Wageningen University & Research – Social Sciences

MSc Thesis Agricultural Economics and Rural Policy

The effect of country of origin labelling on cheese in the Netherlands

A producer and consumer perspective

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Preface

This thesis was written as part of the MSc program International Development Studies at Wageningen University and Research and was written within the Agricultural Economics and Rural Policy group in collaboration with Wageningen Economic Research.

Conducting my own research and collecting data has been a great experience, in which I learned a lot. I hope this thesis will support Wageningen Economic Research with future research on the effect of county of origin labelling.

My warmest gratitude for my supervisors Dr. ir. Roel Jongeneel and Dr. Marie-Luise Rau for their endless support and for providing feedback and helpful suggestions throughout the process. Starting with the very inception phases until today.

Sincere thanks for my respondents. The insides the survey has provides have been extremely valuable in determining the results in this research.

Furthermore, I want to thank Wageningen Economic Research for providing me with a workspace and other tools which helped me to successfully finish my thesis.

Last I would like to thank my family for pre-reading my thesis and providing me with feedback and for supporting me.

Vivian Stevenaar
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Summary

In 2014, a working group, commissioned by the European Commission, looked into mandatory country of origin labelling (COOL) for, among others, dairy products (EC, 2014). For diary, they recommended not to introduce mandatory COOL. Due to the cost of these labels and the lack of willingness to pay (WTP) of consumers. There are adequate private standards in place to fulfil the market's needs. Despite this recommendation, the European Commission decided to do an experiment with COOL. This master thesis looks into the effect of COOL on the Dutch cheese market from both the consumer and producer perspective.

The objective of this thesis is find and analyse the motives of Dutch consumers to have a demand for COOL, their willingness to pay for COOL and the effects of mandatory COOL on cheese producers in the Dutch market. The effects on the market are determined for Dutch consumers and producers.

To measure the effect of COOL on the Dutch market, both the consumer's- as well as the producer's side was analysed. To analyse the consumer behaviour a microeconomic willingness to pay approach was used, using data gathered through an online survey. The overall price increase for cheese is calculated using the equilibrium displacement modelling (EDM) technique.

On average, participants are willing to pay 3% more for products with COOL. A big difference is seen between barely and highly concerned consumers, with an average increase of willingness to pay of 1.2% and 3.6%. An analysis of previous data on producers cost led to an estimated cost increase, due to COOL of 3.2%. The introduction of COOL on the Dutch market would lead to a price increase which is related to the cost and the Dutch consumers' WTP. With a 3% WTP increase, the Dutch consumers' demand would stay almost stable. With a price increase the foreign demand decreases and the overall demand will always decrease, assuming there is no increasing WTP for foreign consumers.

In conclusion, this thesis has shown that there are multiple motives for consumers to demand country of origin labelling. Most of these motives are based on the feeling consumers have toward certain products. On average, the participants are willing to pay 3% extra for COOL for cheese. It is shown there is a substantial difference between consumers with a high concern about the origin of a product and consumers with a low concern for the origin of a product. The producers costs increase by 3.2%. Therefore, this WTP is almost enough to cover the cost and the demand from Dutch consumers stays largely the same.

Most previous studies have focussed on either the producer costs (EC, 2014; Terluin et al., 2012) or on the consumer utility and WTP (Van Tongeren, Beghin, & Marette, 2009; Van Tongeren, Disdier, Ilicic-Komorowska, Marette, & von Lompe, 2010). For this thesis, data on both were gathered and this was used as input for the EDM. New motives for consumers to demand products with COOL have been provided, which can be used as an explanation for the use and additional value of voluntary COOL. The limitations of this thesis mainly arise due to the lack of access to previous producers' costs data. Furthermore, the disadvantages of using an online survey and the direct WTP questions might have led to limitations in the results.

Recommendations for future research are an analysis of the monitoring cost associated with COOL, an analysis of the market for products which would have a negative differentiation value and how COOL affects these products and to update the producers cost.

Furthermore, based on the data gathered, a recommendation is made against the introduction of mandatory national COOL in the Netherlands. Even though, based on the EDM results, the Dutch demand mainly stays the same, the foreign demand decreases if the price goes up, which will always lead to a net loss of total demand.

1 Introduction

Since the introduction of the General Agreement on Tariffs and Trade (GATT) and even more with the foundation of the World Trade Organisation (WTO), international trade has grown and trade barriers, especially tariffs, have been lowered. Before, countries used different tariffs for trade with different countries, but within the WTO countries have to apply the most favored nation principle (MFN). According to this principle, they have to apply the same tariff to all countries that are part of the WTO, with the exception of bilateral trade agreements (Trebilcock, 2015). In order to be able to protect their consumers, governments introduce non-tariff measures (NTMs). The Multi Agency Support Team (MAST) defines NTMs as *policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both*. (MAST, 2008).

A bilateral trade agreement creates integration between the involved states. One of the biggest and most important integration factors is the creation of the European Union (EU). The EU, at this point, is a collaboration between 28 countries. It is a single market, with free movement of products, capital, services, and labour and common regulations (Baldwin, Wyplosz, & Wyplosz, 2006). These regulations are laws which have to be enforced in all EU member states and override national laws on the subject and therefore harmonise the laws between the member states.

The food and agriculture sector is one of the major fields of regulations within the EU. Van Tongeren et al. (2009) discuss that regulations introduced to address the social interest of consumers and producers and mainly focus on human health, animal welfare, and the environment. If the market is not able to cope with these issues, the government will. Regulations are mainly enforced by a national government, and are used to safeguard domestic concerns. In the case of the EU, if there are concerns all over the EU it is possible for the European Commission to enforce EU regulation in this sector.

Regulation (EU) No 1169/2011 concerns the regulation on food information to consumers (FIC) and is one of the EU regulations regarding the food and agriculture sector (EC, 2014). This regulation indicates what information should be on the label of foodstuff produced within the EU. Regulation (EU) No 1169/2011 has been applied since 13 December 2014. This regulation establishes the requirements and responsibilities for labelling of foodstuff to guarantee consumers adequate information on products. This way, consumers are able to make informed decisions, and the EU is able to ensure the free movement of products within the EU will provide healthy and safe food to all consumers.

Information which is mandatory is food's name, ingredients, quality, use by date, using instruction (if necessary), nutrition declaration and operator's name and address. In some cases, the country of origin should also be indicated on the label. This is the case for honey, olive oil, vegetables and fruit, beef and beef products, pork and meat of sheep, goats and poultry and fish. The Commission is considering expanding this labelling to milk and products containing milk ingredients, meats other than beef, pork, sheep, and goat and meat ingredients, unprocessed foodstuff, ingredients that represent more than 50% of a food and single ingredient products.

In 2013 the European Commission commissioned a research into mandatory Country of Origin Labelling (COOL) for dairy and dairy products. This study was finished in September 2014 (EC, 2014) and looked into 9 different countries (Czech Republic, France, Germany, Italy, Netherlands, Poland, Romania, Spain and the United Kingdom), which together account for 78% of the cow milk production in the EU.

The study concluded that voluntary origin labelling is more suitable since it already satisfies the consumer's preferences and does not introduce unnecessary cost for producers. The cost-benefit analysis concluded that the cost of labelling might not be outweighed by the benefits. It was shown that especially producers located near the border of member states and multinational companies will bear the bigger cost if mandatory COOL will be introduced. The cheese sector was examined in all scenarios involving mandatory COOL. It is the sector with the highest cost increase, since the ingredients of processed cheese are sourced worldwide.

Even so, the European parliament decided to commission an extra study, involving an experiment, for the mandatory COOL of milk products in the EU. This research will look into the financial and social costs and benefits of the regulation for both the consumers and producers.

1.1 Problem definition and research objective

In 2014, a working group, commissioned by the European Commission, looked into mandatory COOL for milk, types of meat other than beef, poultry, pig, and sheep and goat meat, milk used as an ingredient in dairy products, unprocessed foods, single ingredient products and ingredients that represent more than 50% of a food (EC, 2014). For milk and milk products, they recommended not to make COOL mandatory. The use of these labels can be very expensive for the producers and there are adequate private standards in place to fulfil the market's needs. Despite this recommendation, the European Commission decided to do an experiment with COOL. If the EU introduces mandatory COOL, this will have an effect on the companies that are already labelling their products as well as the other producers. Furthermore, previous research showed that consumers have a low willingness to pay (WTP) for the labelling. Despite this low WTP, some producers are still labelling their products. This could mean there are other reasons than just the price for producers to put country of origin labels (COOLs) on their products. This master thesis looks into the effect of COOL on the Dutch market from both the consumer and producer perspective.

This thesis focuses on the Dutch market. The objective of this thesis is to find and analyse the motives of Dutch consumers to have a demand for COOLs, their willingness to pay for COOLs and the effects of mandatory COOL on cheese products in the Dutch market. The effects on the market are determined for Dutch consumers and producers. To analyse these effects for producers, producer cost data are used. To determine the effect on the consumer side, data on their preferences and consumption of cheese products are used.

Main research questions

What is the effect of COOL for cheese on the Dutch market considering consumer and producer perspectives?

Sub-questions

1) What does mandatory COOL for cheese entail?
2) What is the reason for consumers to buy a product with an origin label?
3) What is the consumers' willingness to pay for origin labelled European cheese products?
4) What are the effects of implementing COOL on the European cheese producers?

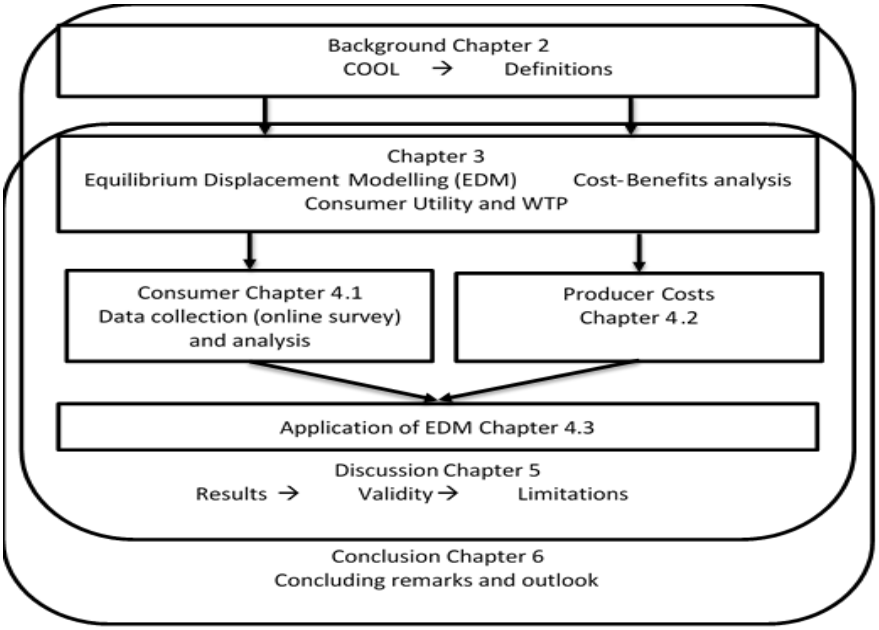

Figure 1.1 - Thesis structure

1.2 Structure

Figure 1.1 shows the structure of this thesis. Based on the background and research questions discussed in chapter 2, different frameworks are selected to answer the research questions. The theory of these frameworks will be discussed in chapter 3. Using these theories and frameworks, the consumer WTP and motivations to buy product with a country of origin label, and producer cost will be analysed. The producer cost and consumer WTP come together in the Equilibrium Displacement Modelling (EDM). This model will be used to analyse the required change in price to cover the increasing cost of labelling the products and determine whether the consumers' WTP covers this price increase. The results of these different analysis will be done in chapter 4. Chapter 5 discusses the results of these analyses and will also compare these results with other research on this subject. This thesis will close with concluding remarks and an outlook.

2 Background

Consumers are increasingly concerned about food quality, nutrition, safety, convenience, origin and production process and methods (Realini et al., 2013; Verbeke et al., 2010). Therefore, product labelling has gained attention in recent years. Labelling provides information about the stakeholders involved in the food chain and reduces the uncertainty faced by consumers about the quality of products (Verbeke & Roosen, 2009). In some cases, the government will take an active role in making sure consumers are informed, and in other cases, private institutions take this responsibility. Governments can introduce public standards which are obligatory, private institutions can introduce private standards, which are not obligatory but do inform consumers. In the cases of labelling, they can also be both public and private.

2.1 Private versus public

In the Dutch market, there are public and private standards. The European mandatory COOL is a public standard, but at this moment labels about origin are voluntary. Voluntary standards are introduced when the government has a limited capacity to inspect and monitor their regulations. This limited capacity leads to inadequate or missing standards, which will be filled by the private standards (Henson & Reardon, 2005). In addition to that, the rise of the importance of market within states leads to less need for the government as a regulator. The roll of regulator is often replaced by scientific bodies and businesses who are increasingly setting and enforcing standards (Purnhagen, 2015). Private standards are becoming the drivers of the agri-food systems in industrial countries as well as on the global market and developing countries. (Henson & Hooker, 2001; Reardon & Berdegué, 2002). Private standards lead to an increase in power for the setters of the standards and the influencers of these standards' setters (Purnhagen, 2015). Therefore, producers can use private standards to protect or gain market share (Henson & Reardon, 2005). Producers can also use private standards, alongside certification, labelling and branding systems, to differentiate from other producers and make their products represent quality and safety in the consumer's mind, increasing their reputation and gaining a competitive advantage. If consumers have a highly positive attitude toward a product, this may increase their loyalty (Dick & Basu, 1994).
With private standards, producers can choose whether or not they want to comply with the standard (Trebilcock, 2015). Purnhagen (2015) explains that in some cases, private standards can serve as a criterion to access a market. This is not yet the cases with origin labelling. COOL is meant to reduce asymmetric information, which is a situation in which the producer possesses more information than the consumer. COOL can also contribute to an improved reputation for producers. Public standards are issued by a government, and therefore they are often mandatory.

2.2 Origin labelling in the EU

Origin labelling appeals to specific groups of producers, consumers and policy makers (Jongeneel & Baltussen, 2014). At the moment, there are different kinds of origin labels available; protected designation of origin (PDO), protected geographical indication (PGI) of products, and the voluntary country/region of origin labels. The first two indicate a specific quality of the product and are legally binding. Voluntary labels are driven by commercial interest and often also indicate quality. Origin labels increase the transparency and traceability of products. This traceability is, according to Bureau and Valceschini (2003), especially important during a food crisis. They explain that products which had an origin indication during the time of certain food crises did not suffer from a fall in demand, as people know the origin of the product is safe. The transparency makes sure there is no imperfect information which can result in inefficiencies. If consumers are fully informed, they will consume a product without any undesired characteristics and pay the right price for a product (Marette, Clemens, & Babcock, 2008; Verbeke & Roosen, 2009). This label can start signalling value and

become something consumers actively search for; this is only the case if the place of origin is associated with a high food quality or safety (Verbeke & Roosen, 2009).
In the EU, COOL is already mandatory for beef and beef products, pork and meat of sheep, goats, and poultry, honey, olive oil, vegetables, and fruit. One of the reasons to introduce COOL for beef was the bovine spongiform encephalopathy (BSE) crisis, better known as mad cow disease (EU, 2011; Verbeke & Roosen, 2009). The BSE made consumers more concerned about the origin of beef. In their study on beef purchase discussions in three European countries (Spain, France, and the UK) Realini et al. (2013) concluded, that the most important driver for beef choice was the origin, followed by animal feed and price. Consumers see origin as an indicator of meat safety. The study also finds that consumers gain the highest utility from beef produced locally and that it providing them with a sense of belonging. Consumers are willing to pay a higher price for products produced locally.

Since the BSE crisis, regulation (EU) No 1169/2011 is used for a harmonization in labelling requirement on a European level. Part of this regulation is the mandatory COOL (Brans, 2017). COOL is only mandatory for certain products, such as meats which are widely consumed in the EU and fish. The intention is to extend it to more products, but the member states face difficulties harmonizing criteria. Article 39 of the regulation makes it possible for member states to have national level COOL measures, but only under certain conditions.

