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- a hedonic price model on wine sales in Sweden

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Abstract

The demand for wine in Sweden is increasing. With this increase in demand for wine it is important to establish what the characteristics the consumers are willing to pay extra for. Using this, an equilibrium for demand and supply at a suitable price can be found. This study investigates the consumers' willingness to pay for certain wine attributes through two approaches of a hedonic price model. The results show that the price of wine is affected by a great number of attributes in various ways. It is clear that the origin, taste segment and colour segment have the most impact on the price of wine.

Sammanfattning

Efterfrågan på vin I Sverige ökar. Med denna ökning I efterfrågan är det viktigt att klarlägga vilka attribut på vin som konsumenterna är villiga att betala extra för. Med hjälp av detta kan ett jämviktsläge för efterfrågan och utbudet, med ett rimligt pris, etableras på marknaden. Den här studien undersöker konsumenternas vilja att betala för specifika attribut genom två tolkningar av hedonic price modellen. Resultaten visar att priset på vin påverkas av en mängd karaktärsdrag på olika sätt. Det är tydligt att ursprung, smak och färg har den största påverkan på priset på vin.

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1 Introduction

In this chapter a short background to the problem will be introduced, followed by the problem statement. Later the aim with the study together with the research question will be presented and also a short review of the structure of the report.

1.1 Background

Winemaking have for a long time been a tradition for the humanity. The first wineries are traced to 6000 BC around Lebanon and have since then spread all over the world (Systembolaget, 2, 2018). The Greeks developed the wine industry which later on were passed on to the rest of Europe by the Romans.

The grape phylloxera from northern America is a small bug that attacks the roots of the grapevine and kills it slowly (Systembolaget, 2, 2018). From the 1860's onwards, the bug almost exterminated all grapevines in Europe. Because of this a great lack of wine arose, counterfeiting of famous wines such as Bordeaux and Bourgogne got more common. This led to a great interest of protecting the industry and the foundation of today's French legislation was created. Today, all registered origins are protected according to EU legislation and wines from outside of EU are also protected by these laws when they are sold within EU.

Alcoholic beverages in Sweden are sold by the government-owned monopoly called Systembolaget. It was founded in October 1955 when 247 small liquor companies were merged together to become what it is today (Systembolaget, 1, 2018). At the time of writing Systembolaget has about 440 stores all around Sweden, in combination with approximately 470 proxies to which you can order beverages to be delivered and withdrawn (Systembolaget, 4, 2018).

During these almost 70 years that Systembolaget have been the monopoly seller of alcoholic beverages in Sweden, a lot has happened. Already in 1956, the prices for liquor increased from 18 SEK per litre to 23.40 SEK per litre, and in 1957 a campaign called "Operation wine" is introduced to promote low alcohol beverages, as an attempt to get Swedes to drink more wine and less strong spirits (Systembolaget, 1, 2018). The same year a new concept with alcohol free "party drinks" is also introduced.

In 1958 there is another increase of the prices, which leads to a decrease in sales of liquor by 13 million litres compared to what it was in 1955 (Systembolaget, 1, 2018). Wine on the other hand has increased its sales with 6.5 litres. Later, the Swedish consumers switch some consumption from *Brännvin* to liquors like whiskey, rum and vodka, although 64% of the strong liquor consumption still consists of *Brännvin.*

The sales of wine increase with 10.7% in 1967 and the shares of light wines of total wine consumption goes from 30% in 1950 to 80% in 1967 (Systembolaget, 1, 2018). During the seventies a renovation of the pricelist is made, the four set store assortments called *A, B, C* and *D* abolishes and every store gets an individual assortment based on demand.

One appreciated tool that Systembolaget implemented in 1980 is the clock charts that shows the products characteristics and help the consumers to choose their most suited product (Systembolaget, 1, 2018). It is also a good way of taking the focus of the alcohol content and instead emphasise it on the taste characteristics.

In Systembolagets' end report for 2018 it is presented that the overall sales increased by 5 percent during 2018, with the increase consisting mainly of the products with lower alcohol content (Systembolaget, 3, 2018). According to Systembolaget the report also shows a significant increase on demand for organic and alcohol-free products.

For a long time, the classical western European wines together with parts of the "new world" wineries have been the most common ones. However, more and more countries are entering the wine market. A globalisation of the wine culture is spreading the interest of growing grapes in places that was previously unthinkable for the wine industry (Carl Jan Granqvist Vintips Vecka 9, 2018).

1.2 Problematisation

Since the 1960s, the demand for wine in Sweden is increasing like in the other Scandinavian countries (Bentzen and Smith, 2004). Before this, wine was a luxury good but is now consumed more often and among more people. This is due to many different factors; both the fact that Sweden is more multicultural, the swedes are well-travelled, they have more money which entails fine dining that includes finer drinks, but also the work by Systembolaget to reduce the swedes alcoholic intake over the years. According to the results from the paper by Lai et. al (2013) the Norwegians have applied a more European style of drinking, which means that the drinking occasions are more scattered during the week than only occurring in the weekends. This could most likely be true for the Swedes as well.

With this increase in demand for wine it is of great importance to establish what the characteristics the consumers are willing to pay extra for. For the consumers themselves the cognizance about what they are paying for and the general preferences are valuable. The increase in demand for wine leads also to an increase in interest of starting up new wine businesses. When building a start up a survey of the willingness to pay is in order to know how to position your product.

For Systembolaget it is of great interest to be aware of what attributes are of utmost importance to the wine consumers in Sweden. By knowing this, the right wines can be for sale at the perfect amount and time. Also, as the study by Lai et. al (2013) suggests, the future challenge for a wine monopoly such as Systembolaget is to establish a base on which educational exchange between the provider and the consumer can take place and be culturally encouraged. More specifically, to teach of the health and social consequences of alcohol over-consumption while also teaching of the sensory characteristics of wine, e.g. through tasting sessions and study trips (Lai et. al, 2013). In order to spread such awareness in an effort to ultimately improve the relationship between cultural behaviour and social health, Systembolaget would be helped by having a thorough analysis of their consumers buying decisions, e.g. their willingness to pay per attribute.

A study to investigate the consumers' willingness to pay for certain wine attributes is also of great significance for the established producers and other price setters. By dint of this, an equilibrium for demand and supply at a suitable price can be found.

1.3 Aim and delimitations

The purpose of this study is to analyse what attributes the Swedish consumers prefer on wines and if they are willing to pay extra for any of them. The aim is to examine how the wine prices are affected by the implicit valuations on different attributes for wine. For this thesis the research question is as follows; "*How are wine prices affected by different wine attributes such as colour segment, taste segment, distribution level, price segment and origin?"*

With this research question, the thesis aims to set up a hedonic price model for price on wine to assess the Swedish consumers' preferences for different wine attributes. By finding the implicit prices for all various attributes and the willingness to pay for them respectively, this aim can be fulfilled. This will in turn help to find answers for the problematisation statements. Finding the implicit prices for wine attributes and the willingness to pay for them, will help both consumers, producers and sellers to establish a market equilibrium. One hypothesis for this study is that at least one, possibly more, of the variables included will have an effect on the price of wine.

The study is limited to the sales of wine by Systembolaget in Sweden. Wines that have been individually imported in small volumes is not included due to lack of data. Another limitation is the fact that Systembolaget is a monopoly and violates the requirement of a free market for a hedonic price model.

1.4 Disposition

The thesis starts with an introduction to the background to illuminate the importance and interest of the research. It also gives a clearer picture of how the area can help with the performance of the study. Chapter one also includes an explanation of the problematisation and the aim and delimitations of the research. In chapter two the theoretical framework is presented as a literature review of important former studies relating to this research. This part of the thesis is of great importance for the analysis later on. This chapter also present the theory behind the hedonic price model which will be needed for the fulfilment of the research question. The third chapter is about the method choice and approach throughout the study, a section about the empirical data which gives an explanation of the data set and then a last section in this chapter; a presentation of the applied variables. Chapter four goes through the results from the study, following with an analysis and discussion in chapter five. At last, chapter six present the conclusion of the research.

2 Theoretical perspective and literature review

A lot of research has been done on wine economics in the past. In this section some significant studies that have helped and encourage the implementation of this research will be discussed. Most of these studies have used the hedonic price model, so first the theory of this model will be presented followed by a review of the significant studies. For easier overview, there is also a table with a summary of all studies in the end of this chapter.

2.1 The hedonic price model

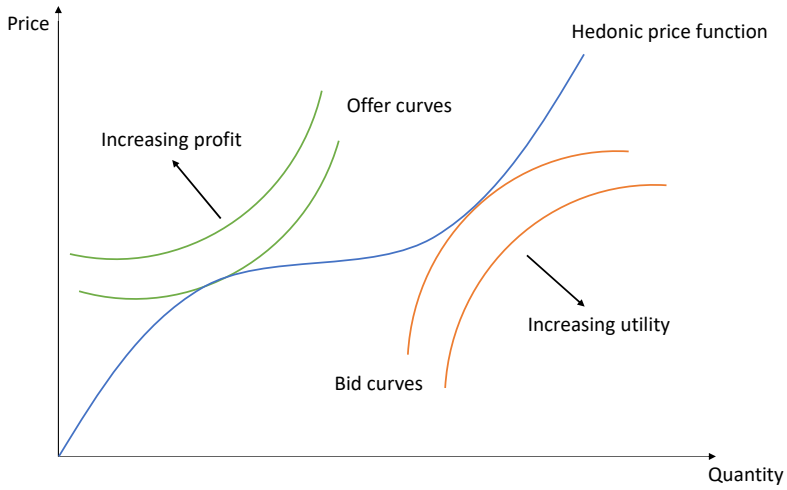
The hedonic price model is a technique to value revealed preferences. The method is commonly used to look at how land prices are influenced by the benefits of environmental quality (Perman, 2011). Ridker and Henning where the first to apply the hedonic model to environmental valuation in 1967. Later, many different variations of the model can be found. Rosen (1974) wrote about the hedonic price model, how to interpret it in different analysis and provided the first formal characterisation of the model.

As said, the most popular area to use hedonic pricing as a method is the housing industry. It is possible to find the implicit price for a house with respect to its characteristics by using the hedonic price model. This is common when looking at attributes such as clean air and closeness to nature, schools and jobs. However, the hedonic price model is not only used to such products, but also in for instance the food industry. Many studies have used the hedonic price method for valuating products such as dairy, meat, dry goods and even bottled water.

The overall utility by all the attributes of a product, together with the production cost will give the price of the product and the market equilibrium (Loke et al. 2015). When conducting the hedonic price method, a price function needs to be set up. This function aims to describe the price of a product with respect to its different quality attributes (Perman, 2011). The hedonic price function appears as an envelope function of the sellers offer curves and the buyers bid functions which means that the price function varies according to factors influencing the sellers offer curves and the buyers bid functions.

All different combinations of prices and quality attributes are shown by the buyers bid functions where every curve represent a constant level of utility. An individuals' willingness to pay for an additional unit of quality attribute is then found by taking the derivative and finding the slope of the bid curve. The offer curves work in the same way but represents instead the sellers' various levels of profits. The hedonic price function together with the offer curves and bid curves are shown in Figure 1.

