

Advertising and Market Structure

A Study of the Norwegian Laundry Detergent Market

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Summary

The Norwegian laundry detergent market is highly concentrated. Throughout the history of industry, Lilleborg, has had an almost monopolistic position in the market with only a few competitors, and none of comparable size. This thesis takes us through the history of the Norwegian market from the birth of the Norwegian soap industry by Akerselva in Oslo, through a resigning prime minister, a detergent war, and environmental concerns ending up in the modern detergent industry. Through World War, attempted entry and environmental changes, the market leader remains the number one producer of laundry detergent in Norway.

Based on the history of the industry, the developments of market structure, and entry and exit in the Norwegian laundry detergent industry is analyzed using a foundation based on economic theory. The theories introduced describe the industry life cycle as well as how advertising, an important part of the laundry detergent market, affects structure. In addition, theory describing how a firm may act strategically to maintain a dominant market position is introduced.

Analysis of the Norwegian detergent market is fundamentally based on the industry life cycle, and how market structure has developed over time. In its infancy, the soap and detergent industry had several large local producers. As time passed, more and more of the local producers dropped out of the market. After the industry matured, entry became more costly. Increasing entry costs meant few companies succeeded in entering the Norwegian detergent market after maturity.

This thesis analyzes when the industry developed into a mature state, and how industry maturity affected entry. The effect of maturity on entry is largely analyzed through how effective advertising was in breaking down brand loyalty. Because brand quality is important in determining how effective advertising is, this thesis will attempt to explain how an incumbent may increase the cost of entry by making sure brand quality is similar or superior to potential entrant brands.

The result of the analysis provided is that current market structure in detergent markets today is mostly the same as in the late 1930s. The explanation underlying this result is that the detergent industry at this point was maturing, and entry by new firms proved costly. In most

cases this high cost of entry has been effective in deterring new entrants, and hence market structure has remained largely unchanged for the majority of the last 70 years.

Preface

In working with this thesis I have developed an enthusiasm and interest for a product and a market I before had a relatively ambivalent relationship to. I have found the history and workings of the laundry detergent market to be profoundly interesting. I hope I have been able to translate some of this enthusiasm into a readable and interesting thesis.

I would like to thank my sister Christine Steiro for introducing me to the world of laundry detergents and for putting me in contact with the right people at Lilleborg. Thanks to my supervisor, Karen-Helene Ulltveit Moe for invaluable feedback especially during the last few hectic weeks. I would also like to thank all the people at Lilleborg that have helped me find data and information about laundry detergent markets, and especially Jenny Wolther at the Lilleborg Museum. Special thanks also go to Espen Willassen Hoel, Rasmus Bøgh Holmen, Martin Tufte Fjellanger, Mari Raddum Berg and Astrid Harjo for reading my thesis and providing valuable feedback. Finally, thanks to my friends, family and fellow students at the 4th floor for holding out on my never ending talk about laundry detergents in what has been a thoroughly enjoyable and interesting semester.

Mistakes and inaccuracies are all mine. And as my old friend Al Gore once said: ‘the day I made that statement, about inventing the Internet, I was tired because I’d been up all night inventing the camcorder’.

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1 Introduction

Consumers in Norway have relatively few choices when shopping for laundry detergent. This lack of options may be illustrated by a simple comparison between Norwegian and European markets. In Norway, Lilleborg control the three major brands and has a market share of 80 percent, while in Europe, three companies have a combined market share of approximately 76 percent. How can we explain this asymmetry between Norwegian and European markets? Why does Lilleborg control such a large market share of the Norwegian market, while European markets are less concentrated?

The times they are a-changing is the title of a song by American singer songwriter Bob Dylan. Relating mostly to the currents of youth rebellion in the United States in the 1960s, the song also captures the situation in Norwegian consumer goods markets at the time. Lilleborg had been the major actor in Norwegian detergent markets since the mid-1930s. In 1960, the EFTA agreement was signed, and trade barriers were about to be removed, opening Norwegian markets for imports from abroad. Norwegian industry feared international competition, and the laundry detergent market was no exception.

Following trade liberalization, major American companies attempted to enter the Norwegian market. After a massive advertising war, the American companies gave up, and the status quo prevailed. Why was the large American multinationals unable to enter Norwegian detergent markets in the 1960s? In the following thesis I will analyze the events and developments during the detergent war as well as developments before World War II in an attempt to explain why things in fact did not change, and why market structure today is largely the same as it was in the late 1930s.

Developments in the detergent market seem to contradict standard economic theory. Where there are profit opportunities, firms will enter the market until profits are driven down to zero. Why have we not seen this development in the market for laundry detergents in Norway? In an attempt to explain this apparent asymmetry between observed market structure and basic economic theory, I will draw on several explanatory frameworks, such as industry life cycle theory to explain why market structure have been fairly stable despite the apparent profit opportunities.

Advertising is an important part of laundry detergent markets. In an attempt to explain current market structure I will also introduce theory that attempts to explain how advertising may affect market structure.

Because Lilleborg has a long history as the market leader, it seems unlikely that the company has not taken steps to make sure they maintain their strong position. In this thesis I will thus examine how the market leader may have acted strategically to retain their market share.

This thesis will be structured in five main chapters. This chapter provides an introduction to the problem and an overview of the thesis. Chapter 2 provides an overview of the detergents industry in Norway and the World. Chapter 2 will also introduce how advertising is an important part of the value chain in laundry detergents. Chapter 3 presents theory on how advertising may affect market structure, industry life cycle theory and some insights relevant to analyzing entry deterring strategies that may have been employed. Chapter 4 takes a look at the Norwegian laundry detergent market in the light of theory introduced in the preceding chapter. Chapter 5 provides concluding remarks.

2 About Laundry Detergents

This chapter will provide an introduction to history and current state of laundry detergent markets with an emphasis on the developments in Norway. Because of the special importance attached to advertising of laundry detergent, one section will also be devoted to this.

2.1 Detergent Markets

Markets for laundry detergents may be divided in two, one market for business customers like hospitals, large firms and the government, and one market for consumers where laundry detergent is sold over the counter in grocery outlets. This thesis will focus on the consumer market for laundry detergents.

Laundry detergent is a so called Fast Moving Consumer Good (FMCG). FMCG's are typically goods sold at a low price and at low margins. Despite their low margins, FMCGs are sold in large volumes, hence giving rise to large profit opportunities (Gordon, 1999, p. 1).

2.1.1 World Markets

The detergent industry has been dominated by four firms worldwide. The European companies Unilever and Henkel, and American consumer good companies Procter & Gamble (P&G) and Colgate Palmolive. P&G recently purchased Colgate Palmolive's Western European laundry detergent business, reducing "the big four" in world detergent markets to three.

Unilever is the traditional giant on the European stage. Unilever was formed when the English soap producer Lever Brothers merged with the Dutch margarine firm Margarine Unie in 1929. Most of Unilever's sales in detergents are made in Western Europe, America and many emerging markets. In 1961, Unilever estimated they accounted for 60 percent of world sales of soap and detergents, their position deriving from barriers to entry arising from economies of scale in production, research and marketing (Jones, 2005, p. 11). During the 1960s Unilever became increasingly concerned about the emergence of private label products. A private label product is a brand manufactured and sold by supermarket chains. After considering several responses, among them third party manufacturing of private label

products, Unilever decided to concentrate on supporting their own premium brands and leave the low end of the market to the private labels.

Unilever fiercest competitor in detergents is Procter & Gamble, today the largest actor in the European market based on sales. P&G is largely focused on developed markets and its home market in the United States. Europe's third largest producer, Henkel, was originally a detergent company but later integrated vertically into chemicals. Ownership of the Persil brand is shared between Henkel and Unilever.

The growth of private label in detergents was slow in Western Europe. Jones (2005, p. 138) argues that this is because detergents build up strong relationships with consumers through advertising and consistent performance in cleaning clothes.

2.1.2 History of the Norwegian Market

One of the characteristics of Norwegian detergent markets is Lilleborg's dominance. The market leader's position has also affected the sources available on laundry detergent market history. Most sources focus on Lilleborg. Because of this bias in existing literature the history of Norwegian laundry detergent markets provided here is, unfortunately, biased towards events occurring in and around the company from Sandaker, Oslo.

The Growth of Lilleborg – The Detergent Market Before 1967

In the 1920s, Lever Brothers was eager to expand its detergent business in Norway. Lever's plan was to increase its market share through ownership of Denofa and the Kongsten soap factory in Fredrikstad.¹ Lever's plans of taking over Norwegian markets were not met with enthusiasm by Lilleborg's management. Their initial reaction was to fight back. Already in 1926, Lilleborg had acquired a share of stock in Denofa from a German-Norwegian businessman (Sandvik 2010:398). When Unilever was established through merger in 1929, the newly formed soap and margarine giant pointed to Norway for further growth. After the, Lilleborg's stance in the battle for the Norwegian soap market changed from fight to cooperate. Lilleborg and Unilever negotiated an agreement where they would share ownership of Denofa, while Denofa owned a share of Lilleborg. This gave Unilever indirect control of

¹ Denofa was the world's largest producer of whale- and seal-oil, an important raw material used in production of margarine and soap. Its value to Unilever was therefore more than just the possible profits from sales of soap and margarine in Norwegian markets.

Lilleborg. Norwegian anti-trust authorities were concerned about Unilever's purchase of Norwegian business interests. After a long process through parliament and government, the Unilever purchase of Lilleborg stock through Denofa was approved by cabinet July 10th 1931.² The agreement between Unilever and Lilleborg gave Lilleborg the right to distribute Unilever's brands in the Norwegian market. In 1933 Lilleborg took over production of Unilever's product range in Norway.

Henkel was the first company to introduce a specialized detergent in Norway, when they introduced their Persil brand in 1930 (Lund, 2008, p. 44). In 1935 Lilleborg followed by launching Blenda. According Ole Christian Moe, manager of Lilleborg's detergent business in the 1970s, the launch of Blenda meant a "revolution in the detergent market" (Jacobsen, 1976, p. 90).³ Among the inventions provided by Blenda was that it dissolved in water, relieving housewives of physically demanding scrubbing. Blenda also contained a bleach system to keep textiles white. Before 1940, Blenda passed Persil as the largest detergent in Norway (Lund, 2008, p. 78). For smaller factories the pressure of competition was getting tough (Jensen, 1999). One attempt to prosper among the large producers was increased cooperation.⁴

During World War II Norway was occupied by Nazi Germany. With help from the occupying forces, German detergent producer Henkel won market shares in an environment that was characterized by lack of raw material (Lund, 2008, p. 81). The lack of raw material was so severe that manufacturers could not produce detergent of the same quality level as before the war. Both Lilleborg and Henkel sold their detergents without brand names in this period. After the war, the Persil factory in Moss, owned by the German company Henkel, was taken over by the Norwegian government as enemy property, and put into new ownership. Although the war ended, the shortage of raw material persisted until 1950.

² The agreement was accepted under somewhat strange circumstances. The Mowinkel-government, who supported Unilever's purchase of stock, lost a non-confidence vote on the subject May 8th 1931 and had to resign. The new government changed their stance and accepted the Purchase, but only after the Norwegian minister of trade, Per Larssen attempted to intervene. Larssen had been a strong spokesman against the purchase. Under unknown circumstances, Larssen took a sudden leave of absence to attend a fisheries meeting in Harstad before the crucial cabinet vote (Sandvik, 2010, p. 413).

³ My translation

⁴ One successful attempt was the cooperation between Goma in Kristiansund, and Jahre chemical factories in Sandefjord. The two smaller producers developed a highly successful detergent. The cooperation between the two smaller factories came to an abrupt stop in 1945 when an English airplane was shot down and crashed in Jahre factories' facilities during World War II (Jensen, 1999, pp. 45-46).

In 1950 the detergent companies once again claimed they could produce detergent of the same quality as before the war. As a consequence, detergent producers reintroduced brand names to their products. After launching their brands in January, Blenda immediately won a significant share of the market. In this new market environment, Blenda and Persil were the two major competitors, while Tomtevask, a smaller producer, also had a significant market share.

The Detergent War (1967-70)

Believing further growth to be impossible, Lilleborg followed a strategy of defending its market position throughout the 1960s. Following the signing of the EFTA agreement in 1960, all import restrictions on industrial goods to Norway were lifted from January 1st. 1967.⁵ This opened the Norwegian laundry detergent markets for imports from abroad.

Colgate's successful launch of their Ajax detergent in Denmark caused concern within Lilleborg. In 1965 the market leader was certain that Colgate had taken over Persil's position as their main competitor in many segments such as toothpaste, and that a launch in laundry detergents was imminent (Lund, 2008, pp. 188-189). In 1967, P&G and Colgate entered Norwegian detergent markets. For Lilleborg the detergent war was a matter of life and death. They were determined to do whatever necessary to make sure their American rivals did not achieve the 10 percent market share the market leader had calculated was necessary to break-even (Lund, 2008, p. 48). Lilleborg succeeded and the two American giants withdrew their products in 1970.

When the dust settled after the detergent war, Lilleborg reclaimed their position in Norwegian detergent markets. Already before war broke out in the detergent market, their main competitor through the 1950s, Persil experienced problems. P&G made a bid for the company, but the factory owners wanted to keep ownership within Norway (Lilleborg, 1983, p. 31). Lilleborg took over the Persil factory in 1967 in a move that gave them control over all the factory's brand names, among them the Persil Brand. Following the detergent war, Lilleborg continued to strengthen their position in the detergent market⁶.

⁵ According to Lilleborg's annual report for 1967, interest for several of their markets had been growing, but interest in the detergent market (their most profitable segment) was noticeable only after the EFTA agreement removed tariffs on industrial goods from 1967 (Lilleborg Annual Report (1967)).

⁶ Lilleborg purchased the majority of stocks in the Goma factory in Kristiansund in 1975 (Jensen, 1999, p. 83)

Towards a Modern Detergent Industry

In the 1970s, Norwegian housewives climbed the barricades to fight for the environment. Public attention was drawn towards pollution in Norway's largest lake, Mjøsa. The environmental problems were caused by Eutrophication, a chemical process caused by high levels of nitrogen and phosphorous in water. Eutrophication causes excessive growth of algae that again disturbs the ecosystem through reduced oxygen levels. Phosphorous pollution in Mjøsa was caused by several factors, one of them was Sodium tri-polyphosphates (STPP), used as a builder in laundry detergents. With laundry detergents containing STPP as their enemy, local housewives campaigned for the use of detergents with reduced STPP content.

Through the public program 'Save Mjøsa', environmental minister at the time, Gro Harlem Brundtland, introduced a comprehensive program aimed at saving the lake from pollution. As a part of the program STPP was banned in detergents from 1988. The environmental action and later ban of STPP in detergents caused a significant effort within detergent companies to develop alternative detergent formulations without STPP.

Throughout the 1990s liquid detergents became increasingly popular, and regular washing powder was replaced by micro powder; a more concentrated washing powder. At this time, a number of new product variants were introduced. This was consistent with a strategy where the market leader launched several product variants to fill all possible niches that might arise (Sørgard, 1997, p. 129). In 1996 Lilleborg demerged with Denofa, 27 years after merging with their long term industrial partner. After separating the two companies, Lilleborg was to focus attention on the branded consumer business, while Denofa was to develop its oil business (Thoner, 2006, p. 72).

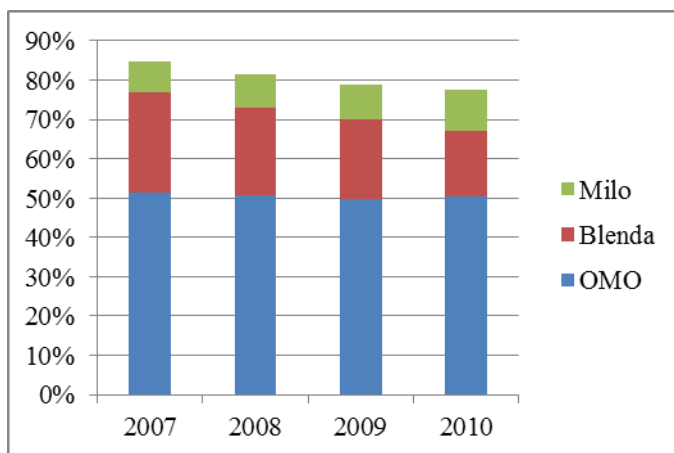
In 1997 Lilleborg opened a new detergent factory in Ski, outside of Oslo. After the opening of the factory, Lilleborg shut down its detergent production by Akerselva in Oslo, closing the book on 164 years of soap and detergent production in the Norwegian capital. Today, Lilleborg's headquarters remain in the company's historical birthplace in Sandaker, Oslo (Thoner, 2006, p. 72).

The Second Detergent War

In 2008, P&G again entered the Norwegian detergent market with their Ariel brand 38 years after they gave up establishing Tag as a brand. In addition to P&G, an American consumer goods company, Sara Lee, is present in the market with their Neutral brand, as well as Bio-Tex. A number of private label products have also surfaced in the detergent market over the last decades.