> *Article 39*[1]
> *National measures on additional mandatory particulars*
> *1. In addition to the mandatory particulars referred to in Article 9(1) and in Article 10, Member States may, in accordance with the procedure laid down in Article 45, adopt measures requiring additional mandatory particulars for specific types or categories of foods, justified on grounds of at least one of the following:*
> *(a) the protection of public health; (b) the protection of consumers; (c) the prevention of fraud; (d) the protection of industrial and commercial property rights, indications of provenance, registered designations of origin and the prevention of unfair competition.*
> *2. By means of paragraph 1, Member States may introduce measures concerning the mandatory indication of the country of origin or place of provenance of foods only where there is a proven link between certain qualities of the food and its origin or provenance. When notifying such measures to the Commission, Member States shall provide evidence that the majority of consumers attach significant value to the provision of that information.*

The first country to notify the European Commission about national COOL measures and used them, was France. France introduced national COOL measures on milk, milk used in dairy products and meat used in foods. The use of COOLs by France was approved by the Commission as a trial for two years (January 1, 2017, until December 31, 2018), under the condition they would provide feedback at the end of this trial period (Brans, 2017). The measures in France entailed that on products that consist for more than 50 percent of milk, the 'country of collection' and the 'country of transformation' have to be indicated on the label. The label can say EU or non-EU if the collection or transformation took place outside of France (Brans, 2017). In addition to France, Italy, Lithuania, Portugal Romania, Greece, Finland and Spain also notified the Commission on their plans to introduce national COOL measures. All of these countries introduced COOLs for milk and milk used in dairy products and agreed to report on the impact on the internal market. In these countries, COOL is only mandatory for domestic producers and domestic ingredients and is claimed not to impact trade with other countries. Brans (2017) mentions that major industry groups have lobbied against both national- and EU-level COOL measures. They argue that these measures will undermine the free movement of goods within the EU. They say the ingredient supply chain will "renationalize" and shorten as the farmers are given the incentive to buy their products locally.

[1] Article 39 of regulation (EU) No 1169/2011

2.3 International legal perspective

Labelling is one of the categories of requirements in trade that are called a non-tariff measure (NTM). NTMs can only be used by a government to reduce market failure in the areas of human health issues and environmental and animal welfare. The WTO prohibits countries to use NTMs to protect the domestic producers from competition of foreign producers (Trebilcock, 2015). To prevent governments from using NTMs to protect their domestic producers, the WTO includes the national treatment principle. This principle explains that domestic and foreign producers should be treated the same and have to apply the same rules (Trebilcock & Howse, 2005).

3 Methodology

To measure the effect of COOL on the Dutch market, both the consumer's- as well as the producer's side will be analysed. To analyse the consumer behaviour a microeconomic willingness to pay approach is used, using data gathered through an online survey. The producers' costs data originate from a literature study. The overall effect on the market for cheese is calculated using the equilibrium displacement modelling (EDM) technique.

3.1 Consumer utility

in general, consumers strive to achieve a maximum utility (Perloff, 2004). This utility can be measured using the indifference curve Figure 3.1. This curve, the red line in Figure 3.1, represents all bundles of two goods (good A and B) for which a consumer gets the same amount of utility. When maximizing utility, consumers have to take into account their income and the price of goods, this is called their budget constraint. Normally, if the price of good A rises, their demand for this good goes down. At first, the consumer is able to consume at bundle b if the price of good A goes up, the budget constraint becomes less steep and the consumer will only consume bundle c (Perloff, 2004). In this case, the consumers' utility is lower, this is illustrated in Figure 3.1. If a consumer becomes more informed about a product, for example with a country of origin label, their preference for this product can go up, this will change their indifference function and therefore their demand function (Swinnen, 2016). This shows that consumer utility, and therefore demand, is depending on both their preferences and the price.

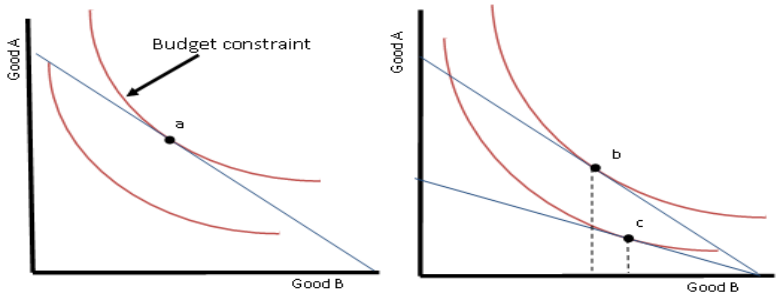

Figure 3.1 - Utility curve and budget constraint

3.1.1 Consumer WTP

The price and preference meet in the consumer's willingness to pay (WTP). Breidert (2007) defines WTP as "*the highest price a consumer is willing to accept to pay for a certain good or service"* (p.30). There are two ways to calculate a consumer's WTP: using the maximum price (P_{max}) or using the reservation price (P_{res}) (Breidert, 2007). P_{max} is the price of the best alternative (reference value), plus the value added due to the difference from the alternative product (differentiation value). This value can be both positive and negative.

It will be negative if buying the product will affect the consumers utility negatively relative to an alternative product (De Pelsmacker, Driesen, & Rayp, 2005). For example with regards to COOL, if a Dutch consumer thinks that products from Poland have a lower quality than products from the Netherlands and they have the possibility to buy Dutch and Polish cheese, they want to pay less for the Polish cheese than for the Dutch product. If the Dutch cheese is the reference product, their differentiation value for Polish cheese is negative. The differentiation value will be positive if the product has positive aspect compared to the alternative. Using the same example as before, if the Polish cheese is the reference product, and Dutch consumers think the quality of Dutch cheese is better. They want to pay more for produces originating from the Netherlands and their differentiation value is positive. Other indicators which can affect the differentiation value positively include fair trade or closeness (Breidert, 2007; De Pelsmacker et al., 2005).

The reservation price is defined by Breidert (2007) as "*the price at which the consumer is indifferent in whether or not he consumes the product, or another product in the same product class"* (p.28). This price will be paid by the consumer only if they believe there is no alternative This price also generates the highest utility.

For voluntary COOL the WTP is based on the maximum price. In this case, the reference value is a product without COOL and the differentiation price is the price consumers are willing to pay for the label. For mandatory COOL, the WTP is the reservation price, as there is no alternative product.

3.1.2 Concerned and non-concerned consumers

Van Tongeren et al. (2009) developed a model to calculate the effects of NTM affecting domestic consumers, domestic producers, domestic government, and foreign actors. For domestic consumers, they calculate utility using the preference for a market good of interest and an added numeraire for consumer *i=(1,…,N)*. This is shown in equation 1 (Van Tongeren et al., 2009).

$$U_i(q_i, w_i) = aq_i - \frac{\bar{b}q_i^2}{2} - Ir_i q_i + w_i \quad (1)$$

In this equation, $-\frac{\bar{b}q_i^2}{2}$ is the immediate satisfaction of consumer *i* from consuming quantity q_i of the good and w_i is the numeraire. a, $\bar{b}$ are the same for the *N* consumers and $-Ir_i q_i$ is the effect of externalities and information. In this variable, I is the knowledge and/or external context regarding the differentiation value (unaware I=0, and aware I=1), and $r_i\ q_i$ is the perceived damage, negative differentiation value, associated with the consumption of the good with the specific characteristic. As not all consumer are concerned with the specific character, $\beta=N_1/N$ represents the proportion of the population completely indifferent the characteristic, further called non-concerned consumers (NCC), and $1-\beta$ represents the proportion of the population concerned with the characteristic, further called concerned consumers (CC). for the NCC $r_i=0$ for every i=1,.., N_1, and for the CC $r_i = r_2$ for every i= N_1+1,.., N. here r_2 is the positive or negative differentiation value.

With COOL there does not necessarily need to be any damage, the differentiation value can also be positive. It will, for example, be positive if consumer prefers products from the original country (e.g. mozzarella from Italy or Feta from Greece) and the label confirms the product is from the original country.

Mathematically, the positive differentiation value is captured by taking a negative number for r_2. Therefore, $Ir_i q_i$ will be positive instead of negative (as illustrated in equation 1). If $Ir_i q_i$ is positive, this means that the consumer obtains a higher utility due to the COOL. This change has to be made because the model created by Van Tongeren et al. (2009) assumes the alternative characteristic to be negative.

3.1.3 WTP for concerned and non-concerned consumers

As mentioned before, two types of consumers are distinguished regarding COOL. Those who are concerned (CC) about the origin and those who are indifferent (NCC) (i.e. knowing the origin of the product does not add any value). Variable z is used to indicate the presence of an origin, with z=0 no origin label on the product and z=1 origin label on the product. For the NCC their WTP is expressed by the inverse demand curve $p=D_{NCC}(q)$, where their WTP or demand function is no direct function of z since these consumers do not have a preference. The CC are concerned about the origin of a product and would, therefore, prefer a product with z=1 (i.e. a product having an origin indication). Depending on the degree of concern they have (r_2) they may reduce their consumption if there is no origin label. This could happen when, for example, they have a lower willingness to pay for the product without an origin label, or do not want to buy the product at all.

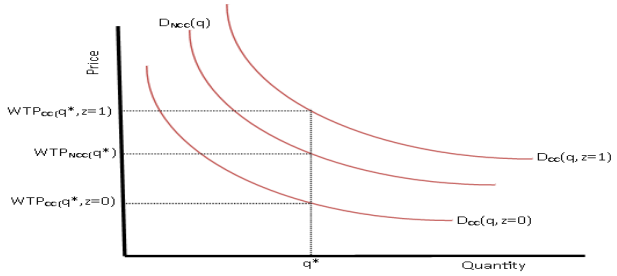

Figure 3.2 - Demand curve with WTP for COOL

In case there is full and reliable product information available (I=1), including the product's origin, this allows the CC to still buy the product from their preferred region or country. In this case, the WTP of these consumers will be a function of the product quantity (as this was the case for NCC) and the z-variable. Their willingness to pay curve is the inverse demand curve $p = D_{CC}(q, z)$, with $D_{CC}(q, z=1) > D_{CC}(q, z=0)$.
Figure 3.2 illustrates the WTP (or inverse demand curves) for both concerned and non-concerned consumers. For the CC there are two curves, one for z=1 and one for z=0. When looking at the WTP at a fixed quantity (q*) P_{max} can be read at the vertical axis (price axis). As can be seen, the WTP for the CC consumer differs between having and not having the origin label. In other words, the CC is willing to pay a premium for origin labelled products, which is a reflection of the increase in consumer welfare (her utility measured in monetary terms) derived from origin-labelled products.

3.2 Obtaining consumer data

The consumer behaviour has been analysed using a microeconomic approach. Valid estimations of WTP is very important for predicting the market's response to a price change and to model demand functions (Diller & Herrmann, 2013). To gather consumer WTP data, this research used an online survey. The survey contained direct questions about the participants WTP. With a direct survey, consumers are asked to state how much they are willing to pay for a product. The survey is completely anonymous to avoid consumers giving a socially desired answer (De Pelsmacker et al., 2005).

To make sure the survey outcome represents the Dutch population with a sufficient power, a sample size analysis was made. The power is the ability of a analysis to correctly reject the null hypothesis when the alternative hypothesis is true. The preferred sample size is calculated using the following formula

$$Sample\ size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1+\left(\frac{z^2 \times p(1-p)}{e^2 N}\right)} \quad (2)$$

With N=population, e=margin of error, z= z-score for confidence interval and p= sample proportion.
In this cases, N=17200000, e=0.05 (5%), z=1.96 (confidence interval of 95%) and p=0.5. Implementing these variables into equation 2 gives to following outcome:

$$\frac{\frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}}{1+\left(\frac{1.96^2 \times 0.5(1-0.5)}{0.05^2 \times 17200000}\right)} = 384 \quad (3)$$

The minimal amount of respondents for this survey, therefore, needs to be 384 to get the desired power.

The survey was created online using GoogleDocs[2] and has been distributed via social media. The advantage of an online survey is that it is self-administrative, and therefore saves the researcher time (Alvarez & VanBeselaere, 2003). The downside to an online survey, especially via social media, is that the response rate is often very low. Therefore it is important to make sure the sample group is very big. Another way to increase the response rate is by a good design (Vicente, Reis, & Santos, 2009). The length, structure, visual presentation, disclosure and response format are very important. Monetary incentives have shown to increase the response rate as well. The study also shows that a monetary incentive increases the response rate (Vicente et al., 2009), therefore two 20 euro coupons have been raffled among the participants. Another method used to get the desired amount of respondents is combining judgement and convenience sampling. With judgmental sampling, the researcher actively searches for the most purposeful sample and with convenience sampling, the most accessible subjects are contacted. By using different social media sites, people with an interest in food were contacted and asked to answer the survey (Marshall, 1996). These people were asked to distribute the survey further to further increase the sample size.

The research focuses only on Dutch consumers and therefore the survey was distributed in Dutch. The questions of the survey covers consumer preferences on WTP and loyalty, as well as motives to buy products with COOL. The survey accounts for, among others, income level, gender, and education, the whole survey can be found in Appendix A.

3.2.1 Analysis

Firstly, this thesis will conduct a descriptive analysis fo the data collected in the survey. Looking at the survey outcomes for motivation to buy or demand COOL on products and the relation between the different variables and WTP for COOL. Average WTP, for both country and region, will be analysed sorted by the different socio-economic indicators. To fit the data better, a differentiation will be made between high concerned consumer (HCC) and low concerned consumer (LCC) An analysis of the difference in WTP between HCC and LCC will be made and, it is expected that the CC have a higher WTP for COOL.

This study will us a Tobit regression for the empirical analysis and the data will be tested on collinearity. A stepwise regression will be done with the following data

$$WTP_i = \beta_0 + \beta_1 Female_i + \beta_2 Age_i + \beta_3 Education_i + \beta_4 Income_i + \beta_5 household_i + \beta_6 Dutch_i + \beta_7 etiquet_i + \beta_8 supermarket_i + \beta_9 market_i + \beta_{10} cheeseshop_i + \beta_{11} doorsale_i + \beta_{12} farm_i \ \beta_{13} fresh_i + \beta_{14} origincounty_i + \beta_{15} domestic_i + \beta_{16} brandloyal_i + \beta_{17} discount_i + \beta_{18} eusafe_i + \beta_{19} imporigin_i + \beta_{20} eatcheese_i + \beta_{21} safety_i + \beta_{22} envirnoment_i + \beta_{23} taste_i + \beta_{24} price_i + \beta_{25} origin_i + \beta_{26} need_i + \beta_{27} intproduction_i + \beta_{28} intingredient_i + \varepsilon_i \quad (4)$$

This stepwise regression will show which variables significantly influence the participants WTP for COOL. This is further explained in Appendix E.

3.3 Producer cost of COOL

If COOL becomes mandatory in the EU, the cost for most producers of products which do not yet have origin labelling will increase and the more detailed the COOL, the higher the cost for adaptation for the supply chain (FCEC, 2015). At the moment, in order to maximise the efficiency of production, a certain amount of flexibility is needed. This flexibility, offered by multiple sourcing practices, is essential for EU food and drink producers to respond quickly to the treats for raw input materials (such as milk). This generally does not affect the products quality or safety (FCEC, 2015). With COOL it becomes harder to maintain this flexibility and production processed can become more expansive.

[2] https://docs.google.com/forms

In the study commissioned by the European Commission in 2014 (EC, 2014), 7 different scenarios for COOL for dairy products on the European market were analysed. They used three different kinds of labels, EU origin (EU/non-EU), Group of Member states (Member States of possible origin) and Multi-country origin (Member States of definite origin) and stages of the supply chain, first place of processing of the raw milk and place of milking. The seventh scenario is the current situation without mandatory labelling and with private standards (voluntary origin labelling) (EC, 2014). These are also the possible labelling options the EU is considering. The cost for a label with place of milking and a multi-country origin is presumed to be the highest.

Mandatory COOL may lead to an unfair discrimination of products (Jongeneel & Baltussen, 2014). Consumers can have a negative feeling toward a certain country. In this case, if a consumer knows the product originates from an origin they have a negative feeling toward, they might no longer be willing to buy this product.

