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The value and market effects of eco-labeled products in the Norwegian grocery market - An empirical analysis

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The value and market effects of eco-labeled products in the Norwegian grocery market - An empirical analysis

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ABSTRACT

The existing research on eco-friendly purchasing relies heavily on stated preferences, which are commonly measured through consumer surveys based on hypothetical market settings. In this study, we instead utilize real purchasing data from a Norwegian grocery chain in order to uncover revealed preferences for eco-labeled products, more specifically products labeled with the Nordic Swan. We use multiple regression and a difference-in-differences analysis to quantify the effect the Nordic Swan has on the price and quantity sold of different consumables. Comparing this to previous findings of willingness to pay for eco-friendly products enables us to evaluate whether there exists a hypothetical bias in the market for these types of goods. We find an average price premium of 21 percent for products labeled with the Nordic Swan, in addition to an average increase in sales volumes of 3 percent. However, we find large variations across different product categories. Overall, our results coincide with findings in the existing literature and hence, this study does not provide ground to claim that there exists a hypothetical bias in the market for eco-friendly goods. The study concludes by urging grocery stores to increase their assortment of eco-labeled goods, not only due to the direct economic benefits they infer, but also due to the indirect effects eco-labeling has on a store's reputation, demand and customer loyalty.

Keywords: Eco-labeling; The Nordic Swan; Price Premium; Hypothetical bias; CSR; Market equilibrium; Willingness to Pay

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1. Introduction

During the past decades, the world has experienced vast economic growth, and consequently, worldwide consumption has increased enormously. Overconsumption and major exploitation of natural resources have resulted in significant deterioration of the environment (Taufique, Siwar, Talib, Sarah & Chamhuri, 2014). Increased enlightenment around the long-term consequences of our actions has led to a growing global concern for the environment and greater awareness of our responsibility as consumers (Cherian & Jacob, 2012). Moreover, companies are now expected to take more action and adopt sustainable ways to manufacture products and deliver services. Many even claim that companies choosing to take sustainability and corporate social responsibility (CSR) seriously, outperform their peers significantly (Choi, 2017). Accounting for one's environmental impact has become a way to improve the company's image and increase sales by capitalizing on the demand from environmentally conscious consumers (Brouhle & Khanna, 2012).

One way for companies to signal that their products and services have a lower negative impact on the environment than its substitutes is through eco-labeling. Eco-labels are voluntary, informative instruments that enable consumers to distinguish environmentally preferable products from otherwise equal ones (Leire & Thidell, 2005) and the market share of eco-labeled products have had a substantial growth in the recent past (Brouhle & Khanna, 2012; Gallastegui, 2002; Taufique et al., 2014). In light of the apparent growing concern for the environment, several studies have attempted to measure the monetary value of eco-labels to evaluate whether it in fact is profitable for companies to choose more environmentally sustainable alternatives throughout their value chain. This field of research is undoubtedly interesting for companies operating in manufacturing and retail, as it explores whether eco-labels can successfully be used as a tool to strengthen competitiveness. However, previous studies have mostly been conducted from a consumer perspective and very few, if any, have taken place in Norway. Thus, our leading research question is:

"*What is the value of eco-labeling and how does eco-labeling affect the market mechanisms in the Norwegian grocery market*"

In order to answer this question, we have established a collaboration with the Norwegian grocery chain Rema 1000. Through this, we have been provided with four years of real purchasing data from their stores in the time period 2016 to 2019. The dataset consists of weekly price and sale quotations for household goods and a selection of these are labeled with the Nordic Swan - perhaps the most well-established eco-label within the Nordic region. Moreover, we have conducted a written interview with their head of CSR and sustainability, where parts of the interview will be used in order to support both market theory and the findings of this thesis. We run a multiple OLS regression model and conduct a difference-in-difference analysis to examine the effect that the Nordic Swan has on the price and sales volume of a labeled product. We find that both are positively impacted by the eco-label, with an average price premium of 21 percent and an increase in sales of approximately 3 percent. However, we do find large differences between product categories, indicating that eco-labeling is a more valued product attribute within certain categories and customer segments. We conclude by urging retailers to increase their assortment of eco-labeled products and encourage further research within this promising field of sustainability literature.

Since the majority of previous studies have been conducted from a consumer perspective, most commonly in the form of consumer surveys, existing findings regarding the value of eco-labels rely heavily on stated preferences. This study takes a slightly different approach as it instead looks at the matter from a corporate perspective and examines the value of eco-labeling by utilizing real purchasing data. To the best of our knowledge, no previous study within the field of eco-labeling has been conducted in the same manner. As our results are very much in line with former findings of the positive economic value and benefits of eco-labeling, we help strengthen the credibility of previous research. Hence, this study contributes to the existing body of literature by underlining the importance of capturing a share of the fast-growing market for eco-friendly goods.

This paper proceeds as follows: Chapter II gives an introduction to the background of eco-labels and the Nordic Swan specifically, before presenting an extensive overview of the empirical research done on this subject so far. Chapter III then presents the main market theory relative to eco-labels and concludes by presenting our hypotheses. Chapter IV describes the data collection process, and summary statistics are presented. Further, Chapter V illustrates the empirical design of the

study before Chapter VI presents the results, aimed at answering our hypotheses. In Chapter VII, we compare our findings to those existing in the literature and briefly discuss the future relevance of eco-labeling schemes. Finally, Chapter VIII draws a conclusion together with suggestions for future empirical work within the field of eco-labeling.

2. Background and literature review

2.1 History and prevalence of eco-labels

Eco-labels proliferated in the 1990s as a means to give guidance to consumers about the environmental performance of different products (Zhou et al., 2016). Thus, information asymmetry between producer and consumer can be reduced or corrected through easily recognizable eco-labels. These labels are placed on products and services that have proved to cause less damage to the environment than similar products or services in the same category. Eco-labeling schemes can be broad or more industry- or product specific and can cover anything from food and beverages to electrical devices and furniture - even entire companies can be eco-labeled (Cerri, Testa & Rizzi, 2018; Rodriguez, 2015). Eco-labeling is voluntary, and the criteria and verification of the environmental impact of a product is the responsibility of independent third-parties (Gallastegui, 2002), such as governmental organizations, NGOs and standard certification bodies (Taufique et al., 2014). The entire life-cycle of the product is taken into consideration in the environment-impact assessment, including the production, consumption and disposal of the product (Gallastegui, 2002). By guaranteeing that environmental requirements are met, eco-labels work as a trustworthy guide to more environmentally friendly purchasing.

The first eco-label ever to be established was the Blue Angel, a certification scheme introduced in Germany in 1978. Since then, eco-labels have flourished in numbers and spread worldwide. According to the Ecolabel Index, the largest global directory of eco-labels, there are currently 458 eco-labels existing worldwide[1], spread over 199 countries and 25 industry sectors. Labeling schemes can be national, regional or international. The most established and recognized eco-label within Europe is

[1] As of May 2020

the EU Eco-label, also known as the EU Flower, which was established by the European Commission in 1992. Even though the label has existed in the market for almost 30 years, they experienced almost a doubling of products certified with their label within the short timeframe from 2016 to September 2019 (European Commission, 2019). Among the product groups which had the highest growth in the number of labeled products were textiles, tissue paper, dishwashing detergents and rinse-off cosmetics.

In the early years of eco-labeling, most labels were established by public institutions and later set to be governed by non-profit organizations. Today, as more people and businesses have discovered the power of an eco-branded product, there has been a massive increase in private-owned labels[2]. According to Hanss & Böhm (2011), the public has gone from being almost unfamiliar with the concept of sustainability in 1995 to be quite aware of and familiar with the term in the last decade. They suspect the increased awareness could stem from intensified media coverage of sustainability issues (e.g. climate change, poverty, or turbulences in international finance markets) and the prominence of the sustainability concept in political agendas. In 2015, the Ecolabel Index could report that out of the 421 eco-labels they recognized at that time, 35 percent were created in the last 10 years (Rodriguez, 2015). Even though these statistics point to a seemingly positive trend for eco-labeling, some argue that the eco-label model may have become too successful and that the wide array of certification programs that have been developed worldwide has led to confusion among consumers and producers (Watanatada, 2011).

Looking at Norway specifically, 42 eco-labels are distributed in total according to the Ecolabel Index[3]. Out of these, the Nordic Swan, Debio's Ø-label and Fair Trade are the most recognized labels for sustainable products among Norwegians, all three with customer awareness between 69-94 percent (Debio, 2018). According to a survey performed by Norstat in 2019, two thirds of the Norwegian population claim they want to contribute to reducing their carbon footprint (Berg, 2019). Hence, and in equivalence with the worldwide trend, new eco-labels are frequently established also in Norway, most recently Klodemerket in 2019 by Orkla Foods Norway.

[2] Private-owned labels are not considered as official eco-labels because the verification is the responsibility of the owner, as opposed to an independent third-party

[3] As of May 2020

2.2 More specifically on the Nordic swan

The Nordic Swan Ecolabel (also referred to as the Nordic Swan or the Swan) was established in 1989 by the Nordic Council of Ministers, an official body for co-operation among the Nordic countries[4] (The Nordic Swan Ecolabel, 2012a). Today, more than 30 years later, the label remains the official eco-label of the Nordic countries and has a high level of consumer awareness and recognition (Brouhle & Khanna, 2012). The overall intention of the label is to make it possible for everyone to contribute to reducing environmental harm. This can be obtained through the label's two main functions; to make it easier for consumers to recognize and choose environmentally friendly alternatives and stimulate to more environmentally friendly production among producers. The Swan can be found on a large variety of different products and services, ranging from detergents, furniture and toys, to hotels, restaurants and mutual funds. More than 30,000 products and services are labeled with the Swan in the Nordic market and at least 15,000 of those are distributed in Norway (Retail Magasinet, 2019).

The Nordic Swan has established environmental criteria for more than 250 different product categories in 50 industries. The criteria are set to reduce the environmental impact of products and services all the way from production to disposal. This means that the entire product life-cycle is reviewed, and aspects such as pollution, sustainable resource usage and non-toxic ingredients are taken into account when applicants are evaluated. The criteria for obtaining the Swan are strict and they continuously become stricter as the organization stretches to fight the increasing severity of the world's environmental issues. An example of a change in their criteria was even apparent in our dataset. One toothpaste, Zendium, had been labeled with the Swan since 2012. A change in the Swan's criteria in 2019 implied that Unilever, the producer of Zendium, would have to compromise on the flavor of the toothpaste in order to renew its license. This was something Unilever was not willing to do, which led to the toothpaste no longer being labeled as of 2020.

Once a producer has applied for the Nordic Swan Ecolabel for one or several of their products or services, they have to pay a fixed fee. This amounts to approximately 3,000 € + VAT and covers the time the national eco-labeling organization spends processing your application, including one inspection visit to

[4] Norway, Sweden, Denmark, Finland and Iceland

a production site in the Nordic region. If the application is approved and the producer receives the license, they additionally have to pay an annual usage fee based on the turnover of the certified product or service (The Nordic Swan Ecolabel, 2012b). For most products, this fee amounts to approximately 0.3 percent of total yearly turnover. Both the application fee and annual usage fee vary across product groups (about 60 different in total). As a non-profit organization, all of their earnings from fees are spent on operating and maintaining the scheme (The Nordic Swan Ecolabel, 2012b). More specifically, the income is used to process applications and manage certifications in the national eco-labeling organization, to increase the supply and demand for eco-labeled goods and services and to ensure that there is a high level of awareness and credibility associated with the Nordic Swan Ecolabel.

There are several aspects separating the Nordic Swan from other labeling schemes found both within and outside of the Nordic region. First and foremost, in contrast to the many private green labels, the label is state controlled and non-profit. Additionally, criteria and documentation are public and available for anyone to access. According to a large number of studies, the most important requirement for achieving credibility is that the label is issued and controlled by a public or independent authority, a so-called third party (Thøgersen, 2000). The Nordic Swan also covers a wider range of products and services than most other eco-labels on the market, which are often restricted to include a single product category, such as food or electronics. The Nordic Swan is also one of the longest existing eco-labels and was established even three years prior to the EU Ecolabel (EU Flower) and Fairtrade. The label is also based on a cross-national scheme, as opposed to most other labels, which operate on national levels. The eco-labels most equivalent to the Nordic Swan are the Blue Angel (German), Good Environmental Choice (Swedish), TCO Certified (Swedish) and GOTS (cooperation between US, Germany, Japan and UK) (The Nordic Swan Ecolabel, 2012c).

According to a recent survey by Ipsos on behalf of Nordic Ecolabelling, 76 percent of Norwegians trust that a product labeled with the Nordic Swan represents a good environmental choice (Retail Magasinet, 2019). In fact, the sale of products labeled with the Swan increased by 3.1 percent from 2018 to 2019[5] and by an additional

[5] Over a 52-week period starting from week 8 in 2018 to week 8 in 2019

4.4 percent from 2019 to 2020[6]. Moreover, the increase happened despite the relevant product categories experiencing a decline in overall sales of 1.8 percent and 1.6 percent in the same period (Henriksen, Bernhus & Lefébure-Henriksen, 2020). A possible explanation could be that Norwegian grocery stores have significantly strengthened their assortment of products labeled with the Swan, but the increase could also stem from a general increased awareness among consumers. Looking at the organization's financial statements, there is a steady increase in user-fee earnings from 2014 to 2018 (the most recent report). The Nordic Swan's annual report from 2016 also reveals that the number of licenses increased by 78 to a total number of 2,101 licenses from 2015 to 2016 and also that the number of products labeled with the Swan increased by over 4,700 products the same year (Nordic Ecolabelling, 2016). These numbers suggest that even though the label has existed in the Nordic market for more than thirty years, the Swan is still highly relevant among producers and consumers, and continues being sought after.

2.3 Empirical research on eco-labels

The monetary value of an eco-label can be discussed in various forms, but the consumer's willingness to pay and price premium are the two definitions most commonly used in the existing literature. Even though the wording is different, these two essentially concern the same matter, namely how much more a consumer is willing to pay for a product carrying an eco-label compared to an otherwise similar, but non-labeled, product.

Many researchers have discovered a general positive attitude and public support towards environmentally friendly products and eco-labels (Zhou, Hu & Huang, 2016; Loureiro & Lotade, 2005) and Leire & Thidell (2005) found that consumers seem to appreciate the opportunity to prioritize among different environmental aspects. Furthermore, several researchers suggest that a person's environmental involvement has a positive influence on his or her engagement in 'green' consumerism (Thøgesen & Ölander, 2002; Urien & Kilbourne, 2011; Laroche, Bergeron & Barbaro-Forleo, 2001) and that consumers who purchase organic goods on a regular basis show loyalty to the label and repeat their purchasing (Nilsson, Tunçer & Thidell, 2004). In order to gain a better understanding of which consumers are interested in purchasing more environmentally friendly goods,

[6] Over a 52-week period starting from week 8 in 2019 to week 8 in 2020

researchers have also conducted several studies where they look at how different socio-demographics influence eco-behavior among consumers. In a recent study of consumer habits in Ukraine, Kucher, Heldak, Kucher, Fedorchenko & Yurchenko (2019) found that the overwhelming majority of those who support the concept of sustainable development is young people, i.e. those under 30 years old. Loureiro & McCluskey (2002) also discovered that women are more eco-conscious than men, and even more so if they have young children. Furthermore, Teisl, Rubin & Noblet (2008) found that educated individuals trust eco-labels more and that they to a greater extent take eco-information into account in their purchasing decisions. Lastly, and most likely in conjunction with the previous finding, Curlo (1999) found consumers from developed countries to be more concerned with the environment. Regardless of which factors that determine green consumerism, a recent survey by Accenture from 2019 found that more consumers are willing to pay extra for environmentally friendly products. In fact, their results showed that 72 percent of consumers buy more environmentally friendly products today than they did five years ago (Accenture, 2019). In the following, we summarize a selection of findings from studies about the consumer demand and willingness to pay for organic, fair-trade and eco-labeled products and, more specifically, the Nordic Swan.

For their research in the late ‘90s, Nimon & Beghin (1999) sought to identify the market valuation of environmental attributes of apparel goods. They found that there was a premium for the organic fibers in the apparel goods with an average markup of 33.8 percent, but they found no evidence of a premium for environmentally friendly dyes. Batley, Colbourne, Fleming & Urwin (2001) studied price premiums in the electricity market in the U.K., and their results showed that approximately 34 percent of the respondents were willing to pay a premium for electricity generated from renewable sources. However, as general environmental awareness most likely has changed significantly over the last twenty years, the conclusions of these studies may no longer be valid. There have also been conducted more recent studies concerning eco-labeled food products. Zhou et al. (2016), for instance, studied whether consumers were willing to pay more for eco-labeled tuna steak. They found that respondents on average preferred turtle-safe-labeled tuna steak and were likely to pay more for it. These findings are evidence of public support for environmental friendliness, particularly with regard to eco-labeling (Zhou et al., 2016). Galarrga & Markandya (2004) studied data on coffee

prices in Britain and estimated an average price premium of 11 percent for coffee with a label indicating environmental friendliness. Marette, Messéan & Millet (2012) conducted an experiment in France which aimed to evaluate the impact of environmental information on consumers' choices between conventional and organic apples. Their results show that additional and precise information about pesticides significantly impacts consumers' choices. In addition, they found that the introduction of labels on apples that only use a few pesticides elicited consumers' willingness to pay. Yenipazarli (2015) suggests that there are variations across product categories so that the price premium is larger in some product categories. For example, he states that retailers can charge a much higher percentage markup for eco-labeled milk than what is possible in the apparel sector (Yenipazarli, 2015).

A few researchers have also specifically studied the effect of the Nordic Swan on consumer behavior. Bjørner, Hansen & Russell (2004) used purchasing data from a consumer panel to estimate models for consumers' choices among different brands of toilet paper, paper towels and detergents in Denmark. By doing so, the authors sought to trace the effects of the Nordic Swan on consumer preferences. The study revealed that the Nordic Swan had a significant influence on the choice of toilet paper, with marginal willingness to pay for a certified product ranging from 13 to 18 percent of the price. The impact on paper towels and detergents was less clear, but the estimate of the SWAN coefficient in their model, i.e. the estimated price premium for the Nordic Swan, was positive for all goods. The results of the study suggest that information on environmental performance has a significant influence on respondents' brand choices. The researchers conclude that (Danish) consumers are willing to act on an environmental label even though this does not yield any direct benefit to them, which indicates the presence of altruistic motives of some kind (Bjørner et al., 2004).

Table 1 summarizes the empirical findings we find to be the most relevant to our study. As the table illustrates, both the definitions of 'willingness to pay' and 'price premium' are used to measure the monetary value of the eco-friendly goods studied.

Table 1. - EMPIRICAL RESEARCH ON WILLINGNESS TO PAY FOR ECO-LABELED AND ORGANIC PRODUCTS

Authors	Year	Product of study	Results
Nimon and Beghin	1999	Apparel goods	33.8% price premium on organic fibers. No evidence of a premium for eco-friendly dyes.
Batley et al.	2001	Electricity	34% willing to pay a premium for electricity generated from renewable sources.
Bjørner et al.	2004	Toilet paper, paper towels and detergents	For toilet paper, marginal willingness to pay ranges from 13% to 18% of the price. However, the impact on paper towels and detergents was less clear.
Galarrga & Markandya	2004	Coffee	An average price premium of 11% for coffee with a label indicating environmental friendliness.
Marette et al.	2012	Apples	The introduction of labels on apples that only use few pesticides elicited customers' WTP.
Zhou et al.	2016	Tuna steak	Respondents prefer on average turtle-safe-labeled tuna steak and were likely to pay more for it.

2.3.1 What is missing in contemporary literature?

As the above literature review reveals, the majority of existing literature indicates that many consumers prefer environmentally friendly products and further, that they are willing to pay a premium for such products. However, most evidence is anecdotal as the literature relies heavily on stated preferences and hypothetical questions about hypothetical settings. This introduces the so-called *hypothetical bias*, which is the difference between hypothetically measured, or stated willingness to pay, and consumers' real willingness to pay (Schmidt & Bijmolt, 2020). Many respondents may claim to be more concerned with the environment than what is reflected in their actual consumer behavior and might thus report a falsely high willingness to pay for environmentally friendly products. In their meta-analysis, Schmidt & Bijmolt (2020) find the hypothetical bias to be 21% on average. Sedjo & Swallow (2002) further state that even if surveys that indicate elicited willingness to pay are correct, this is not necessarily sufficient to generate a premium in the market. The uncertainty that these findings posts on existing results makes it difficult to draw any conclusions regarding the true value of eco-labeling.

Hence, we take a slightly different approach in this thesis by instead looking at the matter from a corporate perspective. By analyzing real purchasing data, we attempt to obtain a better estimate of the price premium for eco-labeled goods, and further study whether consumers' stated or measured willingness to pay for an eco-labeled product are indeed reflected in their true purchasing behavior. A report from 2005

by the United Nations Environment Programme[7] (UNEP) on the assessment of economic and environmental effects of eco-labeling states that there are not enough quantitative studies on which to base the economic impact of eco-labels (Yenipazarli, 2015). Moreover, WWF stated in its review of certification schemes in 2010 that the impact of eco-labels was unclear due to "… insufficient comparable and meaningful data available" (WWF, 2010). As Gallastegui (2002) put it, "Analyzing the market impact of labeling schemes is analytically complicated, because (i) it is very difficult to separate the effect of other factors from the effect of the label and (ii) data about the market impact is usually confidential commercial information". Through our collaboration with Rema 1000, we have overcome Gallastegui's second step. However, we do not claim that our study will be without uncertainty and shortcomings (see Section 4.2 for a further description), as it is indeed difficult to overcome Gallastegui's first step regarding the separation of other factors from the effect of the eco-label. Yet, we do believe that our research method has the potential for a more accurate result with a lower error margin compared to previous studies because our data is not retrieved from hypothetical or staged settings. Moreover, we believe that our analysis will enable us to assess whether eco-labeling represents a lucrative business strategy for grocery stores and whether they should opt for increasing their assortment of these types of goods.

3. Theory

3.1 Price setting in the Norwegian grocery market

The Norwegian grocery market is dominated by three large chains and is thereby characterized as an oligopoly. The market differentiates itself from that in most other countries due to its low number of actors. According to Nielsen Norway's report from 2019[8] (Falck, 2020), the market shares are distributed between the three as follows:

- Norgesgruppen: 43.7 %
- Coop: 29.5 %
- Rema 1000: 23.2 %

[7] Link to the online report: http://www.unep.ch/etb/publications/Ecolabelpap141005f.pdf

[8] Nielsen Norway, a company under the global measurement and data analytics company Nielsen, annually publishes a report showing the development in the Norwegian grocery industry

With an oligopolistic market follows an intensified price competition where the few actors are price setters (in comparison to price takers which is the case in a market with many actors or perfect competition). The retail price of a product is first and foremost based on the product's cost price. This is not necessarily equal for all retailers, as different trade agreements and cooperation with various suppliers often carry discounts. Moreover, the retailer needs to account for fixed costs, and for the sake of simplicity, we assume that this is done by adding an equal markup to all goods. Further, the retailer has to determine the product's gross profit margin. The Norwegian retailers monitor each other's prices closely, so if one chain lowers or raises the price on a particular product, this will in most cases lead to an equivalent price change from at least one of the other retailers. Both Norgesgruppen and Coop consist of several different stores with different strategies, e.g. low price, exclusive brands or a wide product selection. However, the Norwegian grocery industry is overall dominated by stores competing on low prices, such as Rema 1000 and Kiwi (Norgesgruppen), which means that these chains particularly reflect each other's prices thoroughly.