2.1.3 Current Market Situation

In 2010, Lilleborg had the 3 most popular brands in the Norwegian detergent market. Despite its strong position, market shares have been declining as a consequence of increased



1: Market share top 3 brands

competition. *Figure 1* shows

Lilleborg's market share, and how they are divided between the firm's three most popular brands.⁷

Based on sales statistics from 2010, Sara Lee is currently the second largest company in the Norwegian detergent market. Their Neutral brand is 4th in Norway based on sales. From the

1960s, the Bio Tex brand had been sold

in Norway by Tomten, and Jensen & co but the brand was still under ownership of Sara Lee.

In 2001, Sara Lee took over the Bio Tex brand in Norway.⁸ P&G is also present with their Ariel brand. Since re-entry P&G's sales has been growing steadily.

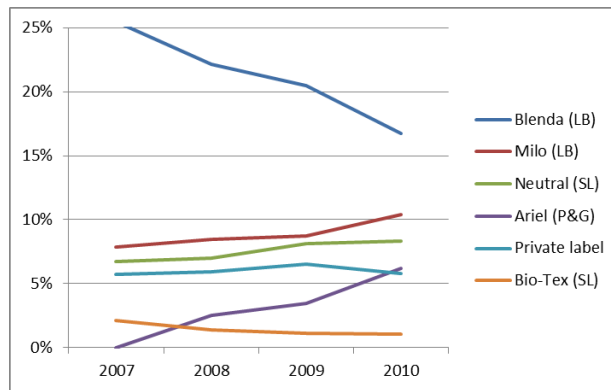
The four retail chain stores in Norway sell a total of 8 private label products in the laundry detergent market.⁹ As of 2010 their combined market share was just below 6 percent of total sales. In addition to private label products, a number of smaller international brands are sold in Norwegian markets.

⁷ Data on market shares for the 2000s is provided by Lilleborg Chief Financial Officer, Stein Eriksen

⁸ Source: Cecilie Nyberg, Sara Lee Norway

⁹ Norgesgruppen (Unik, First Price), Coop (Coop, X-Tra, Coop Änglamark), Ica (Shiny, Skona, Euroshopper), Rema 1000 (Rema 1000, Landlord)

Figure 2 shows market shares in the Norwegian detergent market for all brands excluding Omo.¹⁰ Despite a slowly declining market share the last few years, Lilleborg still occupy a remarkably strong position in the Norwegian detergent market. P&G's



2: Market shares not including Omo

position has been steadily growing since Ariel's introduction in Rema 1000 stores in 2008 and ICA in 2009. In 2011 Lilleborg also launched a new Brand, Surf.¹¹

2.1.4 Production

In the 1800s, soap was a major growth industry. Because of similar uses of raw material, the soap industry largely grew out of the fats and oils industries. The soap industry was characterized by a few large producers, and a large fringe of smaller factories producing soap for a local market (Sandvik & Storli).

In Norway the development was similar to the rest of Europe. Production was initially local, but later developed to be national and later international. Lack of scale economies in production allowed small producers to survive in this environment. At the same time, the larger producers enjoyed significant economies of scale in advertising, distribution and transport (Sandvik, 2010, p. 391).

In addition to using advertisement as a tool to increase its market share, Lilleborg grew by acquisition, taking over several smaller factories.¹² Furthermore their agreement with Unilever constituted a significant resource, both by giving Lilleborg access to Unilever's brands and knowledge, and making sure they would not enter the market as a competitor. While the major competitors battled for the majority of the market in the period following World War II, smaller producers dropped out. Today Lilleborg is the only major producer of detergents in Norway (Lilleborg, 2009).

¹⁰ Omo's Market share in this period has been around 50 percent of the total market. Data on market shares is provided by Lilleborg Chief Financial Officer, Stein Eriksen.

¹¹ Surf, originally a Unilever brand, had a total market share of 3,3 persen in February 2011 (Source Stein Eriksen, Lilleborg)

¹² Lade factories in 1926, DeNoFa (merger) in 1959, Persil in 1967, Goma/Ello in 1975 (Lilleborg, 2009)

2.1.5 Lilleborg's Strategies

After brand names were reintroduced to laundry detergents in 1950, Lilleborg spent only a little time to regain their pre-war position in competition with Persil. After this, Lilleborg has been in a position where focus has been on maintaining its market share rather than continued growth.

Throughout the 1960s Lilleborg focused on developing its products continuously through research and development. If in a given period of time, the product could not point to any improvements in the chemical formulae, advertisement would focus on new areas so as to give the impression of a product in continuous change for the benefit of the housewife.¹³ The focus on research and development is still an important part of Lilleborg's philosophy. Thoner (2006, p. 76) writes "Lilleborg's objective is to hold the number 1 and 2 positions in the categories in which they compete, and the strategy is top line growth, mainly through innovations".

Even though the Persil brand no longer is a significant presence in Norwegian consumer markets, control over this brand might have been an important strategic move by Lilleborg. The owner of the Persil brand in Europe, Henkel, lost control of their Norwegian assets after World War II. The Persil brand is still used by Lilleborg in 2011 but only in the business market.

In a seminar organized by Norwegian competition authorities in 1993, Halvord Stensvold, Chief Executive Officer of Orkla, Lilleborg's parent company, is quoted as saying "[Lilleborg] developed a variety of products in the laundry detergent market to "fill all black holes"" (Sørgard, 1997, p. 127).¹⁴ By introducing many product variants, Lilleborg wanted to prevent profitable market segments to arise. Since Lilleborg established market leadership after brands were re-introduced after World War 2, the number of product variants has been increasing steadily. Compared to preceding periods, Lilleborg launched more products in the period leading up to the detergent war in 1967. The same pattern is observed in the period leading up to what may be termed the second detergent war in the first decade of the new millennium. Lilleborg's use of product proliferation as strategy of maintaining a dominant position is also well argued in Sørgard (1997).

¹³ An example is the launch of the larger size pack of detergent made to save housewives time by reducing the amount of trips they had to make to supermarkets.

¹⁴ My translation. In Norwegian, Stensvold said "fylle alle sorte hull"

2.1.6 Why Tag and Ajax Failed in 1967

Lund's (2008) analysis of why P&G and Colgate failed to establish Tag and Ajax in Norwegian markets is based on an article by marketing manager of Lilleborg Ole Christian Moe. According to Moe, there were four reasons why Lilleborg won the war.

1. Continuing product improvements
2. P&G's test launch of Tag in two counties in Norway.
3. The lack of TV advertisement in Norway.
4. A mix of particularly Norwegian circumstances, among these a boycott keeping Tag and Ajax away from 20% of Norwegian grocery store outlets.

Moe also highlight Lilleborg's cooperation with Unilever as an important factor (Lund, 2008, p. 39). Lund points to Lilleborg's marketing methods in her analysis, and the fact that Lilleborg accumulated significant knowledge in competing with other brands during the 1950s and early 1960s.

2.2 Advertising in Detergent Markets

Advertising is an important part of Laundry detergent markets. Below we will see the development of advertising in the Norwegian market as well as a brief discussion on how advertising messages have changed over time.

2.2.1 History

In 1884 William Lever decided to wrap soap in fixed size packages. In addition to wrapping and fixing the size of the product, Lever came up with the idea of giving the product a name. William Lever's 'Sunlight' is largely accepted as the first industrial brand, and survives until this day. Following Lever's idea of branding of his soap product, advertising became an increasingly important part of soap markets. As laundry detergents later grew out of soap markets, advertising and brand identity persisted as an important part of the industry. Even today laundry detergents are some of the most heavily advertised consumer goods (Morse, Perry, & Lester, 1995, pp. 115-116).

The launch of Blenda in 1935 was accompanied by a massive advertising campaign to establish the brand as Norwegian housewives' first choice laundry detergent.¹⁵ Persil was passed by Blenda as the largest detergent brand before World War II. Lund (2008) points to three strategies used by Lilleborg to overcome Persil and gain market leadership before World War II.

Marketing Blenda in the 1930s, Lilleborg drove around the country in a car demonstrating their new product for Norwegian housewives. It was necessary for the housewife to see how much easier it was to clean clothes with the new product. The campaign was a success, and the increase in demand for Blenda was largely attributed to this particular method of sales (Jacobsen, 1976, p. 90).

In its advertising, Lilleborg used the fact that Blenda was a Norwegian product. The idea that Norwegian industrial employment was threatened by international imports was one of the causes for the so called 'buy Norwegian' campaign. Both housewife organizations and the minister of trade, Alfred Madsen, spoke in favor of buying Norwegian products.¹⁶ By buying Norwegian detergents it was argued, housewives would support their husbands' employment and thereby secure their own income. Additionally Lilleborg used price war and massive advertising as a tool to capture market shares. Smaller producers, such as Goma, did not have the financial muscle to compete with the market leader under these circumstances (Jensen, 1999, p. 41).

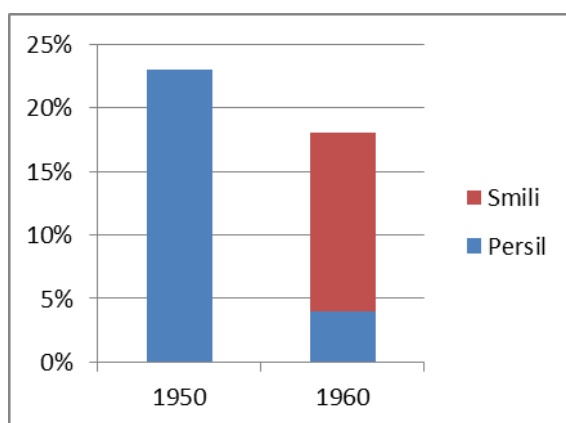
During the 1950s, direct advertising through product demonstrations became more important. According to Lund, product demonstrations were a normal part of advertising in Norway during the 1950s. Still, Lilleborg was unrivalled with regards to the scale and ambition of their product demonstrations (Lund, 2008, p. 110). Throughout the decade several different forms of demonstrations were used. In the major cities, inhabitants were invited for tea in large halls where Lilleborg's products were demonstrated. Persil and Barnengen also used product demonstrations to reach potential customers, but the market leader seemed to be more original than their competitors both in content and the form of presentations. At some point during the 1950s, Lilleborg changed from the stationary Blenda-tea presentations to the more

¹⁵ Lilleborg spent 250.000NOK in 1935 and 400.000 in 1939 on marketing and advertising for Blenda. (Lund, 2008, p. 80) In 2010 this amounts to approximately 8,25 MNOK, and 11,5MNOK confer <http://www.ssb.no/kpi/kpiregn.html>

¹⁶ Housewife organization is my translation of the Norwegian term 'husmorlag'.

flexible Blenda-bus.¹⁷ By changing the form of presentations, the Oslo based company was hoping to reach more housewives in a shorter space of time. During this period it was a major point for Lilleborg to be first to introduce a detergent to housewives in a certain area. The idea of using a bus in advertising, was thus to ‘hunt’ for places where Lilleborg could be first to give demonstrations. As a supplement to the tea-presentations, Lilleborg visited potential customers in their homes to introduce their products and answer questions concerning laundry. While the bus presentations were mostly used in rural areas, the goal of the tea-demonstrations and home visits was to visit every home in the major cities.

During the early 1950s the idea that more products could help win a larger market share did not seem to be present within laundry detergent companies. Most producers had one brand, and focused their resources towards battling for market shares with other single brand producers. Lilleborg answered new market threats by marketing their Blenda brand for all purposes to all consumer groups.¹⁸



3: Market shares Persil (1950 and 1960)

The threat of entry by Swedish synthetic detergent brand Rivitt in 1953 was the first event to cause the launch of a new product by the market leader (Lund, 2008, pp. 104-105).

Lilleborg countered the Swedish threat by launching Sol in 1954. The Persil factory also launched synthetic brand Smili in 1958. The use of a wider variety of brands seemed to be more successful for Lilleborg than for its rival. While Sol helped Lilleborg increase the firm’s total market share, the Smili brand took most of its market share from the Persil brand.

In the 1960s automatic washing machines became more common in use. As popularity of automatic washing machines grew, it seemed like the old soap based detergents caused problems for automatic washing machines. Because it seemed risky making the radical changes necessary to solve these problems using their highly popular Blenda brand, Lilleborg

¹⁷ Automobile presentations were the precursor to the bus presentations. In coastal areas where automobiles were not viable, Lilleborg used boats to get to potential customers

¹⁸ On example is when rival producer Barnengen marketed their “Tomtevaske” successfully for soft wash, Lilleborg adjusted the advertising of Blenda to include a message saying Blenda was soft on textile, rather than introducing a new product.

launched Unilever's Omo-brand as a specialized detergent for automatic washing machines. Later Tomten launched the Dutch owned Bio-Tex brand specially designed for soaking. During the 1960s several brands surfaced. Lilleborg gradually focused efforts on giving different brands an identity directed at different kinds of consumers. Although products were differentiated with respect to who was supposed to buy them, the housewife was still the main target of all advertising.

The cost of introducing a new brand in the detergent industry is high and by the 1960s, the European market was effectively saturated. As a consequence of the high cost of introducing new brands, manufacturers spent their resources on improving existing brands rather than introducing new ones. After the 1960s, few new brands were introduced while at the same time, formulations of existing brands changed constantly (Jones, 2005).

2.2.2 Advertising Messages

In the 1930s, industry represented employment, growth and wealth this was reflected in detergent advertising at the time. With the youth rebellion towards the end of the 1960s and early 1970s this role changed and people became more aware of negative effects of large industry. Advertising was hence given a less authoritarian role in communicating with its audience. One example is the use of Lilleborg's company name in advertisement. During the 1930s the company name featured prominently in most ads, while it took a more withdrawn role in the 1960s and 1970s (Larsen, 1990, p. 170).

Larsen argues that the goal of advertisement was to release consumers from the discomfort of modern society. To solve these problems the advertiser need knowledge about the consumers' needs, frustrations and dreams. Lilleborg's advertisements do not only introduce the potential consumer to a new good, but also communicate how to live in modern society by introducing models of how beauty and youth may be achieved in an attempt to increase the consumers' self-esteem and gain the favor of others. In his conclusion, Larsen states "Advertisement is no longer an authoritarian educator, but appear as a close friend giving us advice in the most intimate parts of life" (Larsen, 1990, p. 173).¹⁹

Lund (2008) focus on how the housewife was the main target of Lilleborg's advertising in the 1950-1970-period. When advertising Blenda, Lilleborg wanted to make sure Blenda was

¹⁹ My translation

portrayed as the owners of the white wash technique. By using Blenda, your laundry will be whiter than everyone else's, was the message. Furthermore, appliance of Blenda would able the housewife to increase her status both within the family, and among other housewives.

While retaining their main message of the status involved in using Blenda, Lilleborg included messages relating to the current market situation in their advertisement.²⁰ In the 1950s, Persil advertised their Henko brand and Persil as two different brands used for different purposes. Rather than introducing a new product, Lilleborg responded by stating Blenda could be used for both purposes. Similarly, Barnengen launched a specialized detergent that was supposed to be soft on textile. Lilleborg's response was by attaching a similar message to their Blenda product. With this move, Lilleborg extended Blenda to be used in the segment for fine textile, and at the same time making sure their competitor was not able to drain this market segment unchallenged.

During the detergent war, Procter & Gamble used TV celebrity and journalist, Knut Bjørnsen, in their advertising. After complaints from Lilleborg employees, P&G and Bjørnsen were depicted negatively by news media because of Bjørnsen's role in endangering Norwegian employment by working for an international competitor. The use of a male expert in advertising detergents was also new. Lilleborg used female experts in an attempt to create an atmosphere of housewives giving each other advice on laundry in their advertisement. Lund (2008) argue that this may have had a negative impact on how Norwegian housewives viewed P&G and their Tag brand.

²⁰ This section is based on 102-104 in Lund (2008)

3 Theory

This chapter introduces a theoretical framework useful in understanding how laundry detergent industries function. The first, and most extensive part, focus on the effect of advertising and brand loyalty on market structure. Part 2 introduce a framework for analyzing the life cycle of an industry. The third and final parts introduce a framework relevant for understanding the strategies employed in detergent markets.

3.1 Advertising and Market Structure

In the following I will introduce three approaches to analyzing how advertising may affect market structure. Economies of scale, long terms effect of advertising and brand loyalty. I will also have a look at some empirical studies providing indications of how the different models may be useful in explaining real world markets.

3.1.1 Product Differentiation

A firm chooses to differentiate its products from products sold by competitors to increase the price of its products compared to other producers. If two products are homogenous, a small change in price will reduce demand for the expensive good and shift demand to the inexpensive good that poses largely the same characteristics. If two products are highly differentiated, a slight increase in the price of one of the goods will affect demand for this product only slightly since few consumers want to change their choice. The degree of differentiation between two products is measured by their elasticity of substitution. Two goods are closer substitutes the larger the magnitude of the elasticity of substitution between the two goods.