3.3.1 Analysis

The production side is analysed on a Dutch market level using data obtained from literature. The literature used is the study done on mandatory country of origin labelling for dairy commissioned by the European Commission (2014) (EC-study) and the data from the study done on COOL for cheese on the Dutch market by Wageningen Economic Research (WEcR) (Terluin et al., 2012) (WEcR-study). The data from the EC-study have been gathered via databases and interviews and by doing case studies on certain geographic markets, one of which is the Dutch market. The WEcR study looked into the processes of and the additional action involved with COOL for cheese. The cost of all actions were analysed and together this gave the additional cost of using COOLs. As the study was conducted for the Dutch ministry of economic affairs, the study solemnly focused on the Dutch market. A combination of these costs will provide the cost increase used for this study.

3.4 Factors affecting consumers and producers

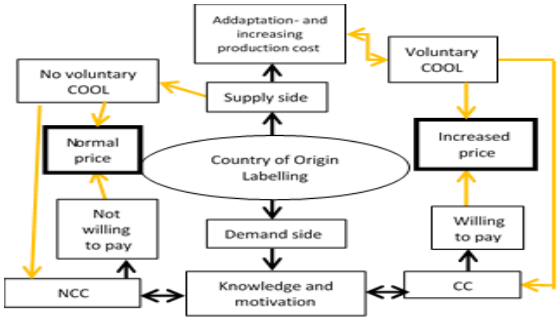

Figure 3.3 - Market with voluntary COOL

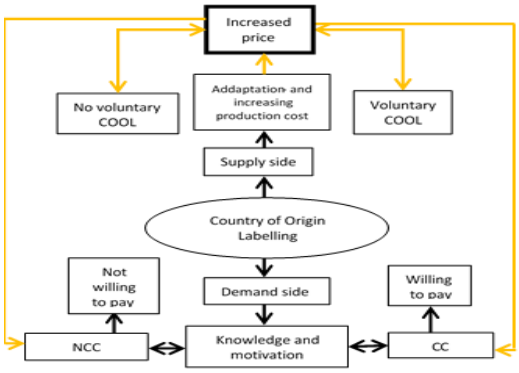

Figure 3.4 - Market with mandatory COOL

At the moment, on the Dutch market, there is voluntary COOL Figure 3.3 shows the factors affecting consumers and suppliers in a market where there are voluntary COOL. In this case, the producers can choose whether or not they want to use origin labelling. If so, their product will have a premium over products without an origin label. This will justify the increasing price. The concerned consumers who are willing to pay, and will buy products with the label in for a higher price. The consumers who are not concerned can buy their products at a lower price from the producers who do not use the origin label. Figure 3.4 shows the factors affecting consumers and suppliers in a market in which there is a mandatory COOL. In terms of differentiation, products with the label no longer demand a premium. With mandatory COOL, both producers will have to adapt and increase their cost, which will lead to

an increasing price. Both the HCC and LCC will have to pay a higher price. There can be a difference in the cost- and therefore price increase for the different scenarios explained in the EC-study. These will also influence the consumers' behaviour.

3.4.1 EDM with consumer WTP

To determine the effect of mandatory COOL on the Dutch market, producer cost increase and consumer WTP are used and together will help to analyse how COOL will affect both the consumer and producer side and how changes in both sides will affect the supply and demand curve. This is done using Equilibrium Displacement Modelling framework (EDM). This model is also applied to analyse the impact of COOL in the WEcR study (Terluin et al., 2012), as well as other studies regarding standards and the dairy sector (Balagtas & Kim, 2007; Brester, Marsh, & Atwood, 2004).

The EDM approach provides a small partial equilibrium model for one specific product, using only known information about behaviour and market response on the market where important effects will accrue. These behaviours are based on elasticities. The model assumes full competition and will leave out other product markets (Terluin et al., 2012). One of the advantages of EDMs is that there is no need to estimate supply and demand functions; these can be calibrated using elasticity information from other sources. Another advantage is that EDMs are more flexible as large sector models (Davis & Espinoza, 1998).

This thesis uses the EDM developed for the WEcR study and modified it to fit the parameters of this study. The EDM is modelled as a matrix. The EDM can graphically be illustrated as a supply and demand curve as shown in Figure 3.5, in which D is demand and S is supply. Before labelling, the consumption is q and the price is P. Due to the cost increase caused by the COOL, the supply curve will shift up (S'). This will lead to a decrease in quantity to $q_1(S')$ and an increase in price toward $P_1(S')$. If the consumer is willing to pay for COOL, the demand curve will also shift upward, the price will shift further up to $P_2(D')$ and the quantity will also shift up from $q_1(S')$ to $q_2(D')$. This will lead to a new equilibrium price with a potential change in the supply and demand and an increased price. Figure 3.5 shows a situation in which the demand shift is smaller than the supply shift. Depending on magnitude of the shift in S and D, the new equilibrium quantity can be higher or lower than the quantity before COOL.
With COOL there are several options, three of which are shown in Table 3.1. In these three cases, there is a cost increase. Due to this cost increase the supply curve shifts up from S to S'. For the WTP there are three different option, there can be no WTP, a WTP smaller than the cost increase and a WTP bigger than the cost increase. For the first option there is no WTP and no shift in D, for the other two options there is a shift in D. If this WTP is bigger than the cost increase due to the COOL $q_2(D')$ will be greater than the original situation before COOL (q). When the WTP is smaller as the cost increase $q_2(D')$ will be bigger than without a WTP ($q_1(S')$), but smaller than before the introduction of COOL (q).

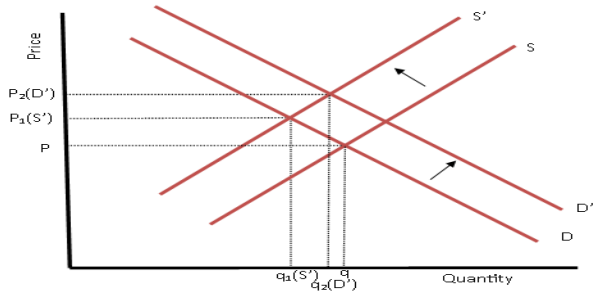

Figure 3.5 - Supply and demand with EDM

Table 3.1 - Different demand shifts for COOL and WTP

Situation	**Shift of the supply curve S and the demand curve D**	**Results for prices (P) and quantities (q) supplied and demanded**
COOL, no WTP	S → S'	$P_1(S') > P$ and $q_1(S') < q$
COOL, positive WTP smaller than cost	S → S' and D→ D'	$P_2(D') > P_1(S') > P$ and $q_1(S') < q_2(D') < q$
COOL, positive WTP bigger than cost	S → S' and D→ D'	$P_2(D') > P_1(S') > P$ and $q_2(D') > q$

4 Results

This paper measures the effect of COOL on the Dutch cheese market using the previously mentioned method. This chapter will present the results of the analysis. Section 4.1 analyses the consumer perspective, section 4.2 producer perspective and section 4.3 used the EDM to look changes for the supply, demand, and price.

4.1 Consumer analysis

In this section, the consumer behaviour regarding COOL will be analysed. This is done using the survey to calculate the WTP and looking into the motives for consumers to buy products with a COOL. A valid estimation of WTP is very important for predicting the market's response to a price change and to model demand functions (Diller & Herrmann, 2013). The motives will give an inside into the importance of COOL for consumers. Section 4.1.1 will start by describing the method used to gather the consumer data and give a description of these data. After this section 4.1.2 will analyse these data using descriptive and empirical analysis.

4.1.1 Data

The consumer data has been collected using an online survey. The link to the online survey was published on several Facebook groups, and other social media networks such as LinkedIn and WhatsApp and on survey sharing sites. This research looks into the WTP of the Dutch consumers and therefore the survey was in Dutch so only Dutch speaking consumers are able to participate. Using an online survey allowed data to be obtained from all different kind of shoppers. In total, 366 consumers were surveyed, of which 351 cheese buying consumers. This is a little bit lower than the 384 that was needed according to the power calculation done before. With 351 participants, the margin of error is 5.25 instead of 5, which is acceptable. Two coupons of 20 euro each have been raffled among the participants. The survey is completely anonymous to avoid consumers giving a socially desired answer (De Pelsmacker et al., 2005).

The survey began with a brief explanation of the purpose of the survey and the indication that the data collected through this survey would be used for a master thesis. The survey contained 24 questions covering consumer preferences on WTP and loyalty, as well as motives to buy products with COOL and socio-economic factors, such as income level, gender, and education. This because consumer behaviour is very much related to their social environment. The whole survey can be found in Table 4.1 provides an overview of the variables used in this survey.

It is possible that there is a case of sample selection bias. Consumers who are more concerned with the effects of COOL, or more willing to participate in student research, are more likely to fill out the survey. Especially if there are more concerned consumers participating, this could lead to a higher average WTP.

Table 4.1 - Overview of variables

Variables	Description	Scale
Female	Gender (1=female, 0=male)	Dummy
Age	Age group (1= <18, 6= >75)	Ordinal
Education	Highest education level (1=high school, 2=MBO 3=HBO/WO/ Ph.D.)	Ordinal
Income	Average spendable yearly income (1= <20.000, 2=20.001-50.000, 3= >50.000)	Ordinal
Household	Household composition (1=together with children, 2=together without children, 3=single with children, 4=single without children)	Nominal
Dutch	Personal origin (1=Dutch, 2=other country in EU, 3=non-EU country)	Nominal
Etiquette	Watching product label for origin (1=yes)	Dummy
Supermarket	Buy cheese in supermarket (1=yes)	Dummy
Market	Buy cheese at market (1=yes)	Dummy
Cheeseshop	Buy cheese in cheese shop (1=yes)	Dummy
Doorsale	Buy cheese at the door (1=yes)	Dummy
Farm	Buy cheese at a farm side (1=yes)	Dummy
Fresh	Preference for fresh cheese (1=yes)	Dummy
origin_country	Preference products from original country (1=yes)	Dummy
Domestic	Preference to buy domestic products (1=totally disagree, 10=totally agree)	Ordinal
Brandloyal	Always buy products from the same brand/producer (1=totally disagree, 10=totally agree)	Ordinal
Eusafe	All EU food is safe (1=totally disagree, 10=totally agree)	Ordinal
Discount	Drawn to product with a discount(1=totally disagree, 10=totally agree)	Ordinal
Importance_origin	Origin of a product should be on the product(1=totally disagree, 10=totally agree)	Ordinal
Eat_cheese	Times eating cheese (1= <once a month, 6=daily)	Ordinal
Safety	Reason to buy certain cheese because of safety (1=yes)	Dummy
Environment	Reason to buy certain cheese because of the environmental impact (1=yes)	Dummy
Taste	Reason to buy certain cheese because of the taste (1=yes)	Dummy
Price	Reason to buy certain cheese because of the price (1=yes)	Dummy
Origin	Reason to buy certain cheese because of the origin of the product (1=yes)	Dummy
Need	Reason to buy certain cheese because it is needed (for a recipe) (1=yes)	Dummy
importance_production	Want to know were cheese is produced (1=yes)	Dummy
Importance_ingredients	Want to know there ingredients for cheese come from (1=yes)	Dummy
WTPland	WTP to know country of origin of a product (0=not willing to 6= >2 euro (per 500 gram))	Ordinal
WTPregio	WTP to know region of origin of a product (0=not willing to 6= >2 euro (per 500 gram))	Ordinal

Source: survey

4.1.2 Consumer results

Summary statistics variables are presented in Table 4.2. These statistics show that the majority of the participants were female (74.36%) and had an HBO or WO educational background.

Table 4.2 - Distribution in the data set and population for the demographic variables

(n=351)	**Categories**	**survey**		**Dutch population**	
		%	Obs.	%	Number of people
Gender	Male	25.26	90	49.62	8.475.102
	Female	74.36	261	50.38	8.606.405
Age	18-25	45.30	159	9.96	1.701.504
	26-45	13.68	48	24.83	4.241.460
	46-65	36.18	127	27.95	4.774.346
	66-75	3.70	13	10.23	1.748.050
	75+	0.85	3	8.26	1.411.610
Highest education	High school	7.41	26	33.09	5.652.000
	MBO	18.52	65	24.72	4.223.000
	HBO,WO bachelor/master/Phd	73.50	258	23.68	4.045.000
Income	< 20.000 euro	39.32	138	21.60	1.645.900
	20.000-50.000 euro	32.19	113	52.04	3.965.200
	> 50.000 euro	25.07	88	26.36	2.008.700
Household	Together with children	21.08	74	25.84	1.969.300
	Together without children	27.07	95	28.33	2.159.000
	Single With children	2.85	10	6.96	530.500
	Single without children	47.58	167	38.86	2.961.000
Origin	Dutch	96.30	338	77.39	1.321.8754
	European (not Dutch)	2.28	8	6.22	1.061.721
	Outside EU	1.42	5	16.40	2.801.032

Source: survey and CBS

On average, the participants are in the age group 26-45 and their average income category was 1.8, meaning in the higher range of the second category (20.000-50.000 euro). With 96.3%, most of the participants were born in the Netherlands.

When comparing the sample with the data of the Dutch central statistical bureau (CBS, 2018a) it is shown that the sample is more female, has a different age distribution and a higher education level. It is comparable in terms of household composition. As is often the case with a survey, the sample's ability to reflect the population is a concern and the effect on the WTP for COOL of the sample is impossible to measure (Loureiro & Umberger, 2003).

Summarizing statistics for all data are shown in Appendix B. These show that the average value for *eat_cheese* is 5, which is 3-6 times a week. It also shows that 45% of the participants sometimes look for the origin (*etiquette*) on a product label and that 51% of the participants prefer to buy cheese from the country where it is originally from (*origin_country*), such as feta from Greece, mozzarella from Italy and Gouda from the Netherlands. This means that consumers are interested to know where the products they consume come from. In the case of *origin_country* labelling will have a positive effect on products which are produced in their original countries. With labelling, consumers will know for sure whether the product originates from that country and if not they will be able to choose to buy a product that is original. Participants in the survey indicated they prefer to buy products from the original country because of the better taste and quality they associate with the product. It is very plausible that producer already voluntarily indicate the origin on their products. In this case, they will not suffer extra cost from the mandatory labelling.

Participants were able to indicate where they buy their cheese. They could choose more than one option. Figure 4.1 shows that most of the participant (88.3%) buy their cheese at the supermarket. A little less than a quarter of the people normally to the market to buy cheese and the smallest amount (2.3%) buys cheese from a door to door salesman. Out of these options, the supermarket is the selling location with the longest supply chain, which can lead to the highest uncertainty and information asymmetry affecting consumers. Mandatory COOL can partly reduce this asymmetry.

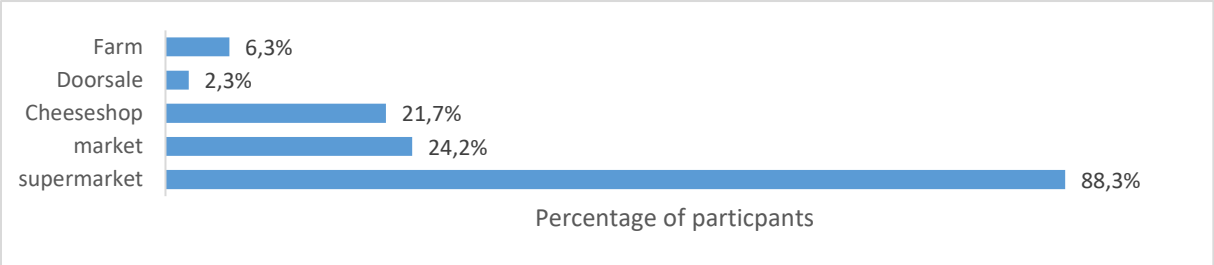

Figure 4.1 - Cheese purchasing distribution in the Netherlands
Source: Survey

As shown in Table 4.3, participants are quite drawn to products with a *discount*. Participants scored the statement on average 7.4/10, meaning they largely agree with it. This is also shown in Figure 4.2 with the modus is 7-10.

