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Hedonic pricing analysis of the Norwegian hotel industry: consumers willingness to pay for environmentally certified hotels.

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Abstract

With consumers becoming more environmentally conscious and governments implementing regulations to combat global warming, hotel owners need to consider making their practice more sustainable. By analyzing the Norwegian hotel industry, we estimate if the consumers are willing to pay more for a stay at an environmentally friendly hotel, than a hotel without sustainability measures. Collecting data on characteristics that influence the final price for a stay at 259 different hotels spread across Norway, we create a hedonic pricing model to calculate the implicit value of being certified as environmentally friendly. We find that consumers are willing to pay a premium of 80kr-161kr for hotels certified by Miljøfyrtårn but need 104kr-109kr in compensation to accept a hotel certified by Svanemerket.

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Introduction

During the last five years, the Norwegian carpark have increased its share of electric cars with over 570% (SSB, 2020c). In the same period, Norwegian households have reduced their emissions of carbon dioxide (CO^2) by nearly 12% (SSB, 2020a). Environmental change is a big topic in today's political discussion, and it is something that must be addressed by all governments in the world (United Nations, 2016). Increased use of wind, water, solar and other renewable energy sources reduces pollution and makes for more sustainable production of goods and services as noted by Ritchie & Roser (2017)

Sustainable production is being sought after in all sectors of the economy, and the hospitality market is no different (Green Lodging News and Greenview, 2017). With tourism in Norway having significantly increased over the years, the industry now accounts for 4,3% of the Norwegian gross domestic product with over 165.000 people employed in the sector (Innovasjon Norge, 2019). Both Norwegian and foreign tourists spend more money while on vacation and business travels comparing 2018 to earlier years. In their report on key statistics on Norwegian tourism, Innovasjon Norge finds that there where over 33 million overnight stays at Norwegian hotels and vacation homes in 2018, and that tourists spent over 128 billion NOK during their stay in Norway.

With it being such a big part of production in Norway, the lodging industry is also responsible for their environmental footprint. The United Nations Framework Convention on Climate Change (UNFCCC) works with the hotel industry to reduce their greenhouse gas emissions and to make the industry more sustainable. In early 2018, hotels contributed to about 1% of the global emission of greenhouse gases, and this needs to be reduced by 66% by 2030 and 90% by 2050 for the goals of the Paris agreement to hold. (unfccc (2018) and International Tourism Partnership (2017))

Hotels and vacation homes that want to advertise their environmental efforts can apply for various environmental certifications (also referred to as ecolabels throughout the thesis). These certifications let the consumer know that the hotel is taking action to preserve the environment by implementing green measures in their production. Conserved water and energy usage, recommending the customer to not get clean sheets and towels every day of their stay and offering local and organic products at the restaurant are some of the requirements for obtaining one of these ecolabels. Meeting the requirements for these labels might be costly for some hotels, and seeing as hotels are businesses that want to maximize profits, why should they pursue such a certification? Are the hoteliers willing to take the cost of a greener production, or should they lay these costs on the consumer? This leads us to the following research question:

Is the consumer willing to pay a premium to stay at a hotel which is certified green? And if so, is there any difference between certifications?

The aim of this thesis is to find the consumers' willingness to pay for green attributes when booking a stay at a hotel in Norway. To answer this question, we are performing a hedonic style analysis of 259 hotels with information on different attributes at the hotels collected from TripAdvisor.com. The hedonic method lets us isolate the value of all characteristics contributing to the final price for a stay at a specific hotel room. Keeping all else equal, the only factor changing the price between hotels must be described by the green attributes.

While there has been extensive research on this topic from all over the world, this thesis contributes to the existing literature by examining the effect of different ecolabels. Previous studies have mainly focused on either "green" hotels (count all certified hotels as one) (see Kuminoff, Zhang & Rudi (2010) or Olsen (2018)) or hotels offering different types of green attributes (see for example Sánchez-Ollero, García-Pozo & Marchante-Mera (2014)). Parts of the analysis conducted in this thesis is based on, or a continuation of, the research done by Mads Olsen (2018). The same Norwegian hotels are included with several of the same variables. Seeing as this is a good selection of hotels spread across the country, it lets us check for changes over the last few years, while also add to the previous research. This thesis will be separating the market into green and non-green hotels, but also differentiating the green hotels based on what specific ecolabel they have. This will help hotel managers in deciding what type of certification to pursue.

Following this introduction is a literature review of previous research on hedonic pricing methods and green lodging. We proceed by presenting background information about environmental certifications and why consumers choose them before an introduction to the hedonic pricing model. After introducing our hypotheses, we describe our estimation model and the variables used with key statistics. Finishing up the paper, we present the results and discuss them against previous research. Lastly are some suggestions for further research before the conclusion.

Literature

As preserving the environment is such an important topic, there has been extensive research on it. Both from the producer angle, looking at what the producers are doing to decrease their environmental footprint (see for example Pavlinovič (2013) and Buan (2007)) and how the consumers are reacting in terms of demand for ecofriendly products and services (see Thornam & Nordbø (2018) and Kristjansdottir (2017)). Governments all over the world are committed to slowing down climate change in the world through the Paris agreement. (United Nations, 2020) Most of the government regulations falls to the producers of products and services, forcing them to make measures in reducing their overall pollution.

As a way of showing off their sustainable measures, businesses may acquire certain ecolabels for their products. Some labels are harder to obtain than others and require substantial work towards environmentally friendly production. An important aspect of ecolabeling is that if the ecolabel is acquired as a means to increase demand for a certain product, the consumer needs to notice and care about the information in their decision making. Thøgersen (2000) and Hansen & Kull (1994) are both studies on the consumers behavior as to why, and if, environmental labels have any effect in their decision making. Both find that ecolabels do have a positive effect, meaning customers are more likely to choose the eco labeled product among otherwise similar products. An important factor in both studies is that the label needs to be well known and credible to have any effect on the consumers decision making. In most cases, this means the company doing the certification needs to be a third party with no own interest in granting a label.

Several studies have been conducted on trying to estimate the implicit prices of different attributes of a hotel room. Following is a list of several scientific articles that in different ways try to make sense of the consumers behavior in terms of choosing what hotels to stay in, and how much they are willing to pay for their stay. Data collection range from surveys and questionnaires to interviews and online databases. While most of the listed research papers are estimating the value of green attributes, the ones who do not are providing valuable insight on ways of estimating the consumer willingness to pay for other attributes. These research papers have helped us in one way or another in completing our analysis of the Norwegian hospitality industry.

As the literature is from different parts of the world from the last two decades, we get to observe different ways of collecting and analyzing data and compare their results against one another. Some of the articles Fuentes-Moraleda et al. (2019), Borisenko (2018), Sánchez-Ollero et al. (2014) and Adiasih et al. (2019) finds that the consumers environmental beliefs are important drivers as to how much they would be willing to pay for green attributes. The studies conclude that consumers that care about the environment and are conscious of the choices they make, have a greater willingness to pay for environmentally friendly hotels than consumers with less environmental concerns. These findings complement research done on hotel prices for hotels that have implemented green measures. Sánchez-Ollero et al. (2014), Kuminoff et al. (2010) and Eslaminosratabadi (2014) studies hotels in Spain, USA and Malaysia, and found that hotels that have implemented sustainability measures in their production are priced higher than hotels with less care for the environment. Seeing as consumers that do care for the environment have an increased willingness to pay for this, hotel owners may push some of the cost of sustainable production on to the consumer.

There are also studies that contradict these results. Soler et al. (2018), Manaktola & Jauhari (2007), Olsen (2018) and Chia-Jung & Pei-Chun (2014) find that in some areas (Spain, India, Norway and Taiwan respectively), the consumer demands compensation in terms of a discount on the hotel room because of sustainable measures at the hotel. Some measures may decrease the overall quality of the consumers stay, and therefore they exert a negative willingness to pay to stay at certified ecofriendly hotel. The negative willingness to pay is also explained by White, Hardisty & Habib (2019) and Akram, Arnäs & Dong (2019) who find that

people are generally eager to buy sustainable products, but are not willing to pay a premium for them.

With such conflicting results, we want to do the analysis for the Norwegian market again. We are using the same hotels as Olsen (2018) did in his analysis, to see if there have been any noticeable change in the consumers' willingness to pay to stay at a certified green hotel. While most of the previous research have focused on either green or "brown" hotels, we are trying to estimate if there is any difference in the type of green certificate the hotel obtains. Are some ecolabels more favorable than others? We seek to answer this question by performing a hedonic pricing analysis of hotels in Norway by separating hotels certified with Miljøfyrtårn and Svanemerket. Comparing the prices and other attributes at the hotels, we will be able to see if there are any difference to the consumers' willingness to pay for hotels certified by either label compared to uncertified hotels.