Qualitatively there are two different types of differentiation. If products are horizontally differentiated, all consumers agree on the qualitative ranking of the two goods, but the price of the goods may be different and different consumers prefer different goods based on their level of income. When goods are vertically differentiated there is no agreed upon ranking of their quality, and consumers' ranking of the goods depends on preference. A characteristic causing goods to be vertically differentiated is colors, that consumers rate differently based on their preferences (Tirole, 1988, pp. 96-97).

In detergents markets, products are differentiated both vertically and horizontally. Different brand products are vertically differentiated in that they occupy different niches in the product market and are supposed to fill different consumer needs. Detergent products are horizontally differentiated as well. Private label products are mostly positioned in the low quality, low price segment of the market. Despite a general trend of private label products being horizontally differentiated and brands vertically differentiated in the top end of the market, this is a rough simplification.

Firms may use advertising to differentiate their products in several ways. Sørsgard (1997) divide the effect of advertising into three effects.

The strategic effect of advertising influences the prices a firm may set. By advertising for its products, firms may increase consumers' willingness to pay for its products. This is the strategic effect of advertising. The strategic effect operates when advertising is designed to target consumers that already purchase a firm's product, by making them less sensitive to price changes. Graphically this may be explained as a tilt in a firm's demand curve.

We say there is a direct effect of advertising when advertising stimulates demand for a firm's product compared to its competitors. This may also be called a 'stealing effect', where advertising is used as a means of 'stealing' market share from competitors – advertising increases demand for the product of the advertising firm by reducing demand for products sold by competitors. The direct effect will occur when advertising is directed at consumers of other firms' products. Holding aggregate demand in the industry fixed, the demand curve facing the firm advertising shifts up, while the opposite is the case for a firm that does not advertise.

Advertising may also have a spillover effect, in that it affects the demand in the market as a whole. In this case advertising increases demand for a firm's product without negatively affecting demand for goods sold by competitors. This sort of advertising causes the industry demand curve to shift, as opposed to the demand curve facing the firm in the case of a direct effect.

3.1.2 Economies of Scale

Fixed costs may give rise to economies of scale, and hence affect market structure. What determines the outcome is the size of the minimum efficient scale, the level of output that minimizes average cost (Varian, 2006, p. 437). If demand is large relative to minimum efficient scale, a competitive market is the likely result, while a minimum efficient scale large relative to industry demand a monopoly is more likely. It is important to note that this statement is relative. What matters is the scale relative to market size. For a given fixed cost, fewer firms will be viable as the size of aggregate supply is reduced. A smaller market will hence give rise to a more concentrated market structure.

Advertising and Economies of Scale

Martin (2010, p. 142), separate between three ways advertising may give rise to scale economies.

1. The effectiveness of advertising may increase more than in proportion to the number of advertising messages that are sent out. In this case the cost of effective advertising decrease with the volume of advertising.
2. Advertising might have to reach a threshold level to have any effect at all – there is a fixed cost level of advertising outlays necessary for advertising to have any effect at all.
3. The cost charged by sellers of advertising space might be lower for large scale advertisers – as advertising outlays increase, the average cost decrease directly.

Kaldor (1950) argue that advertising in fact affect market structure by increasing the scale of production and hence increase concentration. At the same time this depends on continued advertising. Should advertising levels drop, concentration will again be reduced caused by the fact that scale economies present in the industry are lowered. Other than the effect advertising have on the scale of production, advertising shift demand curves.

Michael Spence (1980) explore this further. Due to the fact that advertising is designed to influence demand and therefore prices, it cannot be discussed entirely in terms of economies of scale or cost advantages in the normal sense. Yet scale economies, or advantages of size, are clearly relevant in establishing entry barriers. However, demand and prices are affected by advertising. The relevant measure of scale economies is thus to be found in the relation

between the firm's revenues and its costs per dollar of revenue, rather than in the relation between costs and output in physical units (Spence, 1980, p. 494).

Advertising as an Endogenous Sunk Cost

Advertising may give rise to economies of scale in the same way as fixed costs in production. Nonetheless, as mentioned above, there is a crucial difference. While we may say fixed costs in production are determined exogenously as a consequence of the technology of production, the level of advertising is a choice variable for the firm. In Sutton (1991) the endogeneity of sunk costs such as advertising and research and development is studied.

While exogenously determined fixed costs will diminish in importance as market size increase, increased market size will cause escalating levels of endogenous sunk cost outlays, such as advertising, as firms compete for market shares. In a market dominated by exogenous sunk costs concentration will be reduced infinitely as market size increase. Sutton found that for markets where endogenous sunk costs are important, industry concentration will be bounded away from zero as market size increase.

This has later led to a division of industries to type I and type II industries. Type I constitute industries where exogenous sunk costs dominate. Type I firms deal in products with no or slight horizontal differentiation. Type II industries on the other hand are characterized by a high level of endogenous sunk cost outlays. Here, products may be differentiated both horizontally and vertically (Martin 2010 p. 317).

3.1.3 Depreciable Advertising

When Unilever decided to enter the detergent market in the USA, they ran into difficulties. It proved difficult to enter a market where strong brands were already present. Experience from the detergent war in Norway in the late 1960s give an indication that P&G and Colgate might have encountered a similar problem. Despite spending large amounts on advertising, P&G and Colgate struggled to enter the market.

Martin (2010) argues that mature markets may be particularly difficult to penetrate, since entrants must accumulate goodwill among consumers comparable to that of incumbents. If advertising have effects that last over time, an incumbent might have accumulated a large

stock of goodwill. An entrant might have to accumulate goodwill for some time after entry before demand is stimulated by advertising to the same extent as for an incumbent

To model how a firm that uses advertising may accumulate goodwill over time, we use the following model presented by (Martin, 2010, pp. 426-427).

We assume goodwill is built up by advertising, but that the stock of goodwill depreciates over time. G_0 represents the stock of goodwill inherited from the past. The stock of goodwill for a firm advertising in period 1 and 2 is given by

$$G_1 = (1 - \delta)G_0 + A_1$$

$$G_2 = (1 - \delta)G_1 + A_2 = (1 - \delta)^2 G_0 + (1 - \delta)A_1 + A_2$$

The stock of goodwill in any given period is the part of goodwill inherited from the past that is not depreciated. Goodwill is also increased by current advertising. The general expression for goodwill in period t is given by

$$G_t = (1 - \delta)^t G_0 + \sum_{\tau=1}^t ((1 - \delta)^{t-\tau} A_\tau)$$

The quantity demanded in period t is a function of price and the stock of goodwill

$$Q(p_t, G_t)$$

Profit is given by

$$\pi(p_t, G_t) = (p_t - c)Q(p_t, G_t) - F - p_A A_t$$

Where, c is constant marginal and average variable cost. F is fixed cost. p_a is the cost of a unit of advertising, and A_t is advertising outlays in period t .

The value of the firm is given by the present-discounted sum of profits in all future periods.

$$V = \sum_{t=0}^{\infty} (1 + r)^{-t} [(p_t - c)Q(p_t, G_t) - F - p_A A_t]$$

Advertising causes sales increases in all future periods. The optimal choice of advertising is found where the price of one unit of advertising in the current period equals the discounted and depreciated profit over all future periods from having an extra unit of goodwill in the current period.

$$p_A = \sum_{\tau=0}^{\infty} \left(\frac{1-\delta}{1+r} \right)^{\tau} (p_{t+\tau} - c) \frac{\partial Q_{t+\tau}}{\partial G_{t+\tau}}$$

$\frac{\partial Q_{t+\tau}}{\partial G_{t+\tau}}$ is the change in quantity sold in period $t + \tau$ due to a marginal change in the amount of goodwill in period $t + \tau$.

The fact that advertising have long term effects means that the effect of advertising today is a sum of all past advertising depreciated. Advertising today is naturally more effective than past advertising. How effective depends on the rate of depreciation.

Advertising and Entry

For a potential entrant, quantity demanded will depend on its own price and accumulated goodwill, in the same way as for the incumbent. In addition, demand for each firm's product depends on the price set by the other. The quantity set for the incumbent and the entrant is given by

$$Q^I(p_t^I, p_t^E, G_t^I, A_t^E) \text{ and } Q^E(p_t^I, p_t^E, G_t^I, A_t^E)$$

Since he has no accumulated goodwill, the entrant's goodwill in the first period is equal to his advertising outlays. The incumbent will benefit more from accumulated goodwill since he has already accumulated a significant stock. An entrant has no accumulated goodwill initially and has to increase his stock through advertising over time.

The effectiveness of accumulated goodwill in deterring entry works differently in different markets. In markets where the spillover effect or the strategic effect is dominant, advertising and accumulated goodwill is less efficient in deterring entry. In markets where the direct effect dominates, advertising may increase the cost of entry (Martin 2010:437).

Empirical Evidence on Long Term Effects of Advertising

If advertising is to have an effect on market structure through accumulated goodwill, as mentioned above, advertising must have some sort of a long term effect. Clarke (1976) survey a number of studies investigating possible long term effects of advertising, and conclude that 90 percent of the cumulative effect of advertising on sales occur within 3 to 9 months of the advertisement. ‘The conclusion that advertising’s effect on sales lasts for months rather than years is strongly supported’ Clarke (1976, p. 355) asserts.

He points out that most of the studies in his survey are done on mature industries. For the results in most of the studies surveyed by Clarke, it seems sales in the previous period are the most important factor deciding sales in the next period.

In ‘Advertising in consumer goods: durability, economies of scale and heterogeneity’, L.G. Thomas (1989) investigate the effect of advertising on sales in consumer goods industries using a model similar to Schmalensee (1978b) as discussed below, and a depreciating advertising model as the one above. Thomas (1989) uses four stylized facts about consumer goods industries to find if depreciable advertising or brand loyalty, introduced below, is important in determining demand.²¹

In real world consumer goods industries, best-selling brands advertise most heavily, and advertising rises with sales toward long-run equilibrium (Thomas, 1989, p. 167). Consequently, the depreciable advertising model is not consistent with observed developments in consumer goods industries, Thomas argues. Despite not being consistent with observations of consumer goods industries, observations of large advertising outlays by newly introduced brands imply a secondary role for depreciable advertising.

Thomas finds that assuming a long term effect of advertising, as necessary in the depreciable advertising model leads to results not consistent with his set of observations for consumer goods industries. Homogeneous brand quality, an assumption necessary in depreciable advertising model, results in increasing returns to scale in advertising. Increasing returns to scale may be statistically rejected. Further on, it give rise to an unstable equilibrium that is not consistent with observed developments in consumer goods markets (Thomas, 1989, p. 185).

²¹ 1. There is large, persistent and generally stable heterogeneity in sales and advertising levels of various brands within an industry. 2. Brands having larger sales are advertised more. 3. Brands having larger sales exhibit lower ratios of advertising to sales. 4. Brands are advertised more, ceteris paribus, during a brief period immediately after market introduction (Thomas, 1989, pp. 166-167).

By imposing the false restriction of brand homogeneity, advertising will serve as a proxy for brand loyalty, who is suppressed. In this case, returns to quality and returns to advertising are confused. This will lead to erroneous conclusions about the implications of advertising alone, as the effects of brand loyalty are attributed to advertising (Thomas, 1989, p. 186).

Thomas estimated the depreciation rate for advertising on an annual basis to exceed 80 percent, while returns to scale from advertising are estimated to be decreasing (Thomas, 1989, p. 187). Thomas thus concludes that the depreciable advertising model is not consistent developments in real world consumer goods industries.

3.1.4 Brand Loyalty

Consumers don't usually have full information about the quality of a good. In determining the quality of a good, a consumer may search for the best quality brand or purchase a brand to use it and hence determine by experience which brand she prefer. This has led to the division of goods into two different types; search goods, and experience goods.

According to Nelson (1970, p. 311), consumers' lack of information about the quality of goods have profound effects on market structure for consumer goods. Where consumers have to rely on their experience of trying a good, monopoly power will be higher than for search goods. In a later paper, Nelson (1974) argued that advertising provides useful information about product quality. He argues that misleading advertising cannot be effective for search goods, while it can be for experience goods since consumers cannot verify the content of the advertisement without purchasing the product.

High quality brands are more likely to be advertised more heavily, *ceteris paribus*, since the value of a sale of a high quality brand is larger. This is because the consumer is more likely to purchase the brand again. Because advertising is more effective for brands of high quality, consumers may use advertising as a measure of brand quality, and they should hence buy the most heavily advertised product. The logical content of advertising should hence not factor into the consumer's considerations when choosing which product to buy (Thomas, 1989, pp. 175-176).

Schmalensee (1978b) develop a formal model for investigating experience goods. In his model two opposing forces are central (Schmalensee, 1978b, p. 498).

1. High quality brands by definition enjoy high repeat-purchase probabilities. This increases the present value of returns from advertising and, *ceteris paribus*, yields them high market shares in equilibrium
2. High quality brands have high unit costs if the unit cost advantage enjoyed by low quality sellers is larger than 0. This makes advertising less profitable for them and tends, *ceteris paribus*, to raise their equilibrium shares.

Schmalensee argue that for industries with higher returns to scale in advertising, the second effect is increased and may contribute to a situation where the second effect dominates the first, and poorer brands receive larger market shares. In this perverse equilibrium consumers behave as if they had read Nelson 1974 and purchase the brand most heavily advertised (Schmalensee, 1978b, p. 486).

However, Schmalensee's model is based on strong assumptions on consumer behavior. He points out consumers probably have better memories, and that qualities may be endogenously determined by firms with different cost functions.

Testing the Brand Loyalty Model

In the study mentioned in chapter 3.1.3, Thomas (1989) also introduce a brand loyalty model where each brand loses customers at a rate based on advertising levels and intrinsic brand quality. Brands also lose customers that drop completely out of the market and may attract completely new customers (Thomas, 1989, p. 179). In this model brands that are repurchased more often will experience a higher present value of sales, because selling a good today might make the consumer buy the product again at a later stage. If advertising can be used to induce consumers to buy a product, producers of high quality products will have a larger incentive to advertise because of the added benefit that making a consumer buy your product once may result in a series of consecutive purchases. High quality brands will hence be advertised more heavily, *ceteris paribus*. Due to these linkages among brand quality, brand loyalty and brand advertising, consumers may use relative levels (and not the logical contents) of advertising as signals of relative product quality (Thomas, 1989, pp. 175-176).

In the case of heterogeneous brand quality, where consumer repurchase goods based on past consumption experience, a stable long run equilibrium exists. This is consistent with observations made in consumer goods industries. From the starting point of zero sales, both

sales and the stock of advertising rise toward this equilibrium. Sales rise more rapidly than the accumulated stock of advertising, leading to a falling ratio of advertising to sales over time, consistent with observations. The level of advertising also rises over time, despite falling advertising-sales ratios. This is consistent with observations of consumer goods markets.

Thomas's estimations are done in mature industries close to long run equilibrium. Therefore, brand loyalty, not the short term effects associated with advertising accounts for most of sales. The results of advertising effectiveness may thus be different in infant industries.

The Effect of Advertising on Brand Loyalty

Shum (2004) studies how advertising may be used to break down brand loyalty by reducing switching costs in the breakfast-cereals market. His findings indicate that "an important effect of advertising in the breakfast-cereals market is to encourage "switching" behavior at the household level, which overcomes brand loyalty by persuading households to try brands they have not purchased recently" (Shum, 2004, p. 264).

While brand loyalty may provide significant advantage to incumbents, advertising may be effective in breaking down brand loyalty and hence making entry into markets with loyal consumers easier for potential entrants. Shum thus argue that advertising may work to facilitate entry so that more brands may exist in the market than would be feasible in the absence of advertising.