Figure 1. The hedonic price function as the double envelope



Source: own drawing

To set up the hedonic price function let *h* be the market price of the product and q_i stands for its different characteristics where *i* can take values between 1 and *n.* Also, an error term, ε is included, that is representing the omitted variables. The function for the market price of the product is presented below, which gives the smallest possible price for any combination of attributes (Rosen, 1974).

$$h = h(q_1, q_2, \dots, q_n) + \varepsilon \tag{1}$$

The observed price for a good can be analysed as the sum of all the implicit prices paid for each attribute (Orrego et al., 2012). The implicit price for an attribute is in its turn found by taking the partial derivative of the price function for the product (Perman, 2011). The price for one characteristic can be called P_j.

$$P_j = \frac{\partial h(q_1, q_2, \dots, q_n)}{\partial q_j} \tag{2}$$

Also, the Lagrangian function needs to be set up for solving the hedonic pricing (Perman, 2011). Let the consumers' utility be u, x is the composite good, q is the level of attributes and y is equal to the income of the consumer. This gives us the formation of the Lagrangian function with the associated maximization problem.

$$L = u(x, q_1, q_2, \dots, q_n) + \lambda(y - x - h(q_1, q_2, \dots, q_n)) \tag{3}$$

Via the first order condition it is found that the consumers' marginal willingness to pay for the different attributes is equivalent to the derivative of the price function with respect to each attribute (Perman, 2011).

$$\frac{\partial u}{\partial x} - \lambda = 0 \quad (4)$$

After taking the first partial derivative the function can be solved for λ

$$\lambda = \frac{\partial u}{\partial x} \quad (5)$$

Then, the second partial derivative with respect to the characteristics is taken.

$$\frac{\partial u}{\partial q_i} - \lambda \frac{\partial h}{\partial q_i} = 0 \quad (6)$$

The function for λ is substituted into the derivative of the Lagrangian with respect to q_i.

$$\frac{\partial u}{\partial q_i} - \frac{\partial u}{\partial x}\frac{\partial h}{\partial q_i} = 0 \quad (7)$$

This function can then be solved for the derivative of h with respect to q_i, to find the marginal value of the attributes, which in turn is equal to the ratio of the marginal utility.

$$\frac{\partial h}{\partial q_i} = marginal\ value\ of\ attributes, ratio\ of\ marginal\ utility \quad (8)$$

There is also a second part of the hedonic price analysis (Perman, 2011). This comprises the interconnection with the consumers' demand. This is quite tricky, and it is important to determine the demand curve is with observations with different prices but the same socio-economic characteristics.

2.2 Empirical study

During this research several studies on wine economics have been identified and a synopsis of these is provided in Table 1. Below are more detailed explanations of the literature studies.

A hedonic price study of wine is presented in the article by Nerlove (1995). In this paper the hedonic price model is used in a quite different way than using a regression of price on a vector of quality attributes. Instead a regression of quantity sold on price and quality attributes is set up. This is proven to work fine seeing that the world prices can be treated as exogenous because of the size of the Swedish consumption compared to the rest of the world. This type of study is however a bit trickier to implement.

In the article by Friberg (2012) it is investigated whether expert reviews have an effect on demand for wine or not. For this research, a dataset from Systembolaget in Sweden is used. According to Friberg (2012) it is quite common that reviews and suggestions have a measurable positive impact on the demand for different goods that is significant.

In the article, the book and restaurant industries are taken as examples where studies show that the sales increases after some kind of positive review. In their research they find that the demand increases with around 6 percent the week after a favourable review occurs and the effect remains significant for another 20 weeks.

The work by Combris et al. (1997) is a hedonic price model for Bordeaux wines. The model includes both the attributes that are exposed on the bottles together with the sensory characteristics. The study shows that the hedonic price is mostly affected by the objective characteristics rather than the sensory characteristics which determine the quality more than the price.

A research that do not rely on sensory characteristics like most others, is a study of the British wine retail market by Steiner (2002). The study uses a hedonic price model to find the values which market participants place on labelling information. The data that is used includes, inter alia, country of origin, appellation, grape variety, producer and vintage. According to the study, different attributes are important in different countries. In Austria the grape varieties are of great interests, but for French wines the regional origins are valued most. This is something that are shown in other studies too. For example, in the paper by Orrego et al. (2012) a hedonic price model has been implemented on wine to compare the “old world” with the “new world” producers and consumers. The results show that wines from the “new world” is appreciated for other characteristics than “old world” wines. Thus, there is a gap in their research resulting from no cross-country analysis for “new world” wines in “old world” countries.

Oczkowski (1994) also did a hedonic price function, using Ordinary least square estimation, where he related the price of Australian wine to its attributes. The purpose of his study was to investigate premium table wine and identify the attributes that are behind this classification. Oczkowski (1994) is using data with variables such as grape variety, vintage, location and quality ratings. Together with this the recommended retail prices are used. One reason for this is to elude the effect of discounting, combined with the fact that the recommended retail price aligns better with the assumption of perfect flow of information. Also, wine producers usually set the prices according to the recommended retail prices but without knowing about the discounts. According to his studies he found six different attribute groups that explained the deviations in wine prices. Above all, the grape traits were of great importance combined with the producer size and storage.

Haeck et al. (2018) has performed a rather different study compared to former discussed studies on the wine industry. The paper presents a study on the value of geographical indications that has been carried through with historical data and temporal and geographical variations in wines in the early twentieth century. The results from the study show great impacts on prices for some Champagne wines but the impact is mostly insignificant for other wines from the Champagne district and wines from Bordeaux.

Formerly, hedonic price studies mainly concerned greater wine areas such as France, Australia and California, but Liang (2018) intend that it is of great interest to also examine small developing areas such as Kentucky. Also, the study by Liang differs from most other studies in more ways than just area. Studies by for example Oczkowski (1994) and others have a very large database that shows significant differences between red and white wines. Because of these various effects from attributes such as grape and vintage, some former studies suggest building two separate models. This is something that the research by Liang (2018) does not take into consideration since 20% of their database consists of fruit wines.

The study by Liang (2018) is conducted with three different transformations of the dependent variable. Box-Cox transformation, independent variable transformation and inverse transformation via Ordinary least square method. This means that the author applied Ordinary least square for assumed values of lambda, the box-cox parameter and picked the value of lambda which minimize the sum of square residuals. The results show that the grape variety does not influence the retail price much. This may be due to the small scale of the industry. For this kind of study to get more thorough results in the future a bigger dataset must be used.

One interesting finding is the lack of significant relationship between the grape variety and the price of the wine, by Liang (2018). One might think that the type of grape is one of the most important attributes when it comes to wine demand, but according to the study by Liang (2018) it is not. These results might be because of the lack of knowledge from the consumers, or they might prioritize the origin or the vintage instead of the type of grape.

The studies show that the preferred attributes differ all over the world and between wines produced in different parts of the world. A concluding remark from this literature review is therefore the value of research concerning this topic in all parts of the worlds, to determine the consumers' preferences. Also, some studies show the difference between wines produced in different places have different preferred attributes, which entails that the origin of the wine is a key-attribute for analysis of the wine market. Vintage seems also to be of great importance when analysing the wine market. This variable was desired to include but had to be excluded from the analysis because of missing observations.

Table 1. Summary of previous literature

Author, (year)	Purpose	Theory/Method	Main Findings
Nerlove, (1995)	Aim to find a hedonic price for wine by looking at quantity sold	Hedonic price model with a regression of quantity instead of price	Great difference between using quantity instead of price as dependent variable in hedonic pricing
Friberg, (2012)	Examine whether expert reviews have an impact on demand for wine or not	Fixed effects model	Expert reviews have a significant, positive impact on the demand
Combris et al., (1997)	Analysis of the price of Bordeaux wine concerning exposed characteristics as well as sensory characteristics	Hedonic price model including exposed attributes and sensorial characteristics	Market price is explained by the label characteristics, the quality of the wine is explained by the sensory characteristics
Steiner, (2002)	Find values that market participants place on labelling information	Hedonic price model	Different attributes are important in different countries
Orrego et al., (2012)	Comparison between Old world wines and New world wines	Hedonic price model	Different attributes are preferred for Old world wines and New world wines
Oczkowski, (1994)	Investigate premium table wine and define what attributes gives it its classification	Hedonic price model with OLS	Six groups of attributes that explain the deviations in wine prices
Haeck et al., (2018)	Analyse the regulations that link between the product quality and the production location and how that affects the price	Difference-in-difference framework	Shows significance for some champagne wines but is mostly insignificant
Liang, (2018)	Examine price of wine in small developing wine areas, in this case, Kentucky	Box-Cox transformation, independent variable transformation and inverse transformation via Ordinary least square method	Finds no significant relationship between grape variety and retail price

3 Methodology

This chapter includes three parts. The first part is about the chosen model for this thesis and why this model is suited for this research. After that follows a presentation and explanation of the data. The last part of this chapter states the variables that are included in the estimation of the empirical model. The summary statistics can be found in Appendix 1.

3.1 Model

For this research the hedonic price model has been used to find the implicit prices for wine. The reason for applying the hedonic price method for this research is owing to its good reputation from previous studies. It is a method that have been well used before and is well developed. Despite this, it is highly valued to implement this method on further studies and areas for additional development.

With a large data set on wine sales in Sweden a hedonic price model has been implemented for this research to see the Swedish consumers' willingness to pay for wines and whether they could pay extra premium to get a certain attribute such as for example a specific origin. The hedonic price model enabled to get the implicit prices for the characteristics and to see to what extent the different attributes affect the price of the product. To be able to interpret the hedonic price model a price function was needed to be set up first (Rosen, 1974). This is a function for price on wine dependent on all the characteristics that might have an impact on the price, with the natural logarithmic of the price of wine as the dependent variable. A multiple regression analysis based on ordinary least square estimation, help to find the coefficients for the function. Then, the consumers' willingness to pay for a chosen characteristic could be obtained through the partial derivatives of the price function.

The following model is the hedonic price function that lays the ground for this research;

$$\ln(P_i) = \beta_0 + \sum_{j=1}^{6} \alpha_j \times d_{ij} + \sum_{k=1}^{16} \beta_k \times t_{ik} + \sum_{l=1}^{3} \gamma_l \times c_{il} + \sum_{m=1}^{4} \theta_m \times p_{im} + \sum_{n=1}^{12} \phi_n \times o_{in} + \varepsilon \quad (9)$$

Where d_{ij} designate the level of distribution where subscript *i* defines the brand of wine and subscript *j* defines the different levels of distribution through 1 to 6; *Dist1, Dist2, Dist3, Dist4, Dist5* and *Dist6.* Furthermore t_{ik} designate the taste segment where subscript *k* is defined through 1 to 16; *Grape and floral semidry (1), Grape and floral dry (2), Fresh and fruity semidry (3), Fresh and fruity dry (4), Fruity and tasteful (5), Rich and tasteful dry (6), Semidry (7), Spicy and musty (8), Light and rounded semidry (9), Light and rounded dry (10), Soft and berry (11), Rosé (12), Red (13), Sweet (14),*

Austere and variegated (15) and *Dry (16)*. Then c_{il} designates the colour segment of the wine where subscript *l* is defined trough 1 to 3; *red (1), white (2)* and *sparkling (3),* p_{im} designates to the price segment where subscript *m* is defined through 1 to 4; *low (1), medium (2), high (3)* and *bag-in-box (4).* At last o_{in} designates the origin where the subscript *n* is defined through 1 to 12; *France (1), Germany (2), Hungary (and Austria) (3), Italy (4), Oceania (5), Portugal (6), Spain (7), South Africa (8), South America (9), South East Europe (10), Sweden (11)* and *USA (12).*

The natural logarithmic of the price of wine, P is a function of the wine attributes x_i with coefficient β_i and an error term ε, with expected value equal to zero and constant variance. The regression for this research has been implemented through ordinary least square in the statistical program Gretl.

