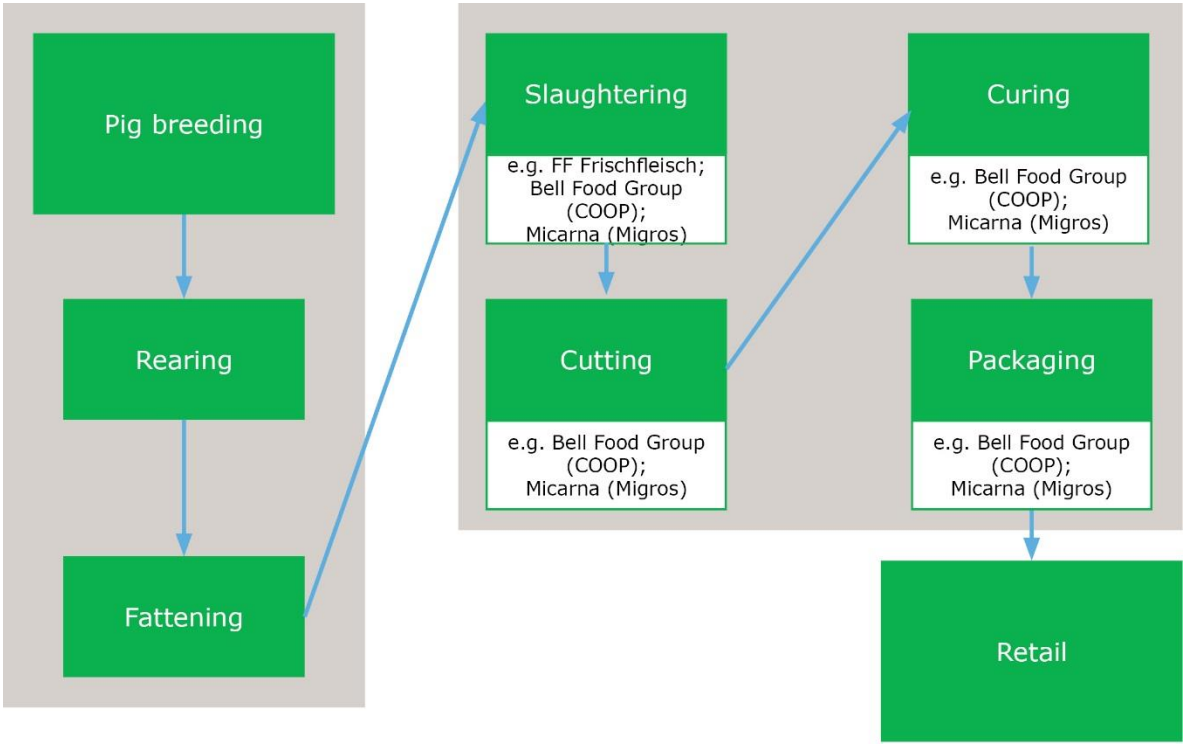


Figure 5.1 *Value chain map of cured ham in Switzerland.*

The value chain map shows all the stages of production and the specific role of each of the actors in adding value to the final product. The chain of cured hams starts with the pig breeding firms. At the rearing farms the piglets are born and reared for about 10 weeks (Schweinezucht). The Swiss piglets are then about 25kg in weight. Then they are moved to the fattening farms (Schweinemast). Rearing and fattening can also take place at the same farm, called a closed pig farm. The pigs are fattened until they are about 6.5 months old or 110-120kg live weight in the generic cured ham supply chain, before they are transported to the slaughterhouse. In the Parma ham and other PDO ham supply chains in Italy, the pigs are in the rearing phase until 35-40kg. The fattening phase of the larger Parma ham pigs lasts until they are 160kg live weight, at a minimum age of 9 months old. There are traders in between the primary production stage and the slaughterhouses in Switzerland. After slaughtering the hams are separated from the rest of the animal and sold to the curing companies. At this stage there are also some traders. The curing companies take care of the drying and packaging for transportation to the retail. In some cases the retailer buys whole hams, for cutting at the counter. Cured ham is sold packed and sliced at the counter in supermarkets, and also in butcheries and specialty stores, restaurants and other out-of-home channels.

5.2 Agricultural production

5.2.1 Market structure of pig farming

In 2016, there were 24,950 farms with pigs in Italy. Of these farms, 8,570 were pig farms with sows. A lot of pig farms in Italy combine pig rearing and fattening. A large number of very small farms with pigs in combination with other livestock and crops are located on Sardinia (6,232 in 2016) and a number of other regions, predominantly in the South. Regions with a more intensive pig farming are Lombardia, Piemonte, and Emilia-Romagna in the North. These three provinces have almost 80% of the total number of pigs in Italy. This is also the region in which the Parma ham is made.

The number of farms with pigs in Italy has declined from 250 thousand in 1997 to less than 25 thousand in 2016 (Eurostat ef_ov_lssum). The number of pig farms is still rapidly declining. Between 2005 and 2016, the number of specialised pig farms in Italy declined from 6,850 to 3,660. At the same time, the total livestock population of pigs remained relatively stable around 8.5m animals; with some temporary increases and decreases. This indicates an enormous growth of the average pig farm.

Almost 4,000 pig farms take part in the value chain of Parma ham, making it an important part of the Italian pig meat sector. The pigs for Parma ham must be bred in one of ten northern and central Italian regions. Over 85% of the pigs are bred in Lombardia, Piemonte, and Emilia-Romagna. Primarily three breeds of pigs are used for Parma Ham: Large White x Landrace with Duroc in the third line (De Roest et al., 2014).

The number of pig farms in Switzerland was 6,406 in 2017 (Table 5.1). This includes farms that combine pig farming with other livestock or crops. About 7% of the holdings is certified under organic farming. Like in Italy, the number of pig farms is decreasing in Switzerland, although at a slower pace than in Italy. The number of specialised pig farms was about 1,309 in 2010 (Eurostat). No more recent data is available, but if the number of specialised farms is declining at the same pace as the number of other farms with pigs, there will be about 925 specialised pig farms left in 2017.

Table 5.1 *Number of pig farms in Switzerland, 2010-2017*

	2010	2011	2012	2013	2014	2015	2016	2017
Conventional farming	8,386	7,849	7,294	6,802	6,570	6,433	6,171	5,932
Organic farming	462	475	470	475	475	432	463	474
Total	8,848	8,324	7,764	7,277	7,045	6,865	6,634	6,406

Source: FSO - Farm Structure Survey.

The average farm with pigs in Italy had 340 pigs in 2016. The average pig farm in Switzerland had 225 pigs in 2017. This is to a large extent caused by policy measures, restricting the number of pigs that can be held at a pig farm in Switzerland to 1,500 (pigs over 35kg), preventing the growth of

larger farms. The fact that the average number of pigs per farm is so much lower than the maximum of 1,500 is because non-specialised farms are also included in the figures. Note that most farms with pigs in Italy have less than 225 pigs as well, but specialised pig farms can be much larger, and 90% of all pigs are raised on farms with more than 1,000 pigs. In Lombardia, e.g. many farms exist with over 5,000 pigs and up to 10,000 pigs.

This also shows the large difference in production systems between the North and South of Italy. Average farms are much smaller in Southern Italy. From Table 5.2 the difference in the size of the total pig livestock population becomes clear. The number of pigs is stable in Italy after 2011 and slightly decreasing in Switzerland.

Table 5.2 *Number of pigs in Switzerland and Italy, 1,000 animals, December 2010-2017*

	2010	2011	2012	2013	2014	2015	2016	2017
Italy	9,157	9,351	8,662	8,561	8,676	8,675	8,478	8,571
Switzerland	1,589	1,579	1,544	1,485	1,498	1,494	1,446	1,440

Source: Eurostat, Pig population - annual data [apro_mt_lspig], Italy 2010 from FAOSTAT.

5.2.2 Production volume, value and prices

Obviously, with a larger number of pigs, the total number of slaughtering in Italy is also higher than in Switzerland. However, the number of pigs was almost 6 times higher in Italy, while the number of slaughters was only 4.2 times higher than in Switzerland in 2017. About 2.7m pigs were slaughtered in Switzerland, while in Italy 11.4m pigs were slaughtered. The difference is caused by the fact that in Italy pigs for the production of PDO ham like Parma and San Daniele are slaughtered at a later age and higher weight. In Switzerland the average slaughtered pig has about 90kg carcass weight, while in Italy the average slaughtered weight of pigs was almost 130kg in 2017. The carcass weight or dressed weight is the weight of the pig after removing the organs and the head and some other inedible parts.

The number of animals slaughtered in Switzerland is slightly decreasing like the number of pigs held, a trend which is visible in many EU countries as well. The average carcass weight of the slaughtered animals (all pigs) is shown in Figure 5.3.

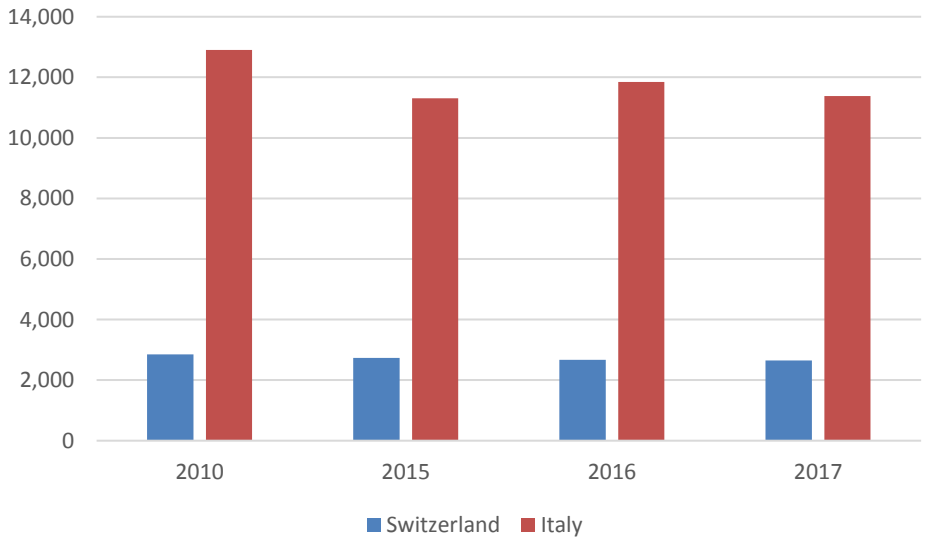


Figure 5.2 *Annual slaughtering of pigs, in 1,000 heads. Source: Eurostat.*

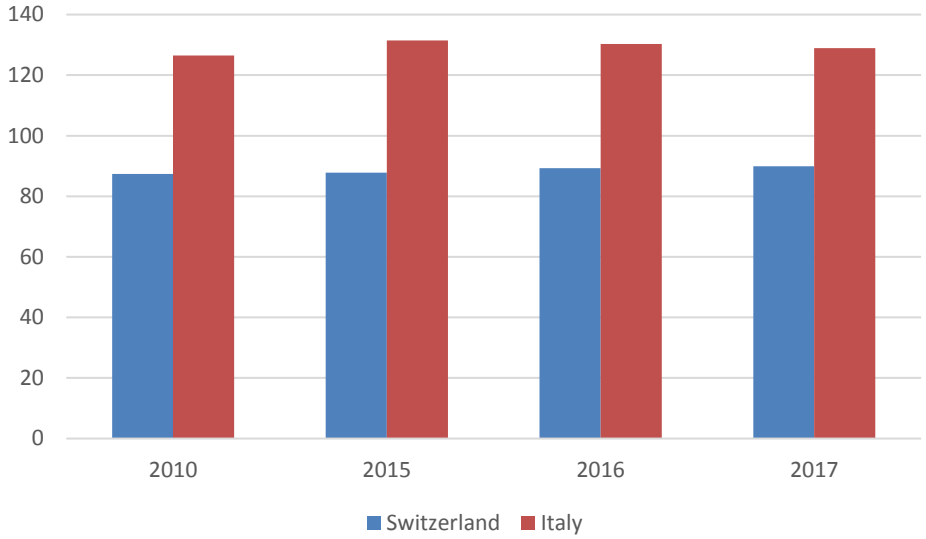


Figure 5.3 *Average weight of the slaughtered pigs (carcass weight), in kg. Source: Eurostat.*

Average prices of pigs for slaughtering are quite a bit higher in Switzerland than in surrounding countries, including Italy. From Figure 5.4 it is clear that the average prices of slaughtering pigs (per kg carcass weight) were about twice as high in Switzerland as in Italy in the past 8 years. The prices in the figure reflect the prices that producers receive per kg carcass weight, excluding costs of transport to the slaughterhouse and margin for the trader (farm-gate prices).

In Italy the average price of Class E slaughtering pigs was 1.96 CHF/kg carcass weight in 2017, while the price of 'Schlachtschweine QM' was 3.75 CHF/kg in Switzerland. Prices of heavier pigs used in Parma ham were a bit lower than Class E in Italy.

Prices vary between regions and between quality classes. Prices of IP-Suisse pigs receive a premium of 30 cents compared to QM ('Qualitäts management') pigs, while Coop Naturafarm pigs receive a premium of 50 cents. Prices of generic pigs in countries like Germany, the Netherlands and Denmark are even lower than those of the heavier Italian pigs. In 2016 and 2017, prices of slaughtering meat pigs in the Netherlands fluctuated between 1.20 and 1.70 per kg carcass weight. Prices of pigs are generally a bit higher in summer than in winter.