As a matter of fact, the low-price strategy has since 2015 been the strategy with the highest growth in Norway, while the other strategies have been declining (Virke Dagligvare, 2015). This is especially prominent around the holidays, where the stores competing on low prices are having a so-called "price war". During these periods, both stores have negative gross profit margins on a number of products in an attempt to attract the most customers. However, the prices also vary outside the holidays. According to Moen, Wulfsberg & Aas (2017), there is significant and persistent price dispersion in tertial prices in Norway and the median standard deviation is 33 percent of the mean price. They also find that there is less price dispersion for non-durable and durable products than for semi-durable products and services. One possible explanation for the price dispersion could be that the stores are adjusting their prices up and down to keep buyers from learning about the identity of the store charging the lowest price, as suggested by Varian (1980). However, the low number of actors in the Norwegian market makes it relatively easy for consumers to collect information about and keep track of current prices. There is also a number of independent sources contributing to price transparency,

such as VG's Matbørs[9]. Consistent with this, Moen, Wulfsberg & Aas (2017) claim that it is the different store characteristics that account for a large part of the dispersion (50-60 percent) in grocery prices in Norway, in addition to differences in marginal costs and specialization.

The purpose of this section was to give the reader an elementary insight into the structure of the Norwegian grocery market and how the different chains compete. This information will be useful when discussing market effects later on. Further discussion regarding how the Norwegian grocery chains compete on price and what specific business models they use, is outside the scope of this thesis.

3.2 The functioning of eco-labels

Overall, eco-labels can be said to have three main functions; offering producers and retailers a way to differentiate themselves from their competitors, serving as a trustworthy signal to consumers and, lastly, contributing to reduce the environmental footprint of a society. The following sections will discuss each of these three functions further and their accompanying challenges.

3.2.1 A differentiation tool for producers

In today's market for goods, with an increasing number of manufacturers, growing globalization and where more and more trade takes place online, it is more important than ever for stores to find ways to differentiate themselves from their competitors. One course of action, which has become remarkably popular during the last decade, is for stores to engage in work related to corporate social responsibility (CSR) and emphasize their efforts through sustainability reporting. Sustainability reporting gathered momentum especially after the UN announced their 17 Sustainable Development Goals in 2016 and corporations tend to incorporate one or several of the goals that are relevant for their business into their business strategy. Engaging in CSR related work will (most likely) attract more customers, who repeatedly report being more and more concerned regarding the environment (Ertz, Karakas & Sarigollu, 2016; Gallastegui, 2002). The same trend can be found in the grocery sector and offering an adverse selection of eco-labels is one of the tools used to increase the visibility of CSR towards consumers.

[9] VG's Matbørs is a division under the Norwegian tabloid "Verdens Gang (VG)" and has since 2000 performed independent price comparisons of groceries in Norway

Especially for stores competing with the same strategy, such as a low-price strategy, they end up having relatively similar prices and product selections. Having a wider selection of eco-friendly products could therefore be a potential source to gaining a competitive advantage and differentiate oneself (Nilsson, Tunçer & Thidell, 2004). Moreover, by producing or distributing eco-labeled goods, grocery stores can contribute to the achievement of several of the UN's goals, especially those regarding responsible production and maintenance of land above and below water[10]. Brom argued as early as in 2000 that the increase in consumer concerns regarding food safety and production methods being used calls for an assurance of credible quality among certain consumer groups and suggests retailers play a more active role in the promotion and marketing of eco-labeling schemes (Brom, 2000). Moreover, Thøgersen followed up by stating that increasing the prevalence of environmentally differentiated products in the grocery sector may be the most important key to increasing the attention paid to eco-labels (2000). Sedjo & Swallow (2002) even raise concerns that firms choosing to serve the non-certified market will eventually experience reduced profits.

As much as one out of four consumers in Norway say that eco-labeling schemes greatly affect their choice of groceries, according to a survey done by YouGov for Miljømerking Norge (Miljømerking Norge, 2017). Head of CSR and sustainability at Rema 1000, Østbye Andresen, confirms that consumers indeed have become more aware of their consumption patterns and that they to a larger extent than before demand transparency and assurance of quality. They want to know what the products contain and how they are produced. Østbye Andresen continues by saying that their product assortment and understanding of how each product affects the environment throughout its lifecycle is as important for Rema 1000 as it is for their customers. Further, she says that they do experience a growing demand for more sustainable groceries and that Rema 1000 continuously strives to increase their offering of eco-labeled products.

One way for the grocery stores to increase their fraction of eco-labeled products is by including more of the eco-labeled products offered by their current suppliers. However, if the supplier does not label more of its own products each year, the

[10] https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Eco-labeling can contribute to the achievement of a majority of the goals, however, goals #6, #9, #12, #13, #14, #15 are especially affected by the schemes

grocery store will eventually not be able to increase their fraction of eco-labeled goods either. A second way is to switch to or include new suppliers specializing in eco-friendly products. Although this could help increase the fraction of eco-labeled products, it also carries a certain risk if the producer is unknown to consumers and the products thereby end up not being purchased. A third way is by eco-labeling more of their private label products. This way, the retailer is in control and the products being labeled are familiar to most consumers. Indeed, one of the main motivators for a producer to label their own products is the assurance of consumers' trust in their brands and products (Nilsson, Tunçer & Thidell, 2004). According to Quelch & Kenny (1994), American retailers increased the fraction of private labels and allocated more shelf place to their private labels during the mid '90s. For the last decade, this practice has become common among Norwegian grocery stores as well, and the fraction of private labels has increased. Rema 1000, for instance, introduced their brand LevVel in 2015 and Prima[11] in 2017. Østbye Andresen points out that Rema 1000, in their strive for increasing the overall number of eco-labeled products, continuously work to get a larger fraction of the store's private label products eco-labeled as well. They also experience that their competitors are doing the same.

However, an eco-label can not just be glued to the front of a product. Each label represents a particular set of criteria when it comes to production methods and the entire production chain. This will in most cases lead to an increase in production costs, where the size of the increase is contingent on the specific product and its production process. Moreover, there will often be a fee for the license which must be paid to the organization behind the eco-label. The retailer will either bear the costs directly as a producer or indirectly as a premium paid to its suppliers. According to Sedjo & Swallow (2002), if certification is always costly to individual producers, the market will always produce a price differential with the certified price remaining higher. Since the eco-label represents an additional attribute added to the product, it also gives the producer an opportunity to charge a higher price (Loureiro & McCluskey, 2003). This additional markup after the new production costs are covered is important in order to create an additional incentive to produce more environmentally friendly eco-labeled goods (Sedjo & Swallow, 2002). Even

[11] Prima is the new brand signaling cheap products by Rema 1000, replacing three former brands "Rema 1000", "SoftStyle" and "Best Pris"

though the price premium is often reported as the primary driver promoting the use of eco-labels, the economic benefits that eco-labels expect to deliver do not necessarily need to come from a price premium and could instead be obtained through enhanced consumer demand or a combination of both (Yenipazarli, 2015).

Challenges

Despite the appealing picture of how eco-labels can contribute to increase the competitiveness of a manufacturer or grocery store, there are certain obstacles preventing its optimal function in this area. First of all, Yenipazarli (2015) found that higher prices commanded by labeled products do not guarantee that a firm will derive higher profits from eco-labeling and that consumers' willingness to pay a price premium for eco-labeled products is not a sufficient condition to generate a premium in the market. This could reduce the incentive to both produce and offer eco-labeled products in the first place, leading to a lack of availability of such products, which further prevents its optimal use (Vermeir & Verbeke, 2006). Even though Thøgersen (2000) advocates that the prevalence of eco-labels in stores increases the attention paid to them, he also points to the opposite effect, where a weak prevalence of labels in the store could in fact reduce the labels' credibility.

Another challenge related to the lack of credibility connected to eco-labels is 'greenwashing'. Greenwashing is when an organization or manufacturer puts more work into green advertising and marketing than actually minimizing its environmental impact, and thereby claiming to be more environmentally friendly than they in fact are. Shelves at the stores today are crowded with seals and declarations using terms such as 'bio', 'green', 'natural' or 'ecological', and since no laws protect such terms, these types of declarations are overused and have led to undermining the credibility of products proven to be more environmentally friendly (Gallastegui, 2002). During a single month in 2015, the Federal Trade Commission in the US revealed more than 30 unnamed brands that used green certification labels that were so vague about the environmental benefits that they ultimately mislead consumers (Rodriguez, 2015).

3.2.2 A signaling tool for consumers

Eco-labels are perhaps first and foremost meant to be an easy and trustworthy guide for consumers to products that are better for the environment in some way (Leire & Thidell, 2005). In today's market for goods, where every producer seems to be

engaging in green marketing[12] (Cherian & Jacob, 2012), it is not easy for consumers to know whether a producer's claims are true or not. In fact, as much as 66 percent of the Nordic population have expressed that they find it difficult to detect products that are more environmentally friendly on the market (Retail Magasinet, 2019). An eco-label is supposed to serve as a credible reassurance to the consumer that the standards for production and content of the product are actually upheld by the producer. They should be recognizable and easy to spot on the front of a product. Furthermore, they could potentially increase awareness among consumers who otherwise would not have thought about the environmental aspects of their purchases.

Many consumers are willing to make an effort to diminish the negative environmental impact of their consumption (Thøgersen, 2000). A survey conducted by Norstat for Toro (in 2019) shows that 64 percent of Norwegian consumers agree in the statement "*I want to help reduce my climate footprint*" (Berg, 2019). Paying attention to environmental labels is correlated with the personal importance of the goal of protecting the environment and with the consumers' perceived effectiveness regarding environmental problems (Thøgersen, 2000). In an environmentally concerned consumers' mental script for buying certain goods, there may be a sequence labeled "choose the most environmentally friendly alternative within the consideration set" (Thøgersen, 2000), and this is where eco-labels should serve as a signal for the consumer to choose that particular product. This is confirmed by Østbye Andresen, who in our written interview states that the consumers who value eco-labeling the most are those who are concerned about the environment and who wish to adopt a more sustainable consumption. She adds that these consumers are of every age, even though surveys tend to indicate that the majority of those who are environmentally concerned are younger people.

There are several forms of motivation and psychological determinants that play a role when deciding to buy an eco-labeled product. Intrinsic motivation, a motivation that arises from within, could stem from pure altruism where the consumer derives private satisfaction for contributing to a public good (Bjørner et al., 2004; Hainmueller, Hiscox & Sequeira, 2015; Sörqvist et al., 2015). It could also stem from impure forms of altruism, where it is the "warm glow" that the

[12] Green marketing refers to the process of promoting products or services based on their environmental benefits.

consumer experiences from contributing to the public good that motivates the purchase (Andreoni, 1990; Brouhle & Khanna, 2012; Hainmueller et al., 2015). Extrinsic motivation, a motivation that arises from the outside, could be driven by a wish to improve social status or one's self image, changes in income or perception of higher product quality (Hainmueller et al., 2015; Kimura et al., 2012; Loureiro & McCluskey, 2003; Nilsson, Tunçer & Thidell, 2004). In fact, preference to eco-labeled products is regarded as socially desirable by society (Félonneau & Becker, 2008; Oerke & Bogner, 2013) and could help explain why Leire & Thidell (2005) find that consumers often overestimate their use of product-related environmental information in their purchasing decisions. Therefore, social desirability could be one of the most important sources to a potential hypothetical bias. The above describes some of the possible motivators for the purchase of an eco-labeled product, but it is hard to know exactly what drives the demand (Brouhle & Khanna, 2012), since it to such a large extent depends on consumer characteristics.

Regardless of the motivational source of the consumer, it can contribute to increase the consumer's willingness to pay for an eco-label (Loureiro & McCluskey, 2003). Whether the consumer's willingness to pay for the marginal unit increases as further consumption increases their ecological impact (Anderson & Francois, 1997) or if the marginal willingness to pay decreases with their consumption because the certification is viewed as a luxury attribute (Sedjo & Swallow, 2002), depends on the individual consumer.

Challenges

In order to serve as intended, eco-labels most importantly need to be known and understood by consumers (Thøgersen, 2000). An important factor preventing the optimal utilization of eco-labels is the lack of knowledge among consumers regarding what the label actually represents (Taufique et al., 2014). Van Amstel, Driessen & Glasbergen (2008) point towards the eco-label itself and argue that by failing to communicate adequately, the eco-labels do not provide enough information to diminish the information gap between seller and buyer. Other studies instead point to the consumer's understanding and argue that wrong interpretation of the symbols, little understanding of the general concept of sustainability, and failure to understand the connection between environmental problems and their purchasing behavior is the root to the problem (Gallastegui, 2002; Grunert, Hieke & Wills, 2014; Song et al., 2019; Szarka 1991).

Furthermore, there is a frequently expressed assumption in a number of studies that consumers pay attention to and use eco-labels in their purchasing decisions only if they trust them (Thøgersen, 2000). However, almost as many studies (unfortunately) point to the lack of trust associated with eco-labels. According to Nilsson, Tunçer & Thidell (2004), the increasing distance between consumer and producer, both geographically and mentally, is one recurring reason for a lack of trust that appears in the literature. What further induces the lack of trust is the multitude of existing eco-labels. Even though the growth in eco-labels could be interpreted as a sign of the labeling-schemes' success, the overload of eco-labels will often lead to confusion among consumers and thereby limit the use of such labels (Horne, 2009). Van Amstel, Driessen & Glasbergen (2008) advocate that fewer eco-labels, but more reliable ones, would make the market more transparent.

Lastly, even though sustainability has become an issue of general interest, and motivation to behave sustainably is frequently found among consumers, there are often other attributes to a product which weigh heavier in the purchasing decision (Cerri et al., 2018; Grunert et al., 2014; Horne, 2009). As an example, when purchasing food products, use-by-date, flavor and nutritional information will influence the purchasing decision, whereas for clothing, the brand, color and quality of a garment are important aspects of the product. There is also a competition among the eco-labels, where the distinctive consumer preferences for different standards and labeling criteria cause consumers to choose one eco-label over another (Yenipazarli, 2015). Some also point to the fact that purchases are largely guided by habits, and Song et al. (2019) even conclude that information given to the consumer on environmentally friendly features during the product selection phase is too late to make an effective impact because consumers typically rely on habitual shopping.

3.2.3 A policy tool

Eco-labels are also meant to encourage a general raising of environmental performance. According to the International Standards Organization (ISO), the objective of eco-labels is "... to encourage the demand for and supply of those products and services that cause less stress on the environment, thereby stimulating the potential for market-driven continuous environmental improvement". Hence, they provide an environmental policy upstream solution, which is generally

preferable to downstream ones (Thøgersen, 2000). The environmental performance of products has indeed gained increased political attention during the last two decades (Leire & Thidell, 2005). There are several ways for governments to stimulate both the supply of and the demand for eco-friendly products and services with the main objective of increasing their total sale. First and foremost, a government could make eco-friendly production statutory and regulate it by law, which is perhaps their most effective measure. However, this process is often time consuming and other ways to stimulate supply in the meantime could for example be to subsidize the production of eco-friendlier goods. This would increase the incentive among manufacturers to produce eco-labeled goods, as they would earn a higher gross profit from these goods. Subsidies could also lead to economies of scale for eco-labeled products, lowering their prices and making them more price competitive with non-labeled goods.

Even though ways of stimulating the supply are many, influencing consumer behavior is becoming a central priority in European environmental and consumer policy (Leire & Thidell, 2005) and the same focus is found within the subfield of 'eco-labels' (Thøgersen, 2000). There are also many ways of stimulating demand, but education, different green taxes and green marketing are examples of commonly used methods. Additionally, the prominence of the sustainability concept in political agendas could help to increase consumers' awareness of sustainability (Hanss & Böhm, 2011) and possibly making them more observant towards eco-labels. Stimulating demand will lead to an improved sale of eco-labeled products, which again will give manufacturers a greater incentive to produce them. A good example of governmental action stimulating the demand for and supply of an environmentally friendly good is the Norwegian policy for electric cars. By granting owners of electrical cars tax reliefs, free parking and charging, in addition to expanding the number of national charging stations, Norway is currently the country with the highest proportion of emission-free cars in the world.

Challenges

There are challenges preventing the optimal usage of eco-labels in a political context as well. A commonly found challenge is again the lack of trust towards the schemes, often due to the uncertainty about which body is responsible for the certification (Borin, Cerf & Krishnan, 2011: Horne, 2009; Taufique et al., 2014). According to a large number of studies, the most important requirement for

achieving credibility is that the label is issued and controlled by a public or independent authority, a so-called third party (Enger & Lavik, 1995; Schlegelmilch, Bohlen & Diamantopoulos, 1996; Tufte & Lavik, 1997). However, many consumers are uncertain or hold outright erroneous beliefs about who issues state controlled labels, such as the Nordic Swan, which could be partly due to the fact that the state controlled labels are outnumbered so many times by private labels and other types of environmental information (Thøgersen, 2000).

3.3 Market effects

In this section, we will take a step back and look at the overall market effect of eco-labeling. We will apply the theory from the previous sections to illustrate eco-labels' effect on the market equilibrium in the form of shifts in price and quantity sold. In the following explanation, let us consider the curves to illustrate the supply of and demand for a random good found in a grocery store (e.g. milk, eggs or shampoo) as this good goes from not being eco-labeled to being eco-labeled. Further, since we are interested in the grocery market in particular in this thesis, let us consider a grocery store as the supplier of this good. Whether the grocery store actually produces the good itself or purchases it from another manufacturer does not matter, as the overall effect will be the same. For the sake of simplicity, we consider the supply of a single grocery store only, and hence, the supply curve is illustrated as a flat curve.

Effects on supply

Figure 1a. - THE EFFECT OF ECO-LABELING ON SUPPLY

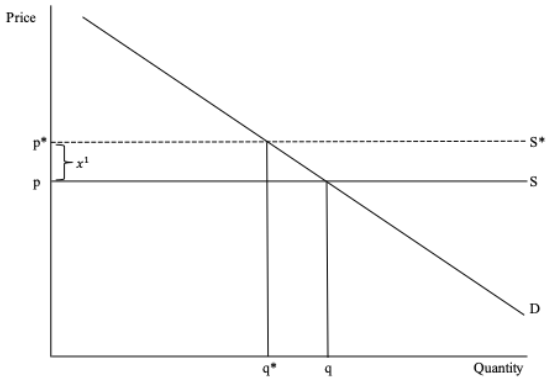
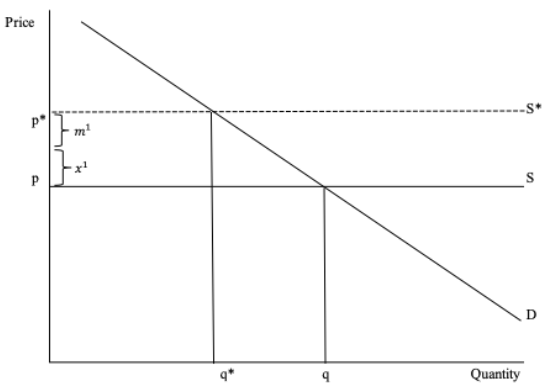


Figure 1b. - THE EFFECT OF ECO-LABELING ON SUPPLY



We begin by looking at the effect of eco-labeling on the market supply in isolation. Figures 1a and 1b illustrate the effect eco-labeling has on the supply side of the

market, in this case when a product goes from not being labeled to being labeled. Since eco-labeling causes both an increase in the production costs of that good (including the license fee) and gives the possibility to charge a higher price due to an additional product attribute, we assume that the supply curve will shift upward when a product becomes eco-labeled. This shift is illustrated by S* in the figures above. This will be the case whether it is the grocery store itself who is the producer of the good or if the store has bought it from an external supplier. The only difference is that the grocery store does not directly bear the production costs, but pays for it in terms of increased cost price for the product in the latter. However, the size of the upward shift in the supply curve depends on the part selling the good, in this case, the grocery store. Figure 1a illustrates the case where the store decides to only increase the price of the product by the amount its production costs increase by (x^1). That is, the markup that the store earns on the good (if any) is kept as it was prior to the labeling. Figure 1b illustrates a different scenario, where the store chooses to not only increase the price of the good by the increase in production costs but to also add an additional markup (m^1) to the good due to the additional attribute that is now added to it. Potentially, we could have a scenario where both the producer and the grocery store chooses to add an additional markup, leading to a quite large upward shift in the supply curve (double marginalization).

Whether the grocery store decides on the scenario depicted in Figure 1a or 1b, depends on the competition in the market in which the store operates in. If the market is characterized by stores competing mostly with a low-price strategy, the grocery store is more likely to choose the first option (1a). However, if the store is competing with its rivals using a different strategy (e.g. exclusive goods or wide selection) or if the market is characterized as a monopoly, the grocery store will most likely choose the latter (1b). The same logic applies regardless of whether the grocery store produces the good or not.

As both figures illustrate, when studying the effect on the supply side of the market isolated, the increase in price (p*) will, regardless of its size, lead to a decrease in the quantity sold of that good (q*).

Effects on demand

We continue by studying more closely the effect of eco-labeling on the market demand. As is common in economic theory, the demand curve depicts the relationship between the price of the good and the quantity of it demanded at that price, aggregated for all consumers in the market. It is also downward-sloping due to the law of demand, as generally assumed. As pointed out by several research papers, eco-labeling can lead to a higher willingness to pay due to an additional product attribute, causing an outward shift in the demand curve. The effect that this shift will have on the market equilibrium, will depend on the size of the shift and the steepness of the demand curve, as illustrated in the two Figures 2a and 2b.

Figure 2a. - THE EFFECT OF ECO-LABELING ON DEMAND

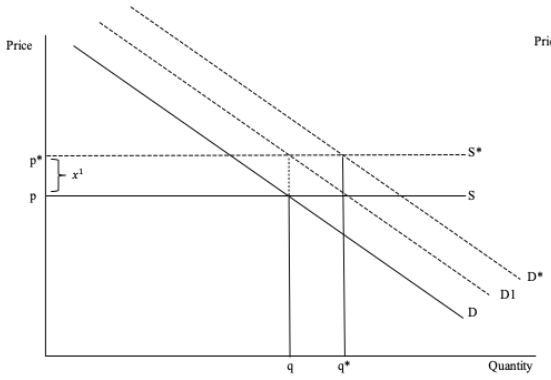
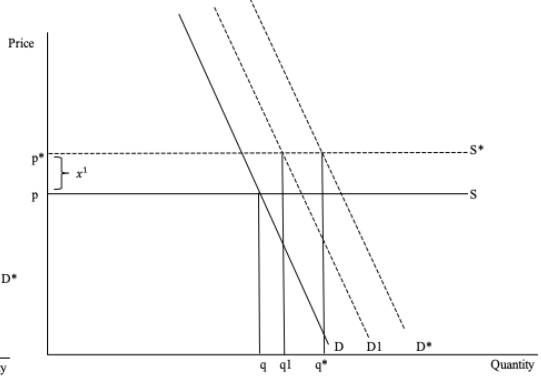


Figure 2b. - THE EFFECT OF ECO-LABELING ON DEMAND



In the first figure (2a), when the slope of the demand curve is less steep, the first outwards shift (D1) causes no change in the quantity of the good. In this case, the grocery store will not receive any economic gain from labeling the product, as the increase in price only covers the additional production costs and the quantity remains the same as before it was labeled. The quantity and profits of the grocery store only increase when there is a larger shift (D* and q*). Figure 2b illustrates a different scenario when the slope of the demand curve is steeper or less elastic. This type of demand curve is common for necessity, non-substitutable and luxury goods. This time, the smaller shift in the demand curve (D1) does lead to an increase in the quantity of the labeled good (q1), making the labeling economically beneficial for the grocery store. A larger shift (D*) causes the quantity to increase even further (q*).

As the two scenarios illustrate, whether the grocery store will experience economic gain from labeling the product depends on the steepness of the demand curve, which again depends on how the individual consumer values the attribute of eco-labeling. Moreover, it will depend on whether the increase in price comes from additional production costs only or an additional markup as well. The two scenarios with different demand curves above are illustrated once more in Figures 3a and 3b, only this time the price increase also includes a markup. From Figure 3a, we now see that the smaller shift in the demand curve (D1) actually causes the quantity to decrease and could potentially lead to a financial loss for the grocery store, if the gain from the markup does not outweigh the loss in quantity sold. A larger shift (D*) will cause the quantity to remain the same as prior to the labeling, but due to the markup, the store will gain some from the labeling. Figure 3b again illustrates that the quantity will increase with both shifts in the demand curve (D1 + D*), making the grocery store better off after labeling in both scenarios.