Table 1, Literature list

Authors	Date and location	Type of research	Results	Research on green lodging
Agmapisarn	2014, Bangkok, Thailand	Hedonic pricing analysis of data collected from 141 different hotels in Bangkok.	Finds proximity to city center and public transport, and age of the hotel to be important attributes on the charged price of a room.	no
Soler, Gemar, Correia & Francisco	2018, Algarve, Portugal	Hedonic pricing analysis of data collected on hotels in the Algarve region of Portugal. Assessment of consumers' willingness to pay for a variety of attributes of a hotel.	Environmental responsibility had no impact on price, and yesterday's prices where the main determinant of today's price.	yes
Kuminoff, Zhang & Rudi	2010, Virginia, USA	Hedonic pricing model to estimate the premium the consumer can expect to pay for a "green" hotel room.	Consumers can expect to pay a significant premium to stay at a certified green hotel room.	yes
Sánchez-Ollero, García-Pozo & Marchante-Mera	2014, Andalusia, Spain	Hedonic pricing analysis of hotels implementing environmental sustainability measures on their hotels.	Found that environmental sustainability measures increase the price of a room with an average of 5% per measure.	yes
Israeli	2002, Israel	Studied the impact of star rating and brand affiliation on the price of a hotel room.	Found that star rating is a stable predictor of hotel room prices.	no
Olsen	2018, Norway	Hedonic pricing research on the consumers' willingness to pay for green attributes in the Norwegian hotel industry.	Finds that there is a negative willingness to pay for green attributes in the hotel industry.	Yes

Fuentes-Moraleda, Lafuente-Ibáñez, Muñoz-Mazón & Villace	2019, Spain	Estimating the consumers' willingness to pay for a hotel having an Environmental management system. And what type of consumers are willing to pay the premium?	Finds that the age and income of the consumer, as well as the strength of their commitment to the environment are strong determinants to if the consumer is willing to pay a premium for a hotel to have EMS.	yes
Adiasih, Budiarso, Sulangi & Petra	2019, Surabaya, Indonesia	Researching if consumers income influences their willingness to pay for green services at a hotel by questionnaire.	Found that when the consumer believes in the green measures done by the hotel, the consumer is willing to pay for them, no matter their income.	Yes
Borisenko	2018, Portugal and online.	Researching if there is a relationship between consumers environmental concerns and their willingness to pay for green attributes at hotels.	Finds that there is a strong correlation between tourist's environmental concerns and their willingness to pay.	Yes
Kang, Stein, Heo & Lee	2012, USA	Study of the connection between U.S. hotel guests' environmental concerns and their willingness to pay for green practices at a hotel.	Finds that guests with higher degree of environmental concern have higher willingness to pay for green practices. Also finds that luxury and mid-priced hotel guests have higher WTP than economy guests.	yes
Eslamino-sratabadi	2014, Malaysia	Study of the consumers intention to pay a premium for green lodging.	Consumers with academic background and higher income are more likely to pay a premium.	yes

Background

Tourism in Norway continues to grow as Norway becomes an increasingly attractive destination to travel to. Numbers from SSB (SSB, 2020b) show that Norwegians statistically have one domestic holiday per quarter. A report on tourism for 2019 done by Innovasjon Norge (2019) shows that the number of overnight stays have increased by five percent among foreign tourists and three percent for Norwegians traveling in Norway as opposed to 2018. The summer months are the ones with most travelers as 68% of overnight stays in 2018 where registered in the period may till august.

The report also shows that the destinations travelled to is different for foreign tourist and for Norwegians. While Norwegians themselves do not seem to have any dominating travel destination, the west, east and northern part of Norway is the most dominating travel locations among foreign tourists. The average foreign tourist stays in Norway for around 10 days, and over 50% of these tourists stay overnight in more than one region as many of them are traveling through Norway while on vacation. One thing both foreign and domestic tourists have in common is what they would like to experience while traveling in Norway. Both groups put “having fun” and exploring the Norwegian nature as very important while traveling in Norway.

Statistics on the hotel business in Norway

According to SSB (2020b) there are 605 hotels and similar lodging businesses in Norway. In 2019 the largest hotel chains in Norway were Scandic Hotels, Thon Hotels and Nordic Choice. In 2018 there were 103.7 million overnight stays in Norway, 23.7 million of these were at hotels. A report done by Hotelia AS in 2019 shows that Norwegian hotels had over 11 million overnight stays in the first half of the year.

For Domestic tourists in Norway, non-commercial lodging options like cabins, friends, family or camping combined forms the most popular lodging option but when you split all lodging option to an individual level, hotels are the most popular option with 35 percent of Norwegians choosing to stay at hotels while traveling in Norway. For foreign tourists the number is naturally higher, as 55 percent of foreign tourist stay at hotels while traveling in Norway. (Innovasjon Norge, 2019)

Why do consumers choose ecofriendly products and services?

There are several reasons to why people would choose an ecofriendly way of living. Halvorsen (2014) finds that people tend to choose the "green" alternative when making a decision based on the fact that they believe it makes a difference in preserving the world. There is also the concept of feeling guilty for not doing the ecofriendly thing driving decisions. In the report "European Perceptions of Climate Change" Böhm (2018), a target sample of 1000 interviews in Norway, Germany, UK and France find that about 60% of the population in Norway thinks being "green" is an important attribute in defining the Norwegian population. When asked about preferred sources of energy, renewable sources like water, wind and solar power was preferred by most.

Previous research by Akram, Arnäs & Dong (2019) and White et al. (2019) finds evidence that consumers generally are interested in buying sustainable products, but are not willing to pay the premium for them compared to other similar products. There are several ways to change this behavior, and White et al. (2019) describes five of them; "*use social influence, shape good habits, leverage the domino effect, decide whether to talk to the heart or the brain, and favor experiences over ownership"*. Social influence refers to the way people make their choices to fit in with their social environment, noted by Laranjo (2016). In a study, Demarque et al. (2015) found that telling online shoppers that other shoppers where purchasing sustainable items lead to a 65% increase in purchases containing at least one sustainable item. Providing information that other customers have chosen the sustainable option often influences future customers to do the same. Kallbekken & Sælen (2013) discovered that informing buffet guests that the norm is to reduce the plate size and rather help them self to more servings reduced food waste by 20%.

Setting environmentally friendly alternatives as the default choice helps shape good habits. Pichert & Katsikopoulos (2008) finds that people generally do not choose green energy, but when it is set as the default offered by the electricity provider, over 90% stayed with it. This concept is true for other situations as Theotokis & Manganari (2015) describes it. When the sustainable option is set as the default, people feel guilt when choosing to opt out, thus making more people stay with the green alternative. An example from a hotel is where the default is for the staff not to change the guests towels each day, but they can choose to get new towels if they want. If this theory holds, fewer people get new towels every day, reducing total emissions from the hotel.

While there are plenty of reasons to choose the ecofriendly alternative, it is not always clear what products and services actually are certified "green". Some companies create their own certifications for their own products, maybe because a line of products is produced with materials that are more ecofriendly than their other products or use ecofriendly transport to ship the product. Toro, (*TORO tar initiativ til klimamerking av mat*, 2019) just started marking their foods with a certification they produced themselves. For the consumer, this might be confusing. How do I make sure that the products I am buying are ecofriendly? This is where environmental certifications come into play.

Environmental certifications

There are several environmental certifications one can obtain for a business, product, or service in Norway. Some are more recognizable than others, both domestic and international. Svanemerket, Miljøfyrtårn and TripAdvisor's GreenLeader program are the certifications we are focusing on in this thesis. To be certified, there are several criteria the company must follow, based on what marking they are trying to be certified under. As an example, to be certified with Miljøfyrtårn, the company needs to improve their environmental representation in areas such as working environment, waste management, energy consumption, procurement, and transport. Within all the categories are strict criteria that needs to be followed to get the certification.

When a company gets its certification, the ecolabels are allowed to be present on the company website, flyers, commercials and other channels where the company want to show off their status as ecofriendly. The company is also added to the list of certified companies with the respective certification. All environmental certifications let consumers search their database to see if a specific company is certified.

GreenLeader

GreenLeader is TripAdvisor's own green certification, giving hotels status as ecofriendly on their website. The program offers 4 levels of certification, ranging from bronze to platinum based on the lodgings commitment to the environment (*Green Hotels*, 2020). This environmental certification is desirable to the lodging industry as the label will be shown in the hotels own TripAdvisor page, making it easy for the consumers to notice the hotels green efforts.

Miljøfyrtårn

Miljøfyrtårn is one of Norway's own environmental certifications. The first Miljøfyrtårn certification dates back to 1997, but the company we know today was formed in 2003 (Miljøfyrtårn, 2020c). The Miljøfyrtårn-program was established as a three-year national program with support from the Ministry of Climate and Environment in 2000. The board of the corporation consisted of members from several different companies and unions, including "Næringslivets Hovedorganisasjon (NHO)", "Handels- og Servicenæringens Hovedorganisasjon (HSH)" and "Kommunenes Sentralforbund (KS)". Later, the biggest union in Norway "Landsorganisasjonen I Norge (LO)" also joined the program.

In 2003, Miljøfyrtårn was recognized as a national environmental certifier by the Ministry of Climate and Environment and was accepted to receive funds through the state budget. The European Union recognized Miljøfyrtårn for their environmental efforts in 2017, making in the first national engagement to receive such recognition. (The certification from EU states that Miljøfyrtårn keeps high standards and high quality in its certifications, on line with international companies like EMAS and ISO 14001.)

To obtain the Miljøfyrtårn certification, the company needs to apply, and pay a fee that is based on how many employees they have. If they are eligible for the certification, there is a yearly fee to stay certified, which is also calculated on the number of employees. The criteria for being labeled with Miljøfyrtårn include having to offer allergy friendly rooms to their guests, the hotel breakfast should include at least 10 ecological and/or local products and at least 75% of shampoo, soaps and other cleaning products must have a third party ecolabel without any toxins (Miljøfyrtårn, 2020d). Miljøfyrtårn also sets limitations to the use of water, and the hotel should have a plan for further decreasing their use of water. In total, there are 190 hotels certified with Miljøfyrtårn in May 2020.

Svanemerket

Svanemerket is the official Nordic environmental certifier. To be labeled with Svanemerket, a company needs to document that they follow the strict requirements through the products lifecycle, from raw materials, production, use and as waste. The Svanemerke guarantees that the product is among the least environmental damaging in that particular group of products, and enlightens the fact that the product is made with reduced environmental impact, sustainable and free from toxins. (Forbrukerrådet, 2020)

Miljømerking is a foundation created by the Norwegian government in 1989. The main properties of the foundation are to manage the official environmental certifiers in Norway, including Svanemerket and “Blomsten”. It is important for Svanemerkets credibility to stay a neutral third party when deciding to certify a product. They have no own interest in certifying a product of business, other than wanting to help make the world more ecofriendly.