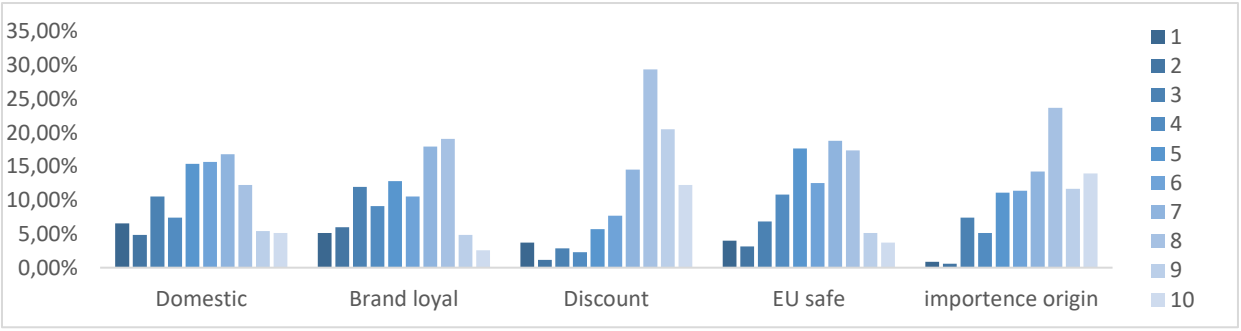

Figure 4.2 - Distribution statement answers in sample
Source: survey

Table 4.3 - Summary statistics for statement variables

Variable	Obs.	Mean	S.D.	Min.	Max.
Domestic	350	5.637143	2.382432	1	10
Brandloyal	350	5.64	2.344682	1	10
Discount	350	7.417143	2.15655	1	10
Eusafe	350	5.917143	2.162852	1	10
Importance_origin	350	7.017143	2.151762	1	10
Importance_production	350	.7057143	.4563734	0	1
Importance_ingredients	350	.6228571	.485365	0	1

Source: survey

With an alpha of 0.1, the Sharpiro-Wilk test shows a normal distribution for *domestic* and *EU_safe,* with an average of 5.6 and 5.9. This shows that the participants, on average, lean just a little bit more to an agreement with the statement than they to do disagreement. For *brandloyal* the participants have a higher spike on the agree side around 7 and 8, which indicates that the participants tend to buy a product from the same, familiar producer. Figure 4.2 also shows that there are still a lot of people who think not all products within the EU are safe, option 4, a bit disagree, is the second most frequently picked answer. Still, the average is 5.9 which indicates that on average, the participants agree. Table 4.3 also shows a higher average value for *importance_origin*, a 7. This means that consumers agree that they are interested in knowing what the origin of a product is. Figure 4.2

shows that the highest percentages of the people indicated this importance with an 8, meaning they agree with the statement that it is important to have a location indicator on a product. It is also shown in Table 4.3 that 71% of the participants want to know where the cheese is produced and 62% want to know where the ingredients of a cheese they consume come from. This confirms that the participants are interested in knowing the origin of the cheese they consume.

4.1.2.1 Consumer motives

As indicated above, the majority of the participants want a product to have a location indicator. Even though this is the case, the participants mainly base their cheese buying decisions on the taste and price of the cheese and their need for it. As for the buying location, the participants were able to choose multiple options. Figure 4.3 shows that only 9.7% of the participant indicated they buy cheese because of the origin of the product. At the end of the survey, participants were asked to explain why they would think COOL is important. 155 participants answered this question. These answers have been categorised and are shown in Figure 4.3 One of the most frequently given answers was that consumers preferred to buy local/Dutch cheese and in that way stimulate the local economy. With a COOL they would know if a product is produced domestically and they would prefer to buy this. This could have a negative effect on the foreign producers as their product will be sold less in the Netherlands. Another reason for the participant to prefer local/domestic products is because of the environmental impact of transporting product from other countries. A locally produced product does not have to travel as far and therefore will have a smaller impact on the environment.

Other indicated reasons for the importance of COOL are the perceived safety of the cheese and the production process and because they want responsibly and ethically produced cheese with good standards for animal and employees. If they are able to see where a product comes from it is easier to control the producer and the production process. These reasons are also linked to the fear of the participants that producers say they meet certain standards even if they do not. For a lot of people, the origin of a product is an indication of quality, they would prefer certain product because they think or know the quality of a product from that region has a higher quality (ed. Better taste).

Another reason given by the participants for the importance of COOL was because they would find it interesting to know where the cheese they consume comes from. They also liked the idea of knowing where a product comes from and mention that a COOL provides more transparency and that they just deserve to know where a product comes from. A few participants stated that they want to know the origin, but that they do not understand why this would cost more.

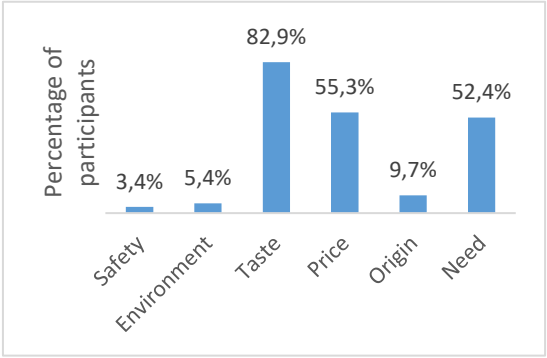

Figure 4.4 - Participants' cheese purchasing motives
Source: survey

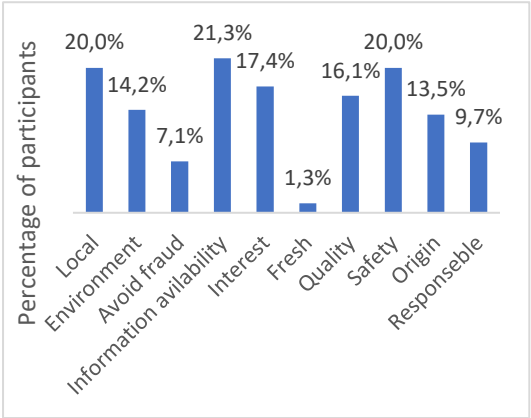

Figure 4.3 - Participants' motives for demand COOL
Source: survey

4.1.2.2 Consumer WTP

In the survey, participants have been asked to indicate their WTP for both countries of origin, (*WTPland)* and region of origin (*WTPregio*) per 500 grams of cheese. It is assumed that 500 gram of cheese costs 6 euro. As shown in Table 4.4 consumer are on average willing to pay 18 cents (+3%) more for *WTPland*. For *WTPregio* this is 13.9 cent (+2.3%).

Table 4.4 - Average participants' WTP for country/region of orogin labelling in cents

Variable	Obs.	Mean	S.D.	Min.	Max.
WTPland	350	18.0	32.92781	0	200
WTPregio	350	13.9	28.84248	0	200

Source: survey

In the survey, the possible WTP was classified into 7 categories. These categories varied from not willing to pay, too willing to pay more than 2 euro (200 cents). The participants' response distribution over the categories is illustrated in Figure 4.5. Out of the 351 participants, 49.29% is not willing to pay more for *WTPland* and even more, 56.13% is not willing to pay more for *WTPregio*. This shows that slightlymore people are willing to pay for land than for region. Out of the people that are willing to pay extra for a label. 74% is willing to pay more for both region and country, 7% is only willing to pay more for the region and 19% is only willing to pay more for country and not for region, see Figure 4.5.

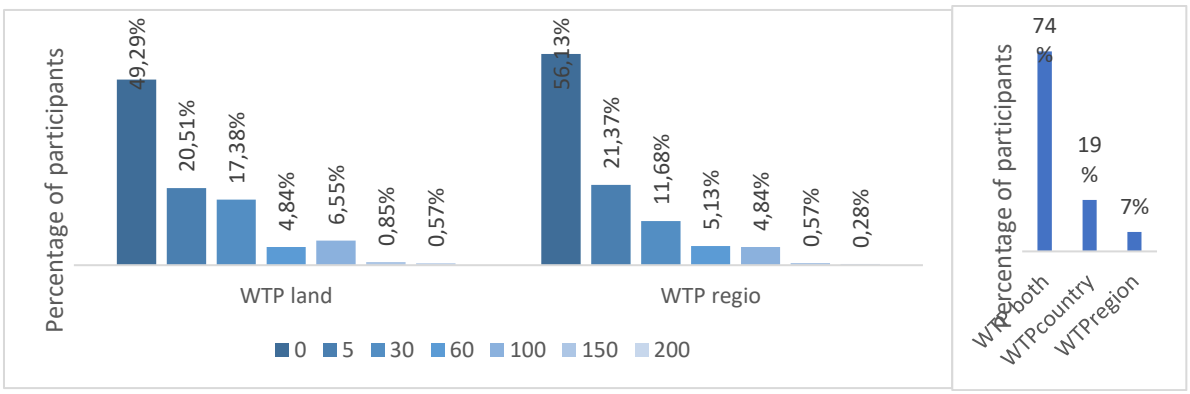

Figure 4.5 - WTP distribution participants
Source: survey

Looking at the percentages of participants that are willing to pay more for labeling overall there is a downward slope as the WTP gets bigger. The only exception to this is between 60 and 100 cents for *WTPland,* here there is an upward trend, from 4.84 to 6.55 percent of the participants.

Figure 4.6 and Figure 4.7 look at the average WTP of the participants within the different socio-economic factors. Appendix C also gives an overview of these indicators. When looking at the figures, the age group 66-75 jumps out with an average WTP for both country and region of more than 50 cents, this is based on 13 observations, but these are not outliers. The figures also show that if the participants get older they are willing to pay more for origin labeling.

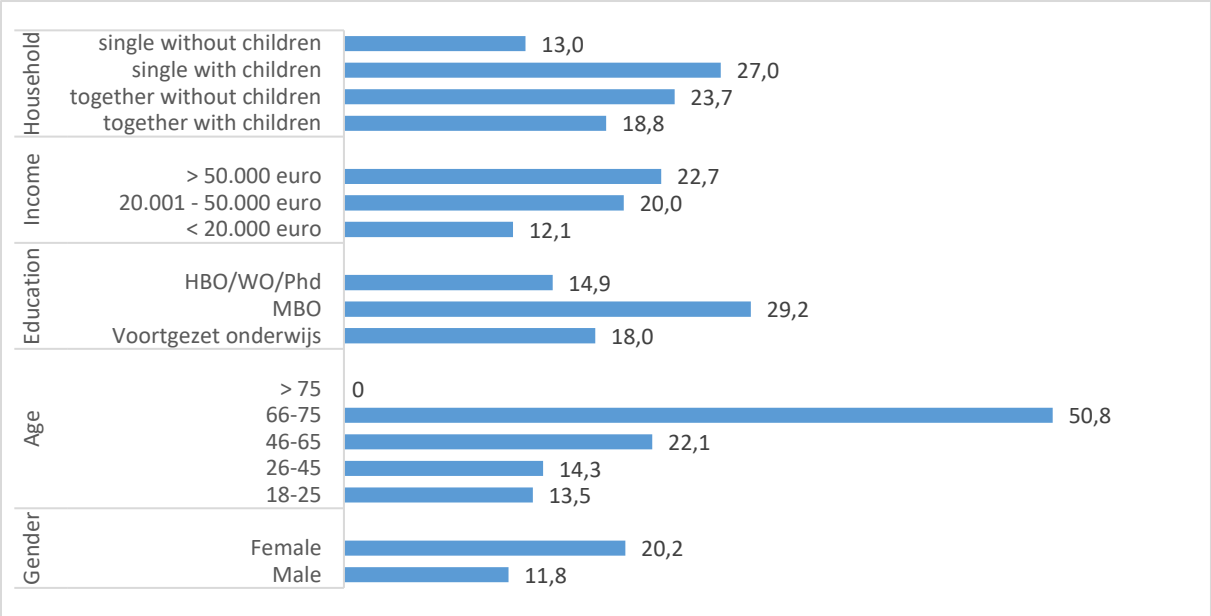

Figure 4.6 - Average WTP country
Source: survey

A big difference between the two figures is the WTP by single parents. They have the highest *WTPland* (27 cents) but the lowest *WTPregio* (7 cents). In both cases, women are on average willing to pay more than men, but women are willing to pay more for *WTPland* (20.2 vs. 14.5) and men are willing to pay more for *WTPregio* (12.1 vs. 11.8).

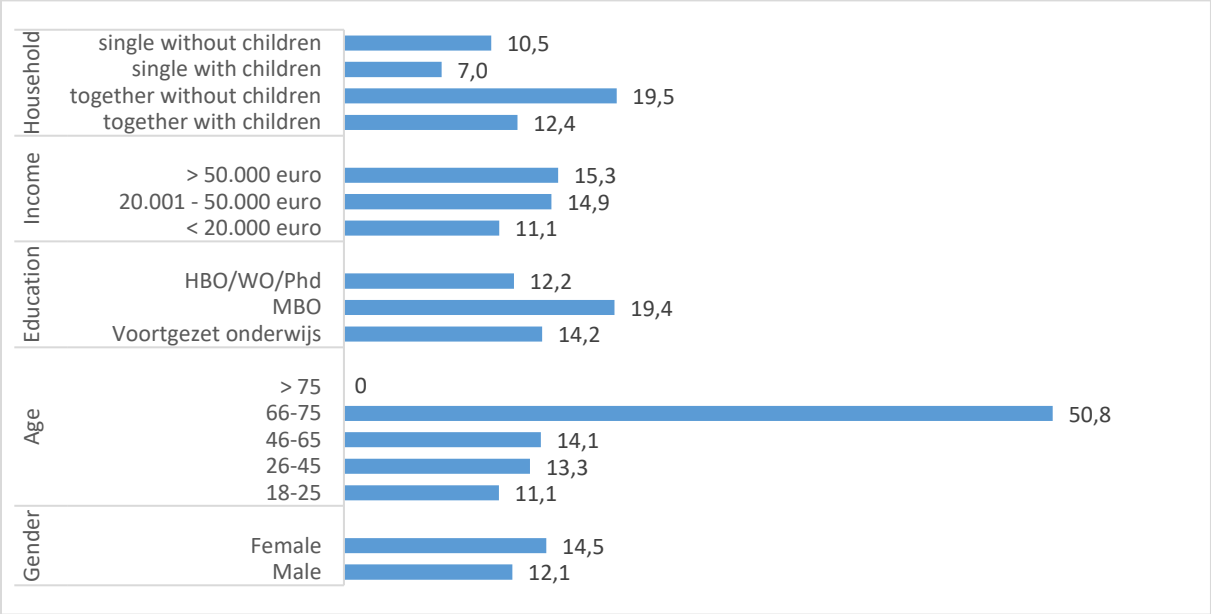

Figure 4.7 - Average WTP region
Source: survey

In both cases, if participants get a higher income they are willing to pay more for labeling and consumers with a high education level are willing to pay less than people with a medium education level.

The literature distinguishes between concerned- and non-concerned consumers. As the survey outcome for *importance_origin* determines the degree of importance on a scale from 1 to 10, this thesis uses high- and low concerned consumers. Assuming an indication of 5 or lower means low concerned and a 6 or higher means high concerned, the average WTP for concerned consumer is 21.6 cent (3.6%) and for non-concerned consumer 7.3 (1,2%). This is also shown in Table 4.5.

Table 4.5 - WTP distribution High- and low concerned participants

Variable	Obs.	Mean	S.D.	Min.	Max.
Importance_origin<=5	88	7.3	20.43927	0	100
Importance_origin>=6	262	21.6	35.47849	0	200

Source: survey

4.1.2.3 Empirical analysis

As is shown above, there is a higher WTP for country as for region. Therefore the empirical analysis is done only looking at *WTPland.* For the empirical analysis, first simple multi-collinearity analysis was done using a correlation matrix. The outcome of this test is shown in Appendix D and shows very little correlation between the different explanatory variables. To further analyze the participants' WTP a Tobit model was used. This model describes the relationship between a non-negative dependent variable and independent variables. Because the WTP in the possible answers ranges from 0 to 200 (WTP cannot be negative), and because of the high proportion of zeros, this model gives the best simulation of the different explanatory variables (Wooldridge, 2013). For the *WTPland*, the following model is used.

$$WTP_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots + \beta_i x_i + \varepsilon_i \quad (5)$$

When running a stepwise Tobit regression (Appendix E), the outcome shows that only a few of these outcomes are significant. The stepwise regression has been done with a confidence level of 90%. In this case, *importance_origin, importance_ingredients*, *domestic* and *discount* are significant. The rest of the variables are not significant, with a confidence level of 90 %. The rest of the explanatory variables are not significant. Table 4.6 summarizes the significant determinants for the WTP of the participants. This suggests that whether consumers think it is important to know where the ingredients come from and the extent to which the participants agree with the statement that origin of a product is important, determine whether they are willing to pay more to know were a product comes from. The same holds for participants who, to a higher extent, agree with the statement that they prefer domestic product. The extent of agreement with the statement if the participants are drawn to buying discount products has a negative effect on the participants WTP.