Figure 3a. - THE EFFECT OF ECO-LABELING ON DEMAND

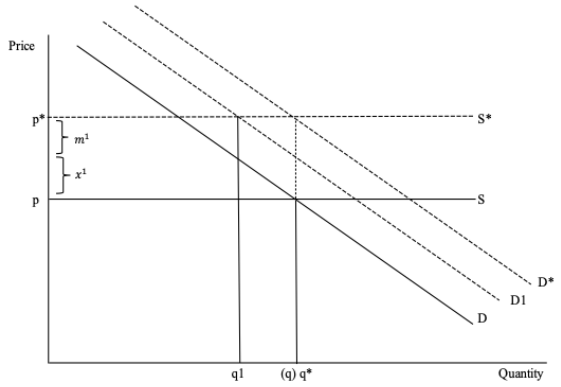
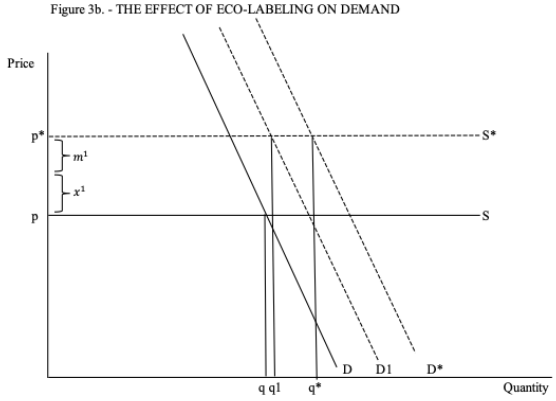


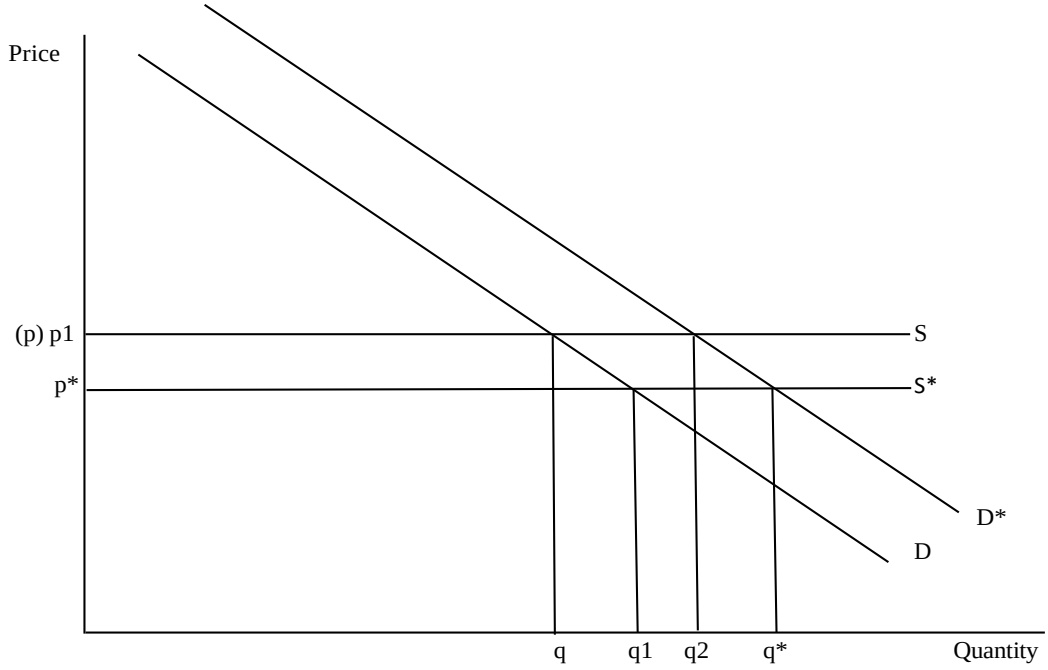
Figure 3b. - THE EFFECT OF ECO-LABELING ON DEMAND



Effects with governmental interference

When eco-labels are viewed as a policy tool, a natural assumption is that a government would be interested in arriving at a market equilibrium in which the overall outcome is that the quantity of eco-labeled products in the market increases. This could be achieved by stimulating either the demand side, the supply side or both.

Figure 4. - THE EFFECTS OF GOVERNMENTAL INTERFERENCE



By stimulating the demand for eco-friendlier products, such as lowering taxes or increasing consumer's willingness to pay in other ways (e.g. marketing campaigns), the government can assist, and perhaps increase, the outward shift in the demand curve (D*), leading to a higher quantity (q2). Additionally, stimulating the supply of eco-friendlier products could also help increase the quantity. By subsidizing some or all of the additional production costs the eco-label represents, the government could reduce the upward shift in the supply curve (S). They could even subsidize beyond the additional production costs, making the supply curve shift downwards (S*), lowering the price and increasing the quantity (q1). If both sides of the market are stimulated simultaneously (D* and S*), we eventually arrive at q*, where the quantity of the eco-labeled good is the highest.

As the above figures illustrate, the possible scenarios when a product goes from not being eco-labeled to being eco-labeled are many. What ends up being the new market equilibrium depends on several factors, but the increase in production costs, how valuable the new product attribute is perceived by consumers and the degree of government interference are among the most important ones. Since our aim in this section was to give the reader a better understanding of how an eco-label may affect the market equilibrium of a random good, without considering any particular scenario or having any information regarding the starting point or slope of the curves, we do not arrive at any specific equilibrium in this discussion. Instead, the

illustrations are there to give a better insight into the general market effects, which will be helpful to keep in mind as we now proceed to our hypotheses.

3.4 Testable hypotheses

Based on existing empirical research and findings within this field, in addition to the theory just presented, we have formulated the following hypotheses that our analysis will attempt to answer:

> **H1a**: There exists a price premium for products that are eco-labeled

Our first hypothesis is based on the majority of findings in existing literature, namely that there exists a positive willingness to pay for eco-labeled products among consumers, and that it thereby exists a ground for charging a price premium for such products. By price premium, we mean the additional price that a retailer charges for a product that is eco-labeled, compared to an otherwise similar, non-labeled product. The premium will thereby consist of both the increase in production costs following the eco-labeling and the potential additional markup the retailer chooses to charge for the extra product attribute. What will be interesting to see is how well our estimate of a potential price premium matches the estimates of consumer's stated willingness to pay for eco-labeled products in existing literature, and through this, we are able to study whether a hypothetical bias exists.

> **H1b:** The relative price premium for eco-labeled products differs across product categories

Since literature has found that other attributes of a product could matter more than the eco-label in the purchasing decision, it is reasonable to assume that the eco-label will be viewed as important within certain product categories, and less important in others. Moreover, one could also assume that consumers are more guided by habits when purchasing products within certain categories, such as those where they make purchases more frequently. For categories where purchases are made more seldom, one could expect less habitual purchases and thereby to find a stronger effect of the eco-label. This could give ground to charge a higher price for eco-labeled products within such categories, and hence we would expect to see a

price premium that varies across product categories. Due to the natural difference in price levels across product categories, it will only make sense to compare the price premiums in relative terms.

> **H1c**: The relative price premium for an eco-labeled product is higher for products aimed at children

This hypothesis is based on the findings of Loureiro et al. (2002) who discovered that women are more eco-conscious than men, and even more so if they have young children. One could also assume that when parents purchase products for their children, they are more guided by altruistic motives and thereby more likely to purchase eco-labeled goods. The perception of higher product quality, or even a wish to improve one's social status, could also be sources of motivation to purchase products that are eco-labeled for children. Since the dataset we received from Rema 1000 contains data for diapers, it provides us with the opportunity to look further into this interesting aspect. Also here we need to study the price premiums in relative terms for the comparison to make sense, considering diapers are rather expensive goods compared to other product categories in the dataset.

> **H1d**: The relative price premium for an eco-labeled product is higher for products that are the most expensive alternatives within their product category compared to the less expensive alternatives

Based on the discussion of increased production costs related to eco-labeling, one can assume that the increase will be somewhat similar for products within the same product segments (e.g. hygiene products, food products, clothing) as they often have similar production methods. However, we do suspect that the price premium for an eco-label is higher for products within a higher price range. We suspect that consumers purchasing the more expensive alternatives within a product category have a higher willingness to pay (in general) and that they are less sensitive to price increases. A reasonable assumption would further be that less price-sensitive consumers are those with higher income and that higher income often is correlated with years of education. Our suspicion could be supported by the findings of Teisl et al. (2008), who found that educated individuals trust eco-labels more and to a greater extent take eco-information into account in their purchasing decisions.

Again, we are interested in looking at the difference in price premiums in relative terms due to the natural price differences between the products being compared.

> **H2**: A product will experience increased sales volumes after being eco-labeled

When a product goes from not being eco-labeled to being eco-labeled, all else equal, an additional attribute is added to the product. This attribute, an assurance of a more environmentally friendly product, is something many consumers have stated that they are willing to pay a premium for (as background for hypothesis H1). It would be reasonable to assume that many consumers would substitute the non-labeled product for the eco-labeled product, given that they are willing to pay the price premium and that the two products are otherwise close to identical.

In order to answer our hypotheses, a regression analysis will be conducted. The design of the regression models is specified in Section 5.1. Hypothesis H2 will be explored further using a difference-in-differences analysis, where a specification of the model and the design follows in Section 5.2. Our analyses will use real purchasing data from a Norwegian grocery chain consisting of prices and quantity sold of goods labeled with the Nordic Swan, and we believe the results from these analyses can be used as a proxy to either accept or reject the hypotheses on a general basis.

4. Data and summary statistics

4.1 Data gathering

In order to study the price premium of eco-labeled products from a corporate perspective, we needed data showing the price and quantity sold of several products within the same product category, both labeled and non-labeled. As this sort of data qualifies as sensitive information for the owner, it is not publicly accessible information. Therefore, we decided to contact Rema 1000, one of Norway's largest grocery chains, to ask if they were interested in a collaboration. They quickly responded positively and expressed that they found the topic of the paper to be of importance and that they were interested to gain insight from our analysis.

As of 2019, Rema 1000 distributed several different eco-labels, including the Nordic Swan, Aquaculture Stewardship Council (ASC), Marine Stewardship Council (MSC), Rainforest Alliance and Debio's Ø-label. We decided to focus on one eco-label only, due to the differences in which product segments they represent. Even though product attributes, and thereby consumer utility functions, vary for products within the same segment, they are still more similar to each other than if one were to compare attributes and utility functions for products across segments. Hence, we believe that the quality of the regression result will be more precise if done for one eco-label and its associated products rather than with several labels across different product segments. The choice fell upon the Nordic Swan, as this eco-label is the best represented and most sold eco-label of Rema 1000. Additionally, it is the most widely known eco-label in Norway (The Nordic Swan Ecolabel, n.d.).

The Nordic Swan is found on a range of hygiene-, detergent- and paper products, and thus, we asked for data within these product segments. We received the dataset from Rema 1000 on the 20th of November 2019. Since the dataset contains highly sensitive information on prices and quantities sold, it is strictly confidential and subject to a non-disclosure agreement (NDA). No product-specific prices or sales numbers are therefore reproduced in this thesis.

In addition to the quantitative dataset, we also conducted a written interview regarding Rema 1000's view on CSR, eco-labels and sustainability strategy. The interview was received on the 28th of November 2019 and the questions are answered by Rema 1000's head of CSR and sustainability, Kaia Østbye Andresen. We have also been in contact with her for additional information and content reviews throughout the writing of this thesis.

4.2 Description of data

The dataset consists of price and quantity quotations obtained from the Norwegian grocery chain Rema 1000. The original dataset contained a total of 105,535 rows of data, where each row represented a weekly observation of price and quantity sold of a given product. More specifically, the dataset includes average price in NOK (incl. VAT), quantity sold and total sale revenues (excl. VAT) of approximately 500 different household goods reported on a weekly basis from 2016 to week 42 in

2019 (200 weeks in total). The data is aggregated for all Rema 1000 stores in Norway, 645 stores in total (as of December 2019), distributed across the entire country[13]. The data is thereby characterized as panel data, also called cross-sectional time-series data.

A number of products are not sold throughout the entire time period of the dataset, as they have either been introduced or withdrawn during this time. Therefore, the number of products sold each week may vary according to the assortment of that time. The median number of price quotations within one week (equal to the median number of data rows for one week) is 295. The products were in the original dataset categorized within five broad categories, *Hygiene/Cosmetics*, *Sanitary*, *Diapers*, *Paper* and *Detergents*. Due to the data sorting described in the sections below, we later expanded these into the product categories found in Tables 2 and 3. Each product is labeled with its own serial number which makes it easier to separate between products with identical or nearly identical names, ensuring that the price and quantity quotations refer to the same product consistently. Products who share the same product name, but have different serial numbers, are treated as individual products.

The original dataset did not contain information regarding several factors that were important to our analysis. Hence, we went on to manually add this information to the dataset using either the website www.kolonial.no or checking the physical product in a Rema 1000 store in Oslo. First, the original dataset did not contain information regarding whether a product was labeled with the Nordic Swan or not. After adding this information, the dataset revealed several product categories where no products were labeled with the Swan, e.g. toothbrushes and fabric softener. These product categories were excluded. Second, an important factor to consider is the size of the product. It would not make sense to compare the prices of products of different sizes - therefore, all prices are controlled for the size effect[14]. Third, the prices were adjusted relative to the Consumer Price Index (CPI) reported by Statistisk sentralbyrå (SSB) with 2016 as reference year[15]. During the time period

[13] With a naturally large share around the largest cities, e.g. Oslo, Trondheim, Bergen and Stavanger

[14] Within each product category, the size that appeared most often were used as a benchmark and products of a different size within the category was multiplied by a factor so to make it equal to the benchmark

[15] This was done using the CPI Total Index, and not the CPI for Foods and non-alcoholic beverages especially, as the products do not count as food and no other specific CPI group was considered a good match

of the dataset, the 12-month annual inflation rate has varied between 1.9 and 3.6 percent with a slightly negative trend.

Ultimately, by adding new columns to the dataset, we ended up including the following information regarding each product to the dataset:

- Eco-labeled
- Average price (incl. VAT) adjusted for size + CPI
- Product category
- Brand
- Perfume free
- Product advertised for female/male or 'neutral' (incl. children)

Lastly, the dataset contained several observations where less than 500 units of one product were sold during a week. Considering that the data reflects the weekly quantity sold on a national level, less than 500 units sold seem unnaturally low. To reduce sampling errors and avoid a regression result that is biased due to products that are either out of stock or removed from the product assortment, these observations were excluded from the dataset. The cleaned and final dataset we ended up with contains 33,201 rows of data (a reduction of approximately 68.5 percent of the original dataset)

It is worth mentioning that the dataset lacks several product characteristics and other information that could help to explain both the price and quantity sold of a product, e.g. marketing campaigns, periods of sale, availability and shelf placement. Since the dataset consists of non-perishable goods that can be stored, we anticipate the same effect as Brouhle & Khanna (2012); that the on-sale variable may have a larger impact on household demand with households stocking up on these goods during sales and not buying much at other times. Furthermore, advertising for any eco-labeled product may inform consumers of the presence and benefits of eco-labeled goods, which may lead consumers to purchase either that specific eco-labeled product or any eco-labeled product (which they in the absence of the advertisement would not have purchased). Additionally, a combination of these two factors, advertisements for certain products on sale, is certainly a major driver for variations in both prices and quantities sold. Lastly, the selection of eco-labeled products available in each store at any given time and the product's shelf placement

will definitely impact the quantity sold and is yet another type of information that we do not possess. Unfortunately, this information is either unavailable or too cumbersome to obtain, and a major shortcoming is therefore that we lack variables accounting for factors that we know with certainty have an effect on the price and sales volume of a product. The uncertainty produced by these weaknesses should be kept in mind when interpreting the results.

4.3 Summary statistics

Table 2. - SHARE OF YEARLY OBSERVATIONS WITH LABEL

Year		Body-lotion	Hand-cream	Handwash	Bodywash	Hairwash	Diapers	Tooth-paste	Makeup wipes	Deodorant	Laundry detergent	Dish soap	Machine dishwash
2016	*N observations*	328	59	593	892	1893	1308	984	315	777	1134	314	420
	% with label	0.0 %	15.3 %	11.5 %	17.6 %	3.5 %	62.8 %	10.8 %	29.8 %	6.7 %	53.4 %	16.9 %	53.8 %
2017	*N observations*	276	87	671	676	1782	1309	931	272	889	1167	301	508
	% with label	3.6 %	47.1 %	30.6 %	38.2 %	4.7 %	62.4 %	17.0 %	23.9 %	1.6 %	55.5 %	20.9 %	26.2 %
2018	*N observations*	293	96	684	661	1661	1324	860	210	800	1099	359	454
	% with label	4.8 %	46.9 %	38.0 %	40.1 %	4.2 %	64.0 %	18.5 %	27.6 %	0.0 %	51.9 %	29.2 %	25.3 %
2019*	*N observations*	245	70	492	599	1349	1012	705	141	672	886	296	347
	% with label	1.2 %	44.3 %	38.8 %	34.4 %	3.7 %	68.0 %	17.9 %	29.8 %	0.0 %	57.2 %	28.7 %	24.2 %

**Only up to week 42*

Table 2 displays how the observations are divided over both product categories and years, in addition to the share of observations labeled with the Swan at that time. One N observation is understood as one weekly quotation of price and quantity sold of a specific product (same as one row of the dataset). The share of labeled products is slightly increasing in the time period from 2016 to 2019, with a few exceptions. Within the category *Machine dishwash,* we see a halving of the proportion of labeled products, possibly stemming from one product being taken off the market or a particular brand not being labeled from 2017 and onwards. Additionally, the category *Deodorant* is down to zero percent of labeled products in 2018 and 2019. *Diapers* and *Laundry detergent* are the two categories with the highest percentage of labeled products. Looking at the number of observations, *Hairwash* clearly stands out with the highest number, together with *Diapers* and *Laundry detergent* as second and third. Most categories have a lower amount of observations in 2019 compared to 2016. We do not have any knowledge of why it is so, but we do know that Rema 1000 implemented their new strategy called 'Bestfriend' in 2017, which among other things consisted of cutting down on the number of brands in their assortment and rather enter into long-term agreements with fewer suppliers. *Makeup wipes* is the category where the relative drop in the number of observations is the largest from 2016 to 2019, whereas *Hairwash* has the largest drop in absolute terms.

Table 3. - SIMPLE STATISTICS

Productcategory	Number Of Products	Mean Price (std)	Coefficient of Variation (x100)	75% quantile / 25% quantile	95% quantile / 5% quantile
Bodylotion	11	33.27 (12.94)	38.91	5.24	9.05
Handcream	6	34.02 (7.74)	22.75	1.91	1.91
Handwash	28	27.28 (11.91)	43.64	2.82	6.38
Bodywash	45	31.35 (9.88)	31.51	2.15	3.64
Hairwash	97	43.40 (12.85)	37.35	2.33	4.74
Diapers	68	52.14 (27.28)	52.33	3.95	7.96
Toothpaste	37	26.19 (8.63)	32.94	2.46	7.43
Makeup wipes	10	26.24 (9.76)	37.19	1.98	3.66
Deodorant	33	32.82 (9.26)	28.22	1.91	5.38
Laundry detergent	51	42.22 (14.41)	34.22	2.56	4.55
Dish soap	11	25.37 (10.74)	42.35	3.88	6.68
Machine dishwash	23	64.85 (41.38)	63.80	5.22	7.19

Note: Price is measured in NOK (incl. VAT) and not adjusted for CPI. One € was equal to 9.589 NOK 01.01.2016 and 10.049 NOK 31.12.2019

Table 3 displays some simple price statistics of the dataset. The first column reports the total number of products within each product category. Column 2 reports the mean price (not adjusted for CPI or size) and standard deviation for each product category and Column 3, 4 and 5 all illustrate the variation in price within each product category. Table 3 shows that there is significant price dispersion between product categories and is in accordance with the findings of Moen et al. (2017). *Machine dishwash* and *Diapers* stand out as the most expensive categories, in addition to being the two categories where prices vary the most. The table also shows that there is a specifically large gap between the most and least expensive alternative in the product category *Bodylotion*, and this is also prominent in the categories *Diapers*, *Toothpaste* and *Machine dishwash*.

5. Empirical design of the study

5.1 Regression model specification

In order to estimate the price premium of eco-labels, and thereby address hypothesis H1a stating that there exists a price premium for eco-labeled products, we first set up an OLS regression model[16] in Stata using our cleaned dataset. With the natural logarithm (hereby denoted as log) of the price as the dependent variable, a dummy for the Nordic Swan is used as one of the explanatory variables, so that we can capture the effect that the Nordic Swan has on the price. We also need to control for other product attributes that also affect the price in order to isolate the effect of

[16] Ordinary least squares (OLS) is a regression method based on the principle of least squares, and aims to minimize the sum of the squares of the differences between the observed dependent variable in the dataset and those predicted by the regression function

the eco-label on the price. Below is our main regression model which captures the overall effect of the Nordic Swan, i.e. across product categories.

$$logprice_{i,t} = \alpha + \delta_1 swan_{i,t} + \delta_2 men_i + \delta_3 women_i + \delta_4 cheap_i + \delta_5 expensive_i + \delta_6 perfumefree_{i,t} + \sum_{j=1}^{11} \gamma_j category_{i,j} + \sum_{k=0}^{52} \mu_k week_{i,k} + \sum_{m=1}^{3} \pi_m year_{i,m} + \varepsilon_{i,t}$$

In this regression model, $logprice_{i,t}$ is an estimate of the log of the CPI- and size-adjusted price of a given product. By using a logged dependent variable, we can interpret our regression estimates as a percentage change. The intercept α can be interpreted as the estimated log of the price given that all explanatory variables are set equal to zero. $swan_{i,t}$ is a dummy variable that has the value 1 if a product has the Nordic Swan label, and 0 if not. δ_1 thereby captures the estimated percentage change in the price of a product as an effect of having the Nordic Swan. Given that this coefficient is positive, it can be interpreted as how much more Rema 1000 charges in percent for a product exclusively from having the eco-label. This is the effect we are interested in finding. The dummies men_i and $women_i$ are added to control for the effect of products that advertise directly to one gender, whereas 'neutral' products have the value 0 for both dummies. To control for the effect of brand recognition, we add a dummy for 'cheap' products, such as Rema 1000's own brand Prima, and a dummy for 'expensive' products that are perceived as more exclusive, such as Klar. We decided on a reasonable threshold that classified a brand as cheap (average brand price < 20 NOK)[17], as well as a threshold for expensive brands (average brand price > 50 NOK) so that all brands were placed in either the cheap, expensive or a medium-priced section. The products that were categorized as medium-priced are the base for the model, so when looking at products within this price range, both the $cheap_i$ and $expensive_i$ dummies will have a value of 0.

[17] The average brand price was calculated by taking the average price of all products with the same brand across categories.

We have also added the dummy $perfumefree_{i,t}$, which is 1 for products that do not contain perfume, to control for the price premium that often comes with such products. Furthermore, we have added dummy variables for all but one product category, namely *Hand cream*. These dummies, $category_{i,j}$, control for different price ranges across different categories of products. We chose to set *Hand cream* as the base because this is the product category with the smallest spread in price observations out of all the categories. Ultimately, the choice of base doesn't really matter, as long as we are aware of which category is the reference. We end up getting the same results no matter what category we choose (Grace-Martin, n.d.). We also control for seasonal effects by adding a dummy for all except the first week, $week_{i,k}$, which we hope will capture some of the changes in prices due to e.g. specific seasons or price wars between grocery stores. Lastly, $year_{i,m}$ is added to control for differences across the four years of data, with 2016 as base. The error term $\varepsilon_{i,t}$ reflects the difference between the theoretical value of the model and the actual observed results (Hayes, 2020). The OLS regression method aims to minimize the sum of squared error terms in our observations. As discussed in Section 4.2, we are aware of several variables that lie in the error term, but these are either too difficult or impossible to observe and thereby not included in our model.