Once a company or a line of products obtain a Svanemerke, its usually valid for three to five years. As the requirements for the label gets stricter, the company needs to change their products to be eligible for the continuous use of the label. To obtain a Svanemerke, an application must be posted, and there is a cost of 3 000 euros for Nordic companies. As the certification expires, the fee to reobtain the label is 1 500 euros. Svanemerket is a non-for-profit organization, meaning you only pay for the cost of the certification, and not so that Svanemerket makes a profit.

To be certified with Svanemerke, the hotel must meet an array of criteria. The criteria consist of a combination of mandatory requirements and a point score requirement. The total score is added together, and must be over a certain level to be eligible for the certification. (Nordic Ecolabelling, 2013) Some of the mandatory requirements include limitations to the use of energy, water, and waste. The production must leave the values of energy, water, and waste under certain limit values. There are strict requirements when it comes to the use of toxins in cleaning products, such as dishwashing, laundry chemicals and general cleaning products. In most of the categories, 80% of the products used for cleaning must also be labeled with Svanemerket. Consumables like paper towels, toilet paper, lightbulbs, shampoo, and soaps should also be certified to obtain a higher score. 143 hotels and conference centers are certified with Svanemerket.

Comparison of Svanemerket and Miljøfyrtårn:

As stated, there are significantly different barriers to obtain a particular ecolabel. While Svanemerket are concerned with the lifecycle of a product or service, from raw material to waste, Miljøfyrtårn rates companies based on their current operations. Miljøfyrtårn is not available for products alone but must be obtained by a business which then will be able to advertise their products as ecofriendly. The price of certification is similar for the two, although Miljøfyrtårn might be a little less expensive for smaller businesses.

Why would a hotel choose to opt for an ecolabel?

As the focus on global warming and sustainable development increases among the public and private sector, Innovasjon Norge (2019) reveals that showcasing the large selection of sustainable development options will increase the probability of a foreign tourist traveling to Norway with 42 percent. The same survey revealed that Norwegian mountains raises the probability with 35 percent, the fjords 30 percent and Norwegian nature overall increases the probability with 31 percent. Previous research arguing for the existence of a willingness to pay a premium for ecofriendly hotels in countries like Spain by Fuentes-Moraleda et al. (2019), the US by Kang et al. (2012) and Hong Kong by Chan (2013) indicates that foreign tourists in Norway will contribute to the demand for ecofriendly hotels as Spain, China and the US all are among the countries that travels the most to Norway. On the other side previous research

done in Norway indicated not only that there did not exist a willingness to pay a premium for ecofriendly hotels, there actually exists a willingness to pay a premium to avoid staying at ecofriendly hotels Olsen (2018).

As obtaining an environmental certification is costly in that you have to pay for both the certification process, and also for the changes that needs to be done in order to satisfy the requirements, why should a hotel opt for a ecolabel? If we are to believe Miljøfyrtårn (2020a) own reports, 45% of certified companies state they have increased competitiveness, 64% reports increased reputation enhancement, and over 50% state that their employees are more proud to be working in an environmentally friendly business. One might also claim that decreased water and energy usage lowers total cost of operating.

A problem with spending time and resources on going green is getting the consumer to choose the green alternative. Even though the majority of consumers state that they would choose the sustainable alternative when asked in surveys, the real numbers show that not so many are willing to pay for it. White et al. (2019) found that in a recent survey, 65% stated they wanted to buy products from brands that operate in a sustainable way, yet only about 26% actually do so. In a similar study, Akram et al. (2019) concludes that even though the consumers have increased awareness of environmentally friendly products, they are still reluctant to pay a premium for these types of products.

Theory

Hedonic pricing

"Hedonic pricing is a method of economic evaluation, based on the premise that the price of a good is partly determined by its characteristics or the services it provides." (Park, 2007) Utilizing a hedonic pricing approach to value single characteristics of a good, one tries to estimate how the consumers' willingness to pay changes as the characteristics of that good changes. Hedonic prices are defined as the prices of these characteristics, that in the end determines the price of the final product or service. These prices are revealed by observing the prices of differentiated products and services, and the specific amount of characteristics associated with them. Under Rosen's (1974) framework, as noted by Kuminoff et al. (2010),

regressing product prices on their attributes may reveal consumers marginal willingness to play (MWTP) for individual attributes of a differentiated product.

As Sánchez-Ollero et al. (2014) describes it, one might think of a theoretical attribute marketplace, where the consumers are filling their shopping carts with the desired amounts of different attributes to satisfy their utility function. At checkout, it is possible to see exactly what the consumer is willing to pay for that specific combination of attributes in the final product.

The concept behind hedonic pricing has been around since the 1920s, but after Rosen (1974) wrote the article "*Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition*", strengthening the microeconomic foundation of the model, the hedonic pricing method has been applied to estimate models in various areas. Most commonly, it is used to estimate variations in housing prices due to differences in environmental characteristics, Park (2007), but it can also be applied to estimate variations in short time housing rental, Gibbs et al. (2018), estimation on demand for fish, Khan (2012), and price characteristics in the cruise industry, Espinet-Rius et al. (2018).

The fact that hedonic pricing can be used on such a wide array of areas, we wanted to apply a hedonic pricing approach to estimate the consumers' willingness to pay to stay at a certified ecofriendly hotel room in Norway. There are several studies on this topic from different parts of the world. Sánchez-Ollero et al. (2014) discussed the impact on room price on hotels implementing environmental sustainability measures in southern Spain. The study concluded that environmental sustainability measures increased the hotel rooms price by up to 36 percent. Soler et al. (2018) studied the consumers' willingness to pay for a wide array of attributes on the hospitality sector in Algarve, a region south in Portugal. The most important attributes turned out to be the previous days prices. Kuminoff et al. (2010) did an analysis of the accommodation market in Virginia and found that there is a significant premium to stay at a certified "green" hotel room. A master thesis written by Olsen (2018) have already performed a hedonic analysis on the Norwegian hotel industry, and we are continuing our research on his previous research. As we are analyzing the same hotels, we get to see if there has been any notable change in the way travelers in Norway value being environmentally friendly over the last two years.

The rate for a one-night stay at a standard two bed hotel room (r) can be expressed as a function of the hotels environmental efforts (e), as well as a vector (a) including the different types of attributes the hotel has to offer. These types of attributes are for example whether the hotel offers room-service, laundry services or transportation to and from the airport. R = R (e,a) gives us an expression of the hedonic price function.

Equation (1) demonstrates how the hedonic price function is incorporated into the guest's utility maximizing problem. The guests will each choose a quantity of the composite numeraire good (x) and a hotel offering a combination of attributes that given the guests preferences (q) and income (I) maximizes the guest's utility.

Equation 1:

$$U(x, e, a, q) \; subject \; to \; I = x + R(e, a)$$

Frist order condition for the hotels environmental efforts (e) provides one of the main outcomes of the hedonic price model. Equation 2 shows the first order condition for g.

Equation 2:

$$\frac{\vartheta R(e,a)}{\vartheta e} = \frac{\vartheta U/\vartheta e}{\vartheta U/\vartheta x}$$

The guests will choose a hotel that offers them the level of environmental efforts where their willingness to pay is equal to its marginal implicit price and with that maximize their utility.

To model the supply side of the market, let C(e,a,k) describe the hotels cost function where k is a vector for the cost associated with running a hotel. This leaves equation (3) to describe the hotels profit maximizing problem. Each hotel will choose the combination of (e) and (a) that given (k) maximizes their profit.

Equation 3:

$$MAX \; \pi = R(e, a) - C(e, a, k)$$

The last equation shows the first order condition for (e) on the supply side of the market.

Equation 4:

$$\frac{\vartheta R(e,a)}{\vartheta e} = \frac{\vartheta C(e,a,k)}{\vartheta e}$$

The hotel chooses a set of (e) where the marginal cost of environmental efforts equals the marginal implicit price. Assuming perfect competition, the market equilibrium will take place when the first order condition for both sides of the market are simultaneously satisfied for all guests and hotels. The slope of the equilibrium price function that satisfies the first order condition for (e) on both sides of the market gives an estimate of the guest's willingness to pay for an ecofriendly hotel. The empirical challenge is to estimate R(e,a) econometrically using room rates and attributes.

Hypothesis

Building an assumption on previous research on green lodging, it is fair to expect the ecofriendly certificates to influence the room rates of hotels in Norway. Research papers by for example Sánchez-Ollero et al. (2014) and Kuminoff et al. (2010) debates that there exists a willingness to pay a premium for hotels with ecofriendly certificates. On the other hand, there are previous research stating the opposite. Soler et al. (2018) does a hedonic price analysis on hotel prices in Algarve in Portugal and found no willingness to pay for green hotels. The same results are reported by Olsen (2018) who found a willingness to pay a premium to avoid staying at hotels with the Svanemerket certificate in Norway.

Hypothesis: Hotel prices in Norway are positively affected by an ecofriendly certificate.

This hypothesis allows for controlling if ecofriendly certificates at a hotel has any effect on the price of a room. Performing the hedonic analysis, separating all different characteristics allows us to isolate the change in price due to the ecofriendly certificates. Looking at the analysis, keeping all other factors fixed, the change in price must be due to the ecofriendly certificates.

The price function below describes the most vital variables for this study. Room rates for hotel "n" which is the depended variable. The independent variables are the variables for the two ecofriendly certificates (Svanemerke & Miljøfyrtårn). The variable (x^{δ}) is a description of the remaining independent variables.