According to a study by Steiner (2002), an interesting approach to hedonic pricing is to adjust the data which will alter the interpretation of the estimates that are produced. From previous studies by Suits (1984), Kennedy (1986) and Oczkowski (1994), the study by Steiner adjust the dummy variable coefficient estimates to avoid discarded variables in the regression. For simplification, an example is shown below.

Let the proportion of the different parameters of all characteristics that are dummy variables be named Pr_i. Then let that, together with their respective coefficient, be summed and set equal to zero. Colour segment for wine is the characteristic chosen for this example, where *RED, WHI* and *SPA* denotes red, white and sparkling wines.

$$\beta_1 * Pr_{RED} + \beta_2 * Pr_{WHI} + \beta_3 * Pr_{SPA} = 0 \tag{10}$$

By rearranging and solving for the parameter β_1, the following function is found.

$$\beta_1 = -\frac{(\beta_2 * Pr_{WHI} + \beta_3 * Pr_{SPA})}{Pr_{RED}} \tag{11}$$

The coefficient β_1 can now be replaced in the regular hedonic price function by expression (11), which yields;

$$ln(Pwine) = b0 + \beta_2 \times \left(c_{WHI} - \frac{Pr_{WHI}}{Pr_{RED}} \times c_{RED}\right) + \beta_3 \times \left(c_{SPA} - \frac{Pr_{SPA}}{Pr_{RED}} \times c_{RED}\right) + d \times Z \tag{12}$$

This adjustment will then be done for all explanatory dummy variables where one of the parameters is set as reference and its coefficient can be replaced by a function of the other parameters proportion and coefficients, and at last, they can be put together in the hedonic price function (9).

After the coefficients and standard errors for the included variables are found trough the ordinary least square regression, the variance and the marginal value (g^*), can be

calculated according to the function by Steiner (2002). The marginal value is the additional amount of money that the consumer is willing to pay if a brand of wine has the given attributes.

$$g^* = \exp(\beta - 0{,}5 * Var(c)) - 1 \quad (13)$$

Also, these values for the interchanged variables can be calculated using the proportions and the values from the variance-covariance matrix. In function 14 it is shown how the calculations for the variance for the references are carried through. This defines *c* in function (13) as the variance of β.

$$V(\beta_1) = V(\beta_2) \times \left(\frac{Pr_{WHI}}{Pr_{RED}}\right)^2 + V(\beta_3) \times \left(\frac{Pr_{SPA}}{Pr_{RED}}\right)^2 + 2 \times \left(\frac{Pr_{WHI}}{Pr_{RED}}\right) \times \left(\frac{Pr_{SPA}}{Pr_{RED}}\right) \times Cov(\beta_2, \beta_3) \quad (14)$$

At last, the relative impact can be found in percentage from the marginal value for all variables. For this research both the regular hedonic price function and the function with adjusted explanatory variables have been analysed through the ordinary least square.

3.2 Data

For this study the same data collection as for the research by Friberg (2012) have been used. This data includes the sales of wines by Systembolaget from the year of 2002 to 2006, including also the first two weeks of 2007, at different distribution levels, from the smallest distribution to 45 stores, to all 420 stores in the regular assortment. The data covers all 750 ml bottles and three litre bag-in-boxes of red, white and sparkling wines, which corresponds to 96% of Systembolagets sales of wines, excluding all temporary products (Friberg, 2012). Instead of this data set, another possibility for this research was to collect new data from Systembolaget. This data would have been more up to date compared to the one from Friberg (2012). Also, variables such as organic, rosé wines and possibly biological (sulphite free) wines could have been included. The data from Friberg was primarily chosen because of the wide range of variables that are included in the data base. However, ultimately all variables were not used, nevertheless this data was easily accessible and well structured.

The data is designed as a panel data set, which means that it includes both the time series and the cross-sectional data. Thus, the data consists of a number of entities on which each entity occurs for at least two time periods. The number of time periods in a set of panel data can be denoted T and the number of entities is denoted n. For the data set from Friberg (2012) we have observations for every week from the year 2002 to end of 2006. This means that we have 52 weeks * 5 years = 260 time periods.

(X_{it}, Y_{it}) where i=1,…,n and t=1,…,T

To simplify the analysis only the first and the last year of the data set is included, in other words 2002 and 2006. Firstly, the panel data set was transformed to cross-sectional data sets for both years. This was done so that the data set could be structured in the desired way for this research. When transforming the data, the annual average of the weekly altering values was taken. All variables included in the data set used by Friberg (2012) was not included in this study.

For the year 2002 there are 526 different wine brands, keeping 750 ml bottles and 3 litre bag-in-boxes of the same brand separated. But in 2006 the number of brands sold at Systembolaget had more than doubled. The number of brands is 1145 in 2006. Some of these observations are although not included in the regression due to lack of information about the vintage. In 2002 there are 112 observations without a vintage and for 2006 there are 160.

The price per litre was calculated to enable comparison of the price between 750 ml bottles and 3 litre bag-in-boxes. Also, the nominal prices were adjusted for inflation using the CPI with base 2002, given by Statistics Sweden (SCB, 2019). This is done to ensure reliable comparison between the two years. The cheapest wine in 2002 had a nominal price at 38 SEK per bottle. This is a red wine from Italy but with a missing vintage, which means it is not included in the regression. The cheapest wine included in the analysis for 2002 is a white wine from Hungary. The most expensive wine of this year was a Champagne from 1995 with a bottle price at 895 SEK. Looking at the data for 2006 the cheapest wine sold is even here an Italian wine with lack of information about its vintage. Although, the cheapest wine included in the regression for 2006 is also an Italian white wine from 2005, sold for the nominal price of 41 SEK per bottle. The most expensive wine in 2006 is as well as in 2002 a Champagne from 1998 with a bottle price of 1035 SEK. Yet, there is one more expensive wine sold that year that is not included in this analysis, also a Champagne with a price of 1133 SEK per bottle. For the hedonic price model, the dependent variable, price, was also calculated with the natural logarithmic. When the data for both years were fully structured and completed with these calculations, the data was transferred to Gretl for analysis.

3.3 Variables

The dependent variable for this research will be the natural logarithmic of the real price for wine. The model will also include independent variables and dummies, such as colour, still or sparkling wine, country, region and vintage. The variables that will be used for this study are listed and defined in Table 2.

There are some details with the data worth mentioning. For example, Lambrusco wines are categorized as red wines and not sparkling wines. Also, it is noted that quite a lot of wines change their names over the years, some even multiple times over one year.

This could complicate the set-up of the data set. In addition, some wines occur in both package sizes, 750 ml and three litre bag-in-boxes. These will be treated as two different wines. To simplify, all wines are identified by their article number.

There are two variables explaining the origin of the wine and they are both transformed into dummy variables, for every country and region. The distribution level is showing to what extent a wine is distributed among Systembolagets' six different distribution level groups, where the first one is all 420 stores and the second is 325 stores, which corresponds to approximately 77 percent of the volume at the time. The other distribution levels are 195, 95, 45 and less than 45 stores. This variable has as well been transformed into a dummy variable.

Table 2. Description of variables

VARIABLE NAME	NOTATION	VARIABLE DESCRIPTION
NAME	-	Name of the wine
ARTIKELNR	-	ID number of wine (given by Systembolaget)
ARTIKELID	-	ID number of brand (given by Systembolaget)
VINTAGE	-	Year of production
COUNTRY	o_i	Origin of the wine, turned into a dummy variable
PRICE	-	Nominal price per bottle/bag-in-box in SEK
LITRE PRICE	-	Nominal price per litre in SEK
REAL LITRE PRICE 2002	-	Real litre price in SEK (base 2002)
LN REAL LITRE PRICE	$Ln(P_i)$	Natural logarithmic of real litre price in SEK
DIST	d_i	Level of distribution, six different groups
TASTE_SEGMENT	t_i	Taste segment of wine (16 groups)
SEGM	c_i	Colour segment of wine
PRICE_SEGM	p_i	Price segment of wine

The variable for taste segment is categorized over sixteen different groups created by Systembolaget. Some examples are *dry*, *sweet*, *fresh and fruity semi-dry* and *spicy and musty*. All the categories are presented in Figure 2, including also the distribution of the wines for 2002. The same diagram but for 2006 is shown in Figure 3 for comparison. It can be concluded from the two diagrams that the number of wine brands have increased over the years. The trends for what taste segments are the most common to be sold are quite similar for 2002 and 2006 despite that the Fresh and fruity dry (4), Spicy and musty (8) and Soft and berry (11) have decreased their share

significantly. Fruity and tasteful (5) is still by far the most common taste segment among all wines sold at Systembolaget.