In addition to revealing the aggregate causal effect of the Nordic Swan for all products in our dataset, we are interested in exploring differences in this effect between product categories. This way, we can evaluate whether the Nordic Swan has a larger effect in certain categories, and thereby state for which type of products the label reflects a more lucrative strategy for producers and retailers. In H1b, we hypothesized that there would be such a variation across product categories. The regression model below shows how we capture the effect of the Nordic Swan for each product category. Here, we have removed the dummy $swan_{i,t}$ from our previous model, and instead added an interaction term between each product category and the Swan, $swan\ x\ category_{i,q}$, which is 1 if a product is labeled with the Nordic Swan and belongs to the category in question. This way, we can find the percentage effect of the Nordic Swan on the price for each of the categories. Furthermore, we can test hypothesis H1c stating that the relative price premium is higher for children's products by comparing the effect on diapers to the other product categories. The category-specific model is specified below.

$$logprice_{i,t} = \alpha + \delta_1 men_i + \delta_2 women_i + \delta_3 cheap_i + \delta_4 expensive_i + \delta_5 perfumefree_{i,t} + \sum_{j=1}^{11} \gamma_j category_{i,j} + \sum_{k=0}^{53} \mu_k week_{i,k} + \sum_{m=1}^{3} \pi_m year_{i,m} + \sum_{q=1}^{11} \lambda_q swan\ x\ category_{i,q} + \varepsilon_{i,t}$$

Next, we wish to examine the effect of the Nordic Swan on sales volumes in order to address hypothesis H2. We set up a new regression model where the dependent variable is the natural logarithm of the number of units sold. Except for this modification, as well as the addition of CPI- and size-adjusted price as an explanatory variable, the model specification and the interpretation of the included variables are equivalent to the regression models described above. In modern economics, price (P) is commonly not included as an explanatory variable in a model for demand (Q) and vice versa, because P and Q are viewed as endogenous variables that are determined simultaneously within the system. Relying on such an assumption, including price as an explanatory variable in the unit models would lead to biased coefficient estimates using OLS regression. However, in this study, we choose to consider the price of a product as an exogenous variable that is determined by the grocery stores prior to when the demand for the same product is determined. We make this assumption based on the discussion in Section 3.1, where we argue that actors in the Norwegian grocery market are price setters due to the structure of the market. Hence, we decide to include price as an explanatory variable in the unit models, as it then would only make sense that the sales volume of a product is affected by its set price. It is for the same reasons we have chosen to exclude the demand for a product (quantity sold) as an explanatory variable in the price models since we consider the demand to be determined after the price is set.

Again, we seek an aggregate effect of the labeling on quantity sold, as well as the effect across product categories. The regression model formulas for the aggregate model and the category model are shown below in this order.

$$logunits_{i,t} = \alpha + \delta_1 swan_{i,t} + \delta_2 price_i + \delta_3 men_i + \delta_4 women_i + \delta_5 cheap_i + \delta_6 expensive_i + \delta_7 perfumefree_{i,t} + \sum_{j=1}^{11} \gamma_j category_{i,j} + \sum_{k=0}^{52} \mu_k week_{i,k} + \sum_{m=1}^{3} \pi_m year_{i,m} + \varepsilon_i$$

$$logunits_{i,t} = \alpha + \delta_1 price_{i,t} + \delta_2 men_i + \delta_3 women_i + \delta_4 cheap_i + \delta_7 expensive_i + \delta_8 perfumefree_{i,t} + \sum_{j=1}^{11} \gamma_j category_{i,j} + \sum_{k=0}^{53} \mu_k week_{i,k} + \sum_{m=1}^{3} \pi_m year_{i,m} + \sum_{q=1}^{11} \lambda_q swan\ x\ category_{i,q} + \varepsilon_i$$

In order to address hypothesis H1d stating that the relative price premium for an eco-labeled product is higher for expensive products than for the less expensive products, we add two additional interaction terms, namely $swan\ x\ expensive_{i,t}$ and $swan\ x\ cheap_{i,t}$ to both of the category models replicated above. This will enable us to assert whether the Nordic Swan has different effects on products belonging to the more expensive brands than the cheaper ones. We will add these terms in both the model with price as the dependent variable and the model with sales volume as the dependent variable so that we can examine both the effect on prices and sales volumes.

For all our regression models, we use clustered standard errors. This is due to the sampling design and the characteristics of our data. First, we have sampled data from a particular grocery store in Norway for a specific period of time. Since we are interested in saying something about the broader population, namely the Norwegian or Nordic grocery market as a whole, it is necessary to use clustered standard errors in the regression (Abadie, Athey, Imbens & Woolridge, 2017). Next, since we have data characterized as panel data, we assume (and test for) heteroscedasticity and autocorrelation among residuals. Since the presence of these two violates two of the assumptions needed for trustworthy OLS regression estimators, clustered standard errors are needed in order to allow for these features to exist. Two different clustering approaches have been used, one where the standard errors are clustered by week (200 weeks in total) and one where the standard errors are clustered by product (420 products in total). Standard errors clustered by weeks are used for the main results presented in Section 6.1. Although both clustering methods account for important effects in the residuals, we assume that clustering by weeks captures the most important effect, namely differences in price levels and sales volumes across seasons. Thereby, we hope to partly adjust for

the marketing campaigns we are not able to capture through an explanatory variable in the models.

5.2 Difference-in-differences specification

For an additional dimension to our analysis, we will look closer at a few products that have been labeled with the Nordic Swan during the time period of our data. We aim to evaluate whether the eco-label has made any significant impact on the sales volume of these products and thereby go more in-depth into our final hypothesis, H2, stating that the labeling of the Nordic Swan generates a boost in sales. To study this, conducting a difference-in-differences analysis is very helpful. This type of analysis relies on the assumption of parallel trends, which states that the treatment group, absent the treatment, would have followed the same time trend as the control group (Fredriksson & Oliveira, 2019). Thus, we must find a product with a sufficiently parallel sales trend pre-eco-labeling as the product in question to be the control group, and thereby study how the trends diverge following the eco-labeling. A natural choice is a product within the same product category as the product that has been labeled to make sure that the products being compared are as similar as possible. By using the control product to estimate a counterfactual sales trend post-eco-labeling for the product in study, we can capture the so-called 'intervention effect', which is the effect on the sales volume from having the Nordic Swan on the product. The difference-in-differences model is specified below and is based on the method described by Angrist and Pischke (2015).

$$logunits_{i,t} = \alpha + \beta SWAN_i + \gamma POST_t + \delta_{RDD}(SWAN_i \; x \; POST_t) + \epsilon_{i,t}$$

A difference-in-differences analysis is essentially an OLS regression in which regressing on dummy variables indicating treatment, time and group isolate the effect of the treatment. The dependent variable is denoted $logsales_{i,t}$ and estimates the log of sales of product *i* in time period *t*. Again, we use the log of sales to be able to interpret the results as a percentage change. Here, $SWAN_i$ is a dummy variable indicating the treatment group, i.e. the product that has been labeled with the Nordic Swan. $POST_t$ is a dummy variable indicating the time from when the product was labeled with the Nordic Swan. The interaction term $SWAN_i \; x \; POST_t$ is a dummy which is 1 for the labeled product after it received the label. The coefficient δ_{RDD} thereby captures the percentage causal effect of the Nordic Swan

on sales volume and can be calculated with a simple regression in Stata. The table below illustrates the difference-in-differences estimator and is based on David Albouy's notes on the method (Albouy, 2020).

	Pre treatment	Post treatment	Post-Pre difference
Control	α	$\alpha + \gamma$	γ
Treatment	$\alpha + \beta$	$\alpha + \beta + \gamma + \delta$	$\gamma + \delta$
T-C difference	β	$\beta + \delta$	δ

α = The intercept. Shows the average sales volume prior to the introduction of the Nordic Swan.
β = The estimated difference in sales between the treatment and control group prior to the labeling
γ = The average change in sales from before to after the labeling. Can be interpreted as the time effect in absence of the labeling.
δ = The diff-in-diff estimator. Shows the estimated change in sales for the treatment group due to the labeling.

In addition to this simple model, we will regress difference-in-differences models where we also include time effects by adding dummies for weeks and years. This is to make sure we control for general sales effects common for both the treatment group and the control group in all the different weeks in our dataset. The model specification is shown below.

$$logunits_{i,t} = \alpha + \beta SWAN_i + \gamma POST_t + \delta_{RDD}(SWAN_i \; x \; POST_t) + \sum_{k=0}^{53} \mu_k week_{i,k} + \sum_{m=1}^{3} \pi_m year_{i,m} + \epsilon_{i,t}$$

Since we, in order to conduct this analysis, rely on both parallel trends and knowledge about the specific time the products were labeled with the Swan, we are limited to only two products. First of all, there were very few products in the dataset that became eco-labeled during the time period 2016-2019. Second, for those that were, there were very few that had parallel sales trends with a suitable control group. None had parallel trends in terms of prices, so this analysis is conducted exclusively by looking at sales volumes. We first do an analysis of a toothpaste for kids from Solidox, which was labeled in March 2018, with a toothpaste for kids from Zendium as the control group. We thereby do the same for tampons from Rema 1000, which were labeled in November 2018, using OB Normal tampons as the control group.

As stated by Bertrand, Duflo & Mullainathan (2004), difference-in-differences analyses are often subject to a possibly severe serial correlation problem. In our study, it is especially important to be aware of this issue as we utilize a panel dataset that consists of several time-series and cross-sectional data. Such datasets are prone to serial correlation between the residuals. To address this, we decided to cluster by weeks in this analysis as well to obtain robust standard errors.

6. Results

6.1 Regression results and interpretation of results

In this section, the results from the regression models described in Section 5.1 will be presented and interpreted. We begin by presenting the results from the aggregate model with the log of the product price as the dependent variable, which can be found in column 1 in Table 4. The coefficients can be interpreted as the percentage effect on the price of a product. In this model, the sought-after result is the overall percentage effect of the Nordic Swan on a product's price across all categories. For presentational ease, the estimated coefficients for each week and year of the dataset are not included in Table 4. A table displaying the complete regression result can be found in Table A.1 in the Appendix. After running the regression and controlling for all the attributes of importance that we were able to observe, we find that the Nordic Swan reflects an overall price premium of 21 percent. This result confirms our first hypothesis (H1a) which states that there exists a price premium for eco-labeled products, and it suggests that retailers can demand a substantial price premium for signaling superior environmental performance in products. Furthermore, it suggests a higher willingness to pay among consumers for eco-labeled products in the market, with the assumption that demand influences prices in the market. The effect is statistically significant at the 1% level. An R^2 of 0.637 indicates that the explanatory variables included in the regression model explain 63.7 percent of the variance of the prices in our dataset. This is quite satisfactory, as we are aware of several other unobservable factors that influence the price but remain in the error term. The table displays negative values to the estimates of all pure category effects, except for *Laundry detergent*. The same is true for the category model. The explanation for these negative values lies in the choice of *Hand cream* as the base, considering products within this category are, on average, more expensive than the majority of consumables in the other categories. Hence,

the coefficients must be seen in relation to the choice of base category, which in this case constitutes a rather high price benchmark.

In the category model, we sought the effect of the Nordic Swan on each of the product categories in our dataset. The results can be found in column 2 of Table 4[18] and include many interesting findings. We see a negative coefficient for the interaction term of the Nordic Swan with *Deodorant* and *Hand soap*. This suggests that selling products labeled with the Nordic Swan within these categories must be accompanied with a discount. For hand soap, the negative effect is the largest, with a statistically significant negative effect on price of 25.8 percent. The effect on Dish soap is not statistically significant on any significance level. For the remaining categories, we observe positive effects on prices, all at a statistical significance level of 1%. The estimated percentage price premium as an effect of the Nordic Swan is the largest for *Diapers*, with a markup of a staggering 68.8 percent. For products in the category *Machine dishwash*, the effect is also substantial, with the Nordic Swan entailing a 43.2 percent price premium. The large variations of price premiums confirm our hypothesis (H1b) stating that the relative price premium for eco-labeled products differs across product categories. Furthermore, the results from the category model support our hypothesis (H1c) stating that the relative price premium for an eco-labeled product is higher for products aimed at children, considering diapers drive the highest percentage price premium by far out of all the categories in the dataset. For the category model, the included explanatory variables explain 66.8 percent of the price variation. This is even higher than in the aggregate model and indicates that isolating the effects of the Nordic Swan for each category results in stronger explanatory power.

[18] For the interaction effects, the choice of base does not have an impact on the coefficients. Regardless of what category is utilized as the base, the interaction terms isolate the effect of the Nordic Swan on each product category, and hence, the coefficients do not need to be interpreted relative to the chosen base.

Table 4. - REGRESSION RESULTS (Standard errors clustered by weeks)
Determinants of the price of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	3.588***	0.018	3.40E-229	3.698***	0.016	7.80E-242
Values						
The Nordic Swan	0.210***	0.004	1.90E-112			
Men *(base: both genders)*	0.126***	0.004	4.35E-74	0.068***	0.005	3.97E-32
Women *(base: both genders)*	0.010*	0.004	0.0196	-0.011*	0.005	0.016
Cheap *(base: medium)*	-1.111***	0.008	1.00E-200	-1.234***	0.006	1.50E-234
Expensive *(base: medium)*	0.348***	0.004	4.90E-163	0.237***	0.004	6.90E-129
Perfume free	-0.154***	0.011	7.21E-32	-0.067***	0.012	1.23E-07
Categories (base: hand cream)						
Makeup wipes	-0.177***	0.015	4.03E-25	-0.224***	0.017	2.98E-29
Hairwash	-0.215***	0.015	4.63E-33	-0.298***	0.014	3.00E-54
Bodywash	-0.346***	0.015	4.46E-59	-0.386***	0.014	7.19E-68
Hand soap	-0.423***	0.015	3.63E-73	-0.379***	0.017	1.38E-56
Deodorant	-0.171***	0.017	3.72E-19	-0.253***	0.016	1.96E-38
Dish soap	-0.373***	0.014	1.91E-65	-0.423***	0.014	1.63E-74
Machine dishwash	-0.187***	0.016	2.76E-25	-0.358***	0.014	6.04E-64
Laundry detergent	0.151***	0.015	4.64E-19	0.149***	0.014	2.82E-21
Toothpaste	-0.269***	0.014	2.00E-46	-0.386***	0.014	2.82E-72
Body lotion	-0.239***	0.018	1.27E-28	-0.325***	0.016	2.77E-50
Diapers	-0.154***	0.015	2.79E-19	-0.514***	0.020	2.39E-66
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.082***	0.015	1.71E-07
The Nordic Swan x Hairwash				0.134***	0.016	1.90E-15
The Nordic Swan x Bodywash				0.048***	0.008	4.34E-08
The Nordic Swan x Deodorant				-0.092***	0.007	4.37E-32
The Nordic Swan x Dish soap				0.002	0.007	0.751
The Nordic Swan x Machine dishwash				0.432***	0.019	1.30E-56
The Nordic Swan x Laundry detergent				0.131***	0.007	2.94E-45
The Nordic Swan x Toothpaste				0.194***	0.004	8.30E-108
The Nordic Swan x Body lotion				0.250***	0.007	7.89E-85
The Nordic Swan x Diapers				0.688***	0.013	2.00E-118
The Nordic Swan x Hand soap				-0.258***	0.010	2.62E-68
The Nordic Swan x Hand cream				0.588***	0.028	2.63E-51
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				1.040***	0.006	6.90E-216
The Nordic Swan x Expensive				-0.051***	0.009	9.60E-09
	R^2 = 0.637			R^2 = 0.668		

Note: The dependent variable is the log of the price of products. The estimates in the table are therefore the estimated percentage effect on prices. In this table, the time dummies Week and Year are excluded. A full version is included in the Appendix. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.744.

Table 5 presents our regression results with the log of quantity sold as the dependent variable. The coefficients can be interpreted as the percentage effect on the sales volume of a product. The result from the aggregate model is shown in the first column and suggests that the Nordic Swan, on average, increases sales by 3 percent. The effect is statistically significant at the 1% level. The positive effect on sales volumes is in support of hypothesis H2 stating that the sales volume of a product will increase if eco-labeled. We will address this hypothesis further in our difference-in-differences analysis, where we are able to study the impact of the labeling on sales volumes more closely. The aggregate model gives an R^2 of 0.326, which again indicates that there are many factors explaining variations in sales that are not included as variables in the model.

Table 5. - REGRESSION RESULTS (Standard errors clustered by weeks)
Determinants of the number of units sold of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	7.315***	0.065	4.50E-182	7.491***	0.065	8.50E-185
Values						
The Nordic Swan	0.029***	0.006	6.08E-06			
Price	-0.010***	2.96E-04	1.34E-85	-0.013***	3.04E-04	2.00E-102
Men *(base: both genders)*	0.040***	0.007	6.29E-08	-0.008	0.007	0.272
Women *(base: both genders)*	0.120***	0.008	1.02E-36	0.078***	0.007	2.95E-23
Cheap *(base: medium)*	0.231***	0.011	9.02E-53	0.068***	0.018	1.93E-04
Expensive *(base: medium)*	-0.102***	0.010	4.11E-21	-0.177***	0.011	2.63E.40
Perfume free	-0.392***	0.014	2.53E-69	-0.392***	0.015	6.13E-66
Categories (base: hand cream)						
Makeup wipes	0.671***	0.026	1.02E-64	0.591***	0.257	4.95E-58
Hairwash	0.160***	0.024	3.43E-10	0.141***	0.025	8.22E-08
Bodywash	0.547***	0.026	7.88E-52	0.501***	0.028	1.83E-43
Hand soap	0.782***	0.027	3.87E-74	0.741***	0.028	9.57E-67
Deodorant	0.458***	0.025	1.40E-44	0.421***	0.026	4.82E-38
Dish soap	1.353***	0.029	5.40E-110	1.414***	0.031	1.70E-108
Machine dishwash	0.505***	0.025	5.10E-50	0.534***	0.029	2.69E-44
Laundry detergent	0.915***	0.023	2.80E-96	1.086***	0.026	1.40E-101
Toothpaste	1.247***	0.025	5.00E-116	1.134***	0.026	3.40E-103
Body lotion	0.060*	0.024	0.0121	0.025	0.025	0.329
Diapers	0.480***	0.023	7.70E-52	0.095**	0.031	0.003
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.248***	0.035	2.21E-11
The Nordic Swan x Hairwash				-0.256***	0.023	9.93E-23
The Nordic Swan x Bodywash				-0.007	0.013	0.578
The Nordic Swan x Deodorant				-0.129***	0.025	4.03E-07
The Nordic Swan x Dish soap				-0.527***	0.017	2.88E-76
The Nordic Swan x Machine dishwash				-0.260***	0.035	1.88E-12
The Nordic Swan x Laundry detergent				-0.217***	0.017	5.41E-27
The Nordic Swan x Toothpaste				0.195***	0.013	4.90E-33
The Nordic Swan x Body lotion				-0.490***	0.025	1.31E-48
The Nordic Swan x Diapers				0.618***	0.025	8.11E-63
The Nordic Swan x Hand soap				-0.046*	0.019	0.015
The Nordic Swan x Hand cream				0.142***	0.038	2.36E-04
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				0.664***	0.018	9.19E.93
The Nordic Swan x Expensive				0.170***	0.018	2.12E-18
	$R^2 = 0.326$			$R^2 = 0.351$		

Note: The dependent variable is the log of the sales volume of products. The estimates in the table are therefore the estimated percentage effect on sales. In this table, the time dummies Week and Year are excluded. A full version is included in the Appendix. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.363.

The results from the category model are found to the right of Table 5 and show the effect of the Nordic Swan on sales volumes within each product category. The highest effect of the labeling is on *Diapers*, where the Nordic Swan generates a 61.8 percent increase in the sales volume. The Nordic Swan on *Makeup wipes* gives an increase of 24.8 percent, while with *Toothpaste*, sales increase by 19.5 percent. However, the results imply a negative sales effect on the product categories *Hairwash*, *Deodorant*, *Dish soap*, *Machine dishwash*, *Laundry detergent, Hand soap* and *Body lotion*. The negative effect is the largest for *Dish soap*, where the Nordic Swan implies a 52.7 percent decline in the sales volume. The effect on *Bodywash* is not statistically significant at any significance level. The results imply that there are certain product categories where the labeling of the Nordic Swan is

very lucrative and increases sales by large percentages, while other categories in fact appear to sell less due to the label. Furthermore, some effects are more significant than others. It is important to point out, however, that omitted variables (e.g. sale campaigns, advertisement) could play a large role in the actual sales volume variation.

Table 6. - SUMMARY OF THE EFFECT OF THE NORDIC SWAN

	Price premium (in percent)	Effect on sales (in percent)
Aggregate	21.0	2.9
Makeup wipes	8.2	24.8
Hairwash	13.4	-25.6
Bodywash	4.8	Not clear
Deodorant	-9.2	-12.9
Dish soap	Not clear	-52.7
Machine dishwash	43.2	-26.0
Laundry detergent	13.1	-21.7
Tooth paste	19.4	19.5
Bodylotion	25.0	-49.0
Diapers	68.8	61.8
Hand soap	-25.8	-4.6
Hand cream	58.8	14.2

Note: 1. 'Not clear' implies lacking statistical significance.

2. The effect of the Nordic Swan on hand cream is extracted from using other categories as the base.

Table 6 summarizes our main findings from the regression models. In order to evaluate the overall benefit of the Nordic Swan, it is crucial to see the price and quantity effects together. As discussed in Section 3.3, the effect on quantity sold from a price increase depends on the elasticity of demand, i.e. the steepness of the demand curve. From the table, it is apparent that there are different elasticities across the product categories, where the price premium from the Nordic Swan is accompanied with an increased sales volume in some categories and a negative sales effect in others. For the product categories with a positive price premium, but a negative sales effect from eco-labeling, it is important to note that the labeling can be profitable even with less quantity sold (if the additional markup is sufficiently high to make up for the quantity lost). The categories *Deodorant* and *Hand soap* show a negative price premium combined with a negative effect on sales. These appear to be the least lucrative categories for eco-labeling. A likely explanation for these negative effects is that these categories contain some products with particularly strong brand names that are not labeled with the Nordic Swan, such as Palmolive, Lano and Dove for *Hand soap*, and Dove, Nivea and Sterilan

for *Deodorant*. These well-established brands may be perceived as higher valued attributes than the eco-label in these particular categories. This is likely the reason for the large negative effect on quantity sold of *Dish wash* as well, as Zalo is not labeled and has for several years been named one of Norway's strongest brand names with a market share of 80 percent in Norway (Finansavisen, 2020; Jerijervi, 2012).

Lastly, we uncover the results from our extended regression models where we included interaction terms between the Nordic Swan and the variables *Cheap* and *Expensive,* determined by the average price level of the product brand. The results suggest that the Nordic Swan on cheap brands coincide with a price premium of approximately 104 percent and increases the sales volume by 66 percent on average. Our results further suggest that with expensive products, the Nordic Swan must in fact be accompanied with a discount of 5 percent, but that quantity sold increases by 17 percent. The effects are all significant at the 1% level. These findings reject our hypothesis (H1d) stating that the percentage price premium for eco-labeled products is higher for more expensive brands than the less expensive ones. The effect of the eco-label is significantly stronger for the cheaper brands, both in terms of the price premium and the quantity sold.