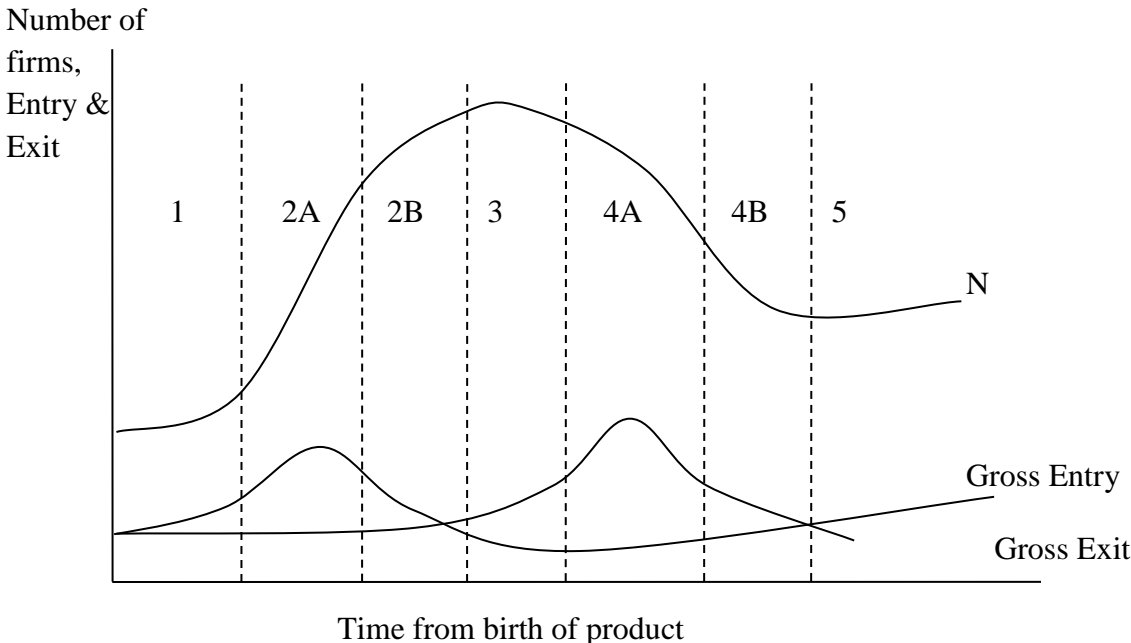
In a related study, Akerberg (2001) examine the effects of different advertising messages. Experienced consumers are consumers that have tried a brand in the past, while inexperienced refer to consumers that have not tried a brand. Akerberg find that "advertising that provides information on inherent brand characteristics should primarily affect inexperienced consumers of a brand, while advertising that creates prestige or association should affect both inexperienced and experienced consumers" (Akerberg, 2001, p. 332).

3.2 The Dynamics of Market Structure

The equilibrium approach to analysis of market structure says that firms will enter and exit the industry until each firm's profits are equal to zero. This theoretical way of modeling entry and exit does not match the observed patterns of entry and exit in real world markets. Because of the difference between observed entry and exit patterns and the traditional theoretical explanation of entry and exit, a literature describing market structure in a dynamic context has emerged (Martin, 2010, pp. 325-326).

3.2.1 Industry Life Cycle

The life cycle of an industry, as described by Agarwal and Gort (1996), may be divided in 5 stages describing the pattern of entry and exit in an industry.



4: The industry life cycle (Agarwal & Gort 1996 p. 490)

Net Entry

In stage 1 (the initial period) initial entrants may come from related industries, or enter the industry through vertical integration. In stage 2 entry rates are higher, and may be subdivided into an initial phase of accelerating entry, followed by a phase of decelerating entry. At this stages firms experiment in design and product prices in an attempt to find consumer needs and to discover their willingness to pay. Stage 3 is a transformational plateau in the number of sellers. Unlike stage 2, stage 3 does not occur in all industries.

Net Exit

In stage 4, the industry experience net exit. Here the industry ‘settles down’ on a dominant design. In stage 4, innovative activity is shifted to improve productive efficiency. At this point, the industry is characterized by more mechanized production and the development of capital assets. The main production in the industry is centered in ‘the oligopolistic core’ while firms that are leading ‘the efficiency race’ gain market share. Minor producers drop out of the market.

The Mature Industry

In stage 5, the industry has matured and there is no longer a consistent trend in entry and exit patterns. Firms in the oligopolistic core compete among themselves. In addition there exists a small group of firms at the edge of the market. The composition of firms in the fringe changes over time, but the group of firms in the oligopolistic core is fairly stable. Firms may (rarely) move from the fringe to the core, but firms on the verge of making this move may find that firms in the oligopolistic core apply entry deterring strategies in order to keep new entrants out of the oligopolistic core.

Sunk Costs

The level of entry also depends on the level of the sunk cost. Larger sunk costs causes lower net entry and also lower net exit from the industry. Entry involves a higher cost, and hence fewer firms decide to enter the industry. Once a firm has entered the industry, the larger level of cost that is sunk works to discourage exit.

3.3 Price Competition and Strategic Commitment

To analyze the strategies employed by Lilleborg in the period after the detergent war, it is useful to look at theory explaining the effect of strategic investment. To fully understand the implications of such investment, some insight into price competition is also necessary.

3.3.1 Price Competition

Price competition is usually modeled by using one of two models, developed by Antoine Augustine Cournot and Joseph Bertrand respectively. Cournot and Bertrand competition is usually depicted as competition in either quantities or prices. The latter case may yield a competitive equilibrium even though there are only two firms in the industry, while the former leads to less tough competition in the market with a lower produced quantity and higher prices. The Cournot model is introduced formally in the appendix.

Tirole (1988, pp. 223-224) points out that the two models should not necessarily be depicted as rival models, but two complementary approaches, each depicting industries with different cost structures. The Bertrand case is a better approximation for industries with fairly flat marginal cost curves while industries with fairly steep marginal cost curves are more accurately modeled using the Cournot approach.

The fact that Bertrand competition may lead to a competitive equilibrium even when there are only two firms indicate that the outcome in this model is more appropriate where there are tough competition. The Cournot model may therefore be more appropriate in markets where price competition are softened by such things as capacity constraints (or more accurately choices of scale), product differentiation and repeated interaction between firms.

In Bertrand competition decision variables are strategic complements, and reaction curves are upward sloping. In Cournot competition reaction curves are downward sloping and decision variables are strategic substitutes.

3.3.2 Games of Commitment

A firm may choose to maximize its profits in the face of future potential entry by acting strategically. A firm may then make an investment before the potential entrant makes his decision to enter the market. For such a strategic move to be efficient it must be both irreversible and observable for the potential entrant. A more formal introduction to this model is provided in the appendix.

The effect of such an investment in the future period may be divided into two effects. The effect investment has on the potential entrant's profits, and the effect it has on the incumbent's future actions.

Entry Deterrence

Firms engaging in entry deterring behavior may want to make some investment with the goal of reducing a potential entrant's profits down to zero and hence make him opt out of entering the market.

How such a firm should invest to deter entry depends on the effect the investment have on the profits of the potential entrant. If the effect is negative in that it reduces the potential entrant's profits, the incumbent should invest more in order to deter entry.²² If investment increases the entrants post entry profits, the incumbents should invest less to deter entry.

Accommodated Entry

In some cases it might not be feasible for the incumbent to deter entry. The incumbent still have an incentive to act strategically in order to maximize its post entry profits. The actions depend crucially on the form of competition prevailing in the given market.

If markets are characterized by Cournot competition, the decision for the firm should be the same as in the entry deterrence case. An entry deterring strategy will also maximize profits in the case of accommodated entry. This is because, in Cournot competition, decision variables are strategic substitutes. If the incumbent choose a high quantity, it is in the entrant's interest to choose to produce a low quantity.

²² 'More' or 'less' investment relates to a comparison between how the firm should invest compared to a situation where strategic considerations are not a part of the incumbent's decision.

In the case of Bertrand competition, the entry deterring strategy and the accommodated entry strategy are opposites. Since decision variables are strategic complements in Bertrand competition, the entrant will choose to produce a high quantity if the incumbent chooses to produce a high quantity. The optimal strategy for the accommodated entry case under Bertrand competition is hence the opposite of what it would be if the firm was successful in deterring entry.

3.3.3 Monopolization by Brand Proliferation

A firm that produces one good may increase their profits by differentiating their products from products sold by competitors. In markets where firms produce several varieties of a similar product, a dominant firm may also use a strategy called monopolization by brand proliferation to maintain a strong position in the market. The idea is that the dominating firm can introduce several variants to fill all possible niches that may develop in a market, and hence deter potential entrants from entering profitable market niches. This was first studied by Schmalensee (1978a) in the ready-to-eat cereals industry in the USA.

4 Explaining Market Structure

The following will take a closer look at the Norwegian laundry detergent market in the light of theory introduced in chapter 3. In the first section I will discuss the industry life cycle of the Norwegian detergent market. In this discussion I will attempt to find when Norwegian detergent markets matured, and when they were in earlier stages of development.

The maturity of the industry in different stages of history will be important when I, in part 2 of this chapter, discuss the effectiveness of advertising at different stages in its development. Differences in effectiveness of advertising over the life cycle of the industry will be used as a major variable in understanding attempted entry into the industry.

I will also discuss how the timing of trade liberalization acted in concert with the development of the industry over the life cycle. I will explain how this relationship may be important in explaining current market structure, as well as how this framework may be used to analyze similar consumer goods industries.

I will also have a look at how Lilleborg's strategies and environmental regulation (The STPP ban) may have affected market structure. Finally I will have a brief look at current detergent markets.

4.1 Maturity of Detergent Markets

A good first step in explaining market structure is by looking at entry and exit on the basis of the industry life cycle model introduced in chapter 3.2.1. This model describes an industry from infancy to maturity with regards to design of the specific good, how firms interact in the market, and by data on entry and exit.

Detergent Design

As described in Chapter 2, washing powder became popular among housewives for doing laundry in the 1930s. After the 1930s, housewives have mostly used powder detergents for their laundry. The growing popularity of automatic washing machines in the 1960s did not change the dominant detergent design significantly, and neither did the environmental concerns in the 1970s and 1980s. Changes in the chemical composition of detergents were

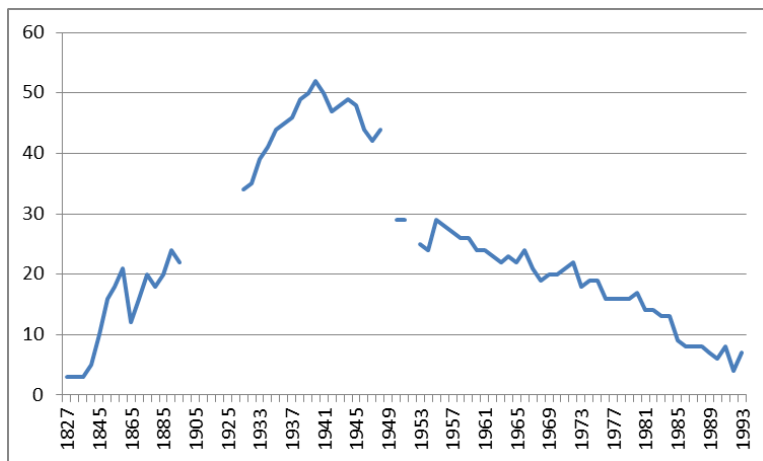
radical, but housewives in the 1990s still used washing powder for their laundry. Although washing powder is arguably the dominant design for laundry detergents, the emergence of liquid detergent has been significant in the 1990s and 2000s. For the sake of an industry life cycle analysis, we may take washing powder as the dominant detergent design even though matters get more complicated as we approach the 2010s.

Industry Structure

From an industrial organization perspective the history of detergent markets in the late 1930s and 1950s provide strong indications that a stable oligopolistic core of detergent producers was developing. Competition between Lilleborg, the Persil factory and Tomten had definite traits of oligopolistic competition as the firms acted and reacted to decisions made by the others. Despite attempts from both Colgate and Procter & Gamble to enter the Norwegian market, the oligopolistic core remained largely unchanged for 70 years. The only lasting change occurred in 1967 when Lilleborg acquired the Persil factory and the oligopolistic core changed to a duopoly consisting of two firms. Similar to the discussion about detergent above, the situation seems to get more complicated as we approach present time. New entrants such as P&G, private label products and other brands have made a significant impact in detergent markets even though competition is duopolistic, and the core consists mainly of Lilleborg and Sara Lee, while P&G may be on the verge of breaking into the duopolistic core of the industry.

Entry and Exit

The development on industry entry and exit provide a similar development for Norwegian detergent markets as that provided by industry life cycle theory. *Figure 5* shows the development of soap and detergent producing firms in Norway between 1909 and 1990, and is constructed using data from Ragnhild Rein Bore & Tor Skoglund (2008), Statistics Norway (1915) and Statistics Norway (1933 -1996) on the number of firms producing soap and detergents in Norway.



5: Firms producing soap and detergents (1827-1994)

The period before World War II was characterized by high net entry into the industry. Our data, starting at 1827 show an increasing trend in the number of firms. After a peak in 1940, the industry experienced net exit, a trend that continue until 1994, which was the final year Norwegian industrial statistics

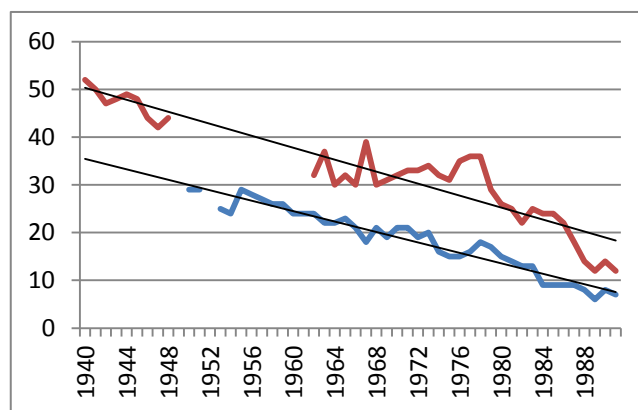
counted soap and detergent producers as a separate group. The data on entry and exit seems to be generally supported by the history of the industry as described in chapter 2, as well as histories of individual companies that operated in the market (Lilleborg (1983), Jensen (1999), Unger (1997)).

Based on industry life cycle theory, net exit occurs after the industry has found the dominant design. The fact that net exit occurs after 1940 support the suggestion of washing powder as the dominant detergent design.

A Note on the Data

The fact that the data used is from the amount of firms producing detergents rather than selling detergents is a significant weakness, excluding for example imports from abroad. Despite this weakness the history of the detergent industry in Norway seems to indicate that imports were significant only after 1967.²³

Another weakness of the data is that Statistics Norway did not always



6: Development of the number of firms including small firms (red line) and excluding small firms (blue line) (1940-1994)

²³ Henkel is mentioned as one firm importing detergents before this time, but later established their own production facilities in Norway, the Persil factory in Moss. The historical sources mentioned in this thesis mention no other importers of detergents in Norway before 1967.

count firms employing only one person after 1949, while data before 1949 contain no breakdown of how many firms were 'large' and how many were 'small'. Due to this, data before 1949 include firms employing only 1 person, and data after this include only firm's employing 5 or more people. This helps explain some, but not all, of the sudden drop in producers after this point. Because small firms were not always counted after 1949, the count for large firms is preferred to give a more complete illustration of the development over time. In *Figure 6* we see that the slope of the trend lines after the peak in 1940 is not significantly different. The data provided above should therefore provide sufficient for discussing entry and exit from a perspective of industry life cycle theory.

Industry Maturity

After finding a dominant design for laundry detergents in the mid-1930s, a mature industry slowly evolved in Norwegian detergent markets. World War II interrupts the analysis of the development from a perspective of competitive interaction, but the general trend in net exit is persistent over time after 1940, as well as the dominant design. After markets normalized following World War II, the market situation seems to have been fairly stable for 50 years, with the notable exception of the detergent war, indicating a fairly mature industry after this point.

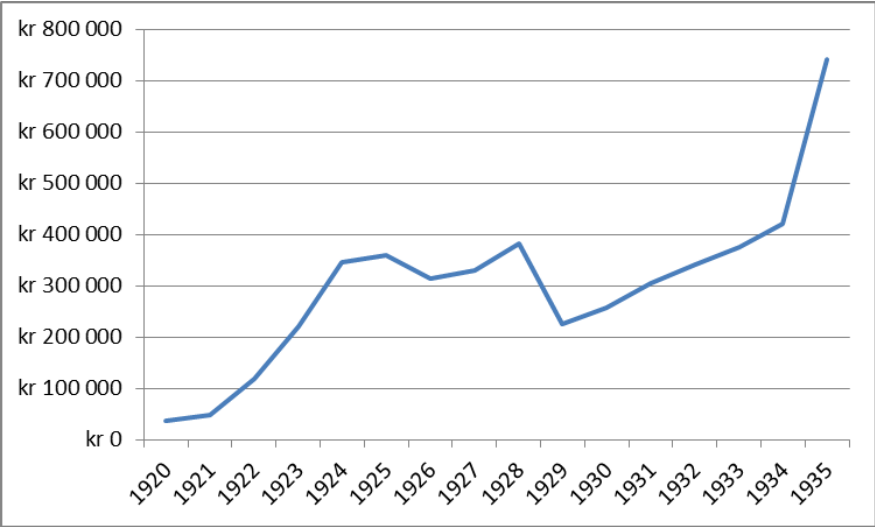
4.2 Effectiveness of Advertising

In the following I will analyze the effectiveness of advertising at different points in the industry life cycle. This will prove useful in determining why the market structure have remained largely unchanged for the last 70 years, and in turn help explain current market structure.

4.2.1 The Rise of Blenda

Below we will see why Lilleborg was successful in establishing Blenda as a brand in competition with Persil in the late 1930s. At this point in the industry life cycle a dominant design had yet to emerge, and the general trend was net entry to the industry. Advertising was at this point highly effective in increasing demand. The effectiveness of advertising in increasing demand was an important factor explaining why Blenda soon was established as the major brand in the Norwegian detergent market.