Equation 5:

$$R_n = \beta_0 + \beta_1 Svanemerket_n + \beta_2 Miljøfyrtårn_n + X^{\delta} + \mu_n$$

The null-hypothesis state that the ecofriendly certificates has a positive effect on the guest`s willingness to pay. Guests are willing to pay a premium to stay at the hotels with one of these ecofriendly certificates, thereby increasing the room rates of these rooms. This mean that we are expected to find a positive correlation between room rates (dependent variable) and the ecofriendly certificates (independent variables).

$$H_0: \beta_1 > 0$$

$$H_0: \beta_2 > 0$$

The alternative hypothesis then states that the ecofriendly certificates has no or a negative effect on the room rates. This means that the guests would be willing to pay a premium to avoid staying at hotels with an ecofriendly certificate.

$$H_1: \beta_1 \leq 0$$

$$H_1: \beta_2 \leq 0$$

Methodology & Data

When estimating the hedonic price model, data on room rates and hotel attributes was collected. Using a search engine when collecting the various information about the different hotels is the most efficient way to get the information as they provide room rates as well as the attributes offered by the hotel. In this study TripAdvisor.com was used as the source of information. Being the world`s largest online travel platform, TripAdvisor.com offers a customer friendly site providing information on hotels all around the world. The most important attribute from TripAdvisor.com is how easy they provide the customers with information about the attributes offered by and around the hotel as well as the room rates.

This study contains two ecofriendly labels. Miljøfyrtårn and Svanemerket. The hotels will be checked against the database for each label to see whether the hotels have obtained one of the labels.

Lastly the data will be processed using STATA, a statistical software for data science to determine whether there exists a willingness to pay a premium for ecofriendly hotels in Norway no not.

Data description

Information about hotel facilities, services and prices were collected from 259 different hotels. The prices were collected as the daily average over a week in April 2020, as of February 2020. The hotels are randomly selected and spread over 5 different regions across Norway. The regions and distribution of the hotels covers all of Norway and is shown in Table 2.

Table 2, Regions and distribution of hotels.

Region	Number of hotels collected data from (%)
Østlandet	89 (34%)
Nord-Norge	48 (19%)
Vestlandet	60 (23%)
Sørlandet	31 (12%)
Trøndelag	31 (12%)
Sum	259 (100%)

Out of the 89 hotels located in Østlandet 69 of them were located within a 25 km radius of Oslo city center. Adding up to a total of 27% of all hotels in this thesis.

There are both internal and external factors effecting the price of a room at a hotel. To control for these factors and create a model that best represents and explain the effect of these different factors, the variables used in this model are based on two main sources. Previous research on similar topics have been used to determine which variables to include in this model. The second source is the search category that TripAdvisor.com offers. These are typical attributes that the guests can add when searching for a hotel. As an example, if a guest wants to stay at a hotel in Oslo with at least a three-star rating and free breakfast, adding these requirements in the search, TripAdvisor will exclude all hotels that does not fit the "description".

The previous research this model has been based on are papers on previous findings from other countries like Spain Sánchez-Ollero et al. (2014), Taiwan Chia-Jung & Pei-Chun (2014), and USA Kuminoff et al. (2010) and Millar & Baloglu (2011).

Table 3, Description of variables.

Hotel Characteristics (Internal factors)	
Price:	The price for a standard double room at the hotel
Ecolabel:	Hotels with one of the ecofriendly certificates
GreenLeader:	Hotels that are labeled as green by TripAdvisor
Rooms:	The number of hotel rooms at the hotel
Star:	The star rating of the hotel
Rating:	The travel rating of the hotel
Facilities:	Facility factors
Dining:	Dining opportunities at the hotel
Business:	Business opportunities at the hotel
Leisure:	Leisure opportunities offered at the hotel
Location:	Which of the five regions the hotel is located in
Attractions near the hotel (External factors)	
Distance to City Center:	In number of meters from the hotel
Distance to Public Beach:	"
Distance to Nature Attractions:	"

Variables

This paragraph provides a description of all variables displayed in Table 3. The variables Ecolabel, Star, Rating, Facilities, Dining, Business, Attractions are all reported as binary variables whereas Price and Rooms are reported as discrete variables.

Price:

Is the lowest price for a single night stay at a standard double room. When collecting the price, we choose the average daily price for a whole week so both weekends and weekdays were accounted for. Information about the room rates are all collected from TripAdvisor.com (TripAdvisor, n.d.-b). TripAdvisor collect and compare prices from different booking services listing up their different prices. The currency used in this thesis is Norwegian kroner.

Ecolabel:

The variables in "Ecolabel" is for hotels that have received an ecofriendly certificate. Either Svanemerket or Miljøfyrtårn which are the two most recognized ecofriendly labels in Norway. To get one of these labels the hotel have to document their ecofriendly practice (Forbrukerrådet, 2020).

GreenLeaders:

This variable is for the hotels that have been listed as environmentally friendly by TripAdvisor. The hotels have to apply for this certification them self which showcases the hotel commitment to green practices. If accepted, the hotel will receive one of four statuses reflecting their level of commitment to green practices. Bronze, Silver, Gold and Platinum (TripAdvisor, n.d.-a).

Rooms:

The number of hotel rooms at the hotel.

Stars:

This variable shows the star rating of the hotel. The star rating at a hotel is often a reflection of what you can expect in terms of service and amenities. The hotels will get a star rating ranging from one to five stars, one being the lowest possible rating and five being the highest. The star rating is collected from TripAdvisor.com. As there is no official global star rating system the star rating can vary in different booking companies, and not all of them uses a one to five system either. In Norway, the standard system to rate a hotel is like that of TripAdvisor.com.

Travel-rating:

Travel-rating gives us the customers rating of the hotel. Travelers can rate and comment on their stay at the hotel and leave it for future travelers to read about their experience staying at that particular hotel. Anyone with an account at TripAdvisor.com can leave these ratings. There is no way to determine how accurate or real these comments are. It will still be an indicator on the experience of previous guest and might influence future guest`s perception of the hotel.

Facilities:

These are the variables that showcases what you can expect to find at the hotel. Under the description facilities, we have added factors like if the hotel is handicap accessible, if it allows pets or offers transportation to the airport etc. These factors might be important to a guest when deciding to book a specific hotel and should be reflected in the price.

Dining:

These variables show us the different dining options offered at the hotel. Free breakfast and whether the hotel have a restaurant.

Business:

Which kind of opportunities the hotel offers to businesses in terms of meeting rooms, a conference center and internet access.

Leisure:

This group of variables showcase different leisure activities the guests can enjoy at the hotel. The variables included are fitness center, spa and swimming pool. These were only collected if the hotel offers them at the hotel and not if they for example had a deal for their guest at the local gym down the street.

Location:

These are dummy variables describing which part of Norway the specific hotel is located at. Norway have been divided into five different regions. Østlandet is the east part of Norway and have cities like the capital Oslo and cities like Sarpsborg and Fredrikstad. Vestlandet is the western part of Norway. Cities like Stavanger, Bergen and Ålesund are located in Vestlandet. Sørlandet is the south part of Norway with cities like Kristiansand and Arendal. Midt-Norge is the middle part of Norway, with cities like Trondheim, Kristiansund and Molde. The last part is Nord-Norge, this is the north part of Norway with cities like Bodø, Tromsø and Alta Thorsnæs (2020).

Attraction:

This variable is a distance variable to attractions surrounding the hotel. There are no specific attractions included. This is due to the data from the dataset being spread across all regions of Norway. The attractions are instead divided in to three categories, city centrum, public beach, or a nature attraction. The hotel would have to be within a 25 km radius of these categories for it to be counted.

City Centrum= The ten largest cities in Norway based on population (Store Norske Leksikon, 2019).

Public Beach = The ten beaches in Norway with the highest rating on TripAdvisor.com.

Nature Attraction = The top ten rated nature attractions in each county in Norway on TripAdvisor.com

Summary of statistics

Table 4 show the descriptive statistic from the data collected. The price for a single night stay at a standard double room varies from 590kr to 3690kr and the number of rooms varies from 7 to 810. The average hotel has a price of 1370kr and 140 rooms. With 58% of the hotels being three star-rated this is the most common rating for the hotels in this dataset. 74% of the hotels has received a four star from previous guest making it the most common travel-rating among the hotels. Internet in both the lobby and rooms are the most common characteristic, as 99% of hotels offer this. As for dining opportunities 85% of the hotels has a bar, 84% has a restaurant and 81% offer free breakfast in their regular room rates. 75% of the hotels offer rooms that are accessible for people with reduced mobility. Laundry service and allowing guest to bring pets is also fairly common at 69%. When looking at business opportunities, 80% of hotels offer meeting rooms and 65% have conference centers. Some of the rare characteristics include airport transportation at 14%, air-condition 14%, swimming pool is at 12%, spa at 5% and the rarest characteristic to find at the hotels are kitchenet at 3%. As a result of Norway's "smoke free act" (Nho reiseliv, n.d.) which bans smoking in public premises, and prevent hotels having more "smoke rooms" than smoke-free rooms some of the hotels offered smoking areas outside of their premises but none of the hotels had rooms were smoking were allowed. Østlandet is the most represented region with 34% of the hotels used in this thesis being located in Østlandet. 49% of the hotels were located within 25 km of one the ten largest cities, 27% of the hotels were located within 25 km of the capital Oslo. 43% of the hotels that were collected data from had obtained an ecofriendly label. Svanemerket 14% and Miljøfyrtårn 29%. Only 7% of the hotels had the GreenLeader label from TripAdvisor.

Table 4, Summary of statistics.