Table 4.6 - Stepwise regression results of Tobit for WTP country

WTPland	Coefficient	Standard Error	P >|t|
Importance_ingredients	23.81584*	7.277482	0.001
Domestic	2.725232*	1.330652	0.041
Importance_origin	3.110275**	1.747199	0.076
Discount	-3.246423*	1.394031	0.020
_cons	-32.41996	17.20857	0.060

* 95% level of significance
** 90% level of significance

Source: survey

The other explanatory variables are not significantly influencing the participants WTP and therefore none of the socio economic variables is significant. This suggests that the social economic factors are not significantly influencing the participants WTP and differences in WTP are only caused by their preferences and interests.

As mentioned before, *Importance_origin* is the indicator splitting concerned and non-concerned consumers. To see which socio-economic factors influence this importance a stepwise OLS regression with *Importance_origin* and the socio-economic variables is used. The outcome of this regression is shown in Appendix F and suggests that gender and age are the two variables significantly and positively influencing participants' interest in the origin of a product. Therefore, these variables are

used to extrapolate the total WTP of the Dutch population for COOL. The extrapolation is based on the total number of people in each age group differentiated by gender in the Dutch population. To be able to aggregate WTP for the Dutch population, first, the survey outcome for the WTP has been translated to average WTP in euro per kilo of cheese (Table 4.7). Table 4.8 shows an overview of the real population in each of age groups based on the numbers from the Dutch central statistical bureau (CBS, 2018b) over 2017.

Table 4.7 - Average WTP participants by age group and gender

Age group	**Male**		**Female**	
	Cent/0.5kg	*€/kg*	*Cent/0.5kg*	*€/kg*
18-25	16.375	0.3275	12.56303	0.251261
26-45	7.631579	0.152632	18.62069	0.372414
46-65	10.4	0.208	24.95098	0.49902
66-75	0	0	94.28571	1.885714
>75	0	0	0	0
total	11.8	0.236	20.2	0.404

Source: survey

Table 4.8 - Distribution in the Dutch population by age group and gender

	Number of people	
Age group	**Male**	**Female**
18-25	866477	835027
26-45	2126652	2114808
46-65	2491047	2482860
66-75	856005	892045
>75	590470	821140
total	6930651	7145880

Source: CBS

Table 4.9 - Extrapolation total WTP by age and gender for 1 kilo cheese each

Age group	**Male**	**Female**
18-25	283,771.22€	209,809.39€
26-45	324,594.25€	787,583.68€
46-65	518,137.78€	1,238,995.80€
66-75	-	1,682,141.92€
>75	-	-
total	1,635,633.64€	2,886,935.52€

Table 4.9 shows the outcome of these extrapolations. This is the total amount the Dutch population is willing to pay more for cheese with an origin label if they would consume one kilo of cheese each. It shows that Dutch women are willing to pay 2.9 million euro more for COOL, men are willing to 1.6 million euro more. This outcome is based on 1 kilo of cheese per person. According to (Zuivelonline, 2016), Dutch consumers consumed on average 21 kilo cheese in 2016. When the total additional WTP by 21, the WTP for women become 60.6 million euro per year and for men 34.3 million euro per year, this is a total of 95 million, which is the total additional WTP in a year for COOL labelling of the Dutch population.

4.1.3 Conclusion

It is shown that even though it is not significant, there is a difference in WTP between socio-economic groups. Using the survey results, it is also shown (Table 4.4) that on average, the participants' WTP for COOL is 18 cents, which is an increase of 3%. When looking at the difference between high- and low concerned consumers, there seems to be a big difference. High concerned consumers are willing to pay an average of 21.6 cents more, which is 3.6%, while low concerned consumers are only willing to pay 7.3 cents more, which is 1.2% (Table 4.5). To see if this is enough to cover the additional cost for the producers. The next section will analyze the producers costs for COOL.

4.2 Production cost

In case mandatory COOL is introduced, there are adoption- and other increasing production costs for producers that need to be taken into account. In 2014 the European Commission commissioned a study on mandatory COOL for dairy products. One of the products this report looked into was cheese (EC, 2014). This research had a strong focus on the producer side of mandatory COOL using a cost-benefit analysis for the impact of COOL. Furthermore, the Dutch Ministry of Economic Affairs commissioned a similar research for the effect of COOL on the Dutch dairy market, including the case of cheese and potential impact on cheese exports (Terluin et al., 2012). This research was conducted by Wageningen Economic Research (WEcR).

Both mentioned studies made an estimation of the additional cost associated with the implementation of mandatory COOL. The WEcR study tried to estimate the cost by identifying the extra actions involved with COOL, the cost of these actions and matching these two to find the additional cost per unit. In the EC-study cost estimates were made based on an additional cost procedure, with empirical information being derived from expert interviews around the EU (including the Netherlands). The aspects increasing the cost have some overlap between the two papers, but there are also differences. The cost increasing actions for both papers are shown in Table 4.10.

Table 4.10 - Included cost increasing action for both papers

EC-study	WEcR-study
Adding new processing lines	
Cleaning between batches	Extra cleaning cost, because more tanks need to be cleaned between batches.
Purchase of new machinery for labelling, preparing and printing a new design of labels	
Cost of materials (labels, packing materials)	
The limitations to using the cheapest sourcing option	
More logistical action	Additional transportation cost if multiple batches from different origin cannot be put together.
	Origin of a product in every phase needs to be registered. An investment in Enterprise Resource Planning (ERP) is needed.
Lower the resource using efficiency	Efficiency loss for cheese and pasteurized cream production, because batches from a different origin need to be processed separately.
	Residue milk and whey cannot be used for the next batch, therefore, it will be used as cattle feed.
	Need for more energy (electricity and gas)
May generate an extra negative impact on the environment	Environmental cost increases with higher CO2-emission.
	Additional storage cost to store raw milk, buttermilk, skim milk, whey, starter cultures and cream per origin.

Source: EC- study and WEcR-study

The studies have a few similar cost categories. The EC paper, in addition to these costs, also identified some other issues which would influence the increase in production cost. One of which is the extent to which process in a factory is automated. Another issue depends on these size of the company, as large companies source raw milk from multiple EU countries and exchange ingredients between their own factories. On the other hand, large companies can also benefit from economy of scale.

The increase in costs can be shifted to any stakeholder in the supply chain, for example, through a lower raw milk farm gate price or a higher price for consumers. With the introduction of COOL,

producers could lose their flexibility and might even change their product mix. Mandatory COOL can also have a negative effect on products which already are subject to a voluntary COOL arrangement as consumers might not be willing to pay any additional premium for these products anymore. For melting cheese specifically, cheese ingredients are also bought from businesses who do not fulfil labelling requirements sources from all over the world, therefore mandatory COOL would require major changes to the business model (EC, 2014).

After analysing the different actions involved with mandatory COOL both papers calculated the percentage cost increase for cheese for the Dutch market. The WEcR paper used an estimation from the NZO, a cost increase of 3%, and took into account the depreciation of sustainable means of production. This calculation predicts a yearly cost increase of 2,3%. This increase is based on a COOL which includes the place where the products were produced and the previous origin of the ingredients of the product. So if for example an ingredient originates from Italy, but has already been processed in Germany the label should say Germany as origin for that product. This is based on the one step back, one step forward principle.

The EC paper looked into three different kinds of level of geographic origin and two stages of the supply chain. Table 4.11 shows the different scenarios of this model. For their cost calculation, they use scenario 6, which they assume brings the highest cost.

Table 4.11 - Scenario's used in EC-study

Level of geographic origin	**Stage of supply chain**	
	First processed place of raw milk	**Place of milking**
EU origin	Scenario 1	Scenario 4
Group of members origin	Scenario 2	Scenario 5
Multi-member origin	Scenario 3	Scenario 6

Source: EC-study

In this case, the origin label should describe the exact country where the milk comes from in a certain product. In this scenario, they estimate the cost increase for the Dutch cheese market at 2.9%.

4.2.1 Conclusion

In the WEcR study, the conditions for the COOL are a little milder than in the EC-study. This is probably one of the reasons why the WEcR study has a lower cost increase by the implementation of mandatory COOL. In this study, the cost are based on a label which always indicates the place of milking and the first origin of the product. As both studies take other cost increasing action into account, the cost increase might be a little bit higher than both studies mentioned above. Therefore the rest of this study takes into account an average cost increase of 3.2%. This is an estimation based the EC and WEcR-study.

4.3 EDM analysis

As described before, the Equilibrium Displacement Modelling (EDM) approach provides a small partial equilibrium model for one specific product, using only known information about behaviour and market response on the market where important effects will accrue. The same model has been used as in Terluin et al. (2012). These data have been updated to fit the current market distribution.

4.3.1 Data input

The model takes into account foreign and domestic supply and demand for cheese. As the original report is from 2012, the data have been updated and now contain the data from 2015 (ZuivelNL, 2016) as these are the latest data that are definitive. Foreign demand is the export, foreign supply is

the import, domestic demand is consumer demand and domestic supply is production. Figure 4.8 shows an overview of the changes for import, export, consumption, and production between 2013 and 2016 (ZuivelNL, 2016). These data are in 1000kg an overview of all data can be found in Appendix F.

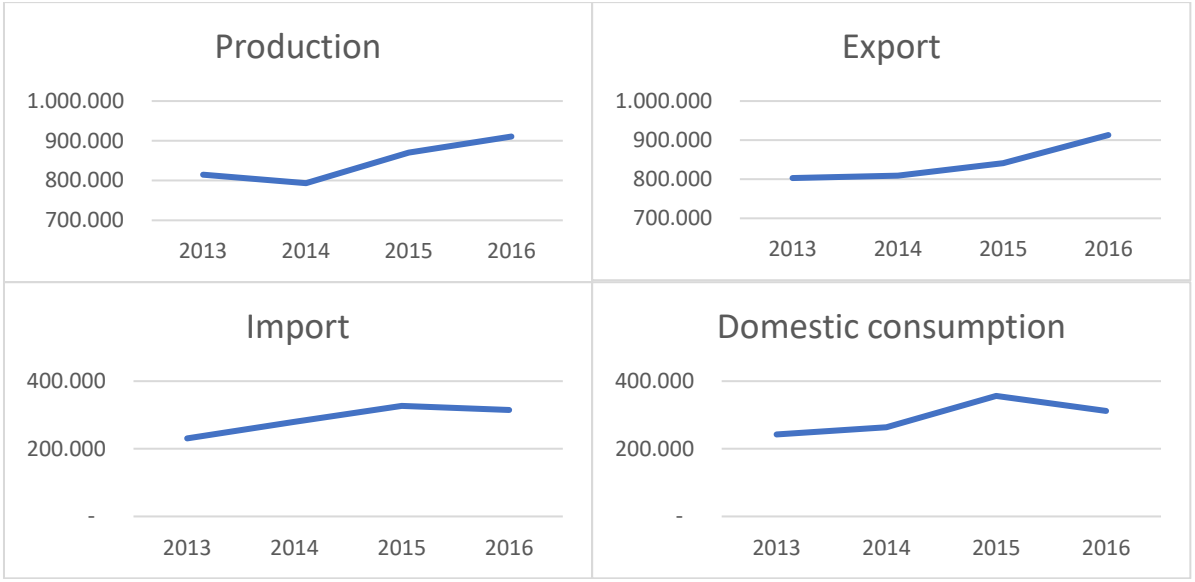

Figure 4.8 - Import, Export, Production, and Consumption 2013-2016
Source: CBS

The figures show that between 2013 and 2016, all four have grown. For import and consumption, the spike of this has been in 2015. The production and exports are still growing. Table 4.12 shows an overview of the number for 2015.

Table 4.12 - Production, Consumption, Import and Export in 2015

	x1000kg
Production	870,000
Consumption	385,000
Import	356,000
Export	841,000

Source: CBS

According to the data of ZuivelNL (2016), the average price of 1 kg of ripe Gouda cheese in 2015 was 7.19 euro. The data in Table 4.12 and the mentioned price are used as baseline.
This model is used to calculate the impact of mandatory COOL. At the moment, COOL is voluntary and is used to provide products with additional information which allows to collect a premium. If a producer decides to use a voluntary COOL, this will increase their production cost. Other producers choose not to have a COOL, and therefore no have additional cost. Consumers have the possibility to choose between products with and without a COOL. If they prefer a product with an origin label, they are probably also willing to pay for this premium, it is assumed that this covers the cost for the producers. Consumers who do not prefer a product with an origin label will not buy it and not pay for it. If COOL become mandatory, all producers will face increasing production cost and all consumers have to buy a product with a COOL. The EDM is used to analyse the impact of the cost increase and consumer WTP on the price and demand change for both the domestic and the foreign consumers. Consumers who are highly concerned about the origin of a product are called high concerned consumer (HCC) and consumers who are not concerned about this are called low concerned consumers (LCC).

Within the model, the effect if different shocks can be calculated. These shock are perceptual changes in any of the indicators. The effect of these shocks is calculated using different elasticities, which are based the data from (Terluin et al., 2012). Most of the shocks in this model, including the

foreign demand in terms of price or WTP, are assumed to be zero. Only a cost shock and different WTP shocks are analysed. The full models and elasticities can be found in Appendix H.

Based on the findings of the survey data, which have been analysed in chapter 3.1, different scenarios have been created. These scenarios will be explained more clearly in the next section. For all scenarios, the cost shock that will be used is 3.2%. The calculation for this is explained above in chapter 3.2.

4.3.2 Scenarios

Different scenarios will be analysed using the EDM by changing the WTP shock. The aim of these scenarios is to show how different distributions of concerned and non-concerned consumer and their WTP affect the price and demand for cheese in the Netherlands. To be able to do this, the most extreme, as well as the average cases are analysed in these scenarios. The percentage WTP increase is based on the average WTP of the survey participants, calculated for HCC and LCC. For both groups, the calculated averages are including the participants who indicated they are not willing to pay anything for COOL. Table 4.13 is an overview of the different scenarios.

Table 4.13 - Different scenarios used in EDM

	Description	**Percentage in population for scenario**		**Average WTP increase**
		Concerned consumer	**Non-concerned consumer**	
Scenario 1	Only LCC	0	100	1.2
Scenario 2	Mostly LCC	25	75	1.8
Scenario 3	50/50	50	50	2.4
Scenario 4	Mostly HCC	75	25	3
Scenario 5	Only HCC	100	0	3.6

Source: survey

The first- and fifth scenarios are the most extreme scenarios, in these scenarios, there are either only LCC, which is scenario 1 or only HCC, shown in scenario 5. The survey outcomes showed that, out of the participants, 75% was highly concerned an 25% was low concerned, the participants average is shown in scenario 4. In this scenario, most of the consumers are highly concerned, but there is also a part of the consumer who is low concerned. Scenario 2 is a counterpart to this, with 75% of the people low concerned and 25% high concerned. Therefore the biggest part of the population is low concerned, but there are also some people who are high concerned. These scenarios show the effect of the average WTP in a population where the great majority of the consumers is highly concerned (scenario 4) and low concerned (scenario 2). Scenario 3 shows the average in which 50% of the population is concerned and 50% is non-concerned. These data are compared with a baseline in which cost shock is 0 and WTP shock is 0. For an additional analysis of the WTP, scenario 0 is added to the outcome table for clarification. In this scenario, there is no WTP shock and only a cost shock of 3.2%.