Figure 7 shows the development of advertising expenditure at Lilleborg in the period between 1920 and 1935. The data is collected from Jacobsen (1976) and is adjusted for cost of living for 1922. The sudden jump in advertising expenditure at the end of this period is due to the launch of Blenda. Since Lilleborg's archives from this period are incomplete, I have not been able to find data showing the development of sales for Blenda and Persil in the period following the launch of Blenda. Despite this, we do know that Blenda, 4 years after the launch in 1935 had a 70 percent share of the market for white wash. These developments indicate



7: Lilleborg advertising (1920-1935)

that the growth of Blenda may be attributed to Lilleborg's advertising at the time. Since the laundry detergent market yet had to develop into a mature state, the studies by Thomas (1989) and Clarke (1976) ruling out long term effects of

advertising does not the possibility that advertising may be important in determining market structure. The mentioned studies take up the importance of advertising in mature industries. As we have seen in chapter 4.1. the laundry detergent market was still in its infancy, indicating a more significant role for advertising than in the mature industry case.

At the time Blenda was launched there was already a brand on the market. Despite of the fact that there was an incumbent present in the market, Blenda was highly successful in entering the market. Because of data restrictions, we may not with accuracy describe the effect of the incumbent on entry, but several possible explanations of why Blenda was able to enter the market arise

Large Spillover Effects

Due washing powder still being a new product in Norway, many housewives had yet to try a powder detergent. Because there was a large pool of consumers that had yet to try a detergent, they had not developed any brand loyalties yet. Brand loyalties may have been associated with the old ways of washing clothes. By using product demonstrations in their advertising, Lilleborg effectively broke down any loyalties attached to the old ways of doing things. After inducing housewives to try the new product, repurchase was most likely guaranteed based on the superiority of powder detergent over soap.

Due to the data restrictions already mentioned we do not have exact numbers confirming the potential for spillover effects in early detergent markets. The existence of such effects seem obvious both from an intuitive point of view, and based on industry history.

Industry history introduced in chapter 2 tells how Persil and Lilleborg travelled around the country introducing their powder detergent to housewives. This form of advertising was used because the firms meant it was crucial to show how the new product functioned. Prevailing until the 1960s the fact that the firms used this form of advertising indicates that they believed there was a pool of housewives that needed to be introduced to powder detergent.

Due to the fact that powder detergent was a relatively new product, Persil might not have established significant brand loyalties yet. Thus spillover effects might have been significant enough for Blenda to capture a 70 percent market share without ‘stealing’ market share from Persil.

Breaking Persil’s Brand Loyalty

If Persil in fact had built up brand loyalties by the time Blenda entered the market in 1935, Lilleborg may have been efficient in breaking down Persil’s position.

As indicated in Shum (2004), advertising may be used to break down brand loyalty and induce trial purchases. Advertising may then be used to help induce entry into an industry. The description provided of Blenda’s advertising during this period in chapter two definitely indicates that this might have been an effect of their advertising. Handing out samples, for example, is a direct way of reducing consumers cost of trying a new brand of an experience

good. The 'buy Norwegian' campaign might also have proved efficient, by playing on economic nationalism prevailing at the time to induce housewives to switch brands.

Once convinced to try a new brand, the quality of the new good must convince the customer that it is of superior quality to induce repurchases. Since Blenda had a 70 percent market share it was obviously successful in inducing repurchases. This may strengthen the impression that the view held by detergent manager Moe regarding Blenda's qualities were shared by Norwegian housewives in the 1930s.

Although we are unable to confirm the above using data from 1930s detergent markets, the history of the industry and previous research introduced in chapter 2 definitely seems to confirm the view introduced here. As we have seen, it is also consistent with theory.

4.2.2 The Failure of Tag and Ajax

During the late 1960s Colgate and P&G attempted to enter Norwegian detergent markets without success. In the following I will attempt to explain why they were unsuccessful.

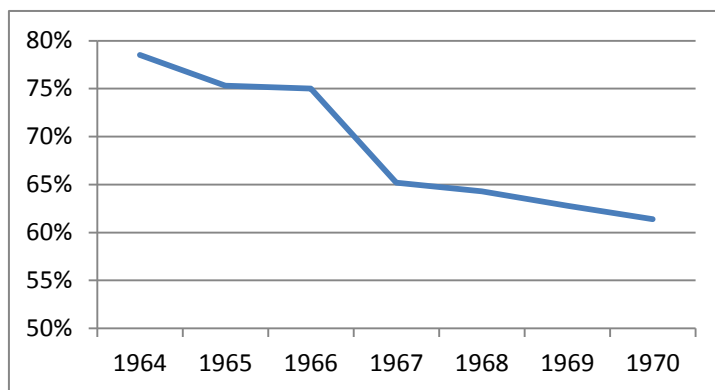
In explaining why I will look at how, as opposed to the situation facing Blenda in 1935, Tag and Ajax faced a market where spillover effects from advertising were less likely. Because the industry had now matured, they were also facing brands with a strong base of loyal customers. To enter the market they thus had to use advertising in breaking down brand loyalty to induce trial purchases. After the initial trial purchase, the entrants needed to convince consumers that the quality of their product was significant enough to make the consumer buy the product again.

While the situation facing Blenda in 1935 allowed for relatively easy entry, I will argue that the three conditions above all made entry into the Norwegian detergent market more costly in 1967. In addition to the above points comparing the situation in 1967 with 1935, I will discuss the development of detergent prices and possible effects of several simultaneous entrants.

General Developments

Before diving into the analysis we start by establishing a general overview of the developments during the detergent war. First, the entrants were mainly P&G and Colgate, while the Dutch brand Bio-Tex was introduced earlier by Norwegian producer Tomten.

Estimates made by Lilleborg indicate that a 10 percent market share was necessary for the entrants to break-even. To reach this point, the entrants would either have to attract new customers, or ‘steal’ enough customers from incumbents to achieve a 10 percent market share.



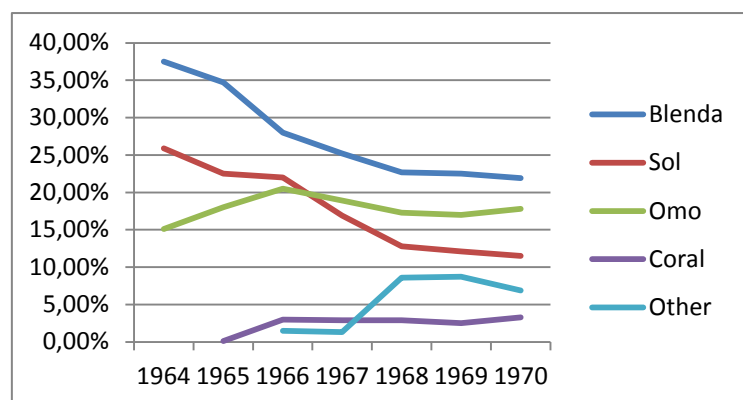
8: Lilleborg market share (1964-1970)

Figure 9 shows market shares for Lilleborg’s brands before and during the detergent war.²⁴ If the goal of P&G and Colgate’s advertising was to break down brand loyalty of Lilleborg’s brands they were successful to a certain extent. Lilleborg’s total market share fell by approximately 15

percent during the detergent war.

Figure 10 decomposes Lilleborg’s market shares before and during the detergent war.²⁵ The jump in “other” brands after 1967 is due to Lilleborg’s purchase of the Persil factory. For the

other brands, Omo and Coral are fairly stable while Sol and Blenda have a general downward trend throughout the detergent war. It thus seems that the Entrants took their market shares mostly from Blenda and Sol, while Omo remained fairly strong. Based on the above data,



9: Market shares Lilleborg brands (1964-1970)

²⁴ Data on market shares collected from Lilleborg marketing plans (1965-1970) Lilleborg Museum Archives

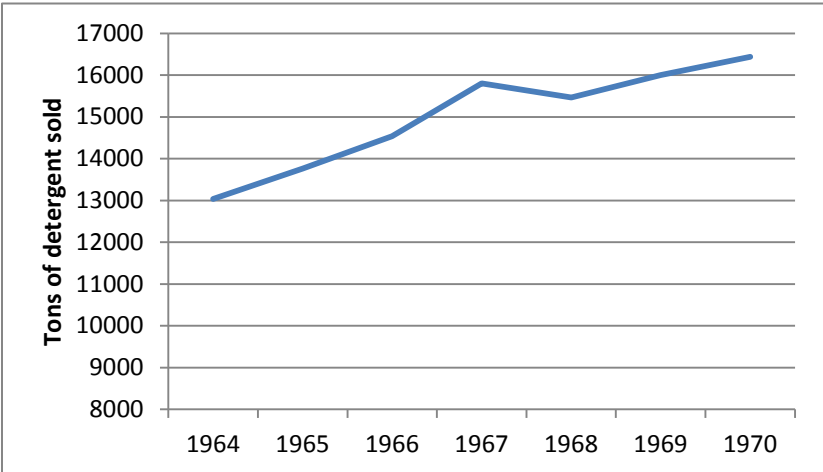
²⁵ Lilleborg Marketing plans 1965-1970, Lilleborg Museum Archives

we know that Lilleborg lost, on aggregate, approximately 15 percent market share during the detergent war. This loss came mostly from Blenda and Sol, while Omo market shares remained fairly stable. The decline in market share for Sol and Blenda was 14,4 and 15,6 respectively, a combined loss of 30 percent. The total market share for Lilleborg is thus maintained at a relatively high level due to the purchase of the Persil factory in 1967.

In the following we will largely focus on Blenda, Omo and Sol in addition to the entrant brands in an attempt to explain events and outcomes of the detergent war.

Lack of Spillover Effects

By inducing consumers that are not loyal to a brand to buy your product, spillover effects may be a useful tool in making entry less costly.



10: Detergent sales (1964-1970)

For the detergent war and the preceding period, data shows that the total market size in tons of laundry detergent is relatively stable (Figure 8).²⁶ There is a clear and relatively constant upward trend, where the only deviation is a slight increase in 1967 followed by a decrease the next year.

This may be attributed to consumers stocking up on detergents due to a sudden decline in prices. Data about Lilleborg’s advertising introduced below, clearly show an increase in advertising expenditure by the market leader. As P&G and Colgate entered, they also contributed to increase advertising outlays significantly. From this we may argue that the relatively stable upward trend in detergent sales seems to be largely unaffected by advertising outlays. Aggregate demand in the industry thus seems to be largely unaffected by total advertising outlays, reducing the scope for spillover effects from advertising.

²⁶ Figure 8 is constructed using sales and market share data collected from Lilleborg marketing plans (1965-1970) from Lilleborg Museum Archives

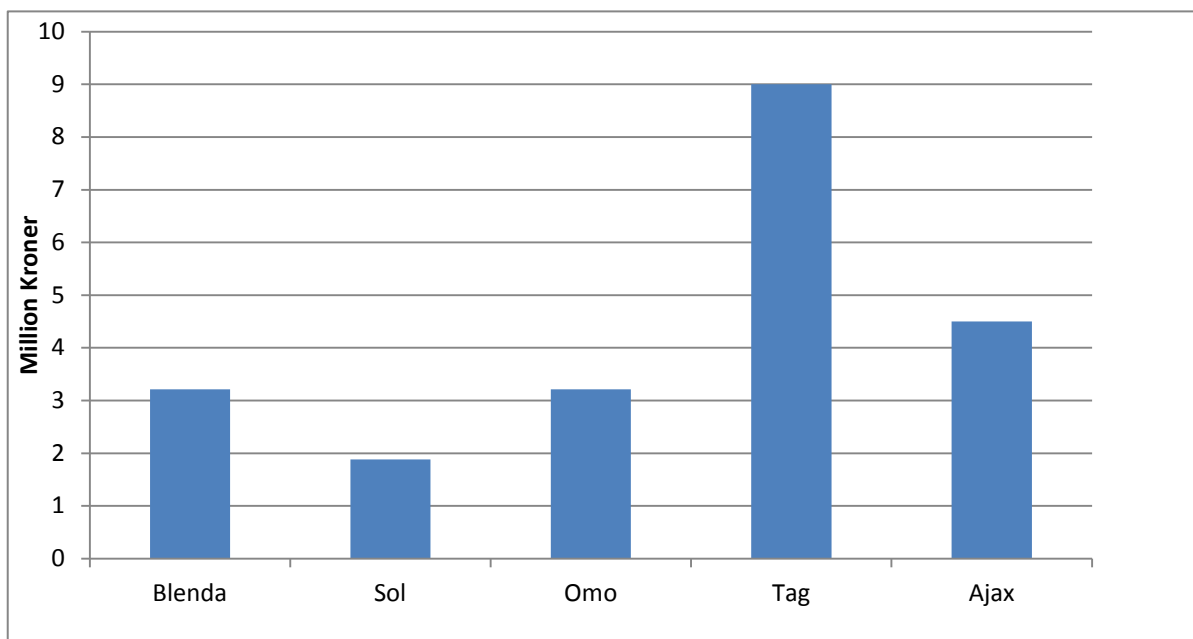
Furthermore, Lilleborg and Persil stopped their direct advertising during the early 1960 because they now meant most housewives had been introduced to powder detergent. At the time of entry, P&G and Colgate were largely unable to attract customers that did not already consume a powder detergent.

We may thus assume P&G and Colgate could not enjoy any spillover effects from their advertising, and that they were unable to attract customers that had yet to be exposed to a powder detergent. Thus, all sales had to come at the expense of an incumbent brand.

We will analyze the effectiveness of the entrants in stealing market shares in two steps below. First we will discuss if they were able to induce trial purchases, before we analyze their effectiveness in securing repurchases from consumers making the initial purchase.

Inducing Trial Purchases

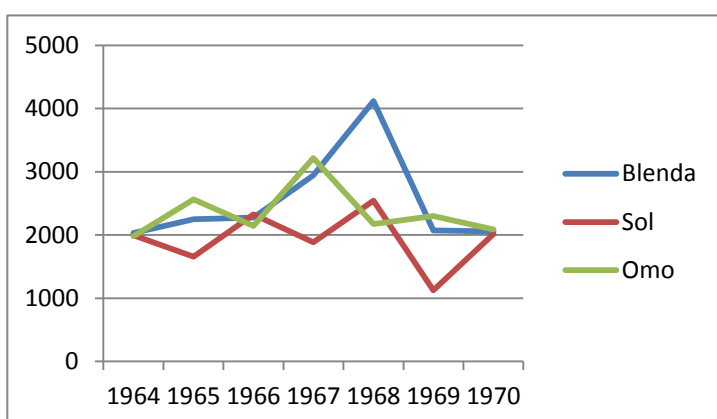
Initial trial purchases relates to the effectiveness of a firm to induce consumers to try an experience good. Since the consumer cannot know the quality of the good without purchasing it, advertising is used as a tool to induce the initial purchase. Market research performed by Lilleborg at the of Tag's test launch seems to indicate that the reason housewives bought Tag was that the image of the product signaled effectiveness and modernity (Lund, 2008, p52). The fact that housewives bought Tag based on perceived differences, not quality differences may indicate that P&G was successful in inducing initial trial purchases for Tag.



11: Advertising 1967

Looking at relative advertising levels (*figure 11*) two points of interest arise.²⁷

First, we see that advertising outlays for Tag and Ajax are significantly larger than for the incumbent brands. From Shum (2004) we know that advertising may be used to break down brand loyalty. This data strongly indicate that breaking down brand loyalty is more costly than it is for an incumbent to maintain it. The large advertising outlays for Tag and Ajax seems to have been successful in breaking down incumbent brand loyalty. On the other hand, the large levels of advertising seem to have been successful in breaking down brand loyal only for two of the three major brands.



12: Advertising Blenda, Sol, Omo 1964-1970

This turns our attention to the second point arising on the basis of the above data. Relative advertising levels among Lilleborg brands does not seem to provide a reasonable explanation for the decline of Sol and Blenda compared to Omo. The fall in market share for Blenda and Sol may thus not be explained by differences in advertising outlays

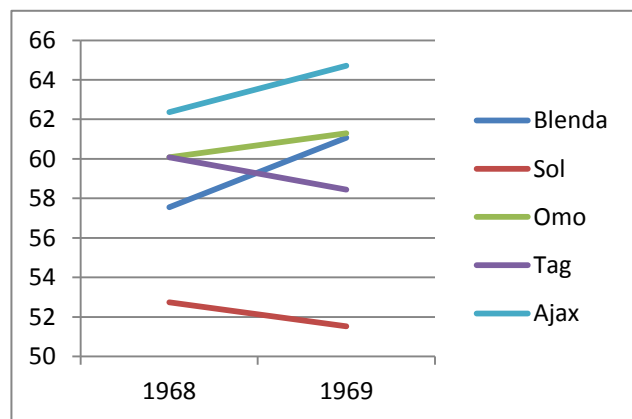
compared to Omo. The lower advertising outlay for Sol may indicate a drop for Sol compared

²⁷ Lilleborg Marketing plans 1968, Lilleborg Museum Archives. Advertising outlays for Tag and Ajax are based on Lilleborg estimates, and range from 8-10 MNOK and 4-5 MNOK.

to Omo. Looking at advertising levels for Lilleborg’s major brands throughout the detergent war (*figure 12*) we see that Blenda indeed was more heavily advertised than all the other brands.²⁸

Based on these data, two questions arise. Why did Omo’s market share remain largely unchanged despite relatively low advertising outlays compared to Blenda? Second, if the goal of advertising is to break down brand loyalty, why is the fall in market share similar for Sol and Blenda, when Blenda was advertised more heavily?