Category	Variable	Observations	Mean	Standard Dev.	Min	Max
Basic	Price (NOK)	259	1370.386	371.729	590	3690
	Miljøfyrtårn	259	.2895	.4544	0	1
	Svanemarket	259	.1428	.3506	0	1
	Green Leader	259	.0733	.2612	0	1
	One-star	259	0	0	0	0
	Two-star	259	.0115	.1072	0	1
	Three-star	259	.5791	.4946	0	1
	Four-star	259	.3977	.4903	0	1
	Five-star	259	.0115	.1072	0	1
	Travel rating One	259	0	0	0	0
	Travel rating Two	259	.0077	.0877	0	1
	Travel rating Three	259	.1776	.3829	0	1
	Travel rating Four	259	.7374	.4408	0	1
	Travel rating Five	259	.0772	.2674	0	1
	Rooms	259	140.725	111.576	7	810
Facilities	Non-smoking	259	1	0	1	1
	Suite	259	.3359	.4732	0	1
	Kitchenette	259	.0308	.1733	0	1
	Pets allowed	259	.6911	.4629	0	1
	Concierge	259	.2432	.4298	0	1
	Room-service	259	.3050	.4613	0	1
	Reduced mobility	259	.7528	.4321	0	1
	Air-condition	259	.1389	.3483	0	1
	Bar	259	.8494	.3583	0	1
	Laundry service	259	.6911	.4629	0	1
	Airport transportation	259	.1428	.3506	0	1
	Free parking	259	.3899	.4886	0	1
Dinning	Free breakfast	259	.8069	.3954	0	1
	Restaurant	259	.8378	.3954	0	1
Business	Internet (Room)	259	.9961	.0621	0	1
	Business center	259	.6525	.4770	0	1

	Meeting room	259	.7992	.4013	0	1
	Internet (Lobby)	259	.9922	.0877	0	1
Leisure	Pool	259	.1158	.3206	0	1
	Fitness center	259	.5250	.5003	0	1
	Spa	259	.0540	.2265	0	1
Attractions within a radius of 25 km	City center	259	.4942	.5009	0	1
	Public beach	259	.3899	.4886	0	1
	Nature attractions	259	.6988	.4596	0	1

Information about the hotels with the ecofriendly labels Svanemerket and Miljøfyrtårn was collected at Svanemerket.no and Miljøfyrtårn.no. (https://www.svanemerket.no/produkter/producttype/?m1=109&m2=166&pt=100255#prodList),(https://www.miljofyrtarn.no/sok-virksomheter/#resultat). All the other information about the hotels were collected through Tripadvisor.com. (https://www.tripadvisor.com/)

Estimation

The hedonic pricing model in its full form is shown below.

Equation 6:

$$R_j = \beta_0 + \beta_1 Miljøfyrtårn_j + \beta_2 Svanemerket_j + \beta_3 GreenLeader_j + \beta_4 Rooms_j + \gamma x Stars_j + \delta x Rating_j + \vartheta x Facilities_j + \tau x Dining_j + \omega x Business_j + \vartheta x Leisure_j + \mu x Attractions_j + \omega x Regions_j + \upsilon_j$$

Even though the approach is similar to Olsen (2018) and Kuminoff et al. (2010), the above model holds a few additional variables. Most importantly the variable Miljøfyrtårn have been added to the model. The reason for adding this variable is that the Miljøfyrtårn is an internationally recognized and was the first national environmental certification acknowledged by the European Union. Leaving hotels with this certificate in the control group would result in a wrong estimation of the "non-green" hotels. This model includes both attractions which Kuminoff et al. (2010) did not include as well as "space" which Olsen (2018)

left out. The reason for adding the different regions in this model was that the majority of the regions had a marginally significant effect on the room rates. This model, unlike Kuminoff et al. (2010), does not include the number of floors at the hotel. This is because the information about floors was not available for the majority of the hotels. The control group for this model will then be a hotel located in Østlandet with a two-star rating from TripAdvisor.com, a two-star rating from previous guest and none of the characteristics collected in the dataset.

Results

The estimated results from the hedonic pricing model are shown in Table 5. The table is divided into six columns with the first one being a reduced regression where the only independent variables are the two ecofriendly labels. Interestingly enough, they reveal two completely different effects on the room rate. Miljøfyrtårn has a statistically significant effect on the room rate at a one percent significance level and shows that guests are willing to pay a 161.12kr premium to stay at a hotel with a Miljøfyrtårn certificate. The effect of the Svanemerket certificate is on the other hand not statically significant at an acceptable level. Even though it indicates that there is actually a willingness to pay a premium to avoid staying at these hotels of 65.17kr, we cannot conclude that the effect of Svanemerket is significantly different from zero.

In the second column the regression is less restricted as all the basic variables GreenLeader, stars, rating and number of rooms has been added to the model. The Miljøfyrtårn certificate is still statistically significant at one percent level of significance and the estimated effect shows a willingness to pay a premium of 121.43kr to stay at those hotels. In this column the effect of the Svanemerket is also statistically significant but at a ten percent level of significance. The effect is still negative and shows that guests are willing to pay a 104.09kr premium to avoid staying in hotels with the Svanemerket certificate. As to be expected, the number of stars (both TripAdvisor and travel rating) effect the price. Travel rating five and star rating four are both statically significant at a ten percent level of significance, whereas the variable for a five-star rated hotel is statistically significant at a one percent level of

significance. Number of rooms seems to have close to zero effect on the price and is not statistically significant at any level.

In column three the variables for facilities has been added. This includes attributes like if the hotel offers suits, whether they allow guests to bring pets on their stay etc. When adding these variables to the regression we see that the Miljøfyrtårn certificate is statistically significant at a five percent significant level and indicates a willingness to pay a premium of 113.03kr. The Svanemerket shows a willingness to pay a 100.50kr premium to avoid staying at hotels with the Svanemerket certificate, but since it is not statistically significant at an acceptable level, it cannot be concluded that the effect is significantly different from zero. Even though it would be fair to assume that the variables added to this regression should have an effect on room rates very few of them is statistically significant from zero. With suite, air-condition and free parking being the only new variables that are statistically significant from zero.

In the fourth column dining, business and leisure opportunities at the hotels have been added to the model. The effect of the Miljøfyrtårn certificates keep decreasing when adding more variables, and in this regression the willingness to pay a premium to stay at a hotel with a Miljøfyrtårn certificate is at 96.58kr and is statistically significant at a five percent level of significance. The label for Svanemerket is still negative as the willingness to pay a premium to avoid staying at these hotels are at 109.77kr and is statistically significant at a ten percent level of significance. Free breakfast, Restaurant, Business center and Meeting room are the only new variables which are statistically significant at an acceptable level.

In the fifth column, the variables for attractions have been added. Both city center and nature attractions are statistically significant at a ten percent level of significance. While there is a willingness to pay a premium to stay at a hotel close to the city center, the coefficient for nature attraction show a willingness to pay a premium to avoid staying at hotels close a nature attraction. The coefficient for suites is no longer statistically significant from zero, but the variable for concierge is now statistically significant at a ten percent level of significance. The effect of Miljøfyrtårn is statistically significant at a five percent level of significance and show a willingness to pay a premium of 101.60kr to stay at Miljøfyrtårn hotel. The effect of Svanemerket is statistically significant at ten percent and show a willingness to pay a premium of 108.80kr to avoid staying in hotels with Svanemerket.

In the sixth column, all the variables from the dataset have been included as it now also includes the different regions in Norway. Adding the variables for the different regions in Norway show that all except Vestlandet is statistically significant from zero at an acceptable level of significance. The effects are all negative, which makes sense as the control group contains Østlandet where the capital Oslo is located, making Østlandet a more attractive place to stay. That the variable for Vestlandet makes sense as the Veslandet and Østlandet are the most popular places to visit when traveling in Norway. Both the effect of Miljøfyrtårn and Svanemerket are statistically significant at a ten percent level of significance. Both variables have the same effects as in the other columns. Guests are willing to pay an 81.00kr premium to stay at a Miljøfyrtårn hotel and are willing to pay a 104.60kr premium to avoid staying at hotels with Svanemerket.

When looking at all columns the results make intuitive sense. The effect the Miljøfyrtårn certificate has on room rates decreases as the model expands. The same can be said for the significance level of Miljøfyrtårn, which in the first column was strong at one percent ended up being "only" ten percent in column six. When including only the columns where Svanemerket was statistically significant, the effect is fairly stable. Guest are expected to pay between 161kr-81kr more for a hotel with the Miljøfyrtårn certificate, while paying between 104kr-110kr less for a hotel with the Svanemerket certificate.

Table 5 also accounted for the models R-squared (R^2) which can be defined as the percentage of variance explained and measures the overall fit of the model. In the first column the R-squared equals .0489 while increasing to .4820 when adding all the variables to the model. This means that when adding all variables, they explain 48.20% of the variation in room rates. Even though this is a fairly high explanation there is still some factors not accounted for in the model that effects the variation in room rates.

Table 5, Regression model.