Table 4.14 - Outcome EDM for different scenarios

		Scenario 0	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
WTP shock	%	0	1.2	1.8	2.4	3	3.6
Cost shock	%	3.2	3.2	3.2	3.2	3.2	3.2
Total demand change	%	-1,76	-1.52	-1.40	-1.28	-1.16	-1.04
NL demand change	%	-2,16	-1.32	-0.90	-0.48	-0.06	0.36
Foreign demand change	%	-1,44	-1.68	-1.80	-1.92	-2.04	-2.16
Price change	%	3.60	4.20	4.40	4.80	5.10	5.39
New total demand	x1000kg	854693	856773	857813	858853	859893	860933
New demand NL	x1000kg	376680	379920	381539	383159	384779	386399
New demand foreign	X1000kg	478013	476854	4762704	475694	475114	474535
New price NL	€/kg	7,45	7.49	7.51	7.53	7.56	7.58

Source: EDM results

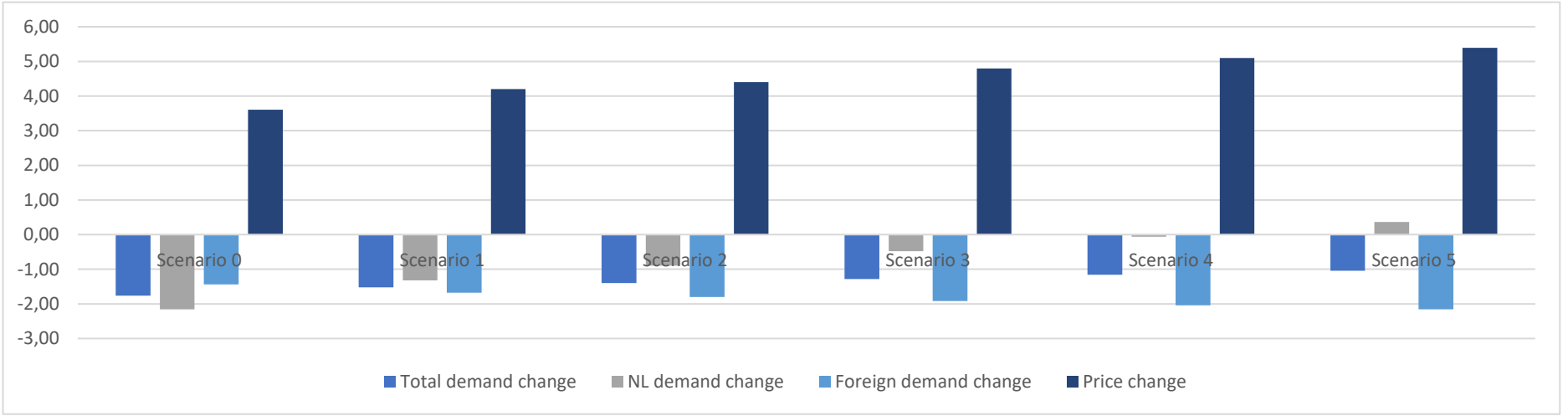

Figure 4.9 - Percentage change for demand and price in different scenarios

Source: EDM results

4.3.3 Results

The results of this EDM show the percentage demand increase for domestic, foreign and overall consumers. It also shows the percentage price change in the Netherlands. The new price and demand are also shown by multiplying the old price and demand with the percentages change. The outputs for the results of the EDM with these scenarios are shown in Table 4.14 and the percentage change are shown in Figure 4.9. It is shown that, the higher the WTP of the consumer, the higher the price of cheese. If the consumer would not be willing to pay anything extra for COOL the price change would be 3.8% with a new price of €7,45. In this case, the domestic and foreign demand would go down with a higher percentage decrease for the domestic demand than the foreign demand. When de WTP of the domestic consumers grows, the demand change for the domestic consumers comes closer to 0 and is even positive in scenario 5. Meaning the domestic consumer demand increases pertaining to the situation without labelling. On the other hand, as the domestic WTP becomes higher, the foreign demand decreases even more. Due to this, the total demand decreases in all scenarios.

In all scenarios, the price change is higher as the cost increase, meaning the producers can pass on all of their cost to the consumers, but this is not very feasible. The model calculates a long term equilibrium and assumes full competition, but for the market of cheese, there are some bigger players with more market power than other (Terluin et al., 2012).

The fourth scenario shows the average of the participants. With this WTP increases, there is barely a change in domestic demand (-0.06%). If this would give a valid representation of the Dutch market, this would mean that the WTP of the Dutch consumers would be enough to keep the demand up.

4.3.4 Conclusion

As shown in the table above. The introduction of COOL on the Dutch market would lead to a price increase which is related to the cost and the WTP of Dutch consumers. With the average WTP of the participants, the demand of the Dutch consumers would stay almost stable. On the other hand, if the Dutch WTP and the price increases, the foreign demand increases. Therefore, the overall demand will always decrease, assuming the foreign consumers are not willing to pay anything extra for COOL.

5 Discussion

Consumers are increasingly concerned about food quality, safety, production processes, and methods etc. After the mad cow disease outbreak, the European Union (EU) introduces the Food Information for Consumers (FIC) regulation (Regulation (EU) NO 1169/2011) (EU, 2011). This regulation indicates what information should be on the label of foodstuff produced within the EU. The aim of this regulation is to decrease information asymmetry and to ensure the free movement of products within the EU while providing healthy and safe food to all consumers. For some products, country of origin labelling (COOL) is part of the (obligatory) information which should be on the label. For other products, such as dairy products, the European Commission (EC) is looking into the possibilities to introduce mandatory COOL. A previous study indicated that cheese is the dairy product with the highest cost for COOL (EC, 2014). In this thesis, it has been discussed what mandatory COOL for cheese entails, what the costs for producers are and what the motivations and willingness to pay (WTP) of consumers is. Though the main focus of this study is on the demand side, an integrated demand-supply analysis is provided in order to assess the market effects of COOL faced by both the consumers and producers. It is shown that consumers have a wide variation of motives to demand products with an origin label and that the average WTP of the participants (3%) was almost high enough to cover to total additional producer costs (3.2%). The EDM even illustrated that with this amount of WTP, the demand of the Dutch consumers barely decreases.

What does mandatory COOL for cheese entail?

COOL started as an European level regulation for certain meats, vegetables, fruits, olive oil, honey, and fish. From the beginning, the idea was to expand this regulation to other products, such as dairy products and other meats, but this has not happened yet. Article 39 of the regulation allows countries to introduce national level COOL. Seven countries have already used this article to introduce national level regulations for dairy products, among which is cheese. After a trial of two years, these countries have to report their feedback to the EC, this will be at the end of 2018. The question is what will happen after this trial period. It is very plausible that these countries want to keep the COOL in place, whatever the EC decides to do on EU level. Their producers have already implemented the costs. In these trials, the country of collection and the country of transformation should be indicated on the label. This regulation is valid for domestic producers and if the collection or transformation indicates another country as the domestic country, it should be indicated as EU or non-EU. The countries imposing national COOL-schemes claim this measure does not affect trade with other countries (Brans, 2017). For the Dutch market, it is indicated as one of the main reasons for consumers to demand COOL that they prefer local food. This would mean that, even with only domestic labelling, the demand for domestic products would go up, and demand for foreign products would go down. Therefore it would affect trade with foreign markets. This would also be an incentive for the producers to buy their raw input materials domestically, disturbing the market for raw material as inputs into cheese production.

The introduction of COOL is associated with monitoring costs for the government. These costs are not discussed in this thesis or in any of the other papers discussed on this subject. With a regulation there needs to be monitoring to make sure producers comply. Without monitoring, the introduction of COOL would not be as useful. As there is already mandatory COOL for other products, the first investment in monitoring has already been made. Therefore, it is assumed the additional monitoring cost for COOL for cheese will not be very high. For further research, it is recommended looking into these monitoring costs.

What are the reasons for consumers to buy a product with an origin label?

When asking directly about their motive to buy a certain kind of cheese, origin is only for a small percentage (9.7%) of the participants the main motive. For most participants, the main motive to buy cheese is the taste (82.9%). However, one of the main motives to demand COOL is because a high

(consumer perceived) quality is associated with certain origins and quality is mainly associated with a better taste. Therefore, in case the taste is the main the motive to buy certain cheese, indirectly the origin of the cheese is also important when making the decision. Furthermore, people demand COOL because they want more transparency regarding the products they consume. This transparency gives them the feeling they know what they are consuming and how this is produced, especially regarding animal welfare. To our knowledge, no other study on COOL mentions this as a motive. It might be that the importance of animal welfare has been caused by the recent scandal about animal cruelty in slaughterhouses in Belgium. Seeing these images may have made people more aware of the conditions animals have to go through and most people are oppose to animal cruelty. The fact that this happened right across the border, probably has had an extra impact on the consumers. More research would be needed to make solid conclusion about this.

Secondly, (consumer-perceived) safety is indicated to be another main reason for consumers to demand COOL. Apparently, Dutch consumers have the feeling not all products in the EU are safe. For a product to be allowed and sold on the European market it has to comply with a minimal safety standard, therefore it should be safe. This means that products are safe for consumption and the idea of unsafe products is only based on the feeling that it is not safe.

A third important reason for Dutch consumers to demand COOL is that they want to consume locally and support the local economy. They have the feeling Dutch cheeses have a high standard and the cheeses have been produced responsibly. The latter of them is not necessarily true. According to some animal activists, the lives of cows in Dutch milk farms are not always good (Astrid, 2016; Wakkerdier). These activists say that Dutch milk cows are bred to give as much milk as possible, which they say has serious consequences for the well-being of these cows. Additional research would be needed to see to what extend this is true.

The outcomes show that sometimes, consumer motives are mainly based on the idea that Dutch products are better and safer. Consumers also prefer locally produced products to lower the environmental impact. For consumers, this impact is mainly associated with the logistical costs transportation has on the environment. Other effects on the environment are not taken into account, such as the effect a farm can have on the eco-system. Both the EC- and WEcR-study associated COOL with an additional impact on the environment because there is a possibility of an increasing CO2-emission.

This thesis adds some new insights into the motives for consumers to demand COOL. Realini et al. (2013) mainly mentioned origin, animal feed, price and safety as indicators for consumers to buy meats with a COOL. Also, the local produce aspect was shortly mentioned. The EC paper mainly focuses on quality issue. This thesis adds the demand due to animal welfare and environmental impact to this list. With regards to these motives, it is good to note that all of the above mentioned motives are based on a feeling or consumers perception. This would mean that purchase decisions are largely based on personal feeling, and not only on objective information about product characteristics.

The survey outcomes show that the participants have a higher WTP for country of origin labelling than for region of origin. This might have to do with the country or region they life in. The Netherlands is only a small country the products are presumed to be basically the same wherever in the Netherlands they are produced. If this research would have been conducted in a larger country, the results could have been the other way around. In bigger countries, there is a possibility there is a differentiation between products from different regions. In such cases, it could be that consumers associated quality or any of the other motives with a region instead of a country, in this cases it could be that consumers associated quality or any of the other motives with a region instead of a country,

in this cases it could be that consumers associated quality or any of the other motives with a region instead of a country, leading to a higher WTP for region.

What is the consumers' willingness to pay for origin labelled European cheese products?
Even though the socio-economic indicators turn out not to be significant for the WTP of COOL, there seems to be a differentiation between the different groups. The statistics in Figure 4.6 show that the higher the average households spendable income is, the higher the average WTP is. This result does not come as a surprise as it is in line with the basic economic theory of demand. For a household with a higher income, this increase would have a smaller impact on the percentage of their income which will be spend on cheese. A consumer with an income of 20.000 euros and a WTP of 24.2 cents %/kg, it would be 0.001% of his or her spendable income. While for a consumer with an income of 50.000 euros and a WTP of 45.4 cents, this would be 0.0009% of his or her spendable income. The person with a high income has an almost double WTP, but the impact on his or her spendable income is lower.

The statistics in Figure 4.6 also show that higher educated people have the lowest WTP for COOL and the participants with a medium education have the highest average WTP. When looking into this a bit further and noticed that the participants with a higher education were mainly younger while participants with a medium education are in a higher age group in this research, as illustrated in Table 5.1. This means that older participants have a higher WTP, this is also confirmed by the statistic in Figure 4.6.

Table 5.1 - Age groups participants for education

	18-25	26-45	46-65	66-75	>75	Total
Low	13	2	8	2	0	25
Percentage of total	52%	8%	32%	8%	0%	
Medium	8	10	36	8	3	65
Percentage of total	12%	15%	55%	12%	5%	
High	138	36	82	2	0	258
Percentage of total	53%	14%	32%	1%	0%	

Source: survey

Starting with the framework developed by Van Tongeren et al. (2009), this thesis used a differentiation between low concerned consumers (LCC) and high concerned consumers (HCC). This thesis confirms the existence and importance of the differentiation between these two groups. To be able to fit the data better, the terms high and low concerned consumer are used instead of concerned and non-concerned. It is shown that HCC have a higher average WTP. This contradicts the EC-study: in their study, they found that consumer are interested to know the country of origin, but are not willing to pay for this. To elaborate on this, this thesis looked into the percentage of people who are not willing to pay for COOL sorted by high and low concerned participants. This showed that out of the 88 LCC, 77.3% is not willing to pay for COOL. Out of the 262 HCC, only 40.1% is not willing to pay for COOL. This is less than halve of the HCC.

Using the empirical Tobit analysis it is shown that some indicators turned out to be significant. Following the theory and previous findings, it was not surprising that *importance_ingredients, importance_origin* and *domestic* are significant. D*iscount* might have been a little more unexpected, but looking back it does make sense, consumers who are more drawn to buying products with a discount prefer to buy products as cheap as possible. Therefore is not a shock that this significantly influences the consumers WTP negatively.

What are the effects for the European cheese producers?
Consumers were asked about the importance to know the origin of the ingredients of cheese and the importance to know where cheese is produced. It turned out a bigger part of the participants is interested in knowing the production place of a product than the origin of the ingredients. The WEcR-study used a label which indicates the place of production and the previous place the ingredients come from (e.g. one step back and one step ahead).

Where the origin is measured is also the biggest differentiation between the WEcR-study and the EC-study. The EC-study uses place of milking as the indicator of origin on the label. The WEcR study uses the place of production and the previous location of the ingredient. This is probably also the reason why the costs in the EC-study are a lot higher than in the WEcR-study. Both papers also use different methods to analyse the cost and include different action into the list of cost increasing action due to COOL. The EC-study seems to focus more on the real process of producing the milk and the logistical effect. The WEcR-study also includes the action surrounding the process, such as storage and the loss of input materials. Still, there is also a lot of overlap between the two studies. For example, they both predict additional cost due to efficiency loss which is also one of the main cost increasing factors according to FCEC (2015) paper.

The cost increase is not the only effect mandatory COOL will have on producers. If consumers know where a product originates from, their feeling toward this origin will influence their purchasing decision. This can have both positive and negative effects for the producers. If consumers have a positive differentiation value for the products of a country, they will purchase more of this product. As Dutch consumers prefer to buy local food, they would have a positive differentiation value towards Dutch products. This positive differentiation value is also the reasons for producers to use voluntary COOL.

With mandatory COOL there could be a threat that consumers are no longer willing to pay a premium for products which already have voluntary labels. This is not very plausible however. The participants in the survey indicated they want to buy products from the original country because of the better taste and quality they associate with the product. This implicates consumers are willing to pay a premium for a product originating from preferred country and this differentiation value is not dependent on whether or not all products have a label, but on the origin indicated on the label.

A negative differentiation value will also have a negative effect on the demand for the product. As a big part of the participants thinks not all products produced in the EU are safe, these consumers are assumed to have a negative differentiation value towards buying these products. This would mean that, with the introduction of COOL, consumers would know if a product originates from this country and adapt WTP for this product and their demand. If the product would have the same price as a product without this negative differentiation value, they would choose to buy the other product. This will mainly be the effect for the HCC. For LCC this is different, it can be assumed their differentiation value will not be negative for these products. The survey also shows that 55% of the participants does not look at the label of a product for the origin. In this case, it does not matter if it is on there or not, they will not use this as a motive to buy a product.

