

Master thesis (MST-80433)

**Short- and Long Run Effects of Supply-Driven  
Market Conditions**

The case of Royal FrieslandCampina's cheese market

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## Management summary

This report describes an integrated research on supply-driven market conditions in the European non-branded cheese market of FrieslandCampina (FC). Supply-driven stands for production without explicit market demand at a given moment in time. This volume pressure is the starting point of this project. The research is performed in three phases. These phases are a literature study, a case study using interviews, and thirdly a quantitative analysis on market and industry data. During the research it appeared that supply-driven markets can be narrowed down towards a volume-price choice. From the literature study this choice can be embedded in the Structure Conduct and Performance (SCP) model (Carlton & Perloff, 2005). This model provides factors which relate the behavior of the firm with its performance under a set of boundaries.

From interviews it appeared that supply-driven markets and its consequences are perceived differently. Interviews were performed with FC employees and external experts from Wageningen University Research Centre (WUR) and Rabobank. All interviewees regard supply-driven cheese as a necessity, caused by milk pressure originating from member farmers. Some interviewees state that supply-driven is an incentive for FC to differentiate and innovate their products. Others perceive the cheese market as the spillway for the dairy market.

From the quantitative analysis it appeared that FC's performance measured in price performance was weak at given supply-driven moments. Export data from Productschap Zuivel and AC Nielsen combined with German market data from ZMP and MIV revealed this. This project calculates that on a monthly basis in 2008-2009, supply volatility was inferior in size compared to demand volatility. Supply-driven conditions as a primary cause for bad performance are thus only half of the truth: real volatility is on the demand side (mainly exports).

The conclusion is that FC should focus on stabilizing and increasing sales. Suggestions are, though outside the scope of this research, e.g. differentiation and segmentation to overcome the so-called Prisoner's dilemma with competitors e.g. German producers.

In the end FC should choose how they would like to position themselves in the dairy market as such. Main indicators are the share of milk towards cheese, the valorization expectations for each segment and the degree of integration with focus on the role of storage.

Furthermore regarding non-differentiated commodity segments FC should reconsider its use of cooperative practices, rather than non-cooperative practices. This implies whether FC bets on a vertical level (traders and retailers/industrial users) or horizontally (towards competitor producers such as Deltamilk and DOC and Nordmilch).

## Preface

Voor u ligt het verslag van mijn afstudeerproject bij FrieslandCampina Cheese. In 2009 kwam ik in contact met Jacob Kroes, werkzaam bij FrieslandCampina, over een eventueel afstudeeropdracht. Het leek mij bijzonder uitdagend om een groot vraagstuk als “supply-driven” cheese te bestuderen en dit bleek ook zo te zijn.

Ik wil graag bedanken mijn begeleiders vanuit de universiteit, Maarten Batterink en Roel Jongeneel. Op een positieve manier wisten zij mijn onderzoek te begeleiden. Daarnaast wil ik Jacob Kroes bedanken voor het mogelijk maken van deze opdracht. Tevens heeft hij mij gesteund tijdens het onderzoek, en kwam hij met zeer sterke en goede opmerkingen, zonder keuzes voor mij te maken.

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Ik wens u veel leesplezier,

Jan Ubbo



# 1 Introduction

This project focuses on the effects of supply-driven markets. Supply-driven means production without explicit market demand at a given moment in time. One can argue that “supply-driven” is special situation in the match between supply and demand. This special situation, supply-driven, can be caused either by demand or supply changes. Demand is directly linked towards the shivers of the market; supply is directly linked towards choices of the firms within the industry (Carlton and Perloff, 2005). This project aims to evaluate the interaction between the firm’s and market. This means that the scope is broader than supply-driven sales only: also the causes and consequences are incorporated. The whole complex of supply-driven sales, production and its aspects is called a “supply-driven market situation”. Summarizing the target is to get insight into the effect that supply-driven sales has on the market, and what a firm can countervail with respect to supply-driven market conditions.

An example of market in which the interaction between the market and the firm plays a role is the European Dairy industry. This market is highly controlled. This means that the quantity of raw milk is limited via restrictions set by the European Union (EU). The EU intervenes in some dairy market segments by buying and temporarily store products such as butter and skimmed milk powders. Due to liberalization requirements from the World Trade Organization (WTO) the price support is decreasing and also the production quota is planned to be abolished (Commission of the European Communities, 2009). According to Rabobank a new era in dairy market has begun (Rabobank, 2009). Their analysts suggest dairy industry has to adapt to higher cost-prices in combination with more volatile markets. This provides the input for dynamics within dairy markets among other reasons.

This project focuses on the Dutch-type cheese within the dairy industry. To give the reader an impression about the importance of cheese within dairy industry: Roughly 50% of the Dutch milk is turned into cheese (Productschap Zuivel, 2008). Another interesting aspect is that of these cheeses roughly 80% is exported, mainly to other European countries. FrieslandCampina is the main player within the Dutch cheese market and has an aggregated market share of 60-70% (Commission of European Communities, 2008).

## 1.1 FrieslandCampina

FrieslandCampina processes milk towards retail products such as butter, milk powder, drinks, cheese and other products. FrieslandCampina processes 10.8 billion kilogram milk per year. This

milk is mainly originated from Dutch farmers. FrieslandCampina (to be abbreviated hereinafter as FC) is the resulting company of the merger of FrieslandFoods and Campina in 2008.

FC sells its products worldwide and has the ambition to become the “most successful, professional and attractive dairy player of the world” (FrieslandCampina, 2010). Currently FC is the largest dairy processor in the Netherlands with a turnover of about 8.2 billion EUR in 2009.

FrieslandCampina is divided into four business units. This project is performed at the Cheese & Butter department with a turnover of 2.1 billion EUR in 2009.

FrieslandCampina is a cooperative. This means the firm is owned and controlled by its member-farmers (Van Dijk & Klep, 1997). The business model of the cooperative FC is slightly different from investor oriented firms. FrieslandCampina processes the milk of their members towards a downstream product e.g. cheese. FC has the obligation to process the milk for the highest possible price. The employees are urged to match the supply from their members with the dynamics of the market on the other hand. This project is within this tension field and has the ambition to enhance this matching process.

## 1.2 Background

FrieslandCampina is continuously trying to find the balance between the stakes of the member-farmers and the demand of the market. In their own words FC wants to achieve the best price for the raw material of the members, the milk. In order to find the balance insight in the market is crucial to make the right decision. Currently, due to the merger of FrieslandFoods and Campina in 2008 resulting in FrieslandCampina, is reevaluating its approach towards the market as such and aiming to reconsider corporate strategy (FrieslandCampina, 2010).

In general each firm is trying to find the balance between inside possibilities (supply) and outside markets (demand). This project focuses on the market structure or the so called industry structure (the outside) and how the firm influences this market structure and its own performance. From industrial organizational economics several tools may be useful for this project since it covers the coordination and motivations within companies and markets (Hendrikse, 2003). For example the Structure Conduct and Performance model (SCP model) provides the links and aspects between the structure, conduct and performance of an industry (Carlton & Perloff, 2005).

Next to that the marginal analysis perspective is also very useful to analyze markets. The marginal perspective analysis originates from micro-economics. According to Perloff (2009), a representative of micro-economics, also several models are available about competition within markets. Basic

mechanisms of supply and demand can be described and may be useful within this project. Several competition forms are known: perfect competition, monopoly, and oligopoly (Carlton & Perloff, 2005). We will come back to these definitions in chapter 2. For now we just give some examples of oligopoly models to give the reader a first impression. Note that these models are methods to give better understanding of how a market works and what choices the players make. The three most common oligopoly types are (Carlton & Perloff, 2005):

- Cournot: the market is determined by **volume** choices of players
- Stackelberg: identical to Cournot, but now with a dominant player
- Bertrand competition: market is determined by **price** choices of players

Within the Cournot and Stackelberg markets the concept of conjectural variation is a phenomenon which is often studied (Ono, 1978). Conjectural variation means the variation of volume controlling for market responses of the competitors. In short oligopoly markets are markets in which the behavior of the individual firms influences the market and the other players (Carlton and Perloff, 2005).

There have been more research projects on the cheese market. In a case study performed on behalf of the European Union Oerlemans and Hees (2005) researched CONO's market strategy. CONO is a medium scale Dutch competitor of FC and follows a differentiated niche market strategy. In the report critical success factors for the market strategy of CONO are presented.

Another study of Pitts (1998) concluded that the semi-hard cheese industry, in which the case study company FC is active in, has increased in production scale in the 1990s. Furthermore he links the increased competition towards scale increasing which in turn results in a lowered milk price.

Summarizing the theme of this research project is the tension and interaction between firms and their markets. The scene in which this tension will be studied is the European dairy market focused on cheese. More specifically a case study towards the phenomenon supply-driven cheese markets within FrieslandCampina will be performed embedded in the theme "tension and interaction" and scene "European dairy market".

In the next paragraphs exact formulation of the objective and the research question will be given. These follow from the problem description of this paragraph.

### 1.3 Research objective

A research objective explains why the project is performed (De Vaus, 2001). The research objective is stated as follows:

**The aim of this project is to evaluate short- and long run effects of and responses on supply-driven market situations in the European cheese market. This will be applied on the case study of FC, aiming to increase the valorization of supply-driven milk allocated to cheese by mapping the market effects and responses, in supply-driven situations at the allocation level.**

Note regarding key concepts within objective:

- Supply-driven: Production without explicit market demand at a given moment in time.
- Short run effects: The effect of oversupplying the demand on the price and aggregate sales on the short run. Perloff (2009): short run means that not all factors have adapted yet to the eventual impact of the over-supply.
- Long run effect: The long run effect of oversupplying the market measured in sales and market share. Perloff (2009): long run means that all factors have adapted to the eventual impact of the over-supply.
- Responses: The reaction of a company measured in variation in volumes and prices including the market strategy.
- Valorization: Creating value from the raw product.
- Allocation level: Level where the production choice is made.

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## 1.4 Research questions

The research objective needs to be transformed into a general question to achieve the formulated target (De Vaus, 2001). The central research question of this project is defined as follows:

**What are short- and long run effects and responses of supply-driven market situations on the cheese market from the perspective of FrieslandCampina?**

The central research question can be divided into specific research questions. These specific research questions make the central research question more clear and give direction towards the research project (De Vaus, 2001). The specific research questions are:

**SRQ1: What are important aspects of the interrelation of firms and markets regarding the evaluation of supply-driven market situations according to industrial organizations and economics literature?**

**SRQ2: What are the main characteristics of a supply-driven cheese market and what are important aspects?**

**SRQ3: What is the effect of supply-driven cheese on the cheese market measured in volume, price and sales on the short and long run?**

The answer on the first research question enables to give a good overview of the literature regarding supply-driven. Specifically we need to know what the theoretical causes and background are for supply-driven market situations. Also what the firm can do to countervail the suspected negative effects.

The answer of second research question makes it possible to come up with a good overview of the causes of supply-driven market situations. Also about how negative effects have to be located and how different stakeholders perceive supply-driven situations. With causes is meant what is really causing the problem and what are side issues? With consequences is meant what possible consequences supply-driven conditions may have.

The third answer should give an overview of measured negative effects. Also this would provide leads towards improvements for the case study company.

In appendix II a more detailed subdivision of these specific research questions is given. The specific research questions need to be answered. The following paragraph will explain how these specific research questions will be answered.

## 1.5 Conceptual research design

The research design elucidates how the research will be performed (De Vaus, 2001). In Figure 1.1 the structure of the research is presented. The first step of this research project is to create the theoretical framework. This is in line with the first specific research question. The resulting framework provides input for the later two steps. The theoretical framework consists of a selection of approaches and theories translated into expectations and ingredients for the qualitative analysis.

The second step will be a qualitative case study towards the phenomenon of supply-driven market situations focused on FrieslandCampina. This question is analogue to the second specific research question. The resulting overview of main characteristics provides input for the third phase of the project. The third phase consists of a quantitative analysis of the supply-driven market situations. Lastly the central research question can be answered and the conclusions can be drawn.

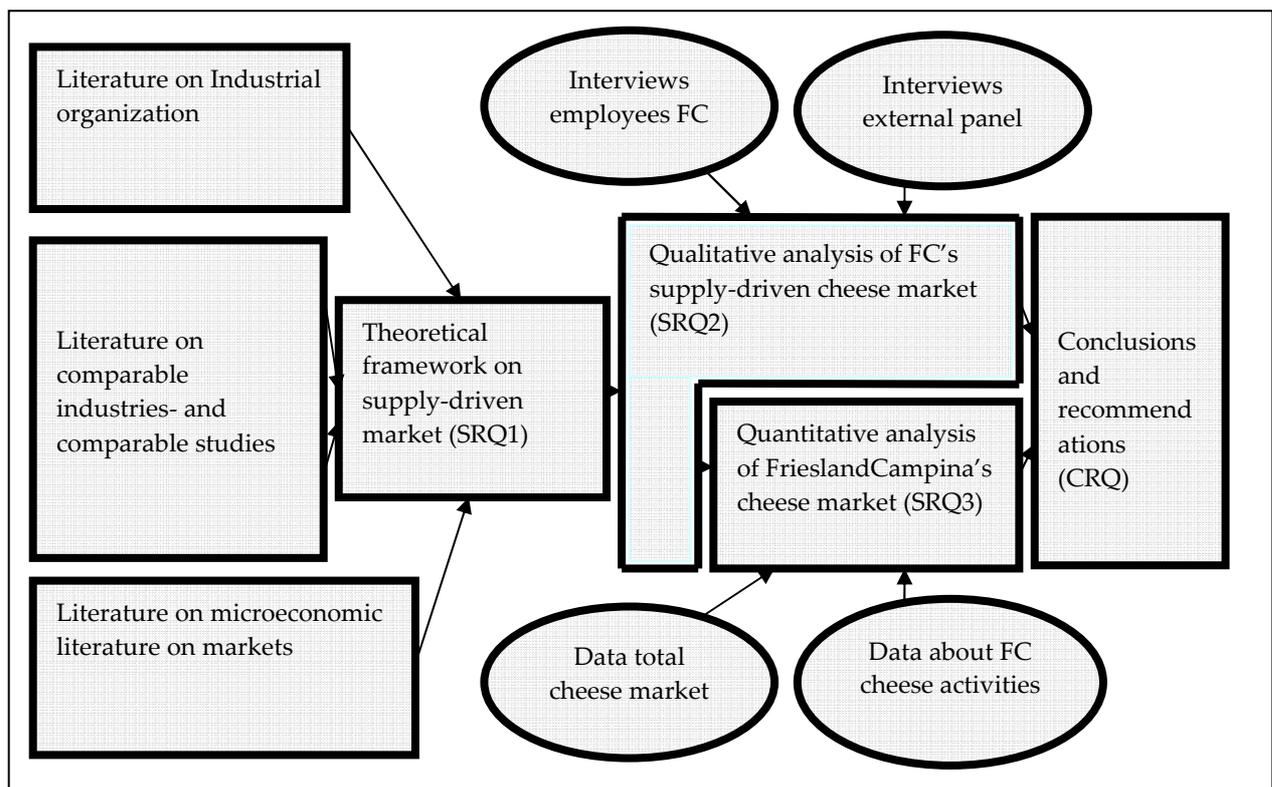


Figure 1.1 Research framework

## 1.6 Technical research strategy

The central research question is: "What are short- and long run effects and responses of supply-driven market situations on the cheese market from the perspective of FrieslandCampina?"

To answer this question a proper research strategy is necessary to make sure that research answers this question (De Vaus, 2001). Below the different steps within the research framework (see Figure 1.1 in paragraph 1.4) will be implemented. This chapter answers how the research will be performed.

First a theoretical framework will be assembled based on two major scientific fields. These two fields are industrial organization and micro-economics. These two fields function as the main perspective to evaluate the relationship between market and firm in the special case of supply-driven situations. Recall that this is in line with the first specific research question:

*“What are important aspects of the interrelation of firms and markets regarding the evaluation of supply-driven market situations according to literature?”*

The reason why the literature study focuses the management and economic perspective is as follows. Intrinsically a cooperative firm is focused on the stakes of the upstream suppliers (in the case of FC to supply milk), and can be called supply-driven (Bijman, 2002). However: cooperatives act usually like “normal” firms by taking rational steps i.e. maximizing revenues for its products. In some markets FC operates as demand-driven while in other markets they are more price-takers. This project is regarding the bulky price-taker markets. This implies general marketing theories considering differentiation, niche-markets and branding are not useful. As stated before: the focus is on the economic market behavior enhanced with knowledge regarding the market strategy. We assume FC already maximizes its branding and differentiation strategies.

A good starting within literature on supply-driven situations is the Structure Conduct and Performance framework as summarized by Carlton and Perloff (2005). Also expectations regarding the supply-driven market can be formulated.

After creating the theoretical framework a qualitative analysis constructed as a case study will be performed. A case study is a method to analyze and zoom in into a specific case in order to solve a specific problem or test a theory (De Vaus, 2001). The case study aims to answer SRQ2. This question is formulated as follows: *“What is a supply-driven cheese market and what are important aspects (i.e. causes, consequences, and perceptions)?”*

Key is to get a clear overview of the cheese commodity market regarding supply-driven sales, in order to enhance the second part of the analysis mainly by preventing overlooking important factors of the quantitative analysis. Furthermore it will facilitate in providing the underlying rationales to enhance validity of the quantitative analysis.

The third phase aims to answer SRQ3. From De Vaus (2001) several research strategies are suggested e.g. experiments, longitudinal designs and cross sectional designs. The third research question is defined as follows: *What is the effect of supply-driven cheese on the cheese market measured in volume, price and sales on the short and long run?* Regarding SRQ3 the element of “effect” is evidently important. To identify effects cross-sectional designs are suitable (De Vaus, 2001). However: longitudinal or experimental design would be more valid, but to really intervene empirically in the sales of cheese market is rather unrealistic for several reasons. First time availability puts restrictions. Second the cheese market is very large and complex. Third: if results are coming from the cross sectional design they may be useful as input for an eventual experiment. Following this reasoning a cross sectional design is the most applicable research design. The cross sectional design requests good due diligence knowledge about the cheese market in order to prevent spurious relationships (De Vaus, 2001). This problem is foreseen since there is an extensive qualitative analysis in advance of the quantitative research. The qualitative analysis is expected to provide inputs for allocating controlling variables. Another factor to mitigate the cross-sectional design is to find retrospective experimental events (De Vaus, 2001). Within this research supply-driven cases will be sought and some of them are known on forehand.

In the Data and Methods chapter (chapter 3) a more in detailed overview of the approach of step 2 and step 3 will be given.

## 2 Literature study

The first specific research question concerns what industrial organization and economic literature provides about supply-driven market situations. The industrial organization and economic perspective are chosen on forehand since it appeared in the explorative phase of this study that general marketing theories would not be applicable on this specific case. More specifically this chapter answers the SRQ1 *“What are important aspects of the interrelation of firms and markets regarding the evaluation of supply-driven market situations according to literature?”*

The structure of this part is as follows. It will start with an introduction about the interrelation between the market and a firm. Second the concept “market” and “firm” will be treated separately in paragraph 2.2 and 2.3. Fourth paragraph will zoom in onto the interrelation between these two concepts and regularities. Fifth paragraph contains introduction to Game theory in the context of the problem enhanced with an introduction towards the Structure Conduct and Performance framework. The latter two items will act as tools and framework. In paragraph 2.6 empirical researches towards the cheese market are reviewed and results evaluated. The last paragraph converges findings into a theoretical framework for this research project.

### 2.1 Introduction to market and firm

In general each firm is looking for the best configuration of its capabilities considering market environment (Langlois, 1993). Langlois, an ambassador of the Resource Based View (RBV) strategists, suggests a firm should align its internal resources with the market.

According to more recent management authors e.g. Johnson *et al.* (2008) the challenge for a firm is to align its internal resources with the environment among other aspects. This aggregate is called strategic positioning. The analysis of strategic positioning as perspective is helpful to analyze *effects* and *responses* on the *market* and the *firm* including interaction between market and firm. In order to do this a good view about both elements is required.

### 2.2 The market

This chapter will discuss the concept market. According to Cournot cited in Geroski (1998) a market can be seen as the place where products are exchanged. Meulenbergh (1983) makes the concept broader and writes in a comprehensive article that “markets are exchanging, supplying

and facilitating". The market as such is not just a description of transactions but plays a role in itself namely by facilitating the transfer of goods.

In chapter 2.2.1 the consumer demand will be discussed. In the next paragraph we will discuss the supply side and its factors.

### 2.2.1 Consumer demand

According to Hull (2005) the market can be rather dynamic or stable with respect to demand. With dynamic he means that the demand can fluctuate very fast. Stable means that the demand does not change over time. He refers to a Harvard Business Review article from Fisher (1997). According to Fisher there are two types of markets: functional products and innovative products. For functional products a stable demand is assumed and a low price elasticity since consumers cannot afford not to buy these products since they are functional.

Agricultural economics focuses on the distinguishing aspects of the agricultural markets. For example agricultural markets are more volatile due biological nature, time lag between production decision and selling moment (Tomek & Robinson, 1990). This means that this uncertainty is accompanied with increased risks which have to be hedged. A cooperative is one way to achieve that (Van Dijk & Klep, 1997).