6.1.1 Robustness checks

Regression model modifications

To make sure our regression results are reliable and robust, we have conducted several forms of robustness checks. Confirming that our main results are not sensitive to changes done to our regression model is important in order to claim true effects. Moreover, including and excluding different combinations of independent variables in the models to see how the coefficients change is a commonly used method to detect omitted variable bias. First, we ran the regressions adding and leaving out different explanatory variables. Instead of baking the CPI into the dependent variable in the price regression, we tried to include it as an independent explanatory variable. We also tried leaving out the week dummies, then the year dummies, and finally both. Lastly, we excluded the dummy for $perfumefree_{i,t}$ as well as the dummies for men_i and $women_i$. With these alterations, both the aggregate and the category model revealed the same effects of the Nordic Swan with approximately equal coefficients. This indicates that our results are robust.

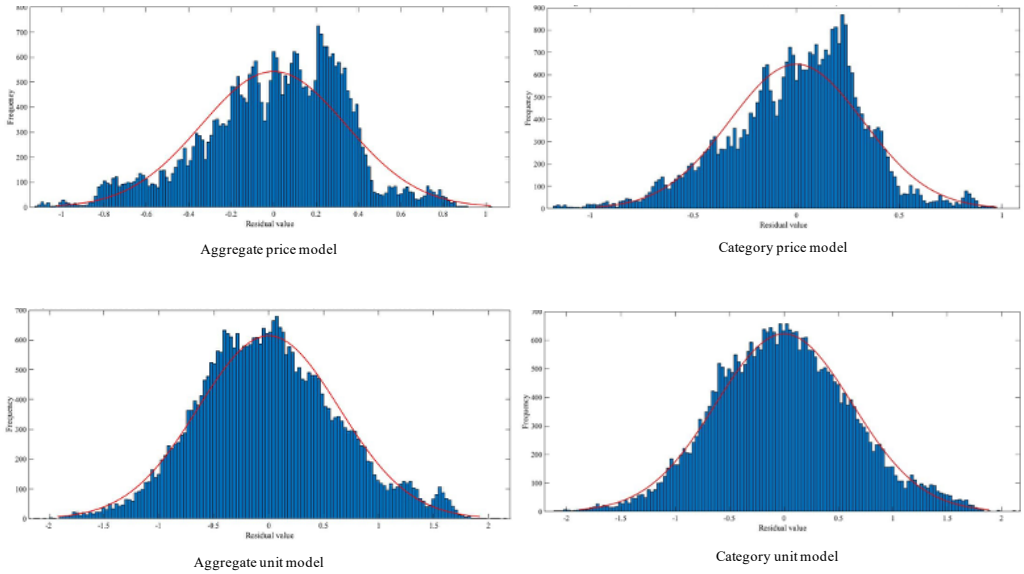
However, excluding the dummies $cheap_i$ and $expensive_i$ made a huge impact on the results. The coefficient for the Nordic Swan decreased to 0.008 after excluding these dummies, implying an effect on the price of only 0.8 percent. This is not surprising as these variables are determined solely by the price level of a product and hence, they should have a strong explanatory power of prices. The massive drop in the effect can likely be explained by the many Nordic Swan products within low-price brands, such as Rema 1000's own product line, Prima. Next, we replaced *Hand cream* as the base of our model and tried with all of the different categories as base instead, to see whether this would have an impact on the results. We replaced the base for the category dummies as well as the interaction terms, and again, this only led to very slight changes in the coefficients of importance.

We conducted similar robustness checks for the regression model capturing the effect on quantity sold. While the effect of the Nordic Swan within each category remained satisfactorily consistent with the modifications, the average effect in the aggregate model was slightly affected following the removal of some of the variables. Removing the time variables decreased the average effect of the Nordic Swan on quantity sold from 3 to 2.3 percent. The removal of the $cheap_i$ and $expensive_i$ dummies increased it to 6.1 percent, again indicating that these variables have strong explanatory power. When excluding the dummy $perfumefree_{i,t}$, the effect was lowered to 1.5 percent. However, the average effect of the Nordic Swan on quantity remains positive and consistent within a small interval, so the variation in the coefficient is not a huge worry.

Residual plots

Since the models use panel data, we suspected them to have correlation in the residuals. Therefore, and as should always be done when estimating a regression model, we studied different residual plots of the models to make sure that they did not display any unwanted patterns and thereby violate any of the OLS assumptions. By residuals, we mean the difference between the observed values in the dataset and the predicted values by the regression model. We began by plotting histograms of the residuals of each model to make sure they are close to normally distributed with mean zero and equal variance, as regression model analysis assumes normally distributed residuals. The results for all four regression models are shown in Figure 8.

Figure 8. - HISTOGRAM OF RESIDUALS AND THE NORMAL DENSITY

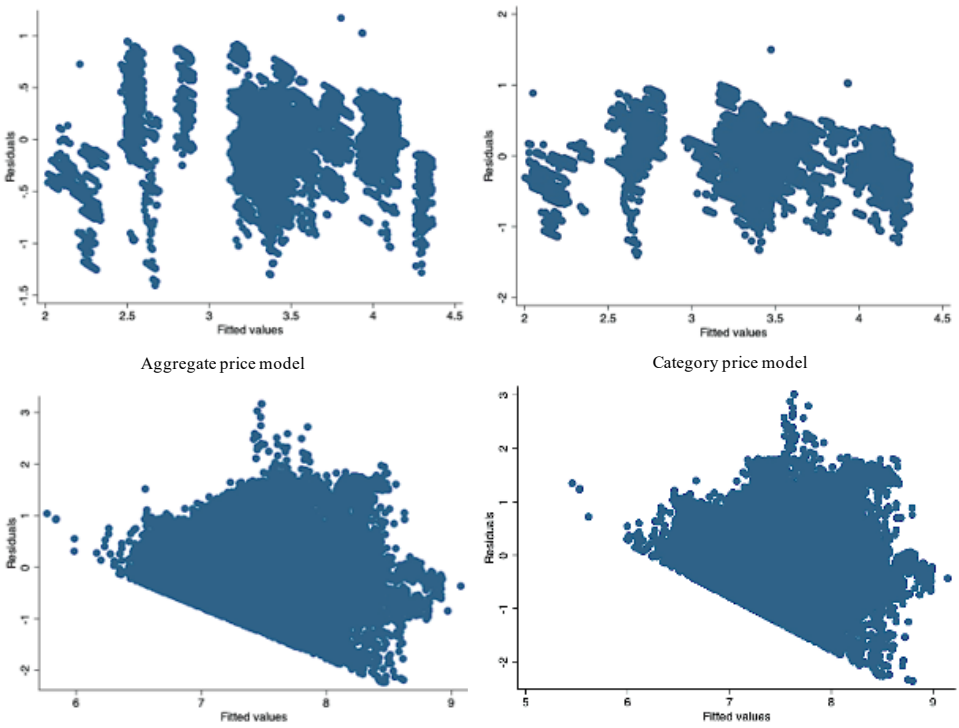


As can be seen from the graphs in Figure 8, the residuals of all regression models appear to be fairly close to normally distributed, although the two price models are slightly skewed to the left. Moreover, for all four models, the mean residual value is very close to zero and the standard deviation is small. Judging from the histograms, it looks as though the assumption of normally distributed residuals holds.

However, residuals should be plotted in more than one way in order to achieve a more exhaustive insight into their distribution. Figure 9 displays the standardized residuals against the fitted values of each of the four regression models. In these plots, each point represents one observation, where the prediction made by the model is on the x-axis and the accuracy of the prediction is on the y-axis. Ideally, the points should be symmetrically distributed, clustered around the middle of the plot (close to zero on the y-axis) with no clear pattern or trend. The plots reveal that the residuals are not perfectly randomly distributed. For the price model, the model's predictions seem to be systematically too high and follow a cone-shaped pattern. For the unit model, the variance seems to increase as the fitted values increase and follows a fan pattern. Both the fan- and cone-shaped patterns are signs of heteroscedasticity. On average, the residuals of the unit model seem to be more randomly clustered around zero than those of the price model, with the exception of the oblique line on the lower half of the y-axis. Two additional residual plots (found in Figure A.1 and A.2 in the Appendix) confirm the assumption that the

residuals of the unit model are more normally distributed than those of the price models.

Figure 9. - PLOT OF RESIDUALS (STANDARDIZED) VS. FITTED VALUES



The residual plots indicate that the independent variables in our models do not capture the entire deterministic component and that some of the explanatory power lies within the residuals. This problem can occur due to a variety of reasons. With a panel dataset, two of the most common sources to the problem are; neighboring residuals are correlated (a problem of autocorrelation) and/or residuals have a non-constant variance (a problem of heteroscedasticity). This will be further investigated below.

We begin by checking whether neighboring residuals are correlated. This would mean that one residual can predict the next, which is known as autocorrelation. Autocorrelation causes the estimated standard errors of the coefficients to be biased, meaning that coefficients claimed to be significant may not be and vice versa. This problem is particularly common for models with time-series data, such as ours, and therefore we want to check whether it applies to our models as well. To do this, one can use a Durbin-Watson test[19]. Table 7 reproduces the results of this test for each

[19] The Durbin-Watson test is a test statistic used to detect the presence of autocorrelation at lag 1 in the residuals of least squares regression models. It tests for the null hypothesis that the errors are serially uncorrelated against the alternative that they follow a first-order autoregressive process. The test is named after James Durbin and Geoffrey Watson, who further developed the works of John von Neumann. Further specification of test formula is found in the Appendix in Equation A.1

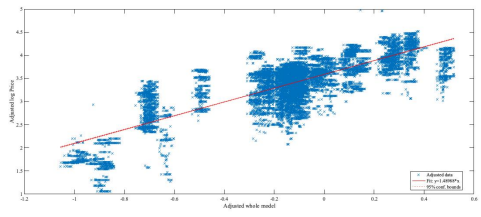
of the four regression models. The Durbin-Watson test statistic ranges from 0 to 4, where values close to 2 suggest less autocorrelation, and values closer to 0 or 4 indicate greater positive or negative autocorrelation respectively. Each model obtained a p-value of zero, which indicates that the autocorrelation among residuals is greater than zero.

Table 7. - DURBIN-WATSON TEST FOR AUTOCORRELATION

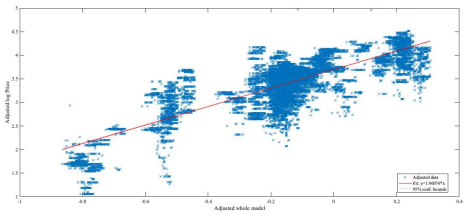
	p-value	Durbin-Watson test statistic
Aggregate price model	0	0.7783
Category price model	0	0.8284
Aggregate unit model	0	1.1424
Category unit model	0	1.1884

Lastly, we need to check whether the residuals have a constant variance or not. OLS regression assumes that all residuals have constant variance (homoscedasticity), so if this assumption does not hold, we could be victim to a problem of heteroscedasticity. Figure 10 below depicts the observed values plotted against the regression line of each of the four models. For the residuals to be homoscedastic, the vertical spread of data points around the estimated regression line should be close to constant as we move to the right on the x-axis. Judging from the four graphs, the variance is not perfectly constant and seems to be increasing for larger x-values, especially for the unit models.

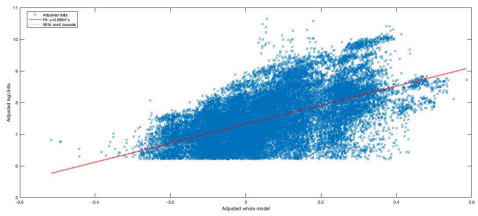
Figure 10. - REGRESSION LINE VERSUS OBSERVED VALUES



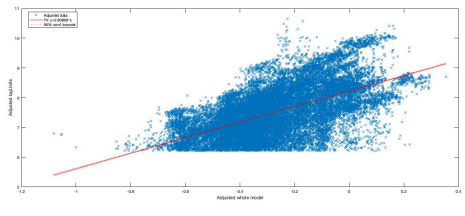
Aggregate price model



Category price model



Aggregate unit model



Category unit model

We further confirm the suspicion of heteroscedasticity by running an Engle's ARCH test[20] on the residuals. This test assesses the significance of ARCH effects, also known as autoregressive conditional heteroscedastic effects, which is common for models containing time series data as the residuals become both non-constant and affected by variances preceding it (autocorrelation). The results from the Engle's ARCH test confirm that the residuals are indeed both heteroscedastic and autocorrelated (full results found in Table A.7 in the Appendix).

The above tests confirmed that the residuals of our models suffered from both autocorrelation and heteroscedasticity. This violates two of the OLS regression assumptions, as the estimated coefficients are subject to biased standard errors and the significance of the OLS coefficient estimates are thereby distorted. In order to increase the credibility of our estimated coefficients, we correct for this by clustering the standard errors. This is a method commonly practiced within panel data analysis, where observations are collected at different times and from different subgroups of the population that is studied. The method takes into account that the dependent variable may be correlated within observation groups, and thereby their residuals as well, but independent across the different observation groups. Therefore, the standard errors should be computed as clustered-robust standard errors using the observation groups as the different clusters. For our dataset, we identified two different observation groups, namely observations gathered within the same week (in total 200) and observations gathered for the same product (in total 420). For the main models presented in Section 6.1 with results (Tables 4 and 5), the standard errors were clustered by week. As an additional robustness check, the models were also run with standard errors clustered by product and the results are included in the Appendix (see Tables A.3 and A.4). The results for the two price models show that the standard errors are on average larger when they are clustered by product, resulting in fewer of the coefficients being statistically significant. The very same effect is found for the two unit models, where, more specifically, the estimated effect of the Nordic Swan for the aggregate unit model ends up with a very high p-value and is thereby not statistically significant on any level. The clustering method led to a change in standard errors, t-statistics and p-values

[20] The Engle's ARCH test is constructed based on the fact that if the residuals are heteroscedastic, the squared residuals are autocorrelated. The test fits a linear regression model for the squared residuals and examines whether the fitted model is significant. The null hypothesis is that the squared residuals are a sequence of white noise (homoscedastic). The test was proposed by Robert Engle. Further specification of test formula is found in the Appendix in Equation A.2

for every coefficient of our four models with ordinary OLS regression. However, the coefficient estimates remained unchanged (as they should). The change in statistical significance can be found by studying the difference between the results replicated in Tables 4 and 5, and the results from the regular OLS regression without clustering in Tables A.5 and A.6 in the Appendix. The comparison shows that, on average, the standard errors decrease when they are clustered by week compared to standard OLS and increase when they are clustered by product compared to standard OLS. Since the R^2 of a regression model is the sum of squared residuals divided by the total variation in outcome, and neither of these change when standard errors are clustered, the R^2 remains the same across models (with or without clustering and with week as clustering group or product as clustering group).

We also conducted a third regression to make sure that the clustering method worked as intended. The regression was conducted using robust standard errors (also known as Huber-White standard errors), which are heteroscedasticity-consistent standard errors, and the method thereby deals with problems of heteroscedasticity and normality. Had the clustered standard errors not captured its intended effect, the final results presented in this paper from the clustered standard errors regression should have matched those of the third analysis (presented in Tables A.8 and A.9 in the Appendix). The third analysis displays estimated coefficients with much higher t-values and lower p-values than those in our final results, indicating that the clustering works as intended.

Even though the regression models are corrected so that the assumption of independence (no autocorrelation) and homoscedasticity is met, there is still the possibility that our models are missing relevant independent variables or interaction terms. This represents the problem of an omitted variable bias, where the regression model is forced to attribute the effects of the omitted variables to other variables of the model, causing biased coefficient estimates. For models that include time series especially, an omitted variable bias will often result in the presence of autocorrelation. This is because the influence of the omitted variable is similar from one period to the next, making the residuals correlated with one another. In Section 4.2, we mentioned some variables that we suspect are important determinants of our dependent variables $logprice_i$ and $logunits_i$ (e.g. shelf placement, marketing campaigns, periods of sale, availability), but due to the difficulty of collecting this sort of data, we are not able to include these in our models. In summary, there is a

possibility that one or several of these variables have left our models with an omitted variable bias and caused the problem of autocorrelation. We were able to correct the latter, but as we cannot correct for the missing variables this could mean that our models are suffering from biased coefficient estimates, a matter which should be kept in mind when interpreting the results.

6.2 Difference-in-differences results and interpretation

This section is devoted to revealing the results from the difference-in-differences models specified in Section 5.2. First, we uncover the effect of the Nordic Swan on the quantity sold of Solidox kids' toothpaste. The results from the simple model are found in column 1 in Table 7. The DiD-estimator of 0.111 suggests that the Nordic Swan-labeling boosted the sales of Solidox kids' toothpaste by 11 percent. With an R^2 of 0.836, the included variables seem to explain the variation in sales quite well. However, after including time effects, the R^2 increases even further to 0.991, as can be seen in column 2. The DiD-coefficient is still 0.111, which is the exact same coefficient as in the simple model. This suggests that an increase of approximately 11 percent in quantity sold is accurate.

Table 7. - DIFF-IN-DIFF RESULTS FOR SOLIDOX KIDS TOOTH PASTE

Coefficient	(1) Simple DiD model	(2) DiD with time effects
Intercept	7.391***	7.301***
	(0.020)	(0.011)
Time	0.012	
	(0.030)	
Treated	0.767***	0.767***
	(0.015)	(0.022)
DiD	0.111***	0.111***
	(0.018)	(0.025)
R^2	0.836	0.991

Note: Standard errors are given in paranthesis under the estimates. *** p<0.01, ** p<0.05, * p<0.1. Coefficients for each week and year are not included in this table.

Next, we look at the effect of the Nordic Swan on the sales volume of Rema 1000 tampons with OB Normal as the control group. The DiD-estimator of 0.275 in the simple model (column 1 in Table 8) indicates an increase in quantity sold of 27.5 percent post-labeling. The estimates do not change when we add the time effects. R^2 increases from 0.918 to 0.993 along with the addition of time effects, which implies that including these gives higher explanatory power here as well.

Table 8. - DIFF-IN-DIFF RESULTS FOR REMA 1000 TAMPONS (OB Normal CG)

Coefficient	(1) Simple DiD model	(2) DiD with time effects
Intercept	8.396***	8.214***
	(0.008)	(0.026)
Time	-0.067	
	(0.042)	
Treated	-1.758***	-1.758***
	(0.037)	(0.052)
DiD	0.275***	0.275***
	(0.039)	(0.055)
R^2	0.918	0.993

Note: Standard errors are given in paranthesis under the estimates. *** p<0.01, ** p<0.05, * p<0.1. Coefficients for each week and year are not included in this table.

The results from the difference-in-differences analysis confirm our hypothesis (H2) stating that the eco-labeling of a product increases its sales volume. However, our analysis does not go into depth on the underlying causes of the increase. We know that Rema 1000 and Orkla[21] were quick to market both products as eco-labeled right after they were labeled with the Swan, and these campaigns could have had a major impact on the sales volume in the period post-labeling. The momentum that these campaigns create could help explain why we obtain a much stronger impact on sales volume from this analysis compared to the regression analysis, where the products that are analyzed have been labeled for longer. The same factors that we listed earlier, which may have had an impact on the price and sales volume of a product but that we were not able to measure or collect, also apply here (e.g. shelf placement, availability in stores, sales campaigns), and could help to explain the results from the analysis.

Table 9 summarizes our findings with regard to the hypotheses stated in Section 3.4.

[21] Lilleborg, the manufacturer of Soldix products, has since 1985 been under the Orkla Group

Table 9. - OVERVIEW OF THE FINDINGS ADDRESSING OUR HYPOTHESES

	Hypothesis	Result	Finding
H1a	There exists a price premium for products that are eco-labeled.	Confirmed	We found an average price premium for eco-labeled products of 21 percent.
H1b	The relative price premium for eco-labeled products differs across product categories.	Confirmed	The price premium varies greatly between categories; from 68.8 percent for diapers to a negative effect of 25.8 for hand soap.
H1c	The relative price premium for an eco-labeled product is higher for products aimed at children.	Confirmed	Diapers, a childrens' product, is the category that represents the highest percentage price premium.
H1d	The relative price premium for an eco-labeled product is higher for products that are the most expensive alternatives within their product category compared to the less expensive alternatives.	Not confirmed	We found that the price premium for eco-labeled products within cheaper brands was 104 percent, whereas the expensive brands has a negative price premium of 5 percent.
H2	A product will experience increased sales volumes after being eco-labeled.	Confirmed	The eco-label reflects an average increase in sales of 3 percent. Rema 1000 tampons experienced an increase of 27.5 percent post-labeling, while the effect was 11 percent for Solidox toothpaste for kids.

6.2.1 Robustness checks

There are several ways to evaluate the robustness of a difference-in-differences model. One is incorporated in the model design, namely adding time effects and comparing the results with a simple model. Seeing that the results barely change with the inclusion of time effects is a sign of robust results.

Next, the difference-in-differences method relies on the assumption of parallel trends. Below are Figures 12 and 13, showing the sales trend of the treatment groups and their respective control groups. The vertical green dotted lines show the time in which the treatment group was labeled with the Nordic Swan.

Figure 12. - LOG SALES TRENDS FOR SOLIDOX JUNIOR AND ZENDIUM KIDS TOOTHPASTE

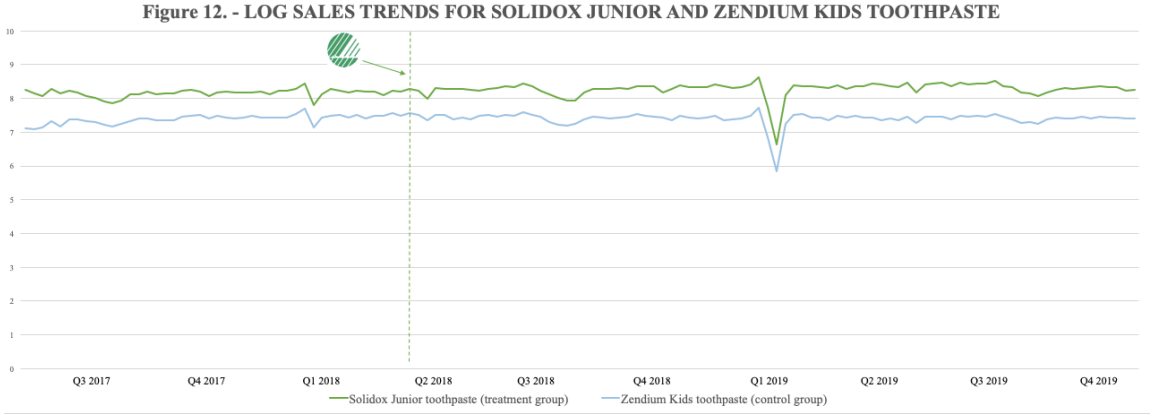
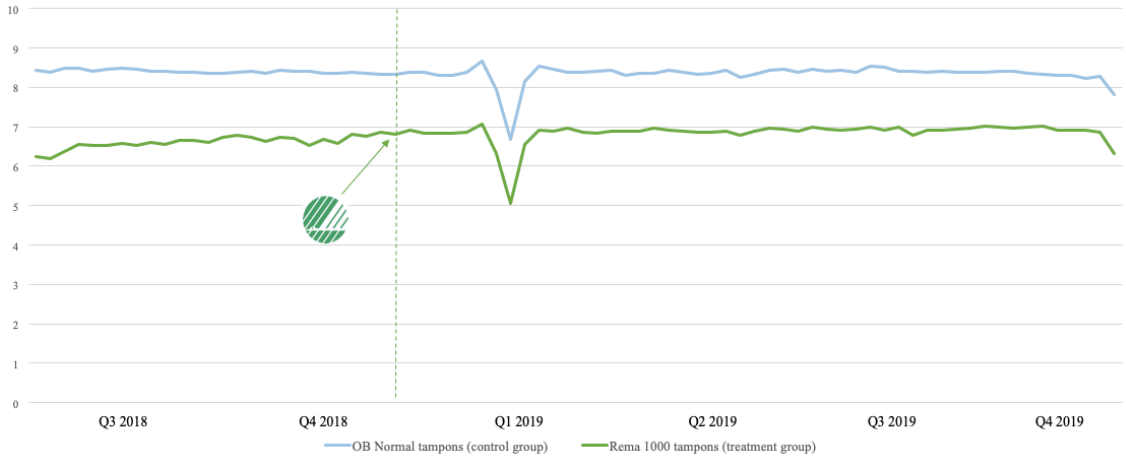


Figure 13. - LOG SALES TRENDS FOR REMA 1000 TAMPONS AND OB NORMAL TAMPONS



Even though the graphs give a visual impression of parallel trends prior to the labeling, it is also important to test whether this is also found within the data. In order to test the assumption of parallel trends, we add a linear trend specifically for the treatment group, i.e. an interaction term between the treatment group and time. If the coefficient of this interaction term is statistically equal to zero, we can expect the parallel trends assumption to hold. For both the toothpaste and the tampons, the coefficient is very close to zero and statistically significant at the 5% level. A coefficient of zero can assure us that the effect is not solely due to a linear trend over time. With this, we can say that the assumption of parallel trends holds.