This study mainly looked into the effect of COOL for the Dutch market with both Dutch consumers and producers. It is shown that Dutch consumers have a positive attitude towards products which are produced in the Netherlands. Therefore, this thesis mainly looked into the effect of products with a positive differentiation value. To be able to get an idea of the complete impact of COOL, It would be recommended to also look into the market for products which would have a negative differentiation value and how COOL affects these products.

What is the effect of COOL considering consumer and producer perspectives?

The EDM has been the main tool to analyse the effect of COOL on the cheese market in the Netherlands and has been used as a device to integrate demand (WTP) and supply (cost of COOL). The five scenarios give a valuable overview of the effect WTP has on the market change as a result of COOL. As would have been expected with regards to the theory, as soon as the WTP increase becomes higher than the cost increase, the demand of the Dutch consumers increases further up compared to a situation without COOL. With the average WTP of the participants being 3% and the assumed cost increase 3.2%, there is only a very small loss in demand. If the cost increase would be 2.3 or 2.9 %, as is the case in the WEcR- and EC-study, there would be an increase of demand for Dutch cheese by the Dutch consumers. With an increasing WTP, there is also an increasing price which is in line with the theory. This increase in price reduces the demand for Dutch cheese of foreign consumers, as their WTP stays zero. It is not very plausible that the WTP for foreign consumers with regards to COOL is zero. If the WTP for COOL for all other European countries would be zero, these countries would not have introduced national COOL. It could be that the WTP of these consumers is only focussed on their domestic cheese and not foreign cheese. Therefore it is hard to have a value estimation of the foreign demand for Dutch cheese and It would recommend for future research to look into the foreign WTP.

The EDM outcomes also show the percentage price increase, even with zero WTP, is bigger than percentage the cost increase. This seems odd but, with a price elasticity of -0.6, cheese is an inelastic product. This means the slope of the demand function is very steep and a shift of the supply curve, due to increasing cost, along the demand curve causes a shift in the price which is bigger as the supply shift. This is shown in Figure 5.1. D_2 is steeper than D_1 and the price increase of with D_2 is also bigger, a shift from P to P'_2. This shift is also bigger as the as the shift of the supply curve (S to S').
An increase of the price higher as the costs would mean that producers would pass on all the costs to the consumers. The model calculates the long term equilibrium with the assumption of full competition. In the market of cheese, this is not necessarily the cases, some stakeholders have more market power (Terluin et al., 2012). Generally, the costs are split between the producers and the consumers. This would lead to a lower cost increase as shown in the model.

In the case, there is only a domestic WTP for COOL, the effect of COOL is different for net exporting and importing countries. Analysing the data on net trade (EC, 2014), It can be seen that most of the countries who introduced national COOL are net importers. Following the outcomes of this EDM for the Dutch market and the assumption consumers prefer local produce, national COOL would

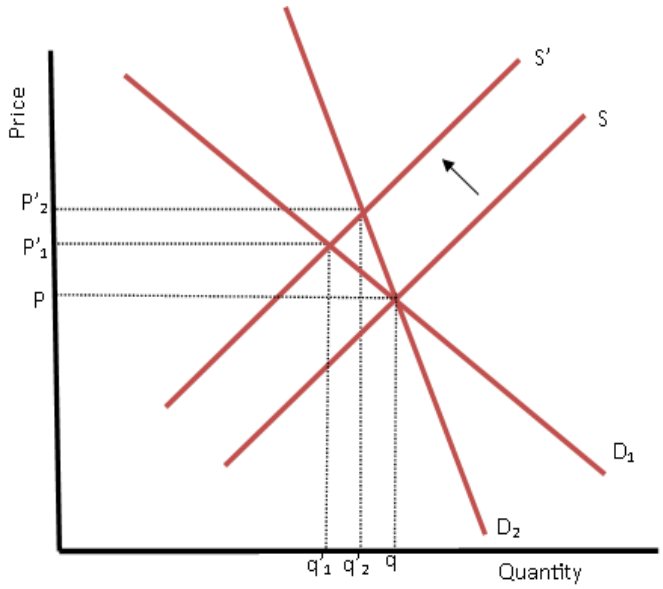

Figure 5.1 - Price reaction of supply shift

increase demand for domestic products and producers would be able to increase their production. If the domestic consumers would consume more domestic products this would decrease the demand for foreign products. For net exporting countries, if the price goes up and the foreign demand goes down, the total demand goes down. This is also the case for the Netherlands, which also is a net exporting country (EC, 2014). If the total demand decreases, the demand for raw input products, such as milk, also decreases, which could lead to the need to close farms.

5.1 Validity

This thesis has brought some new insights. Most previous studies have focussed on either gathering data for the producer costs (EC, 2014; Terluin et al., 2012) or on analysing the consumer utility and WTP (Van Tongeren et al., 2009; Van Tongeren et al., 2010). For this thesis, data on both was gathered and this was used as input for the EDM. For their calculation of the effect of COOL, Van Tongeren et al. (2009) assumed the costs for producers would be zero. The EC-study did use data from a survey on WTP for COOL for cheese but got the results consumers are interested but not willing to pay. In this thesis, the opposite of this is proven.

This thesis also provided new motives for consumers to demand products with COOL. This is also an explanation for the use and additional value of voluntary COOL.

5.2 Limitations

This thesis has had some limitations. The first limitation concerns the consumer data. These data obtained from the survey are also partly biased. The participants of the survey are a lot younger and higher educated than the real population. There is also a lack of old people in the surveyed population, probably because older people are less active on online platforms. As also mentioned by Loureiro and Umberger (2003) it is always very difficult for a survey to reflect the real effect of WTP on COOL. In addition to the high percentage of younger and low income participants, it is also possible that people who responded to this survey people with an above average interest in food and consumption of cheese. This could have influenced the average WTP positively.

Secondly, the average WTP only shows the differentiation value for consumers with regards to cheese purchasing. The survey did not contain a question about the reservation price of consumers regarding cheese. Looking back this could have been a valuable addition to this thesis.

The third limitation is the number of respondents. this is not enough to get the desired power, but it is close. With this amount of respondents, the margin of error is 5.25 instead of 5. For this thesis, it is presumed this margin is to be acceptable.

Fourthly, this survey used direct questions to ask about the participants WTP. The problem with a direct survey is that consumers sometimes tend to give socially desired answers (De Pelsmacker et al., 2005). Participants were assured anonymity and it was emphasizing that there are no wrong answers, to try and avoid these kinds of answers.

The fifth limitation mainly affects the outcome of the EDM, the assumption that the foreign WTP is zero. It can be assumed foreign consumers have a WTP for COOL, especially since other countries introduced national COOL. The foreign WTP affect the foreign demand and as the Netherlands is a net exporting country, the outcome of the EDM is largely based on the foreign demand.

The sixth limitation is on the costs side. Due to confidentiality and inaccessibility of the data, it was not possible to distinguish the full cost distribution for the costs. Therefore the cost increase used in the EDM is mainly an estimation based on the cost increase of the C- and the WEcR study.

The last limitation for this thesis the lack of time to do a more in-depth research on the producer costs side. It would have been of added value to do some expert interviews to see if there had been any changes in the production costs for cheese.

6 Conclusion

In conclusion, this thesis has shown that there are multiple motives for consumers to demand country of origin labelling. The biggest part of these motives is based on the feeling consumers have toward certain products. On average, the participants in the Dutch survey are willing to pay 3% extra for COOL for cheese. It is shown there is a substantial different between consumers with a high concern about the origin of a product and consumers with a low concern for the origin of a product. The cost of COOL for producers has been estimated to increase by 3.2%. Therefore, this WTP is almost enough to cover the cost and the demand from Dutch consumers stays largely the same.

Recommendations

For future research on COOL for cheese, a first recommendation would be to look into the monitoring cost associated with COOL. This is still a relatively unexplored issue because none of the studies on this subject go into depth about these costs. Future research could look in who should pay for these costs and how can these inspections best be executed.

Secondly, looking into the market for products for which consumers have a negative association is recommended. Some consumers have a negative association with certain countries. If they would know a product was produces here, or the ingredients are from this country, they would be willing to pay less for this product, this is a negative differentiation value. Looking into which products bear these negative differentiation values and how COOL affects these products will give a more complete overview of the impact of COOL.

Thirdly, Future research could look into the willingness to pay of foreign consumer for COOL with regards to Dutch cheese. This WTP is assumed to be zero, this is not very plausible. In order to make a valid estimation of the effect of European COOL for the Dutch producers the foreign WTP needs to be taken into account, especially in the EDM model which had been used.

The last recommendation for future research would be to update producer cost. This thesis used producers' costs which are based on number from 2013, there might have been changes over time, and therefore the cost composition and potential changes could have changed.

Based on the EDM-results, this thesis recommends against the introduction for national mandatory COOL for the Netherlands. Even though, with the average WTP of the participants, the Dutch demand mainly stays the same, foreign demand decreases if the price goes up, assuming foreign consumers are not willing to pay extra for COOL. As mentioned before, the Netherlands is a net exporting country. The demand for Dutch cheese is mainly foreign; therefore, a decrease in foreign demand will always lead to a net loss of total demand, even if the domestic demand increases, which will negatively affect the Dutch cheese producers. If there is a foreign WTP this will affect the foreign demand and if this WTP would be bigger as the price increase, the introduction of a COOL, which indicates Dutch cheese, would positively affect the Dutch producers.

The survey results show an added value for Dutch consumers in Dutch cheese. Therefore it would be recommended to permit voluntary COOL, as the producers would be able to make their own cost-benefit analysis and see if the COOL would have a positive effect on their sales.

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Appendix

Appendix A - Complete survey

Voor mijn master scriptie ben ik bezig met een onderzoek naar consumentengedrag met betrekking tot koemelk kaas. In deze vragenlijst vindt u enkele vragen die hierover gaan. Ik verzoek u deze vragen naar waarheid in te vullen, er zijn geen foute antwoorden.

1.1	Geslacht	0- Man 1- Vrouw
1.2	Leeftijd	1- Jonger dan 18 2- 18-25 3- 26-45 4- 46-65 5- 66-75 6- ouder dan 75
1.3	Hoogste genoten onderwijs	1- voortgezet onderwijs 2- MBO 3- HBO 4- WO bachelor/master/Phd 5- Anders
1.4	Jaarlijks besteedbaar inkomen	1- minder dan 20.000 euro 2- 20.001-50.000 euro 3- 50.001-80.000 euro 4- Meer dan 80.000 euro
1.5	Huishouden	1- samenwonend met kinderen 2- samenwonend zonder kinderen 3- alleenstaand met kinderen 4- alleenstaand zonder kinderen 5- Inwonend bij ouders 6- Studentenhuis 7- met vrienden 8- anders
1.6	Afkomst	1- Nederlands 2- Ander land in Europa 3- Ander land buiten Europa
1.7*	Koopt u ooit kaas	0- Nee 1- Ja

2.1*	Kijkt u ooit op het etiket van een product waar het vandaan komt	0- Nee 1- Ja
2.2*	Waar koopt u normaal gesproken kaas *Meedere opties mogelijk*	1- supermarkt 2- markt 3- kaas winkel 4- aan de deur 5- boerderij 6- anders
2.3	Heeft u voorkeur voor kazen van verse melk	0- Nee 1- Ja
2.4*	Koopt u het liefste kaas uit het land waar het oorspronkelijk vandaan komt? *Mozzarella uit Italië, Fetta uit Griekeland, Gouda uit Nederland*	0- Nee 1- Ja

3.1*	Ik heb een voorkeur voor het kopen van producten uit mijn eigen land	Schaal 1-10
3.2*	Ik koop altijd producten van hetzelfde merk/de zelfde producent	Schaal 1-10
3.4*	Voedsel van alle Europeese landen is veilig	Schaal 1-10
3.3*	Ik koop producten sneller als ze in de aanbieding zijn	Schaal 1-10
3.5*	Ik vind het belangrijk dat op een product staat waar het vandaan komt	Schaal 1-10

4.1	Hoe vaak eet u kaas?	1- Minder dan eens per maand 2- eens per maand 3- eens per twee weken 4- 1-2 keer per week 5- 3-6 keer per week 6- Dagelijks
4.2*	Hoe bepaald u welke kaas u koopt	1- veiligheid van het product 2- Effect op het milieu 3- smaak 4- prijs 5- afkomst 6- behoefte 7- anders
4.3*	Zou u willen weten waar uw kaas geproduceerd wordt	0- Nee 1- Ja
4.4*	Zou u willen weten waar de ingrediënten van uw kaas vandaan komen?	0- Nee 1- Ja

5.1*	Hoeveel zou u maximaal meer willen betalen voor een pak kaas om te weten uit welk LAND het komst *Een blok kaas kost 6 euro per 500 gram*	0- ik ben NIET bereid meer te betalen 1- Tot 5 cent meer per 500g 2- tot 30 cent meer 3- tot 60 cent meer 4- tot 1 euro meer 5- tot 1,50 meer 6- meer dan 2 euro meer
5.2*	Hoeveel zou u maximaal meer willen betalen voor een pak kaas om te weten uit welke REGIO het komst *Regio is bijvoorbeeld alpen, een blok kaas kost 6 euro per 500 gram*	0- ik ben NIET bereid meer te betalen 1- Tot 5 cent meer per 500g 2- tot 30 cent meer 3- tot 60 cent meer 4- tot 1 euro meer 5- tot 1,50 meer 6- meer dan 2 euro meer
5.3	Waarom vindt u het belangrijk om te weten waar een product vandaan komt? *Optioneel*	*Open vraag*
5.4	Email *Optioneel*	*Open vraag*

* Beantwoorden van deze vraag is verplicht

Appendix B - Summarising statistics for survey outcome

```
. sum Female Age Education Income Household Dutch etiquet
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Female	350	.7428571	.4376845	0	1
Age	350	3.008571	1.02263	2	6
Education	348	2.66954	.6049677	1	3
Income	338	1.85503	.8041001	1	3
Household	345	2.776812	1.252688	1	4
Dutch	350	1.051429	.278526	1	3
etiquet	350	.4457143	.4977559	0	1

```
. sum supermarket market Cheeseshop Doorsale Farm
```

Variable	Obs	Mean	Std. Dev.	Min	Max
supermarket	351	.8831909	.3216512	0	1
market	351	.2421652	.4290053	0	1
Cheeseshop	351	.2165242	.4124635	0	1
Doorsale	351	.022792	.1494529	0	1
Farm	351	.0626781	.242729	0	1

```
. sum Domestic Brandloyal Discount Eusafe Importence_origin
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Domestic	350	5.637143	2.382432	1	10
Brandloyal	350	5.64	2.344682	1	10
Discount	350	7.417143	2.15655	1	10
Eusafe	350	5.917143	2.162852	1	10
Importence~n	350	7.017143	2.151762	1	10

```
. sum Fresh orogin_country Eat_cheese
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Fresh	347	.29683	.4575207	0	1
orogin_cou~y	350	.5142857	.5005114	0	1
Eat_cheese	348	4.982759	.9809373	1	6