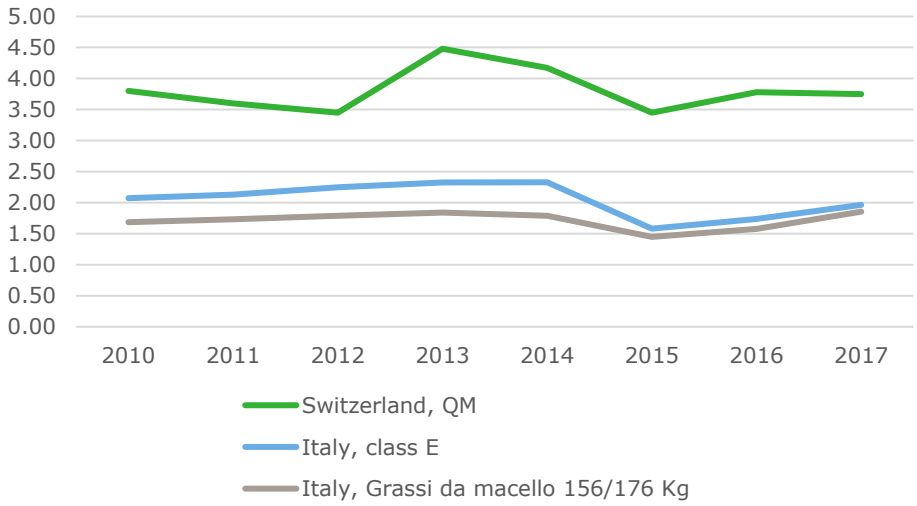


Figure 5.4 *Producer prices of meat pigs, QM quality in Switzerland, Class E slaughtering pigs and Grassi da macello 156/176 Kg in Italy, in CHF/kg carcass weight. Source: Proviande, Suisseporcs, EU Meat Market Observatory – Pig; Camera di Commercio di Modena CIAA; calculations Wageningen Economic Research.*

The total production value of pigs in Italy was 2,864m euros (3,122m CHF) in 2016. In Switzerland the total production value was 895m CHF. With a 45% higher average carcass weight and a 50% lower average price per kilogram in Italy, it becomes clear that production costs are much higher in Switzerland than in Italy. The smaller average size of the farms is one factor, but also the costs of feed have a significant impact on the price, as well as the costs of capital goods as will become clear in the next section.

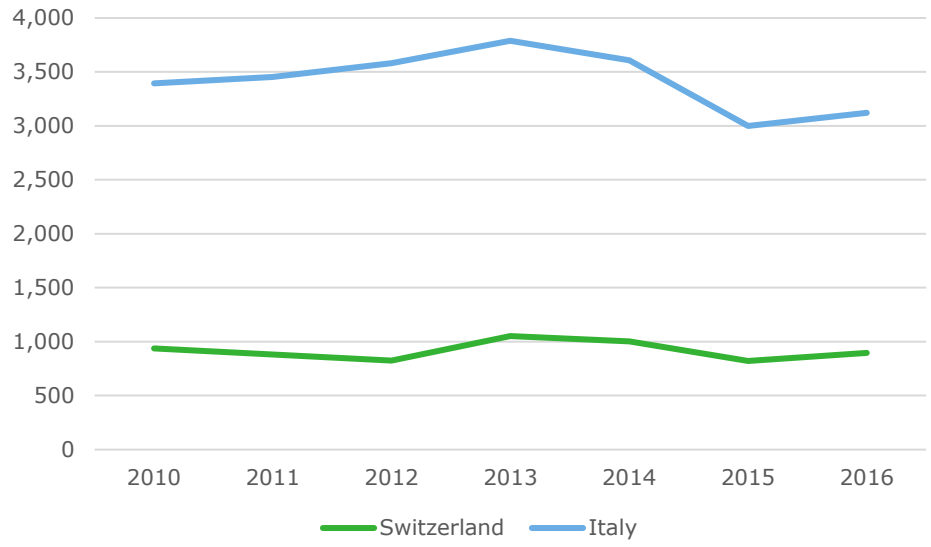


Figure 5.5 *Production value of pigs, in producer prices, in million CHF. Source: Eurostat; calculations Wageningen Economic Research.*

5.2.3 Input use and production costs

The most important input to pig rearing and fattening is feed. According to Interpig data (AHDB, 2017; Hoste, 2017), in a comparison of twelve European countries and Brazil, Canada and the US, about 50 to 70% of the total costs of pig production (all stages from breeding to fattening) were linked to feed costs. Labour costs make up about 9.3% of total costs in Italy and depreciation and finance (fixed costs) account for the remaining 12%. In the Interpig data, the costs of the labour of the farmer-owner are included in labour costs. These costs are calculated on the basis of average hourly wages in agriculture and the average time spent on farm work.[42]

Italy is among the countries with the highest relative feed costs, with 66% in 2016. Other variable costs were about 13.3% in Italy. These costs include mostly water, energy, medicine and veterinary services. In Switzerland, the share of feed in total costs of pig production is estimated at 55%. This estimate is based on 42% feed costs for rearing pigs and 36% feed costs for the fattening stage (calculations based on data from Agroscope, 2017).[43]

Figure 5.6 gives an overview of the production costs of slaughtering pigs in Italy and Switzerland, and the main costs categories. It is clear that feed costs in Switzerland are about 1 CHF higher than in Italy. Labour and fixed costs like buildings are also more expensive. The labour costs in the figure include both paid labour and allocated labour costs of the farmer and family members. Fixed costs also include allocated costs of the capital invested by the farmer-owners. The comparison with regular pigs instead of Parma ham pigs would show even larger differences in costs.

The figure also shows that average producer prices were lower than average total costs including allocated costs of own labour and capital in the displayed periods. This means that farm incomes were

[42] In Interpig data, labour costs are considered fixed costs as they mainly include the farmers own labour. For ease of comparison with other supply chain stages and sectors, we include labour costs in variable costs.

[43] Agroscope, Dierk Schmid, Daniel Hoop, Swetlana Renner, Dunja Dux, Pierrick Jan (2017). Zentrale Auswertung von Buchhaltungsdaten; Betriebszweigergebnisse, Stichprobe Referenzbetriebe und Stichprobe Betriebsführung. Ökonomie Spezialpublikationen I Oktober 2017.

low or even negative (decreasing equity value of the farms). If labour costs are deducted from total costs a small positive margin remained in Switzerland in 2017, while the average margin was slightly negative in Italy in 2014-2016. Net incomes in the pig production sector tend to fluctuate quite a bit under the influence of fluctuating feed costs and pig prices.

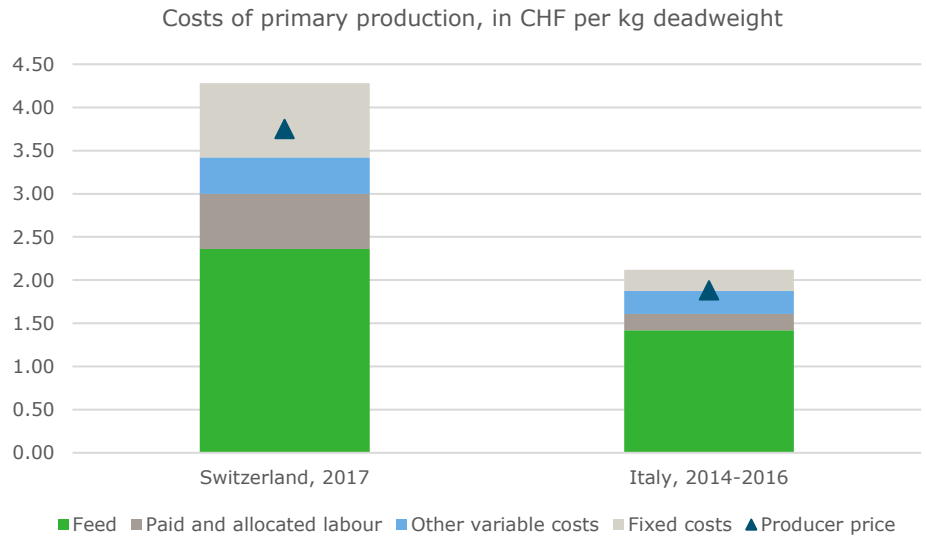


Figure 5.6 *Production costs of slaughtering pigs in Switzerland and Italy, and producer price excluding premiums for animal welfare programmes, in CHF/kg carcass weight. Source: Agroscope, Suisseporcs, AHDB, Eurostat; calculations Wageningen Economic Research.*

Both in Italy and Switzerland, farmers face specific production requirements. In order to have the possibility to deliver pigs to the Parma ham chain, the pig farmer has to comply with the PDO product specifications. In Switzerland, farmers have to comply with the requirements of retailers, most notably IP-Suisse and Coop Naturafarm. But also legal requirements on animal welfare have an impact on the production costs. With respect to the Swiss retailer programmes, farmers receive a price premium for adhering to the standards. According to some of the interviewees, the premiums do not fully cover the additional costs of adhering to the programme standards at the moment, but exact numbers are lacking.

As almost 70% of the total production costs for pig meat is represented by feed, a short overview of the market of pig feed in Italy is provided. Although Italy is an important producer of maize, almost 50% of maize actually is imported from countries like Hungary and Ukraine. The same holds for soybeans and soybean meal, that is primarily imported from South America and the US. The Parma Ham pigs are fed with cereal grains and, in some local cases, whey from the production of Parmigiano-Reggiano PDO and Grana Padano PDO cheeses (De Roest et al., 2014).

A major bottleneck for the production and provision of feed to pig farmers in Italy is the infrastructure. With respect to the harbours of North Western Europe, Italian harbours have a low maximum draught of vessels, that does not allow the arrival of ships of more than 20,000 tonnes. Then, over 90% of transport of raw materials and compound feed concern road transport, as the country does not have rivers for transport of goods. These unfavourable infrastructural factors exert an upward effect on the prices of raw materials for animal feed as compared to some other EU countries. In Switzerland, however, similar or even worse conditions exist.

Another factor that affects pig feed prices is the PDO product specification for Parma ham following EC Regulation 20821/92. For pigs in the Parma ham value chain the following main restrictions concern the feed composition:

- In the rearing phase (up to 80kg) at least 45% of the dry matter content of feed should be cereals. Soybean meal cannot exceed 20% of dry matter. Also for other feed ingredients maximum inclusion levels have been defined.

- In the finisher phase at least 55% of dry matter should come from cereals. Soybean meal cannot exceed 15% of dry matter in the ratio. For a long list of other single feed ingredients maximum inclusion percentages have been defined, e.g. maize up to 55%, barley 40%., wheat 25%, manioc 5% etc.

The above-mentioned factors create an upward effect on Italian pig feed prices for pigs that enter into the Parma ham value chain as opposed to generic pig meat and foreign pigs. Finisher pig feed prices were about 26 euros per 100kg (about 30 CHF per 100kg) in Italy in 2013-2017 (Source: Elaborated by CRPA on Interpig data). In other EU countries like Germany and France, prices were also about 26 CHF per 100kg in the same period. Feed mills in Italy produce compound feed fully in line with the product specification, but pig farmers who prepare their own feed on farm need to comply with these restrictions as well. According to WBF (2015), the prices of finisher pig feed in Switzerland were about 53-64 CHF per 100kg in 2015, or twice as high as in Italy.

Other important restrictions for the Parma ham pig producers are:

- The minimum age at slaughter is 9 months;
- Live weight at slaughter should be 160kg with a tolerance of 10%;
- The pure breeds Landrace Belga, Hampshire, Piétrain and Spotted Poland are forbidden.

It is clear that a minimum age of 9 months and a live weight of around 160kg significantly increases the production costs of pig meat. In particular the feed conversion rate and the average daily growth in the range of 130-160kg is much worse than for light pigs of 100-120kg that are raised in the rest of Europe and Switzerland.

Feed prices react to the prices of inputs like soya. According to the Swiss farmer representatives, increased soya prices will be factored into the pig feed prices quite soon. Most suppliers of feed and other inputs are national suppliers in Switzerland. There is one large supplier of animal feed, Fenaco, which has a market share of about 50%. In total, there are about 10 suppliers of animal feed. The costs of feed are higher in Switzerland than in Italy, mostly due to import tariffs and sustainability requirements.

But also the fact that smaller companies buy smaller quantities of feedstuffs is increasing average purchasing prices as larger quantities are usually cheaper. Although most farmers have a preference for national suppliers, there is some competition from foreign suppliers. This is particularly true for machinery and feed (from Germany). Although the market for animal feed is quite concentrated, farm representatives indicate that farmers can switch suppliers if they want to. Whether they actually do so is another story. Most farmers stay with the same suppliers and customers. From the interviews, it was confirmed that farmers also have a preference for domestic suppliers as the provision of inputs is often linked to the provision of services.

Stable construction costs are also higher in Switzerland. A place for fattening pigs costs between 1,500 and 2,000 CHF in Switzerland, in Italy about 855 to 970 CHF (750 to 850 euros) (Source: interviews; CRPA). Other costs that are considerably higher in Switzerland are veterinary costs. Prices of pharmaceutical products are higher. For vaccines and medications there are a very limited number of suppliers, according to the farmers and farmer representatives that were interviewed.

5.2.4 Innovation and product differentiation

Innovation is a factor that can also determine the cost of production and the price that consumers pay. On the one hand, innovation can lower production costs by making existing processes more efficient. By doing so, consumer prices are expected to decrease if markets function correctly. On the other hand, innovation can also increase average consumer prices, as new products are introduced with higher prices. These product innovations change the characteristics of the products and the willingness to pay of consumers.