Using different control groups is another way of ensuring robustness considering different comparison products should give the same effect. When we replace OB Normal with OB Mini as the control group for Rema 1000 tampons, we find an effect of the Nordic Swan of 32.1 percent in both the simple model and the model with time effects (See Table 10). This finding is a reassurance that the labeling of Rema 1000 tampons has had a positive effect on sales, generating an increase in quantity sold by approximately 30 percent. Unfortunately, the dataset does not contain another sufficiently similar product to Solidox kids' toothpaste showing parallel sales trends prior to the labeling, so we cannot execute the same robustness check for this product.

Table 10. - DIFF-IN-DIFF RESULTS FOR REMA 1000 TAMPONS (OB Mini CG)

Coefficient	(1) Simple DiD model	(2) DiD with time effects
Intercept	7.300***	7.109***
	(0.025)	(0.035)
Time	-0.114*	
	(0.051)	
Treated	-0.660***	-0.660***
	(0.050)	(0.071)
DiD	0.321***	0.321***
	(0.052)	(0.073)
R^2	0.481	0.035

Note: Standard errors are given in paranthesis under the estimates. *** p<0.01, ** p<0.05, * p<0.1. Coefficients for each week and year are not included in this table.

Another robustness check requires grouping the data so that A = total sale for the control group before the labeling, B = total sale for the control group after the labeling, C = total sale for the treatment group before the labeling, and D = total sale for the treatment group after the labeling. The difference-in-differences coefficient should then equal ln(D) - ln(C) - (ln(B) - ln(A)). Fortunately, this is the case for the effect on both the products we study.

Finally, we tried to assign "placebo" labeling where we used products that were not labeled both as the treatment group and the control group, inspired by a study conducted by Bertrand et al. (2004). The response to the Nordic Swan should only manifest for the products that were actually labeled. By assigning a non-labeled product as the treatment group, we should therefore not expect to see an effect of the Nordic Swan. First, we used OB normal as the treatment group and OB Mini as the control group. We randomly selected a week for the placebo labeling and ran the regression with time effects. This gave a difference-in-differences estimator of 0.046, but a p-value of 0.56, which indicates that the "effect" is not statistically significant. Next, we did the same with toothpaste, where Zendium for kids was set to be the treatment group, with a toothpaste from Solidox showing parallel sales trends as the control group. Randomly selecting a week for the placebo labeling and running the regression with time effects, we get a difference-in-differences estimator of -0.0006 with a p-value of 0.976. Considering that we end up lacking statistical significance and estimators around zero for products that are in fact not labeled strengthens the credibility of the actual difference-in-differences analyses.

Even though the difference-in-differences analysis confirms our hypothesis H2 and the results are found to be both significant and quite robust, it is necessary to stress that the analysis is conducted for two products only (due to the requirement of parallel trends and labeling within the time period of the dataset). Optimally, the analysis should have been run on far more products in order to claim something about the general impact of eco-labeling on sales volumes.

7. Discussion

7.1 Connection between our results and existing literature

Through our regression analysis, we found that the Nordic Swan reflected an average price premium of 21 percent. This positive price premium is a sign of public support of environmental friendliness and is very much in line with the results from the literature covered in Section 2.3, where most studies revealed that consumers were willing to pay an additional amount for products that guaranteed to have a less negative impact on the environment. Since we fall short of data on the production cost of each product, it is impossible to identify what share of the 21 percent premium for eco-labeled products that stem from increased production costs in order to reveal the isolated additional markup exceeding these costs. Regardless, this study aimed to reveal whether there exists a price premium for eco-labeled products at all, and it was not our intention to isolate said markup. Compared to the previous studies which also found a percentage estimate of the price premium, we see that our result of a 21 percent premium is slightly higher than their findings of respectively 13 to 18 percent (Bjørner et al., 2001) and 11 percent (Galarrga & Markandya, 2004). Some of the articles we reviewed might be outdated, which possibly opens up for an even larger increase in the price premium since these studies were conducted. This could explain why our results turned out higher. Furthermore, we found evidence of quite large variations in price premiums across product categories, as suggested by both Yenipazarli (2015) and Bjørner et al. (2004). Moreover, several survey studies have concluded that an increasing number of consumers buy eco-labeled products and look for environmental information when selecting a product. In our difference-in-differences analysis, we found that the introduction of the Nordic Swan on the products we studied increased their sales by approximately 28 and 11 percent respectively. Additionally, our regression

results showed that the Nordic Swan, on average, increased the sale of a product by 3 percent. The positive effect on sales is consistent with the previously mentioned findings in the literature. Again, we find large variations across product categories. This could partly be due to a large share of well-established, non-labeled brands in certain categories that are higher valued by consumers than the attribute that the Nordic Swan offers, e.g. brands like Zalo and Lano. A possible explanation for the high impact effects of the Swan in the difference-in-differences relative to the average effect in the aggregate unit regression model is that companies often run marketing campaigns announcing newly labeled products. As such campaigns create momentum for these products, this can explain why the effect is significantly larger in these cases than for products that have been labeled for longer.

Surprisingly, our findings suggest a higher price premium for eco-labeled products with a brand categorized as cheap, as well as a larger effect on quantity sold. This contradicts our hypothesis of a larger effect of the Swan on expensive brands. However, we found evidence for increased willingness to pay for an eco-label when the product is aimed at children, a finding in line with those of Loureiro et al. (2002). Our difference-in-differences analysis further suggests that the Nordic Swan on children's products entails higher quantities sold. This is also consistent with theory, as parents have a tendency to engage in a more thoughtful purchasing process when the purchase is for their child. This is further confirmed in our written interview with Østbye Andresen, who said that Rema 1000 puts particular emphasis on communicating the environmental aspect of a product when the product is meant for children and mothers.

The demonstration that eco-labeled products elicit consumers' willingness to pay, assuming that demand drives prices, suggests that the hypothetical bias is small or non-existent. The price premiums and willingness to pay identified in various consumer preference studies are indeed reflected in the data and are hence not only artifacts of hypothetical settings. This is in contrast to Schmidt & Bijmolt (2020), who found the hypothetical bias to be 21 percent on average for goods. However, despite the small differences between stated preferences and real purchasing behavior found in this study, we cannot completely reject the existence of a hypothetical bias. First of all, there are some shortcomings to our dataset, e.g. the absence of information regarding advertisement campaigns and shelf-placement (as discussed in Section 4.2). Second, we only use purchasing data from one

Norwegian grocery chain, Rema 1000. Even though we have reason to believe that our result can be generalized to other grocery chains in Norway due to the low number of actors and their similarities in terms of prices and product assortment, we cannot discard the possibility that the results could have been different had we used purchasing data from all Norwegian grocery chains. Lastly, the data only regards products labeled with the Nordic Swan. This means that we only have data for specific product segments, namely hygiene and detergent products. Since we even find large variations in price premiums between product categories in these segments, it is highly probable that the premiums will vary across and within other product segments as well, such as clothes, furniture or food. Nor can we safely assume that the results we find for the Nordic Swan also apply outside the Nordic region or to other eco-labels, as the Nordic Swan is a particularly well-established and trusted label in the Nordic countries. Had this study been conducted in another country or with a different eco-label, there is a probability that the results would have been different. However, in our attempt to say something regarding the value of eco-labeled goods in general, we knew our study would have its limitations. There are nevertheless great similarities between our study and other studies done on the subject, which we believe provide us with the premise needed to compare our findings with those of others and say something regarding the general effect of eco-labeling.

To summarize this section, our analysis supports the leading message in the existing literature of eco-labels; namely that there exists a higher willingness to pay for eco-labeled products among consumers and that a positive price premium for such products exists. Our empirical research does not give reason to believe that a hypothetical bias is prevalent in the setting of eco-labels, yet it cannot be completely rejected. Our analysis further supports the claim in the existing literature that eco-labeling represents a valuable product attribute for consumers as we find increased sales volumes for products after they have been eco-labeled.

7.2 Future relevance of eco-labels

In his paper from 2002, Gallastegui wrote that the future of eco-labeled goods depends on the level of environmental awareness and the consumer demand for green goods. Almost twenty years later, it certainly seems as though we have evolved in the right direction. Consumers now claim to be more concerned with

sustainability when they make purchasing decisions than they have been previously and the increase in demand is, according to Østbye Andresen, also highly prominent for grocery stores. Manufacturers and retailers are to a larger extent than ever competing against each other to appear the most sustainable in order to win customers. Moreover, also governments seem to be more involved in sustainability affairs than earlier, resulting in different types of product labeling becoming increasingly strict, and some even statutory. In fact, during the writing of this thesis, a new Norwegian branding scheme for waste management and recycling of product packaging has been launched[22]. The scheme is based on the Danish branding scheme for recycling, which was introduced in 2017, to facilitate a common Nordic system, with a clearer and more uniform symbol use.

Even though the growing attention around sustainability has led to an increase in the proportion of eco-labeled goods in the market, they are not alone in experiencing a greater market share. In general, eco-friendlier products are frequently being introduced and among those who have been the most popular for the last years are vegetarian, vegan and plastic-free products. Judging by the recent years' media coverage and advertisements, it could seem as though these types of products are the new trend and that they have taken some of the attention away from eco-labeled goods. Knowing that many consumers purchase eco-labeled products to experience "warm glow" or improve their social status, it could be that these new, green products provide the same effect for the consumers. This could be amplified by the fact that most consumers tend to be happy as long as they at least contribute a little, and that many thereby chooses to substitute eco-labeled goods for products with more trendy and appealing green attributes. Moreover, there is still the challenge that many consumers do not possess enough knowledge of what eco-labels represent (Song et al., 2019), and the outcome could be that they instead opt for declarations that convey a much simpler message, such as "meat free".

Østbye Andresen thinks that the majority of the consumers who purchase at least one green product also tend to purchase eco-friendlier products in general. According to a very recent report by Nielsen on behalf of the Nordic Swan, this assumption seems to be quite correct. The report reveals that the Nordic Swan has had a very strong growth in sales for the past three years and increased its

[22] For further information regarding the new branding scheme for waste management, see https://sortere.no/avfallssymboler/brukermanual

turnover in the Norwegian grocery industry by almost 8 percent, despite the categories it is prominent in having a negative 3.3 percent decline in turnover for the very same period (Henriksen et al., 2020). This very trend may indicate that the increased focus on sustainability that has followed the more recent introduction of vegetarian and plastic-free products has had a positive ripple effect on the Nordic Swan as well. Østbye Andresen also points to the Swan's expansion into new product categories, such as clothing, textile and cosmetics, as a smart move and says she believes this will contribute to increase the status of the Swan for the next ten years. She could be right, and perhaps the abundance of trendy, green products at the grocery stores calls for the Swan making itself more prominent within new business areas and services, such as restaurants, tourism, stocks and funds or social arrangements. In order for such a strategy to succeed, increasing consumers' knowledge about eco-labels and the Nordic Swan specifically would be wise. Most people today associate the Swan with products found at the grocery store, although services in fact are one of their largest areas of business. Song et al (2019) suggest smartphone apps as a helpful tool to assist consumers in making the connections between an eco-label and what it represents. Within the grocery sector, providing this sort of information through the grocery stores' own apps (such as Rema's mobile app 'Æ') could help decrease the existing information gap and increase the visibility of the Swan, making the products a more favored option.

Regardless of how the future of eco-labels will look exactly, they have most definitely come to stay. In addition to predicting the value of the circular economy reaching 4.5 trillion USD by 2030, Accenture's 2019-report also revealed that from a survey of more than 6,000 consumers in 11 countries, 81 percent said they plan to buy more eco-friendly products over the next five years. Consequently, Accenture strongly advises businesses to learn how to engage in the market for eco-friendly goods in order to accelerate growth. With regards to the future of the Swan in particular, it too seems very promising. The global trends regarding sustainability are to a large extent applicable in the Nordic countries as well, and recent market estimates and the results of this thesis point towards a positive development for the Swan. Hence, we are highly confident that the label will be even more prevalent in the Nordic countries in the decade to come.

8. Conclusions and further research

In this thesis, we have studied the value of eco-labels from a corporate perspective. Furthermore, we have reflected on the different ways in which eco-labels work to incentivize more sustainable production and consumption and to ultimately lessen the impact and deterioration of our environment. Through a multiple regression analysis, we found an average price premium of 21 percent for the Nordic Swan for the consumables in our dataset. As hypothesized, the price premium varied largely across product categories, where the largest premiums were found for hand creams, machine dishwash and diapers. The latter confirms our hypothesis that products aimed at children are compatible with a higher price premium. We also found that the Nordic Swan has a considerably larger effect in terms of a higher price premium and higher sales volumes when placed on cheaper brands. This rejects our hypothesis that the opposite is true. When studying the effect of the Nordic Swan on sales volumes through a difference-in-differences analysis, we found that the sales of Solidox toothpaste for kids increased by approximately 11 percent as an effect of the labeling, while the sales of Rema 1000 tampons increased by approximately 28 percent. Moreover, through our regression analysis, we found that the Nordic Swan resulted in an average increase in sales volumes of 3 percent, and the largest positive effects were found for diapers, makeup wipes and toothpaste. This is evidence in support of our hypothesis that the labeling of the Nordic Swan on products entails higher sales volumes.

Our research question was as follows: "*What is the value of eco-labeling and how does eco-labeling affect the market mechanisms in the Norwegian grocery market*". We begin by addressing the first part of the question regarding the value of eco-labeling. Based on our findings summarized above, eco-labeling clearly represents a lucrative strategy for certain types of products, where there appears to be a lot to gain in terms of both a substantial price premium and increased sales volumes for the manufacturer or retailer of the product. However, determining the exact value of eco-labeling remains difficult. In terms of the price premium of 21 percent, we are not able to establish how much the increased production costs and the additional markup account for separately. These values could possibly be extracted if one had access to a manufacturer's production costs prior to and after producing an eco-

labeled good, which would give an even deeper and more exhaustive insight into the value of eco-labels. Nevertheless, in this thesis, we did not intend to make this separation, as our overall objective was to find out whether there existed a price premium at all, which the evidence from our analysis clearly indicates.

To address the second part of our research question, our review of theory and existing literature on the subject shows that eco-labels are perceived as an additional and valuable product attribute for consumers, and as a source of competitive advantage for manufacturers and retailers. This has implications for the market mechanisms in the Norwegian grocery market in many ways. We have put particular emphasis on the supply side in our study as this has been given little attention in existing research. We have demonstrated that, unless there is governmental support of sustainable production in the form of subsidies, eco-labeling will always lead to an upward shift of the supply curve due to increased production costs (including a license fee) and the possibility of charging a higher price as the eco-label represents an additional product attribute. Moreover, we show the latter causes the demand curve to shift outwards because willingness to pay among consumers increases. Most importantly, our graphical demonstration revealed that the overall market outcome of eco-labeling is highly dependent on the magnitude of the shifts in the curves, as well as their steepness. However, the majority of potential outcomes lead to a higher price and increased quantity sold of the eco-labeled product in question, a finding that coincides with our conclusion regarding the first part of the research question. Moreover, we have argued that by increasing the share of eco-labeled products in their assortment, grocery stores can attract and win more customers, and thereby enhance their earnings through increased sales volume, even if the new customers do not necessarily purchase eco-labeled products.

In terms of further research on the effect of eco-labels, we recommend conducting more research aimed at capturing revealed purchasing behavior, as opposed to stated preferences. Accurately measuring willingness to pay for eco-labeled products requires moving away from surveys and interviews based on hypothetical settings, and instead find ways to reveal how much consumers actually value environmental performance in products. This type of study could help companies in achieving a more accurate price-setting of eco-labeled products. We believe that studying the matter from a corporate perspective using real sales data, as we did in

this study, helps alleviate common biases and barriers for precise estimates of consumers' willingness to pay for eco-friendly products. As an extension to our study, we recommend acquiring access to production cost data in addition to sales data. This way, it is possible to divide the price premium of eco-labeled products into the additional costs of producing eco-friendly and the isolated markup that the retailer can charge for the additional attribute. Moreover, we recommend looking further into the marketing effect of eco-labeled products, for example by conducting a difference-in-differences analysis aiming to capture the sales effect of a marketing campaign on an eco-labeled product. This type of study could provide companies with insight on how to tailor effective marketing campaigns in order to increase the sales of these goods. Lastly, an interesting study would be to examine how different policy measures with respect to eco-labeling affect prices and quantity sold. A possible way to study this is by comparing two otherwise similar countries that have different approaches of eco-label policies and explore to what extent eco-labeled products and services perform differently in the two countries. Such a study could signal which type of policy approach that performs more effectively with the goal of increasing the amount of eco-labeled products and services in a market.

We strongly believe that the effect of eco-labeling and other sustainability measures will constitute a widely researched topic within the field of sustainability in the years to come and that an increasing amount of businesses will become aware of the benefits of better understanding the value of eco-labeling. We are eager to see what will happen with regard to further development in environmentally friendly production and consumption, both in Norway and on a global basis, and hope that our suggestions for further research will be carried out sometime in the near future.

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Appendix

Table A.1: *Regression results for the price models with standard errors clustered by week (extension of results presented in part 6 in the paper)*

The full version of the regression results with the natural logarithm of the price as the dependent variable including all explanatory variables.

Table A1. - COMPLETE REGRESSION RESULTS (Standard errors clustered by weeks)
Determinants of the price of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	3.588***	0.018	3.40E-229	3.698***	0.016	7.80E-242
Values						
The Nordic Swan	0.210***	0.004	1.90E-112			
Men *(base: both genders)*	0.126***	0.004	4.35E-74	0.068***	0.005	3.97E-32
Women *(base: both genders)*	0.010*	0.004	0.0196	-0.011*	0.005	0.016
Cheap *(base: medium)*	-1.111***	0.008	1.00E-200	-1.234***	0.006	1.50E-234
Expensive *(base: medium)*	0.348***	0.004	4.90E-163	0.237***	0.004	6.90E-129
Perfume free	-0.154***	0.011	7.21E-32	-0.067***	0.012	1.23E-07
Weeks						
Week 2	-0.001	0.017	0.933	-0.001	0.017	0.932
Week 3	-0.003	0.018	0.849	-0.003	0.017	0.844
Week 4	-0.038**	0.013	0.004	-0.037**	0.013	0.005
Week 5	-0.014	0.012	0.234	-0.013	0.012	0.289
Week 6	-0.003	0.013	0.810	-0.003	0.014	0.836
Week 7	-0.018	0.016	0.257	-0.016	0.016	0.309
Week 8	-0.012	0.015	0.425	-0.012	0.015	0.430
Week 9	-0.010	0.013	0.453	-0.010	0.012	0.427
Week 10	0.003	0.013	0.792	0.004	0.012	0.755
Week 11	0.004	0.014	0.802	0.004	0.014	0.753
Week 12	0.021	0.014	0.143	0.021	0.013	0.103
Week 13	0.024	0.014	0.077	0.025*	0.012	0.046
Week 14	0.016	0.014	0.250	0.017	0.013	0.169
Week 15	0.010	0.015	0.489	0.011	0.014	0.439
Week 16	0.011	0.016	0.488	0.010	0.014	0.479
Week 17	0.014	0.015	0.360	0.013	0.014	0.337
Week 18	0.016	0.015	0.309	0.017	0.014	0.229
Week 19	0.019	0.014	0.170	0.020	0.013	0.119
Week 20	0.015	0.014	0.279	0.019	0.013	0.171
Week 21	0.018	0.014	0.224	0.021	0.014	0.120
Week 22	0.009	0.013	0.508	0.012	0.012	0.317
Week 23	0.009	0.013	0.517	0.012	0.013	0.335
Week 24	0.010	0.015	0.523	0.013	0.015	0.369
Week 25	0.016	0.015	0.302	0.020	0.015	0.174
Week 26	0.018	0.016	0.259	0.019	0.015	0.226
Week 27	0.040**	0.013	0.002	0.043**	0.013	0.001
Week 28	0.036*	0.015	0.020	0.038*	0.016	0.017
Week 29	0.038*	0.017	0.023	0.039*	0.017	0.026
Week 30	0.038*	0.016	0.021	0.039*	0.017	0.019
Week 31	0.036*	0.015	0.016	0.037*	0.015	0.016
Week 32	0.029*	0.014	0.038	0.031*	0.013	0.018
Week 33	0.023	0.014	0.109	0.026	0.013	0.057
Week 34	-0.016	0.021	0.452	-0.013	0.020	0.537
Week 35	-0.018	0.020	0.378	-0.014	0.020	0.471
Week 36	-0.022	0.020	0.272	-0.018	0.020	0.355
Week 37	-0.023	0.016	0.163	-0.018	0.016	0.238
Week 38	-0.011	0.017	0.520	-0.008	0.017	0.653
Week 39	-0.009	0.015	0.573	-0.005	0.015	0.726
Week 40	-0.002	0.015	0.899	0.003	0.014	0.856
Week 41	-0.007	0.019	0.700	-0.001	0.018	0.948
Week 42	0.004	0.022	0.873	0.010	0.023	0.663
Week 43	0.028	0.016	0.075	0.036*	0.015	0.014
Week 44	0.016	0.026	0.543	0.023	0.024	0.337
Week 45	0.014	0.027	0.607	0.020	0.026	0.441
Week 46	0.017	0.026	0.513	0.026	0.025	0.309
Week 47	0.018	0.026	0.490	0.027	0.026	0.301
Week 48	0.015	0.025	0.558	0.027	0.024	0.351
Week 49	0.009	0.026	0.725	0.017	0.025	0.487
Week 50	0.015	0.026	0.570	0.022	0.026	0.385
Week 51	0.021	0.027	0.446	0.028	0.026	0.296
Week 52	0.012	0.025	0.065	0.018	0.025	0.470
Week 53	0.051***	0.012	1.70E-05	0.034**	0.011	0.001
Week 0	-0.009	0.011	0.429	-0.021*	0.010	0.035
Year						
2017	0.025***	0.005	6.32E-07	0.042***	0.005	2.87E-15
2018	0.002	0.004	0.640	0.026***	0.005	5.75E-08
2019	0.022***	0.004	2.11E-05	0.044***	0.005	1.10E-13
Categories (base: hand cream)						
Makeup wipes	-0.177***	0.015	4.03E-25	-0.224***	0.017	2.98E-29
Hairwash	-0.215***	0.015	4.63E-33	-0.298***	0.014	3.00E-54
Bodywash	-0.346***	0.015	4.46E-59	-0.386***	0.014	7.19E-68
Hand soap	-0.423***	0.015	3.63E-73	-0.379***	0.017	1.38E-56
Deodorant	-0.171***	0.017	3.72E-19	-0.253***	0.016	1.96E-38
Dish soap	-0.373***	0.014	1.91E-65	-0.423***	0.014	1.63E-74
Machine dishwash	-0.187***	0.016	2.76E-25	-0.358***	0.014	6.04E-64
Laundry detergent	0.151***	0.015	4.64E-19	0.149***	0.014	2.82E-21
Toothpaste	-0.269***	0.014	2.00E-46	-0.386***	0.014	2.82E-72
Body lotion	-0.239***	0.018	1.27E-28	-0.325***	0.016	2.77E-50
Diapers	-0.154***	0.015	2.79E-19	-0.514***	0.020	2.39E-66
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.082***	0.015	1.71E-07
The Nordic Swan x Hairwash				0.134***	0.016	1.90E-15
The Nordic Swan x Bodywash				0.048***	0.008	4.34E-08
The Nordic Swan x Deodorant				-0.092***	0.007	4.37E-32
The Nordic Swan x Dish soap				0.002	0.007	0.751
The Nordic Swan x Machine dishwash				0.432***	0.019	1.30E-56
The Nordic Swan x Laundry detergent				0.131***	0.007	2.94E-45
The Nordic Swan x Toothpaste				0.194***	0.004	8.30E-108
The Nordic Swan x Body lotion				0.250***	0.007	7.89E-85
The Nordic Swan x Diapers				0.688***	0.013	2.00E-118
The Nordic Swan x Hand soap				-0.258***	0.010	2.62E-68
The Nordic Swan x Hand cream				0.588***	0.028	2.63E-51
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				1.040***	0.006	6.90E-216
The Nordic Swan x Expensive				-0.051***	0.009	9.60E-09
	R^2 = 0.637			R^2 = 0.668		

Table A.2: *Regression results for the unit models with standard errors clustered by week (extension of results presented in part 6 in the paper)*

The full version of the regression results with the natural logarithm of the quantity sold as the dependent variable including all explanatory variables.