Figure 2. Diagram for distribution of taste segments in 2002

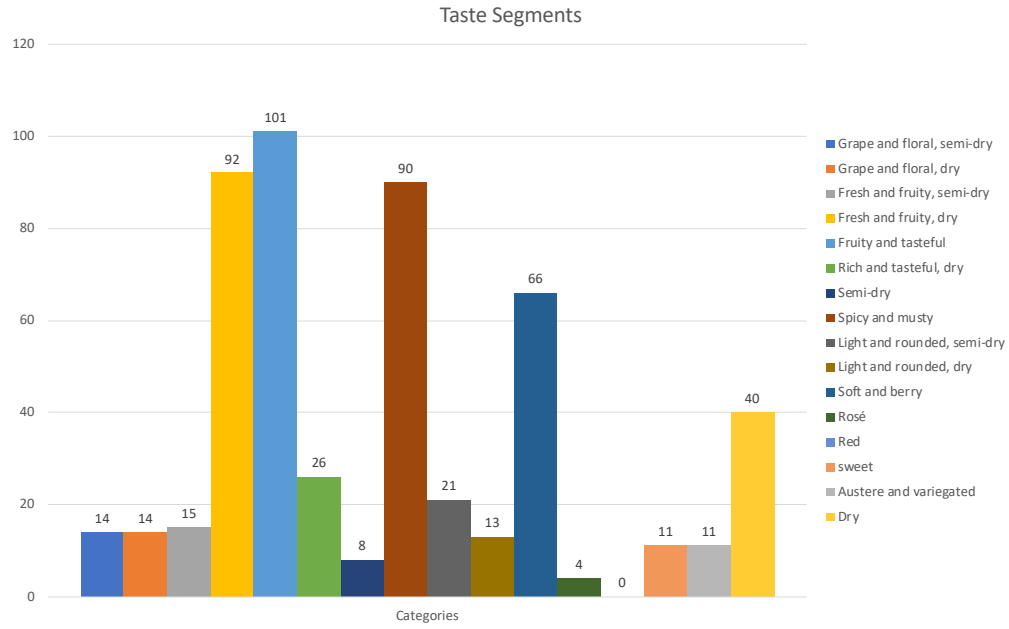
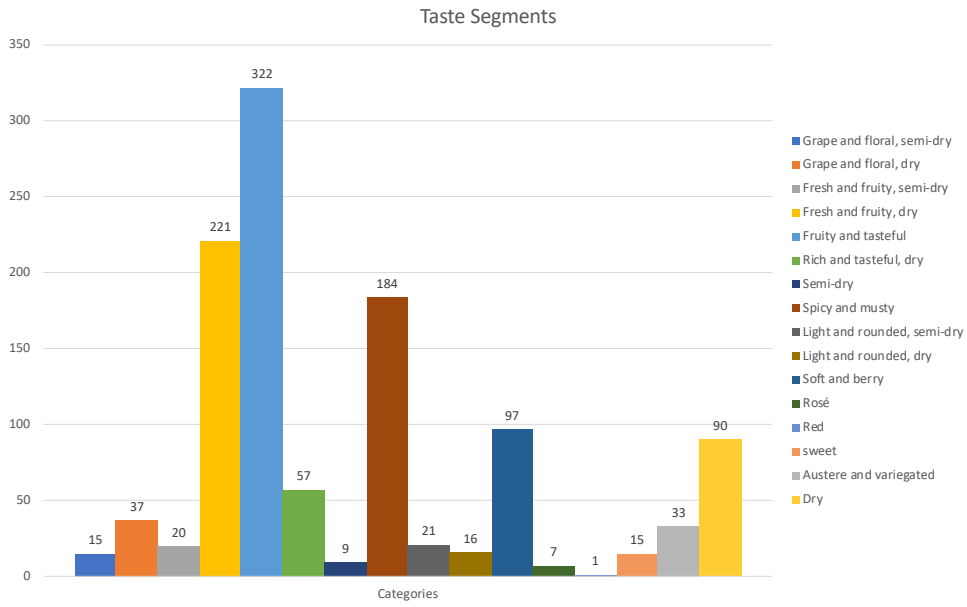


Figure 3. Diagram for distribution of taste segments in 2006



The colour segment is divided into three groups; *red*, *white* and *sparkling*. There distribution is shown in Figure 4 and 5 for year 2002 and 2006, respectively. It can be seen from the diagrams that the distribution is quite similar for the two years, with a slight increase in red wines. This increase implies a decreased share of sparkling wines and especially a percental decrease in white wines.

Figure 4. Diagram for distribution of colour segment in 2002

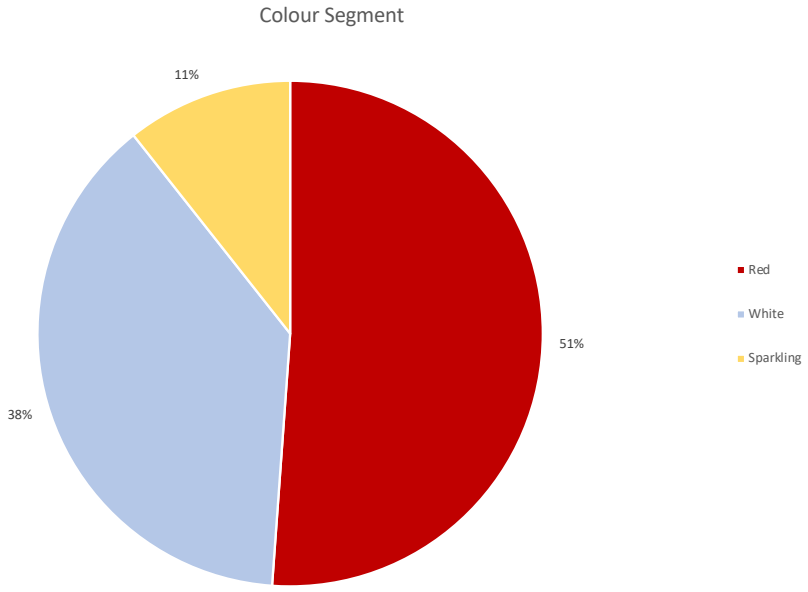
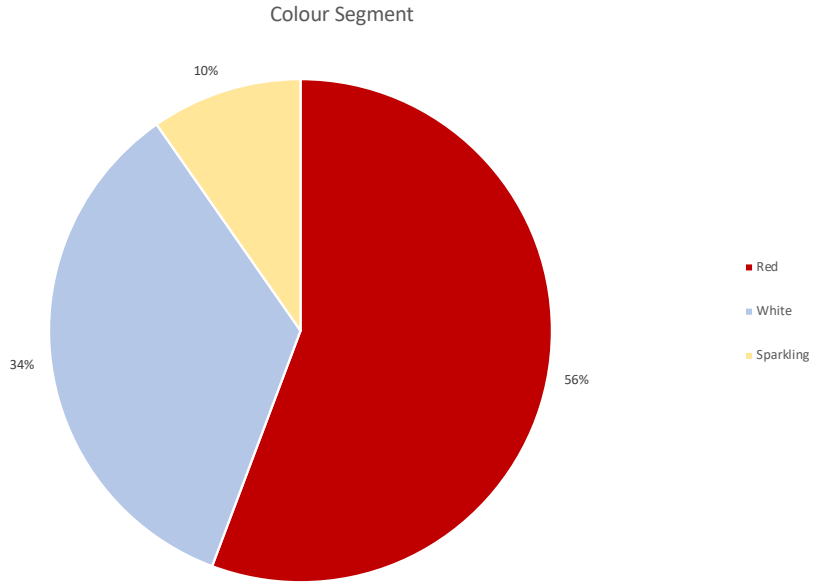


Figure 5. Diagram for distribution of colour segment in 2006



Another variable is the price segment which is a description of the price. Here there are four different groups. There is low price, medium price and high price then all the wines sold in three litre packages have their own category; bag-in-box price. In the table of the summary statistics for 2002, that can be found in Appendix 1 together with the summary statistics for 2006, it is shown that the cheapest wine sold this year was for a litre price of 41.7 SEK and the most expensive wine had a litre price of 1190 SEK. Compared to the same variable but for 2006 it is shown that the cheapest wine sold

that year is for 19.2 SEK per litre, and the most expensive had a price of 1450 SEK per litre. The distribution of the origin for all the wines in 2002 are displayed in Figure 6 and the corresponding diagram for 2006 can be found in Figure 7. It is clear that Systembolaget have a great quantity of wine with the origins France, Italy and Spain, which could be expected since these countries are big wine producers, are part of the old-world producers and are relatively close to Sweden. Except the general increase of wines from most countries, the distribution is almost identical.

Figure 6. Diagram for distribution of origin in 2002

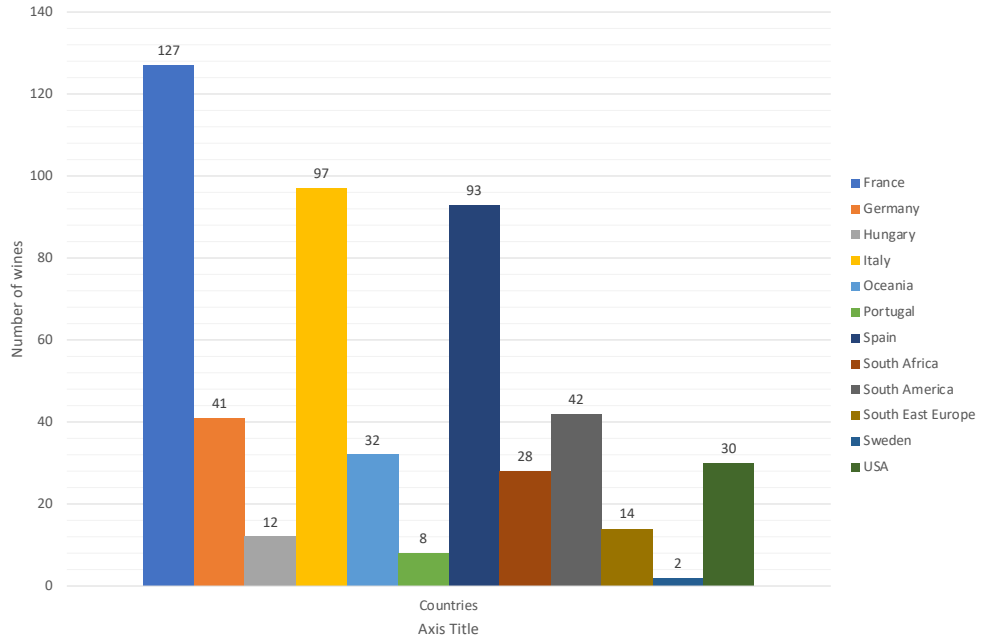
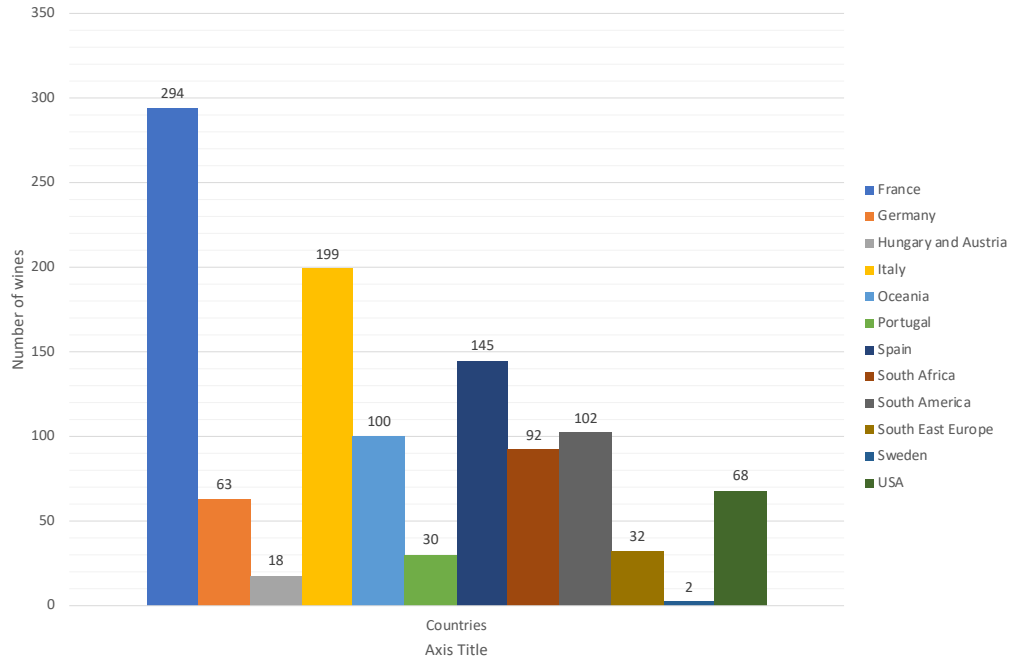


Figure 7. Diagram for distribution of origin in 2006



4 Results

This chapter will present all the results that are obtained by the empirical work. The chapter is divided by the two different scenarios; regular hedonic price function with all explanatory variables as dummies and the hedonic price function with adjusted explanatory variables. An analysis of the results will be given in the following chapter.