At the level of the farm, most technical innovations are targeted at lowering production costs. The costs of production of pig farms are related to the technologies employed in the production process,

besides the prices of the inputs and production factors. Feed conversion rates of Swiss finisher pigs are comparable to those of surrounding EU countries that have a similar average slaughtering age. The heavier Italian pigs have a higher feed conversion ratio meaning that they require more feed on average for a kg of weight gain. Rearing and finishing mortality are quite low in Switzerland. The average number of piglets per litter is a bit lower than in more intensive rearing systems. But on the whole the number of piglets weaned and reared per litter is quite high in Switzerland. (Source: Interpig and Agroscope data, calculations Wageningen Economic Research)

Although we have no exact numbers about which type of machines and installations are used in Italian and Swiss pig farming, there are no major differences expected in the availability of modern installations. When comparing the professional farms in both countries, except for the differences in average size of the farms, both make use of modern production techniques. On the whole, the farms in Switzerland are a bit smaller than in Italy, but the technical performance of the Swiss farms is comparable to that of countries with similar production systems.

Regarding product innovation, there are a number of ways to differentiate one pig from the other. A focus on different breeds or meat quality is one, and other ways are e.g. a focus on animal welfare. All pig farms in Switzerland have to adhere to the minimum legal requirements on animal welfare, which are somewhat more strict than in Italy. Farms that do not adhere to the legal requirements on animal welfare are not eligible for direct payments as these requirements are part of the so-called ökologischen Leistungsnachweises (ÖLN) of the Direktzahlungsverordnung, DZV of 2013.

In addition there are a number of voluntary federal regulated animal welfare schemes (RAUS and BTS) in which a considerable part of the pig farms participates; about 66% of the pigs is reared in BTS (Besonders tierfreundliche Stallungshaltungssysteme) stables with additional attention to animal friendliness, and about 50% has access to open air as required by the RAUS programme (Regelmässiger Auslauf im Freien). Farmers are compensated for the extra effort through additional payments in the direct payments scheme. The sector initiated Quality Scheme QM-Schweizer Fleisch with its Suisse Garantie label is another programme (see Section 5.2.5 below). In Switzerland, the focus of retailers and producers alike is on animal welfare and Swiss origin. Swiss consumers tend to favour Swiss made products; and the Suisse Garantie label caters to that preference. A large part of pig meat is sold under the label. As mentioned before, also organic agriculture is relatively well developed in Switzerland, with 7% of the pig farms producing according to organic standards.

There are two main other private quality schemes in Switzerland that have specific production requirements for pig producers. The labels are IP-Suisse (Terra Suisse for pig meat) that sells primarily but not exclusively to Migros supermarkets through their meat company Micarna, and Coop Naturafarm, a programme by the other big retailer in Switzerland. Both set standards for animal welfare that exceed the Swiss animal welfare laws in some respects. E.g. relatively large spaces and organic bedding are required, and RAUS and BTS are required for e.g. stall systems used in fattening under the TerraSuisse scheme.[44]

About 516,000 slaughtering pigs were slaughtered in the IP Suisse programme in 2017, about 20% of the total number of meat pigs slaughtered. According to Migros about 54% of the pig meat they sold was labeled TerraSuisse (Migros, 2017). The farmers adhere to the set production rules and receive a premium from the buyer of about 20 cents above the QM market price per kg carcass weight. At the same time, the farmers have to pay a membership fee (of about 50 to 70 CHF in 2015) and a levy per animal slaughtered (0.90 CHF per slaughtered animal in 2015). For COOP Naturfarm the premium is 0.20 CHF higher, but the rules are different. As mentioned before, according to some of the interviewees, the premiums do not fully cover the additional costs.

In total, an estimated 30% of all pork in Switzerland is sold within one of the animal welfare labels of the large retailers that is visible to consumers (not including Suisse Garantie which is primarily an origin label). A larger part of the farmers participate in the schemes; but not all the meat is being sold in the scheme due to a lack of demand for the labelled meat. Farmers can choose whether to

[44] https://www.pigprogress.net/Health/Articles/2017/6/Switzerland-a-pig-island-surrounded-by-the-EU-137592E/

participate in the schemes (BTS, RAUS, TerraSuisse, Naturafarm, BIO Suisse organic or other). In theory they could participate in both TerraSuisse and Naturafarm, but in practice they do not. Especially for small farms the costs involved will not outweigh the benefits. Also the costs of switching are significant. Although some of the schemes are comparable in some respects they all have their own special attributes.

5.2.5 Government regulations, support measures and taxes

Regulations concerning animal welfare and feed composition are the most important regulatory factors causing differences in production costs of pigs in Switzerland and Italy. From the interviews, it is clear that both Italian and Swiss pig farmers face restrictions on production methods, both from public authorities as well as from private (retail) standards. With respect to public regulations, EU producers have to adhere to the regulations on identification and registration of pigs, but similar regulations exist in Switzerland. Country of origin labelling rules differ between Switzerland and the EU, but these costs are mostly applicable to the processing industry (see Section 5.4.5).

In Switzerland, the 'maximum stock regulation' – *Höchstbestandesverordnung*[45] is a regulation that limits the number of pigs kept on a single farm to 1,500 pigs over 35 kg of both sexes; and 250 breeding sows over 6 months old, nursing and not nursing. This has an effect on the average size of pig farms in Switzerland, as described in Section 2.6. With the smaller average size of pig farms, the efficiency is also a bit lower in Swiss pig farms, especially with regard to buying (with reductions and specific deals) and storing feedstuffs and labour costs. In addition, in Switzerland piglets are always kept free with the sows ('free farrowing'). That means the space needed for the sows and piglets is about twice as large in Switzerland as in Italy. To prevent the piglets' mortality relatively calm breeds of sows are used, mostly Swiss large white breed. A rough estimation of the additional cost would be that the extra space for a free farrowing system costs 1 to 3% extra (see e.g. Guy et al., 2012).

In the previous section some of the ÖLN regulations and additional federal animal welfare programmes were discussed. A significant part of Swiss farmers is participating in these programmes and the animal welfare requirements resulting from them (BTS, RAUS) are certainly relevant and cost increasing. However, participation is voluntary and there is compensation (apart from higher prices) involved. The 'Tierwohlbeiträge' for BTS and RAUS are 155 and 165 CHF per slaughtering pig in 2018.[46] That is equivalent to about 1.30 CHF/kg carcass weight.

There are no custom quotas for feed, but some import tariffs apply. In order to import feedstuff, an import permit of agricultural products known as 'general import permit' (GIPs) is necessary. The GIPs are issued without charge and are valid indefinitely. The application takes around one week to be processed and quantities of up to 20kg may be imported without the need for a GIP. If the annual import of feedstuffs exceeds 4,000 tonnes, the GIP-holder must conclude an agreement with the Federal Office for National Economic Supply (FONES)[i]. In addition to the tariff a 5 CHF/100kg contribution to the guarantee fund must be paid at imports for soft wheat for grinding purposes within the quota limits. The guarantee fund contributions cover the costs of compulsory stock managed by the réservesuisse. According to requirements of the Federal Council, certain essential goods, including animal feed, are to be stocked.(see Cerca et al., 2018).

Table 5.3 provides an overview of main regulations that are considered as being relevant for the comparison of the production of cured ham in Switzerland and in Italy. We also indicate the effect of the prices in order to provide insights for explaining the price difference.

[45] https://www.admin.ch/opc/de/classified-compilation/20130227/index.html
[46] https://www.admin.ch/opc/de/classified-compilation/20130216/index.html

Table 5.3 *Overview of most important regulations applying to pig husbandry in Italy and Switzerland and indication of their effect on pig prices*

Topic	Regulation/requirement in Switzerland	Regulation/requirement in Italy	Effect on relative price
Feed with GMO	Not allowed to be produced in Switzerland under moratorium, but can be imported. However, Swiss importers have been importing GMO-free products. [47]	The EU applies the precautionary principle by demanding a pre-market authorisation for any GMO to enter the market and post-market environmental monitoring. All food (including processed food) or feed which contains greater than 0.9% of approved GMOs must be labelled	Lowering costs of feed in EU; for an indication of the costs of GMO-free soy see Mann (2013)
Trade/Tariff Rate Quota	• No quota for feedstuffs, but import tariff on feedstuffs 0 to 11CHF/100kg; • Outside quota Import tariff on live pigs for slaughter of 1,309 CHF per pig; • Within quota tariff of 40 CHF per pig; • No import tariffs on herbicides/pesticides; • GIPs and Guarentee Fund Contribution of 5 CHF/100kg for feed cereals	No import tariffs in EU internal market	Increasing price of feedstuffs in Switzerland; Increasing price of pigs in Switzerland due to tariffs restricting imports of live pigs
Food safety, animal and plant health	• General Food Law Hormones ban • Regulations on identification and registration of pigs	• General Food Law • Hormones ban Directive • Regulations on identification and registration of pigs	Similar regulations, negligible effect on price
Animal welfare	• Maximum stock regulation 'Höchstbestandesverordnung' • Free farrowing • Farmers receive payments if they participate in programmes like animal welfare programmes. These compensate for the additional costs of production. ÖLN, BTS, RAUS	• Directives on the protection of calves, pigs and animals kept for farming purposes • Minimum slaughter age for Parma ham pigs (private standard with price premium)	Free farrowing increases costs of pig husbandry in Switzerland (estimate Wageningen Economic Research, and e.g. Guy et al. (2012): about 1-3% cost increase) Minimum slaughter age increases costs of pig husbandry in Italy.
Direct payments and subsidies, taxes	No basic payments based on output, but ÖLN, direct payments for adhering to sustainable production methods. BTS and RAUS payments of about 155 and 165 CHF/pig.	Also direct payments. According to our own calculation using FADN data, very limited amount of subsidies (2% of output value in 2016). Taxes exceed subsidies: we calculated the share of support being -1% of output value.	

Source: Expert and industry interviews, OECD, FADN.

[47] Keeping Switzerland GMO-free, as envisioned in some areas already, would of course come at a costs. Mann and Venus (2015) conducted a cost-benefit analysis to investigate the situation of GMO-free milk in Switzerland. They estimated a welfare loss per consumer of about 1 to 5 euros. In their study, they also found that the private sector in Switzerland actually supports the idea of GMO-free production and for example does not import GMO feed for dairy cows, despite the additional costs due to higher feed costs.

5.3 Trade in live swine

After the fatting stage the pigs are sold to slaughterhouses either directly or through traders. In most cases, traders are involved, who buy the pigs from the farmers and sell them to the slaughterhouses. In Switzerland, the transport of the animals is subject to regulations and controls of the Bundesamt für Lebensmittelsicherheit und Veterinärwesen BLV. The private association Kontrolldienst Schweizer Tierschutz STS also conducts controls (conformity assesmeent) in the chains for labelled products of IP Suisse and Naturafarm, including during transport. Additional requirements may exist depending on the quality scheme. E.g. Coop Naturafarm has 10 certified traders; although transports can be performed by other transport companies as well. The largest 15 trader organisations have 80% of the market, with Fenaco covering about 25%. In this sense, the traders seem to have a more important role than in Italy, where direct contact with the slaughterhouses is more common.

The prices paid to farmers depend mostly on the quality (labels) and on supply and demand conditions in the market. Under normal conditions, the traders will roughly follow the prices that Suisseporcs is publishing every week (http://www.suisseporcs.ch/Markt/Preisuebersicht). Suisseporcs is the Swiss organisation of pig producers. It publishes a market quote price every week which is reflecting current market conditions. Producers and traders are free to negotiate other prices, but usually the Preisübersicht is reflecting actual market prices.

The costs of transportation of the live animals to the slaughtering house and the margin of the traders in Switzerland is currently estimated at about 0.20-0.25 CHF per kg (Source: interviews). This is much higher than in Italy or other surrounding countries. In e.g. the Netherlands, transportation costs of live pigs is estimated at about 1.20 CHF per kilometre and 85 CHF per hour for loading and waiting at the slaughterhouse (Source: Wageningen Economic Research estimate based on online accessible quotes from transport companies). For a 100 kilometre transport of 20 tonnes of pigs, the costs are just 2.5 to 5 cents per kg carcass weight, depending on the time needed for loading, cleaning and waiting. The difference is due to regulations for animal transport, but also smaller vehicles, higher fuel consumption, and higher labour costs in Switzerland.

Imports and exports of live animals are virtually non-existent in Switzerland. About 130 tonnes of live swine for slaughter can be imported within the tariff quota per year. This quota is usually filled. But this is just a fraction of the total production of pigs in Switzerland; 2.7m pigs or about 240 thousand tonnes (carcass weight) in 2017. A prohibitively high out-of-quota tariff rate prevents further imports.

5.4 Meat processing industry

5.4.1 Market structure of pig meat processing

The meat processing industry consists of all those firms that are slaughtering, cutting, processing and preserving meat. Slaughtering and cutting is usually done by the same companies, who sell pieces of meat to the manufacturers of meat products. In some cases, these are integrated companies, such as the Bell Food Group in Switzerland which operates slaughterhouses and also produces meat products. In total there were 456 companies in the processing and preserving of meat and production of meat products industry in Switzerland in 2016, as opposed to almost 3,500 in Italy (Table 5.4). According to Eurostat statistics, the number of meat processing companies in Switzerland has been fluctuating very much. On the whole it seems like the number of companies is increasing.

Table 5.4 *Number of enterprises in the meat processing industry in Switzerland and Italy, 2010-2016*

		2010	2011	2012	2013	2014	2015	2016
C101 - Processing and preserving of meat and production of meat products	Switzerland	154	146	159	344	536	403	456
C101 - Processing and preserving of meat and production of meat products	Italy	3,561	3,601	3,555	3,500	3,458	3,463	:
C1011 - Processing and preserving of meat	Italy	1,448	1,490	1,487	1,495	1,462	1,485	:
C1013 - Production of meat and poultry meat products	Italy	137	137	113	113	110	108	:

Source: Eurostat.