```
. sum inmoptence_production Importence_ingredients WTPland WTPregio
```

Variable	Obs	Mean	Std. Dev.	Min	Max
inmoptence~n	350	.7057143	.4563734	0	1
Importence~s	350	.6228571	.485365	0	1
WTPland	350	18	32.92781	0	200
WTPregio	350	13.87143	28.84248	0	200

Appendix C - Average WTP per group for country and region

	Category	Average WTP country	Average WTP region
	Male	12.1	11.8
Gender	Female	14.5	20.2
	18-25	11.1	13.5
	26-45	13.3	14.3
	46-65	14.1	22.1
	66-75	50.8	50.8
Age	> 75	0	0
	Voortgezet onderwijs	14.2	18.0
	MBO	19.4	29.2
	HBO/WO/Phd	12.2	14.9
Education			
	< 20.000 euro	11.1	12.1
	20.001 - 50.000 euro	14.9	20.0
	> 50.000 euro	15.3	22.7
Income			
	together with children	12.4	18.8
	together without children	19.5	23.7
	single with children	7.0	27.0
Household	single without children	10.5	13.0

Appendix D - Collinearity analysis for survey data

	Female	Age	Educat~n	Income	Househ~d	Dutch	etiquet	superm~t	market	Cheese~p	Doorsale	Farm	Fresh	orogin~y	Domestic	Brandl~l	Discount	Eusafe	Import~n	Eat_ch~e	Safety	Enviro~t	Taste	Price	Origin	Need	inmopt~n	Import~s	WTPland
Female	1																												
Age	-0.0015	1																											
Education	-0.0807	-0.2331	1																										
Income	-0.1091	0.6644	-0.0394	1																									
Household	-0.0599	-0.6721	0.1596	-0.6843	1																								
Dutch	0.0377	-0.0585	-0.0461	-0.047	0.0298	1																							
etiquet	0.1456	0.2425	-0.0716	0.1289	-0.111	0.0774	1																						
supermarket	-0.1109	-0.2051	0.0453	-0.1946	0.1008	0.0325	-0.1221	1																					
market	0.0544	0.1137	0.0063	0.1198	-0.0719	-0.0788	0.114	-0.2164	1																				
Cheeseshop	0.0583	0.2704	-0.0449	0.2412	-0.1878	-0.046	0.1482	-0.4021	0.243	1																			
Doorsale	0.0062	0.0854	0.0509	0.1505	-0.132	-0.0289	-0.0199	-0.0047	0.0025	-0.0368	1																		
Farm	-0.0856	0.0344	0.0408	0.0634	-0.0342	-0.0059	0.0827	0.0587	0.0468	0.0913	-0.0423	1																	
Fresh	0.1048	0.3838	-0.082	0.2218	-0.2161	-0.0672	0.2353	-0.1955	0.2264	0.1846	-0.0553	0.2373	1																
origin_country	0.0165	0.3935	-0.0309	0.3209	-0.2166	-0.059	0.3191	-0.1804	0.0979	0.1537	-0.0043	0.017	0.3137	1															
Domestic	-0.017	0.19	-0.079	0.0807	-0.0674	-0.0755	0.1386	-0.0887	0.0355	0.0501	-0.0001	0.0472	0.2518	0.2381	1														
Brandloyal	0.0157	-0.1299	-0.0235	-0.0878	0.0643	-0.0078	-0.1034	-0.0166	-0.1248	-0.1805	-0.0675	-0.0873	0.0043	-0.0164	0.2342	1													
Discount	0.0356	-0.3156	0.2021	-0.331	0.2674	0.0241	-0.1701	0.2517	-0.0684	-0.2404	0.0515	-0.1146	-0.2703	-0.272	-0.0273	0.085	1												
Eusafe	-0.0421	-0.1909	0.2351	-0.1136	0.1799	-0.0865	-0.1453	-0.0201	0.0606	-0.0679	0.0978	-0.0893	-0.1221	-0.132	-0.0186	0.0379	0.2042	1											
Importence_ori	0.0924	0.2751	-0.0399	0.17	-0.1256	0.0191	0.5222	-0.1939	0.1662	0.1884	-0.0364	-0.0007	0.275	0.3489	0.3093	-0.0656	-0.174	-0.079	1										
Eat_cheese	-0.0215	0.3677	-0.0566	0.3021	-0.3149	0.0326	0.1138	-0.1755	0.1338	0.2093	0.0493	-0.0584	0.1326	0.2082	0.154	0.0091	-0.1702	-0.0551	0.2178	1									
Safety	-0.0022	0.0409	0.0143	0.0336	-0.0373	0.0259	0.1086	-0.0386	0.0916	0.0228	-0.0294	0.0179	0.071	0.0795	0.015	-0.0499	-0.0129	-0.14	0.1304	0.028	1								
Environment	0.0662	-0.036	-0.0051	-0.1408	0.0938	0.0116	0.1302	-0.0578	0.1478	0.0586	-0.0345	-0.0002	0.0246	-0.0206	0.0833	-0.0275	-0.0361	-0.0442	0.1653	-0.002	0.2025	1							
Taste	0.0369	0.0649	-0.0385	0.0983	-0.022	0.0256	0.0572	-0.0118	0.1436	0.1251	-0.0335	0.0889	0.1227	-0.02	-0.0066	-0.0371	-0.0426	0.0251	0.0897	0.1703	-0.0057	-0.0173	1						
Price	0.0344	-0.4896	0.1631	-0.4397	0.39	0.0748	-0.1232	0.2754	-0.114	-0.1777	-0.0198	-0.0581	-0.2761	-0.3068	-0.1077	0.0303	0.4828	0.1622	-0.1566	-0.207	0.0278	0.046	-0.0083	1					
Origin	-0.0166	0.0643	0.05	0.0968	-0.014	0.0147	0.3236	-0.0462	0.2052	0.0531	-0.0509	0.1219	0.2134	0.2097	0.16	-0.0333	-0.1163	-0.0867	0.255	0.0189	0.2873	0.1789	0.063	0.0329	1				
Need	0.1138	-0.2436	0.1638	-0.1639	0.1957	0.0229	0.0034	0.152	0.0274	0.009	0.0709	0.0836	-0.0257	-0.0593	-0.0801	-0.0904	0.124	0.1075	-0.0057	-0.1359	0.0073	0.0616	0.0882	0.1929	0.0771	1			
importence~pro	0.0444	0.0951	-0.0026	0.0266	0.0233	0.0519	0.4012	-0.0756	0.1315	0.0065	-0.0233	0.0199	0.2276	0.3281	0.2028	-0.1051	-0.0958	-0.0016	0.5301	0.1348	0.0871	0.1455	0.0843	-0.0559	0.1921	0.041	1		
Importence~ing	0.0773	0.1337	-0.0018	0.063	-0.0212	0.0589	0.4199	-0.076	0.1069	0.0543	0.0459	-0.0093	0.1862	0.3022	0.1407	-0.0924	-0.143	-0.0636	0.5155	0.1234	0.1147	0.1457	0.0338	-0.056	0.1951	0.0478	0.6938	1	
WTPland	0.1031	0.1509	-0.1058	0.1346	-0.1148	-0.0476	0.2011	-0.0562	-0.0188	0.0751	0.0396	-0.0154	0.2066	0.184	0.1753	0.0147	-0.2207	-0.1016	0.2048	0.0753	0.0547	0.0779	0.0076	-0.1644	0.0662	-0.0663	0.1846	0.2447	1
WTPregio	0.0268	0.0964	-0.0672	0.0532	-0.0772	-0.0567	0.1665	-0.0872	0.0108	0.0676	0.0019	-0.0343	0.1505	0.0936	0.1421	0.0347	-0.1553	-0.0115	0.1974	0.0344	0.0307	0.0473	-0.0249	-0.1168	0.0837	-0.1276	0.1415	0.217	0.7657

Appendix E - Stepwise Tobit regression outcome

```
. stepwise, pr(0.05): tobit WTPland Female Age Education Income Household Dutch  etiquet supermarket market Cheeseshop Doorsale Farm
>  Fresh origin_country Domestic Brandloyal Discount Eusafe Importence_origin Eat_cheese Safety Environment Taste Price Origin Need
> importence_production Importence_ingredients, ll
                    begin with full model
p = 0.9174 >= 0.0500  removing Price
p = 0.8310 >= 0.0500  removing Household
p = 0.7958 >= 0.0500  removing Taste
p = 0.7799 >= 0.0500  removing Eusafe
p = 0.7567 >= 0.0500  removing importence_production
p = 0.7335 >= 0.0500  removing Dutch
p = 0.6274 >= 0.0500  removing Origin
p = 0.5861 >= 0.0500  removing Brandloyal
p = 0.5419 >= 0.0500  removing Safety
p = 0.5387 >= 0.0500  removing Education
p = 0.3526 >= 0.0500  removing Eat_cheese
p = 0.3920 >= 0.0500  removing Farm
p = 0.3840 >= 0.0500  removing Cheeseshop
p = 0.3197 >= 0.0500  removing origin_country
p = 0.3227 >= 0.0500  removing Environment
p = 0.2588 >= 0.0500  removing supermarket
p = 0.2638 >= 0.0500  removing Income
p = 0.2862 >= 0.0500  removing Female
p = 0.2822 >= 0.0500  removing Need
p = 0.3771 >= 0.0500  removing Age
p = 0.3428 >= 0.0500  removing Fresh
p = 0.2747 >= 0.0500  removing Doorsale
p = 0.2419 >= 0.0500  removing market
p = 0.2338 >= 0.0500  removing etiquet
p = 0.0760 >= 0.0500  removing Importence_origin

Tobit regression                                  Number of obs   =        329
                                                  LR chi2(3)      =      41.22
                                                  Prob > chi2     =     0.0000
Log likelihood = -970.09507                       Pseudo R2       =     0.0208

------------------------------------------------------------------------------
      WTPland |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
Importence_~s |   29.74537   6.530076     4.56   0.000     16.89896    42.59178
     Domestic |   3.378806   1.280834     2.64   0.009     .8590628    5.898548
     Discount |  -3.573574   1.380944    -2.59   0.010    -6.290261   -.8568877
        _cons |  -15.20109   13.97486    -1.09   0.278    -42.69337    12.29119
--------------+---------------------------------------------------------------
        /sigma |   48.27368   2.882207                      42.60361    53.94375
------------------------------------------------------------------------------

  Obs. summary:        165  left-censored observations at WTPland<=0
                       164     uncensored observations
                         0 right-censored observations

. stepwise, pr(0.1): tobit WTPland Female Age Education Income Household Dutch  etiquet supermarket market Cheeseshop Doorsale Farm
> Fresh origin_country Domestic Brandloyal Discount Eusafe Importence_origin Eat_cheese Safety Environment Taste Price Origin Need i
> mportence_production Importence_ingredients, ll
                    begin with full model
p = 0.9174 >= 0.1000  removing Price
p = 0.8310 >= 0.1000  removing Household
p = 0.7958 >= 0.1000  removing Taste
p = 0.7799 >= 0.1000  removing Eusafe
p = 0.7567 >= 0.1000  removing importence_production
p = 0.7335 >= 0.1000  removing Dutch
p = 0.6274 >= 0.1000  removing Origin
p = 0.5861 >= 0.1000  removing Brandloyal
p = 0.5419 >= 0.1000  removing Safety
p = 0.5387 >= 0.1000  removing Education
p = 0.3526 >= 0.1000  removing Eat_cheese
p = 0.3920 >= 0.1000  removing Farm
p = 0.3840 >= 0.1000  removing Cheeseshop
p = 0.3197 >= 0.1000  removing origin_country
p = 0.3227 >= 0.1000  removing Environment
p = 0.2588 >= 0.1000  removing supermarket
p = 0.2638 >= 0.1000  removing Income
p = 0.2862 >= 0.1000  removing Female
p = 0.2822 >= 0.1000  removing Need
p = 0.3771 >= 0.1000  removing Age
p = 0.3428 >= 0.1000  removing Fresh
p = 0.2747 >= 0.1000  removing Doorsale
p = 0.2419 >= 0.1000  removing market
p = 0.2338 >= 0.1000  removing etiquet

Tobit regression                                  Number of obs   =        329
                                                  LR chi2(4)      =      44.45
                                                  Prob > chi2     =     0.0000
Log likelihood = -968.48467                       Pseudo R2       =     0.0224

------------------------------------------------------------------------------
      WTPland |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
Importence_~s |   23.81584   7.277482     3.27   0.001     9.498918    38.13276
     Domestic |   2.725232   1.330652     2.05   0.041     .1074541     5.34301
Importence_o~n |   3.110275   1.747199     1.78   0.076    -.3269721    6.547522
     Discount |  -3.246423   1.394031    -2.33   0.020    -5.988887   -.5039596
        _cons |  -32.41996   17.20857    -1.88   0.060    -66.27421    1.434286
--------------+---------------------------------------------------------------
        /sigma |   48.20081   2.876843                      42.54123     53.8604
------------------------------------------------------------------------------

  Obs. summary:        165  left-censored observations at WTPland<=0
                       164     uncensored observations
                         0 right-censored observations
```

Appendix F - Stepwise OLS regression importance origin

```
. stepwise, pr(0.1) : regress Importence_origin Female Age Education Household Income Dutch
                      begin with full model
p = 0.5803 >= 0.1000  removing Income
p = 0.5350 >= 0.1000  removing Dutch
p = 0.5141 >= 0.1000  removing Education
p = 0.1076 >= 0.1000  removing Household
```

Source	SS	df	MS		
Model	129.873695	2	64.9368475	Number of obs	= 333
Residual	1458.07826	330	4.41841896	F(2, 330)	= 14.70
				Prob > F	= 0.0000
				R-squared	= 0.0818
				Adj R-squared	= 0.0762
Total	1587.95195	332	4.78298781	Root MSE	= 2.102

Importence~n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Female	.4433805	.2602953	1.70	0.089	-.0686669	.9554279
Age	.5994063	.1165246	5.14	0.000	.3701816	.8286311
_cons	4.914114	.4101378	11.98	0.000	4.1073	5.720928

Appendix G - Dutch export, import, production and consumption 2000-2016

x1000	2000	2005	2010	2013	2014	2015	2016*
Production	687300	685100	770677	814696.5	793461	870434	910742.2
Export	500335.0	561206.0	735149.1	803041.5	809259.4	840970.1	913043.2
Import	122326	167044	212662	230783	279629.7	326888.4	314626.6
Consumption	309291.0	290938.0	248189.9	242438.0	263831.3	356352.3	312325.6

Appendix H - EDM full model

		%	qntty			
demand:	domestic		385000	(1000kg)	0.44	
	foreign		841000	(1000kg)		
supply:	domestic		870000	(1000kg)		
	foreign		356000	(1000kg)		
	price:		7.19	(€/kg)		
elasticities	price nl	price for	income	pop	shock	
demand nl	-0.6	0.2	3.2	0.0	1.0	
demand for	-0.4	-1.3	0.8	0.0	1.0	(other EU ms + RoW)
supply	0.4	0.4	0.0	0.0	1.0	

model structure			A			Y	=						B						X	
equation		Q	Qd nl	Qd for	P nl				inc nl	pop nl	P for	inc for	pop for	sd nl	sd for	ss nl		inc nl	0.00	
1	Qd nl	0.0	1.0	0.0	0.6	Q*			0.00	3.20	0.20	0.00	0.00	1.00	0.00	0.00		pop nl	0.00	
2	Qd for	0.0	0.0	1.0	0.4	Qd nl*	=		0.40	0.00	0.60	0.00	0.00	0.00	1.00	0.00		P for	0.00	
3	Qs nl	1.0	0.0	0.0	-0.4	Qd for *			0.00	0.00	0.40	0.00	0.00	0.00	0.00	-1.00		inc for	0.00	
4	equil	1.0	-0.4	-0.6	0.0	P nl*			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		pop for	0.00	
			use market shares															sd nl	1.80	
																		sd for	0.00	
																		ss nl	3.20	

market equilibrium																
		A-1						B								X
	0.20	0.25	0.55	0.45			0.00	3.20	0.20	0.00	0.00	1.00	0.00	0.00		0.00
Y* =	0.70	-0.38	0.68	-0.68			0.40	0.00	0.60	0.00	0.00	0.00	1.00	0.00		0.00
	-0.20	0.75	0.45	-0.45			0.00	0.00	0.40	0.00	0.00	0.00	0.00	-1.00		0.00
	0.50	0.63	-1.13	1.13			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
																0.00
																1.80
																0.00
																3.20

			A-1 * B							X
Y* =	0.10	0.64	0.41	0.00	0.00	0.20	0.25	-0.55		0.00
	-0.15	2.24	0.18	0.00	0.00	0.70	-0.38	-0.68		0.00
	0.30	-0.64	0.59	0.00	0.00	-0.20	0.75	-0.45		0.00
	0.25	1.59	0.03	0.00	0.00	0.50	0.63	1.13		0.00
										0.00
										1.80
										0.00
										3.20

			%-change		
	Y* =		-1.40	Q*	
			-0.90	Qd nl*	
			-1.80	Qd for *	
			4.50	P nl*	
			0	P for	
	welfare impact				
		zonder OL	met OL		
NL	prijs	7.19	7.51	€/kg	
	hoeveelheid	385000	381539	1000kg	
EU	prijs	7.19	7.19	€/kg	
	hoeveelheid	485000	476274	1000kg	
	totale hh.	870000	857813.2		