The demand of such market is usually determined by (Tomek & Robinson, 1990):

- 1) Population size and its distribution by age, geographic area
- 2) Consumer income and its distribution
- 3) Prices and availability of other commodities and services
- 4) Consumer tastes and preferences

The demand elasticity is a measure of the responsiveness of consumers on price by for example substitution. Usually the price is represented as function of the quantity. However: this relation is unilateral i.e. price and quantity are determined simultaneously (Perloff, 2009).

The relationship between price and volume can be evaluated using the elasticity analysis. First there is the *price elasticity*. This represents the change in demand as reaction on price change. See Formula 2.1 for the representation.

$$\varepsilon = \frac{\Delta Q}{\Delta P} \frac{P}{Q} \quad (2.1)$$

In this formula the Q stands for the demand quantity and P stands for the price paid for that given quantity. It turns out market can be elastic (price change influences quantity) or inelastic (price change does hardly influences quantity) as presented in Figure 2.1.

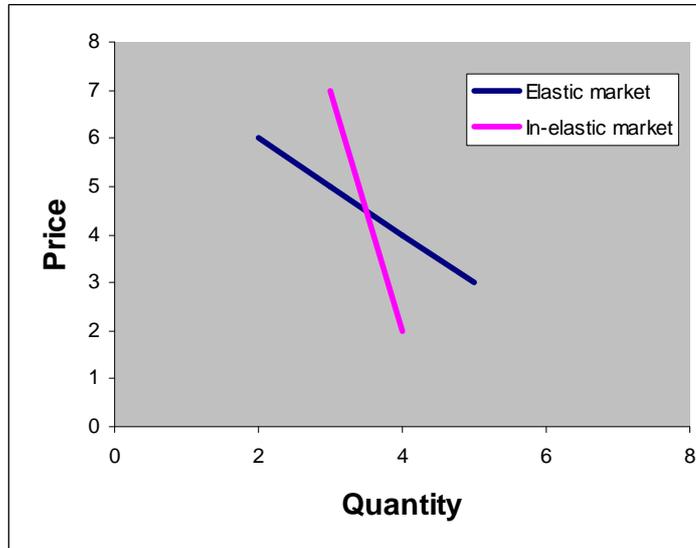


Figure 2.1 Elastic and inelastic market

The two lines in Figure 2.1 are hypothetical demand curves. From demand curves individual firms can derive their own faced demand curve also known as the residual demand curve (Carlton & Perloff, 2005). The residual demand curve is defined as the total demand minus the supply of the other firms. The shape of this residual demand curve determines the optimal price quantity choice among other conditions. Stylistically speaking a residual demand curve has two extremes namely a monopolistic (equal to total market demand curve) and a competitive (horizontal curve). Under monopolistic conditions a firm can choose along the demand curve while under a horizontal price quantity curve each price change leads to loss of all sales (Carlton and Perloff, 2005). Between these extremes one can consider markets applying the residual demand approach with the elasticity as key determinant.

## 2.2.2 Production

The supply of agricultural products from the neoclassical perspective is determined by the equilibrium of marginal costs (MC) and marginal revenues (MR). This means that firms will increase production till the point that the extra revenue for one extra product equals the costs of producing it. Furthermore the opportunity costs for the firm are important. When a firm can produce other higher yielding products the supply of the particular product will decrease.

Tomek & Robinson (1990) come up with six main supply factors:

- 1) Changes in factor prices
- 2) Changes in return from commodities that compete for the same resources
- 3) Changes in technology that influence both yields and costs of production or efficiency
- 4) Changes in the prices of joint products
- 5) Changes in the level of price and/or yield risks faced by the producer
- 6) Institutional constraints

According to Tomek & Robison (1990) agricultural markets are supply inelastic. That means that supplied volume is not responsive to prices.

## **2.3 The firm**

This paragraph introduces the main concepts and aspects for a firm with respect to its conduct on the tactical and operational level. A firm is defined as *“an organization that transforms inputs (resources it purchases) into outputs (valued products that it sells)”* (Carlton and Perloff, 2005). This project is about the problem when this transformation of outputs does not per se leads towards valuable sold products i.e. a mismatch between supply and demand.

In this light the role of the cooperative rationale behind a firm will be discussed first. Second the tactic-strategic options a firm has with respect to its behavior are presented. Third choices on operational level regarding general pricing options, volume variation, and production optimization theory from micro-economics will be presented. Fourth the stake and factors of the long term strategy of a firm is described.

### **2.3.1 Cooperative being**

As written in the introduction FC is a cooperative and exists primarily to satisfy the needs of the members by processing and market the raw material at the highest possible price (Van Dijk & Klep, 1997). According to Hoffman and Royer (1997) the presence of cooperative firms within a market results in a different market structure. In their project they prove cooperatives to change equilibriums in favor of the members. Intrinsically a cooperative firm is focused on the stakes of the upstream suppliers (in the case of FC the member dairy farmers), and is thus supply-driven (Bijman, 2002). However: cooperatives act usually like “normal” firms by taking rational steps i.e. maximizing revenues for its products. However: in some markets FC operates as demand-driven while in other markets they are more price-takers.

According to Rogers and Marion (1990) marketing cooperatives only have market power if they can control their supply. They suggest three methods: controlling the number of members, controlling the individual supply or by diversion of some production by price discrimination out of the market.

Rogers and Petraglia (1994) found that the presence of agricultural cooperatives in markets is the argument for a lower price-cost margin within an industry analogue towards the yardstick effect. This is obvious since a cooperative opts for profit maximization for their shareholders via the raw material relationship rather than via direct financial profit (Van Dijk & Klep, 1997).

### **2.3.2 Tactical behavior of firms**

Carlton and Perloff (2005) summarize conduct of individual firms by two mainstream philosophies. Note that these options have to be seen in the light of the competitive environment. How do you treat the competition? Is the firm aware of its impact on the market? The first is cooperative behavior (note that this is different from the cooperative business form). Cooperative behavior includes:

- Uniform pricing of firms
- Penalty on price discounts
- Advance notice of price changes
- Information exchange between firms
- Delivered pricing
- Swaps and exchanges of products

Note that these practices do not mean that companies coordinate their actions explicitly. This is forbidden by anti-cartel policies at national and supranational level.

In contrary a firm may opt for non-cooperative strategies and practices.

Non-cooperative practices are (Carlton & Perloff, 2005):

- Price discrimination. (Charge different prices for the same product)
- Tie-in sale (Joint sale of products)
- Quality discrimination
- Predatory pricing (Set price so low other producers stop)
- (Dynamic) Limit pricing (Set price so that others do not enter your market)
- Investment to lower costs (Lower your marginal cost line)
- Raise rival's costs (Raise the marginal cost line of the competitor)

### 2.3.3 Production optimization

A rational firm will maximize its profits by tune their input transformations optimally, among other factors (Carlton & Perloff, 2005). For example how prices are set or followed and what quantities will be produced at a given point in time. Theoretically the short term profit maximization of the production is done by finding the point that the marginal costs are equal to the marginal revenues. In Figure 2.2 this is the point where the lines MC and MR cross each other indicated with (1). At this point the profits are maximized see the lower graph of Figure 2.2. However, further increase of the quantity still generates sales. According to Perloff (2009) a firm may increase its sales until the price does not weigh up to the average variable costs since rational markets have a downward sloping demand curve (law of diminishing returns).

Perloff (2009) states that in the short run a firm should consider a two-stage decision. First the firm should target for profit maximizing such that the marginal revenues are equal to the marginal costs.

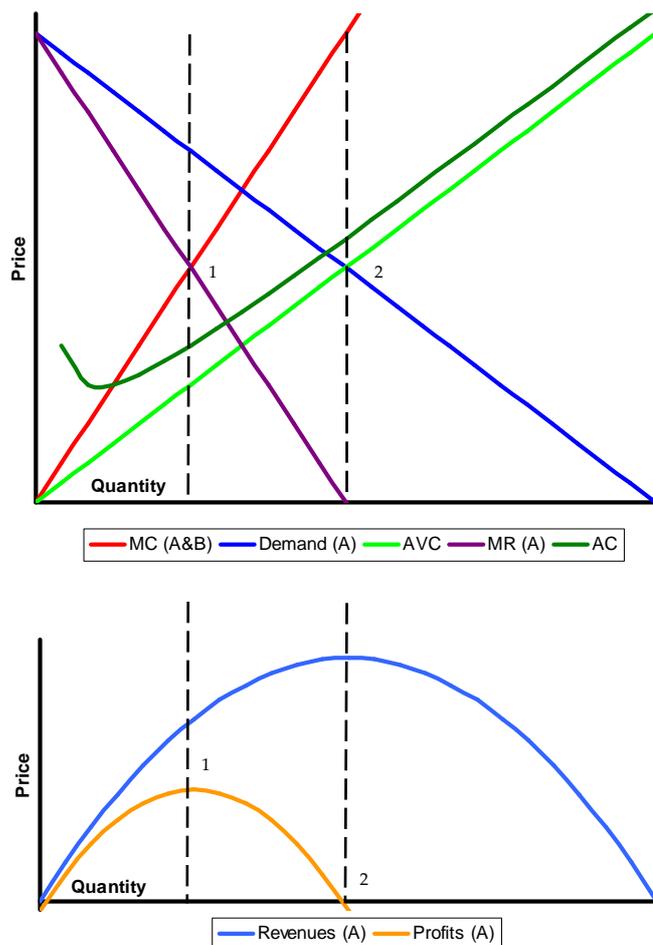


Figure 2.2 Marginal costs and marginal revenues (derived from Perloff, 2009)

Second the firm should only shut down if the price is lower than the average variable costs. In Figure 2.2 this is the crossing of the AVC line with the demand line indicated with a (2).

On the long run a firm makes the same decisions as in the short with one difference (Perloff, 2009). The difference is that the firm considers all costs as variable costs. This implies that the equilibrium of Figure 2.2 on the long run will be between 1 and 2 since also fixed costs have to be covered. Also on the industry level this holds. A firm will start producing if total average costs are covered and stop if that is not the case.

### 2.3.4 Non-uniform pricing

One variable a firm has within competitive environment is pricing strategy. This is about what price to charge for the products and how this price is reached (Carlton & Perloff, 2005).

Non-uniform pricing is mentioned as important strategic tools for companies to enhance performance (Carlton & Perloff, 2005). Price discrimination is a form of non-uniform pricing and it implies charging a different price for an identical product (Perloff, 2009). Note that in general the concept price discrimination is third degree price discrimination (Carlton & Perloff, 2005; Corts, 1998). Also the following example of Figure 2.3 is third degree price discrimination.

Make sure that price discrimination is another concept than price differentiation. Under price discrimination the products are identical under price differentiation they are not. Note that by demarcation of this project product/price differentiation is excluded. There are three conditions for applying price discrimination. These conditions are:

**1) The firm must have market power**

According to Perloff (2009) this implies the ability of firm to charge a price above the marginal costs in other words to generate profits. A firm can do this by controlling the volume and the price in a market (Merel, 2008).

**2) There must be differences in price sensitivity across consumers and this is known**

This means that the demand elasticity differs across consumers/ market segments/ geographical locations (Perloff, 2009).

**3) Limited reselling by the purchaser**

According to Perloff (2009) this is often the biggest constraint for applying price discrimination. If you charge a different price to customer 1 but he resells it to customer 2 the price discrimination tactic fails. Carlton and Perloff (2005) give several factors for preventing reselling like: services-being (you simply cannot resell since it is a service), warranties (only given at first-purchase), adulteration (change product characteristics), high transaction costs, contractual remedies (legal),

vertical integration or Government intervention. Vertical integration means that you acquire one of your customers to prevent him from reselling to your other customers.

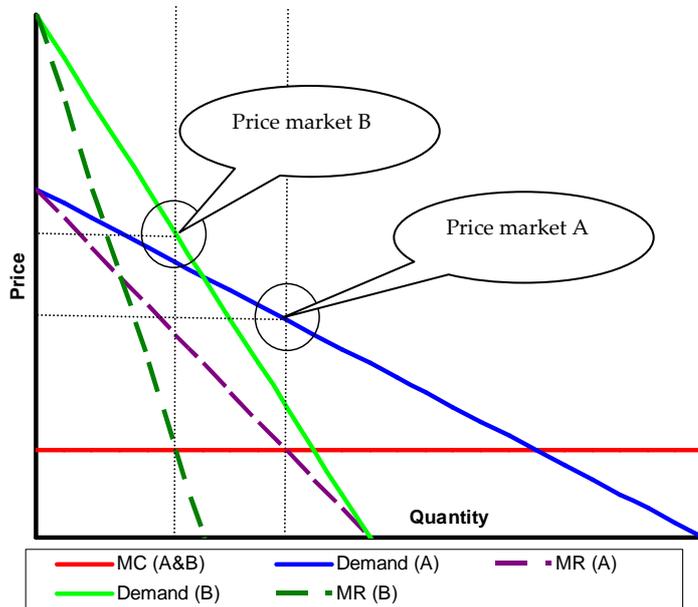


Figure 2.3 Price discrimination (derived from Carlton & Perloff, 2005)

In Figure 2.3 the concept of discriminated pricing is illustrated for a two-market scenario. Given are two downward sloping demand curves of market A and market B and a constant marginal cost line. From the demand curves marginal revenue curves (MR) can be constructed by twice the slope of the demand curve assuming market power (Perloff, 2009). Carlton and Perloff (2005) describe price discrimination as using differences in demand curves of customer groups to charge different unit prices. In Figure 2.3 this is visible since the market price in market B is higher than in market A. These market prices are derived from the profit maximizing point  $MC = MR$ .

Furthermore there are three types of price discrimination (Perloff, 2009)

- 1) First-degree price discrimination = perfect price discrimination. This means that every point on the willingness to pay curve (demand curve) is used to sell the products.
- 2) Second-degree price discrimination = quantity discrimination. This means that larger quantities are sold for a lower price than smaller volumes.
- 3) Third-degree price discrimination = Multimarket price discrimination. Per customer/geographic location/ channel charging a different price.

According to Corts (1998) third degree price discrimination may lead to overall decreased prices. He argues that price discrimination is a very aggressive weapon in the competitive field. One may force competitors to do the same and induce a price war in the sense of a minimax game by undercutting each others price. He thinks firms should use no-haggling policies and uniform

pricing rather than aggressive price discrimination. Armstrong (2008) makes distinction between “strong” markets and “weak” markets. Strong markets are markets considered as inelastic and stable accompanied with high prices while weak markets are the opposite. Corts (1998) argues that firms may reciprocal dump in each others markets if the strong/weak markets are perceived differently, ending up in overall lower prices.

International economics scholars like Krugman and Obstfeld (2006) link price discrimination to dumping. They argue firms to sell excess products in foreign markets in order not to disturb their domestic market. Under maximum price discrimination a firm sells its products on the foreign market at the point (a price and volume combination) such that the marginal revenues are equal to the marginal costs. The clearing price from this point determines than the quantity sold at the domestic market by finding the point such that the marginal revenues of the domestic market are equal to the marginal revenues of the foreign market. In such a way the producers shields its domestic market from surplus production.

### **2.3.5 Long term strategy**

So far the rationale of the firm is treated in 2.3.1, the tactical options and the theoretical operational optimization procedure in the following paragraphs. Now we will look into the behind lying strategy determining the long run state within all these factors (Johnson et al., 2008). Johnson *et al.* (2008) summarize the generalized strategic options using two dimensions namely perceived product benefits and price. Perceived benefits from consumers can be high (e.g. branded products) or low (bulky products). For example we treat two strategic options from the strategy clock of strategic options: “no-frills” strategy and “low price” strategy (Johnson et al., 2008). Aspects of no-frills markets are commodity markets with price-sensitive customers. Furthermore there are low switching costs and the “no-frills” strategy can be used to achieve momentum and volume in a market. The other example is the low price strategy. Important aspects here are low margins sometimes supported via cross-subsidizing. Also firms try to obtain a unique cost structure or make use from their organization specific advantages (e.g. scale). Furthermore Johnson *et al.* (2008) link price strategy with a price war and a segment focus. Low pricing strategies can be prone to reduced margins for all players. Also the ability to reinvest to keep sector healthy may be at danger. Thus: there are two strategies concerning low price strategy: one with high perceived value and one with a low perceived value.

Christopher (2005) underlines the importance for firms and in a larger extent supply chain to become agile. He means that a system should be responsive towards the market. The whole system: “organization, logistics, planning and mindsets” should become agile.

Hull (2005) argues that efficiency supply chains belong to stable markets and that flexible markets have to be suited with flexible supply chains. One level deeper has sought for tools to evaluate supply chains in the light of dynamic markets.

## **2.4 Interactions between market and firm**

So far we have seen the factors of the market and the strategic options of the firm. In this chapter we will go one step further and zoom in on market clearing. Second we will go into competition forms. Competition forms are regularities within market clearing (Carlton and Perloff, 2005).

### **2.4.1 Market clearing**

Market clearing is about how markets find equilibrium measured in price and quantity. The neoclassical theory comprises the equilibrium between supply and demand functions. At a given price a producer is willing to sell, at the same time a consumer is willing to buy. Adding the dimension of volume one can derive supply functions with the variables price and quantity (Perloff, 2009). A special case for market clearing is the topic of this study: supply-driven markets. Supply-driven markets are not discussed abundantly in literature explicitly. Asche *et al.* (2003) define the concept supply-driven as “prices of downstream products are influenced by upstream prices”. A concept which comes close to supply-driven is the concept of *excess supply* by Perloff (2009). Theoretically in an excess supply situation a firm would lower its prices to ensure sales (Perloff, 2009). Note that an excess supply situation can origin from two reasons: supply increase or demand decrease. Hull (2005) among other scholars makes the distinction between shifts along the supply curve and shifts of the curve itself. A supply interruption is a supply shock and will induce a supply-curve shift.

Under some circumstances the market clearing as presented may not be valid and complete (Carlton and Perloff, 2005). In some cases not the market price clears, but firms setting their own prices. Also price-cost margins may fluctuate over time so called boom and bust cycles (Carlton and Perloff, 2005). Booms are accompanied by rising prices and seller market power while busts are decreasing prices and buyer power. There are two opinions about this: Price wars (low price-cost margins) during booms or during busts of the business cycles.

Another aspect in market clearing is intertemporal substitution. A consumer or producer may delay the transaction. There are two factors for intemporal substitution: expected supply and demand and the ability store. If a producer is able to store rather than sell, the price can be

changed. Other habits of intertemporal substitution are knowledge of needs of the customers. If it is known that in some period of the year the demand is higher the producer will anticipate on that. Also under high expected markups, usually inventory is higher to prevent stock-outs (Carlton & Perloff, 2005).

### **2.4.2 Competitions forms**

There are several types of market competition forms. The main decisive variable is the number of firms. The main three are perfect competition markets (large number of firms), monopolies (one firm) and oligopolies (few firms) according to Carlton and Perloff (2005). Under perfect competition a firm cannot influence the market and acts like a price taker (Perloff, 2009). Monopolists can influence the market price and can act like a price setter. In oligopolistic markets the players can influence the market depending on their behavior (Carlton & Perloff, 2005).

The case study of this project is most related towards an oligopoly type of market since there are few sellers and a high concentration level. However: on the buyers side there is also a high concentration. It should be better to call it a oligopoly-oligopsonic market. What is important for now is that characteristics of oligopoly markets are that the actions of the firms are not independent from each other (Carlton & Perloff, 2005). Though main assumptions are that consumers of oligopoly industries are price takers and that the products are homogenous. Furthermore the firms collectively have market power and firms set only price or output. Also no entry is possible (Carlton and Perloff, 2005). There are several theoretical approaches to understand oligopoly circumstances. There is no real consensus about the market mechanisms within oligopoly mainly due diversity of oligopoly industries (Carlton and Perloff, 2005). Note that these equilibriums are hypothetical.

First there is the so called Cournot equilibrium. This situation appears when all players decide upon their volume based on the expectation of the production of the others. This equilibrium can be calculated by solving all reaction curves of the players. Reaction curves are defined as the profit-maximizing strategy given the strategies of the other firms mostly measured in quantities and/or product prices (Hendrikse, 2003). Reaction curves are different for all players and are determined by marginal revenues and marginal costs (Perloff, 2009). For example under duopoly circumstances the quantity of a firm is adapted based on the expectation what the other player will produce. Imagine the market is large 1000 units. If player 1 expects player 2 to produce 300 while the market is player 2 will produce 700, under Cournot competition.

Secondly there is the Stackelberg type of competition. In this case a dominant player determines the quantity supplied based on what other firms will supply and sets price optimal to the faced demand curve. Other players produce for this market price their quantity and follow. This is done via calculating the residual demand for a certain product. The difference with the Cournot market is that there is a dominant firm which can set output in advance for the others by knowing their output at a given price (their reaction curve). For the dominant player the profits are higher in comparison to profits he would have made under Cournot equilibrium. Sources for dominance are for example that a firm is the first one introducing the product. Dominance means here that independent from the choice of firm 1, the best choice of firm 2 is to follow and produce less.

Carlton and Perloff (2005) come up with the competitive fringe concept. This implies that there is one price setting firm and multiple small price taking firms. Dominance can be acquired by lower costs, superior products or by collusion of multiple small firms acting as a monopoly. A dominant firm aiming maximum profits will reason as follows. Let the small fringe firms produce as much as they can at your set price. Fill up the residual demand as if you were a monopoly. The risk of this strategy is that you will lose market share if other firms will produce more.