4.1 Results with regular hedonic price function

The ordinary least square regression for the regular hedonic price function was implemented both including and excluding the variable vintage. This was done because the vintage had multiple missing values for both years which resulted in observations being excluded from the regression. This in turns made the results misleading due to numerous collinearities, so the variable was decided to be left out from the regression to ensure more reliable results.

4.1.1 Results for 2002

The regression was done with the natural logarithmic of the real litre price as the dependent variable. In Table 3 the results from the regression for 2002 can be found.

The important sections in the ordinary least square model are first of all the coefficient and the p-value. This indicates how much the dependent variable is affected by the different variables and how significant the results are, respectively. It is desired to have a p-value as small as possible since that gives the most reliable results (Blom et al. 2013, p. 324). For easier verification, Gretl uses stars (*) that indicates the confidence interval where a 1% level of significance is displayed using three stars, i.e. the highest level.

It is also of interest to look at the obtained R-squared value and the adjusted R-squared, which should be as close to 1 as possible. The values for these two parameters in this regression is 0.8663 and 0.8567, respectively, which are both good values that tells us that the estimated model explains around 87% of the variability in the dependent variable.

The reference variables for this regression are for the distribution level; Dist1, for the taste segment; Dry, for the colour segment; Red, for the price segment; Bag-in-box and for the country origin; France. These are the references to which we can measure the changes in price compared to other variables. The estimated coefficients are compared relative to the mentioned category of wine.

The estimated coefficients for the distribution levels all have relatively small values. This indicates that their relations to the price of wine is quite small. Also, none of them

show any significance. The coefficients for the taste segment are higher and almost all of them have values around 0.2-0.3, where the highest coefficient is Spicy and musty with 0.4243. Most of the taste segments are insignificant and among the significant only two out of six have a higher level of significance than 10%, where the variable type Spicy and musty has the highest level of significance of 1%.

The colour segment and the price segment have by far the highest coefficients among all variables, which all also show a high level of significance, where the coefficient for price segment *high* has a value of 1.2551. Hungary is the country with the biggest impact on price with a coefficient of -0.26. All countries except Germany, Oceania and South Africa show a high level of significance with either two or three stars (*).

4.1.2 Results for 2006

The same regression as for 2002 was then also done for the data set for 2006 with the natural logarithmic of the real price as the dependent variable. The found results from this ordinary least square regression are displayed in Table 4.

The R-squared from the results for 2006 is 0.8598 and the adjusted R-squared has a value of 0.8552 which both indicates of a high level of explanation in variability of the dependent variable.

The results here are similar to 2002 concerning the estimated coefficients. The values are quite low for the distribution levels, still without showing any significance. The values for taste segment are a bit higher were the coefficients are now alternating around 0.3-0.4, with the biggest impact on price is for Light and rounded semidry with the value of -0.4248. This variable type shows a significance level of 5%. The variable types that are significant have altered a bit from 2002 and generally the level of significance is higher for the taste segments in 2006, even though there are still only six variable types that show any significance. Both colour segment and price segment show the highest level of significance for all variable types. The highest coefficient of all variables included in the analysis is, also here, the one for the price segment *high*, with a value of 1.2136. For the origin segment, Sweden has the biggest impact on the price with -0.2910.

Table 3. Ordinary least square regression for 2002, observations 1-526, LNRealprice is dependent variable

		Coefficient	Std. Error	t-ratio	p-value	
		(1)	*(2)*	*(3)*	*(4)*	*(5)*
	const	3.8779	0.1499	25.8600	<0.0001	***
Distribution level	Dist2	-0.0155	0.0567	-0.2739	0.7843	
	Dist3	-0.0381	0.0540	-0.7055	0.4809	
	Dist4	-0.0371	0.0504	-0.7368	0.4616	
	Dist5	-0.0469	0.0464	-1.0100	0.3131	
	Dist6	-0.0274	0.0448	-0.6118	0.5410	
Taste segment	Grapeandfloralsemidry	-0.2448	0.1879	-1.3030	0.1932	
	Grapeandfloraldry	-0.1847	0.1677	-1.1010	0.2714	
	Freshandfruitysemidry	-0.2216	0.1799	-1.2320	0.2187	
	Freshandfruitydry	-0.1800	0.1662	-1.0830	0.2793	
	Fruityandtasteful	0.3572	0.1498	2.3850	0.0175	**
	Richandtastefuldry	-0.1254	0.1667	-0.7521	0.4523	
	Semidry	-0.1796	0.0980	-1.8320	0.0675	*
	Spicyandmusty	0.4243	0.1491	2.8450	0.0046	***
	Lightandroundedsemidry	-0.3282	0.1715	-1.9140	0.0562	*
	Lightandroundeddry	-0.2955	0.1682	-1.7570	0.0795	*
	Softandberry	0.2913	0.1495	1.9480	0.0520	*
	rosA	-0.1372	0.1320	-1.0390	0.2991	
	sweet	-0.1326	0.1475	-0.8987	0.3692	
	Austereandvariegated	0.3174	0.1987	1.5980	0.1108	
Colour segment	whi	0.5052	0.0891	5.6690	<0.0001	***
	spa	0.6229	0.1383	4.5030	<0.0001	***
Price segment	l	0.2690	0.0174	15.4600	<0.0001	***
	m	0.6055	0.0221	27.4100	<0.0001	***
	h	1.2551	0.0434	28.9200	<0.0001	***
Country origin	Germany	-0.1000	0.0713	-1.4020	0.1614	
	Hungary	-0.2600	0.0401	-6.4900	<0.0001	***
	Italy	-0.0890	0.0310	-2.8710	0.0043	***
	Oceania	-0.0291	0.0300	-0.9710	0.3320	
	Portugal	-0.1410	0.0595	-2.3720	0.0181	**
	Spain	-0.1454	0.0294	-4.9490	<0.0001	***
	SouthAfrica	-0.0928	0.0435	-2.1350	0.0333	**
	SouthAmerica	-0.0161	0.0313	-0.5153	0.6066	
	SouthEastEurope	-0.2361	0.0514	-4.5930	<0.0001	***
	Sweden	-0.2320	0.0643	-3.6050	0.0003	***
	USA	-0.1342	0.0373	−3.5940	0.0004	***

Mean dependent var	4.6091	S.D. dependent var	0.4993
Sum squared resid	17.5001	S.E. of regression	0.1890
R-squared	0.8663	Adjusted R-squared	0.8567
F(41, 484)	332.9893	P-value(F)	0.0000
Log-likelihood	148.6520	Akaike criterion	-225.3039
Schwarz criterion	-71.7531	Hannan-Quinn	-165.1820

*Notes: The stars (*) represent the different level of significance where; * = 90%, ** = 95%, *** = 99%. R*eference variables; Dist1, Dry, Red, Bag-in-box and France.

Table 4. Ordinary least square regression for 2006, observations 1-1145, LNRealprice is dependent variable

		Coefficient	Std. Error	t-ratio	p-value	
		(1)	*(2)*	*(3)*	*(4)*	*(5)*
	const	4.1466	0.1755	23.6300	<0.0001	***
Distribution level	Dist2	-0.0124	0.0232	-0.5328	0.5943	
	Dist3	-0.0005	0.0226	-0.0211	0.9832	
	Dist4	-0.0239	0.0191	-1.2530	0.2103	
	Dist5	-0.0252	0.0174	-1.4460	0.1485	
	Dist6	-0.0145	0.0177	-0.8170	0.4141	
Taste segment	Grapeandfloralsemidry	-0.3263	0.1856	-1.7580	0.0790	*
	Grapeandfloraldry	-0.3073	0.1781	-1.7250	0.0848	*
	Freshandfruitysemidry	-0.2936	0.1811	-1.6210	0.1053	
	Freshandfruitydry	-0.2879	0.1779	-1.6190	0.1058	
	Fruityandtasteful	0.0275	0.1762	0.1558	0.8762	
	Richandtastefuldry	-0.2405	0.1791	-1.3430	0.1795	
	Semidry	-0.3146	0.0951	-3.3090	0.0010	***
	Spicyandmusty	0.0844	0.1760	0.4794	0.6317	
	Lightandroundedsemidry	-0.4248	0.1799	-2.3620	0.0184	**
	Lightandroundeddry	-0.3962	0.1805	-2.1950	0.0284	**
	Softandberry	-0.0565	0.1774	-0.3185	0.7502	
	rosA	-0.1221	0.0997	-1.2240	0.2213	
	rAda	-0.3470	0.0509	-6.8190	<0.0001	***
	sweet	-0.2482	0.1666	-1.4900	0.1365	
	Austereandvariegated	0.1307	0.1865	0.7011	0.4834	
Colour segment	whi	0.2896	0.0531	5.4490	<0.0001	***
	spa	0.4507	0.1678	2.6850	0.0074	***
Price segment	l	0.2723	0.0146	18.6700	<0.0001	***
	m	0.5996	0.0157	38.1200	<0.0001	***
	h	1.2136	0.0284	42.7500	<0.0001	***
Country origin	Germany	-0.0720	0.0317	-2.2660	0.0236	**
	HungaryandAustria	-0.2222	0.0354	-6.2820	<0.0001	***
	Italy	-0.0770	0.0230	-3.3510	0.0008	***
	Oceania	-0.0140	0.0224	-0.6263	0.5313	
	Portugal	-0.0920	0.0254	-3.6250	0.0003	***
	Spain	-0.1056	0.0224	-4.7140	<0.0001	***
	SouthAfrica	-0.0291	0.0263	-1.1070	0.2687	
	SouthAmerica	-0.0394	0.0200	-1.9730	0.0488	**
	SouthEastEurope	-0.1620	0.0308	-5.2680	<0.0001	***
	Sweden	-0.2910	0.0844	-3.4460	0.0006	***
	USA	-0.0842	0.0225	-3.7380	0.0002	***

Mean dependent var	4.6605	S.D. dependent var	0.5301
Sum squared resid	45.0916	S.E. of regression	0.2017
R-squared	0.8598	Adjusted R-squared	0.8552
F(42, 1102)	320.6108	P-value(F)	0.0000
Log-likelihood	227.0466	Akaike criterion	-380.0932
Schwarz criterion	-193.4962	Hannan-Quinn	-309.6409

*Notes: The stars (*) represent the different level of significance where; * = 90%, ** = 95%, *** = 99%. R*eference variables; Dist1, Dry, Red, Bag-in-box and France.