Variable	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Miljøfyrtårn	161.120*** (51.644)	121.436*** (45.672)	113.033** (48.990)	96.579** (47.640)	101.599** (47.451)	80.987* (47.595)
Svanemerket	-65.176 (66.940)	-104.093* (61.182)	-100.505 (62.808)	-109.774* (61.939)	-108.797* (61.698)	-104.633* (61.328)
GreenLeader		-35.770 (77.846)	-10.892 (77.996)	-6.730 (76.299)	-6.055 (76.002)	-7.141 (75.476)
Three-star		211.780 (186.431)	225.312 (186.436)	223.745 (181.104)	238.650 (180.580)	219.595 (182.468)
Four-star		333.325* (185.214)	342.564* (190.922)	343.733* (184.691)	383.622** (187.332)	335.621* (185.163)
Five-star		1794.463*** (255.790)	1853.781*** (271.271)	1937.388*** (262.868)	1965.150*** (263.178)	1904.931*** (263.088)
Travel rating Three		67.505 (223.577)	72.469 (230.785)	105.506 (257.688)	108.608 (261.038)	108.338 (260.413)
Travel rating Four		163.015 (221.651)	175.901 (229.232)	168.898 (255643)	179.588 (258.247)	182.306 (256.982)
Travel rating Five		352.530* (233.135)	349.438* (241.301)	302.668 (265.292)	324.519 (269.105)	350.372 (268.427)
Rooms		.0058 (.192)	.2189 (.214)	.2677 (.231)	.3170 (.236)	.2451 (.241)
Suite			52.546* (43.901)	51.791 (42.868)	53.492* (42.826)	41.033 (43.673)
Kitchenette			-180.461 (118.526)	-183.432 (120.081)	-182.895 (119.500)	-139.097 (120.370)
Pets allowed			23.217 (48.662)	-2.966 (47.938)	-1.684 (48.253)	-.5818 (48.519)
Concierge			59.986 (46.555)	80.336* (45.098)	91.006* (45.192)	75.950* (45.401)
Room-service			-12.483 (45.230)	-2.764 (44.528)	-.4930 (45.067)	9.402 (45.447)
Reduced mobility			-10.190 (51.181)	.0757 (50.826)	-9.386 (50.853)	8.326 (51.202)
Air-condition			-113.276* (58.152)	-100.544* (56.380)	-108.433* (56.492)	-97.447* (56.051)
Bar			-15.684 (62.761)	-42.485 (64.021)	-51.163 (63.858)	-62.319 (63.370)
Laundry service			-41.641 (45.862)	-44.662 (44.452)	-43.230 (45.234)	-35.744 (45.133)
Airport transportation			-20.197 (58.649)	-38.955 (56.830)	-35.547 (57.985)	-57.876 (59.094)
Free parking			111.696** (46.236)	98.083** (46.911)	91.258* (48.473)	81.221* (48.360)
Free breakfast				110.789** (52.612)	110.797** (52.750)	99.789* (52.677)
Restaurant				118.881* (62.562)	110.796* (63.250)	92.192 (62.971)

Internet (Room)				246.141 (313.646)	257.254 (311.914)	249.169 (308.937)
Business center				-182.846*** (48.938)	-174.642*** (49.091)	-167.064*** (49.300)
Meeting room				109.448** (54.566)	98.438* (55.033)	94.897* (54.635)
Internet (Lobby)				-129.633 (251.330)	-120.346 (250.281)	-155.633 (248.159)
Pool				82.562 (68.491)	77.788 (68.159)	68.879 (67.551)
Fitness center				48.776 (45.200)	48.494 (45.005)	55.385 (44.856)
Spa				-133.617 (98.395)	-135.062 (97.976)	-116.227 (97.386)
City center					94.065* (54.401)	30.490 (62.988)
Public beach					--46.598 (49.915)	-91.744 (59.051)
Nature attractions					-105.089* (55.853)	-84.535 (57.541)
Nord Norge						-166.832** (67.377)
Vestlandet						-36.523 (57.541)
Sørlandet						-151.053* (77.480)
Trøndelag						-131.795* (74.428)
Constant	1333.04*** (30.017)	916.137*** (284.276)	850.166*** (294.775)	583.149 (449.821)	596.671 (456.093)	759.742* (459.785)
R^2	.0489	.3362	.3783	.4479	.4614	.4820
Observations	259	259	259	259	259	259

*Significant at 10%, ** Significant at 5%, *** Significant at 1%

Comparing green to non-green hotels

In this thesis the hotels have been placed into three different groups. The first group is hotels that have obtained the Svanemerket certificate, the second group is hotels that have obtained the Miljøfyrtårn certificate and the last group is hotels without any of these ecofriendly certificates also referred to as non-green hotels in this thesis. This leaves hotels that have obtained the Green Leader certificate from TripAdvisor but none of the two certificates (Svanemerket, Miljøfyrtårn) are considered as non-green hotels. To test if there is a significant difference between the two eco-friendly certificates and a difference between the specific certificate and non-green hotels a t-test is used to be able to analyze each variable against each other. Each variable is tested to determine whether the mean from the two groups tested is significantly different from each other. Table 6 show the variable mean of the different groups as well as the standard deviation. The variable will be given the superscript "a" if the variable is significantly different between the Miljøfyrtårn certificated and the Svanemerket certificated hotels. Superscript "b" will be given if the variable is statistically different between Svanemerket hotels and non-green hotels. Lastly superscript "c" will be given to the variables who are significantly different between Miljøfyrtårn hotels and non-green hotels. The acceptable level of significance is 10%.

The following hypothesis will be tested for each variable:

$$H_0: \beta_{Svanemerket} = \beta_{Miljøfyrtårn}$$

$$H_0: \beta_{Miljøfyrtårn} = \beta_{Non-green}$$

$$H_0: \beta_{Svanemerket} = \beta_{Non-green}$$

$$H_1: \beta_{Svanemerket} \neq \beta_{Miljøfyrtårn}$$

$$H_1: \beta_{Miljøfyrtårn} \neq \beta_{Non-green}$$

$$H_1: \beta_{Svanemerket} \neq \beta_{Non-green}$$

The null-hypothesis states that there is no significant difference in the variable means of the three groups. If rejected, it indicates a significant difference between the two groups. Following formula is used to calculate the t-statistics:

Equation 7:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_1^2}{n_1}}}$$

$\overline{x}_1 = Mean\ for\ group\ 1\ (Svanemerket, Miljøfyrtårn)$

$\overline{x}_2 = Mean\ for\ group\ 2\ (Svanemerket, Miljøfyrtårn, Non - green)$

$s_1^2 = Squared\ standard\ error\ for\ group\ 1$

$s_2^2 = Squared\ standard\ error\ for\ group\ 2$

$n_1 = Number\ of\ observations\ in\ group\ 1$

$n_2 = Number\ of\ observations\ in\ group\ 2$

A two-tailed t-test is used. The group with the lowest amount of observations is chosen to decide the degrees of freedom. This is because all the groups have different amounts of observations. If the total value of the t-value is larger than the critical value, we reject the null-hypothesis.

Comparing Svanemerket and Miljøfyrtårn

$$H_0: \beta_{Miljøfyrtån} = \beta_{Svanemerket}$$

$$H_1: \beta_{Miljøfyrtån} \neq \beta_{Svanemerket}$$

When comparing hotels with the Svanemerket certificate against hotels with the Miljøfyrtårn certificate 36 degrees of freedom was used, this is as the group of Svanemerket hotels were the smallest group. The statistics from the comparison can be seen in in Table 6.

The first thing to notice is the difference in price. The difference in price is significantly different at a 1% level of significance and shows that the price for a hotel with the Svanemerket certificates averages a price 226kr lower than hotels with a Miljøfyrtårn certificate. The variable for Green Leader is significantly different at 5% level of significance. It shows that 21.6% of the Svanemerket hotels also have obtained the Green Leader certificate from TripAdvisor while only 4% of the Miljøfyrtårn hotels have it. When it comes to the ratings three-star and four-star between the two groups the difference is significantly different at a 1% level of significance. The majority of hotels with Svanemerket has a four-star rating (67.6%), the rest of the hotels has a three-star rating (32.4%). The Miljøfyrtårn hotels are mostly three-star rated (64%) and four-star rated (34.7%). The rest is five-star rated but the variable is not significantly different at an acceptable level of significance. The rating given by previous guest are also different between the two groups. While majority of hotels both with the Svanemerket (97.3%) and Miljøfyrtårn (76%) has a four-star travel rating, the variable is significantly different at a 1% level of significance. None of the hotels with the Svanemerket has lower than four-star travel rating, while 9.3 percent of the Miljøfyrtårn hotels have received a three-star rating from previous guest. The variable for three-star travel rating is also significantly different at a 1% level of significance. The difference in a five-star travel rating is significantly different a 5% level of significance. Hotels with the Miljøfyrtårn (14.7%) have more hotels with a five-star rating than the hotels with Svanemerket certificate (2.7%). Hotels with the Svanemerket certificate averages a total of 71 rooms more per hotel then those with a Miljøfyrtårn certificate the difference is significantly different at a 5% level of significance.

When comparing the variables in the category for facilities we see that an average of 44% percent of hotels with the Miljøfyrtårn certificate offers their guest the possibility to stay at a suit at their hotels as appose to 21.6% of the Svanemerket certificated hotels offers the same. The difference is significantly different at a 5% level of significance. The Svanemerket have a remarkably high percentage of hotels being pet friendly (92%), while just under half of the Miljøfyrtårn certificated hotels (48%) offer their guests the same possibility. Out of the 259 hotels that were used to collect data for this thesis 24% of the hotels offeres concierge services to their guests. Isolating hotels with the Svanemerket certificate 38% of their hotels offers concierge services while 21% of Miljøfyrtårn hotels offer the same. The variable is significantly different at a 10% level of significance. The Svanemerket hotels also has a higher average of their hotels having a bar at the hotel, as much as 97% of their hotels have bars on their premises. Hotels with the Miljøfyrtårn certificate also have fairly high percentage of bars in their premises with 80%. The difference in this variable is significantly different at a 1% level of significance. The variable for laundry services is also significantly different at a 1% level of significance. 92% of the Svanemerket certificated hotels offer laundry services which is over the total average of all hotels in this thesis (69%). Miljøfyrtårn hotels is under the average of the total hotels at 60%. While 19% of the hotels with the Svanemerket certificate offers some sort of airport transportation to and from their premises, only 0.6% the hotels with the Miljøfyrtårn certificate offers the same. Hotels with the Miljøfyrtårn (39%) does offer more free parking on their premises than the hotels with the Svanemerket (22%) certificate. Both of these variables are significantly different at a 10% level of significance. When it comes to the category of dining variables 95% of Svanemerket hotels have restaurants at their premises and 80% of the Miljøfyrtårn hotels do the same. The variable is significantly different at a 5% level of significance. Svanemerket hotels also offers more business (86% vs 61%) and fitness (86% vs 51%) centers than Miljøfyrtårn hotels, both these variables are significantly different at a 1% level of significance.