The third type is the Bertrand model. This emphasizes the role of price rather than the role of quantity. Within a Bertrand market structure firms assume the prices of the competitors to be fixed. A firm can undercut this market price to gain market share. The equilibrium is reached when the profits of the firms are not influenced by price changes for each individual firm. The ultimate equilibrium is reached when the marginal costs are equal to price. However, mostly some assumptions are not met, so this equilibrium will not be reached. Factors for the existence of stable equilibriums are heterogeneity of the product and limited production capacity. A firm may choose differently when its production capacity is constrained or when its long time horizon determines different choices for the price.

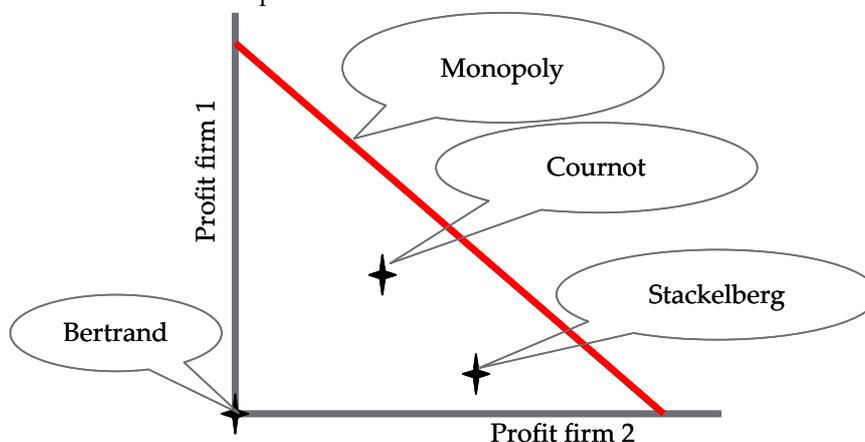


Figure 2.4 Profits under linear demand with two firms (Derived from Carlton & Perloff, 2005)

Ono (1978) discusses the three forms of competition for duopoly situations. He argues that homogenous markets are per definition price competition markets. If a firm acts as a price setter it should have lower processing costs or either use limit pricing policy, to prevent competitors to enter the market. In Figure 2.4 the profit outcomes are given for the three types of competition and under monopoly. Under monopoly (as if the two firms act like a monopoly) the profit line is maximal. In Bertrand competition the profit is minimal since both firms compete each other on price, such that both firms do not gain from extra production (Carlton & Perloff, 2005). Under Cournot competition the profits are in between monopoly and Bertrand and equally distributed among the players. Under Stackelberg the dominant firm has the capability to increase profit compared to the other firm.

## 2.5 Tools and frameworks

For evaluation of supply-driven market conditions several tools and frameworks are useful. According to Hendrikse (2003) and Johnson *et al.* (2008) Game theory provides tools and frameworks to evaluate and describe industry and market structures including internal firm strategies. Also decisions regarding for example pricing can be modeled as well. Second the Structure Conduct and Performance model (SCP) is useful to give an overview of aspects playing a role in the decision making process around supply-driven cheese. Paragraph 2.5.1 will treat Game theory using two examples and paragraph 2.5.2 will describe the SCP model.

### 2.5.1 Game theory

The reaction of a firm can be modeled with a reaction curve. Imagine the case of a duopoly: two firms producing the same homogenous product. Hendrikse (2003) reasons that under quantity competition the relation is negative (the more firm 1 produces, the less firm 2 can produce). Under price competition the relation is positive (the higher price 1 charges, the higher firm 2 can charge vice versa). Most important determinant is the slope of the reaction curve. How steeper the curve, the more aggressive the action. This depends on the demand structure and the marginal costs of the firm (Hendrikse, 2003).

Hendrikse (2003) presents a non-cooperative game theory and its five ingredients. Those are:

1. *The players*
2. *The set of choices of the players*
3. *The pay-offs as result of the choices*
4. *The information structure about the players, choices and pay-offs*

### 5. *The rules of the game*

As a result of these ingredients equilibriums of all the choices and outcomes of the players will be established. Hendrikse (2003) lists the strategic consequences of the game. First the game theory can be used to formulate the expected market behavior. Second the observed equilibrium can be challenged by actions of the company targeted on a specific element of the game.

#### 2.5.1.1 Prisoner's dilemma

The Prisoner's dilemma is an example of a Game theory application. It considers two players having two options. In our case the options are: lower price or not lower price. If an individual player will do so, the other will lose. Key is that the players together have more gains if they collude (both not to lower price), but because they know the other will do it, both will lower price. One can also image the Cournot format of this dilemma: increase production or keep production stable. The same key outcome holds: players together have more gains if they collude (both not to increase production) but because they know the other will do it, both will increase production.

#### 2.5.1.2 The hold-up problem

The Prisoner's dilemma is usually faced between horizontal players e.g. producers. The hold up problem exists at the vertical direction in the chain. The coming example is adopted from Hendrikse (2003). Imagine a producer and a buyer of a product. Suppose that the producer creates a product with costs of 200 and that the buyer perceives the product at 240. Under symmetric bargaining conditions the market price would be  $240 + 200 / 2 = 220$ . This is called the ex-ante bargaining price in Table 2.2.

However: when we introduce the concept of sunk cost this bargaining price changes. Sunk costs are costs which can not be recovered elsewhere. Examples are investments in factories and specific equipment. Suppose that the sunk costs in our example are 60. The costs considered in the bargaining game are lowered by the sunk costs. The bargaining price *ex post* is lowered.

**Table 2.2 the hold up problem (Derived from Hendrikse, 2003)**

	Ex ante	Ex post
Producer	200	140
Buyer	240	240
Bargaining price	220	190

#### 2.5.1.3 Other games

The three non-cooperative oligopoly competitions presented before (Cournot, Stackelberg, Bertrand) can be extended using multiple period games. This is more dynamic and realistic

compared to a one period static game. In a multi period game other firms can supply products just below this price-set. As a consequence a minimax game occurs between the players. This means that a price decrease of individual players induce price lowering of the other players (price war). The occurrence of this phenomenon depends on the time horizon of the players and the interdependency. Players may signal others behavior and react on that or threat other players to punish (Carlton & Perloff, 2005). The effectiveness of the punishment depends on the credibility of the punishment. Credibility means that the punishment in any price or quantity changes will be profitable for the threatening firm. Possible solving of the Prisoner's dilemma is backward reasoning. This means view the last period and reason back to the first option. Using historical data to detect the credibility may be useful (Carlton & Perloff, 2005).

### 2.5.2 Structure Conduct and Performance model

There are four main components within the SCP model: the basic conditions structure, conduct and performance. In Figure 2.5 the SCP model is in its leanest representation.

The SCP model is usually applied to find factors (e.g. conduct) for successful performance. In this study the relationships are focused on the concept of supply-driven. In the next paragraphs the relationships will be elucidated. The SCP model has been developed by Mason (1939; 1949) and his successor Bain (1959).

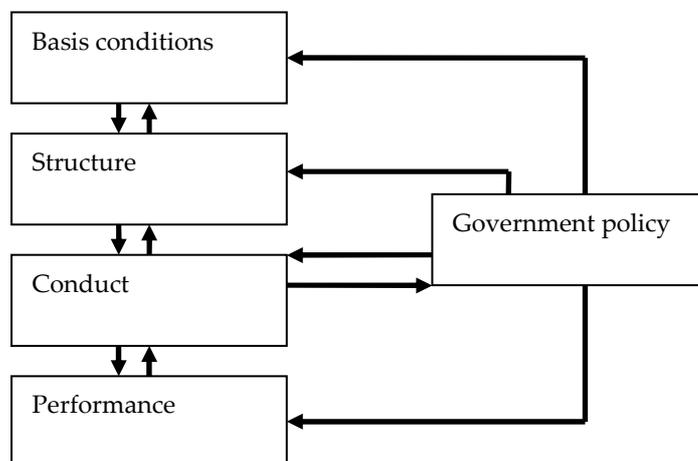


Figure 2.5 Structure, Conduct, Performance model (derived from Carlton & Perloff, 2005)

The strategic position can be evaluated using the five forces model of Porter (1985): threat of entry, suppliers, buyers, substitutes and internal rivalry. For a more extensive review see Johnson *et al.* (2008). Porter based his theory on the Structure, Conduct and Performance (SCP) model to study industrial organizations and industries (Carlton and Perloff, 2005).

The SCP model implies that the conduct of the firm influences the basic conditions via the structure. Also the conduct determines the performance. The policy of the Government is an

external factor influencing all the other factors. Basic conditions are for example the elasticity of demand or the product durability. Aspects of the structure are the degree of integration and the number of players and for the conduct these are pricing behavior and product choice.

When comparing the model of Porter (1985) and the SCP model, Porter adapted the structure and basic conditions into the five forces. However: the SCP model is more extensive and gives a full overview of the aspects (Carlton & Perloff, 2005). The full SCP model with its aspects presented by Carlton and Perloff (2005) is given in Table 2.1. Note that by demarcation the Government policy is excluded from this research project and will not be elucidated here.

Table 2.1 Structure, Conduct, Performance model by (derived from Carlton and Perloff, 2005)

	Factor	Explanation	
<b>Basic conditions</b>	Consumer demand	Elasticity of demand	<i>Quantity response on a price change</i>
		Substitutes	<i>Products which can replace the original</i>
		Seasonality	<i>Sales quantity changes over time</i>
		Rate of growth	<i>The growth rate of the consumption</i>
		Location	<i>The location of the demand</i>
		Lumpiness of orders	<i>The regularity of the purchase</i>
		Methods of purchase	<i>How consumer buy the goods</i>
	Production	Technology	<i>The way the product is produced</i>
		Raw materials	<i>Raw materials required for the produce</i>
		Unionization	<i>Organization of the laborers</i>
		Product durability	<i>The shelf life of the product</i>
		Location	<i>The production location</i>
		Scale economies	<i>Degree of advantage sourcing from scale</i>
		Scope economies	<i>Degree of advantage sourcing from scope</i>
<b>Structure</b>	Number of buyers and sellers	<i>The numbers of buyers and sellers</i>	
	Barriers to entry of new firms	<i>The ease of which firms can enter industry</i>	
	Product differentiation	<i>The homo/heterogeneity of the market</i>	
	Vertical integration	<i>Integration of successive stages of production</i>	
	Diversification	<i>The diversity of products one player offers</i>	
<b>Conduct</b>	Advertising	<i>The degree of advertising</i>	
	Research and development	<i>Degree of new product/processes introduction</i>	
	Pricing behavior	<i>The price behavior of the firm</i>	
	Plant investments	<i>The investments in plants</i>	
	Legal tactics	<i>The legal plans and tactic</i>	
	Product choice	<i>The products a firm produce</i>	
	Collusion	<i>(Tacit) agreement between firms</i>	
	Merger and contracts	<i>Merging and contracts between firms</i>	
<b>Performance</b>	Price	<i>The price a product has</i>	
	Production efficiency	<i>How efficient a product has been produced</i>	
	Allocative efficiency	<i>The efficient allocation of the production</i>	
	Equity	<i>The financial reserve of a company</i>	
	Product quality	<i>The quality of the products</i>	
	Technical progress	<i>The technical process of the production</i>	
	Profits	<i>The profits of a firm</i>	

## 2.6 Empirical studies to cheese market

This paragraph aims to provide an overview on the literature studies related towards supply-driven cheese. We will start by discussing industry studies. Second we will discuss specific studies towards the demand elasticity in cheese markets. Third we will look in 2.6.3 into studies performed in other sectors but related towards supply-driven markets in general.

### 2.6.1 Cheese market industry

There has been some research towards cheese industry on behalf of the European Union. For example Pitts (1998) examined the industry structure in the early 1990s. He concluded that the European cheese industry is increasing in scale and decreasing in number of players. Also he found cheese prices in Germany and the Netherlands to decrease, while in France in the same time cheese prices had risen. The author directly explains this difference by the cheese type. The Gouda-type cheese is subject to economies of scale and thus cost-price competition. This has a decreasing effect on the cheese prices and ultimately the milk prices according to Pitts (1998).

Another study performed on behalf of the European Union was about market power in the Comte market (Merel, 2008). Comte is a typical French cheese with a PDO status (Protected Designation of Origin). Furthermore the author tested for presence of market typologies such as Cournot competition using a NEIO approach. The NEIO approach estimates the marginal costs, elasticity and degree of competition simultaneously by fixed market price. In the model they compare the mark-up of Comte cheese with Emmental cheese. The hypothesis of her research was that the Comte market was supply-controlled. The hypothesis was rejected since the author did not find market power from the suppliers.

There have been more research projects on the cheese market. In a case study performed on behalf of the European Union Oerlemans and Hees (2005) researched CONO's market strategy especially regarding the up scaling of a niche initiative. CONO is a medium scale Dutch competitor of FC and follows a differentiated niche market strategy. In the report critical success factors for the market strategy of CONO are presented. Also they give an extensive analysis of the state-of-the-art of the Dutch cheese industry in 2002. The researchers conclude that CONO found a niche market not interesting enough for the larger cooperatives such as FrieslandFoods and Campina as present at that time.

In 2008 Gohin and Femenia used the European intra-trade to validate the CES-based gravity approach. CES stands for constant elasticity of substitution. This is a condition for calculating the

value of elasticity. They use the export data (prices and quantities) as a proxy for the trade incentive.

The authors argue that the dairy industry is highly regulated but still under influence of the market (supply and demand). The European cheese market is relatively slow in its consolidation in comparison to other dairy industries especially regarding Italian and French producers (Gohin and Femenia, 2008).

## **2.6.2 Elasticity empirical evidence**

We will treat here the effect of price on sales first. Second we will look into empirical studies towards the effect on income on sales of cheese.

### **2.6.2.1 Demand elasticity for cheese**

According to some studies cited in Tomek and Robinson (1990) the demand elasticity for cheese is about -0.33. This means that an increase in price of 1% will lead to a decrease in volume of 0.33%. Other studies e.g. Bouamra-Mechemache *et al.* (2007) compiled researches within Europe. They found the price elasticity for cheese to vary between -1.33 and -.15 (average -0.6). They explain this variance by the differences within cheese. A branded cheese is assumed to be less sensitive to price than non-branded cheeses. However: one must be careful comparing elasticity parameters since the way of calculation may alter.

### **2.6.2.2 Income elasticity for cheese**

According to some studies cited in Tomek and Robinson (1990) the income elasticity for cheese is about 0.59 (United States). Other studies e.g. Bouamra-Mechemache *et al.* (2007) compiled researches to the same measure within Europe. They found the price elasticity for cheese to vary between 0.02 and 3.22 (average 0.78). They explain this partly by difference by computing differences but also due country differences. E.g. French cheese consumption is more price sensitive compared to other European countries. The Commission of European Community (herinafter EC) concludes in 2008 that elasticity estimations are significantly varying based on the findings of Bouamra-Mechemache *et al.* (2007). They state dairy products in general to be inelastic. However: fresh dairy products and cheese are assumed to be relatively more elastic (Commission of European Community, 2008).

### 2.6.3 Comparable industries

The oil industry has some congruous elements with the dairy industry. Within both industries raw material is transformed towards processed products. E.g. in the oil industry the crude oil is transformed towards transport fuels or plastics. In the dairy industry the milk is processed towards fresh milk or cheese.

The phenomenon of interest within this project is the supply-driven cheese market with most important aspects volume and price relations. Also in the oil industry the price and volume relationships are researched (Asche et al., 2005). First within the oil industry analyses the choice of the exogenous variable is problematic. Does the oil price influence the price of the refined product or vice versa or even both? Asche *et al.* (2005) found that some refined products are price-related while others are not. Also: they found that the crude oil price determines on the long run the refined product prices. On the short run also the other way around is found to be true.

Also inter-product relationships were found for example some products to be dependent while others were independent from each other. This gives useful information in the product portfolio optimization of the oil companies.

## 2.7 Summary and theoretical framework

In this chapter we have gone through the concepts market, firm, market clearing, game theory and the SCP model and lastly through empirical studies. What we have learned so far will be summarized here.

The structure-conduct-performance model gives an overview of the aspects about the interrelation of the firm and the environment (Carlton and Perloff, 2005). Supply-driven can be seen as a consequence of the conduct (price/product) choice towards the performance and the structure & basic conditions and vice versa. The SCP-model will function as a library containing aspects of firm-market interrelation rather than a predictive model.

In Figure 2.6 the theoretical framework of this research project is presented. The main elements are derived from the SCP model complemented with micro-economic price theory.

We will go through the three blocks (1-3) first and zoom in onto the arrows (A-C) after that. Note that each block contains a short and a long run element consistent with the central research question of this project.

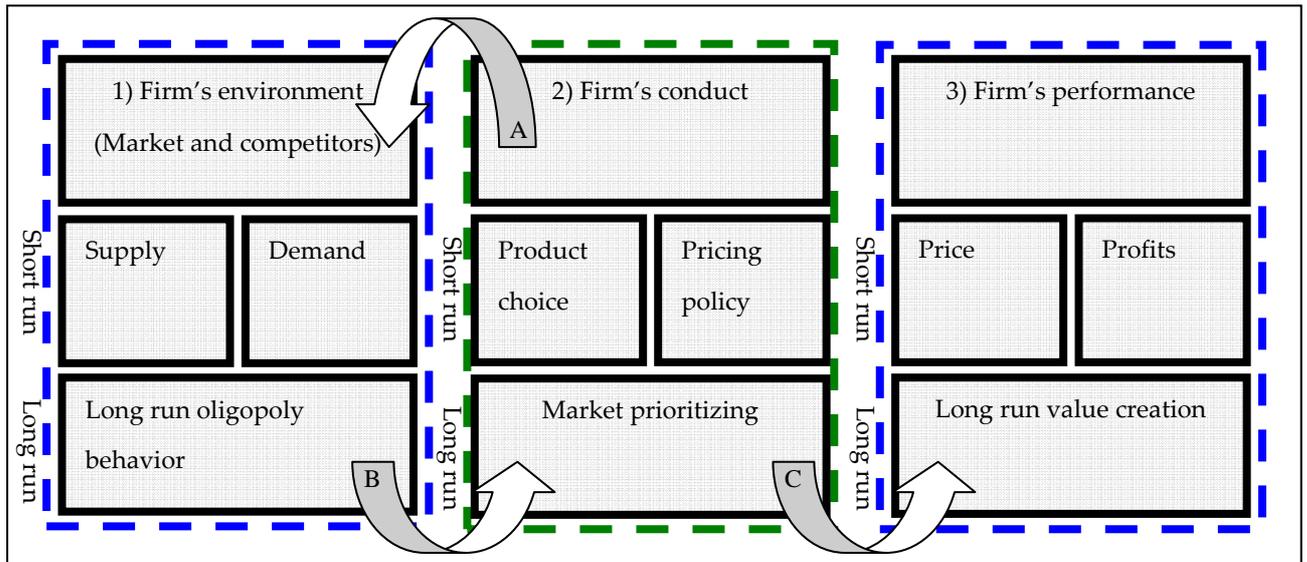


Figure 2.6 Theoretical framework

### 2.7.1 Firms environment

Considering supply-driven one has to realize that supply-driven is an example of a market situation. On the short run in supply-driven situation there are two main components: the supply and the demand. These factors have to match and this causes in the long run an oligopoly behavior (Carlton & Perloff, 2005). Given the expectations of producers, traders and consumers equilibrium will be reached. Under oligopoly circumstances the supplies from individual firms are related and may affect the market price (Carlton & Perloff, 2005). Reaction curves of firms may be either aggressive or passive. If a firm lowers its price one may aggressively undercut this price or act passive.

Demand in agricultural products is relatively price inelastic: price changes will not affect the volume of the sales. Rigidities such as imperfect information, price adaptation etcetera may buffer the effect of natural market clearing (Carlton & Perloff, 2005). Market clearing is done by price in perfect markets, however under oligopoly circumstances it may be clearing by quantity and intertemporal substitution (Carlton & Perloff, 2005). Intertemporal substitution means postponing either delivery or purchase of the product.

### 2.7.2 Firms' conduct

Firms can either choose cooperative and non-cooperative strategies (Carlton & Perloff, 2005). Non-cooperative strategies can be modeled using Game theory. Johnson *et al.* (2008) treat the subject of business-level strategy among other types of strategy levels. They provide some inputs for

strategic decisions. Choices meant by Johnson *et al.* are for example low-cost strategies and no-frills strategies.

Main factors on the short run are product and price choices (Carlton & Perloff, 2005). On the operational level and under competitive circumstances all firms will lower their price on the short run such that the average variable costs will equal the marginal revenues (Carlton & Perloff, 2005). On the long run the complex of product and price choices is the result of strategic and tactical choices (Johnson *et al.*; Carlton & Perloff, 2005). We will call this long run market prioritizing. A company can determine its volume and price per market based on strategic choices and the dynamic of the market (Johnson *et al.*, 2008).

### **2.7.3 Performance**

Performance can be measured using several indicators (Carlton & Perloff, 2005). We will pick here price of the product and profitability (Carlton & Perloff, 2005). Price since it is a good comparable and measureable instrument, profitability since it covers more or less the other factors mentioned by Carlton & Perloff (2005).