Sol’s relative strength in comparison to the more heavily advertised Blenda may be explained by looking at detergent prices. From *Figure 13* we see that Sol was clearly horizontally differentiated from the other major brands. While Blenda lost large market shares, large advertising outlays might have prevented the fall from being more significant. For Sol, the fact that this brand was positioned at the lower end of the market compared to the other brands may explain why the drop in market share was not more significant. Despite being a lower quality brand than Tag and Ajax, some of Sol’s customers remained loyal due to the fact that it was cheaper.



13: Detergent prices for major brands 1968-1969

Still, it remains to explain Sol and Blenda’s decline relative to Omo. Despite being the most heavily advertised among the incumbent brands, Blenda lost significant market share, while Omo, with lower advertising outlays remained fairly unaffected by the massive advertising outlays by the incumbents. To explain this we take one step further to analyze the effects of brand quality.

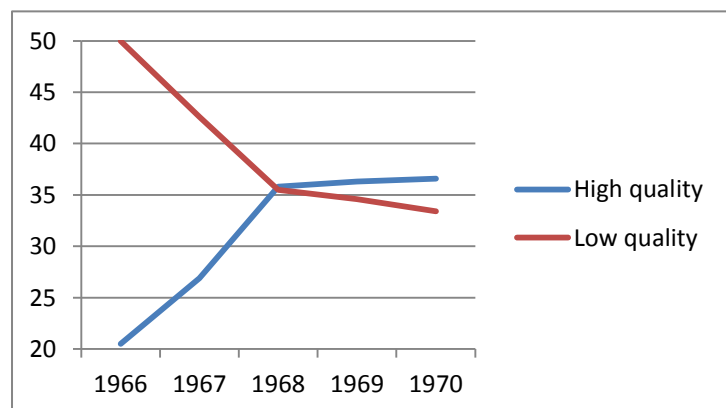
²⁸ Lilleborg Marketing plans 1965-1970, Lilleborg Museum Archives

Inducing Repurchases

Above we have been able to explain why Sol and Blenda fared relative similarly in the face of attempted entry. Still, it remains to be explained why Omo had a fairly stable market share throughout the detergent war while Blenda and Sol suffered significant losses.

In Lilleborg's market plans from this period it is clear that Tag was of superior quality to Lilleborg's products at the time Tag was test launched (Lund, 2008, p. 51). If Tag thus was able to convince housewives of making trial purchases, they should also be able to induce repurchase. As we have seen in the case of Blenda and Sol, the entrants were largely successful in breaking down brand loyalty. The relative strength of Omo may thus be explained by the fact that Lilleborg, after the test launch of Tag, embarked on a major development program aiming to strengthen the quality of their products. This program led Lilleborg to introduce an improved formulation for Omo before Tag was launched nationwide. The formulations of Blenda and Sol saw were left unchanged.

Figure 11 shows the development of high quality brands Omo, Tag and Ajax and low quality brands Blenda and Sol during the detergent war. The loss of market share of low quality brands is the same as the gain for high quality brands. The high quality entrant products Tag and Ajax, were successful not only in inducing trial purchases, but they were also were successful in inducing repurchases.



14: High quality (Omo, Tag, Ajax) and low quality brands (Blenda and Sol) 1966-1970

The developments for the first two years of the detergent war suggests that the entrants were largely successful both convincing consumers of making trial purchases and by inducing repurchases based on product quality. Why does the trend seem to stop after 1968? The lack of further growth by the entrants may be explained by two events in the detergent market.

First, Lilleborg improved the quality of Sol and Blenda in 1968. This may have reduced incentives to switch brand for housewives making a trial purchase of the entrants' product.

When consumers of Blenda and Sol did not experience an increase in quality when trying the new brand their incentives to switch brands were reduced. This in turn caused market share for Sol and Blenda to stabilize.

Second, we know from Lilleborg's marketing plans at the time that the advertising outlays for Tag and Ajax were significantly larger in 1967 and 1968 than in 1969 and 1970. As the entrants' advertising outlays were reduced, they convinced less housewives of making trial purchases. Persistent brand loyalties for incumbent brands were thus more important in determining demand, and the entrants' growth was halted.

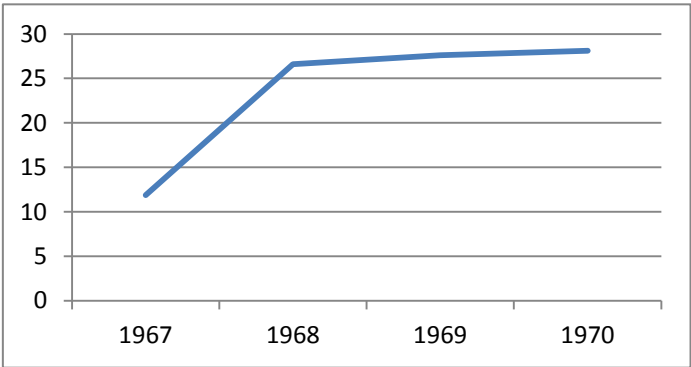
Tag and Ajax's lack of success in taking market share from similar quality products, such as Omo and the improved versions of Blenda and Sol confirm the importance of product quality in the laundry detergent market. Omo's strength, despite significantly lower advertising outlays in comparison to Tag and Ajax, suggests that to break down brand loyalties of strong incumbent products, an entrant has to offer a significant improvement in product quality. The case of Omo suggests that advertising is largely ineffective to break down brand loyalty at all for products of similar quality.

Blenda and Sol lost significant market share in the period where Tag and Ajax could provide a significant improvement in product quality but only for a while. When the quality of Sol and Blenda were improved and thus more similar to Tag and Ajax, the entrants' growth halted. For Blenda advertising outlays may have contributed to restricting the loss in the period where the entrant were able to provide an improved product, while being horizontally differentiated was able to maintain some of Sol's market share despite offering a lower quality detergent.

The Effect of Simultaneous Entry

Above we have seen that the growth of Tag and Ajax were halted in 1969, a factor that might have contributed significantly to their failed attempt at entry. This is, however, not the full story. Sol and Blenda lost approximately 30 percent of their market share from 1964- 1970. For the point of view of the entrant this should prove more than enough to make entry profitable, under the condition that a 10 percent market share was necessary to break even. In the following we will analyze how the number of entrants might have proved a deciding factor in deterring entry by P&G and Colgate. In addition to the international entrants, we will

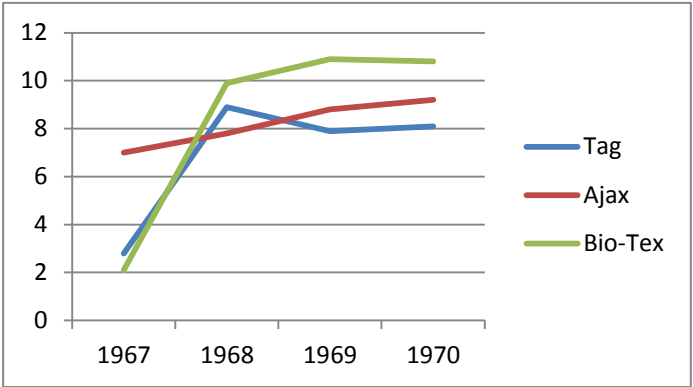
also include Bio-Tex in the analyses, the Norwegian brand introduced by Tomten a few years before the detergent war.²⁹



16: Total market share Bio-Tex, Tag, Ajax 1967-1970

Figure 16 show the development of market share for the three major entrants in the period 1967-1970.³⁰ Based on Lilleborg’s 10 percent break-even estimate for entrants, there should be room for at least two entrants in the Norwegian market. As Bio-Tex was the only brand to successfully enter the market despite the entrants’ success in

capturing almost 30 percent market share, the number of entrants might be important in explaining the failure of Tag and Ajax. First, Bio-Tex was the only brand to achieve a 10 percent market share (Figure 15). This seems to confirm that Lilleborg’s estimate of a 10 percent market share being necessary to break-even is correct.



15: Market shares Bio-Tex, Tag, Ajax 1967-1970

Despite the presence of Bio-Tex, P&G and Colgate captured approximately 17 percent of the total market, enough for one entrant to break into the market. Assuming a 10 percent being necessary to break-even, the 17 percent achieved by Colgate and P&G was not enough for two firms to enter. When P&G and Colgate did not reach this point before Sol and Blenda was improved, this may explain why their entry attempt proved unsuccessful.

Based on the above, the entrants were largely successful in breaking down the brand loyalties necessary to enter the Norwegian market. Because two entrants had to compete for the market shares they were able to ‘steal’, none of them achieved the 10 percent break-even point

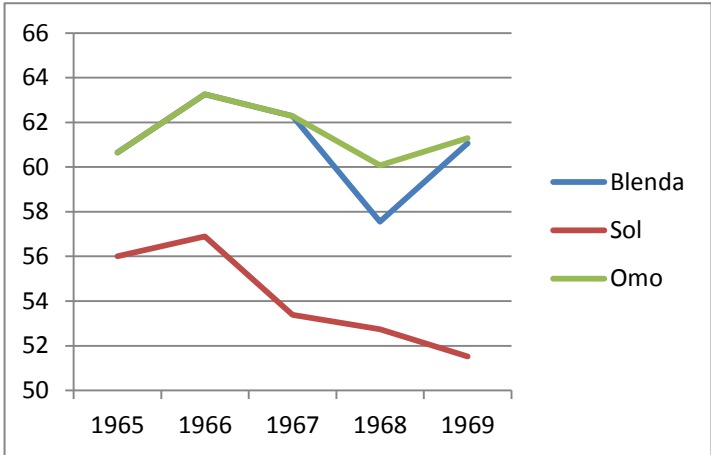
²⁹ Both P&G and Colgate introduced a second brand during the detergent war, but these brands did not achieve the same success as Bio-Tex, Tag and Ajax
³⁰ Bio-Tex was launched in Norwegian markets before liberalization in 1967, but experienced most of its growth during the detergent war period.

necessary before Lilleborg improved the quality of Sol and Blenda. That two companies attempted to enter the Norwegian market simultaneously may be a significant factor explaining their eventual failure.

Laundry Detergent Prices

According to economic theory, a concentrated market structure is often related to reducing welfare compared to a competitive market. In the following we will see how detergent prices were affected by the entry of Bio-Tex, Tag and Ajax, and make some statements about the effect Tag and Ajax’s entry had on economic welfare.

In *Figure 13* we saw that prices on laundry detergents during the detergent war were fairly similar across brands, except for Sol that was differentiated horizontally at a lower price. That prices were fairly similar across brands suggests that Tag and Ajax did not possess significant cost advantages over the incumbent to make price reductions a part of their strategy in capturing market shares. Rather than working as a tool for more efficient entrants to break into the market, price reductions for Lilleborg’s brands in the period 1967-1968 (*Figure 17*) instead contributed to deterring entry.



17: Detergent prices for Lilleborg brands 1965-1969

This drop in prices indicates that Lilleborg was able to extract some rents from the market before Tag and Ajax entered the Norwegian market.

Since Tag and Ajax’s entry caused prices to fall, their attempt at entry improved consumer welfare in the short run by giving consumers more choices and lower prices. Because we do not know the consumers’ elasticity of demand we are unable to determine if the reduction in prices resulted in a transfer of wealth from producers to consumers or a reduction in deadweight loss. Furthermore, since the reduction in prices might have been important in deterring Tag and Ajax’s entry, the initial price drop may have contributed to Lilleborg being able to extract rents in the market in the long run. While increasing consumer welfare in the short run, the fall in prices during the detergent war helped deter entry, causing higher prices

and reduced choice in the future. The negative long term effect thus cancels the positive effect in the short run, indicating that the reduction in prices in fact was not positive for consumers.

A full analysis of the welfare effects of market structure in laundry detergent markets is outside the scope of this study. Based on data for the detergent war and the preceding period, it seems the unsuccessful entry attempt did not provide significant welfare improvements in the long run, as it was used as a tool of deterring entry.

Summing Up the Detergent War

In the end, Tag and Ajax failed in gaining enough loyal customers to buy their products.

Above we have seen how the entrants were successful in breaking down brand loyalty and inducing repurchases of their products. Because there were two entrants in the market at the same time, they were not able to break down enough of incumbent brand loyalty to make simultaneous entry plausible. Despite breaking down a significant part of incumbent brand loyalty, their this lack of success may be explained either by their lack of success in tempting consumers to buy their products, or their lack of success in inducing repurchases of their brand once consumers were convinced to try it once. The former relates to the success of advertising, while the latter relates to product quality. With regards to Omo the quality of the incumbent product proved a significant factor in maintaining the brand's market share. Despite significant losses for Blenda and Sol, large advertising outlays and horizontal differentiation may have limited the losses for the incumbent, hence contributing to deterring entry.

4.2.3 1935 and 1967 – A Comparison

The situation facing Blenda in 1935 stands in stark contrast to the situation facing Tag and Ajax in 1967. Different circumstances in the detergent market at different points of industry maturity are important in explaining Tag and Ajax's failure compared to Blenda's success.

Blenda's owners enjoyed significant spillover effects by introducing their detergent to housewives in a market where no detergent yet was established. Tag and Ajax on the other hand were facing a market where consumers had already established loyalty to a brand. All

sales had thus to come at the expense of other brands, requiring costly advertising outlays to break down brand loyalties.

While Tag and Ajax faced a brand of similar quality in parts of the market, the part of the market where they were able to provide an improved product, they faced significant brand loyalties. Heavy advertising was used to defend Blenda's position, while the horizontal differentiation of Sol might have reduced the entrants' ability to take significant market shares from these brands. From the entrants' point of view, Lilleborg seems to have been more effective in communicating with consumers through advertising messages in 1935 than for Colgate and P&G was in 1967.

While Blenda, according to Lilleborg sources, provided a superior quality detergent compared to all alternatives available in 1935, Tag and Ajax had to compete against an incumbent of similar quality in Omo. While Sol and Blenda were of inferior quality for a while, Lilleborg updated their formulations and increased product quality during the detergent war. As we have seen it has proven difficult to break down brand loyalties for products of similar quality, contributing largely to Tag and Ajax's failure.

Further, Colgate and P&G's apparent lack of cost advantages reduced the scope for price wars as a tool to push Lilleborg out of the market. The fact that entry was attempted simultaneously by two firms in 1967, at a time when the industry experienced net exit, also had a negative effect on their eventual success.

Above we analyze why P&G and Colgate were unsuccessful in entering Norwegian laundry detergent markets in the late 1960s. Because of strong brand loyalties, entry was costly after the industry had matured. Since breaking down brand loyalty is costly, and in the case where products are of similar quality merely impossible, successful entry to the Norwegian laundry detergent market has been limited to the entry of Bio-Tex.

This lack of entry explains why current market structure is similar to the market structure prevailing in the 1930s, when the dominant detergent design was 'discovered'. The analysis provided of the detergent war in the late 1960s does not rule out entry, it indicates that entry require special circumstances such as an entrant providing a product of improved quality. In the case where an entrant is able to introduce an improved product, entry will still be costly.

Despite offering a high quality product, successful entry is not at all certain, explaining why entry into the Norwegian laundry detergent market has been so limited.

4.3 Brand Loyalty and Trade Liberalization

Above we have seen the effects industry maturity have on entry costs in the Norwegian laundry detergent market. The increase in the cost of entry caused by significant brand loyalties may make entry into mature industries prohibitively expensive.

Since entry into the Norwegian detergent market occurred following a wider liberalization of trade, the above analysis may be relevant for explaining market structure in similar industries. Generally, 2 conditions are necessary for a situation like the one occurring in the Norwegian laundry detergent market to arise.

1. The goods sold in the industry must be experience goods, and brand loyalty must be important in determining demand.
2. The industry must have matured before trade was liberalized, in this case 1967. The entrant must thus not be able to provide an improvement on the dominant design.

In such industries, the market structure prevailing in the industry at its infancy is more likely to prevail in current markets if:

1. There are no spillover effects from advertising in the industry hence market structure is more likely to be unchanged in markets for necessities than for luxury goods.
2. Dominant product design has remained largely unchanged after liberalization.

The product may have changed, but the more often changes occurs, the more likely it is that a potential entrant have been able to use the change in the dominant design to enter the market. For the laundry detergent market, changes in product formulations occur relatively often, and the real question with regards to changes in market structure relates to whether there have been changes in the dominant design that have not immediately been filled by the incumbent.

As mentioned above, there were several industry specific causes explaining why entry into the detergent market proved costly. The interrelationship between advertising effectiveness and trade liberalization following the EFTA agreement might still be an interesting topic for

studying similar industries. Investigating market structure in industries that fit the above description is outside the scope of this study.