5.4.1.1 Market structure of slaughterhouses

The first stage of pig meat processing is slaughtering. In Switzerland there are about 15 slaughterhouses, but the two largest slaughtering firms have 60-70% of the market share. Bell Schweiz AG Schlachtbetrieb Basel slaughters all the pigs for Coop. Micarna SA Courtepin, Frischfleisch AG in Sursee, Schlachtbetrieb Zürich, SBAG Bazenheid (Schlachtbetrieb St. Gallen AG.), and Gustav Spiess AG in Berneck are slaughtering the certified meat for Migros. The market is hence quite concentrated. Especially if a farmer is entering into one of the quality schemes of the large retailers, there is not much choice. On the other hand, the prices paid by the slaughterhouses are basically all the same. This could be an effect of concentration, but probably it is also stimulated by the fact that weekly prices are published by the pig producers association and farmers are not switching much between traders or slaughtering houses. The market is hence quite commoditised and institutionalised and driven mostly by aggregated supply and demand imbalances. At the moment, the supply of pigs is somewhat larger than demand resulting in prices that are actually below costs (see Section 5.2.2). Prices for slaughtering pigs in Switzerland have been fluctuating by about 20% in the past eight years (see Figure 5.4).

In Italy, with respect to Parma ham there were 128 certified slaughterhouses in 2009.[48] But in reality the market concentration is higher, with the 10 largest slaughterhouses having 80% of the market. Nevertheless, it is much more fragmented than in Switzerland. Parma ham producers typically source hams with bone from multiple slaughterhouses.

5.4.1.2 Market structure of curing companies

The exact number of companies that produce dry cured hams is difficult to establish. Even more so because the difference between industrial specialised companies and more artisanal small scale producers is ambiguous. The association Viande séchée du Valais has 24 members, some of which are also owned by the larger meat processing groups such as Micarna that belong to the integrated chains. The Association of Parma ham producers has 145 members in the delimited area south of Parma, that are dedicated to the production of Parma ham. In the whole of Switzerland and Italy there are many more producers of cured dried ham.

5.4.1.3 The slaughtering and curing process

In the slaughterhouse the pigs are inspected, slaughtered, and the carcasses are cut in 4 pieces. In Switzerland, dissection of the carcass occurs in separate cutting lines. This is an important difference with the heavier Parma ham pigs. For heavy pigs the carcasses are immediately dissected after slaughter and the different cuts (hams, neck, bellies, loin, etc.) are subsequently refrigerated. The dissection of the carcasses of light pigs is instead carried out 'cold', which allows a much higher productivity on the slaughter line. The slaughter costs for heavy pigs are higher than for light pigs, as the full dissection of the carcasses of the heavy pigs needs to be carried out 'warm' directly after slaughter. The warm dissection of the carcasses is carried out by highly qualified employees, as each cut needs to be prepared according the specific requests of the processing industry.

The PDO product specification for Parma ham foresees a series of prescriptions for slaughterhouses:

[48] https://www.origin-gi.com/images/stories/PDFs/English/OriGIn_in_Action/OriGIn_Events/XV_CRT/Parma_Ham_-_Guadalajara_-_Calderone.pdf

- The fresh hams after dissection should preferably fall in the weight range of 12-14 kg, but should weigh at least 10kg;
- Fresh hams with signs of PSE, DFD or lesions are excluded;
- The hams should be preserved within a temperature range of -1 °C to 4 °C;
- Only pigs that fall in the classes R, O and P (of the EUROP classification) are allowed to be used for Parma ham.

The phase of dissection determines the speed of the slaughter line which in Italian slaughterhouses reaches 200 to 450 pigs per hour. Slaughterhouses of light pigs carry out the cold dissection of the carcasses in half-carcasses. These companies need more refrigerated rooms to stock the half-carcasses, but the productivity of the slaughter line can reach 600-700 pigs per hour. It has been estimated that the extra slaughter costs of heavy pigs are around 10% per kg carcass weight more than of light pigs (ISMEA, 2013).

PDO Parma Ham production process

The pigs for the Parma ham chain are born, raised and slaughtered in northern Italy, and are of specific breeds. The animals must be over 9 months old when they are slaughtered, and weight not less than 144 kg (average of 160kg). In the slaughterhouses the legs are cut from the carcasses and are cooled down for 24 hours. The fresh hams are cut by specialised employees into the typical shape foreseen by the PDO product specification. This work is carried out either by the slaughterhouse or by specialised companies. The legs loose about 1% of their weight during cooling and 24% during trimming. The cooled and trimmed legs are sent from the slaughterhouses to the curing houses. The legs sent to the curing companies are preferably between 12 and 14 kg but at least 10kg.

1. Salting

The salting is carried out using both humid and dry salt: the pigskin is covered with humid salt, while the muscular parts are covered with dry salt. It is important at this stage that the legs have an adequate and uniform temperature, as a leg that is too cold doesn't absorb enough salt, whereas a leg that is not cold enough may deteriorate.

Legs are then put in a cold store at a temperature ranging from 1°C to 4°C, with a humidity level of approximately 80%. Legs stay in this store called 'first salt' for six to seven days; they are then taken out, residual salt is removed and they are covered again with a thin coat of salt. Finally they are put in another cold store called 'second salt', where they stay for 15 to 18 days, according to their weight. During this period the leg slowly assimilates the salt and loses some humidity. At the end of the salting phase the weight loss is approximately 4%. Salt is the only preservative used in the production method, no chemical elements are allowed.

2. Rest storage

After removing the residual salt, the legs are put in the rest store for 60 to 80 days with a humidity level of about 75% and at a temperature ranging from 1°C to 5°C. These stores are often aired. During this phase the ham has to 'breathe' without becoming either too wet or too dry and the assimilated salt penetrates deeply and distributes uniformly inside the muscular mass. The weight loss during the rest phase amounts to approximately 8% - 10%.

3. Washing and drying

The legs are washed with warm water to eliminate excess salt and impurities. During sunny, dry and airy days the drying of the legs is carried out in natural conditions. In winter, cold, wet or humid conditions special dryers are used. This process lasts approximately one week.

4. Pre-curing

The pre-curing phase is carried out in large rooms with windows on either side, where hams are hung on special wood frames called 'scalere'. The airflow regulation is very important: windows are opened with regard to the ratios of internal/external humidity and internal humidity/product humidity. This allows for a constant and gradual drying of the hams. This phase lasts about 3 months. Weight loss during this phase amounts to about 8% - 10%.

5. Greasing

The greasing softens the superficial muscular layers to prevent the external layers drying too rapidly. The cavity around the bare part of the bone, the uncovered muscular mass and possible chaps are covered a mixture of lard, salt and pepper and sometimes ground rice. It also allows further humidity loss.

6. Curing

In the seventh month, the ham is transferred to the 'cellars', rooms with less air and light where the sounding, an essential phase in the 'ham life', is carried out. During the seasoning, important biochemical and enzymatic processes occur which determine the typical Parma Ham flavour, perfume and taste and the easy digestibility. The weight loss during the curing is about 5%.

7. Branding

At the end of the ageing period, which is a minimum of 12 months, a horse bone needle, which rapidly absorbs the product fragrances, is inserted in different parts of the ham and smelt by experts who can verify the development of the production process. Only then are the hams ready for the official stamp of certification: the firebranding with the Ducal Crown. Since the fire branding is the final guarantee that all the processing stages have been carried out correctly, the officers of the independent certifying body, the Istituto Parma Qualità (I.P.Q.) arrive. The officers check the ageing period from the registers and the seal on the ham and they ensure that the hams have conformed to all the processing procedures.

Source: https://www.prosciuttodiparma.com/pdf/en_UK/CPP-2013_en.pdf

IGP Jambon Cru du Valais production process

The pigs for the Jambon Cru du Valais ham chain are born, raised and slaughtered in Switzerland and the production of the hams takes place in the Canton of Valais. Like the Parma region, the Valais region is very much suited for drying meat due to the dry air that constantly flows from the mountains. Contrary to the Parma ham, the raw material for the production of Jambon Cru du Valais are usually not a 12-14kg leg with bone, but a 4.6-5.2kg piece of ham without bone. The meat is sent to the curing companies at a temperature of 2-4°C.

1. Salting

The pieces of meat are pulled into a stocking and the dressed hams are stirred, manually or mechanically, with a mixture of salt and aromatic plants. Ripening ferments, rubbing agents and sugars are allowed. Aromatic plants commonly used are: garlic, basil, coriander, tarragon, juniper, clove, bay leaf, lovage, marjoram, nutmeg, oregano, pepper, rosemary, savory, sage, thyme. The use of other plants is allowed, but should not be dominant. The use of plants that have a colouring effect (eg curry, turmeric, paprika, etc.) is not allowed. Injection of salt is not allowed. The hams are cured for 72 hours.

2. Rest storage

The hams are then put in rest storage for about 3 weeks in stainless steel tanks. The hams are manually turned three times during this period. The temperature is kept under 6°C.

3. Washing

The pieces of ham are then hanged and washed with cold water and left to sweat for about 4 days at 24°C. In this phase there is about 10% weight loss.

4. Curing

In this phase the hams are hanged in a rack and dried for about 5-16 weeks. Temperatures are kept at about 12°C and air humidity between 75%-85%. During this period the hams are pressed a few times to evenly distribute the moisture. At the end of this stage the moisture loss is about 40-45%.

5. Packing

After the air drying, the hams are vacuum packed and stored for about 2-3 weeks to balance the moisture.

Compared to the Swiss cured hams, the Italian hams have a considerably longer production time. During the maturing phase the major factors that drive up the costs are:

1. The minimum maturing period of 12 months. Compared to any other generic cured ham this period is 5 to 6 months longer. Capital is therefore immobilised for a longer time.
2. The labour input used for salting the fresh legs and for greasing the hams after the first period of maturing. In particular this last procedure is labour intensive and performed by artisanal workers.

5.4.2 Production volume, value and prices

The total production of cured hams in Italy and Switzerland is unknown. According to Eurostat (Prodcom) Italian producers sold a total of 406m kg of salted and dried hams, shoulders and cuts of meat of swine in 2017. The majority is dried hams. The Parma ham producers are however delivering about 9m hams per year. With an average weight of 8-10kg per ham, that would imply that the Parma hams have a total weight of 9m kg, or 22% of the total production volume. The average value of the salted and dried pig meat was about 6.5 euros or 7.2 CHF per kg.

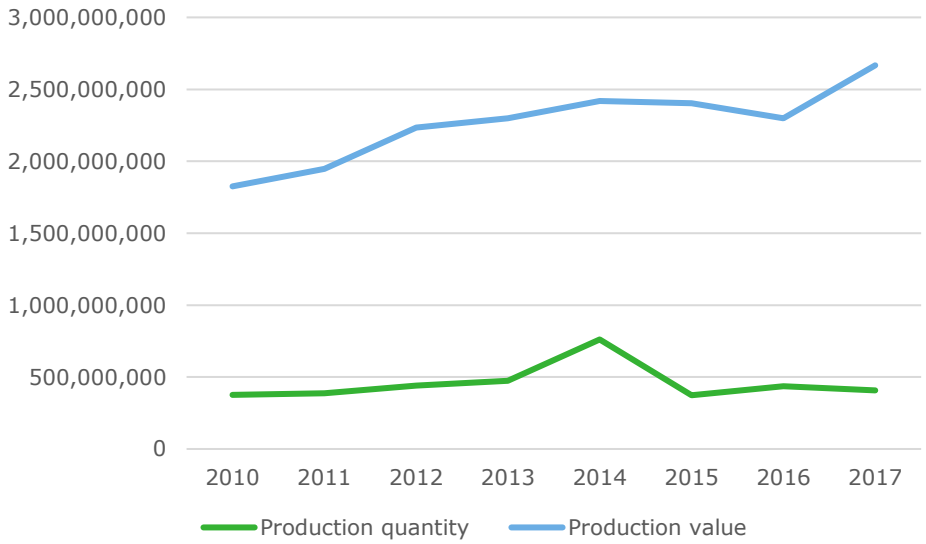


Figure 5.7 *Production quantity in kg and value in euros, of 10131120 - Hams, shoulders and cuts thereof with bone in, of swine, salted, in brine, dried or smoked, in Italy. Source: Eurostat Prodcom.*

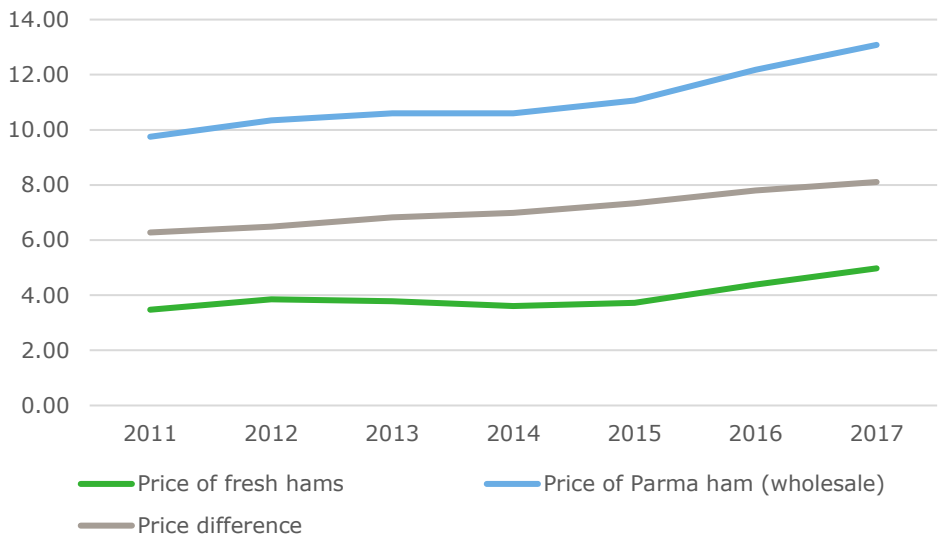


Figure 5.8 *Price difference between fresh and final Parma ham (leg with bone in), in euro/kg, 2011-2017. Source: Elaborated by CRPA on market data of Chamber of Commerce of Parma.*

A generic cured ham with 6 months of maturing is losing less weight than Parma ham. Cured ham produced with imported fresh hams shows an average price difference of 3.12 euros between the fresh leg and the cured ham, which is less than half the price difference of Parma ham. Evidently the costs of maturing generic cured ham are significantly lower.