It is expected that firms will have a higher price-cost margin in inelastic markets than in elastic markets (Carlton & Perloff, 2005). Intuitively a firm will not increase production in markets expected to be sensitive for extra volumes (competition with your own products). On the long run the combination of price and profitability leads to value creation and viability of the firm.

### **2.7.4 Relation A: Effects of conduct on environment**

On the long run a firm has to realize that price-based strategies are prone to erosion risks (Johnson *et al.*, 2008). This means that the margins for all players are at risk and that firms are incapable to reinvest industry to keep it viable.

Also within an oligopoly it is expected that output of individual firms is related and dependent. How this is related depends on the behavior of the players: either cooperative or non-cooperative. The more non-cooperative players are the higher the risk on a non-viable industry (Carlton & Perloff, 2005).

### **2.7.5 Relation B: Effects of environment on conduct (and performance)**

Firms do not act independently from each other in an oligopoly market and tune their production levels on each other (Carlton & Perloff, 2005). If the environment is highly competitive a firm may opt for leaving this specific industry.

Good examples of modeling of effects the environment on the conduct of the firms are the Prisoner's dilemma and the Hold-up problem. The Prisoner's dilemma learns that a firm is forced to choose a suboptimal choice because the other firm will do so and vice versa. The hold-up problem is about the fact that ex-post knowledge about costs will deteriorate bargaining price for the producer. In other words: since buyers know a large part of your costs are sunk costs they will opt for a lower price. Summarizing the environment influences your conduct and in the end also the performance.

### **2.7.6 Relation C: Effects of conduct on performance**

One cause for supply-driven can be the supply. The effect of the obligation to process all the milk originated from cooperative being has a negative effect on the price-cost margin but does not have to be disadvantageous for the cooperative controlling for its rationale (Rogers & Marion, 1990). The aim is not maximum profit but maximum sales or revenues from a given quantity. If a firm raises its price it may increase profits but lose market share (Carlton & Perloff, 2005). This depends on the entrée barriers of potential competitors and the presence of substitutes of the product. If a firm lowers its price the industry is less attractive for new entrants.

### **2.7.7 Key take-aways**

From here we will focus on the relationships A-C as presented in the previous paragraph and in Figure 2.7. This is in line with the objective of this research to analyze *"the effects and responses of supply-driven cheese"* In short we want to know what effect the actions of the firm have on their environment and vice versa (relationship A and B). Second we want to know what effect this resulting conduct has on its performance (relationship C). Furthermore these three items will function as a framework for the chapters 4 and 5.

### 3 Data and Methods

This chapter aims to describe how the data will be gathered and what approaches will be applied. As stated in chapter 1 the research consists of 3 phases: the creation of a theoretical framework, a qualitative analysis and a quantitative research. The three phases require a different approach and data gathering and will be discussed below separately. The approach for the literature study has already been discussed in chapter 1. This chapter will focus on data and approaches chosen for the qualitative and the quantitative analysis.

#### 3.1 Structure of the project

The structure by the three phases needs an explanation as such. The start of the research is the problem statement of FrieslandCampina: the effect and responses on supply-driven situations. From this point a theoretical framework is constructed around the core concepts of market and firm as presented in chapter 2. This framework is then used to deduct expectations and ideas for the latter two phases (the qualitative and quantitative parts). Deduction is to generate ideas and hypothesis from theory (Bryman and Bell, 2003). The second and third phases are the actual case study and observation part of this project. According to Bryman and Bell (2003) the combination of a qualitative and a quantitative analysis is not unambiguous. They call the combination of these two analyses a multi-strategy research. They mention that a combination of the two is not by definition superior to a single-strategy research. The main arguments against the multi-strategy type of research are that both strategies have their own embedded methods and that both strategies have a different paradigm. Hence: the conjunction of both strategies may imply contradictions (Bryman and Bell, 2003). However multi-strategy research may be successful if the approach is in line with three clauses. These are triangulation, facilitation and complementation (Bryman and Bell, 2003). This research projects aims to use qualitative and quantitative research as triangulation of sources. E.g. are the sales numbers in line with the views and expectations? Furthermore the quantitative part facilitates the qualitative part in selecting the main features for the quantitative research. Third the researches complement each other in answering the central research question: *“What are short- and long run effects and responses of supply-driven market situations on the cheese market from the perspective of FrieslandCampina?”* The main ideas and perceptions of supply-driven market situations will be combined with the numbers and facts for example the performance measured in prices and profits.

## 3.2 Qualitative analysis

As stated in chapter one the qualitative research should facilitate the quantitative research. A qualitative analysis leaves open room for the unexpected black swans. In this research the qualitative case study is in between of the literature study and the quantitative analysis and has to be seen as an intermediate step.

### 3.2.1 Approach

The general research question for the case study is: *"SRQ2: What are the main characteristics of supply-driven cheese market and what are important aspects?"*

Yin (2003) defines the case study as a research method to research phenomena which are not bounded exactly and are complex in the sense of uncontrollable (external) variables. He argues research can follow the pattern matching approach as a valid procedure for case studies. Pattern matching in this project is interpreted as expectations from literature tested in the case study of supply-driven cheese of FrieslandCampina ultimately targeting to give recommendations to FC. Yin (2003) encourages having key informants reviews of drafts of the case study report to enhance validity of the research. To gather information a semi-structured interview is made. A semi-structured interview is a flexible approach if the researcher wants to leave space for interviewees' insights not yet detected (Bryman and Bell, 2003). This project aims to increase understanding around supply-driven situations. In advance of this project it appeared the concept supply-driven situations was not unambiguous. This underpins a more open approach towards interviewees.

Furthermore the interview process is iterative. Findings from interviews are processed and used in later interviews while continuously feeding back towards the aim and central research question. Besides the interviews various documents are used to increase understanding of the cheese market. Most important here is the report of the Commission of European Communities regarding the merger procedure of Friesland and Campina.

### 3.2.2 Interviews

The interview is constructed based on findings from the literature study. On its turn the literature study departs from the central research question and the objective of the study. The literature study provides a topic tree to extract information from the interviewee.

The topic tree is as follows:

- Impacts of supply-driven cheese on performance

- Chain analysis. Result: Consensus about the bigger picture of the problem.
- Market definitions. Result: consensus about the market definitions.
- Causal model “supply-driven cheese”. Result: Consensus about the mechanisms and aspects
- Short run impacts
- Long run impacts
- Responses (actions) of FrieslandCampina
  - Volume and price choices
  - Market prioritizing
  - Long run strategy

In appendix III till V a complete version of the interviews is presented in Dutch. In the next paragraph the tailor made approach towards for the interviews towards the interviewees is explained.

### 3.2.3 Choice of interviewees

According to Bryman and Bell (2003) it is very difficult to find managers and experts to be interviewed. To increase the construct validity of the research it is good to having keep informants informed about the research project (Yin, 2003). This desire was in line with the expectations from the company. People to interview were found using two approaches: experts and using snowball method.

First relevant departments of FrieslandCampina and external expert were selected since they are related to the central research question of this project. From the bottom to the top of the organization the phenomenon supply-driven markets will be revealed. Furthermore external experts from Rabobank (worlds leading agricultural bank) and Wageningen University were asked to create triangulation of sources.

The departments and persons included in the case study are:

- Management of FC Cheese (1 person, chosen on forehand)
- Central planning department of FC (2 persons, chosen on forehand)
- Sales department of FC (3 persons) (1 chosen on forehand, 2 by snowball)
- Trade marketing department of FC (1 person, chosen on forehand)
- Milk valorization and allocation department of FC (1 person on forehand, 2 by snowball effect)
- Controllers of FC (2 persons) (snowball)

- Rabobank Food and Agri Research market department: ir. Mark Voorbergen
- Wageningen University: Professor Gert van Dijk of Theory and practice of Cooperatives
- Wageningen University: Professor Joost Pennings. Professor marketing and consumer behavior.
- Wageningen University Landbouw Economisch Instituut: ir. Gemma Tacken. Author of various articles on dairy market.

In total 11 internal employees were involved and 4 external experts. Some internal employees were consulted more than once. It appeared during the research that the problem of supply-driven was located more closely to sales and that is why more than 1 person from the sales department was interviewed.

### **3.2.4 Processing and representation of the findings**

The findings and results of the findings will be presented using the theoretical framework of the literature study to enhance consistency of the project report. In the beginning the semi-structured interviews based on the topic tree above were held. In the second stage the results of these interviews were summarized to create a chain-of-evidence (Yin, 2003). By doing so the pattern matching strategy is followed. Results were for example the value chain and the causal tree of supply driven market circumstances.

### **3.2.5 Reliability and validity**

Reliability is about measuring what one really wants to measure (Bryman and Bell, 2003). The “problem” occurs at FrieslandCampina and so it is obvious to ask people at stake. As seen in previous paragraph management, sales, planning and others were involved. On top of that also external experts were consulted. By doing so the reliability is enhanced since multiple stakeholders (internal, commercial external, scientific external) were interviewed (Bryman and Bell, 2003). According to Yin (2003) reliability has to do with representatives of the research. He advises to make a case study database and to follow case study protocols. For this project literature, interviews and data are stored and on top of that evidences were validated by stakeholders.

Validity has to do with whether obtained results are valid as such (internal) or even outside of the specific case (external validity) (Bryman and Bell, 2003). Using triangulation enhances the internal validity and external validity. Bryman and Bell (2003) elaborate further on the concepts reliability and validity. They argue a research project should be “credible, transferable, dependable and

confirmable". Using an iterative way the interviewees have confirmed/ disconfirmed each other. By doing so stumbling blocks and core issues were identified regarding key topic. By consulting FC managers the dependability of the report is enhanced for internal (FrieslandCampina) use. The credibility of the research project is expected to be sufficient since methods used are general and representative (qualitative and quantitative).

Transferability of the research is enhanced by saving and combining data sets which will be transferred to FrieslandCampina Milk Valorisation Department.

### **3.3 Quantitative analysis**

The third research question to be answered is: *"SRQ3: What is the effect of supply-driven cheese on the cheese market measured in volume, price and sales on the short and long run?"*

This chapter aims to explain how the quantitative analysis will be performed. In the first paragraph the starting point and assumptions are presented. The second paragraph will explain what sources and data will be used to give a descriptive top line view of the cheese market. The third paragraph outlines the model of price discrimination. According to Carlton and Perloff (2005) a firm can apply several measures to react on competitive environment such as pricing and product differentiation.

#### **3.3.1 Assumptions and starting point**

This quantitative analysis should unveil the performance of FC in 2008-2009 given market circumstances from external data sets. This will be done by using factors from the SCP model as presented in the literature study. Summarizing this project consists of constructing a framework from a practical problem perspective, from which an analysis (case study) will be made to answer central research question, in order to solve the problem and ultimately achieve the objective.

#### **3.3.2 The top line analysis based on the SCP model**

The top-line analysis gives a quantitative overview in order to answer the question about the effect of supply driven sales. This is the descriptive statistics for the latter part. In the Structure Conduct and Performance model several items were mentioned. From the interviews the model has been filtered on relevance:

The main remaining factors are:

- Basic conditions (Elasticity of demand, Substitutes, Seasonality, Rate of growth, Product durability)
- Structure (Number of buyers and sellers, Vertical integration, Diversification)
- Conduct (Pricing behavior, Product choice)
- Performance (Price, Profits)

Following this reasoning we would like to find indicators for all these individual factors to deliberately decide on tactical and strategic level about the conduct (price and product).

The descriptive top-line overview consists of:

- Basic conditions:
  - An analysis of the Dutch supermarket prices of Dutch type cheese from 2006 till 2009 will be given
- The structure
  - Number of buyers and sellers
  - The supply variation of the other Dutch type cheese producers
- The conduct
  - Product and price choices
- The performance
  - Price of FC versus German ZMP prices
  - Market share

For comparing the volatility we calculate the standard deviation divided by the mean. In (3.1) the formula for the standard deviation is given. X stands for the quantity at a given moment N for the number of samples: in our case often twelve months of sales or production etc.

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N - 1}} \tag{3.1}$$

### 3.3.3 Data sources

The data needs to be sampled since the cheese market as such is too large to comprehend in one study. Also the question makes explicit that the supply-driven cheese is the main interest. The sampling method chosen is the non-random method since there is information available about the specific interest. Remark: the self fulfilling prophecy may be a risk since deliberately data picking can bias research. To prevent this, good objective reasons must be decisive for the data set. This means that there should be reasons coming from outside the dataset.

For the analysis the cheese market needs to be operationalized. Also: there are different data sources. The approach is to map different classifications with focus on standardizing. Roughly speaking there are two types of data: internal and external data. The external data is mainly originated from the Productschap Zuivel and German Sources:

- Productschap Zuivel
- German data
  - ZMP (Zentrale Markt- und Preisberichtsstelle für Erzeugnisse der Land-, Forst- und Ernährungswirtschaft GmbH)
  - BLE (Bundesanstalt für Landwirtschaft und Ernährung-)
  - MIV (Milch Industrie Verband)
- Commission of European Communities. A study performed to presumed market power of FrieslandCampina in advance of the merger in 2008.
- Nielsen data about retail sales of cheese in The Netherlands
- Sales data from FrieslandCampina Cheese

## 4 Results from qualitative analysis

The qualitative analysis aims to answer this specific research question: “*SRQ2: What are the main characteristics of the supply-driven cheese market and what are important aspects (e.g. causes, consequences, and perceptions)?*”

This chapter will use structures and elements from the theoretical framework. It begins with a short introduction to the European cheese market and the role of FrieslandCampina within that market. Second we will focus on the origin and definition of supply-driven cheese. Third we will continue on the consequences and mechanisms for the supply-driven market circumstances. Fourth we will treat solutions and mitigates based on the interviews. Lastly a summary will be given to stylize findings from interviews and to function as input for the quantitative analysis.

### 4.1 Background: cheese market

According to the International Dairy Foods Association (2009) the total annual cheese production worldwide is 16,000 KT. According to the same source the European (27) cheese production is about 7,000 KT annually. Note that this number is about all types of cheese from cheddar towards Gouda. Within the Netherlands the cheese production is about 722 KT in 2008 (Productschap Zuivel, 2008). To make a good understanding we have to go one level deeper than the denominator cheese. Typical Dutch cheeses are Gouda, Edam and Maasdam type cheese. Gouda is the main common Dutch cheese, Edam is historically a less quality type of cheese (less fat) and Maasdam is a Swiss cheese (with holes). In Holland almost all cheese is Dutch type cheese as visible in Table 4.1.

**Table 4.1 Dutch factory cheese production in 2008 (Productschap Zuivel, 2008 and FrieslandCampina Cheese)**

Type of cheese	Production weight	CAGR <sup>1</sup> 2000-2008	CAGR 2008-2009 FC <sup>2</sup>
Gouda Nature Round	241 KT	-1.5%	[]%
Gouda Nature Rectangular	64 KT	-1.9%	[]%
Gouda Rindless	102 KT	+6.9%	[]%
Edam Nature (all shapes)	46 KT	-4.1%	[]%
Edam Rindless	79 KT	+12%	[]%
Maasdam (All)	106 KT	-1.2%	[]%
Other	85 KT	+6%	[]%
Total	723 KT	+0.9%	[]%

1) CAGR = Compound Annual Growth Rate

2) Based on sales figures using combined Gouda Edam numbers but separated for nature and rindless

#### 4.1.1 FrieslandCampina cheese market

The cheese market can be divided using different categories coming from interviews with employees. Within FC the departments have their own way of dividing up the cheese market. For example the planning department works with capacity groups for the factories, sales uses market recognition groupings and finance divides by price and margin differences. The division below had been established by iterative interviewing of the employees of the different department as described in chapter 3 focusing on analyzing the phenomenon of supply-driven.

The first main decision is at the raw source or base material level. At this point two major choices are made namely the mode of production and the type. The mode of production is either nature or rindless cheese. Note that rindless cheese is produced in closed plastic and nature cheese is the original approach using special coating for natural moistening (Commission of European Communities, 2008). Rindless cheese is used more often for industrial purposes while nature cheese is used for direct consumption. The types are mainly Gouda, Edam and Maasdam.

The second main decision is the age of the product. Cheese is matured over time. Depending on recapture nature cheese can be matured up to a year. Usually rindless cheese is not matured longer than a few weeks and exists only as young cheese. The third main decision is the commercial product appearance which is partly overlapping with the second choice point. Cheese can be sold either as whole, sliced or packed in wedges. On top over the main decision FC has to market the cheese directly or indirectly.

FrieslandCampina is producing all types of cheese currently using 12 factories throughout Holland and Germany. FrieslandCampina Cheese considers the production of cheese at its core business and outsources trade to a large extent. This means that in some cases the storage of cheese is outsourced too.

As presented in the theoretical framework the way a market is bounded influences the classification of the market (Geroski, 1998). The subdivision given in the previous paragraphs is a non-mutually exclusive multiple choice set. For example: A cheese can be categorized as Gouda, Nature round, whole, aged and sold via the retail. The aggregate of the market is crucial for appropriate findings for the market strategy.

In 2008 the Commission of the European Communities (hereinafter EC) did research to alleged market power of the merged entity FrieslandCampina. For cheese it turned out FC has to sell a cheese factory (former Campina factory Bleskensgraaf). In order to do this the EC defined markets by market recognition for cheese as presented in Figure 4.1. FrieslandCampina argued however

some of these markets to be similar by stating that prices are highly correlated. EC (2008) disagreed upon this since correlation could be caused by other factors like milk prices.

The following markets will be assessed hereinafter:

- (i) Sale of Dutch-type cheese to specialised cheese wholesalers
- (ii) Sale of Dutch-type cheese to modern types of retail
- (iii) Sale of nature Dutch-type cheese to specialised cheese wholesalers
- (iv) Sale of 15-day-old nature Dutch-type cheese to specialised cheese wholesalers
- (v) Sale of nature Dutch-type cheese to modern types of retail
- (vi) Sale of rindless Dutch-type cheese to specialised cheese wholesalers
- (vii) Sale of rindless Dutch-type cheese to modern types of retail.

Each of the markets referred to in (i) – (vii) could also be defined more narrowly as only comprising Gouda or Maasdam respectively.

Figure 4.1 Definitions of markets using relevant notice markets (Commission of European Communities, 2008)

#### 4.1.2 FrieslandCampina cheese marketing

FrieslandCampina has many different cheeses for many different end users. Currently FrieslandCampina has [] end-products according to the head of the FC data information system. Furthermore the client base is varied and is about [] unique clients for non-branded cheese only in 2009. Some of these clients are traders and wholesalers; others are retailers such as Albert Heijn and Aldi. According to the finance department the sales can be divided using six categories: Retail, Trade, Industry, Value Adding Resellers and Agents. Their shares in 2009 are consequently about ([], [], [], [], []) for non-branded cheese. Retail channel is about direct marketing towards retail mostly packed cheese. The trade channel are used for both rindless and nature cheese. Industry is also a direct channel: but mainly for rindless cheese only. The value-adding- resellers use mainly nature but also rindless cheese. For simplification issues the marketing process of non-branded cheese of FrieslandCampina can be seen as Figure 4.2.

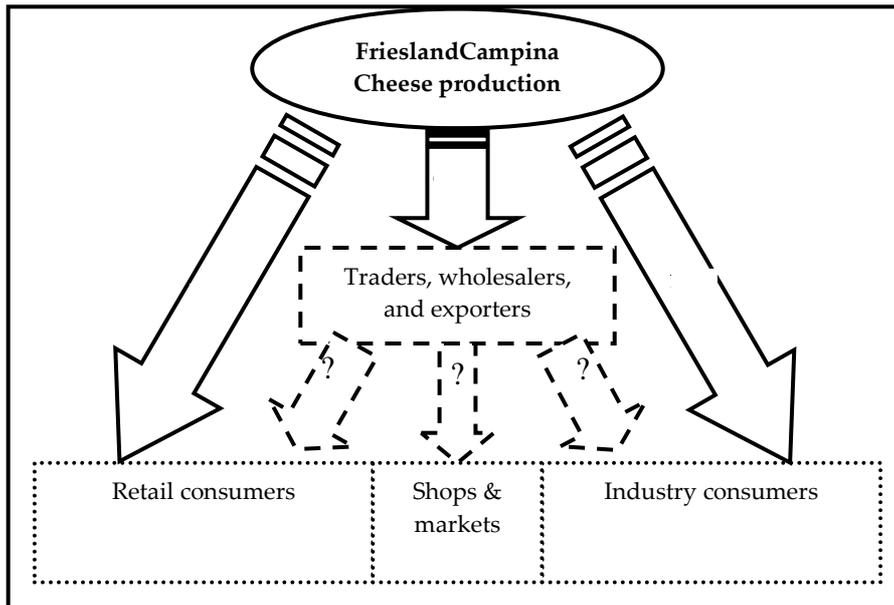


Figure 4.2 FrieslandCampina cheese marketing of non-branded cheese

#### 4.1.3 FrieslandCampina cheese market: Groupings relevant for this project

For the further research it is necessary to focus on important cross-sections of the market. So far we have discovered 6 dimensions: Mode of production, type, age, marketing channel, commercial appearance, branded. Note that this project by demarcation focuses on non-branded cheese such that Milner and other brands are excluded. This is because supply-driven never occurs in this segment. We pick here rindless versus nature and direct selling to retail and end users or indirect selling via wholesalers and resellers. This cross section originated from definitions from the European Commission and the interviews with the employees. Factors are market recognition and importance by volume. For simplifications we use here Gouda cheese only. We obtain than a two by two matrix of possibilities in Figure 4.3.