Table A2. - COMPLETE REGRESSION RESULTS (Standard errors clustered by weeks)
Determinants of the number of units sold of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	7.315***	0.065	4.50E-182	7.491***	0.065	8.50E-185
Values						
The Nordic Swan	0.029***	0.006	6.08E-06			
Price	-0.010***	2.96E-04	1.34E-85	-0.013***	3.04E-04	2.00E-102
Men *(base: both genders)*	0.040***	0.007	6.29E-08	-0.008	0.007	0.272
Women *(base: both genders)*	0.120***	0.008	1.02E-36	0.078***	0.007	2.95E-23
Cheap *(base: medium)*	0.231***	0.011	9.02E-53	0.068***	0.018	1.93E-04
Expensive *(base: medium)*	-0.102***	0.010	4.11E-21	-0.177***	0.011	2.63E.40
Perfume free	-0.392***	0.014	2.53E-69	-0.392***	0.015	6.13E-66
Weeks						
Week 2	0.073	0.063	0.249	0.073	0.063	0.248
Week 3	0.071	0.068	0.297	0.071	0.068	0.296
Week 4	0.072	0.073	0.325	0.070	0.073	0.342
Week 5	0.075	0.068	0.270	0.074	0.067	0.270
Week 6	0.079	0.070	0.260	0.079	0.070	0.262
Week 7	0.055	0.065	0.397	0.057	0.065	0.386
Week 8	-0.031	0.060	0.607	-0.030	0.595	0.612
Week 9	-0.024	0.062	0.700	-0.024	0.061	0.693
Week 10	-0.0323	0.066	0.728	-0.023	0.066	0.723
Week 11	0.006	0.071	0.931	0.007	0.071	0.925
Week 12	-0.024	0.066	0.722	-0.023	0.066	0.725
Week 13	-0.037	0.064	0.567	-0.036	0.064	0.569
Week 14	0.002	0.062	0.980	0.001	0.061	0.987
Week 15	0.035	0.066	0.595	0.036	0.066	0.591
Week 16	0.028	0.062	0.646	0.027	0.061	0.662
Week 17	0.038	0.598	0.527	0.037	0.059	0.534
Week 18	0.003	0.061	0.958	0.003	0.061	0.963
Week 19	0.083	0.077	0.278	0.084	0.076	0.268
Week 20	0.012	0.064	0.852	0.014	0.064	0.825
Week 21	0.037	0.061	0.547	0.039	0.060	0.524
Week 22	0.049	0.062	0.426	0.051	0.061	0.409
Week 23	0.037	0.064	0.569	0.038	0.064	0.550
Week 24	0.070	0.060	0.242	0.073	0.059	0.220
Week 25	0.074	0.060	0.224	0.078	0.060	0.196
Week 26	0.016	0.063	0.794	0.017	0.062	0.787
Week 27	1.32E-04	0.062	0.998	0.004	0.061	0.945
Week 28	-0.0323	0.060	0.596	-0.029	0.060	0.626
Week 29	-0.046	0.062	0.461	-0.044	0.061	0.472
Week 30	-0.055	0.060	0.360	-0.053	0.059	0.370
Week 31	-9.14E-04	0.063	0.988	8.65E-04	0.063	0.989
Week 32	0.044	0.061	0.474	0.045	0.061	0.460
Week 33	0.053	0.061	0.381	0.054	0.060	0.374
Week 34	0.049	0.061	0.424	0.046	0.061	0.444
Week 35	0.046	0.060	0.447	0.043	0.059	0.466
Week 36	-0.003	0.060	0.956	-0.006	0.060	0.925
Week 37	0.023	0.062	0.707	0.021	0.062	0.734
Week 38	0.018	0.060	0.771	0.017	0.060	0.774
Week 39	0.015	0.062	0.811	0.014	0.062	0.826
Week 40	-0.047	0.062	0.444	-0.048	0.061	0.437
Week 41	-0.031	0.060	0.603	-0.029	0.059	0.623
Week 42	-0.090	0.091	0.323	-0.088	0.093	0.346
Week 43	-0.024	0.060	0.686	-0.019	0.060	0.751
Week 44	-0.008	0.060	0.899	-0.004	0.059	0.948
Week 45	-0.011	0.059	0.858	-0.009	0.059	0.885
Week 46	0.007	0.059	0.909	0.012	0.059	0.833
Week 47	-0.025	0.060	0.680	-0.020	0.060	0.740
Week 48	-0.005	0.059	0.933	-9.79E-04	0.059	0.987
Week 49	0.005	0.059	0.933	0.009	0.059	0.890
Week 50	0.076	0.060	0.203	0.081	0.060	0.179
Week 51	0.230***	0.063	3.43E-04	0.240***	0.064	2.21E-04
Week 52	-0.313***	0.657	3.60E-06	-0.311***	0.066	5.08E-06
Week 53	-1.020***	0.059	9.32E-42	-1.055***	0.058	7.05E-44
Week 0	-1.038***	0.059	1.74E-42	-1.057***	0.058	6.91E-44
Year						
2017	-0.171***	0.010	1.62E-42	-0.165***	0.010	2.79E-39
2018	-0.153***	0.009	2.23E-41	-0.146***	0.009	1.26E-38
2019	-0.214***	0.011	3.56E-48	-0.208***	0.011	8.75E-47
Categories (base: hand cream)						
Makeup wipes	0.671***	0.026	1.02E-64	0.591***	0.257	4.95E-58
Hairwash	0.160***	0.024	3.43E-10	0.141***	0.025	8.22E-08
Bodywash	0.547***	0.026	7.88E-52	0.501***	0.028	1.83E-43
Hand soap	0.782***	0.027	3.87E-74	0.741***	0.028	9.57E-67
Deodorant	0.458***	0.025	1.40E-44	0.421***	0.026	4.82E-38
Dish soap	1.353***	0.029	5.40E-110	1.414***	0.031	1.70E-108
Machine dishwash	0.505***	0.025	5.10E-50	0.534***	0.029	2.69E-44
Laundry detergent	0.915***	0.023	2.80E-96	1.086***	0.026	1.40E-101
Toothpaste	1.247***	0.025	5.00E-116	1.134***	0.026	3.40E-103
Body lotion	0.060*	0.024	0.0121	0.025	0.025	0.329
Diapers	0.480***	0.023	7.70E-52	0.095**	0.031	0.003
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.248***	0.035	2.21E-11
The Nordic Swan x Hairwash				-0.256***	0.023	9.93E-23
The Nordic Swan x Bodywash				-0.007	0.013	0.578
The Nordic Swan x Deodorant				-0.129***	0.025	4.03E-07
The Nordic Swan x Dish soap				-0.527***	0.017	2.88E-76
The Nordic Swan x Machine dishwash				-0.260***	0.035	1.88E-12
The Nordic Swan x Laundry detergent				-0.217***	0.017	5.41E-27
The Nordic Swan x Toothpaste				0.195***	0.013	4.90E-33
The Nordic Swan x Body lotion				-0.490***	0.025	1.31E-48
The Nordic Swan x Diapers				0.618***	0.025	8.11E-63
The Nordic Swan x Hand soap				-0.046*	0.019	0.015
The Nordic Swan x Hand cream				0.142***	0.038	2.36E-04
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				0.664***	0.018	9.19E.93
The Nordic Swan x Expensive				0.170***	0.018	2.12E-18
	$R^2 = 0.326$			$R^2 = 0.351$		

Table A.3: *Regression results for the price models with standard errors clustered by product*

Clustering by product results in larger standard errors for most coefficients than when we clustered by weeks. Consequently, there is lacking statistical significance for several of the important explanatory variables, as can be seen for the interaction terms. However, we see that the average overall price effect of the Nordic Swan is still statistically significant at the 1% level.

Table A3. - REGRESSION RESULTS (Standard errors clustered by product)
Determinants of the price of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	3.588***	0.167	1.24E-69	3.698***	0.194	1.06E-58
Values						
The Nordic Swan	0.210***	0.053	1.05E-04			
Men *(base: both genders)*	0.126*	0.063	0.046	0.068	0.063	0.284
Women *(base: both genders)*	0.010	0.076	0.892	-0.011	0.074	0.882
Cheap *(base: medium)*	-1.111***	0.099	9.02E-26	-1.234***	0.102	2.58E-29
Expensive *(base: medium)*	0.348***	0.050	1.52E-11	0.237***	0.058	5.44E-05
Perfume free	-0.154	0.108	0.154	-0.067	0.093	0.470
Categories (base: hand cream)						
Makeup wipes	-0.177	0.194	0.361	-0.224	0.220	0.308
Hairwash	-0.215	0.178	0.227	-0.298	0.205	0.148
Bodywash	-0.346*	0.172	0.045	-0.386	0.204	0.059
Hand soap	-0.423*	0.187	0.025	-0.379	0.219	0.084
Deodorant	-0.171	0.177	0.333	-0.254	0.202	0.210
Dish soap	-0.373	0.195	0.056	-0.423	0.224	0.060
Machine dishwash	-0.187	0.194	0.335	-0.358	0.228	0.116
Laundry detergent	0.151	0.177	0.393	0.149	0.205	0.467
Toothpaste	-0.269	0.172	0.118	-0.386	0.201	0.055
Body lotion	-0.239	0.217	0.271	-0.325	0.236	0.170
Diapers	-0.154	0.179	0.390	-0.504*	0.221	0.020
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.082	0.116	0.477
The Nordic Swan x Hairwash				0.134	0.093	0.152
The Nordic Swan x Bodywash				0.048	0.105	0.648
The Nordic Swan x Deodorant				-0.092	0.058	0.113
The Nordic Swan x Dish soap				0.002	0.124	0.985
The Nordic Swan x Machine dishwash				0.432	0.233	0.065
The Nordic Swan x Laundry detergent				0.131	0.118	0.268
The Nordic Swan x Toothpaste				0.194**	0.067	0.004
The Nordic Swan x Body lotion				0.250	0.138	0.071
The Nordic Swan x Diapers				0.688	0.133	3.30E-07
The Nordic Swan x Hand soap				-0.258*	0.126	0.042
The Nordic Swan x Hand cream						
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				1.040***	0.110	2.36E-19
The Nordic Swan x Expensive				-0.052	0.095	0.588
	R^2 = 0.637			R^2 = 0.668		

Note: The dependent variable is the log of the price of products. The estimates in the table are therefore the estimated percentage effect on prices. In this table, the time dummies Week and Year are excluded. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.744.

Table A.4: *Regression results for the unit models with standard errors clustered by product*

As in Table A.3, clustering by product results in several explanatory variables lacking statistical significance. In addition, the coefficient for the overall sales effect of the Nordic Swan is no longer statistically significant on any significance levels.

Table A4. - REGRESSION RESULTS (Standard errors clustered by product)
Determinants of the number of units sold of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	7.315***	0.135	6.00E-191	7.491***	0.154	3.20E-174
Values						
The Nordic Swan	0.029	0.091	0.748			
Price	-0.010***	0.003	2.78E-04	-0.013***	0.003	6.54E-06
Men *(base: both genders)*	0.040	0.123	0.746	-0.008	0.126	0.951
Women *(base: both genders)*	0.120	0.115	0.296	0.078	0.122	0.520
Cheap *(base: medium)*	0.231	0.166	0.165	0.068	0.169	0.687
Expensive *(base: medium)*	-0.102	0.097	0.293	-0.177**	0.150	0.009
Perfume free	-0.392**	0.131	0.003			
Categories (base: hand cream)						
Makeup wipes	0.671*	0.332	0.044	0.591	0.410	0.151
Hairwash	0.160	0.125	0.201	0.141	0.140	0.312
Bodywash	0.547***	0.123	1.14E-05	0.501***	0.138	3.12E.04
Hand soap	0.782***	0.176	1.14E-05	0.741***	0.207	2.88E-04
Deodorant	0.458***	0.130	4.77E-04	0.421**	0.136	0.002
Dish soap	1.353***	0.283	2.50E-06	1.414***	0.338	3.47E-05
Machine dishwash	0.505**	0.156	0.001	0.533**	0.196	0.007
Laundry detergent	0.915***	0.134	3.31E-11	1.086***	0.160	3.47E-11
Toothpaste	1.247***	0.129	5.27E-20	1.134***	0.157	2.15E-12
Body lotion	0.060	0.153	0.696	0.025	0.149	0.867
Diapers	0.480***	0.110	1.72E-05	0.095	0.109	0.385
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.248	0.546	0.650
The Nordic Swan x Hairwash				-0.256	0.187	0.171
The Nordic Swan x Bodywash				-0.007	0.241	0.976
The Nordic Swan x Deodorant				-0.129	0.118	0.276
The Nordic Swan x Dish soap				-0.527	0.414	0.203
The Nordic Swan x Machine dishwash				-0.260	0.289	0.370
The Nordic Swan x Laundry detergent				-0.217	0.228	0.342
The Nordic Swan x Toothpaste				0.195	0.134	0.146
The Nordic Swan x Body lotion				-0.490***	0.132	2.44E-04
The Nordic Swan x Diapers				0.618**	0.192	0.001
The Nordic Swan x Hand soap				-0.046	0.376	0.902
The Nordic Swan x Hand cream				0.142	0.160	0.375
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				0.664*	0.310	0.033
The Nordic Swan x Expensive				0.170	0.245	0.489
	R^2 = 0.326			R^2 = 0.351		

Note: The dependent variable is the log of the sales volume of products. The estimates in the table are therefore the estimated percentage effect on sales. In this table, the time dummies Week and Year are excluded. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.364.

Table A.5: *Regression results for the price models using standard OLS*

Regressing without using clustered standard errors nor a robust commando results in quite similar outcomes as our main model with clustering by weeks with regard to statistical significance. Most importantly, the coefficients for the effect of the Nordic Swan have the same level of statistical significance. Surprisingly, many standard errors are in fact larger here than with clustering by weeks.

Table A5. - REGRESSION RESULTS (OLS with default standard errors)
Determinants of the price of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	3.588***	0.024	0	3.698***	0.023	0
Values						
The Nordic Swan	0.210***	0.005	0			
Men *(base: both genders)*	0.126***	0.011	9.42E-30	0.068***	0.011	4.21E-10
Women *(base: both genders)*	0.010	0.008	0.197	-0.011	0.008	0.170
Cheap *(base: medium)*	-1.111***	0.006	0	-1.235***	0.007	0
Expensive *(base: medium)*	0.348***	0.005	0	0.237***	0.006	0
Perfume free	-0.154***	0.013	2.30E-33	-0.067***	0.013	1.51E-07
Categories (base: hand cream)						
Makeup wipes	-0.177***	0.024	1.76E-13	-0.224***	0.024	1.08E-20
Hairwash	-0.215***	0.021	7.83E-25	-0.298***	0.020	2.08E-49
Bodywash	-0.346***	0.021	7.09E-63	-0.387***	0.020	1.03E-80
Hand soap	-0.423***	0.021	1.53E-91	-0.379***	0.020	4.10E-77
Deodorant	-0.171***	0.021	3.09E-16	-0.253***	0.020	1.95E-36
Dish soap	-0.373***	0.022	4.72E-65	-0.423***	0.022	5.50E-85
Machine dishwash	-0.187***	0.021	1.74E-18	-0.358***	0.022	4.05E-64
Laundry detergent	0.151***	0.020	8.88E-14	0.149***	0.020	1.79E-13
Toothpaste	-0.269***	0.021	4.06E-39	-0.386***	0.020	1.50E-84
Body lotion	-0.239***	0.022	4.41E-27	-0.325***	0.021	4.12E-53
Diapers	-0.154***	0.020	2.32E-14	-0.514***	0.020	2.16E-139
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.082***	0.025	8.27-04
The Nordic Swan x Hairwash				0.135***	0.022	3.44E-10
The Nordic Swan x Bodywash				0.049***	0.014	5.03E-04
The Nordic Swan x Deodorant				-0.092*	0.041	0.025
The Nordic Swan x Dish soap				0.002	0.022	0.914
The Nordic Swan x Machine dishwash				0.432***	0.018	7.15E-131
The Nordic Swan x Laundry detergent				0.131***	0.010	5.48E-36
The Nordic Swan x Toothpaste				0.194***	0.015	1.41E-36
The Nordic Swan x Body lotion				0.250***	0.064	9.92E-05
The Nordic Swan x Diapers				0.688***	0.011	0
The Nordic Swan x Hand soap				-0.258***	0.015	1.86E-65
The Nordic Swan x Hand cream				0.581***	0.038	3.08E-52
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				1.040***	0.013	0
The Nordic Swan x Expensive				-0.051***	0.011	5.12E-06
	$R^2 = 0.637$			$R^2 = 0.668$		

Note: The dependent variable is the log of the price of products. The estimates in the table are therefore the estimated percentage effect on prices. In this table, the time dummies Week and Year are excluded. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.757.

Table A.6: *Regression results for the unit models using standard OLS*

Again, standard OLS with default standard errors gives a similar interpretation as the regression models where we cluster by weeks. However, the quantity effect on *Bodywash*, *Deodorant*, *Hand soap* and *Hand cream* is no longer statistically significant on any significance levels. The coefficient for the aggregate effect of the Nordic Swan is now statistically significant only at the 5% level.

Table A6. - REGRESSION RESULTS (OLS with default standard errors)

Determinants of the number of units sold of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	7.315***	0.047	0	7.492***	0.047	0
Values						
The Nordic Swan	0.030**	0.010	0.002			
Price	-0.010***	3.59E-04	6.85E-175	-0.013***	3.68E-04	4.77E-271
Men *(base: both genders)*	0.039	0.021	0.058	-0.008	0.021	0.694
Women *(base: both genders)*	0.120***	0.015	7.82E-16	0.078***	0.015	3.02E-07
Cheap *(base: medium)*	0.230***	0.014	1.66E-62	0.067***	0.015	1.18E-05
Expensive *(base: medium)*	-0.102***	0.011	5.69E-19	-0.177***	0.012	2.30E-51
Perfume free	-0.391***	0.024	7.08E-60	-0.392***	0.024	1.07E-57
Categories (base: hand cream)						
Makeup wipes	0.671***	0.045	3.27E-50	0.590***	0.046	2.01E-37
Hairwash	0.160***	0.039	4.29E-05	0.141***	0.039	2.62E-04
Bodywash	0.547***	0.039	6.27E-45	0.500***	0.039	1.85E-37
Hand soap	0.783***	0.039	1.27E-88	0.741***	0.039	1.53E-79
Deodorant	0.458***	0.039	2.17E-31	0.420***	0.039	1.33E-27
Dish soap	1.352***	0.041	2.27E-234	1.414***	0.042	2.06E-249
Machine dishwash	0.504***	0.040	1.75E-36	0.533***	0.041	4.22E-39
Laundry detergent	0.915***	0.038	7.21E-128	1.086***	0.039	1.17E-169
Toothpaste	1.247***	0.038	2.72E-227	1.134***	0.038	3.05E-192
Body lotion	0.060	0.041	0.149	0.025	0.041	0.542
Diapers	0.480***	0.038	7.82E-37	0.094*	0.039	0.016
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.249***	0.047	1.30E-07
The Nordic Swan x Hairwash				-0.254***	0.041	6.73E-10
The Nordic Swan x Bodywash				-0.006	0.026	0.809
The Nordic Swan x Deodorant				-0.130	0.079	0.100
The Nordic Swan x Dish soap				-0.527***	0.042	7.98E-37
The Nordic Swan x Machine dishwash				-0.259***	0.033	1.82E-14
The Nordic Swan x Laundry detergent				-0.217***	0.020	4.17E-27
The Nordic Swan x Toothpaste				0.194***	0.029	4.27E-11
The Nordic Swan x Body lotion				-0.490***	0.123	6.78E-05
The Nordic Swan x Diapers				0.618***	0.022	1.52E-176
The Nordic Swan x Hand soap				-0.043	0.029	0.136
The Nordic Swan x Hand cream				0.142	0.074	0.055
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				0.663***	0.027	8.41E-129
The Nordic Swan x Expensive				0.168***	0.024	6.66E-12
	R^2 = 0.326			R^2 = 0.351		

Note: The dependent variable is the log of the sales volume of products. The estimates in the table are therefore the estimated percentage effect on sales. In this table, the time dummies Week and Year are excluded. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.364.

Table A.7: *Results from Engle's ARCH test for residual heteroscedasticity*

Table A.7 - ENGLE'S ARCH TEST

	p-value	Logical value
Aggregate price model	0	1
Category price model	0	1
Aggregate unit model	0	1
Category unit model	0	1

*Logical value = 1 indicates rejection of the no ARCH effects null hypothesis in favor of the alternative in favor of the alternative

Both p-values of zero and a logical value of 1 strongly indicates the presence of heteroscedasticity among the residuals in all of the four models (for equation specification see Equation A.2 further down).

Table A.8 & A.9: *Results from regression with robust standard errors (regress command with robust option in Stata)*

The Stata regress command includes a robust option for estimating the standard errors using the Huber-White sandwich estimators. Such robust standard errors can deal with a collection of minor concerns about failure to meet assumptions, such as minor problems about normality, heteroscedasticity, or some observations that exhibit large residuals or influence. The results from this analysis is included in order to demonstrate that the clustering of standard errors was done correctly and actually had the wanted effect. Had the clustering not worked as intended, the t-values and p-values from the results presented in the paper and the results shown in the table below should have been a perfect match, which they are not. T-values from the analysis below are greater (and p-values smaller) than those from the regression with clustered standard errors, indicating that the clustering method work as intended.