4.2 Results with adjusted explanatory variables

Now the regression was done for both years but with the adjusted dummy variables instead. Also, here the variable for vintage is not included due to the missing observations and the fact that it affects the results in a negative way.

4.2.1 Results for 2002

In Table 5, the results for the regression with adjusted explanatory variables for 2002 are presented. The relative impact for the reference variables were calculated and the obtained results from these calculations are also shown in this table. The associated covariance matrix can be found in Appendix 2.

For these results, beyond the coefficient and the p-value, the standard error is also important. It is used to calculate the variance, which in turn is used to calculate the relative impact, i.e. the marginal value for each variable. This is also done for the variables that were the base for the adjustment calculations. In this case, the chosen variables for this are the same as the reference variables for the regular hedonic price model; Dist1, Dry, Red, Bag-in-box and France. These explanatory variables are obtained by expression (11) and marked in the table with bold characters in the top of each variable list.

The significance level for the reference explanatory variables has been found by calculating the t-ratio. The function for this is expressed below.

$$t = \frac{\hat{\beta}}{Se(\hat{\beta})} \tag{15}$$

The estimated coefficient is simply divided by the standard error, where the quota tells to what percentage the variable is significant. Values around 1.64 gives a 10% significance, i.e. one star (*), values approximately equal to 1.96 gives a 5% significance interval and values higher than around 2.59 gives a 1% significance level with a three star (*) indicator.

4.2.2 Results for 2006

Even this time, the same regression as for 2002 was implemented for the data set for 2006, with the adjusted explanatory variables and without the variable for vintage. The results from the regression can be found in Table 6 and the associated covariance matrix is presented in Appendix 2. The same calculations for the variance and relative impact for the included variables were also done for 2006. It is clear that the price segment *high* has the highest relative impact with 99.78%. For the taste segment Light and rounded semidry has the biggest impact of -28.77%.

Table 5. OLS regression for 2002, adjusted dummy variables, observations 1-526,

		Coefficient *(1)*	Std. Error *(2)*	t-ratio *(3)*	p-value *(4)*	*(5)*	*Relative impact (6)*
	const	4.6091	0.0082	559.4000	<0.0001	***	99.3904
Distribution level	**calc_dist1**	0.0302	0.0417	0.7242	-		0.0298
	calc_dist2	0.0146	0.0277	0.5278	0.5978		0.0143
	calc_dist3	-0.0079	0.0224	-0.3541	0.7234		-0.0081
	calc_dist4	-0.0070	0.0173	-0.4034	0.6868		-0.0071
	calc_dist5	-0.0168	0.0136	-1.2340	0.2177		-0.0168
	calc_dist6	0.0027	0.0103	0.2611	0.7941		0.0027
Taste segment	**calc_dry**	-0.1019	0.1351	-0.7542	-		-0.1051
	calc_semidryGrapeandfloral	-0.3468	0.1024	-3.3880	0.0008	***	-0.2968
	calc_dryGrapeandfloral	-0.2867	0.0652	-4.3990	<0.0001	***	-0.2509
	calc_semidryFreshandfruity	-0.3236	0.0883	-3.6630	0.0003	***	-0.2793
	calc_dryFreshandfruity	-0.2820	0.0593	-4.7570	<0.0001	***	-0.2471
	calc_Fruityandtasteful	0.2552	0.0418	6.1010	<0.0001	***	0.2896
	calc_dryRichandtasteful	-0.2274	0.0630	-3.6080	0.0003	***	-0.2050
	calc_Semidry	-0.2816	0.1482	-1.9000	0.0580	*	-0.2537
	calc_Spicyandmusty	0.3223	0.0428	7.5370	<0.0001	***	0.3790
	calc_semidryLightandrounded	-0.4302	0.0704	-6.1110	<0.0001	***	-0.3512
	calc_dryLightandrounded	-0.3975	0.0639	-6.2200	<0.0001	***	-0.3294
	calc_Softandberry	0.1893	0.0416	4.5470	<0.0001	***	0.2074
	calc_rosAsegm	-0.2392	0.1736	-1.3780	0.1688		-0.2245
	calc_sweet	-0.2345	0.0390	-6.0070	<0.0001	***	-0.2096
	calc_Austereandvariegated	0.2154	0.1303	1.6530	0.0990	*	0.2299
Colour segment	**calc_red**	-0.2593	0.0391	-6.6317	-	***	-0.2290
	calc_Whi	0.2458	0.0547	4.4920	<0.0001	***	0.2767
	calc_Spa	0.3635	0.1229	2.9570	0.0033	***	0.4275
Price segment	**calc_l**	-0.2118	0.0097	-21.8351	-	***	-0.1909
	calc_m	0.1246	0.0135	9.2660	<0.0001	***	0.1326
	calc_h	0.7742	0.0329	23.5600	<0.0001	***	1.1677
	calc_b	-0.4809	0.0168	-28.6200	<0.0001	***	-0.3819
Country origin	**calc_France**	0.0808	0.0195	4.1436	-	***	0.0840
	calc_Germany	-0.0192	0.0634	-0.3030	0.7620		-0.0210
	calc_Hungary	-0.1792	0.0334	-5.3590	<0.0001	***	-0.1645
	calc_Italy	-0.0082	0.0184	-0.4470	0.6551		-0.0083
	calc_Oceania	0.0517	0.0214	2.4170	0.0160	**	0.0528
	calc_Portugal	-0.0602	0.0548	-1.0980	0.2725		-0.0598
	calc_Spain	-0.0646	0.0172	-3.7520	0.0002	***	-0.0627
	calc_SouthAfrica	-0.0120	0.0342	-0.3496	0.7268		-0.0125
	calc_SouthAmerica	0.0647	0.0213	3.0390	0.0025	***	0.0666
	calc_SouthEastEurope	-0.1553	0.0443	-3.5060	0.0005	***	-0.1447
	calc_Sweden	-0.1512	0.0581	-2.5990	0.0096	***	-0.1418
	calc_USA	-0.0534	0.0310	-1.7220	0.0856	*	-0.0525

Mean dependent var	4.6091	S.D. dependent var	0.4993
Sum squared resid	17.5001	S.E. of regression	0.1890
R-squared	0.8663	Adjusted R-squared	0.8567
F(41, 484)	332.9893	P-value(F)	0.0000
Log-likelihood	148.6520	Akaike criterion	-225.3039
Schwarz criterion	-71.7531	Hannan-Quinn	-165.1820

*Notes: The stars (*) represent the different level of significance where; * = 90%, ** = 95%, *** = 99%. R*eference variables; Dist1, Dry, Red, Bag-in-box and France.

Table 6. OLS regression for 2006, adjusted dummy variables, observations 1-1145,

		Coefficient *(1)*	Std. Error *(2)*	t-ratio *(3)*	p-value *(4)*	*(5)*	*Relative impact (6)*
	const	4.6605	0.0060	781.7000	<0.0001	***	104.6860
Distribution level	**calc_dist1**	0.0109	0.0108	1.0093	-		0.0109
	calc_dist2	-0.0015	0.0174	-0.0847	0.9325		-0.0016
	calc_dist3	0.0104	0.0158	0.6585	0.5103		0.0103
	calc_dist4	-0.0130	0.0126	-1.0360	0.3002		-0.0130
	calc_dist5	-0.0143	0.0105	-1.3570	0.1750		-0.0142
	calc_dist6	-0.0036	0.0105	-0.3418	0.7325		-0.0036
Taste segment	**calc_dry**	0.0867	0.1584	0.5473	-		0.0770
	calc_semidryGrapeandfloral	-0.2396	0.0644	-3.7230	0.0002	***	-0.2147
	calc_dryGrapeandfloral	-0.2205	0.0426	-5.1830	<0.0001	***	-0.1986
	calc_semidryFreshandfruity	-0.2069	0.0512	-4.0380	<0.0001	***	-0.1880
	calc_dryFreshandfruity	-0.2012	0.0384	-5.2360	<0.0001	***	-0.1828
	calc_Fruityandtasteful	0.1142	0.0270	4.2300	<0.0001	***	0.1205
	calc_dryRichandtasteful	-0.1538	0.0390	-3.9410	<0.0001	***	-0.1432
	calc_Semidry	-0.2279	0.1725	-1.3210	0.1867		-0.2156
	calc_Spicyandmusty	0.1711	0.0286	5.9740	<0.0001	***	0.1861
	calc_semidryLightandrounded	-0.3381	0.0463	-7.3080	<0.0001	***	-0.2877
	calc_dryLightandrounded	-0.3094	0.0464	-6.6640	<0.0001	***	-0.2669
	calc_Softandberry	0.0302	0.0316	0.9560	0.3393		0.0302
	calc_rosAsegm	-0.0353	0.1769	-0.1998	0.8417		-0.0497
	calc_redsegm	-0.2603	0.1527	-1.7050	0.0884	*	-0.2381
	calc_sweet	-0.1615	0.0468	-3.4520	0.0006	***	-0.1500
	calc_Austereandvariegated	0.2175	0.0679	3.2030	00014	***	0.2401
Colour segment	**calc_red**	-0.1438	0.0259	-5.5521	-	***	-0.1343
	calc_Whi	0.1457	0.0367	3.9680	<0.0001	***	0.1561
	calc_Spa	0.3068	0.1507	2.0360	0.0419	**	0.3438
Price segment	**calc_l**	-0.2491	0.0075	-33.2133	-	***	-0.2205
	calc_m	0.0781	0.0086	9.1140	<0.0001	***	0.0812
	calc_h	0.6922	0.0197	35.1300	<0.0001	***	0.9978
	calc_b	-0.5214	0.0133	-39.3300	<0.0001	***	-0.4064
Country origin	**calc_France**	0.0537	0.0130	4.1308	-	***	0.0551
	calc_Germany	-0.0182	0.0274	-0.6663	0.5053		-0.0184
	calc_Hungary	-0.1685	0.0319	-5.2750	<0.0001	***	-0.1555
	calc_Italy	-0.0233	0.0137	-1.7000	0.0893	*	-0.0231
	calc_Oceania	0.0397	0.0154	2.5720	0.0102	**	0.0404
	calc_Portugal	-0.0383	0.0204	-1.8800	0.0604	*	-0.0377
	calc_Spain	-0.0519	0.0147	-3.5240	0.0004	***	-0.0506
	calc_SouthAfrica	0.0246	0.0190	1.2930	0.1964		0.0247
	calc_SouthAmerica	0.0143	0.0123	1.1620	0.2456		0.0143
	calc_SouthEastEurope	-0.1083	0.0264	-4.1020	<0.0001	***	-0.1030
	calc_Sweden	-0.2373	0.0834	-2.8460	0.0045	***	-0.2140
	calc_USA	-0.0305	0.0168	-1.8130	0.0702	*	-0.0302

Mean dependent var	4.6605	S.D. dependent var	0.5301
Sum squared resid	45.0916	S.E. of regression	0.2017
R-squared	0.8598	Adjusted R-squared	0.8552
F(42, 1102)	320.6108	P-value(F)	0.0000
Log-likelihood	227.0466	Akaike criterion	-380.0932
Schwarz criterion	-193.4962	Hannan-Quinn	-309.6409

*Notes: The stars (*) represent the different level of significance where; * = 90%, ** = 95%, *** = 99%. R*eference variables; Dist1, Dry, Red, Bag-in-box and France.