	<b>Production mode</b>	
<b>Marketing channel</b>	<i>Rindless direct</i> ([]%)	<i>Nature direct</i> ([]%)
	<i>Rindless indirect</i> ([]%)	<i>Nature indirect</i> ([]%)

Figure 4.3 Market groups

## 4.2 The origin of supply-driven cheese

We have just seen with what kind of dimensions the cheese market can be split up ultimately ending up with the simplified model of Figure 4.3. For this research project we have to add another dimension: supply-driven or non supply-driven. One has to regard supply-driven unconnected from the other dimensions. Supply-driven cheese is defined as cheese that is produced without an explicit order from a customer or a forecast of a salesman. From interviews it appeared that some customers have regular orders and stable demand. Another part of the market is more flexible and is done by forecasts of individual salesman.

Since FC is a cooperative with a clear rationale: "process all milk towards maximum value" FC can not opt for not processing milk. (*"I am not working for Coca Cola which can shut down factories"* Salesman FC) Also a central sales planner underlines the presence of supply-driven cheese. *"Sometimes there is cheese we ideally speaking would not have produced"*

Also marketing professor Gert van Dijk specialized in cooperative entities underlines this disadvantage: *"Members chose for you to process all the milk"* He explains this since member farmers independently can not change the milk price but only their sold volumes. This causes volume pressure in the milk markets ultimately causing collectively price pressure.

Besides FC employees and academic scholars also Mark Voorbergen on behalf of Rabobank underlines the surplus milk withdrawal role of cheese. However he says: *"Cheese is sometimes a package system for fat and protein, but I have this sentence from former FrieslandFoods management"*

On top of that management underlines the temporary habit of supply-driven cheese. (*Overall supply and demand are matching, FC manager*)

So far we can conclude that supply-driven cheese comes from milk pressure which in turn is originated from the cooperative duty. We will continue on the mechanisms and consequences of supply driven cheese.

## 4.3 Mechanisms of supply-driven sales

In Figure 4.4 a causal tree of supply-driven sales is given based on iterative interviews with FC employees. The blocks contain actions and choices which can be made.

Figure 4.4 has to be viewed as a causal choice tree. At level one possible starting point is indicated and via several choices three possible outcomes can be predicted. In the next sections the blocks will be discussed including the possible paths and their factors.

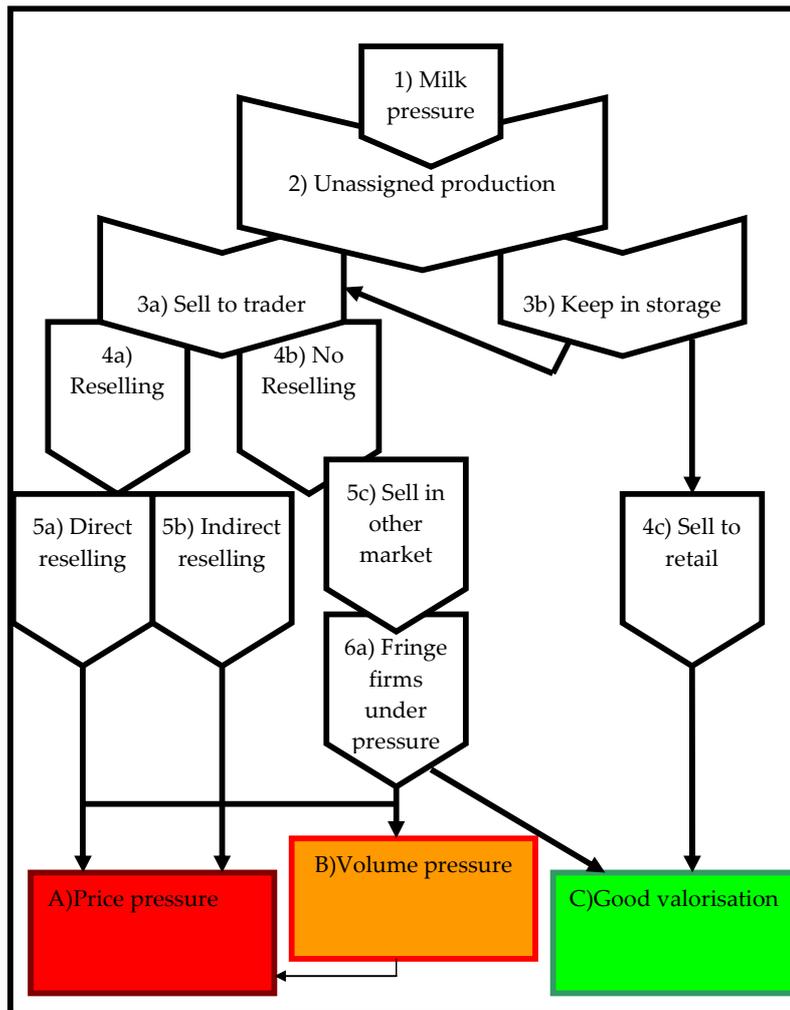


Figure 4.4 Causal tree of supply-driven sales

Furthermore there are some news reports providing further evidence for the supply-driven mechanism. In the strategic plan of DOC, a major competitor of FC in the north of The Netherlands announced to find other ways to valorize milk<sup>1</sup>. This underlines the presence of milk pressure within the industry as well as a little suggestion that fringe firms are under pressure. Also the new owner of the former Campina factory, Deltamilk B.A. announced in their strategy to source only a limited amount of milk from members to prevent milk pressure<sup>2</sup>.

1) <http://www.boerderij.nl/1089237/Rundveehouderij/marktprijzen-rundveehouderij/markt-veehouderij/DOC-participeert-in-melkpool.htm>

2) [http://www.deltamilk.nl/docs/DeltaMilk\\_Zuivelzicht.pdf](http://www.deltamilk.nl/docs/DeltaMilk_Zuivelzicht.pdf)

Table 4.1: Explanation of the causal tree

Point in Figure 4.3	Explanation	Quote's to underpin mechanism
1	Milk pressure means milk should be processed	"[]" FC manager
2	At this point FC decides whether it will market the unassigned cheese themselves or will outsource it to specialized traders.	"[]" FC manager "[]" FC sales manager
3a	At this point there is an important distinction for the consequence of the behavior of the trader. He may resell it in the same market FC is active in or he may sell it in another market.	"[]" FC planners "[]" FC central sales planner
3b	FC will store the surplus production as a matter of intertemporal substitution. Later, FC can decide to sell the product either direct to retail or to indirect traders.	"[]" FC manager
4a	Reselling means that the trader will sell it in the same market as FC	"[]" FC trade marketer
4b	No reselling means the trader will sell the cheese in a different market	"[]" FC sales manager
5a	Direct reselling means that the trader does buy less cheese at FrieslandCampina	"[]" Planning department
5b	Indirect reselling means that the trader sells its cheese to direct clients of FC	"[]" Sales person FC
5c	Sell in other market than FC is active in	"[]" FC manager
6a	Fringe firms are competitors operating on smaller scale than FC. Traders possibly buy less from these firms since they source from supply-driven FC cheese.	"[]" FC sales manager

### 4.3.1 Possible scenarios of supply-driven conditions

There are three main outcomes from supply-driven sales identified during the interviewees

**Box 4.1: The HZPC case: Price pressure**

HZPC is an international seed potato trading company which has a major market share in the export of Dutch seed potatoes. For seed potatoes the volumes to sell are determined by the crop of each year. Through weather conditions among other things, the volume varies strongly over the years and is influencing the price. According to the controller of HZPC higher volumes lead to lower prices. The quantity sold does not really change over years, because the export market is stable. The overproduction gives price pressure. Seed potatoes can also be sold as consumption potatoes. This market functions as the surplus market.

presented in Figure 4.4. These are price pressure, volume pressure and optimal valorization. Price pressure means that the equilibrium of supply and demand has a down-force. Volume pressure means that it is hard to sell the cheese since the market is saturated which usually is translated towards price pressure. See textbox 4.1 for an impression from a comparable industry. The third outcome is categorized as good valorization. This is defined as the optimal way to process milk towards value added products such as cheese. In the way to do that the

allocation procedure plays a big role. In the next paragraph we will look for drivers, possible mitigates and optimal settings.

## 4.4 Drivers

So far we have seen three possible scenarios regarding supply driven sales. There are several factors playing a role in determining which scenario holds under supply-driven cheese. We want to separate factors which are endogenous and exogenous. Endogenous factors are within the scope of the choice-set FrieslandCampina, exogenous are outside. Furthermore we analyze whether factors are positively or negatively related towards optimal valorization of milk.

We will discuss first the important factors which drive the causes, second factors which influence the intermediate steps by others and FC.

### 4.4.1 Factors driving milk pressure

Rabobank and FC underline the substitution at the production side with powder/butter production. If the prices of powder and butter are high, less cheese is produced and vice versa. Rabobank: “powder and butter are tradables.” This means that those goods are traded in the

commodity market. The variation of the valorization possibilities other than cheese influences the milk pressure of FC and also of its direct competitors. Also: Cheese is produced using about 8.5 liters of milk. The valorization possibilities of milk altogether determine the milk price: this means that the cheese production is influenced via two ways. During interviews it appeared that the milk price is a steering factor in how to sell cheese. However: The main part of the milk price paid to the farmers of FrieslandCampina is exogenous from the sales of the dairy products of FC itself

Exogenous factors	Relation	Quote to underpin
Alternative valorization competitor	If alternative valorization is higher than cheese valorization there is less milk pressure	<i>"German producers make less if powder prices are high"</i> (FC Central sales planner) <i>"Competitors use the same LP model with some different parameters"</i> FC controller and market analyst FC
Regulation of EU quota	If market regulation is reduced minimum prices are not guaranteed any more for alternative products	<i>"Market regulation required for stability"</i> FC controller
Endogenous factors	Relation	Quote to underpin
Alternative valorization FC	If alternative valorization is higher than cheese valorization there is less milk pressure	<i>"[]"</i> FC market analyst

(FrieslandCampina, 2010). In 2009 this main part was 98% of the total milk price.

Table 4.2 factors for milk pressure

#### 4.4.2 Factors driving outcome of scenario

Between milk pressure and the three possible outcomes of the model of Figure 4.4 there are several steps. We will discuss the main drivers and factors here. The exogenous factors are factors where FC cannot change, the endogenous factors can be changed.

Uncontrollable factors is the behavior of the indirect sales channel. Controllable is the performance of the sales channel. The outcome and configuration of the factors is likely influencing the optimal configuration of markets measured in quantities and prices.

Exogenous factors	Relation	Quotes to underpin
- Separation of markets of traders and FC	If markets are not separated supply driven sales may affect volume pressure	"[]" Sales manager FC
-Cancelling of regular orders by trader	If traders buy more supply-driven cheese they buy less regular cheese	"Market is rigid: producers can not switch easily" Controller FC
-Undercutting of the market price by trader	If traders can not sell product they will undercut market price to sell their product	"[]" Controller FC
- Behavior of direct competitors	If you produce less others will likely produce more	"Nordmilch explicitly stated they prefer to produce more cheese" Mark Voorbergen "You have to follow the market because you cannot set price" Controller FC
Endogenous factors	Relation	Quotes to underpin
- Ability of sales organization FC	If the ability of sales organization increases more cheese is marketed directly	"[]" Sales manager FC
- Coordination costs	If coordination costs are too high sales are performed indirectly	"If customers are too small and too irregular we cease serving them directly" Sales planner FC
- Competences of FC to store cheese	If FC can store its cheese it is more flexible in its selling moment	"We outsource our maturing and storing of cheese" FC manager
- Durability of cheese	If you can store cheese longer you are more flexible in selling moment	"Limit of flexibility in supply-demand shocks related to physical properties" Mark Voorbergen

Table 4.3 factors determining outcomes of intermediate steps of Figure 4.4

## 4.5 Summary and convergence

The aim of chapter four was to obtain a clear overview of characteristics of the supply-driven cheese market. We will summarize here the key characteristics which determine the supply-driven cheese markets and later factors which influence the effect of supply-driven. We will start with key characteristics.

First all stakeholders mention the concept of milk pressure as the element causing supply-driven market conditions. We have seen that this factor is multi-interpretable. According to the sales management it is negative since there are forced sales of cheese. The forced selling gives a price

pressure on the market under oligopoly circumstances. On the other hand Gert van Dijk argues milk pressure is the incentive towards the cooperative firm to innovate and create value from the milk.

Secondly supply-driven is a temporarily event according to the interviewees. This means that in some periods there is an overproduction either due fluctuations of demand or supply. According to some stakeholders supply-driven cheese should not be interpreted as structural overproduction, while others do not fully share this opinion. This opts for the degree of flexibility as determinant. Factors here are the durability of the goods, faced risk curve and coordination costs.

We will continue listing factors from the interviews which determine the effect.

First observation is that the distinction between direct and indirect selling is important for the choices regarding supply-driven cheese. It appears that FC can choose between direct and indirect marketing. The marketing can be cast aside towards traders or included into operations. By outsourcing the marketing the effect of supply-driven conditions are out of scope of FC and dependent on the reselling behavior of the traders.

Key here is whether the indirect end users are separated from the direct end users of the cheese. If markets are not separated indirect sold cheese competes with the direct sold cheese.

Second observation and related to the previous one is the ability of the sales organization of FC cheese. If the direct sales organization is improved less cheese has to be marketed indirectly. If FC sales activities are improved, measured as the utilization of the willingness-to-pay curve, the valorization of supply-driven cheese will be improved.

In chapter five we will look into these factors and evaluate this in order to do recommendations to improve valorization of supply-driven cheese.

## 5 Results from the quantitative analysis

This chapter aims to evaluate the supply-driven cheese market quantitatively. We want to answer the following question: *“What is the effect of supply-driven cheese on the cheese market measured in volume, price and sales on the short and long run?”* We will start by describing the market using a selection from factors of the SCP model. We will continue to discuss these factors combining with findings from the interviews in chapter 4 in paragraph 5.2.

### 5.1 The environment

Roughly speaking the business environment consists of an outer circle of basic conditions of supply and demand and an inner circle of industry structure. First we will look into demand such as elasticity and potential and thereafter the supply factors. Second we will describe most important aspects of industry structure.

#### 5.1.1 The demand

In this chapter we will discuss the demand of cheese here. We have access to export data from Productschap Zuivel and Dutch retail consumption presented in Figure 5.1. Note that Dutch retail are real end users while export data is just a proxy of foreign consumption. Expected market shares according to Commission of European Communities (2008) are between 50% and 80%.

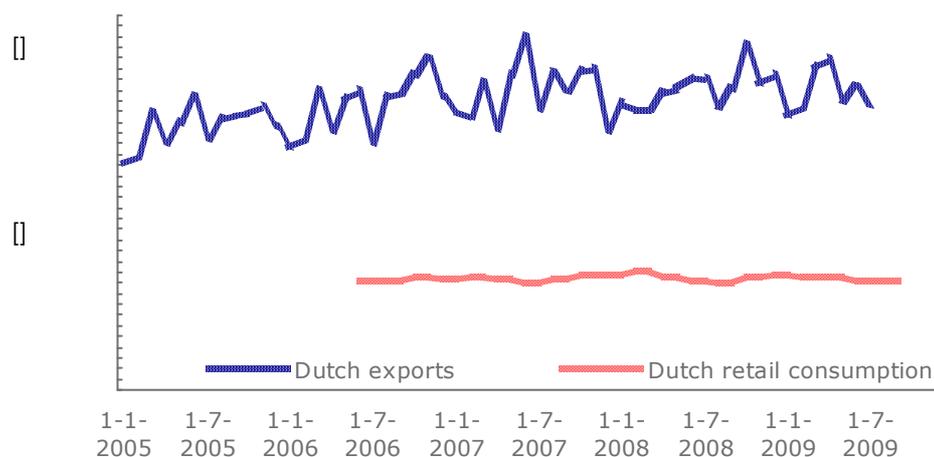


Figure 5.1. Dutch export volumes of cheese and domestic retail consumption

#### 5.1.1.1 The elasticity of demand

The elasticity of demand means the responsiveness of the sales towards price changes. However notice that sales data represent the crossing of supply and demand curves. For this project we have access towards Dutch retail data of Nielsen. From these numbers we can draw several conclusions. Overall the price does not affect the Dutch retail cheese sales in a consistent way. We can confirm expert Mark Voorbergen that the total amount of cheese sold has not changed, only a tiny shift from branded towards private label was observed. The Dutch cheese consumption in the retail is about [ ] KT in 2008 in is rather stable over years (Nielsen). Furthermore the Dutch consumption consists of 93% nature ripened cheese (European Commission, 2008). In general price is not influencing the Dutch cheese consumption. The Nielsen data is about all Dutch type cheese and correcting for FC's market share using EC (2008) the data represents 15% of FC production. This means that the other sales may be dependable on price. According to Mark Voorbergen industrial consumers have shifted towards substitutes for cheese consisting of for example palm oil. We can hypothesize that in the lower-end (low prices and low perceived value) of the market the consumption is more price elastic than in the middle-priced and high price cheeses.

#### 5.1.1.2 Market potential

On top of retail there are other channels namely specialized shops and the marketplace. For the Netherlands this is estimated by the GfK at [ ]% of the total cheese consumption. Adding this part up with the Nielsen retail data the total Dutch consumer market is 150 kT. Using the average sales price of the Nielsen data this represents a value of 1.1 B EUR.

For this project we do not have access towards external data regarding foreign consumption of Dutch type cheese. However: we know from the EC that FC has an market share of 70% of the Dutch cheese market. This implies that 105 kT of the FrieslandCampina cheese is marketed via Dutch retail representing about 20% of its total sales. Furthermore we know from the Productschap Zuivel that in 2008 112 kT of "Goudse rond" was exported and 140 kT of "Goudse overig". These two items represent the Dutch cheese export and are exported for an average price of 2,85 EUR kg<sup>-1</sup> in 2009. Reasoning so the 400 kT produced at export has an intermediate value of 1.4 B EUR.

#### 5.1.1.3 Seasonality of demand

A market can be either dynamic or stable (Hull, 2005). According to the Rabobank the dairy market has switched from a stable towards a dynamic market. Also employees from the case study company underline this fact. How doe we explain this volatility: what are the main drivers?

We will first look at the demand of cheese. For this project we have data from Nielsen as presented before. Note that this data covers only the retail sales of cheese of Dutch type and that this data is for full cheese market including the competitors. We calculate the standard deviation as percentage from the mean as an indicator for volatility. Also we want to try whether some months have higher demand than other months. On top of that we would like to compare this with production numbers to indicate the same. By doing so we can evaluate what the main factor of the mismatch between supply and demand is.

We observe that on two-monthly basis from 2006-2009 the overall sales of cheese is []% lower than average in the months May and June by []% and in August and September it is []% lower while it is in Oktober and November []% higher.

Furthermore the overall volatility measured as standard deviation as percentage of the mean is 2.6%. For the export data from the Productschap Zuivel in the same period this figure is higher namely 6.1%. For the export of Dutch cheese we can say that in Januari and in Februari the export is 6% lower compared to the average monthly export in 2006-2009.

### 5.1.1.4 Substitutes

From the interviews it appeared there has been some demand decrease under high cheese prices in 2007. For industrial purposes cheese has been replaced in some cases by analogue cheese e.g. on pizza's. Analogue cheese is made of palm oil among other ingredients and sometimes blended with real cheese. According to market experts this demand decrease will be recovered under current cheese prices. Mark Voorbergen (Rabobank) estimates that the upper level was around 4 euro unit price for industry purposes. Under current low prices of around 2 euro the industry will reconsider the use of cheese. This in contrary to other dairy markets e.g. the cream ice industry.

Another substitution takes place between nature and rindless cheese. Nature cheese is more expensive in production and has a higher market value than rindless produced cheese. Rindless cheese is cheaper in production since there is no dehydration in contrary to nature produced cheese. We know that price is an incentive towards substitution (Carlton and Perloff, 2005). We perform an analysis here to verify whether the premium for nature cheese influences the sales of nature cheese for FrieslandCampina. We use monthly internal data from FrieslandCampina of 2008 and 2009. It appeared that the indexed premium on nature cheese is negatively correlated with the sales of nature cheese directly competing with rindless cheese in Figure 5.2. The Pearson correlation was found to be -0.51 with a significance of 1.1%.

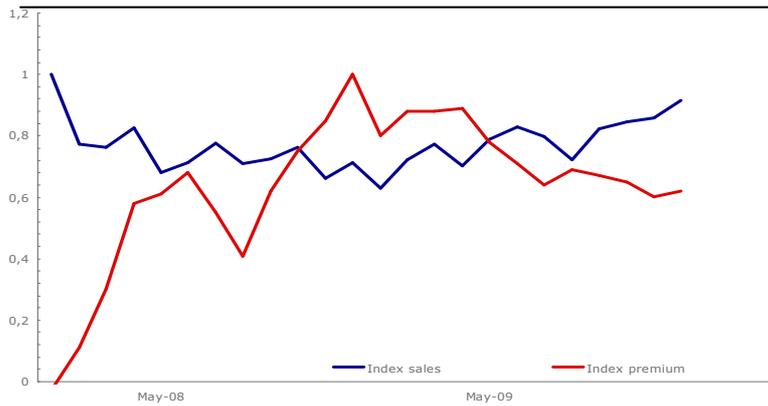


Figure 5.2. Indexed sales and average nature premium

Note that there are other factors than (relative) price influencing sales. However: we can conclude that it is likely that a decreasing price leads to increased sales in this specific segment (nature cheese).