Table A.8. - REGRESSION RESULTS (with robust standard errors)
Determinants of the price of consumables

	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	3.588***	0.024	0	3.698***	0.025	0
Values						
The Nordic Swan	0.210***	0.005	0			
Men *(base: both genders)*	0.126***	0.006	1.89E-85	0.068***	0.007	8.61E-25
Women *(base: both genders)*	0.010	0.006	0.140	-0.011	0.007	0.112
Cheap *(base: medium)*	-1.111***	0.008	0	-1.234***	0.009	0
Expensive *(base: medium)*	0.348***	0.005	0	0.237***	0.006	0
Perfume free	-0.154***	0.012	1.29E-38	-0.067***	0.011	1.82E-09
Categories (base: hand cream)						
Makeup wipes	-0.177***	0.022	5.29E-16	-0.224***	0.024	3.68E-20
Hairwash	-0.215***	0.020	5.93E-27	-0.298***	0.022	1.89E-40
Bodywash	-0.346***	0.020	1.01E-68	-0.386***	0.022	2.56E-66
Hand soap	-0.423***	0.021	1.14E-92	-0.379***	0.023	3.83E-59
Deodorant	-0.171***	0.020	8.53E-18	-0.253***	0.022	2.24E-30
Dish soap	-0.373***	0.021	2.02E-71	-0.423***	0.024	1.31E-71
Machine dishwash	-0.187***	0.021	2.14E-18	-0.358***	0.024	5.05E-60
Laundry detergent	0.151***	0.020	4.24E-14	0.149***	0.023	5.66E-11
Toothpaste	-0.269***	0.020	2.28E-42	-0.386***	0.022	1.09E-67
Body lotion	-0.239***	0.023	7.37E-26	-0.325***	0.024	4.14E-40
Diapers	-0.154***	0.020	1.18E-14	-0.514***	0.024	1.20E-100
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.082***	0.017	1.22E-06
The Nordic Swan x Hairwash				0.134***	0.016	1.41E-17
The Nordic Swan x Bodywash				0.048***	0.011	1.18E-05
The Nordic Swan x Deodorant				-0.092***	0.007	1.10E-36
The Nordic Swan x Dish soap				0.002	0.011	0.835
The Nordic Swan x Machine dishwash				0.432***	0.024	6.94E-70
The Nordic Swan x Laundry detergent				0.131***	0.012	1.13E-25
The Nordic Swan x Toothpaste				0.194***	0.007	1.50E-167
The Nordic Swan x Body lotion				0.250***	0.013	6.37E-87
The Nordic Swan x Diapers				0.688***	0.013	1.20E-100
The Nordic Swan x Hand soap				-0.258***	0.012	4.99E-96
The Nordic Swan x Hand cream				0.588***	0.024	4.10E-128
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				1.040	0.011	0
The Nordic Swan x Expensive				-0.051	0.010	3.38E-07
	$\bar{R}^2 = 0.637$			$\bar{R}^2 = 0.668$		

Note: The dependent variable is the log of the price of products. The estimates in the table are therefore the estimated percentage effect on prices. In this table, the time dummies Week and Year are excluded. *, **, *** represent 10%, 5% and 1% significance levels, respectively. R-squared including price level interaction terms is 0.757.

Table A.9. - REGRESSION RESULTS (with robust standard errors)
Determinants of the number of units sold of consumables

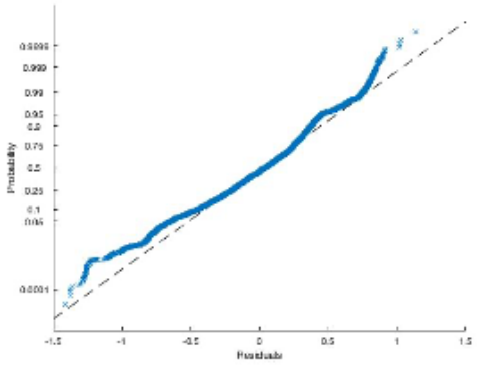
	Aggregate model			Category model		
Predictor	Estimate	SE	p-Value	Estimate	SE	p-Value
Intercept	7.352***	0,037	0	7.533***	0,039	0
Values						
The Nordic Swan	0.033***	0.009	4.83E-04			
Price	-0.011***	0.000	6.9E-193	-0.014***	0.001	1.1E-266
Men *(base: both genders)*	0.043***	0.014	2.09E-03	-0.006	0.014	0.670
Women *(base: both genders)*	0.122***	0.012	1.59E-25	0.080***	0.012	8.19E-11
Cheap *(base: medium)*	0.216***	0.016	2.84E-42	0.050**	0.017	0.005
Expensive *(base: medium)*	-0.087***	0.011	4.32E-15	-0.163***	0.012	8.46E-46
Perfume free	-0.396***	0.017	2.7E-119	-0.395***	0.018	1.6E-103
Categories (base: hand cream)						
Makeup wipes	0.652***	0.036	1.32E-73	0.567***	0.041	1.06E-43
Hairwash	0.148***	0.024	5.24E-10	0.126***	0.026	9.04E-07
Bodywash	0.535***	0.024	2.8E-108	0.488***	0.027	5.20E-73
Hand soap	0.765***	0.026	1.9E-188	0.722***	0.029	2.1E-140
Deodorant	0.450***	0.024	4.15E-81	0.410***	0.025	7.69E-60
Dish soap	1.333***	0.031	0	1.392***	0.035	0
Machine dishwash	0.487***	0.028	1.42E-68	0.511***	0.033	2.52E-55
Laundry detergent	0.892***	0.024	5.8E-296	1.054***	0.028	0
Toothpaste	1.223***	0.025	0	1.105***	0.027	0
Body lotion	0.051***	0.025	0.004	0.015	0.026	5.79E-01
Diapers	0.478***	0.023	1.42E-99	0.087***	0.025	5.15E-04
Interaction terms (base: hand cream)						
The Nordic Swan x Makeup wipes				0.252***	0.058	1.38E-05
The Nordic Swan x Hairwash				-0.257***	0.027	1.08E-21
The Nordic Swan x Bodywash				-0.008	0.025	0.757
The Nordic Swan x Deodorant				-0.132***	0.030	9.86E-06
The Nordic Swan x Dish soap				-0.533***	0.036	1.92E-50
The Nordic Swan x Machine dishwash				-0.254***	0.036	9.15E-13
The Nordic Swan x Laundry detergent				-0.212***	0.023	1.12E-19
The Nordic Swan x Toothpaste				0.193***	0.018	1.56E-27
The Nordic Swan x Body lotion				-0.483***	0.029	5.27E-64
The Nordic Swan x Diapers				0.631***	0.019	1.2E-232
The Nordic Swan x Hand soap				-0.050	0.035	0.159
The Nordic Swan x Hand cream				0.171***	0.044	1.13E-27
Price level interaction terms (base: medium)						
The Nordic Swan x Cheap				0.666***	0.029	3.7E-114
The Nordic Swan x Expensive				0.173***	0.024	4.96E-12
	$R^2 = 0.329$			$R^2 = 0.354$		

Note: The dependent variable is the log of the sales volume of products. The estimates in the table are therefore the estimated percentage effect on sales. In this table, the time dummies Week and Year are excluded. *, **, *** represent 10%, 5% and 1% significance levels respectively. R-squared including price level interaction terms is 0.367.

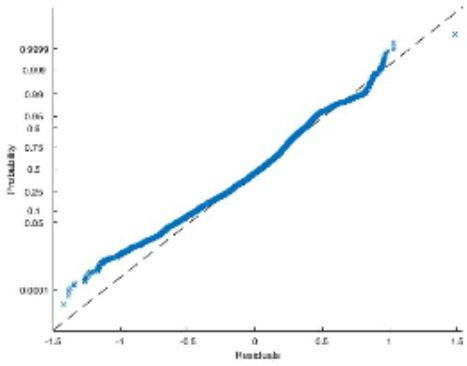
Figure A.1: *Normal probability plots of residuals for all four regression models*

These plots further show how the deviation from normality is minor.
The probability plots for the price models show the skewness on the left tail of the distribution of residuals, as was depicted in the histograms of residuals in the robustness check. The probability plots for the unit models reveals a small tendency of a skewness on the right tail of the distribution of residuals.

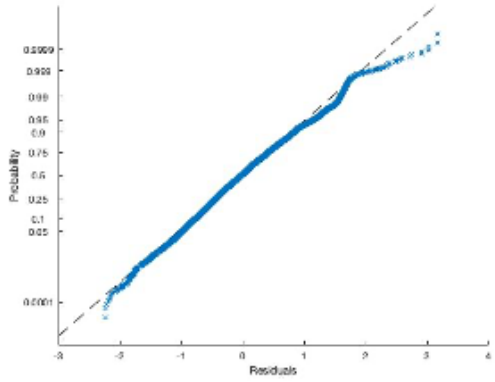
Figure A.1. - NORMAL PROBABILITY PLOT OF RESIDUALS



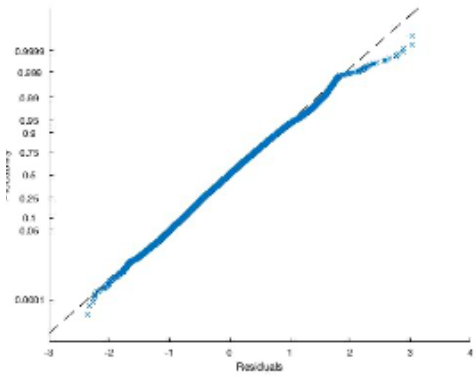
Aggregate price model



Category price model



Aggregate unit model

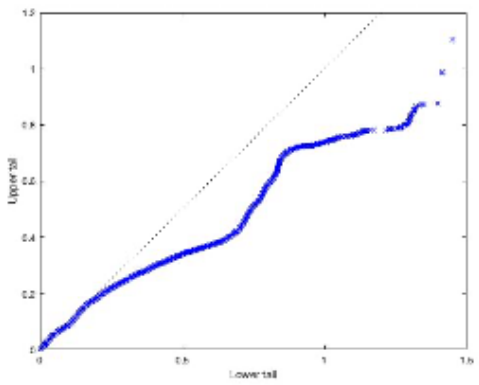


Category unit model

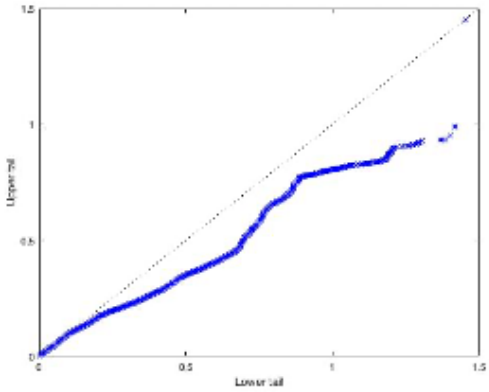
Figure A.2: *Symmetry plot of residuals around their median for all four regression models*

The residuals should be equally distributed around their mean if we are dealing with a perfect normal distribution. As evident from the plots below, this is not the case for either of the four models. However, the two lower plots for the unit models indicates once again that these two models are closer to a normal distribution than the two price models.

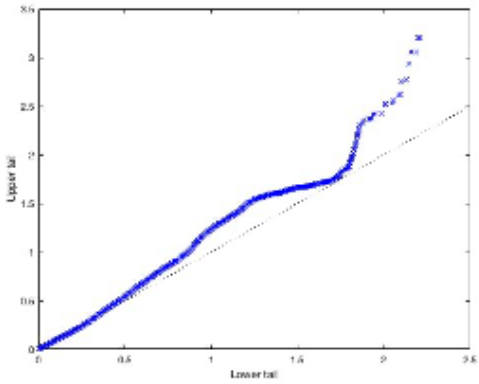
Figure A.2. - SYMMETRY PLOT OF RESIDUALS AROUND THEIR MEDIAN



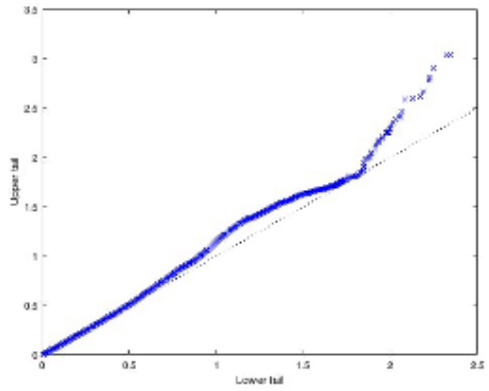
Aggregate price model



Category price model



Aggregate unit model



Category unit model

Equation A.1: *Specification of formula for calculating the Durbin-Watson statistic*

Equation A.1. - Durbin-Watson test statistic

$$d = \frac{\sum_{t=2}^{T}(e_t - e_{t-1})^2}{\sum_{t=1}^{T} e_t^2}$$

e is the residual given by $e_t = \rho e_{t-1} + v_t$

T is the number of observations

Equation A.2: *Specification of formula for calculating the ARCH statistic*

Equation A.2. - ARCH test statistic

Estimate the best fitting autoregressive model

$$\mathrm{AR}(q) y_t = a_0 + a_1 y_{t-1} + \cdots + a_q y_{t-q} + \epsilon_t = a_0 + \sum_{i=1}^{q} a_i y_{t-i} + \epsilon_t$$

Obtain the squares of the error ϵ^2 and regress them on a constant and q lagged values:

$$\hat{\epsilon}_t^2 = \hat{\alpha}_0 + \sum_{i=1}^{q} \hat{\alpha}_i \hat{\epsilon}_{t-i}^2$$

q is the length of ARCH lags

Exhibit A.1: *Written interview with Kaia Østbye Andresen (in Norwegian)*

Kunderelaterte spørsmål:

1. Har dere inntrykk av at kundene deres synes det er viktig/setter pris på at dere har miljømerkede produkter i hyllene? Hva med Svanemerket spesielt?

Vi opplever at kundene blir stadig mer bevisste på varene de kjøper. De vil vite hva de er laget av, hva de inneholder og hvordan de er produsert. Vi opplever at mange ønsker seg flere bærekraftige varer og sertifiseringer som eksempelvis Svanemerket er noe som verdsettes. Kjennskapen til Svanemerket er høy i befolkningen (kilde: undersøkelsen fra Svanemerket for et par år tilbake) og det er mange produkter som har merket. Dette påvirker også naturlig nok både salg og etterspørsel.

2. Hvilke kundesegment opplever dere at verdsetter miljømerkede produkter mest? Hva med Svanemerket spesielt?

De som verdsetter miljømerking høyest er det som er mest opptatt av miljøet og som ønsker å ha et mer bærekraftig forbruk. Vi finner disse forbrukerne i alle aldre, men ser vi på forbrukerundersøkelser generelt viser de ofte en overvekt av miljøinteresser i de yngre målgruppene (Kilde: Sustainable Brand Index). Hygiene og vaske-produkter har ofte Svanemerket og vi kan også se at det er etterspurt på typiske mor/barn-produkter. Vår egen serie LevVel er blant annet merket med Svanemerket.

3. Har dere inntrykk av at det eksisterer en høyere betalingsvillighet hos kunder for Svanemerkede produkter?

Ser man på forbrukerundersøkelser ser vi at kundene ofte oppgir at de gjerne betaler mer for mer miljøvennlige og bærekraftige produkter (Kilde: Sustainable Brand Index). Derimot har vi historisk ikke opplevd den samme faktiske atferden i form av økt etterspørsel i samme grad. Min opplevelse er at dette er i endring og vi ser at sertifiseringer som eksempelvis Svanemerket, Debio, UTZ/Faitrade og MSC/ASC er noe stadig flere etterspør, og også kjøper.

4. Ser dere noen merkbar forskjell på salget av miljømerkede produkter mellom Norge og Danmark? Hva med Svanemerket spesielt?

Må komme tilbake til dere på denne da jeg kun er ansvarlig for Norge og derfor ikke kjenner til etterspørsel i DK.

CSR-relaterte spørsmål:

5. Hva er Rema 1000 sin største "motivasjonsfaktor" for å ta inn miljømerkede produkter i hyllene?

At det er noe kunden er opptatt av og i økende grad etterspør er selvfølgelig viktig. Videre gir det oss også en sikkerhet for at produktene er ansvarlig produsert, noe som er viktig for å kunne øke den totale andelen bærekraftige produkter i butikkene våre.

6. Har dere inntrykk av at antallet av miljømerkede produkter som grossistene deres tilbyr øker?

Generelt ser vi at industrien har den samme oppfattelsen som oss: at kundene blir stadig mer bevisst. Videre er det mange selskaper som har klare ambisjoner om å bidra til en bedre verden og ønsker å ta ansvaret de har. Å øke andelen miljømerkede produkter er derfor viktig for de fleste grossister og leverandører.

7. Hvor bevisste er dere på deres rolle som en stor aktør i det norske samfunnet og det ansvaret det bringer med seg? Og hvordan jobber dere i så fall med dette innad i Rema 1000?

I REMA 1000 er vi vårt ansvar bevisst og vi er opptatt av å gjøre ting skikkelig. Vårt mål er å handle raskere enn vi er pålagt å gjøre og minimere vår negative påvirkning. Ikke minst er det viktig for oss at kunden skal oppleve at vi hjelper de å ta gode valg gjennom å fjerne palmeolje, kutte salt eller redusere plasten for å nevne noe. Helt sentralt i dette er varene vi selger. En forståelse av hvordan de påvirker miljøet fra jord til bord er viktig for oss, og ikke minst å kunne gjennomføre tiltak som fører til endring. I 2014 lanserte vi vår forretningside som er en del av arbeidsbeskrivelsen til alle som jobber i selskapet. Denne er således førende for alle valg vi tar og sier noe om ansvaret vi har og hva det innebærer for oss som dagligvareaktør:

«Kundene velger oss fordi vi alltid har laveste pris på varer av høy kvalitet, produsert og solgt på en ansvarlig måte»

8. Hvordan kommuniserer dere Rema 1000 sine verdier som bedrift utad i samfunnet?

Den nevnte forretningsideen er noe vi nevner både internt og eksternt. Videre sier verdigrunnlagene i Reitangruppen noe om hvordan vi skal opptre, blant annet er «Vi skal være gjeldfri», «Vi holder høy forretningsmoral» og «Kunden er vår øverste sjef» verdigrunnlag som kan knyttes til ansvarsarbeidet vårt. Videre gir vi kundene og øvrige interessenter et innblikk i hvordan vi jobber gjennom vår årlig ansvarsrapport og innhold

i egne kanaler som rema.no og sosiale medier, samt markedsføring når det er naturlig. Vi rapporterer også vårt klimaregnskap til CDP årlig og vårt arbeid med ansvarlig handel til Etisk Handel Norge. Dette er rapportering som er offentlig.

9. Når det kommer til Rema 1000 sine egne produkter - jobber dere for å få majoriteten av disse produktene miljømerkede?
Forretningsideen vår er førende for hvordan vi produserer våre egne merkevarer. Det er mange produkter som ikke er gjenstand for miljømerking enda, f.eks. matvarer, men vi etterstreber å øke andelen sertifiserte varer totalt sett. Det gir både kunden og oss en trygghet om at varene er produsert på en ansvarlig måte.

10. Hvordan forholder Rema 1000 seg til å ta inn nye miljømerker i sitt varesortiment? Og i så fall, hvordan gjøres vurderingen av et eventuelt nytt merke?
Forretningsideen er også førende for innkjøp av varer fra merkevareleverandører og vi er positive til at stadig flere produkter får sertifiseringer som eksempelvis Svanemerket. Dette er ikke et avgjørende kriteria for å tilby en vare i sortiment, men det vil absolutt være positivt.

Strategirelaterte spørsmål:
11. Anser dere det å tilby miljømerkede produkter som en form for konkurransefortrinn?
I den grad bevisstheten hos kundene øker og etterspørsel går opp vil det absolutt være en fordel. Videre er det et viktig ledd i å kunne tilby kundene stadig flere bærekraftige produkter.

12. Hvordan mener dere at Rema 1000 posisjonerer seg med tanke på tilbud av miljømerkede produkter kontra konkurrentene deres? Gjør Rema 1000 noe annerledes enn konkurrentene sine for å fremme miljømerkede produkter?
Jeg kjenner ikke dette inngående dessverre, men jeg vil tro vi alle er nokså like på dette punktet, litt avhengig av sortimentstørrelse naturligvis (lavpris vs. supermarked). Merkevareleverandørene tilbyr stadig flere merkede produkter og jeg opplever at alle er opptatt av å utvikle gode egne merkevarer der sertifiseringer generelt er noen av det man er opptatt av.

13. Med tanke på hylleplassering - har dere noe bestemt system eller strategi for hvordan de Svanemerkede produktene blir plassert i forhold til andre produkter i samme sortiment som ikke er merket?

Dette må jeg dobbeltsjekket, men det tror jeg ikke.

14. Har dere tidligere gjennomført, eller planlegger dere å gjennomføre, en reklamekampanje hvor fokuset har vært å fremme miljømerkede produkter?
Ikke generelt, men vår serie med hygiene/bleier for mor og barn markedsføres som et mer miljøvennlig valg. Her er trekker vi blant annet frem Svanemerket i kommunikasjonen. Videre har vi gjennomført kampanjer på eksempelvis utfasing av palmeolje i egne matvarer, men dette er ikke knyttet til Svanemerket da det i stor grad er matvarer.

15.Når det kommer til varesortiment - i hvor stor grad er det opp til hver enkelt kjøpmann å ta inn miljømerkede/Svanemerkede produkter i sine hyller og hvor stor del (om noen) av de merkede produktene er de pålagt å tilby?
Kjøpmannen forholder seg i stor grad til sortiment og gjeldende sortimentskoder relevant for hans/hennes butikk. Utover dette pålegges de ikke å ha en viss andel miljømerkede produkter. I den grad dette øker er det gjerne som et resultat av produkt- og kategoriutvikling.

Svanemerket spørsmål:
16. Hvordan vil dere si at salget av Svanemerkede produkter har utviklet seg i løpet av de siste 20 årene, grovt sett?
Jeg kjenner ikke historikken på salgstallene (det vil jeg tro dere finner ut J), men generelt er opplever vi som sagt en stadig økende etterspørsel etter miljø- og bærekraftige produkter. Veksten i andelen av produkter med Svanemerket må også sees i lys av at det i hovedsak benyttes på hygiene, vask og non-food produkter og dette er kategorier som ikke er blant de største verken i antall varelinjer er salgsvolum i dagligvare.

17. Hvordan spår du at Svanemerket kommer til å utvikle seg i løpet av de neste ti årene? Tror du merket vil få svekket eller forsterket status?
Kjennskapene til Svanemerket er høy og en stor andel forbrukere forbinder det med mer miljøvennlige produkter (kilde: Undersøkelse gjort av Miljømerking for et par år tilbake). Med det økende fokuset – og utvidelse til kategorier som blant annet tekstil og klær som gjør seg gjeldende i andre bransjer, vil jeg tro at statusen kan forsterke seg.

18. Hvor kostbart er det å få Rema 1000 sine egne produkter produsert på en slik måte at de kan bli Svanemerket sammenlignet med å la produktet forbli umerket? Og er det noen

spesielle ledd i produksjons- eller verdikjeden som er mer kostbare enn andre tilknyttet denne prosessen? (eks. Rema 1000 tamponger)
Jeg kjenner ikke dette i detalj dessverre, men jeg vil tro det er noe varierende ut i fra produktkategori. I noen kategorier er miljømerkede produkter mer vanlig og da vil kostnadene kunne være lavere. I andre kategorier kan det krever mer å få råvarene/produktet sertifisert. I tillegg kommer kostnaden ved bruk av selve merket (kan sjekke opp tamponger/bind om ønskelig)

19. Har dere tidligere erfart en drastisk eller uventet endring i salgstallet på et produkt før og etter at det ble Svanemerket?
LevVel er en serie som har blitt godt mottatt av kundene, men denne serien markedsføres ikke med et særlig fokus på Svanemerket. Kommunikasjonen er tydelig rettet mot at produktene er mer miljøvennlig, der Svanemerket spiller en naturlig rolle sammen med andre sertifiseringer.

20. Rema 1000 har jo tatt inn en hel del kjøttfrie og veganske produkter i løpet av de siste årene etter at det har blitt et økt kunde- og mediefokus på disse produktene - hvilken innvirkning tror dere disse varene og dets kundesegment har hatt for salget av Svanemerkede produkter?
Svanemerkede produkter benyttes ikke på matvarer, så er usikker på hvorvidt dette spiller en rolle. Vi ser at kjøttforbruket i befolkningen går ned (kilde: Helsedirektoratets årsrapport) og etterspørselen etter vegetarprodukter har økt de siste årene. En del av våre hygiene og vaskeprodukter av egen merkevare er veganske og flere av disse har Svanemerket, men her er det nok andre driver til salg som blant annet pris og kvalitet. Men, igjen, vi ser en økende bevissthet hos forbruker som det er ikke helt unaturlig at de som kjøper vegetar også ønsker å kjøpe miljømerket vaskemiddel, bleier, tamponger eller grillkull (for å nevne noen av de mange produktene vi har merket).