5 Analysis and discussion

This chapter will treat the analysis and the discussion of the results presented in the previous chapter. First the result with the regular hedonic model will be analysed and discussed, followed by the same arrangement for the results with adjusted dummy variables.

5.1 Regular hedonic price model

For this research the wine characteristics' impact on the price of wine was of interest and the hypothesis says that at least some of the included variables will affect the price of wine. The results have confirmed this hypothesis and show a high level of significance which indicates trustworthy results.

As shown in the results and mentioned earlier, the two different data sets for 2002 and 2006 respectively, have a great difference in the number of observations. This causes the clear disparity between the results.

The variable distribution level with *Dist1* set as reference, show no significance in neither of the two years, which indicates no relation between distribution level and price of wine. This could be explained by Systembolagets strict rules of even prices in all stores. To derive a more explicit explanation is hindered by the fact that Systembolaget does not give a thorough explanation of the differentiation of district types.

Concerning the taste segment, the variable *dry* was set as reference which resulted in some significance for 2002. *Fruity and tasteful*, *Semidry*, *Spicy and musty*, *Light and rounded semidry*, *Light and rounded dry and Soft and berry* are the variables that show significance in 2002s' data. *Fruity and tasteful*, *Spicy and musty* and Soft and berry have positive relations to the price compared to *Dry* wines by 35.72%, 42.43% and 29.13% respectively. The others have a negative relation to price compared to dry wines, with around 10-30% decrease in price. *Light and rounded semidry* has the highest level of decrease with -32.82%. These results can be analysed by the findings by Combris et al. (1997), where it was established that the market price is explained by the label characteristics. In a free market this would mean that the Swedish consumers value wines that are Spicy and musty the most and are therefore willing to pay more for that attribute. In the case of Systembolaget, which is a monopoly, the situation changes. One could assume that the average price for Dry wines is lower than the average price for Spicy and musty, and this could depend on that Systembolaget desire a broader price range for Dry wines. This is however not the case according to this dataset and the situation is inexplicable.

For 2006 there are a number of significant variables too. The wines that are significant in 2006 are *Grape and floral semidry, Grape and floral dry, Semidry, Light and rounded*

semidry, Light and rounded dry and Rada (red). Here, all of the segments are negative compared to the reference *Dry*, which implies that the consumer is willing to pay more for dry wines compared to any other taste segment. This implies that dry wines are among the more expensive type of wines sold at Systembolaget in 2006, which is not very astonishing since most Champagnes are dry wines and they are the most expensive wines at Systembolaget. From a monopoly perspective and compared to the year 2002, perhaps Systembolaget consciously decided to sell more expensive dry wines such as champagne. Looking at the distribution of the wines over the different taste segment it is found that Systembolaget have more than doubled the number of dry wines offered. This change in willingness to pay could also be due to an increase in the number of cheaper Spicy and musty wines, or a combination of both these scenarios. The taste segments that are not significant in the results have no impact on the price. This information could be of interest to someone planning on entering the wine market, to not putting too much effort into producing wines with the taste segments that are not influencing the price.

According to the results, the coefficient for the colour segment white is positive when red is the reference variable. This is quite surprising when comparing with results from the calculations of average price for each colour segment, where it is clear that the average price for red wine is higher than the one for white wines over all the years from 2002-2006. The weighted average price has been calculated and also this shows that red wines are more expensive than white wines. An investigation of this issue has been done and it shows that the colour segment is highly collinear with the taste segment.

The price segment shows high significance for all the variables for both years. The price segment for bag-in-box is the reference and it is clear that the other variables have a positive impact on the price for wine. This is as expected since the litre price should be lower when buying greater quantities. Also, it is as expected when looking at the level of increase in price for the different variables. The variable *low price* is increasing the price by 26.90%, the *medium price* is increasing the price by 60.55% and the high price gives by far the greatest increase by as much as 125.51% in 2002. The results for 2006 are very similar as for 2002, with just a slightly higher level of increase for low price and a slight lower increase for medium and high prices.

One of the hypothesises for this study was that the origin of the wine would have a high significant impact on the price. This is supported by previous studies. By looking at the results for 2002, where France is the reference variable, it is clear that all other countries have a negative relation to the price of wine. Hungary, Italy, Portugal, Spain, South Africa, South East Europe, Sweden and USA are all significant and have negative coefficients that explains their decrease in price of wine compared to French wines. Sweden has quite a big impact on the price but there are only two different wines from Sweden where the real litre prices are 92 SEK and 81 SEK in 2002. Hungary is the origin that affects the price the most by -26%.

For 2006, Austria is also included and merged together with Hungary, they show a significant negative relation to the price. Germany is now also significant and negative. It has a decrease in price by -7.2 % compared to French wines. South Africa no longer shows any significance, instead South America show a significant negative relationship to price. Sweden has an impact on the price with -29.1% which is the highest level of decrease among all countries. Italy and Spain have both small impacts on the price which could be explained by the fact that these countries together with France are some of the greatest and oldest wine producers.

5.2 Hedonic price model with adjusted explanatory variables

When the dummy variables have been adjusted according to the calculations by Steiner (2002), the results differ a bit from before with the regular hedonic regression. However, there is a variable that still is very similar to previous results; the variable for distribution level still show no significance for neither of the two years.

The variables for taste segment for the year 2002 all show significance except for the *Rosé* segment. There are only four wines in total having the segment *Rosé* in 2002. This can be an explanation for why it is insignificant. For 2006, the variables that are insignificant are *Semidry, Soft and berry* and *Rosé*. All significant variables have a negative relation to price except *Fruity and tasteful* that show a positive marginal impact of 12.05%, *Spicy and musty* that have a relative impact of 18.61%, *Soft and berry* with 3.02% and *Austere and variegated* with 24.01% relative impact on the price. Dry wines have a relative impact of 7.70%. This means that the taste segment that has the highest willingness to pay among Swedish consumers is *Austere and variegated* since it has the highest relative impact in 2006. In 2002 on the other hand, the segment Spicy and musty has the highest willingness to pay with a relative impact on 37.90%.

The colour segment show results that are initially quite surprising. They show a high level of significance with three stars (*) which indicates a level of significance of 1%. According to the results shown in Table 7, *red* has a negative marginal value and a relative impact of -22.90% compared to *white* and *sparkling* which both have positive relative impacts with price of wine of 27.67% and 42.75% respectively. The results for 2006 show a similar relation to the price of wine, with a pervading decrease in relative impact. Both the average price and the weighted average price for the three colour segments, over the time period 2002-2006, show that sparkling wines are by far the most expensive wines, white wines are the cheapest, and red wines are slightly more expensive. This indicates that the results from the calculations for this study are not reliable. The negative relation between red wine and the price can thus be explained by the high collinearity between the colour segment and the taste segment. By running the regression without the taste segment, it can be confirmed that the results for the colour segments are as first expected. For future studies this issue needs to be taken

care of, either by omitting the colour segment or a more distinct clarification of the correlation.

When looking at the price segment for wine the results are as expected, where the litre price for bag-in-box wines are the lowest with a relative impact of -38.19% in 2002. The results for 2006 are similar.

The origin of the wine is a segment that could be imagined to be important to the consumer. The results from the regression for 2002 show no significance for *Germany, Italy, Portugal* and *South Africa* where France was the variable used for calculations of the adjustment. This could be explained by the fact that the wines from these countries are quite similar and competes on the same market and the same consumers. The relative impact for French wines on the price is 8.40% which is the highest increase of the price of all the countries in 2002. This is most likely due to the fact that all champagne wines are from France and they are the most expensive wines.

For 2006 only *Germany*, *South Africa* and *South America* lack significance. Oceania has a positive relative impact of 4.04%. France have however the highest relative impact of 5.51% on the litre price of wine, which could have the same explanation as for the results for 2002. Also, in 2006 there were 294 different wines from France sold by Systembolaget, which is considerably more than any other origin. This could also explain the high impact since France has a higher number of wines and most likely a wider distribution.

5.3 Comparison

The two different approaches to the hedonic price model both show interesting results. Although the regression with the adjusted explanatory variables, despite the fact that it requires more time to perform and requires more pervading and advanced calculations, it is more meaningful since it is possible to attribute the marginal values for all the dummy variables. When there are as much explanatory variables as for this study, with almost 40 different variables, it is easier to interpret the results when the dummies are adjusted based on this method and this enables in turns a simplified way to calculate the relative impact for all variables, even the ones that were used as base for the calculations of the adjustment. Thereof, it is preferred to implement this adjustment in future studies.

6 Conclusions

The overall conclusion from this research is simply that the price of wine is affected by a large number of different characteristics. To study the sales of wine in Sweden and the price of wine is a rather difficult task due to the fact that the market for all beverages with a high alcohol content in Sweden is a monopoly and this violates one of the main criteria of a free market for the hedonic price model to work.

The variables for the taste segments and the colour segments need to be improved to avoid collinearity and to improve the results. The price segment and the origin seem to have a great impact on the price of wine and France produces the most expensive wines, as expected.

What can more specifically be concluded from the results with the adjusted variables is that the variables with the highest willingness to pay for Swedish consumers are *Spicy and musty*, *Sparkling* and *French* wines for 2002. For 2006 the results are similar with *Sparkling* and *France*, and with *Austere and variegated* also showing great impact. Except from the variable group *price segment*, the variable *Sparkling* has the greatest impact on the price of wine, with a level of 42.75% and 34.38% respectively, among all variables for both years.

One aspect that could have been interesting to add is the level of sales, defined as the number of respective vines sold times the specific price of each respective wine. This could help to understand what the Swedish consumers actually are willing to pay for since the price does not have a high incentive to adjust according to demand in a monopoly. This addition would enable a comparison with the study by Nerlove (1995) that showed that there is a great difference in using the quantity instead of the price as the dependent variable.

This research is based on the data set from the study by Friberg (2012). However, it is chosen to omit the expert reviews as a variable since the price of wine is set before the reviews are made and remains unchanged in the Swedish monopoly market, and therefore it would not be applicable to this study.

The results from this research could be a contribution to the study by Steiner (2002) or future similar studies, since it describes and analyses the Swedish market. It could also be possible to extend this research as a confirmation to the results from the study by Orrego et al.(2012). The data for origin could be grouped to form new variables for *Old world wines* and *New world wines*, in order to compare results with the study by Orrego et al. (2012). To be able to compare the results from this research with the studies by Oczkowski (1994) and Liang (2018), the data set needs to be complemented with additional variables such as grape variety and producer size.