### 5.1.2 Rate of growth of production

The cheese industry defined as Dutch type cheese is growing steadily on European level. In Figure 5.3 the European, Dutch and German Gouda cheese production are schematically presented. We see that at European level the annual growth is 2.4% presented as blue pillars using the left hand axis (LHA).

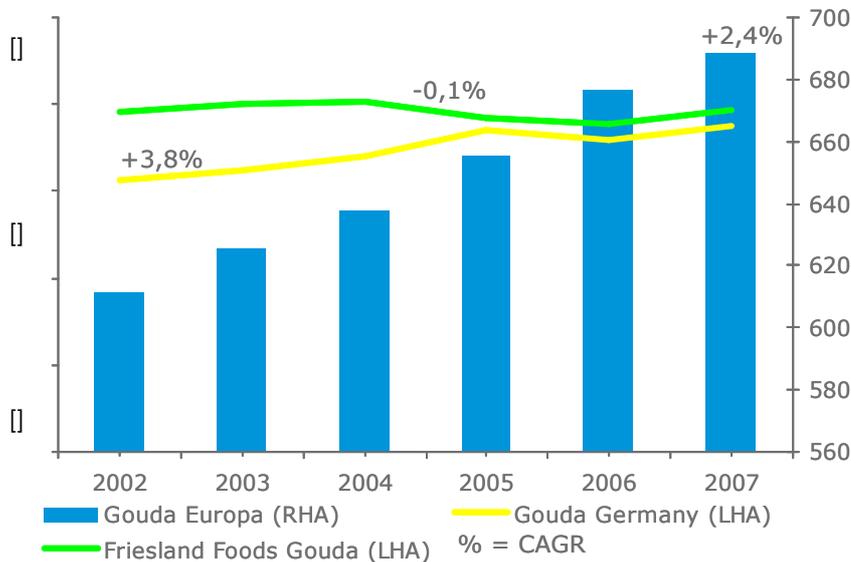


Figure 5.3 Gouda production data compared (FrieslandCampina & Productschap Zuivel)

Furthermore it is visible that Germany grows at a faster rate. This is even greater when comparing with the year 2000. In 2000 the annual German Gouda production was about [ ] KT and has increased with [ ]% towards [ ] KT. At the same time Dutch cheese production increased only [ ]%.

Several authors explain the growth of the German cheese production by the increased pricing policy of FrieslandFoods in 1998 among other reasons (Bremmers and Zuurbier, 2000). Pitts (1998) states that an economy of scale industry has led to decreased margins. Furthermore there is shift towards rindless ripened cheese. According to data the Compounded Annual Growth Rate (CAGR) of rindless cheese from the predecessor with the main cheese production of FrieslandCampina over 1997 until 2002 was about [] % and for nature cheese in the same period []%.

### 5.1.3 Seasonality of supply

We observe that the Dutch cheese production is stable month-to-month only in January the production is about 4% higher and in June the production is lower with 4.3% according to Productschap Zuivel data.

For the German Gouda production we observe that they produce 9% more in January and in May and June about 6.5% less. The variation month-on-month has a standard deviation per average of about 3.6% for the Netherlands while it is German Gouda production 8.2%. This means that Germany tends to have a less stable supply than the Netherlands.

For FrieslandCampina the month-on-month variation is about [] %, less than the Dutch average. This implies that the production of FC is rather stable and predictable.

### 5.1.4 Intertemporal substitution

Indirect clients are urged to buffer and function as the intertemporal substitution within the market. FrieslandCampina themselves have storage capacity of roughly [] KT which has to be corrected for the standard 15days operational storage. The remaining storage capacity would imply to cover only []% of its annual production. Since FC outsourced this part of the marketing it loses sight on the inventories of cheese which makes it difficult to anticipate on changing market conditions according to interviewees.

A main factor determining intertemporal substitution is the product durability. Depending on purposes the age of the cheese is very important. In general we can state here that nature cheese can be sold between 2 and 52 weeks, rindless cheese between 4 and 8 weeks depending on purposes.

**5.1.5 Substitutes on production side**

From the interviews it appeared that at the production side other dairy products such as powders and butter are substitutes. In Table 5.1 the different alternatives are given.

**Table 5.1 Production substitutes evaluated to size**

	Size of world trade (KT)	FrieslandCampina production (KT)	Share FC production from world trade
Cheese	1,245	500	40%
Butter and butter oil	695	85 + 75	23%
Non skimmed milk powder	1,600	55	3.4%
Skimmed milk powder	1,060	60	5.7%

We need to consider here that cheese is a large denominator and that within cheese is diversity. However: we can conclude from this table that the share of production is higher for cheese from the perspective of FrieslandCampina. It is unlikely that FC's production of commodities other than cheese will have an effect on the market while this is likely not true for the cheese production.

Besides we will compare Dutch dairy industry with the German industry for substitution on production side.

**Table 5.2 Production of Germany and The Netherlands: % change between 2000 and 2008**

	The Netherlands	Germany
Other dairy products	15%	-12%
Cheese	6%	20%

We observe that Germany is rebalancing its dairy production in favor of cheese with 2000 as base year. Note that this rebalancing is even greater by considering Gouda cheese only since the change is than 60% rather than 20%.

**5.1.6 The structure of the industry**

From Milch Industrie Verband data it appears that there are only 3 German Nature cheese producers. Furthermore there are in the Netherlands CONO, Bel Leerdammer and Deltamilk and DOC producing Nature cheese. For Rindless cheese the amount of German competitors is larger: there are about 11 Rindless cheese producers. In the Netherlands only DOC produces this cheese. There are also Gouda cheese factories in Poland, France and Belgium but accurate data lacks.

From the sellers perspective Rindless cheese has more buyers and is a more flexible market according to the interviews. Quantitative underpinning lacks here mainly due to the unknown destination of the indirect selling of cheese from FrieslandCampina.

#### **5.1.6.1 Degree of integration**

In chapter four we have seen that FC sells roughly half its cheeses directly (fully integrated chain) while the other half is outsourced. In the past the predecessor with the core cheese production of FC named FrieslandCobercoDairyFoods (FCDF) increased the degree of direct selling from 50% till 75% by purchasing four important cheese traders<sup>1</sup>. However: this share deteriorated trough the year since market shares of these purchased traders decreased.

#### **5.1.6.2 Degree of diversification**

From the interviews it appeared that the choice on production side is determined by the alternative valorization. FC as such has four business units competing for the same resource: milk. Some competitors have less diversification than FC has: such as DOC producing cheese only. The existence of alternatives amplifies the effect of oversupplying the market.

## **5.2 Integration with interviews**

There were some factors mentioned during the interviews but they were outside the SCP model as treated above. Also we would like to integrate the findings with the performance elements of the SCP model. We use sales data over the year 2009 of FrieslandCampina cheese. This contains about 400 KT in total. First we will verify whether traders anticipate on supply-driven market conditions of FrieslandCampina. We identify two historical supply-driven market situations: January 2009 and June 2009.

### **5.2.1 Reselling behavior**

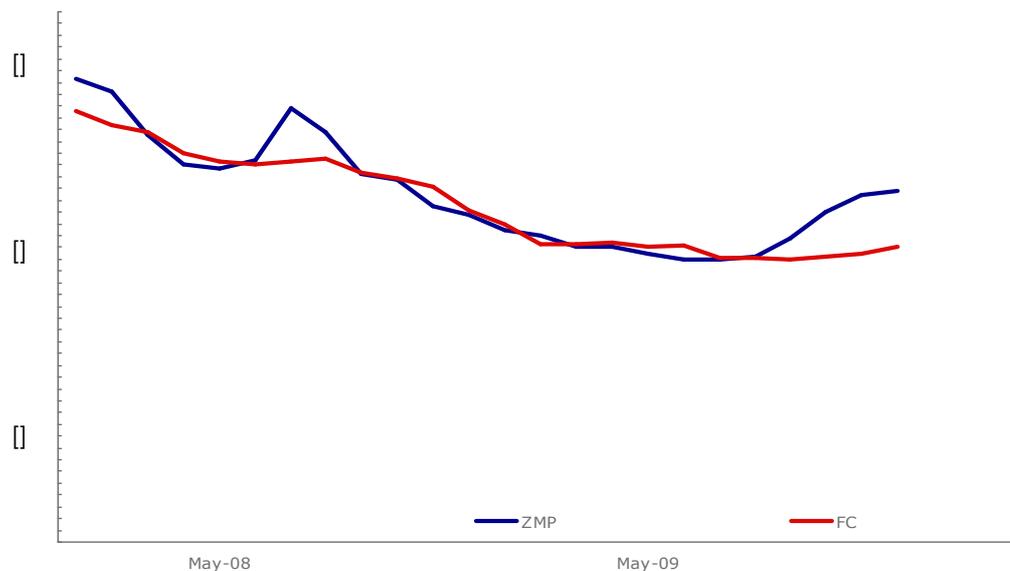
We want to know whether supply more into indirect channels affects the selling into the direct channels. We assume here that the indirect sales could be correlated to the direct monthly sales and the direct lagged monthly sales.

1) <http://www.answers.com/topic/friesland-coberco-dairy-foods-holding-n-v>

We could not find significant correlations so we can not prove that indirect sales is related to direct or direct lagged sales. However we can say that the amount of direct selling has decreased over 2008-2009. One given reason is the dual-supplier policy of supermarkets which had FrieslandFoods and Campina before s two suppliers. Thus: they were seeking for alternative sources. Furthermore we can state that we do not know where indirect sales find their end user. If no geographical difference is in place the competition between direct and indirect cheese is evident.

### 5.2.2 Performance

Performance will be measured here in price and in profits. The latter needs some clarification since FC is not opting for profit but for maximum valorization of milk in attribution to their shareholder farmers (Van Dijk & Klep, 2005). We will start with evaluating prices. We see that FC has a stable price but this can be due to that we present here an average price. Also: market price is not followed sometimes in Figure 5.4



**Figure 5.4 Prices benchmarked**

The comparison of prices needs some clarification. The price of ZMP is the German price of Rindless Gouda cheese. The price of FrieslandCampina is weighted price for all cheese comparable towards this price (industrial segment). We know that the underperformance related to the ZMP price coincides with supply-driven moments of FrieslandCampina. So far we can state that supply-driven has a negative effect on the price performance of FrieslandCampina Cheese.

### 5.3 Optimal valorization model of two markets

We will go through four hypothetical situations using the marginal cost/revenues model combined with the price discrimination model as presented in chapter 2 (Carlton & Perloff, 2005). Marginal revenues depend on the demand function. We make assumptions about the demand function faced by the firm. This is because we could not find an aggregate demand curve for cheese. The main reason for this is that accurate and complete end-user data for the exports was not found. Exports account for 80% of the sales so accurate vision is hard to obtain. This holds for retail and industrial use. Second the cheese market is complex with many dimensions e.g. production method, type, age, appearance etc. Furthermore we have seen in the literature study that the derivation of the residual demand curve of an individual firm depends on the degree of market power. This depends on how a firm perceives its market. We will go through hypothetical perceptions of the market.

#### 5.3.1 Three scenarios

In this paragraph we assume two markets: a market perceived as “strong” and one perceived as a “weak” market. Market I is the “strong” market for the firm and has a higher price than market II and has an higher perceived absolute elasticity value (Armstrong, 2008). Market II is the “weak” market for the firm and has a lower price than market I and is assumed to be less elastic. Note that there are two factors to come to this typology: the behind lying total market demand and the relative position that the firm has in that market (Carlton & Perloff, 2005).

Second dimension is the marginal costs since that is theoretically this is the other factor to derive an optimal production set (Perloff, 2009). Lastly we introduce the special situations of a minimum quantity produced to simulate milk pressure.

**Table 5.3 Scenarios of market situations**

			Quantity
	Market I	Market II	minimum
<b>1) Base line scenario</b>	Strong	Weak	100%
<b>2) Extreme scenario</b>	Very strong	Very weak	100%
<b>3) Milk pressure</b>	Strong	Weak	150%

The goal function is profits over two markets (1). The marginal revenues are the price at that point including the loss of market price over the quantity at that point (2). We can rewrite this function to (3) and (4). Assuming equal marginal costs leads to (5).

$$\Pi = \sum_{i=1}^N (p_i - c)q_i \equiv \sum_{i=1}^N \pi_i \quad (1)$$

For  $i = 1,2$

$$MR_i = p_i + Q_i \frac{\partial p_i}{\partial Q_i} \quad (2)$$

For  $i = 1,2$

$$MR_i = p_i \left(1 + p_i \frac{Q_i}{P_i}\right) = p_i \left(1 + \frac{1}{\varepsilon_i}\right) \quad (3)$$

For  $i = 1,2$

$$\frac{p_i - mc}{p_i} = -\frac{1}{\varepsilon_i} \quad (4)$$

For  $i = 1,2$

$$\frac{p_1}{p_2} = \frac{1 + \frac{1}{\varepsilon_2}}{1 + \frac{1}{\varepsilon_1}} \quad (5)$$

**Situation 1: Baseline scenario**

In the baseline scenario we have two markets: a weak and a strong one. Weak markets have lower prices and higher absolute values for elasticity following (5). This means that price changes have higher influence on the volumes. We model the strong market as  $5 - Q$  since marginal revenues are decreasing. Furthermore we model market 2 as  $4 - 0.5Q$  since we expect this market to be less sensitive to volumes due to near-competitive being of this market (flat curve). Solving this model we find that the optimal solution is to produce more in market II than in market I and that the price in market I is higher under profit maximization following formula (1)

**Table 5.4 Baseline scenario**

	Classification	Demand function	Optimal Price	Optimal Quantity
Market I	Strong	$P = 5 - Q$	2.5	2.5

Market II	Weak	$P = 4 - 0.5Q$	2.0	4
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The result is that the profit is 14,25 in this example with a quantity ratio of 0,63 and a price ratio of 1,25.

**Situation 2: Extreme scenario**

In the extreme scenario we have two markets: a market perceived as very weak and a one perceive as very strong one following (Armstrong, 2008). This means that price changes have higher influence on the volumes. We model the strong market as  $5 - 2Q$  since marginal revenues are decreasing. Furthermore we model market 2 as  $4 - 0.25Q$  since we expect this market to be less sensitive to volumes. In other words: we change the price parameters in comparison to scenario 1. Solving this model we find that the optimal solution is to produce more in market II than in market I and that the price in market I is higher under profit maximization following formula (1).

**Table 5.5 Extreme scenario**

	Classification	Demand function	Optimal Price	Optimal Quantity
Market I	Very strong	$P = 5 - 2Q$	2.5	1.25
Market II	Very weak	$P = 4 - 0.25Q$	2.0	8

The result is that the profit is 19,125 in this example with a quantity ratio of 0,17 and a unchanged price ratio of 1,25. We can conclude that if perceived “strongness” differences are large also the distribution is more extreme.

**Situation 3: Milk pressure**

In the milk pressure scenario we have the same two markets as under situation 1: a weak and a strong one following (Armstrong, 2008). Weak markets have lower prices and higher absolute values for elasticity following (5). This means that price changes have higher influence on the volumes. We model the strong market as  $5 - Q$  since marginal revenues are decreasing. Furthermore we model market 2 as  $5 - 0.5Q$  since we expect this market to be less sensitive to volumes. We give the constraint of a minimum quantity of 10 (this is about 150% of the baseline scenario).

**Table 5.6 Milk pressure scenario**

	Classification	Demand function	Optimal Price	Optimal Quantity
Market I	Very strong	$P = 5 - Q$	1.42	3.6
Market II	Very weak	$P = 4 - 0.5Q$	0.92	6.2

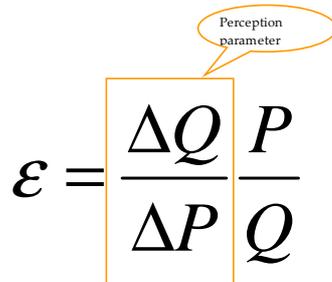
The result is suboptimal profit namely 10.72, but optimal allocation. Important learning is that both markets gain volumes and that the price ratio and the quantity ratio has increased i.e. differences are enlarged.

### 5.3.2 Evaluation of scenarios

Using the three scenarios we would like to see the effects of the perception of a market, changing price parameter and milk pressure for optimal valorization of milk.

We will first treat perception and the price parameter.

Within the elasticity formula as presented in Figure 5.3 the perception of price/volume changes is surrounded by a rectangular. This part represents the influence of price changes on quantity sold. In scenario 2 the difference between price parameters of the two markets have been made more extreme compared to scenario 1. This resulted in greater use of the market with a lower price parameter (inverse of the perception parameter) in Figure 5.3.



$$\varepsilon = \frac{\Delta Q}{\Delta P} \frac{P}{Q}$$

Figure 5.3 The elasticity formula

Furthermore it appears that it is feasible to increase production until elasticity reaches -1. However: under milk pressure the optimal elasticity will be exceeded assuming market all markets are operating at the point with an elasticity of -1. We observe both markets to be enlarged not just one market. In paragraph 4.1 and in chapter five we worked with a simplified representation of the cheese market using four markets. These were nature direct, nature indirect, rindless direct and rindless indirect. Considering the optimal division more factors than “on paper” return play a role. What we can state is that you have to sell your cheese to a maximum price possible. However: this is very hard since there are hardly any gauged instruments for this. We can speak about relative incomes from the four markets. Regarding this FC would opt to sell more in a higher yielding market as long as the elasticity is smaller than -1. Otherwise the extra sales does not weigh up against the lowered price.

## 5.4 Game theoretic modeling

In the literature study two game theoretic situations were found to be applicable on a supply-driven market. We will apply them here.

### 5.4.1 Prisoner's dilemma

Stylistically speaking we can state the following: There is a so called prisoner's dilemma at horizontal level in the chain. Horizontal means in relation towards competing producers. If you do not sell the cheese under a certain market circumstance, your competitor will do that for you. In other words: you have to follow the market.

The question is whether this holds for FrieslandCampina. We consider the situation of FrieslandCampina in 2008 compared to the situation of now and we will reason back. We will measure the payoff in accumulated sales since that will cover the price and profit as performance indicators both. Furthermore we assumed production increase to be linear with prices. We want to know the pay-offs of increasing the production or by anticipated (on demand) production. Data shows that the annual German Gouda production has increased 60% departing from the year 2000 till 2008. In Table 5.7 the original phase is called option 1. In this phase both FC and its competitors have a pay-off (as index of sales and price) of 100. However: increasing the production gives an advantage to both of the parties since  $110 > 100$ . Since increased production will induce price pressure (economies of scale by Pitts, 1998) the payout of the anticipated production is equal to 90. Since both FC and the competitors know this the production-price setting will end up in option 4 since  $95 > 90$ . This argues while collusion is advantageous for both parties since  $100 > 95$ .

Table 5.7 Prisoner's dilemma

	Anticipated production FC	Increase production FC
Anticipated production stable competitors (C)	Option 1 (100, 100)	Option 2 (110, 90)
Increased production competitors (C)	Option 3 (90, 110)	Option 4 (95, 95)

### 5.4.2 Hold up problem

In chapter 2 the hold up problem was presented stylistically. We will now apply this model to explain and quantify the effect of milk pressure. Ex-ante we assume the production costs of cheese at around 1 EUR per kg. We assume a milk price of 30 Eurocent per liter an 10 liters use per kg of

Cheese. By doing so we come to costs of 3 EUR + 1 EUR = 4 EUR. The bargaining price is the right between the willingness to pay of the buyer and the costs.

**Table 5.8 Hold up problem**

	Ex ante	Ex post
FC cost	4,0	3,0
Buyer	4,5	4,5
Bargaining price	4,25	3,75

If we now assume the milk price not to be recovered elsewhere: the opportunity costs to be e.g. process it into milk powder we have to lower the ex-post price. If we assume these opportunity income to be 2 EUR the sunk costs part of the milk is  $3 - 2 = 1$  EUR. The credible costs to be accounted into the bargaining game are than  $4 - 1 = 3$  EUR.

Theoretically we can come to the following credible hold up problem: Bargaining price = (Perceived value by buyer) + (Variable cost – Sunk cost). With sunk costs = unit fixed costs and the not-to-be-recovered milk costs i.e. milk costs – opportunity incomes from the milk. Translated to practice: if the alternative incomes of one liter of milk decrease with 1 euro the effective bargaining price of your product (cheese) will be lowered by 0,5 under equal bargaining conditions.

## 5.5 Summary

In chapter five the aim was to evaluate quantitatively the effects of supply-driven market conditions. In paragraph 5.1 we have described the cheese industry using factors coming from the Structure Conduct and Performance model. We have seen that the Dutch demand is rather stable in contrary to the export. Furthermore we have seen that price is not influencing the turnover of cheese that much perhaps at the lower end of the market (Mark Voorbergen of Rabobank). Lower price performance during supply-driven conditions was found. Furthermore the price is influencing the sales of the nature market due substitution towards rindless cheese since the Pearson correlation index was -0.51. Furthermore the position of FC in nature market is slightly decreasing because the CAGR for this market is decreasing faster than the CAGR of the Dutch production. This effect is partly covered by the dual supplier policy of some large customers. However: it is proved that price difference increase substitution from rindless towards nature cheese. It depends on strategy and vision of FC how to handle this phenomenon.