5.4.3 Input use and costs

CRPA has calculated the slaughtering costs of pigs in Italy for the year 2016. The large majority of pigs slaughtered are heavy pigs, but some companies do also have a minority line for light pigs where cold dissection takes place. The table below reports the results of this survey of 2016.

Table 5.5 *Slaughter costs of pigs 2016, in CHF/animal and CHF/kg carcass weight, in Italy*

	CHF/animal	CHF/kg carcass weight	In % of total costs
Costs of means of production and services	14.6	0.11	36.4
Raw material and consumables	2.7	0.02	6.7
Energy, gas and other energy sources	3.2	0.02	8.0
Withdrawal service and transport of pigs	3.3	0.03	8.3
Veterinary inspection	0.7	0.01	1.6
Other services (cleaning, guards)	1.0	0.01	2.5
Repairs and ordinary maintenance	1.8	0.01	4.4
Treatment of waste water	0.9	0.01	2.1
Other (consultancy, assurances)	1.1	0.01	2.6
Labour:	23.1	0.18	57.3
- Employees	13.4	0.10	33.2
- Free-lance labour	9.7	0.07	24.1
Depreciation and financial costs	2.5	0.02	6.3
Total slaughter costs	40.2	0.31	100.0

Source: CRPA; calculations Wageningen Economic Research.

In Italy, about 57% of the total costs of slaughtering of 40 CHF per animal are labour costs. In addition to these slaughtering costs, the slaughterhouses have to pay the farmers or traders for the pigs, about 1.90 CHF per kg carcass weight which is not included in the table. With a 130kg carcass weight that amounts to 247 CHF per animal or a total slaughtering costs of 287 CHF per animal. Labour costs hence account for about 8% of the total costs of the abattoir.

In Figure 5.9 the costs of the meat processing industry in Italy and Switzerland are shown in percent of turnover for the period 2013-2015 (from Eurostat).[49] In the figure, for Italy a distinction is made between the entire meat processing and preserving industry (C101 Processing and preserving of meat and production of meat products) that includes all sorts of meat, and slaughtering of red meat (C1011 Processing and preserving of meat includes the processing of meat of bovine animals, swine and other red meat), and the manufacturing of meat products (C1013 Production of meat and poultry meat products is the production of meat products from both red meat as well as poultry meat).

The sum of wages and salaries, social security costs and payment for agency workers in percent of total costs (excluding depreciation) of the red meat slaughtering industry in Italy was about 7% in this period, almost the same as in the detailed costs structure presented in Table 5.5. Note that this concerns not only pig slaughtering but also to the slaughtering of bovine animals. When comparing the Italian and the Swiss meat processing industry, the most evident difference is the share of wages and salaries in turnover; 6% versus 14% of turnover. The share of purchases of goods and services is lower in Switzerland, 88% versus 78%. The costs in Figure 5.9 concern all costs except the costs of depreciation. Judging from the data on net investment in tangible capital goods (from Eurostat), depreciation in the Italian meat processing and preserving industry was about 1.5% of turnover while in Switzerland it was about 2.5%. Profit margins in both countries are only a few percent of turnover. Based on the available data and estimates of depreciation costs, in 2013-2015, average earnings before interest and taxes in percentage of turnover were about the same in the two countries; 1.7% in Italy and 1.4% in Switzerland for the meat processing and preserving industry as a whole.

For the analysis of costs along the supply chain of cured ham in Section 5.8 the comparable data on the total meat processing and preserving industry are used as a proxy for the costs of slaughtering and curing.

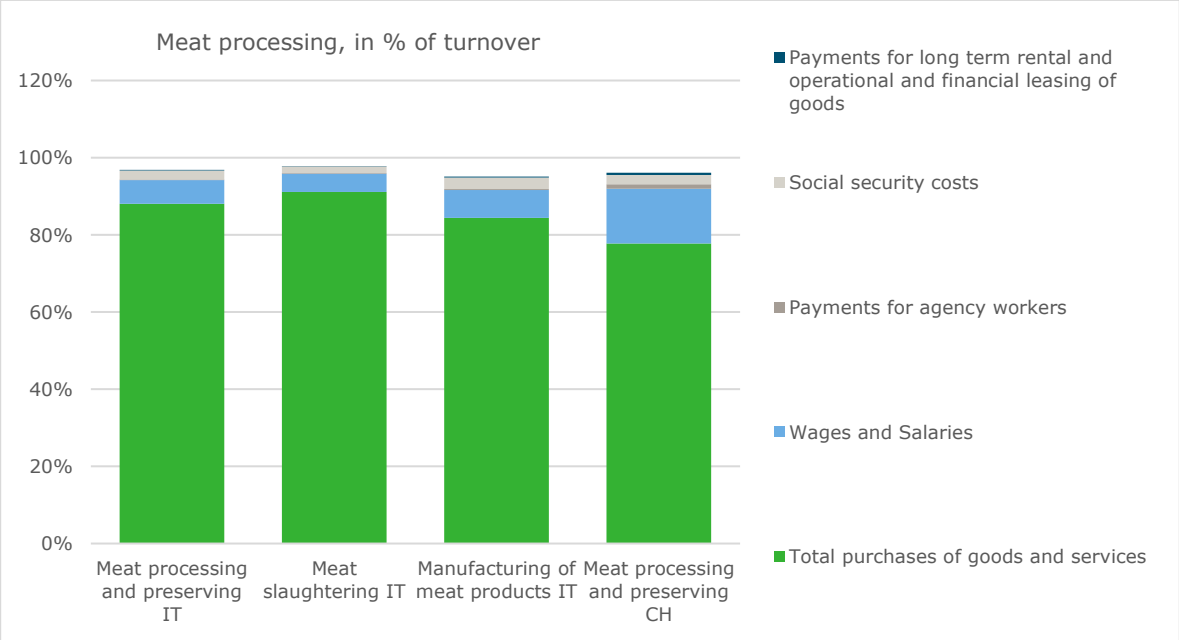


Figure 5.9 *Cost of meat processing in percent of turnover, 2013-2015. Source: Eurostat, calculations Wageningen Economic Research.*

5.4.4 Innovation and product differentiation

Innovation at the processing stage of the cured ham supply chain is mostly related to product differentiation. The production processes also differ and much of the former manual work and artisanal production methods are nowadays replaced by more industrial production methods. For cured hams,

[49] For the Italian total meat processing and preserving industry, the costs of payments for long term rental and operational and financial leasing of goods were exceptionally high in 2014, which we have replaced by the average of 2013 and 2015.

however there is still a lot of manual labour involved and the production processes are essentially not changed much. This is especially true for the traditional hams, such as PDO Parma and Cru du Valais.

Protected Denominations of Origin (PDO) and Protected Geographical Indications (PGI) are a means of communicating a specific quality to consumers, and linking the production to a specific region. In Italy, there are a total of 46 registered EU PDO and PGI products in the meat products category. 10 of those concern dried meat (prosciutto or crudo). Most of these quality products have been registered between 1996 and 2000 (6 out of 10), while Prosciutto di Parma was registered in 2008 and three others (Prosciutto Amatriciano; Prosciutto di Sauris; Crudo di Cuneo) in 2009, 2010 and 2011.

These product quality labels require specific production conditions, like a minimum slaughter age. On the one hand this will increase production costs, but on the other hand it adds consumer value and willingness to pay. Usually these quality labels are registered in close collaboration between farmers, processors, and other stakeholders. In Switzerland there are also national PGI hams, such as IGP Jambon Cru du Valais. A major difference however with the PDO hams in Italy is the absence of special requirements with respect to the production of the pigs – except for the requirement that pigs are reared and slaughtered in Switzerland. The IGP Jambon Cru du Valais is only laying down requirements for the processing of the ham. Also, it applies to the cured ham without bone, while the Parma ham PDO refers to both the ham with bone as well as the (pre-sliced) ham without bone.

On the whole, in both Italy and Switzerland, producers of hams are using regional marketing and quality labels to differentiate.

Table 5.6 *Number of PDOs and PGIs registered, applied and published in meat products, in Italy, per 15 October 2018*

	PDO	PGI	Total
Class 1.2 Meat products (cooked, salted, smoked, etc) total	21 registered	21 registered, 3 applied and 1 published	46 registered
Of which Prosciutto and Crudo	7 registered	3 registered	10 registered

Source: European Commission, DG AGRI, DOOR database.

5.4.5 Government regulations, support measures and taxes

Food safety requirements, labelling and packaging can be considered to be the most relevant governmental regulations at the processing stage. According to the experts and the information by Baur and Nitsch (2013), food safety and packaging do not seem to differ much between Switzerland and the EU, including Italy. We conclude that there is hardly any price effect that can be attributed to these governmental regulations for the meat processing industry.

As mentioned, country of origin labelling is mandatory for all food products including pig meat and meat preparations in Switzerland. Indication of the country of origin of the primary ingredient is also mandatory. For meat used as a primary ingredient (equal to or greater than 20% by weight), the origin has to be indicated. In the EU, country of origin labelling is also mandatory for pig meat, but not for preparations of pig meat and thus not applicable to cured hams. The EU rules only apply to fresh, chilled and frozen meat from pigs that is sold pre-packed to final consumers or mass caterers. On those products 'reared in' and 'slaughtered in' must be printed on labels. The country of origin labelling of cured hams in Switzerland potentially increases the costs of the processors. From EC (2014)[50] we conclude that the costs for pig meat processors can increase by 15% to 50% after the introduction of country of origin labelling. However, for dry cured Parma ham as well as many other dry cured hams, the specific production requirements make that these cost increases are much lower or negligible. Parma hams are made from whole legs, from a specific country – Italy - anyway. For

[50] https://ec.europa.eu/food/sites/food/files/safety/docs/labelling_legislation_com_2013-755_en.pdf

Swiss hams, the origin of the meat is almost exclusively Swiss. Hence the additional costs of labelling (and tracking products along the chain) are very small.

One element that might however be of concern to this case, is the fact that country of origin labelling is not mandatory for generic cured ham from the EU. Printing the origin of the meat on the label specifically for the Swiss market may be an additional cost that prohibits EU exporters to export cured meat to Switzerland, hence lowering competition in the Swiss market. In this study no information could be obtained on the size of such labelling costs. Campden BRI (2010) estimates the costs of changing a label for the food industry in the United Kingdom in 2010 at as much as 3,000 to 5,000 CHF per stock keeping unit (SKU). But those costs refer to the costs of changing an existing label altogether, including wastage of the old labels. For supplying foreign markets, the labelling requirements of the importing country apply, which adds trade costs for exporters. For exporting to Switzerland, a new label would probably have to be designed anyway. Designing new labels is something that food manufacturers do quite frequently. The same study of Campden BRI shows that most food labelling changes are made on a voluntary basis and only in about 6% (for large firms) to 31% (for micro firms) the label changes were due to regulatory changes.

5.5 International trade in hams

Imports and exports of cured ham in Switzerland are very small, relative to the total Swiss market for cured ham. In 2010-2017 about a thousand tonnes were imported within the tariff quota No. 6 per year, and another 1,600 tonnes outside of the quota.[51] For imports within the quota a normal tariff of 225 CHF/100kg applies, while there is a 1,000 tonnes preferential tariff quota for imports from the EU with a 0 tariff. For imports outside of the quota a tariff of 935 CHF/100kg gross weight applies to hams without bone and 1,530 CHF/100kg for hams with bone. The majority of imported ham is ham without bone. The import of hams with bone is virtually non-existent. From the data it is concluded that the import tariffs are high enough to prevent imports effectively. Exports from Switzerland are almost zero. The EU also applies a tariff for dried hams, but it is much lower than the Swiss tariff, at 151 euros per 100kg/net.

Figure 5.10 shows the average prices (unit values) of imported hams (salted, dried or smoked) between 2010 and 2017. The prices of hams without bone have been fluctuating between 15 and 20 CHF per kg. Because of the small quantities, the prices may be fluctuating, but they roughly show a decreasing trend. This decreasing trend has also been visible in the pig prices. The difference in prices of hams with bone, in and out of quota cannot be explained by the tariff itself, as that is not a part of the reported unit value. The difference in import prices is explained by the origin of the ham and the quality. Outside quota hams with bone are mainly coming from Spain. These are more expensive hams of the best quality sorts for which it is worthwhile to import them, even paying tariffs. While within quota imports of hams with bone are mostly somewhat lower quality hams. For dried ham without bone, Italy is the largest supplier for imports within and outside the quota. About 50-70% of the total imports of dried ham without bone are coming from Italy.

[51] The relevant tariff numbers are 0210.1191 - Hams, shoulders and cuts thereof of swine (excl. those of wild boar), salted, in brine, dried or smoked, with bone in, within the limits of the tariff quota No. 6; 0210.1199 - Hams, shoulders and cuts thereof of swine (excl. those of wild boar), salted, in brine, dried or smoked, with bone in, out of tariff quota; 0210.1991 - Meat of swine (excl. those of wild boar), salted, in brine, dried or smoked (excl. hams, shoulders and cuts thereof, with bone in, and bellies [streaky] and cuts thereof), within the limits of the tariff quota No. 6; 0210.1999 - Meat of swine (excl. those of wild boar), salted, in brine, dried or smoked (excl. hams, shoulders and cuts thereof, with bone in, and bellies [streaky] and cuts thereof), out of tariff quota.