In the variable category attractions and regions none of the variables were significantly different at an acceptable level of significance. This indicates that there is no difference is the regional spread of hotels between the two groups.

Comparing Svanemerket to Non-green hotels

$$H_0\colon \beta_{Svanemerket} = \beta_{Non-green}$$

$$H_1\colon \beta_{Svanemerket} \neq \beta_{Non-green}$$

When comparing hotels with the Svanemerket certificate against non-green hotels with 36 degrees of freedom was used, this is as the group of Svanemerket hotels were the smallest group. The statistics from the comparison can be seen in Table 6.

The first thing to notice when comparing these two groups is that the variable for price is not significantly different at an acceptable level of significance indicating that there is no difference in price between the two groups. One surprising finding is that that there is a significantly difference between the two groups for the variable Green Leader. Approximately

27% of the hotels that have obtained the Svanemerket certificate is also a Green Leader on TripAdvisor, the surprising part is that approximately 9% of the non-green hotels are as well. These are hotels that have not obtained one the two eco-friendly certificates but are still considered a green hotel as of TripAdvisor`s standards. While none of the Svanemerket hotels in this thesis have a rating lower than three-stars, approximately 1,6% of the non-green hotels have a two-star rating from TripAdvisor. The difference is significantly different at a 10% level of significance. There is also a significantly difference at a 1% level of significance for the variables three-star and four-star ratings. While the Svanemerket hotels (67,5%) have the majority of their hotels rated with four-stars, non-green hotels most common rating is three-stars. Travel ratings three and four are also statisticallty different at a 1% level of significance. Both groups have the majority of their travel ratings being four-stars, 97% for the Svanemerket hotels, and 73% for the non-green hotels. The Svanemerket hotels does not have a travel rating lower than four, while 21% of the non-green hotels have received a three-star rating from previous guests. Hotels with the Svanemerket certificate does also have average a higher number of rooms at their hotels than the non-green hotels. The average Svanemerket hotel has an average of 203 rooms while the non-green hotels have an average of 144 rooms. The difference is statistically significant at a 1% level of significance. None of the hotels with the Svanemerket certificate have kitchenette in their rooms, when it comes to the non-green hotels 3,8% of them have kitchenette in their rooms. The variable is significantly different at

a 5% level of significance. The variable for allowing guests to bring pets when staying at hotels is significantly different at a 1% level of significance. 48% of the non-green hotels allow pets, while 92% of the Svanemerket hotels offer this. Concierge services is significantly different at a 10% level of significance. The average among Svanemerket hotels is higher than the non-green hotels group, 38% vs 21%. The variables for reduced mobility, bars, laundry services, free parking and free breakfast are all significantly different from zero at a 1% level of significance. The hotels with the Svanemerket certificate (89%) offer a higher percentage rooms capable of welcoming guest with reduced mobility than the non-green hotels (71%). There are also more bars at Svanemerket hotels, the non-green hotels offer bars at 87% of their hotels while Svanemerket hotels have bars at 97% of their hotels. They do also more often offer laundry services at their hotels. Approximately 92% of the hotels with the certificate from Svanemerket offer a kind of laundry service as appose to 73% among the non-green hotels. Free breakfast is more commonly served at Svanemerket hotels (92%) then at non-green hotels (77%). Free parking is more frequently offered at non-green hotels (39% vs 22%). Both groups average a fairly high percentage of restaurants at their hotels, but Svanemerket hotels (94.5%) has a higher percentage than non-green hotels (80%). The variable is significantly different at a 5% level of significance. Both business (86% vs 67%) and fitness (86% vs 53%) centers are significantly different at a 1% level of significance, both of these attributes are more frequently offered at hotels with the Svanemerket certificate. 51% of the hotels with Svanemerket are located within a radius of 25km to one of the 10 best rated public beaches in Norway as appose to 39% among the non-green hotels. The variable is significantly different at a 10% level of significance. The variable for Sørlandet is also significantly different from zero at a 5% level of significance indicating that there is less Svanemerket hotels (5%) in Sørlandet then non-green hotels (16%).

Comparing Miljøfyrtårn and Non-green hotels.

$$H_0\colon\ \beta_{Miljøfyrtårn} = \beta_{Non-green}$$

$$H_1\colon \beta_{Miljøfyrtårn} \neq\ \beta_{Non-green}$$

When comparing hotels with the Miljøfyrtårn certificate against non-green hotels 74 degrees of freedom was used, this is as the group of hotels with Miljøfyrtårn were the smallest group. The statistics from the comparison can be seen in Table 6.

Comparing these two groups there is not that many of the variables that are statistically different from zero at an acceptable level of significance compared to the other comparisons. The price for a room is statistically different between the two groups of hotels. Hotels with the Miljøfyrtårn certificates have an average room rate approximately 174kr higher than the non-green hotels. The variable is statistically different at a 1% level of significance. The variable two-star rating is significantly different at a 10% level of significance is this comparison as well. The only variable among the travel ratings that is significantly different from zero is the variable for travel rating three at a 1% level of significance, and travel rating five at a 5% level of significance. 9% of the hotels with the Miljøfyrtårn certificate have received a three-star rating by pervious guest while 21% of the non-green hotels have the same score. Nearly 15% of the hotels with the Miljøfyrtårn certificate have received a five-star rating by previous guests, while just 5% of the non-green hotels have received the same score. Miljøfyrtårn also offers guests the possibility to stay at in a suit at more of their hotels with 44% of the hotels with the Miljøfyrtårn certificate offers suits at their hotels as appose to 29% of the non-green hotels. The variable is statistically different at a 10% level of significance. Both the variables for allowing pets at their hotels and room prepared for guests with reduced mobility are significantly different a 1% level of significance. Allowing guests to bring guest in their hotels is more frequently offered by the non-green hotels (78% vs 48%), while Miljøfyrtårn hotels more frequently offer rooms constructed for guests with reduced mobility (86% vs 71%). Transportation to and from the airport is more commonly offered by non-green hotels. Even though none of the groups have a high percentage of hotels offering this service the non-green hotels offer airport transportation at 17% of their hotels while 6% of the

Miljøfyrtårn certificated hotels offer the same service. The variable is significantly different at a 5% level of significance. Free breakfast when staying at the hotel is fairly common among both groups, the variable is significantly different at a 1% level of significance and Miljøfyrtårn hotels offers free breakfast at 88% of their hotels, while non-green hotels offer the same service at 78% of their hotels. The last variable that is significantly different from zero when comparing these two groups is the variable for Sørlandet. The variable is significantly different at a 10% level of significant and indicates that there is a higher average of non-green hotels (16%) then Miljøfyrtårn hotels (8%) in Sørlandet.

Table 6: comparison of green and non-green hotels

Category	Variables	Svanemerket hotels (37 Obs)	Miljøfyrtårn hotels (75 Obs)	Non-green hotels (184 Obs)
Basic	Price (NOK)	1267.865[a] (214.861)	1494.160[a,c] (382.898)	1319.935[c] (355.937)
	Green Leader	.2162[a,b] (.4173)	.04[a] (.1972)	.0870[b] (.2825)
	One-star	0	0	0
	Two-star	0[b]	0[c]	.0163[b,c] (.1270)
	Three-star	.3243[a,b] (.4745)	.64[a] (.4832)	.5543[b] (.4984)
	Four-star	.6756[a,b] (.4745)	.3466[a] (.4791)	.4185[b] (.4946)
	Five-star	0	.0133 (.0115)	.0489 (.1039)
	Travel rating One	0	0	0
	Travel rating Two	0	0	.0108 (.1040)
	Travel rating Three	0[a,b]	.0933[a,c] (.2928)	.2120[b,c] (.4098)
	Travel rating Four	.9729[a,b] (.1644)	.76[a] (.4299)	.7282[b] (.4461)
	Travel rating Five	.0270[a] (.1644)	.1466[a,c] (.3561)	.0489[c] (.2163)
	Rooms	202.757[a,b] (79.019)	131.560[a] (87.703)	144.462[b] (119.169)
Facilities	Non-smoking	1	1	1
	Suite	.2162[a] (.4173)	.44[a,c] (.4997)	.2935[c] (.4566)
	Kitchenette	0[b]	.0133 (.1155)	.0380[b] (.1918)
	Pets allowed	.9189[a,b] (.2767)	.48[a,c] (.5030)	.7771[b,c] (.4172)
	Concierge	.3783[a,b] (.4916)	.2133[a] (.4124)	.2254[b] (.4373)
	Room-service	.2973 (.4633)	.2666 (.4452)	.3206 (.4680)
	Reduced mobility	.8919[b] (.3148)	.8666[c] (.3422)	.7065[b,c] (.4566)
	Air-condition	.1621 (.3737)	.12 (.3271)	.1467 (.3548)
	Bar	.9729[a,b]	.80[a]	.8695[b]