The effects of increasing cheese production compared to the other dairy products such as powder regarding presence of FrieslandCampina in these markets assuming equal marketing processes, is larger for cheese than for other products.

Game theory gives more insight around the mechanisms and possibilities of supply-driven circumstances for FrieslandCampina. Using the prisoner’s dilemma the lower limit for production

response on changing dairy market has been placed. The hold-up problem makes clear that under supply-driven conditions defined as diminished opportunity incomes the price level is under pressure.

Thus far we have seen several factors. The goal function of FC should be to maximize valorization of milk. We will summarize here factors determining optimization in Table 5.9.

**Table 5.9 Core factors how to handle supply-driven cheese**

	<b>Factor</b>	<b>Determinants</b>	<b>Volatility<sup>1</sup></b>
1	<b>Marginal revenue</b>		Dutch: 2.6% Exports: 6.1%
	Demand	Consumer preferences and income.	
	Access	Ability of sales organization, dual supplier policy of customers	
	Sensing	Ability of sales organization	
2	<b>Storage</b>	Ability of FC	Limited data
	Outsource	Choice of FC and monitoring capabilities	
3	<b>Competitors</b>	Alternative valorization, historical investments	Germany Gouda: 8.2%
	Cooperate	Uniform pricing	
4	<b>Supply</b>		FrieslandCampina 2.6%
	Marginal costs	Investments (Capital Exposure), evaporation,	
	Milk pressure	Passive until 2015, thereafter active due abolition production quota	

1) Volatility = Standard deviation / Mean on monthly sales of 2009

From the SCP factors we have seen that the cause of the mismatch of supply-demand, using the volatility as an indicator, is mainly the exports and competitors production variation. Supply variation is a factor, but not the most amplifying one. FC should focus on exports and monitoring of competitor produce rather than on fixating on the supply-driven cooperative being.

This research can not provide evidence for what cheese to produce or what cheese had to be produced. This is because the cheese market is rather opaque mainly due the large share of indirect sales. FC should weigh whether this handicap (as observed by this research) is lower than the extra transaction costs of controlling the export markets. Furthermore management decisions are more visionary statements rather than deterministic outcomes of optimal performances.

The project can be summarized into two main trade-offs about supply-driven cheese presented in Figure 5.4 and will discuss them below.

Dilemma (1): Increasing sold volumes do not  
have to weigh up decreasing price effect  
Dilemma (2): Higher payout price does not have  
to weigh up to decreasing market share

**Figure 5.4 Main trade-offs regarding supply-driven cheese**

Dilemma 1 means that the gains of extra sales are smaller than the decrease of the price over the current sales. This is stronger if the markets are already saturated or close to saturation. An increase in volume will likely give price pressure. But since you know competitor dairy companies valorize with more or less the same products you can not protect market price by not producing cheese. Thus you may, even though unwanted, produce cheese.

Dilemma 2 follows from dilemma 1 and is in fact an application of the Prisoner's dilemma. If you protect the market by producing "on demand" only others will undercut the price of your "on demand" produced cheese. Thus: market share will decrease and long run valorization is in danger. Furthermore price setting is dangerous since you stimulate entrance and substitution both.

## 6 Conclusions and recommendations

The central question of this project is: *“What are short- and long run effects and responses of supply-driven market situations on the cheese market from the perspective of FrieslandCampina?”*

We have three angles to answer this question: the literature study, the interviews (qualitative) and the quantitative analysis. We will discuss the short and long run effects first, thereafter the recommendations for possible responses.

### 6.1 Short and long run effects

This project started with the question of surplus cheese. We have seen that surplus cheese is a consequence of a mismatch between supply and demand.

From the literature study we have learned that the general supply-demand model with decreasing revenues predict lower prices under higher supply (Perloff, 2009). Second we have seen that under oligopoly circumstances the clearing by price is impeded by imperfect competition. Most important determinant is intertemporal substitution, in other words inventory. Regarding effects of over supplying the market we found decreasing prices on the short run and deteriorated non-viable industries on the long run.

From the interviews it appeared that effects of supply-driven market situations are that indirect channels compete with direct channels. Possible effects are lowered prices compared to what was possible. This is a very hard to prove statement. However: if we follow the ZMP benchmark price FC underperforms in rindless cheese sales. This can be stated as a consequence of supply-driven sales. The cheese market is found to be non-transparent by the researcher. This is in line with the findings of the research of the Commission of the European Communities (2008) towards market power due the merger of Friesland and Campina. For deserts and other consumer products they performed an econometric analysis while for cheese they performed interviews with retailers and traders.

From the quantitative analysis it appeared that the supply variation is less than the demand variation. We can not determine quantitatively the effect of a supply-driven market controlling for what would have been possible at a given moment. However we can say that for FC factors determining the effect of supply-driven measured in optimal milk valorization are:

- The reselling behavior of the traders
- The performance of the direct sales channel

Also from Figure 6.1 it is visible that the performance of the direct sales channel is very important for two reasons. First the valorization directly is expected to have higher margins since you are closer to the consumer. Second the amount of supply-driven cheese via the indirect sales and thus out of control of FC is decreased if more cheese is marketed directly.

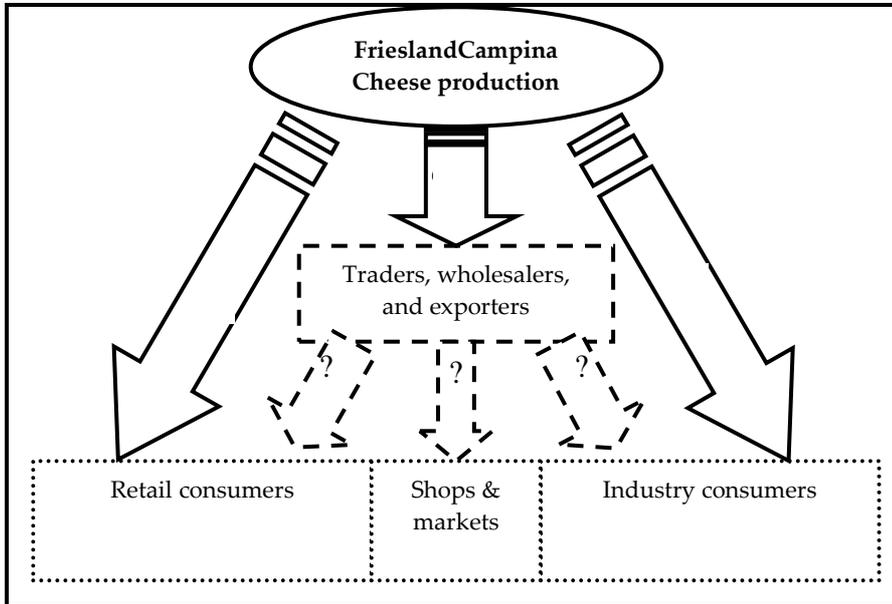


Figure 6.1 Cheese marketing of FC

## 6.2 Possible responses of FC

From the literature study we have learned that a rational choice can be made by calculating marginal costs and revenues (Perloff, 2009). Also we have seen that factors, determinants and indicators for optimal industry tuning can be found from the SCP model (Carlton & Perloff, 2005). From the interviews it appeared that the cause of supply-driven market is milk pressure i.e. the duty to produce. Furthermore it appeared that the difference between nature and rindless cheese and the difference between direct and indirect selling are the most important steering factors for the optimal valorization of surplus milk.

From the quantitative analysis it appeared that:

- The credibility of an individual cooperative firm to control supply is low since they aim maximum milk valorization implying supplying more cheese if alternative valorization is low
- The prisoners dilemma is present: German cheese producers and Dutch competitors increases cheese production

- Market tuning is restricted towards direct substitution on buyer side (for rindless this is analogue cheese, for nature this is rindless) and also on the production side (for both types)
- Intertemporal substitution is key factor in supply-driven cheese problem. Monitoring this aspect including feedback to decision makers. To evaluate current approaches FC possibly can monitor inventories of traders on presence of FC cheese at a specific production date.
- Under volume pressure (supply-driven) you should increase production in both markets independent from costs as long as you are not sure markets are unconnected. Otherwise you will encourage substitution.
- Make other players aware of the oligopoly circumstances. Make sure you do not overrule and force fringe firms like DOC and Deltamilk and Nordmilch to use also non-cooperative strategies.

Supply-driven is the example that you can not trick the market. It appears that the upstream suppliers force FC to process more milk than they would prefer. FC should become more flexible to handle this since the demand is stable. This provides an incentive for FC to differentiate and break its products.

We can state that FrieslandCampina is more price-taker in rindless cheese than in nature cheese simply because the market share in rindless is lower than for nature cheese (Commission of European Communities, 2008).

Rogers and Marion (1990) mentioned three instruments for cooperatives to execute market power. These are controlling of members, controlling individual supply and price discrimination to diverse part of the market. Assuming these three things of the same order these things are interchangeable. This means that if you do not fix individual supply this will lead to more incentives to use the other two factors: controlling number of members and price discrimination. FC should fix this blind spot and make more cooperation towards the member. Also: members should become more aware of dynamic circumstances in the market. By doing so an optimal dairy cluster can be formed to overcome supply-driven circumstances.

Hull (2005) makes distinction between dynamic and static markets. This project shows that the dairy market has transformed into a dynamic market (measured in price volatility). Following Hull (2005), the priority of FC should be to become more flexible rather than efficient. It is not to say efficiency is a bad focus, but flexibility is key in dynamic markets such as the cheese market. Flexibility in cheese has mainly to do with product durability and market estimations, which both urge attention.

## 7 Discussion and recommendations for further research

This chapter will describe two things. Discuss what/how could have been performed better. Secondly we will present here practical recommendations for further research for FC and universities.

### 7.1 Critical reflection

- Divergence rather than convergence

This project was initiated to create clearness in the cheese market. Mainly the interviews in the second phase were broad and very divergent. The result is that the chance of overlooking factors was smaller, but that the convergence of all these factors appeared to be difficult and time consuming.

- Focus on FrieslandCampina

This research was performed at FrieslandCampina. The objectivity of the researcher is at risk, since the researcher was right between the people currently working with the topic.

- Independence during interviews with FC employees at risk

During the interviews PowerPoint slides were used. These may have steered the conversation and outcomes of these interviews. It would have been better if these interviews were completely open.

- Low compatibility between deterministic economic and management viewpoint

This research was performed at the management studies group of the Wageningen University with cooperation of the economics department. These two disciplines are not always in line. Where management studies is more open and visionary, economics tend to be more deterministic. The union of both disciplines appeared to be a very tough challenge.

- New articles were found during the research but were not incorporated in the research.

Most important one is an article about Nordmilch and FrieslandFoods regarding market orientation by Everwand *et al.* (2007). This research comes up with a clear construction to evaluate previously mentioned firms but does not use it quantitatively either.

- Indicators weakness (construct validity)

This research uses volatility as the main indicator to evaluate supply-demand match. This is just one of the aspects. Other aspects are e.g. absolute values, limitation by storage time etc.

## 7.2 Recommendations for further research

- Within this project the demand elasticity of cheese could not be estimated. This may be very helpful though. Core issue is the uncertain status of export demand and industrial cheese use. Focus should be on the knowledge of habits of end-users rather than indirect traders.
- To calculate the market potential FC can make a list of the financial performance of their main traders over the last 3 years (sourcing e.g. Kamer van Koophandel). Using this it can benchmark this results with the transactions made with these firms.
- The role of traders and wholesalers within the cheese sales system of FrieslandCampina needs further attention. How to form a successful cluster? How to align stakes to create sustainable cooperation? Key topic should be strategic positioning of FrieslandCampina Cheese. A student with a for example a business administration background may perform this research.
- New fields to explore are here for FrieslandCampina. Can members be involved in anticipating on the market? Via price incentives as suggested by Mark Voorbergen? Or by involving primary producers in the downstream processing choices via member boards?
- For science more research could be performed towards the role of information and negotiation in a market. Focus should be on the oligopoly-oligopsony markets i.e. few sellers and few buyers.

## References

- Armstrong, M. 2008. Price Discrimination." In: Handbook of Antitrust Economics, edited by p. Buccirosi. *MIT Press*, 433-468.
- Asche, F. Gjolberg, O., Volker, T. 2003 Price relationships in the petroleum market: an analysis of crude oil and refined product prices. *Energy Economics* 25 (2003) 289-301
- Bijman, J. (2002) Essays on Agricultural Co-operatives; Governance Structure in Fruit and Vegetable Chains. ERIM ph.D. *Series Research in Management* 15
- Bryman, A., Bell, E. (2003) Business research methods. 1<sup>st</sup> edition. *Oxford university press*.
- Bouamra-Mechemache, Z., Réquillart, V., Soregaroli, C., Trévisiol, A. (2007) Demand for dairy products in the EU. Paper provided by Institut d'Économie Industrielle (IDEI), Toulouse in its series [IDEI Working Papers](#) with number 454
- Bremmers, H., Zuurbier, P. (2000) Cooperative restructuring in a global environment. *Article in monograph or in proceedings*.
- Carlton, D.W., Perloff, J.M. (2005) Modern Industrial Organization 4<sup>th</sup> edition. *Addison-Wesley*
- Christopher, H. 2000. The agile supply chain, competing in volatile markets. *Industrial Marketing Management* 29, 37-44 (2000)
- Commission of European communities, (2008) Commission Decision of 17.12.2008 declaring a concentration to be compatible with the common market and the EEA Agreement, *Public version*
- Commission of the European communities, 2009 - Dairy market situation 2009
- Corts, K.S. Third-Degree Price Discrimination in Oligopoly: All-Out Competition and Strategic Commitment. *Journal of Economics*, Vol. 29, No. 2 (Summer, 1998), pp. 306-323
- De Vaus, D. (2001) Research Design in Social Research. 3<sup>rd</sup> edition *Sage publications ltd*.

- Everwand, W.C., Ingenbleek, P.T.M., Backus, G.B.C., (2007) From commodity to customer value : the transition from a production-oriented to a market-oriented European dairy industry. *LEI Rapport*
- FrieslandCampina, 2010, Jaaroverzicht 2009 Koninklijke FrieslandCampina N.V.
- Geroski, P.A. Thinking creatively about markets. *International Journal of industrial organization*. 16 (1998) 677-695
- Gohin, A and Femenia, F (2009) Estimating Price Elasticities of Food Trade Functions: How Relevant is the CES-based Gravity Approach? *Journal of Agricultural Economics*, Vol. 60, No. 2, 2009, 253–272
- Hendrikse, G. Economics and Management of Organizations – Co-ordination, Motivation and Strategy. *McGraw-Hill companies 2003*
- Hoffman, S.H., Royer, J.S. Evaluating the Competitive Yardstick Effect of Cooperatives on Imperfect Markets: A Simulation Analysis Presented at Western Agricultural Economics Association 1997 Annual Meeting July 13-16, 1997 Reno/Sparks, Nevada
- Hull, B. The role of elasticity in supply chain performance. *International Journal of Production Economics* 98 (2005) 301-314
- International Dairy Foods Association (2009). The World Dairy Situation. *A bulletin*
- Johnson, G. Scholes, K., Whittington, R. (2008). Exploring Corporate Strategy, text & cases. 8<sup>th</sup> edition. *Pearson Education Ltd, Harlow*
- Krugman, P.R., Obstfeld, M. (2006) International Economics – theory and policy 7<sup>th</sup> edition *Pearson*

- Langlois, R.N. 1993 Capabilities and Coherence in Firms and Markets. *Paper for the Conference on Evolutionary and Resource-based Approaches to Strategy, August 27-29, 1993, Copenhagen*
- Merel, P.R. Is there Market Power in the French Comte Cheese Market? *Paper prepared for presentation at the 12th EAAE Congress 'People, Food and Environments: Global Trends and European Strategies', Gent (Belgium), 26-29 August 2008*
- Meulenbergh, M.T.G. (1989) Structuur en ontwikkeling van afzetkanalen. Een literatuuroverzicht. P 247- P 263. *Wageningen University and Researchcenter Publications*
- Oerlemans, N., Hees, E. (2005) "Marketing Sustainable Agriculture: An analysis of the potential role of new food supply chains in sustainable rural development" 'BeemsterKaas' Marketing quality and image. *THE FIFTH FRAMEWORK PROGRAMME 1998-2002 European Commission*
- Ono, Y. The equilibrium of Duopoly in a Market of Homogeneous Goods. *Economica, New series, Vol. 45, No. 179 (Aug, 1978), pp. 287-295*
- Perloff, J.M. Microeconomics. (2009) *Pearson International Edition 5<sup>th</sup>*
- Pitts, E. European cheese industry: changing structure, economies of scale and implications for competitiveness. *International Journal of Dairy Technology*. Vol. 51, No 3 August 1998
- Porter, M.E. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press
- Productschap zuivel, 2008 Statistisch jaaroverzicht 2008
- Rabobank, 2008: The Global Dairy Industry - Reshaping in a New Market Era
- Rogers, R.T., Marion, B.W. Food Manufacturing Activities of the Largest Agricultural Cooperatives: Market Power and Strategic Behavior Implications. *JOURNAL OF AGRICULTURAL COOPERATION* 59 (1990)

- Rogers, R.T., Petraglia, L.M. Agricultural Cooperatives and Market Performance in Food Manufacturing. *Journal of agricultural cooperation* (1994)
- Tacken, G.M.L., 2009, Competitiveness of the EU dairy industry. *LEI WUR report*
- Tomek, W.G., Robinson, K.L., (1990) Agricultural product prices, 3<sup>rd</sup> edition. *Cornell university press*
- Van Dijk, G., Klep, L.F.M. 1997 Als de Markt faalt [Publisher]
- Yin, R.K. (2003) Case study research: Design and Methods 3rd edition

## Appendix I: planning table

Weeknummer	33	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
List of activities Datum (ma)	10-aug	24-aug	31-aug	7-sep	14-sep	21-sep	28-sep	5-okt	12-okt	19-okt	26-okt	2-nov	9-nov	16-nov	23-nov	30-nov
Reading dairy sector																
Introduction to cheese FrieslandCampina																
Start talks university supervisors																
Writing Research Proposal																
Startcolloqium																
Interviews FC Introductory																
Prepare interviews (SRQ2&3)																
Interviews FC RFC2																
Interviews experts (WUR and Rabobank)																
Literature study (SRQ1)																
Data gathering (SRQ3)																
	50	51	52	53	1	2	3	4								
List of activities Datum (ma)	7-dec	14-dec	21-dec	28-dec	4-jan	11-jan	18-jan	25-jan								
Write Chapter 2 (Literature)																
Pick method(SRQ3)																
Write Chapter 3 (Data and Methods)																
Performing quantitative analysis (SRQ3)																
Write Chapter 4 (SRQ2)																
Write Chapter 5 (SRQ3)																
Convergence of literature, qualitative and quantitative analysis																
Write Chapter 6 & 7																
Finish report																
Final colloqium																



## Appendix II: Detailed specific research questions

SRQ1: How does a supply-driven market function according to literature on supply chain economics, organizational economics, econometrics and micro-economics?

SRQ1.1: What information comes from supply chain economics about effects and responses of supply-driven market situations?

SRQ1.2: What kind of market typologies and responses are available from micro-economics?

SRQ1.3: What relevant information comes from organizational economics regarding supply-driven market situations?

SRQ1.4: What information do comparable industries and markets offer to tackle the problem?

SRQ1.5: What specific studies have been performed on the cheese industry in the light of the central research question?

SRQ1.6: What kind of econometric studies have been performed on supply-driven markets?

SRQ2: What are the main characteristics of supply-driven cheese market and what are important aspects (e.g. causes, consequences, and perceptions)?

SRQ2.1: What is supply-driven cheese?

SRQ2.1.1: What are causes of supply-driven cheese?

SRQ2.1.2: What are consequences of supply-driven cheese?

SRQ2.2: How do the cheese commodity markets of FC look like?

SRQ2.2.1: What are the main classifications and segments of cheese?

SRQ2.2.2: What are the main actors in the cheese commodity market of FC?

SRQ2.3: How are prices of cheese established?

SRQ2.3.1: In the different channels (i.e. Industry, Retail, Traders, Small traders)

SRQ2.4: What is the perception of supply-driven cheese within FC?

SRQ2.4.1: Within FC (operations, sales, management, controlling)

SRQ2.4.2: Within former FrieslandFoods

SRQ2.4.3: Within former Campina

SRQ2.5: What is the role of speculation in the cheese market?

SRQ2.5.1: What is a good definition of short run and long run within cheese market?

SRQ2.5.2: How important is the role of storages within the cheese market?

SRQ3: What is the effect of supply-driven cheese<sup>1</sup> on the cheese market measured in volume, price and sales on the short and long run?

SRQ3.1: What data is required to answer CRQ based on insights from SRQ2?  
(Suggested: volume and prices of I: market, II: FC and III: FC supply-driven cheese)

SRQ3.2: What is a good method to analyze data from SRQ3.1 in order to answer SRQ3?

SRQ3.3: To what extent do the sales of the supply-driven cheese affect the cheese market on the short run?