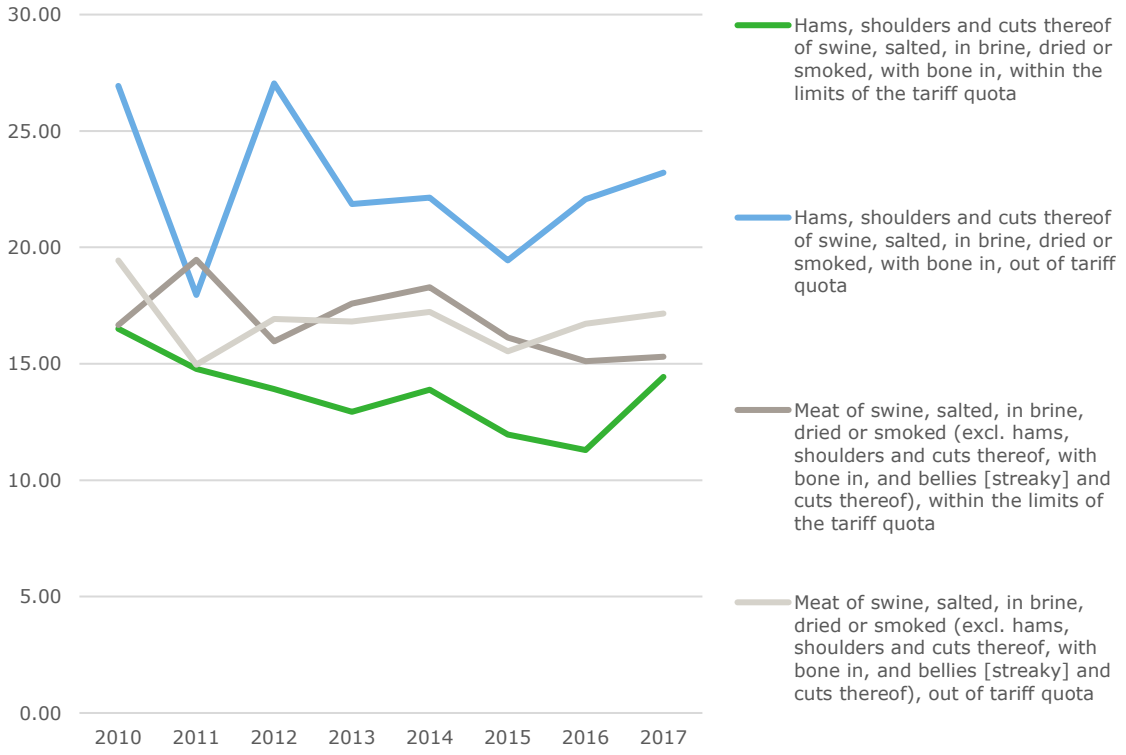


Figure 5.10 *Import prices of salted, dried and smoked pig meat in Switzerland, in CHF/kg. Source: Swiss IMPEX database.*

5.6 Retail

5.6.1 Market structure of retail

In Italy, the four largest retailer groups have about half of the market (Figure 5.11). In addition, Italy still has a relatively large share (25% of modern and traditional retail sales combined according to USDA) of traditional food retail, i.e. small family owned non-specialised supermarkets. The contrast with Switzerland is big, as Switzerland's two biggest retailers have over 80% of the market (high market concentration) and the role of traditional smaller grocery stores is limited.

Figure 5.11 *Retailers' market shares in Italy, 2017. Source: IGD, calculations Wageningen Economic Research*

Another important aspect to mention with respect to cured ham is that in Italy a lot of ham is sold that is sliced and packed in the supermarket. This is not the case in Switzerland. With competition from lower priced freshly cut ham of various sorts, Italian consumers are probably more price conscious with respect to pre-packed cured ham. The prices of pre-packed ham in Italy are higher than that of ham sliced at the counter, just because of the pre-packing. Not only does it add to the costs of packing (under controlled atmosphere), it also increases waste, as the expiration dates of pre-packed ham are more often reached, than those for whole legs (Source: CPRA expert).

5.6.2 Input use and costs

Purchased goods, mostly goods for the re-sale in the stores, and labour are by far the most important inputs in the retailing business in both Switzerland and Italy.

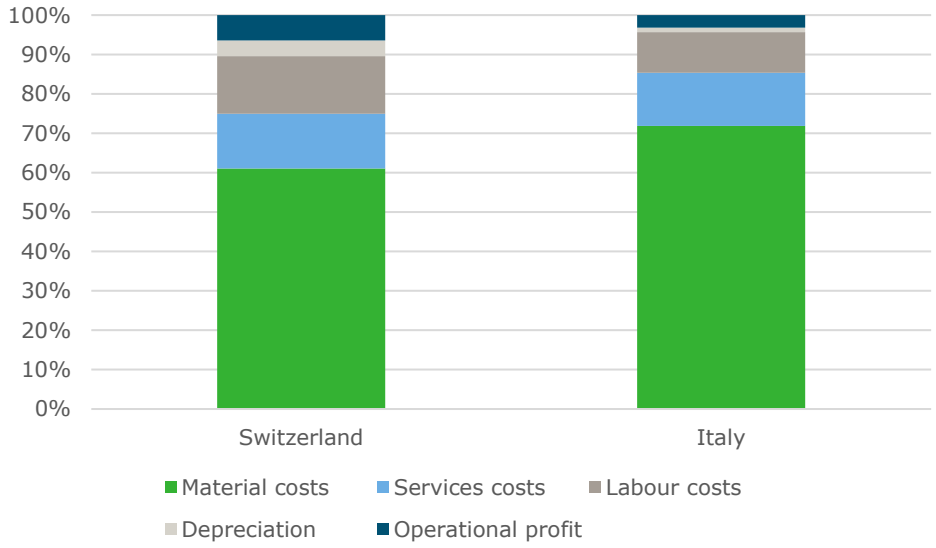


Figure 5.12 *Cost structure of non-specialised retailers with food and beverages predominating, in Switzerland and Italy, in % of turnover, 2014-2016. Orbis database Bureau van Dijk; calculations Wageningen Economic Research.*

In Figure 5.12, the data for the retail cost structure is presented. For Switzerland, the same data is used as in the cases of bread and yoghurt in Section 3.7.3 and Section 4.6.3. In Switzerland, the costs of purchased materials were around 60% of the turnover in the 2014-2016 period, whereas in Italy these costs accounted for around 72% (Figure 5.12). The share of costs for services is comparable around 14%. The share of costs for labour is significantly higher in Switzerland (15%) than in Italy (10%).

Operational profit of retailers is higher in Switzerland (6%) than in Italy (3%) with lower profit taxes in Switzerland. This is in line with the more competitive structure of the retail sector in Italy.

The study of BAKBASEL (2017) shows that the costs (purchases of goods and services and labour costs) of food retailing are about 70% higher in Switzerland than in Italy. The cost difference is shown to be primarily driven by (inland) purchasing costs and labour costs. In the current study, data for the absolute costs difference of retailers for the distribution of specific products (like ham in this case) were not obtained. The average costs structure of retailing in Switzerland and Italy was applied to the respective gross price spreads (see Section 5.8). The cost structure of the total retail sector in Switzerland and Italy as shown in the BAKBASEL study (including non-food) is largely similar to the structure shown here in Figure 5.12, with the exception that the costs of material is somewhat higher and the relative costs of services a little bit lower for food retailing.

5.6.3 Product differentiation

In Switzerland, most cured ham products in the retail are sold already sliced and packed at the meat processing company. At retail level in Italy, Parma ham is sold to the consumers according to three modalities: entire Parma ham with bone; sliced at the spot at the service counter of the point of sale; already sliced at meat processing level and vacuum packed. The majority of Parma ham is sold sliced at the counter, where the consumers can choose different hams with different periods of maturing, that determine different prices. The second modality of sale is sliced Parma ham vacuum packed. The sales of this type of product have increased a lot for consumer convenience reasons, as the ham can be preserved better and for longer time than ham sliced at the counter.

5.6.4 Government regulations, support measures and taxes

In Switzerland, imports of most agri-food products are regulated either by single tariffs or, for a number of products, by a combination of relatively low in-quota tariffs and high out-of-quota import tariffs within a system of Tariff Rate Quotas (TRQ). For cured ham without bone an out-of-quota tariff of 935 CHF per kg is applied (tariff code 0210.1999; status 2018). For dried ham with bone the tariff is higher at 1530 CHF per 100kg gross. Note that the EU members import duty free within the quota (contingent no. 101 of 1,000 tonnes).

Table 5.7 Overview tariff rates for cured ham in Switzerland

	Within the limits of the tariff quota (Q. No. 6)		**Outside the quota**	
	0210.1191 Dried ham, with bone in	0210.1999 dried ham, boneless	0210.1199 dried ham, with bone in	0210.1999 dried ham, boneless
Normal	225 CHF per 100kg gross	225 CHF per 100kg gross	1,530 CHF per 100kg gross	935 CHF per 100kg gross
EU	0,00 within contingent no. 101 of 1,000 tonnes	0,00 within contingent no. 101 of 1,000 tonnes	1,530 CHF per 100kg gross	935 CHF per 100kg gross

Source: xtares.

With respect to origin labelling, in Switzerland the origin of the meat used in cured ham (or other products) has to be mentioned on the packaging if the ingredient exceeds 20% of volume of the final product. The origin of ingredients that comprise less than 20% of the volume of the final products does not have to be declared in Switzerland. In the EU also the ingredients that comprise less than 20% have to be declared, which implies a costs for Swiss exmporters or rather foreign exporters of cured meat incur as they have to determine the origin and relabel consumer prepacked food. For cured ham like Parma ham, determining the origin of the meat is usually not very difficult since Parma ham e.g. can only be made from whole legs coming from Italian pigs. The costs of origin labelling can thus be expected to be little, especially as the origin of Parma ham is also declared for products being sold on the Italian market. For other ham, that does not have the designated origin label and the requirements to obtain the label, the labelling requirement of Switzerland add to trade costs, continuing a barrier to trade.

There are no relevant subsidies in Italy and Switzerland. No other measures are found that are directly aimed at affecting cured ham sales at the retail. For taxes on profits in general see Section 2.6.7 and Section 5.7.3.

5.7 Consumption

5.7.1 Consumption volume

In Switzerland, the average inhabitant consumed about 32 kg of meat in 2015 (Federal Statistical Office; calculations Wageningen Economic Research). Thereof, about 3.7 kg was ham and other preserved pig meat (Figure 5.13). According to FAO statistics, the supply of meat was 72 kg per capita in Switzerland in 2013 of which 31 kg was pig meat. In Italy, annual meat supply was about 84 kg per capita of which some 40kg was pig meat. Note that the supply of meat is calculated by FAO in

livestock primary equivalent weight. About 30% of the weight is lost in dressing after slaughtering and about 20% of the carcass is bones. In addition part of the fat and other products are not consumed. When meat products are preserved another part is lost, such as with drying hams. Hence, the actually consumed amounts are much lower than the primary equivalent supply. Nevertheless, the data indicate that Italian people eat more meat than Swiss and also more pork. The Swiss people are particularly fond of sausages, and charcuterie which comprises the largest share of meat consumption.

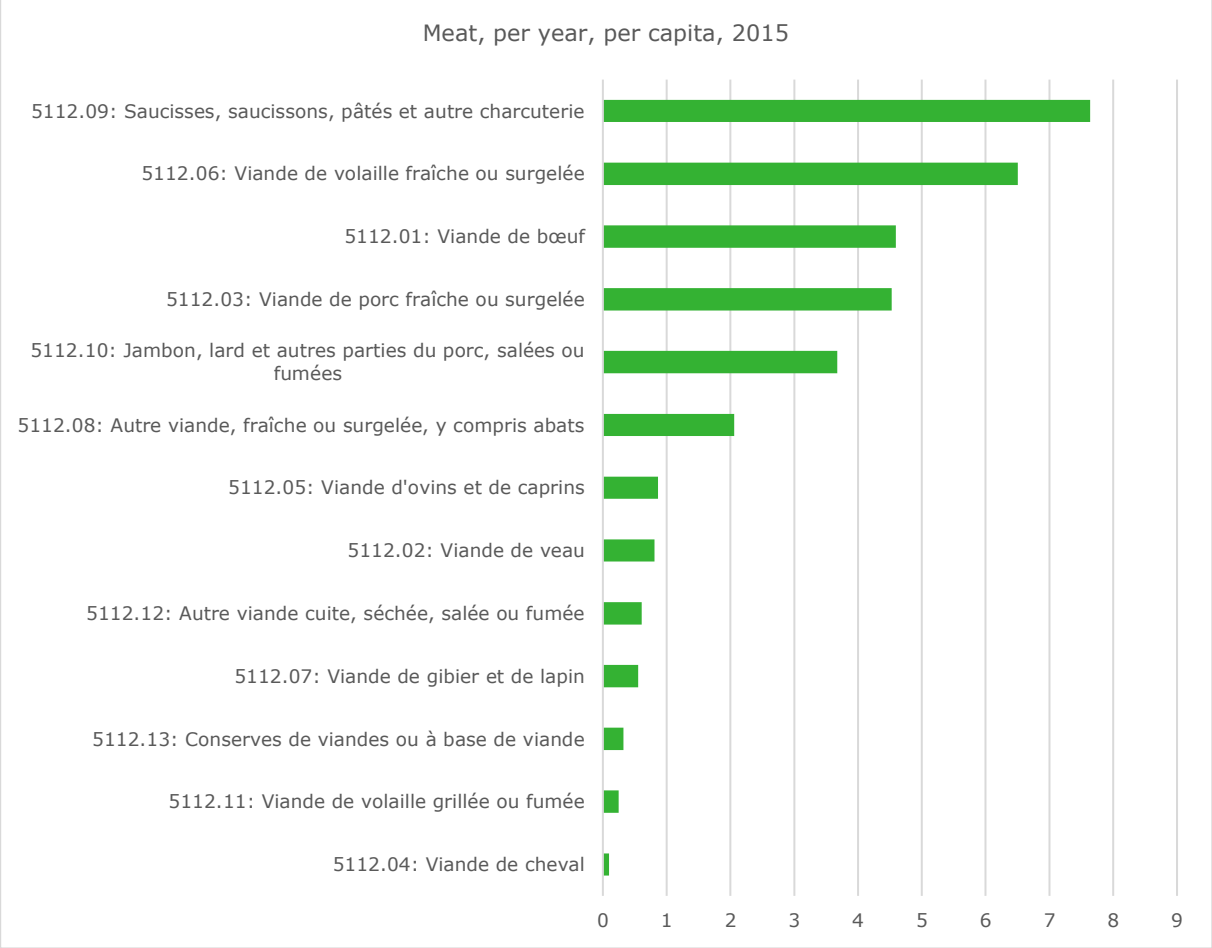


Figure 5.13 *Consumption of meat products in Switzerland, in kg per capita in 2015. Source: Office fédéral de la statistique, Enquête sur le budget des ménages (EBM), calculations Wageningen Economic Research.*

5.7.2 Consumer prices

In Switzerland, there are some differences in price per kg between cured ham depending on quality and brand. An average price of 65 CHF per kg is found at the retail when performing online and in-store checks.