		(.1644)	(.4027)	(.3377)
	Laundry service	.9189[a,b]	.60[a]	.7282[b]
		(.2767)	(.4932)	(.4461)
	Airport transportation	.1892[a]	.06666[a,c]	.1701[c]
		(.3970)	(.2511)	(.3801)
	Free parking	.2162[a,b]	.3866[a]	.3913
		(.4173)	(.4902)	(.4894)
Dinning	Free breakfast	.9189[b]	.88[c]	.7771[c]
		(.2767)	(.3271)	(.4173)
	Restaurant	.9459[a,b]	.80[a]	.8532
		(.2292)	(.4027)	(.3548)
Business	Internet (Room)	1	1	.9945
				(.0737)
	Business center	.8648[a,b]	.6133[a]	.6685[b]
		(.3465)	(.4902)	(.4720)
	Meeting room	.8378	.80	.7989
		(.3737)	(.4027)	(.4019)
	Internet (Lobby)	1	1	.9891
				(.1040)
Leisure	Pool	.1351	.12	.1141
		(.3466)	(.3271)	(.3188)
	Fitness center	.8648[a,b]	.5066[a]	.5326[b]
		(.3465)	(.5033)	(.5003)
	Spa	.0540	.0666	.0489
		(.2292)	(.2511)	(.2163)
Attractions within a radius of 25 km	City center	.5946	.52	.4837
		(.4977)	(.5030)	(.5011)
	Public beach	.5135[b]	.40	.3858[b]
		(.6067)	(.4932)	(.4881)
	Nature attractions	.7837	.7466	.6793
		(.4173)	(.4378)	(.4680)
Regions	Østlandet	.4054	.4	.3206
		(.4977)	(.4932)	(.4680)
	Nord-Norge	.1892	.1467	.2011
		(.3971)	(.3562)	(.4019)
	Vestlandet	.1892	.2667	.2174
		(.3971)	(.4452)	(.4135)
	Sørlandet	.0541[b]	.08[c]	.1587[b,c]
		(.2292)	(.2731)	(.3436)
	Trøndelag	.1622	.1067	.125
		(.3737)	(.311)	(.3316)

Discussion

The aim of this thesis is to estimate if consumers are willing to pay a premium to stay at a green hotel in Norway, and if so, are there differences between the available certifications. As the results show, the consumers' willingness to pay varies for different types of environmental certifications. For hotels certified under Svanemerket, our results are comparable to the results Olsen (2018) found in his thesis. However, the conclusion drawn by Olsen is that the negative willingness to pay is between 157kr – 193kr, while our results show a negative willingness to pay at about 104kr – 109kr. Although we do not know for sure, there might be several reasons for this "increase" in the willingness to pay for green certified hotels over the last two years. One factor might be that in Olsen's analysis, only hotels with the Svanemerket ecolabel is considered a green hotel. The analysis done in this thesis is on the same hotels, but also including Miljøfyrtårn as a green certification, effectively removing 75 hotels from the control group of Olsen's analysis. Combining this with the results of a positive willingness to pay between 80kr-161kr for hotels certified with Miljøfyrtårn, the inclusion of Miljøfyrtårn is a possible conclusion to the differences in results.

Another reason might be that that tourists in Norway have become more environmentally conscious. Kronthal-Sacco & Whelan (2019) analyzed the US market and found that green products have increased their market share in the period 2013-2018, as well as having significantly faster growth than non-green products. As for the lodging industry, (Green Lodging News and Greenview, 2017) finds that consumers are more interested in their ability to make an impact with their stay at a specific hotel. This implies an increase in the consumers preferences for sustainable products. As for example Kang et al. (2012), Borisenko (2018) and Fuentes-Moraleda et al. (2019) conclude, the level of the consumers environmental commitment impacts the willingness to pay for green attributes when choosing a hotel for their vacation or business travel, making this another possible reason for the difference in results.

From the comparison of the three groups of hotels in Table 6, we see that hotels labeled with Svanemerket is cheaper than Miljøfyrtårn hotels in this sample. The same table also shows that Svanemerket hotels offer premium services like concierge-services, laundry service, business- and fitness -center to a bigger degree than Miljøfyrtårn hotels. Although not statistically significant at an acceptable level, Svanemerket hotels also have room-service, air-condition and free breakfast on a bigger share of their hotels. Being that the hotels are cheaper but offer a larger amount of premium services could imply that the services are of lower quality due to the environmental certification.

This thesis' results for the environmental certification Miljøfyrtårn is in line with previous research from for example Kuminoff et al. (2010), Sánchez-Ollero et al. (2014) and Kang et al. (2012) which all found that the consumer had to pay a premium to stay at an environmentally responsible hotel. Our results conclude that guests have a willingness to pay between 80kr-161kr for the hotel having a Miljøfyrtårn certification. To try to explain the gap between Svanemerket and Miljøfyrtårn, we might look at research by for example Thøgersen (2000) or Hansen & Kull (1994). They both describe that for an environmental certification to be effective, the consumer needs to notice the certification and take it into consideration when deciding what hotel to stay at. Miljøfyrtårn is the most used ecolabel in Norway (Stiftelsen Miljømerking et al., 2017), and therefore might be the most recognizable and trusted certification. Hotels that are certified under Miljøfyrtårn also seem to advertise it more on their own webpage. While online travel agencies like hotels.com and booking.com do not provide information about hotels environmental engagements, customers are able to book their stay directly at the hotel's own web page. As an example, Thon Hotels, a Norwegian hotel chain, advertise that they certify all their own hotels as Miljøfyrtårn (Thon Hotels, n.d.) both in general, and in the listed information about each specific hotel. In comparison, Scandic Hotels, a Swedish chain operating mainly in the Nordic countries, only advertise their certified hotels by adding the Svanemerket logo to the bottom of a certified hotels sub-page.

Another possible way to describe the consumers' increased willingness to pay for Svanemerket, and the positive premium for Miljøfyrtårn, is described in Berg (2020) report on *"The Consumer Conditions Scoreboard. Consumers at home in the Single Market"* (European Commission, 2019). The scoreboard is published every second year, with information gathered from surveys of a representative number of customers and retailers. Some of the

key findings of the last report is that consumers in Norway and other EU countries are increasingly purchasing goods that have environmental certifications. In 2018, they estimate that 63% of consumers buy products that are certified green in Norway (57% EU average), which is a significant increase from 24% in 2011 (29% EU). Following this trend, one could expect another 10% increase during the last two years, further improving the consumers' willingness to pay for green attributes when booking a hotel.

Limitations and further research

As with most research papers, there are limitations to the research conducted within this thesis. Firstly, we need to address the global outbreak of the Covid-19 virus (World Health Organization, 2020). The collection of data was completed on the same day as the Norwegian government implemented strict regulations as to who were allowed to travel in and out of Norway. Most other countries in Europe had the same regulations, effectively stopping international tourism for the duration of the outbreak. The results presented in this thesis might therefore be affected if the sudden reduction in demand for hotel rooms had already been reflected in the price of available rooms.

Another limitation to the data collection process is that the price of a hotel room will vary throughout the year. (Trivago, n.d.) People tend to book hotels near the beach in the summer, and at ski resorts in the winter. Increasing the demand for such hotels in short periods increases the price and might also affect the consumers' willingness to pay for green attributes. Without controlling for this effect by looking at time series data, the results from this study is only applicable to the period that the prices are collected from, or other periods where the demand for hotels are similar to the demand in April.

Out of the hotels selected for this study, hotels certified as Miljøfyrtårn are more expensive that both the non-green, and Svanemerket hotels. Without performing interviews, surveys or looking at the books of those hotels, we cannot say for sure what the main reason for the difference in price is. The selection of variables to include in this study is based on the selection in Olsen (2018) and Kuminoff et al. (2010), who both report issues when selecting what variables to include in the final model. Omitting variables that the consumers care about may

bias the estimations if they are in any way correlated to the dependent variable, or any other independent variable in the model. On the opposite side, including variables that do not affect the final price of a hotel room will have undesirable influence on the variance of the estimated coefficients. These issues make it difficult to choose the right variables for the model and is something that is important to keep in mind when doing the estimations.

While the limitations mentioned above where problematic for us, they open opportunities for further research. As the results from this thesis is only useable for some parts of the year, it would be interesting to see a time series analysis with a closely related research question to see if there really are differences throughout the year. One could also focus on the different chains of hotels operating in Norway to estimate if some chains have attributes differentiating them from other chains.

Seeing as this thesis was limited by the availability of data on the internet, future research should include questionnaires, surveys, and interviews with both the consumers and the producers. On the consumer side, performing interviews might reveal why there are such differences in the willingness to pay for different environmental certifications. Interviewing hotel owners gives insight as to why a specific hotel might have chosen one ecolabel over another. Getting access to the hotels books shows what the short-term and long-term costs are associated with being certified. The researchers could then combine the data from the interviews with the real numbers on sales and find more precise estimations to the consumers true willingness to pay. This would allow for easier decisions for hotel owners when deciding how to be more sustainable and what actions to take.

Conclusion

The motivation behind this thesis was to prove whether a willingness to pay a premium for a hotel with an ecofriendly certificate among guests in the Norwegian hotel market existed or not. A hedonic price function was used to control for both internal and external attributes that weigh in on the price of a hotel room. The focus of attention was to estimate the effects the ecofriendly certificates has on room rates when controlling for the most common attributes most hotels offer as well as external factors like location.

The results themselves were surprising as the hedonic price model showed two completely different effects for the two ecofriendly certificates. While the Miljøfyrtårn certificate shows a positive effect, indicating that there exists a willingness to pay a premium for ecofriendly hotels, the certificate for Svanemerket has a negative effect, therefore indicating a willingness to pay a premium to avoid staying at ecofriendly hotels in the Norwegian market. The estimated numbers show that guest staying at a hotel in Norway are willing to pay a premium between 81kr and 161kr if the hotel has the Miljøfyrtårn certificate. On the other side the price model shows that a hotel with the Svanemerket certificate have to price their rooms between 104kr to 110kr less than hotels without any of the ecofriendly certificates to be attractive for their guests.

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