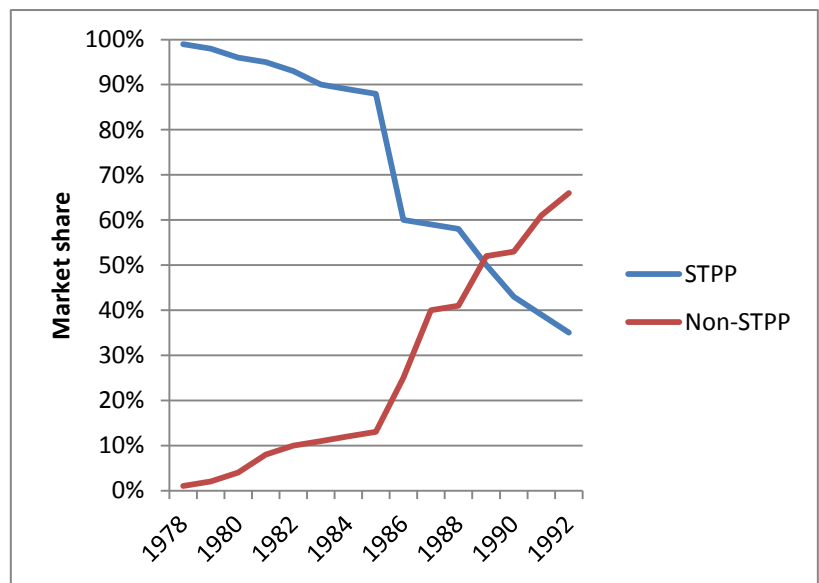
4.4 Other Entry Barriers

After the detergent war, the dominant design and brand loyalties for Lilleborg was largely stable. Still, the STPP ban and Lilleborg’s brand proliferation strategy may be interesting to analyze in the context of explaining current market structure.

Environmental Regulation

Imposing a ban on the use of STPP in detergents may effectively deter entry from all producers that cannot produce a detergent without STPP. Norway was one of very few countries that imposed such a ban in the 1980s. This may have been a significant barrier to entry.

Among the big 4, Lilleborg’s ownership of the Persil brand and close ties with Unilever reduced potential competition in Norwegian markets to Colgate and P&G. Having already failed to enter Norwegian markets in the late 1960s, P&G and Colgate’s hunger for attempting entry in Norwegian markets is likely to have been low.



18: STPP use in Western Europe

Among the big 4, environmental considerations were a part of Henkel’s strategy. They were hence the most aggressive in developing non-STPP detergents. *Figure 13* taken from Morse et al. (1995, p. 112) and shows the availability of non-STPP detergents in Western Europe. In the early 1990s, approximately 70 percent of the population in Western Europe had access to non-STPP detergent. The STPP ban is unlikely to provide a significant barrier to entry at this point, since most detergent producers thus have a non-STPP brand available. Due to the discussion above about product quality, it would be necessary to know the quality of STPP

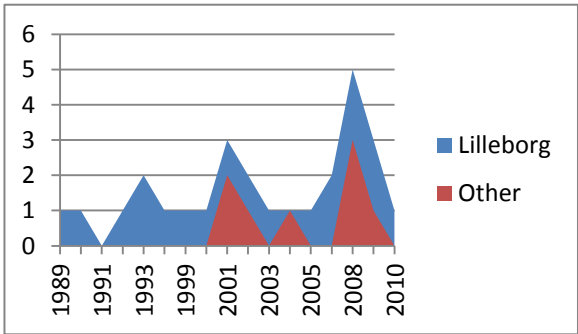
substitutes among all potential entrants to know if the STPP ban provided a significant barrier to entry. Morse et al. (1995) also provide data on which countries imposed restrictions on STPP use. In the 1980s, the countries that imposed restrictions or an outright ban were Sweden, Finland, Germany, Netherlands, Norway, Italy, Austria, Switzerland and Belgium. In several of these countries Henkel control the Persil brand, and the early development of non-STPP may be due to Henkel’s efforts in developing non-STPP detergents.

The development of non-STPP detergents in Western Europe in the early 1990s is evidence that the STPP ban cannot have proved a significant barrier to entry in Norwegian detergent markets in the 1990s. In the 80s we may not draw such conclusions. Henkel was the most aggressive in developing alternatives to STPP, and in Norway, Lilleborg owned Henkel’s major brand thus providing an important barrier to entry from Henkel. We may not conclude that restrictions and later ban on STPP use in detergents provided a significant barrier to entry into Norwegian detergent markets in the 1980s, but based on the data introduced above we most certainly cannot rule out that the ban on STPP may have had entry deterring effects.

Monopolization by Brand Proliferation

Already in chapter 2 we established that Lilleborg have been following a strategy of monopolization by brand proliferation. *Figure 19* and *figure 20* shows Lilleborg and other firm’s product launches since 1989.³¹ The number of variants launched by Lilleborg follows the number of launches by other market participants closely. This surely strengthen the view that Lilleborg’s statement of launching several product varieties to ‘fill all black holes’ is

followed by the firm in the market as well.



19: Product launches 1989-2011

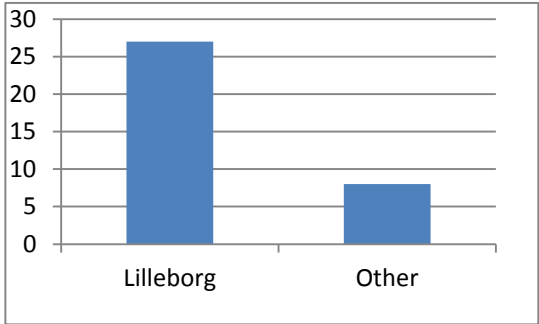
According to Thomas (1989) only the number 1 and 2 brands in a FMCG market usually provide significant rents for their owners. This should indicate that Lilleborg, already controlling the top 3 brands, has no incentive to launch new products based solely on profit opportunities that may arise in market niches.

The incentive for launching many product varieties under the condition that only the number

³¹ Constructed based on data on new product launches provided by Lilleborg CFO, Stein Eriksen

1 and 2 brand is profitable should thus not be to increase profits, but rather to reduce the probability of other firms taking over the number 1 and two positions by entering the market through a profitable niche.

The most interesting part of analyzing such a strategy is whether or not it is profitable. Based on the framework for analyzing strategic investment as an entry deterring strategy the profitability of such a strategy depends on the firm's reaction curves, and on the success of the strategy. Lilleborg have clearly chosen a strategy, where the major laundry detergent producer, overinvest to deter entry, a so called Top Dog Strategy. Such behavior should indicate that the market leader either believes decision variables to be strategic complements, or that it will be able to deter entry.



20: Product launches 1989-2011

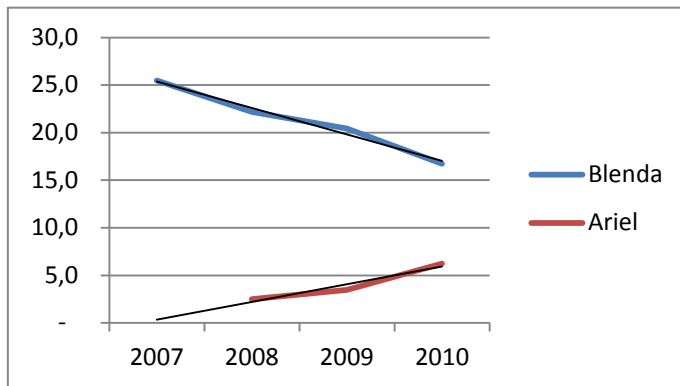
Assume that only the number 1 and 2 brands are profitable in Norwegian laundry detergent markets we may argue that the goal of a brand proliferation strategy is to reduce the likelihood that a potential entrant is able to locate a niche that may grow enough so as to take over the number 1 and 2 positions. If an entrant was to be successful in establishing itself as a number 1 or 2 brand, the investment made in deterrence will not increase incumbent profits, since only the number 1 and 2 brands are profitable. Decision variables are thus strategic substitutes, indicating that Lilleborg in fact is convinced they will be able to deter entry.

Based on Lilleborg's current market position, successful entry deterrence seems plausible, leading us to the analysis on current detergent markets.

4.5 Current Detergent Markets

The strategy employed by Lilleborg indicate that they are convinced they will be able to deter potential entrants from taking over the number 1 and 2 positions in the Norwegian detergent market. During the second detergent war, Omo's market share seems to be fairly stable, while Blenda is losing significant market share. This is similar to the situation in the late 1960s and may indicate that Blenda is not of the same quality as Omo and Ariel. Lilleborg's concern should thus be with improving the quality of the number 2 product.

Figure 16, showing an excerpt from the market share figure introduced in chapter two showing only Blenda and Ariel indicate the developments of the last few years and shows



21: Market shares Blenda and Ariel (2007-2010)

how. If the trend continues we will see Ariel take over Blenda's position as the number two brand in Norway.

Concerning the welfare effects of such a change, the last 10 years have definitely provided consumers with more choices in the detergent market. If the entry during the second detergent war has had the same effects on prices as it did in the late 1960s, the entry occurring in

Norwegian detergent markets after 2000 will cause a transfer of wealth from detergent producers to detergent consumers or a reduction in deadweight loss depending of the consumers' elasticity of substitution.

5 Conclusions

Laundry detergent is an experience good, meaning that consumer experience in using and verifying the quality of the good is important in determining demand. This causes brand loyalty to be important in determining final sales. We have seen that Lilleborg was able to build up strong brand loyalties for their products after the launch of Blenda in 1935. As laundry detergent settled down on a dominant product design, the industry slowly matured, and several firms exited the detergent market. That Blenda, launched in 1935, and Omo, launched in 1952, are still the two most sold laundry detergents in Norway is a good indicator that their brand loyalties have been strong in the mature detergent market.

Because of these strong brand loyalties, entry into the Norwegian detergent market is costly. This is especially the case after markets matured. We have seen that two major multinationals have been deterred from entering the Norwegian laundry detergent market in the late 1960s. Their lack of success may be explained by the fact that breaking down brand loyalties was very expensive. Despite introducing products that provided an improvement in quality to some of the incumbent brands, they were not able reach the break-even point.

For explaining current market structure, the general observation that entry into the mature detergent market is expensive is important. The failed entry attempt by P&G and Colgate in the late 1960s may thus have provided an important signal to potential entrants that this market was impenetrable. Despite their failure, the attempt of Procter & Gamble and Colgate was also a matter of circumstances surrounding this particular attempt of entry. The fact that Lilleborg was quick to improve their Omo brand and later Sol and Blenda meant the potential market available for the entrants was smaller. Since there were two entrants competing for a limited share of the market may also be important in explaining their failed attempt at entry.

The evolution of the detergent industry as described by the development of entry and exit patterns is important in explaining current market structure. Similarly, strong brand loyalties persist, making entry into the industry costly. In the case of attempted entry into the Norwegian detergent market, entry proved to be prohibitively costly, even for multinationals like Colgate and P&G that no doubt had the financial muscle necessary to break in to the Norwegian market had they been convinced it would prove to be profitable in the long term.

While strong brand loyalties may explain why entry has not occurred in mature detergent markets, special circumstances surrounding the Norwegian market may explain why entry did not occur in while the market was still developing. Tariffs on soap may have proved a barrier to deterring entry by foreign companies before strong brand loyalties had been built up. Once trade was liberalized, the brand loyalties associated with the market leader's brands proved difficult to break down.

Despite strong brand loyalties, we have also seen that they may be broken down, and entry may be possible if the entrant can provide an improvement in product quality over incumbent brands. This explains why Tag and Ajax were close to breaking into Norwegian markets in the late 1960s. Despite the observation that entry seems plausible in the case where a higher quality product is provided, entry requires large advertising outlays. Because of this, entrants may still find entry to be unprofitable despite offering a higher quality product.

Explaining current market structure is the main task of this thesis. In doing so, I have chosen to analyze the history of detergent markets, and why entry has proved not to be successful in the past. Since market structure is similar today as it was in the late 1930s, entry barriers arising after this point in the history of the detergent market should provide most important factor in explaining current market structure. The general conclusion is that strong brand loyalties are the main reason why market structure today is largely unchanged for the last 80 years. It is also important to emphasize that it is possible to break down brand loyalty, as we have seen in the case of the detergent war. To maintain its position it is thus important for the incumbent to make sure the quality of their product high enough. If this is the case, entry is not only costly, but as we have seen in the case of the detergent war, prohibitively costly.

Entry barriers arising after industry maturity in the Norwegian laundry detergent market is found to be the main reason why market structure has been largely unchanged for the last 70 years. The initial market structure that developed in the industry before maturity is thus found to be largely unchanged. With regards to explaining the market structure that developed in the industry before maturity, available data indicate that Lilleborg's advertising is an important factor. Due to lack of data available about the Norwegian laundry detergent market in the 1930s the certainty surrounding our conclusions about the infant industry is not the same as for our analysis in the mature industry. Based on the available data we may be fairly certain about why entrants were unable to enter the Norwegian detergent market after 1940. With regards to explaining developments before maturity lack of data results in less certainty

surrounding the causes of why Lilleborg ended up being the number one producer of detergent in the 1930s. Based on available data and the industry history, Lilleborg's launch of Blenda in 1935 and the accompanying advertising campaign seems to be the main factor in explaining the initial market structure that developed at the time before the industry found their dominant design and evolved into a mature industry.

A more concentrated market structure is usually associated with reduced economic welfare. This study has not focused on welfare analysis, but developments of price levels during the attempted entry by Tag and Ajax indicate that Lilleborg have been able to extract some rents from the market. Because we do not know the consumers' elasticity of demand we are unable to conclude whether the reduction of prices is a mere transfer of wealth from consumers to producers, or if there is deadweight loss associated with the higher prices charged.

When it comes to future developments in the Norwegian detergent market, the situation seems more complicated. Based on the analysis above we know that consumers should expect high quality laundry detergent in spite of the seemingly dominant position of the market leader. High entry from private label and international brands the last few years indicates that a new detergent war is being fought in the Norwegian laundry detergent market. Based on the analysis of the history of the laundry detergent market provided above we do know that to be successful, the entrants should offer a product providing improved quality over incumbent brands. At the same time they should expect significant amounts of advertising outlays to break down incumbent brand loyalty. If entrants are successful in these endeavors, times may in fact be a-changing in the Norwegian laundry detergent market.

Sources

Literature

- Ackerberg, Daniel A. (2001). Empirically Distinguishing Informative and Prestige Effects of Advertising. *The RAND Journal of Economics*, 32(2), 316-333.
- Agarwal, Rajshree, & Gort, Michael. (1996). The Evolution of Markets and Entry, Exit and Survival of Firms. *The Review of Economics and Statistics*, 78(3), 489-498.
- Clarke, Darral G. (1976). Econometric Measurement of the Duration of Advertising Effect on Sales. *Journal of Marketing Research*, 13(4), 345-357.
- Gordon, R. Foxall. (1999). The Substitutability of Brands. *Managerial and Decision Economics*, 20(5), 241-257.
- Jacobsen, Tove. (1976). *Krise og markedsutvidende tiltak: en undersøkelse av krisens virkninger på produsenters bruk av markedsutvidende tiltak i mellomkrigstiden*. [T. Jacobsen], Tromsø.
- Jensen, Anders. (1999). *Goma Fabrikker - Ello 100 år*: Lilleborg AS Avd. Ello.
- Jones, Geoffrey. (2005). *Renewing Unilever: transformation and tradition*. Oxford: Oxford University Press.
- Kaldor, Nicholas. (1950). The Economic Aspects of Advertising. *The Review of Economic Studies*, 18(1), 1-27.
- Larsen, Leif Ove. (1990). *Ren, pen og moderne: sosialhistoriske perspektiver på reklame og analyser av Denofa-Lilleborgs reklamefilmer 1927-1988* (Vol. nr 2, 1990). Oslo: Rådet.
- Lilleborg. (1968). *Årsberetning og regnskap for A/S De-No-Fa for Lilleborg Fabrikker 1967* (*Annual Report and Accounts, 1967*), Lilleborg Museum Archives
- Lilleborg. (1983). *150 år ved Akerselven* (1983 ed., pp. 45). Oslo: A/S Denofa og Lilleborg Fabrikker.
- Lilleborg. (2009). *Det rene eventyr - Lilleborg 175 år*: Lilleborg AS.
- Lund, Ellen Cathrine. (2008). *Branding Blenda: Lilleborgs markedsføring overfor husmødre 1950-1970*. nr. 351, Det humanistiske fakultet, Universitetet i Oslo, Oslo.
- Martin, Stephen. (2010). *Industrial organization in context*. Oxford: Oxford University Press.
- Morse, Gary K., Perry, Roger, & Lester, John N. (1995). The Impact of Sodium Tripolyphosphate Substitution in Western Europe. *Ambio*, 24(2), 112-118.