In Italy, there are no official quotations of retail prices for different Parma ham products, but the price per kg certainly is about two times higher than for sliced ham at the counter.[52] The price of sliced vacuum packed Parma ham differs between brands with a mean of about 55 CHF per kg. Price differences within the same category of product are related to the brand name and the product quality. Sliced generic cured ham vacuum packed is sold at prices that range from 38 to 50 CHF per kg in Italy.

[52] The price difference at the retail shop covers weight loss due to deboning the ham and to cutting loss at the counter (this loss can be estimated at 40%), and the costs of transport to and distribution at the retail shop (labour, energy, interests, consumables and other costs)

5.7.3 Government regulations, support measures and taxes

The VAT tax rate in Switzerland is lower at 2.5% compared to 4.0% in Italy. For both countries, these are reduced VAT rates. No other policy measures aimed at cured ham consumption were detected.

5.8 Prices and costs along the chain

In Table 5.8, the consumer prices of cured ham are given in the last row. The products that are compared in this study are moderately priced pre-packed sliced Rohschinken in the supermarket in Switzerland and pre-packed sliced moderately priced Parma ham in supermarkets in Italy. Parma ham costs about 55 CHF in Italy and Swiss Rohschinken costs about 65 CHF per kg in Switzerland. The value of the slaughtering pigs, fresh hams, and cured sliced and pre-packed ham at the manufacturer stage are also given, in CHF per kilogram end product.

Table 5.8 *Prices and costs along the cured meat supply chain, 2017/2018, in CHF/kg*

	Unit value, in CHF		Difference in unit value, in %	Added value, in CHF		Difference in added value, in CHF	Difference in added value, in % of total price difference
	Switzerland	Italy	CH/IT	Switzerland	Italy	CH – IT	CH/IT
Slaughtering pigs, farm gate, carcass weight	6.91	4.18	65%	6.91	4.18	2.73	29%
Fresh hams, from slaughterhouse	20.00	10.00	100%	13.09	5.82	7.27	77%
Processing Cured hams sliced and prepacked	40.00	28.00	43%	20.00	18.00	2.00	21%
Retail Cured hams sliced and prepacked excl. VAT	63.00	53.00	19%	23.00	25.00	-2.00	-21%
VAT	1.60	2.20	-27%	1.60	2.20	-0.60	-6%
Cured ham consumer price, incl. VAT	65.00	55.00	18%	63.40	52.80		

Sources: Eurostat, CRPA, Suisseporcs, CCIAA di Modena, retail price data from online and in-store checks. Calculations: Wageningen Economic Research.

The costs per kg of the end product depend on the amount of input used to produce the sliced cured ham. On average the weight loss is somewhat higher in Italian Parma ham. The moment that the bone is removed from the ham is different in Italian Parma ham and Swiss Rohschinken. The Parma ham can only be called Parma ham if it is branded after 12 months of maturing, still including the bone. Despite all the differences in production methods, the table clearly shows that the differences in value added along the chain are most pronounced at the farm level and the first processing stage (slaughtering). Especially in slaughtering there are higher costs in Switzerland. The difference in added value at farm level can explain about 29% of the price difference at consumer level, while the difference in added value of the slaughtering houses is a big as 77% of the price difference. Prices do however differ substantially between different brands and quality labels.

In the figure below, the various costs aspects are compared per supply chain stage. It shows the different factors that contribute to the difference in price as the value that is added to the main ingredient from the previous stage. The sum of all the columns in Figure 5.14 is equal to the total price difference at retail level. The difference in costs is to a large extent attributed to labour costs and the non-labour costs of the processors. Also the operating margins of the retailers are higher in Switzerland than in Italy.

A striking difference is the costs of retailing between Italy and Switzerland. The retail gross margins (approximated by the difference in prices of the pre-packed ham at manufacturer and retail level) is about the same (23 versus 25 CHF), and actually somewhat higher in Italy. But retail labour costs are higher in Switzerland (15% versus 10% of turnover of the retailers), while the non-labour costs (other

than the costs of purchasing the ham) were lower in Switzerland. Note that the costs differences in the figure below exclude the costs already made in the previous chain stage. This difference can be explained by the relatively smaller scale of Italian food retailing leading to higher fixed costs per unit of turnover.

The profit margins of the retailers are twice as high in Switzerland as in Italy. With a lot of competition between retailers in Italy, profit margins are consequently limited. Although our research cannot pinpoint the exact effect of the market structure on the price of cured ham, it is clear that the market structure is very concentrated in Switzerland and profit margins of supermarkets in Switzerland are generally higher than in surrounding countries.

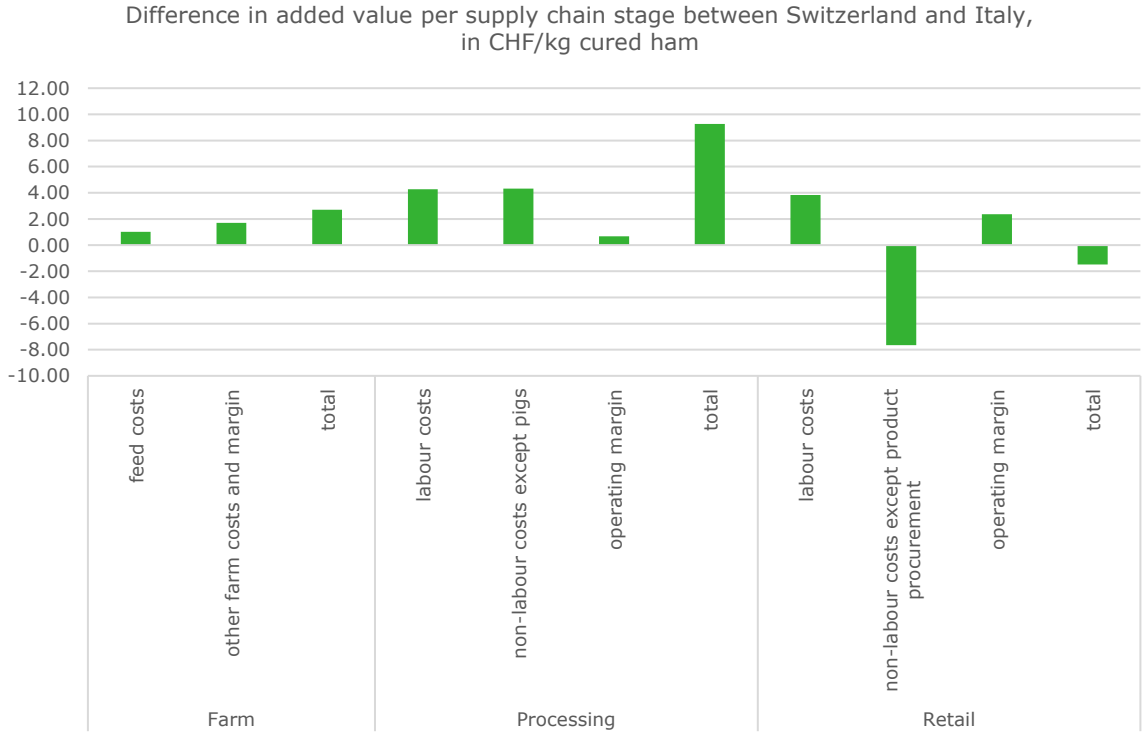


Figure 5.14 *Difference in costs between Switzerland and Italy, in CHF per kg of cured ham. Sources: CRPA, Interpig, Suisseporcs, CCIAA di Modena, Eurostat, estimates Wageningen Economic Research based on Eurostat and interviews with industry sources. Calculations: Wageningen Economic Research.*

Despite the fact that the Parma ham production takes a lot longer than the generic Rohschinken in Switzerland and is subject to strict regulations, the production costs are substantially lower than in Switzerland; 24 CHF as opposed to 33 CHF per kg of cured ham. On the other hand, the gross margin of the retail is comparable in Switzerland and Italy. A possible explanation is the higher sales of cured ham sliced at the counter in Italy. The risk of expiration is higher for pre-sliced ham than for whole hams. The price of ham sliced at the counter is lower than that of pre-packed ham. Another explanation is the relative importance of smaller supermarkets in Italy.

Cured ham (pre-packed and sliced, without bone) can be imported from Italy for about 28 CHF/kg plus import tariffs of 9.35 CHF per kg (tariff line 0210.1999). The difference in VAT at the border, 2.5% in Switzerland versus 4% in Italy, is having only a small effect of 0.42 CHF per kg. This leaves a remaining margin of 3 CHF for a potential importer. This should be enough to cover the costs of transportation and leave a profit. Nevertheless imports of cured ham are limited to about 2 thousand tonnes per year of which a thousand tonnes within the preferential EU contingent, or just about 230 grams per inhabitant. It seems that, among other factors, a preference for Swiss ham among consumers and retailers causes a limited import. Also. the IP-Suisse and Naturafarm labels, and the chain integration (or cooperation) between slaughterhouses, meat processors and retailers is the foremost reason that most ham sold in Switzerland is originating from domestic pigs. Importing ham from abroad would directly compete with the hams that are made by the integrated companies.

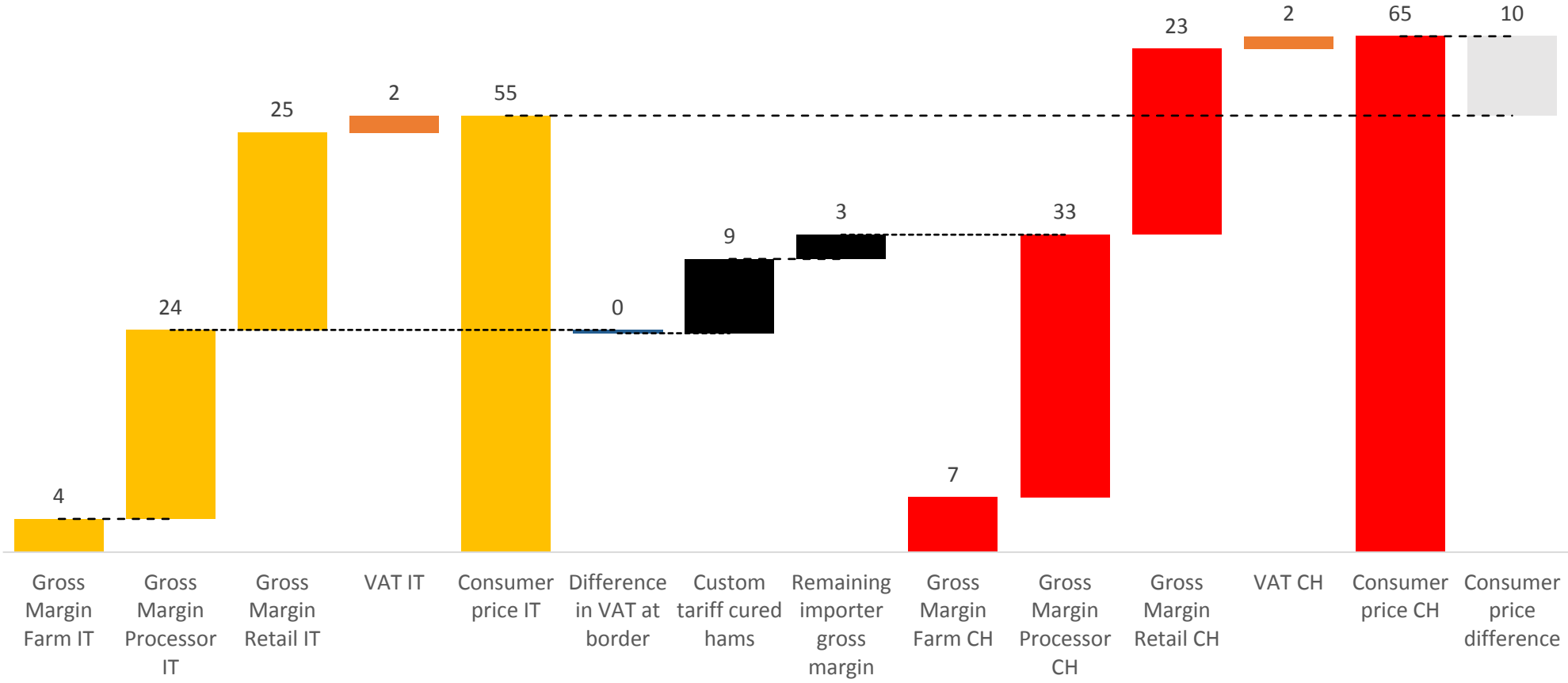


Figure 5.15 *Factors explaining higher price level for cured ham in Switzerland compared to Italy, in CHF per kg of cured ham. Sources: CRPA, Interpig, Suisseporcs, CCIAA di Modena, Eurostat, estimates Wageningen Economic Research based on Eurostat and interviews with industry sources. Calculations Wageningen Economic Research.*