SRQ3.3.1: Does the quantity of the supply-driven cheese affect the prices of the cheese of the regular volume prices of FC?

SRQ3.3.2: Does the price of the supply-driven cheese affect the prices of the cheese of the regular volume prices of FC?

SRQ3.4: Same as SRQ3, but now on the long run

1) Note: On forehand supply-drive cheese is assumed to be a dichotomous classification. In reality it may be a gradual aspect. Furthermore the cheese market is split up in four segments based on the allocation level subdivision. These are 1) Rindless, 2) Nature ripened, rectangular, 3) Nature ripened, round, 4) Nature ripened block. Furthermore the time dimension is preferred monthly or even weekly to improve accuracy.

## Appendix III: Semi structured interview FC employees

1) Wat zijn de oorzaken, kwantificeer model boven

- Melkdruk
- Kwaliteit
- Tegenvallende verkopen
- Werkkapitaalvermindering?
- Risk management?

2) Beïnvloed aanbodgedreven kaas volgens u de markt?

3) Wat zijn de factoren die de impact beïnvloeden?

4) Wat is supply driven sales precies?

- 1/0 variabele of meer gradueel

5) Hoe komen prijzen tot stand?

- Rol vraag
- Rol aanbod van melk
- Opbrengsten overige zuivelproducten
- Rol regulering/ Interventie

6) Wat zijn mogelijke gevolgen en hoe werken de mechanismen?

- Korte termijn (prijs/volume)
- Lange termijn (prijs/volume)
- Wegdrukken concurrent=>voorraadopbouw concurrent=>???
- Opslag bij tussenhandel
- Wat zijn omstandigheden waaronder gevolgen versterkt/verzwakt worden?
- Status van de kaasketen (vol/medium/leeg)
- Meetbaar?
- Prijzen "opportunity cost" e.g. opbrengsten melkpoeder
- Rol van voorraden en veredeling:
- Wat is de rol van voorraden in de markt?
- Wat is de rol van veredeling in push-kaas?
- Wat is een mogelijke oplossing om verkoop van supply driven kaas te verminderen?

7) Wat zijn verwachte elasticiteitswaarden voor de markten?

- Folie

- Natuur (Rond, Rechthoek, Vierkant)

8) Alternatieve producten

---

8a) Van melk

Wat is het verschil tussen melkpoeder en kaas qua marktgedrag?

Wat is het verschil tussen kaas en overige zuivelproducten qua marktgedrag?

8b) Voor kaas

Hoe groot is het aandeel analoge kaas en in hoeverre is dit een substituut voor kaas?

9) Kaas en speculatie

Is de kaasmarkt speculatief te noemen, waarom wel waarom niet?

Hoeveel voorraden kaas zijn er?

Wat is "korte termijn" en "lange termijn" in kaasmarkt (gemeten als prijsreactie)?

10) Korte termijn

11) Lange termijn

12) Grofweg zijn er twee strategieën: kostprijsleiderschap en differentiatie (merken). Heeft het voor de Nederlandse zuivelsector zin om de "race to the bottom" i.e. prijsleiderschap aan te gaan?

Waarom wel, waarom niet?

13) Stelling: Als je de melkdruk wegneemt (door meer kaas of poeder te maken onder de marktprijs) geef je verkeerde prikkels richting de boeren en wordt de downstreammarkt op de langere termijn verpest.

14) Kaas als commodity?

Wat maakt kaas anders in vergelijking met andere zuivelproducten?

Wat is de meerwaarde van kaas? Hoe zou dit behaald kunnen worden

Nederland als kaasland?

## Appendix IV: Semi structured interview Mark Voorbergen

**Introductie:** Het doel van het project is de korte en lange termijn effecten van aanbodgestuurde kaas te evalueren. Dit wordt toegepast op een case study van FrieslandCampina met als hoger doel de valorisatie van aanbodgestuurde kaas te verbeteren. Het uiteindelijke doel is de effecten tijdens aanbodgedreven marktomstandigheden op de markt en de reacties in kaart te brengen.

### 1) Kaas value chain



Wat is de rol van elke speler?

Wat zijn de marges?

FrieslandCampina hier binnen?

Ter aanvulling: u stelde ooit: Cooperatives need to re-invent themselves. Wat bedoelde u daar precies mee?

Idee over aanbodelasticiteiten?

Idee over vraagelasticiteiten?

### 2)Kaasmarkt opdelen

Hoe zou u de kaasmarkt opdelen als je een marktanalyse wil maken?

(suggesties: naar type (folie/natuur), naar leeftijd, naar kwaliteit, naar marktherkenning)

### 3)Kaas prijzen

Welke factoren bepalen deze prijs?

#### 3a) Rol regulering

Interventie

Melkquotum

### 4) Aanbodgedreven markt

Wat zijn de oorzaken?

(suggesties: tegenvallende sales, kwaliteit, melkdruk)

Wat zijn de gevolgen?

Wat zijn verzachtende omstandigheden?

Beïnvloed aanbodgedreven kaas volgens u de markt?

Is sales dan bepalend, de lagere prijs, of de volumes?

Idee over mechanismes?

**5) Substituut of complement (naar concurrentie oogpunt)**

Is de kaasmarkt een complement markt? Of eerder volledig substitueerbaar? Waarom wel, waarom niet?

**6) Alternatieve producten**

**6a) Van melk**

Wat is het verschil tussen melkpoeder en kaas qua marktgedrag?

Wat is het verschil tussen kaas en overige zuivelproducten qua marktgedrag?

**6b) Voor kaas**

Hoe groot is het aandeel analoge kaas en in hoeverre is dit een substituut voor kaas?

**7) Kaas en speculatie**

Is de kaasmarkt speculatief te noemen, waarom wel waarom niet?

Hoeveel voorraden kaas zijn er?

Wat is "korte termijn" en "lange termijn" in kaasmarkt (gemeten als prijsreactie)?

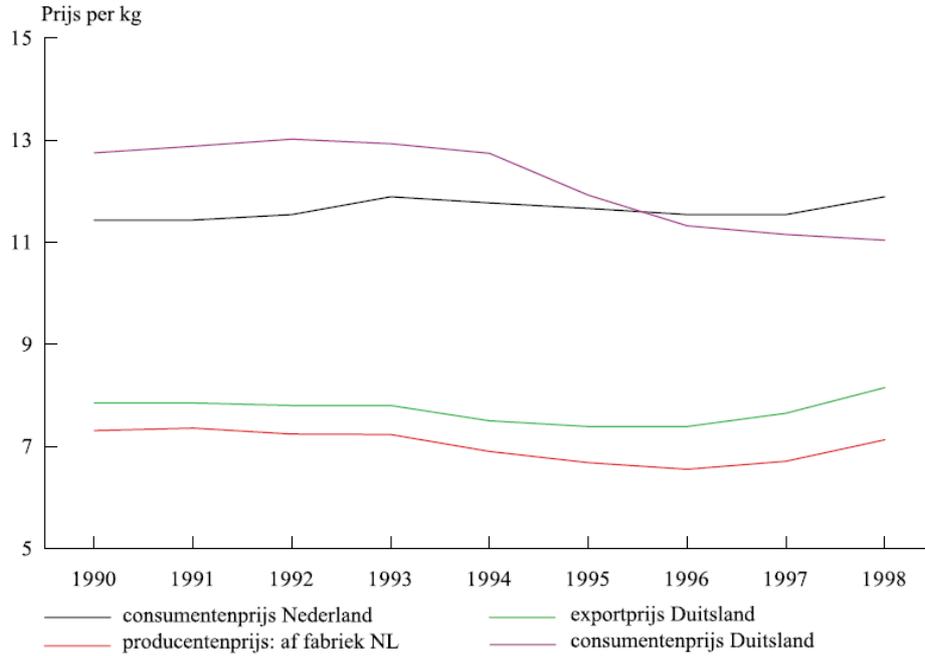
**8) Positionering**

Kaas als commodity?

Wat maakt kaas anders in vergelijking met andere zuivelproducten?

Wat is de meerwaarde van kaas? Hoe zou dit behaald kunnen worden

Nederland als kaasland?



Grofweg zijn er twee strategieën: kostprijsleiderschap en differentiatie (merken). Heeft het voor de Nederlandse zuivelsector zin om de “race to the bottom” i.e. prijsleiderschap aan te gaan? Waarom wel, waarom niet?

Stelling: Als je de melkdruk wegneemt (door meer kaas of poeder te maken onder de marktprijs) geef je verkeerde prikkels richting de boeren en wordt de downstreammarkt op de langere termijn verpest.

## Appendix V: Semi structured interview Gert van Dijk

Ter achtergrond: Het doel van het project is de korte en lange termijn effecten van aanbodgestuurde kaas te evalueren. Dit wordt toegepast op een case study van FrieslandCampina met als hoger doel de valorisatie van aanbodgestuurde kaas te verbeteren. Het uiteindelijke doel is de effecten tijdens aanbodgedreven marktomstandigheden op de markt en de reacties in kaart te brengen.

Vooraf vraag: hebt u affiniteit met de kaasmarkt? Als ja: daar meer op door gaan. Als nee: dan focus op de rol van coöperatief businessmodel in zuivelmarkt.

**Inleiding tot vraag 1: Oorzaak aanbodgedreven kaas.**

Aanbodgedreven betekent dat er voor deze kaas nog geen direct afzetkanaal is ten tijde van de productie. Mogelijke oorzaken uit verkennend onderzoek zijn:

- 1) Tegenvallende verkopen
- 2) Kwaliteitsproblemen
- 3) **Melkdruk**

In ons gesprek wil ik focussen op de derde oorzaak. Melkdruk betekent dat er melk is wat verwerkt moet worden tot een eind product. Als de melkdruk hoog is betekent het dat er veel melk is wat verwerkt moet worden en dat de alternatieve producten (boter, poeder) ook mogelijkheid zijn.

Melkdruk ontstaat als de vraag naar zuivelproducten kleiner is dan het aanbod.

Het aanbod is vast middels het melkquotumsysteem. Tegelijk is FrieslandCampina aan haar leden verplicht alle melk af te nemen en zo goed mogelijk te verwaarden.

Samenvattend zou je de oorzaak-gevolg relatie zo kunnen leggen:

Marktomstandigheden zuivel => Melkdruk => Aanbodgedreven kaas

**Stelling: Doordat FrieslandCampina een cooperatie is wordt de oorzaak-gevolg relatie versterkt.**

**Inleiding tot vraag 2: Marginale kosten/ marginale opbrengsten analyse: het coöperatief verschil.**

U stelt in uw boek "als de markt faalt" dat zolang  $MR > MC$  de productie opgevoerd kan worden. De MC zijn onder "melkdruk" omstandigheden heel laag (de kaas is er toch al)

- 1) Wat doet een coöperatie anders dan een niet-coöperatie qua volume prijs setting in een downstream markt volgens u?  
NB downstream markt: Melk = 1)boter, 2)melkpoeder, 3)kaas, 4)vers en overig
- 2) Hoe verhoudt zich de volume-prijs keuze van melk zich tot die van de eindproducten volgen u?
- 3) U spreekt over de lang-termijn-gemiddelde-kostencurve. Heeft deze haar minimum bereikt na de fusie tussen FF en C, of was deze al bereikt.

Er bestaan o.a. de volgende markttypologieën: **Cournot, Stackelberg en Bertrand. Welke is van toepassing op FC's kaasmarkt volgens u?**

**Inleiding tot vraag III: Evaluatie: Yardstick theorie**

U betoogt dat de aanwezigheid van coöperatieve spelers in een markt dwingt tot hogere uitbetaalprijs aan leden. Tegelijk beïnvloedt dit mechanisme de downstream markten. Immers: er wordt een oneigenlijke prikkel afgegeven naar ledenbedrijven. De downstream markt zit vol, toch wordt de melk afgenomen en verwerkt. Dit leidt tot prijsdalingen in de downstream markt en veroorzaakt uiteindelijk een melkprijsdaling.

Vraag: Wegen volgens u de extra volumes voor ledenbedrijven op tegen de verslechterde downstream markten?

Hoe zou u dit willen testen?

Wat zijn volgens u eigenschappen van een markt om wel of niet melkdruk te laten doorwerken? (elasticiteit?)

**Andere spelers zijn ook coöperatie**

- Nordmilch
  - CONO
  - DOC
  - Deltamilk
- Non-coöperaties**

- **Bel-Leerdammer**

Wat voor invloed heeft dit volgens u op de markt?

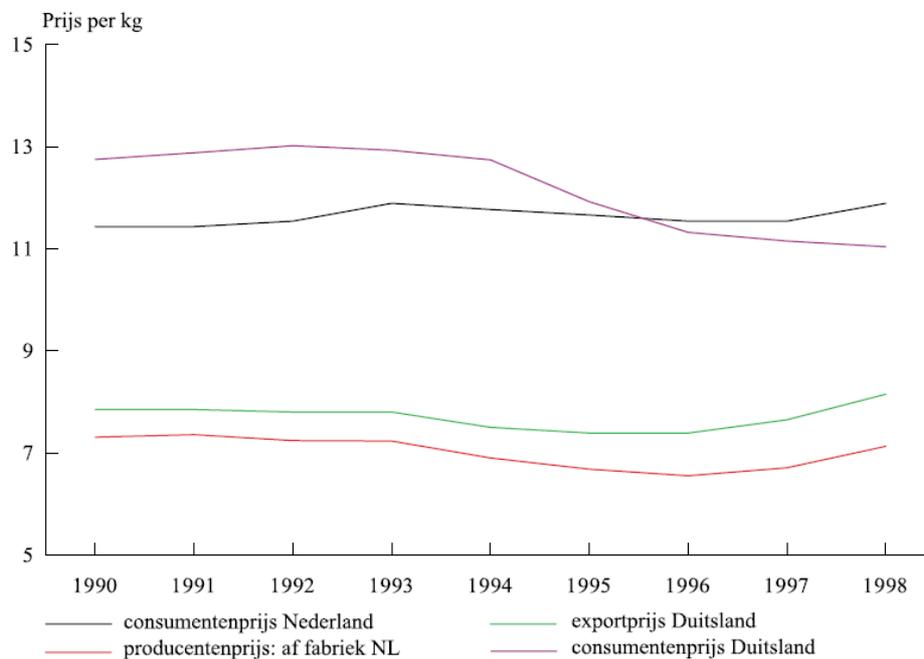
En hoe FC aan moet kijken tegen deze “concurrenten” ?

Stelling: Het coöperatief model werkt alleen bij gratie van het melkquotumsysteem. De rationaliteit om melkcomzet te maximaliseren leid tot destructie van de downstream markten zoals bijvoorbeeld de kaasmarkt, tenzij de melkcomzet gereguleerd wordt. Anders had de race-to-the-bottom al lang plaatsgevonden. In andere bewoording de aanbodgedreven marktomstandigheden zijn een voorbode van wat komen gaat in 2015.

**Perceptie**

Lange termijn positionering en perceptie van kaas.

- Intern (FC)  
Wat voor advies zou u willen geven aan FC qua prikkels naar boeren en personeel in de kaastak?
- Markt  
Spelers weten dat FC eens in de zoveel tijd van haar producten af moet.



Weegt volgens u de korte termijn yardstick op tegen de lange termijn markeffecten?

Voorbeeld: Franse kaas kent structureel hogere marges dan NLse kaas.

## Appendix VI: Statistic tests on sales data

### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
April en Mei	3	21090897.07	#####	105313.576
Juni en Juli	4	20414699.65	#####	159336.988
Augustus en September	4	20528407.80	#####	105098.468
Oktober en November	3	21349069.73	97822.483	56477.837
December en Januari	3	21311280.93	#####	232045.224
Februari en Maart	3	21597623.97	#####	335742.582

Test value 21048663.19

### One-Sample Test

	Test Value = 21048663					
					Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
April en Mei	.401	2	.727	42234.067	-410893.68	495361.81
Juni en Juli	-3.979	3	.028	-633963.350	-1141044.76	-126881.94
Augustus en September	-4.950	3	.016	-520255.200	-854725.43	-185784.97
Oktober en November	5.319	2	.034	300406.733	57402.21	543411.25
December en Januari	1.132	2	.375	262617.933	-735792.08	1261027.95
Februari en Maart	1.635	2	.244	548960.967	-895622.77	1993544.70

### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Januari	3	43783	338	195
Februari	3	43625	1111	641
Maart	3	47684	2782	1606
April	3	45996	4264	2462
Mei	3	45889	2981	1721
Juni	3	50933	3945	2278
Juli	3	46179	2826	1631
Augustus	3	44448	6021	3476
September	3	46401	1740	1005
Oktober	4	49628	3506	1753
November	4	47763	4088	2044
December	3	44314	3494	2017

46387

### One-Sample Test

	Test Value = 46387					
					of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Januari	-13.352	2	.006	-2,604	-3,443	-1,765
Februari	-4.307	2	.050	-2,762	-5,521	-3
Maart	.807	2	.504	1,297	-5,615	8,208
April	-.159	2	.888	-391	-10,983	10,200
Mei	-.289	2	.799	-498	-7,904	6,907
Juni	1.996	2	.184	4,546	-5,255	11,047
Juli	-.127	2	.910	-208	-7,227	6,812
Augustus	-.558	2	.633	-1,939	-16,897	13,020
September	.014	2	.990	14	-4,309	4,336
Oktober	1.849	3	.162	3,241	-2,338	8,819
November	.673	3	.519	1,376	-5,129	7,880

**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
Januari	5	8.609	0.890	0.398
Februari	5	8.766	0.880	0.394
Maart	5	9.616	0.738	0.330
April	5	9.277	1.285	0.575
Mei	5	9.114	0.889	0.397
Juni	5	9.553	0.676	0.303
Juli	5	8.046	0.586	0.262
Augustus	4	9.016	0.945	0.473
September	4	9.212	0.262	0.131
Oktober	4	9.521	0.984	0.492
November	4	9.438	0.501	0.250
December	4	9.611	0.943	0.471

9.148

**One-Sample Test**

	Test Value = 9.418					
					95% Confidence Interval of the	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Januari	-2.033	4	.112	-0.809	-1.914	0.296
Februari	-1.657	4	.173	-0.652	-1.745	0.441
Maart	.602	4	.580	0.198	-0.717	1.114
April	-.246	4	.818	-0.141	-1.737	1.455
Mei	-.765	4	.487	-0.304	-1.408	0.799
Juni	.446	4	.679	0.135	-0.705	0.975
Juli	-5.235	4	.006	-1.372	-2.099	-0.644
Augustus	-.851	3	.457	-0.403	-1.907	1.102
September	-1.575	3	.213	-0.206	-0.622	0.210
Oktober	.208	3	.848	0.103	-1.464	1.669
November	.079	3	.942	0.020	-0.777	0.817
December	.409	3	.710	0.193	-1.307	1.693

**Production Germany**

	N	Mean	Std. Deviation	Std. Error Mean
Januari	4	16.837	0.575	0.287
Februari	4	15.030	0.662	0.331
Maart	4	15.917	0.995	0.497
April	4	15.561	0.975	0.487
Mei	4	14.437	0.317	0.159
Juni	4	14.466	0.570	0.285
Juli	4	15.198	0.647	0.323
Augustus	4	15.002	1.282	0.641
September	4	14.657	0.747	0.374
Oktober	4	15.977	1.841	0.921
November	4	15.790	2.026	1.013
December	4	16.770	1.494	0.747

15.470

**One-Sample Test**

	Test Value = 15.470					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Januari	4.759	3	.018	1.367	0.453	2.282
Februari	-1.328	3	.276	-0.440	-1.494	0.614
Maart	.898	3	.435	0.447	-1.136	2.029
April	.186	3	.864	0.091	-1.460	1.642
Mei	-6.511	3	.007	-1.033	-1.538	-0.528
Juni	-3.521	3	.039	-1.004	-1.912	-0.096
Juli	-.842	3	.461	-0.273	-1.302	0.757
Augustus	-.731	3	.518	-0.469	-2.508	1.571
September	-2.177	3	.118	-0.813	-2.002	0.376
Oktober	.550	3	.620	0.507	-2.423	3.436
November	.316	3	.773	0.320	-2.903	3.544
December	1.741	3	.180	1.300	-1.077	3.677

**Variables Entered/Removed<sup>b</sup>**

	Variable s Entered	Variable s Remove d	Me tho d
	Delta Indirect <sup>a</sup>	.	En ter

a. All requested variables entered.

b. Dependent Variable: Natuur Indirect

**Model Summary**

	R	R Squ are	Adjuste d R Square	Std. Error of the Estimate
	,82 8 <sup>a</sup>	,685	,654	5,542015 3955941 84E2

a. Predictors: (Constant), Delta Indirect

**ANOVA<sup>b</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig .
Regression	6684057, 825	1	6684057 ,825	21, 762	,00 1 <sup>a</sup>
Residual	3071393, 465	10	307139, 346		
Total	9755451, 290	11			

a. Predictors: (Constant), Delta Indirect

ANOVA<sup>b</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6684057,825	1	6684057,825	21,762	,001 <sup>a</sup>
Residual	3071393,465	10	307139,346		
Total	9755451,290	11			

a. Predictors: (Constant), Delta Indirect

b. Dependent Variable: Natuur Indirect

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	11748,890	1088,154		10,797	,000
Delta Indirect	-7985,339	1711,753	-,828	-4,665	,001

a. Dependent Variable: Natuur Indirect