- Nelson, Phillip. (1970). Information and Consumer Behavior. *The Journal of Political Economy*, 78(2), 311-329.
- Nelson, Phillip. (1974). Advertising as Information. *The Journal of Political Economy*, 82(4), 729-754.
- Sandvik, Pål Thonstad. (2010). Såpekrigen 1930-31 - Lilleborgsaken, venstrestaten og norsk økonomisk nasjonalisme [The Soap War 1930-31]. *Historisk Tidsskrift*, 03, 25.
- Sandvik, Pål Thonstad, & Storli, Espen. *Encountering economic nationalism, Lever's, Van den Bergh's and Jürgen's expansion into Norway 1912-1935*. Forthcoming
- Schmalensee, Richard. (1978a). Entry Deterrence in the Ready-to-Eat Breakfast Cereal Industry. *The Bell Journal of Economics*, 9(2), 305-327.
- Schmalensee, Richard. (1978b). A Model of Advertising and Product Quality. *The Journal of Political Economy*, 86(3), 485-503.
- Shum, Matthew. (2004). Does Advertising Overcome Brand Loyalty? Evidence from the Breakfast-Cereals Market. *Journal of Economics & Management Strategy*, 13(2), 241-272. doi: 10.1111/j.1530-9134.2004.00010.x
- Spence, A. Michael. (1980). Notes on Advertising, Economies of Scale, and Entry Barriers. *The Quarterly Journal of Economics*, 95(3), 493-507.
- Sutton, John. (1991). *Sunk costs and market structure, price competition, advertising and the evolution of concentration*: The MIT Press.
- Sørgard, Lars. (1997). *Konkurransestrategi - Eksempler på anvendt mikroøkonomi* (2 ed.): Fagbokforlaget.
- Thomas, Lacy Glenn. (1989). Advertising in Consumer Goods Industries: Durability, Economies of Scale, and Heterogeneity. *Journal of Law and Economics*, 32(1), 163-193.
- Thoner, Kristoffer. (2006). *Change management in Lilleborg, a Part of the degree Master of Business Administration.*, University of Bath, Bath.
- Tirole, Jean. (1988). *The theory of industrial organization*. Cambridge, Mass.: MIT Press.
- Unger. (1997). *Fra såpe til tensider og surfacanter, Unger Fabrikker A.S, gjennom 75 år (1922-1997)*: Unger Fabrikker AS.
- Varian, Hal. (2006). *Intermediate microeconomics, a modern approach* (7 ed.): W.W. Norton & Company.

Data Sources

Bore, Ragnhild Rein, & by), Tor Skoglund (edited. (2008). *Fra håndkraft til høyteknologi, norsk industri siden 1829*. Statistics Norway.

Jacobsen, Tove. (1976). *Krise og markedsutvidende tiltak: en undersøkelse av krisens virkninger på produsenters bruk av markedsutvidende tiltak i mellomkrigstiden*. [T. Jacobsen], Tromsø.

Lilleborg. (1963). *Marketing Plans 1964*, Lilleborg Museum Archives

Lilleborg. (1964). *Marketing Plans 1965*, Lilleborg Museum Archives

Lilleborg. (1965). *Marketing Plans 1966*, Lilleborg Museum Archives

Lilleborg. (1966). *Marketing Plans 1967*, Lilleborg Museum Archives

Lilleborg. (1967). *Marketing Plans 1968*, Lilleborg Museum Archives

Lilleborg. (1968). *Marketing Plans 1969*, Lilleborg Museum Archives

Lilleborg. (1969). *Marketing Plans 1970*, Lilleborg Museum Archives

Statistics Norway. (1915). *Fabrikkællingen i Norge (Census of Establishments) 1909 Fjerde Hefte, Produksjonsstatistik*. Statistics Norway.

Statistics Norway. (1933 -1996). *Norges Industri, Produksjonsstatistikk (Manufacturing Statistics) 1931-1994*. Statistics Norway.

Issues:

NOS IX 1 1931

NOS IX. 19 1932

NOS IX 44 1933

NOS IX 75 1934

NOS IX 105 1935

NOS IX 131 1936

NOS IX 157 1937

NOS IX 188 1938

NOS X 16 1939

NOS X 44 1940

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NOS XI 1751952 og 1915
NOS XI 206 1953 og 1952
NOS XI 245 1954 og 1953
NOS XI 278 1955 og 1954
NOS XI 320 1956 og 1955
NOS XI 349 1957 og 1956
NOS XII 31 1958
NOS XII 55 1959
NOS XII 81 1960
NOS XII 121 1961
NOS XII 143 1962
NOS XII 172 1963
NOS A 120 1963
NOS A 157 1964
NOS A 179 1965
NOS A 217 1966
NOS A 256 1967
NOS A 310 1968
NOS A 385 1969
NOS A 485 1970
NOS A 530 1971
NOS A 647 1972
NOS A 702 1973
NOS A 791 1974
NOS A 847 1975
NOS A 949 1976
NOS B 15 1977

NOS B 98 1978
NOS B 194 1979
NOS B 273 1980
NOS B 384 1981
NOS B 456 1982
NOS B 538 1983
NOS B 597 1984
NOS B 673 1985
NOS B 755 1986
NOS B 836 1987
NOS B 914 1988
NOS B 989 1989
NOS C 36 1990
NOS C 89 1991
NOS C 162 1992
NOS C 253 1993
NOS C 327 1994.

Appendix

Appendix A – Cournot Competition

The simplest form of Cournot competition is the duopoly case in a one shot game, with homogenous products as described by Sørsgard 1997. The firm's decision variable, quantity of production, is not known to other when they each make their production decision. The market price is determined as a function of total quantity produced, given by

$$P = A - B(Q_1 + Q_2)$$

Q_1 and Q_2 are quantities chosen by firm 1 and 2 respectively. Assuming constant marginal cost, and zero fixed costs, the profit function for firm 1 is given by

$$\pi_1 = [A - B(Q_1 + Q_2)]Q_1 - C_1Q_1$$

The market equilibrium is the situation where both firms choose their optimal level of production, given the other firms level of production. Since the market price depends on the firm's output decision, each firm will take into account the effect increased quantity will have on the market price. Each firm will also take into account the production decision of the other firms when making its production decision. Each firm's reaction function satisfies the first order conditions of their profit functions,

$$\frac{\partial \pi_1}{\partial Q_1} = A - C_1 - 2BQ_1 - BQ_2 = 0$$

Solving for Q_1 we get firm 1s reaction function which is a function of the other firms produced quantity.

$$Q_1 = \frac{A - C_1 - BQ_2}{2B} \equiv R_1(Q_2)$$

Similarly for firm 2:

$$Q_2 = \frac{A - C_2 - BQ_1}{2B} \equiv R_2(Q_1)$$

The relationship between the decision variables of the two firms is given by

$$\frac{dQ_2}{dQ_1} = -\frac{1}{2} < 0$$

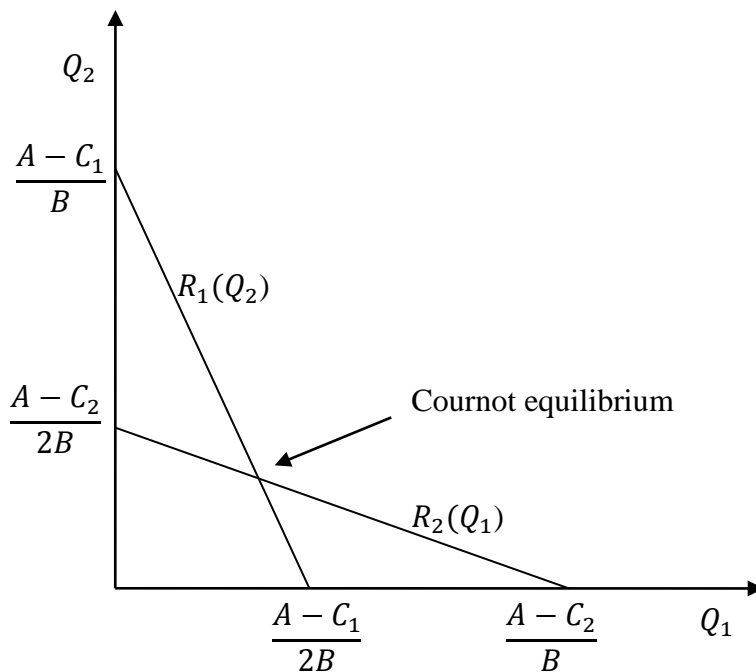
The interpretation of this is that the larger quantity firm 1 chooses, the smaller quantity firm 2 should choose. We say the decision variables are strategic substitutes, in the respect that when the opponents increase his decision variable we have incentive to lower ours.

The equilibrium is found by inserting firm 2's reaction function into firm 1's. This yields the following expression

$$Q_1 = \frac{A - C_1 - B\left[\frac{A - C_2 - BQ_1}{Q_2}\right]}{Q_1}$$

Solving for Q1

$$Q_1^* = \frac{A - 2C_1 + C_2}{3B}$$



Appendix B – Games of Commitment

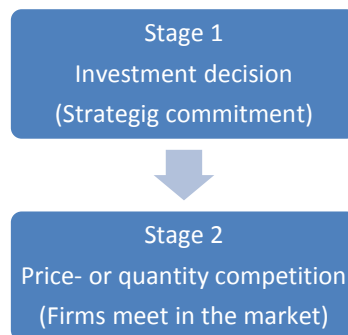
A firm's decision may be related to how it may maximize its present profits. Firms also care about future profits, and may take action in a bid to maximize their expected profits in the future. When a firm makes a decision so as to affect its own or its rival's future decisions, we say that the firm is acting strategically.

Strategic commitment

In the following I will introduce model in an attempt to understand a firm's strategic behavior. The starting point is a two stage game where investment is the firm's decision variable. The model will attempt to understand how a dominant firm may use investment as a tool to increase its future profits in the case where there is a potential entrant. The presentation will follow Sørsgard 1997's presentation of the strategic commitment model.

The two stage game

At stage 1, a firm will make an investment decision involving some sunk cost. At stage two in the game, the firm will either continue to operate as a monopolist, or compete a la Bertrand or Cournot. The presentation will follow Sørsgard 1997.



Two stage game (Sørsgard, 1997 p. 132)

For a firm's decision to have a long term strategic effect (an effect on potential entrant's future behavior), the following two conditions must be met

1. The decision must be observable by the other firm
2. The decision must incur some credible change in the incumbent's future decisions

The strategic effect of a decision by the firm may be categorized into an indirect and a direct effect.

- The indirect effect works will change the way the incumbent are likely to act in the future in the face of entry. An example is actions making price war a profitable strategy for the incumbent in the case of entry. Through changing its own optimal strategy in the face of entry the incumbent hopes to change the potential entrants' entry decision, or the entrants' behavior post entry.
- A strategic decision may also have a direct effect by changing potential entrant's decisions directly. The direct effect may work in two different ways. The incumbent's actions may:
 1. Change the costs of the potential entrant.
 2. Affect the market size the entrant faces.

When acting strategically, the firm will choose its strategy based on what it sees as the ultimate goal of the strategy. There are two possible scenarios

1. The firm thinks it might be able to deter entry, and hence choose a strategy that will reduce the potential entrants post entry profits to zero.
2. The firm is unable to prevent the firm from entering the industry. In this case it might still be in the interest of the firm to act strategically to increase its own post entry profits.

We will examine both strategies in the following.

Entry Deterrence

We are assuming a firm is able to deter entry by the potential incumbent by making an investment involving a sunk cost K . K is observed by the other firm before the entry decision is made at step two of the game. In step one of the game K is a decision variable for firm 1, while x_1 and x_2 is the decision variable for the two firms in stage two of the game, should the new firm decide to enter the industry. When the decision of x is made, K is known, so that x_1 and x_2 are functions of K .

To deter entry, firm 1 has to choose K such that the post entry profits of firm 2 is equal to zero. Firm 2's profit function will have the form:

$$\pi_2(K, x_1^*(K), x_2^*(K))$$

To find how firm 1 may choose K to make entry unprofitable for firm 2, we differentiate firm 2's profit function with respect to K.

$$\frac{d\pi_2}{dK} = \frac{\partial\pi_2}{\partial K} + \frac{\partial\pi_2}{\partial x_1} \frac{dx_1^*}{dK} + \frac{\partial\pi_2}{\partial x_2} \frac{dx_2^*}{dK}$$

- The first expression $\frac{\partial\pi_2}{\partial K}$ on the right hand side is the direct effect the incumbent's investment. As mentioned above, the direct effect may change both costs and the market size facing the potential entrant.
- The second expression, $\frac{\partial\pi_2}{\partial x_1} \frac{dx_1^*}{dK}$, measures the strategic effect. K changes the incumbent's behavior in the second stage of the game. The indirect effect measures how this change in behavior affects the potential entrants post entry profits.
- Assuming firms choose the optimal level of their decision variable we may skip the third part of the right hand side expression in our analysis, since this includes the marginal change in the firm's decision variable, that under optimality necessarily have to equal 0.

The total effect on the entrant's profits depends on the sum of the direct effect and the indirect effect.

The incumbent want to choose a level of K so that the entrant's profits are reduced to zero. What this means for the actual choice of K, depends on qualitative effect the investment has on the entrant.

- If $\frac{\partial\pi_2}{\partial K} < 0$, increased investment by the incumbent reduces profits for the entrant. In this case the incumbent should invest more than he would do in the absence of strategic considerations to deter entry by the potential entrant.

- In this case where $\frac{\partial \pi_2}{\partial K} > 0$ the incumbent should invest less to deter entry, compared to the situation where strategic considerations are not a part of the incumbents decision making.

The above model describes how a firm should act in if its strategy is to reduce the potential entrants post entry profits to 0. Still, it might be the case that the incumbent is not able to reduce the entrant's profits to zero. In the next section we will discuss how a firm should act in the case where it believes that it cannot deter entry.

Accommodated Entry

Even though an incumbent decides to let another firm enter a given market, it might be in the incumbent's interest to behave strategically. Compared to the case where the incumbent choose a strategy of deterrence, the goal of an accommodation strategy is not to push the potential entrant's profits to zero, but rather to maximize the incumbent's post entry profits.

We continue by using the investment level K as the incumbent's decision variable.

Differentiating π_1 with respect to K we find how the incumbent's investment level affects its own profits.

$$\frac{d\pi_1}{dK} = \frac{\partial \pi_1}{\partial K} + \frac{\partial \pi_2}{\partial x_2} \frac{dx_2^*}{dK} + \frac{\partial \pi_1}{\partial x_1} \frac{dx_1^*}{dK}$$

- The first expression is the direct effect. That is, how much an investment will affect the incumbent's fixed costs.
- The second part of the expression is the strategic effect. The strategic effect will determine if the firm should invest more or less, compared to a situation where strategic considerations are absent.
- Assuming the incumbent will make an optimal production decision, the third expression on the right hand side will equal zero.

The aggregated effect is found by decomposing the second part of the expression on the right hand side.

$$\frac{\partial \pi_1}{\partial x_2} \frac{dx_2^*}{dK} = \frac{\partial \pi_1}{\partial x_2} \frac{dx_2^*}{dx_1} \frac{dx_1^*}{dK}$$

- The first expression on the right hand side is the effect of the incumbent's profit in a change in the entrant's decision variable.
- The second part of the right hand side expression is the derivative of the entrants reaction function, how the entrant's decision variable is affected by a change in the incumbent's decision variable.
- The last part of this expression is the effect of the investment on the entrant's behavior in the second stage of the game.

Not considering the second part of the right hand side expression, the two parts remaining is analogous to the strategic effect in the case of entry deterrence. In the case of entry deterrence, the potential entrant is never present in the market, and hence we don't have to take into account how firms would compete in the case of entry. In the case where entry takes place, we have to take into account how competition in the market will take place post entry.

$\frac{dx_2^*}{dx_1}$ is the slope of the reaction curve. If the slope of reaction curves is negative (as in Cournot competition), the strategy a firm should employ in the accommodated entry case is the same as the strategy it should employ in the case of entry deterrence. In the case of Bertrand competition with upward sloping reaction curves, the optimal strategy employed by the incumbent is qualitatively different in the case of accommodated entry compared with entry deterrence.

In Bertrand competition decision variables are strategic complements, and reaction curves are upward sloping. In Cournot competition they are downward sloping and decision variables are strategic substitutes.

When the market is characterized by Cournot competition, the strategy choice will not depend whether or not the incumbent chooses a strategy of entry deterrence or accommodation. In Cournot competition, the decision variables (quantities) are strategic substitutes. If the incumbent choose to produce a large quantity to deter entry, the entrant should also produce a low quantity if the strategy fails.

In the case of Bertrand competition, the firm's decision variables are strategic complements. In this case the incumbent should choose opposite strategies if the firm choose an accommodation-strategy compared to a deterrence-strategy.

Graphically, in Cournot competition, aggressive behavior will shift the incumbent's reaction curve out while in Bertrand competition, investment will cause the incumbent's reaction curve to shift inwards.