5.9 Conclusions

1. The price difference for dry-cured ham between Switzerland and Italy is about 10 CHF per kg or 20% in the retail stage. The Swiss tariff for out-of-quota imports of boneless dried ham of 935 CHF per 100kg just compensates the difference in the costs of cured hams in Italy and Switzerland. Transport costs may account for part of the different. In addition and probably more importantly the integrated structure of the Swiss meat supply chain with the retail, also are a reason for the limited amount of imports. Importing would directly compete with the hams made by the integrated companies themselves.
2. The prices at farm gate are about twice as high in Switzerland as in Italy, even though the pigs in Italy are older and heavier at slaughtering (i.e. higher production costs). The additional costs in Switzerland are caused by higher feed costs, larger animal space requirements and higher labour costs. Nevertheless, the total difference at farm gate of 2.73 CHF per kg, can only explain about 29% of the total difference in the consumer price of ham of 10 CHF.
3. The difference in consumer prices is mostly caused by differences in the costs of slaughtering and production of the cured hams. Per kg of cured ham, the costs of processing are 9 CHF higher in Switzerland than in Italy, of which about 4 CHF is explained by higher labour costs. Non-labour costs are 5.30 CHF more expensive in Switzerland, including the 3 CHF higher costs of pigs. The differences at the processing stage are particularly pronounced for the slaughtering stage, which adds 7.27 CHF to the price of Swiss ham as compared with Italian Parma ham. The difference in added value at the slaughtering stage is 77% of the total price difference at consumer level.
4. The operating margins of the processing companies and the retailers are higher in Switzerland than in Italy. Retail margins in Switzerland are twice as high as in Italy. The market structure of the retail in Switzerland is very much concentrated. The same applies to the slaughtering houses. Although there is a number of slaughtering houses, there is not much choice for farmers, because ultimately due to vertical integration they all belong to, or supply to one of the two main retailers. The fact, that most of the slaughtering houses pay more or less the same prices for live pigs, confirms the concentrated market structure. This is different in Italy where there are a lot more slaughtering houses that have to compete for pigs.
5. The slaughtering houses and larger meat companies in Switzerland are very much linked to the large retailers. With the two main animal welfare programmes laying down strict rules for farmers, switching costs for farmers are considerable.
6. Considering that the retailers and processors in Switzerland both make a higher profit than in Italy, it is plausible to assume that the market structure – helped by the trade barriers – have a small upward effect on prices. The difference in profits of the retailers is about 2.4 CHF per kg of cured ham, or 4% of the consumer price.

6 Conclusions

There are several factors explaining higher prices of food products in Switzerland compared to the neighbouring countries. These include costs for input goods, higher wages and higher profit margins at some stages of the supply chain. Other factors play also a role, such as preferences, labelling requirements, private standards and quality differences, but those are less quantifiable. The Swiss import tariffs system effectively prevents large imports of food products, which are also produced domestically. In the study commissioned by the Swiss State Secretariat for Economic Affairs, three exemplary domestically produced food products in Swiss supermarkets are taken for the assessment of factors contributing to consumer price differences between the comparable products in the supermarkets of the neighbouring countries: 1) non-organic mid-price segment wheat bread in Germany, 2) non-organic, low-to-mid price segment plain natural yoghurt in France, and 3) cured Parma ham from Italy versus Swiss cured Rohschinken. Their prices and costs along the chain were collected and compared between Switzerland and a neighbouring country. In reality, the characteristics of the chosen products are not perfectly identical between Switzerland and the benchmark country. Although the choice for a product with certain features determines the magnitude of the outcomes, the analysis is able to provide insights in the mechanisms that drive price differences. The following conclusions are drawn from the study:

1. Consumer prices of the three studied products are 20% higher in Switzerland for yoghurt and cured ham, and 100% higher for bread, compared to the benchmark countries. When compared to average price differences of food products between Switzerland and the EU-15 (purchasing power parity adjusted), of about 66% for food, 121% for meat, 57% for bread and cereals, and 44% for milk, cheese and eggs, the price differences of the selected yoghurt and cured ham products are lower, while bread is relatively more expensive. This shows that there is quite a lot of variation in price differences between and within product groups.
2. The relative price differences are generally most pronounced at the farm level. Farm-gate prices for wheat are three times higher in Switzerland than in Germany. Raw milk and pigs are 60% and 100% more expensive in Switzerland at farm gate. This does not include differences in direct subsidies to farmers which are existing in Switzerland and the EU, and are generally found to be somewhat higher in Switzerland.
3. The higher costs at farm level can be attributed to scale effects (partly due to stricter regulations as in the case of the regulations related to free farrowing for pigs, and the maximum number of pigs allowed in one farm), as well as to higher costs of inputs, and labour costs. Although the exact contribution of each of these factors is not provided in our study, it is shown that fixed costs are a relatively large part of the higher costs.
    a. Non-labour input costs per tonne of wheat are about twice as high in Switzerland as in Germany. For dairy farms, input costs in Switzerland are just about 10% higher than in France. Finally for pigs, input costs are about 70% higher in Switzerland than in Italy. For dairy farms, the feed costs are a much lower part of the costs than for pig farms, and hence the contribution of the higher input costs is much lower for dairy farms.
    b. The smaller scale of farms (sometimes related to regulations as with the maximum number of pigs regulation for pig farms) and the corresponding higher overhead costs is also an important factor. For wheat, (based on information from Sustain Consult and interviews) the fixed costs are estimated to be about five times higher in Switzerland than in Germany. Fixed costs per kilogram were estimated to be twice as high in Switzerland for milk and four times higher for pigs, as compared with the benchmark countries. Especially the production costs of wheat are affected by the fixed costs factor.
    c. The labour costs; paid labour and the margin for the farm entrepreneurs (farm income excluding subsidies) are the lion's share of the remaining cost difference. For pig production, paid and allocated labour costs are more than twice as high in

Switzerland as in Italy, per kilogram of pig. For milk, paid labour costs were much higher – seven times higher - in Switzerland than in France. Data about farm income per kilogram were not available. For wheat production, comparable data were not available to conclude about the total costs of labour and farm income.

4. The import tariffs can explain the near absence of imports of yoghurt and partly of bread and its intermediate products (wheat, flour, bread from industry) and cured ham in Switzerland.
    a. For bread, the price of wheat from Germany plus import tariffs and transport costs is about 0.47 CHF per kg of bread, while domestically produced wheat costs about 0.41 CHF per kg of bread. The tariff is hence effective in avoiding imports and therefore keeping the price level higher in Switzerland. Imports only occur when there are shortages in wheat (requiring a temporary increase of the quota). For wheat bread for the retail, the situation is slightly different. When importing bread for the retail, about 1.40 CHF is still left for the importer. But the relatively small (although increasing) share of bread imports is rather to be explained by the perishability and freshness reference for bread by Swiss consumers.
    b. For yoghurt the price of French natural yoghurt plus the prohibitively high import tariffs exceed the price for domestically produced yoghurt by far. For this reason, no imports of yoghurts in the mid-range price segments are occurring. The Swiss market is completely closed in the production process.
    c. For cured hams, the import price of about 28 CHF plus the import tariff of 9.35 CHF equals about 37 CHF. The price of domestically produced cured hams was estimated at about 40 CHF. Another small price of the price difference is covered by transport costs. The tariff regime is not large enough to prevent the imports of this product. Still, the retailers choose to sell domestic products due to factors as the preference of consumers for Swiss products and transport costs. In addition, there is a high level of integrated structure of the Swiss meat supply chain with the retail, which leads to the preferred supply of Swiss product. Some smaller volumes of Italian hams are indeed imported. About half of these imports were within the quota, hence allowing importers to profit from the preferential import quota with the EU.
5. For bread, most of the cost differences are due to higher costs at the bakeries and in the retail. For cured hams, the costs are particularly higher in the slaughtering industry in Switzerland. For yoghurt however, the cost differences are originating mostly at the farm level and in the retail.
6. The market structure of the Swiss retail is much more concentrated than in the benchmark countries. This seems to be reflected in relatively large operational profit margins of the Swiss retailers. The high market share of the two largest retailers (>80%) and the relative absence of hard discounters (i.e. very small market shares) allow retailers in Switzerland to make operational profits (EBIT) that are considerably higher than those in the benchmark countries. In some cases, such as for bread and cured ham, the additional profit at retail level (as estimated from our study) almost equal the additional costs at farm level.
7. There are strong links between the processors and the large retailers in Switzerland which may warrant a different division of costs and profits along the chain. From the three cases studied in this report, it is observed that farmers in Switzerland are very much tied in, meaning that they have limited choice in customers especially after entering into one or the other retailer environmental or animal welfare programme. In practice, their additional costs are not fully covered, according to some of the interviewees. Switching to other customers, however, is not always feasible, due to the small market and the concentrated nature of processing and retailing in Switzerland as well as the costs for adapting to the new rules of the other programme. Farmers in other countries may have a little bit more choice of customers. On the other hand, farmers are generally price takers in all countries considered.
8. The shares of each actor in the consumer Swiss Franc are roughly the same in Switzerland and the benchmark countries, although the farmer shares are generally higher in Switzerland, which is consistent with the fact that farm-gate prices are relatively high. The share of farmers in the price of bread is just about 7% in Switzerland and 5% in Germany. Also for yoghurt, 29% in Switzerland and 22% in France, and for cured ham, 11% in Switzerland and 8% in Italy, the farmer share is higher in Switzerland.
9. The shares of the retail in the consumer price vary between 50% and 60%. The share of the processing industry is relatively large for bread and cured hams.

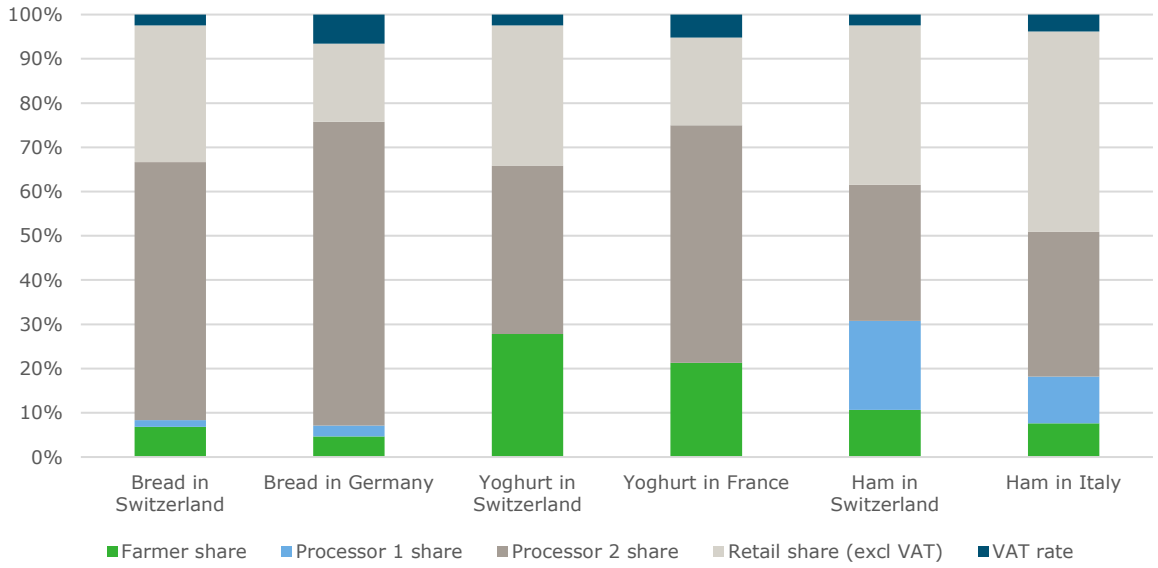


Figure 6.1 *Share in food Franc (including VAT) of different stages of the value chain, 2014-2016. Calculations: Wageningen Economic Research.*

10. On the whole, there are large differences between the various products. The contribution of additional farm costs to the difference in consumer prices varies between 9% for bread and 61% for yoghurt. This is caused by the relative importance of the raw product in the end product, the number and nature of the processing stages, the market structure and efficiency of the different actors along the value chain.
11. The contribution of the processing stage to the additional costs varies between -39% for yoghurt and 99% for ham. Especially slaughtering and meat processing seem to be rather expensive in Switzerland, especially considering the fact that the hams are dried for a longer period in Italy. Labour costs in the slaughtering and meat curing process are the primary reason for these higher costs, although additional operating profits are also made.

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Economic Policy Directorate

Holzikofenweg 36, 3003 Berne
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www.seco.admin.ch, wp-sekretariat@seco.admin.ch