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Appendices

Appendix 1. Summary statistics

Summary statistics for 2002

	Variable	Mean	Median	S.D.	Min	Max
Price	Realliterprice2002	118.000	89.300	98.500	41.700	1190.000
	LNRealliterprice	4.610	4.490	0.499	3.730	7.080
Distribution level	Dist1	0.099	0.000	0.299	0.000	1.000
	Dist2	0.106	0.000	0.309	0.000	1.000
	Dist3	0.137	0.000	0.344	0.000	1.000
	Dist4	0.181	0.000	0.385	0.000	1.000
	Dist5	0.179	0.000	0.383	0.000	1.000
	Dist6	0.298	0.000	0.458	0.000	1.000
Taste segment	Grapeandfloralsemidry	0.027	0.000	0.161	0.000	1.000
	Grapeandfloraldry	0.027	0.000	0.161	0.000	1.000
	Freshandfruitysemidry	0.029	0.000	0.167	0.000	1.000
	Freshandfruitydry	0.175	0.000	0.380	0.000	1.000
	Fruityandtasteful	0.192	0.000	0.394	0.000	1.000
	Richandtastefuldry	0.049	0.000	0.217	0.000	1.000
	Semidry	0.015	0.000	0.123	0.000	1.000
	Spicyandmusty	0.171	0.000	0.377	0.000	1.000
	Lightandroundedsemidry	0.040	0.000	0.196	0.000	1.000
	Lightandroundeddry	0.025	0.000	0.155	0.000	1.000
	Softandberry	0.125	0.000	0.332	0.000	1.000
	rosA	0.008	0.000	0.087	0.000	1.000
	rAda	0.000	0.000	0.000	0.000	0.000
	sweet	0.021	0.000	0.143	0.000	1.000
	Austereandvariegated	0.021	0.000	0.143	0.000	1.000
	Dry	0.076	0.000	0.265	0.000	1.000
Colour segment	red	0.511	1.000	0.500	0.000	1.000
	whi	0.382	0.000	0.486	0.000	1.000
	spa	0.106	0.000	0.309	0.000	1.000
Price segment	l	0.523	1.000	0.500	0.000	1.000
	m	0.207	0.000	0.406	0.000	1.000
	h	0.171	0.000	0.377	0.000	1.000
	b	0.099	0.000	0.299	0.000	1.000
Country origin	France	0.241	0.000	0.428	0.000	1.000
	Germany	0.078	0.000	0.268	0.000	1.000
	Hungary	0.023	0.000	0.149	0.000	1.000
	Italy	0.184	0.000	0.388	0.000	1.000
	Oceania	0.061	0.000	0.239	0.000	1.000
	Portugal	0.015	0.000	0.123	0.000	1.000
	Spain	0.177	0.000	0.382	0.000	1.000
	SouthAfrica	0.053	0.000	0.225	0.000	1.000
	SouthAmerica	0.080	0.000	0.271	0.000	1.000
	SouthEastEurope	0.027	0.000	0.161	0.000	1.000
	Sweden	0.004	0.000	0.062	0.000	1.000
	USA	0.057	0.000	0.232	0.000	1.000

Summary statistics for 2006

	Variable	*Mean*	*Median*	*S.D.*	*Min*	*Max*
Price	realliterprice2006	126.000	92.900	109.000	19.200	1450.000
	LNRealliterprice	4.660	4.530	0.530	2.950	7.280
Distribution level	Dist1	0.299	0.000	0.458	0.000	1.000
	Dist2	0.106	0.000	0.308	0.000	1.000
	Dist3	0.137	0.000	0.344	0.000	1.000
	Dist4	0.145	0.000	0.352	0.000	1.000
	Dist5	0.141	0.000	0.349	0.000	1.000
	Dist6	0.172	0.000	0.378	0.000	1.000
Taste segment	Grapeandfloralsemidry	0.013	0.000	0.114	0.000	1.000
	Grapeandfloraldry	0.032	0.000	0.177	0.000	1.000
	Freshandfruitysemidry	0.018	0.000	0.131	0.000	1.000
	Freshandfruitydry	0.193	0.000	0.395	0.000	1.000
	Fruityandtasteful	0.281	0.000	0.450	0.000	1.000
	Richandtastefuldry	0.050	0.000	0.218	0.000	1.000
	Semidry	0.008	0.000	0.088	0.000	1.000
	Spicyandmusty	0.161	0.000	0.367	0.000	1.000
	Lightandroundedsemidry	0.018	0.000	0.134	0.000	1.000
	Lightandroundeddry	0.014	0.000	0.117	0.000	1.000
	Softandberry	0.085	0.000	0.279	0.000	1.000
	rosA	0.006	0.000	0.078	0.000	1.000
	rAda	0.001	0.000	0.030	0.000	1.000
	sweet	0.013	0.000	0.114	0.000	1.000
	Austereandvariegated	0.029	0.000	0.167	0.000	1.000
	Dry	0.079	0.000	0.269	0.000	1.000
Colour segment	red	0.557	1.000	0.497	0.000	1.000
	whi	0.346	0.000	0.476	0.000	1.000
	spa	0.097	0.000	0.296	0.000	1.000
Price segment	l	0.411	0.000	0.492	0.000	1.000
	m	0.257	0.000	0.437	0.000	1.000
	h	0.210	0.000	0.408	0.000	1.000
	b	0.121	0.000	0.327	0.000	1.000
Country origin	France	0.257	0.000	0.437	0.000	1.000
	Germany	0.055	0.000	0.228	0.000	1.000
	HungaryandAustria	0.016	0.000	0.124	0.000	1.000
	Italy	0.174	0.000	0.379	0.000	1.000
	Oceania	0.087	0.000	0.282	0.000	1.000
	Portugal	0.026	0.000	0.160	0.000	1.000
	Spain	0.127	0.000	0.333	0.000	1.000
	SouthAfrica	0.080	0.000	0.272	0.000	1.000
	SouthAmerica	0.089	0.000	0.285	0.000	1.000
	SouthEastEurope	0.028	0.000	0.165	0.000	1.000
	Sweden	0.002	0.000	0.042	0.000	1.000
	USA	0.059	0.000	0.236	0.000	1.000

Appendix 2. Covariance matrix

Covariance matrix for 2002 with adjusted explanatory variables

const	calc_2	calc_3	calc_4	
0.00007	-0.00002	-0.00003	-0.00001	**const**
	0.00077	-0.00003	-0.00007	**calc_2**
		0.00050	-0.00004	**calc_3**
			0.00030	**calc_4**

calc_5	calc_6	calc_semidryGrapeandfloral	calc_dryGrapeandfloral	
-0.00002	0.00000	-0.00001	-0.00008	**const**
-0.00007	-0.00006	0.00015	0.00021	**calc_2**
-0.00004	-0.00006	-0.00010	0.00015	**calc_3**
-0.00003	-0.00004	0.00020	0.00011	**calc_4**
0.00018	-0.00001	0.00007	0.00009	**calc_5**
	0.00011	0.00017	0.00007	**calc_6**
		0.01048	0.00253	**calc_semidryGrapeandfloral**
			0.00425	**calc_dryGrapeandfloral**

calc_semidryFreshandfruity	calc_dryFreshandfruity	calc_Fruityandtasteful	calc_dryRichandtasteful	
-0.00006	-0.00009	0.00006	-0.00011	**const**
0.00010	0.00022	-0.00002	0.00007	**calc_2**
-0.00010	0.00011	-0.00003	0.00016	**calc_3**
0.00023	0.00017	-0.00015	0.00017	**calc_4**
0.00007	0.00009	-0.00012	0.00018	**calc_5**
0.00021	0.00008	-0.00012	0.00008	**calc_6**
0.00780	0.00259	-0.00224	0.00262	**calc_semidryGrapeandfloral**
0.00273	0.00311	-0.00169	0.00309	**calc_dryGrapeandfloral**
0.00780	0.00281	-0.00224	0.00286	**calc_semidryFreshandfruity**
	0.00351	-0.00175	0.00328	**calc_dryFreshandfruity**
		0.00175	-0.00178	**calc_Fruityandtasteful**
			0.00397	**calc_dryRichandtasteful**

calc_Semidry	calc_Spicyandmusty	calc_semidryLightandrounded	calc_dryLightandrounded	
-0.00007	0.00006	-0.00005	-0.00007	**const**
0.00011	-0.00012	0.00017	0.00017	**calc_2**
-0.00019	-0.00003	-0.00003	-0.00013	**calc_3**
-0.00013	-0.00009	0.00017	0.00011	**calc_4**
0.00026	-0.00012	0.00005	0.00014	**calc_5**
0.00026	-0.00011	0.00017	0.00011	**calc_6**
-0.00137	-0.00216	0.00539	0.00258	**calc_semidryGrapeandfloral**
-0.00242	-0.00170	0.00285	0.00300	**calc_dryGrapeandfloral**
-0.00126	-0.00215	0.00516	0.00279	**calc_semidryFreshandfruity**
-0.00256	-0.00186	0.00292	0.00313	**calc_dryFreshandfruity**
-0.00153	0.00145	-0.00199	-0.00167	**calc_Fruityandtasteful**
-0.00251	-0.00188	0.00295	0.00315	**calc_dryRichandtasteful**
0.02196	-0.00141	-0.00182	-0.00247	**calc_Semidry**
	0.00183	-0.00193	-0.00172	**calc_Spicyandmusty**

		0.00495	0.00290	**calc_semidryLightandrounded**
			0.00408	**calc_dryLightandrounded**
calc_Softandberry	**calc_rosAsegm**	**calc_sweet**	**calc_Austereandvariegated**	
0.00006	-0.00019	-0.00009	0.00020	**const**
-0.00008	0.00047	0.00026	-0.00087	**calc_2**
-0.00008	0.00028	0.00021	-0.00034	**calc_3**
-0.00011	0.00020	0.00010	-0.00021	**calc_4**
-0.00010	0.00013	0.00003	-0.00001	**calc_5**
-0.00008	0.00017	0.00002	-0.00007	**calc_6**
-0.00212	-0.00237	-0.00093	-0.00268	**calc_semidryGrapeandfloral**
-0.00162	-0.00184	-0.00041	-0.00242	**calc_dryGrapeandfloral**
-0.00210	-0.00210	-0.00074	-0.00275	**calc_semidryFreshandfruity**
-0.00171	-0.00190	-0.00033	-0.00247	**calc_dryFreshandfruity**
0.00147	-0.00184	0.00048	0.00162	**calc_Fruityandtasteful**
-0.00176	-0.00180	-0.00028	-0.00219	**calc_dryRichandtasteful**
-0.00140	0.01558	-0.00066	-0.00240	**calc_Semidry**
0.00144	-0.00166	0.00041	0.00171	**calc_Spicyandmusty**
-0.00187	-0.00207	-0.00060	-0.00257	**calc_semidryLightandrounded**
-0.00158	-0.00221	-0.00051	-0.00205	**calc_dryLightandrounded**
0.00173	-0.00175	0.00047	0.00136	**calc_Softandberry**
	0.03013	0.00008	-0.00266	**calc_rosAsegm**
		0.00152	-0.00018	**calc_sweet**
			0.01699	**calc_Austereandvariegated**
calc_Whi	**calc_Spa**	**calc_m**	**calc_h**	
0.00006	0.00012	-0.00003	0.00012	**const**
-0.00009	-0.00011	0.00002	0.00004	**calc_2**
-0.00008	0.00000	-0.00003	-0.00023	**calc_3**
-0.00015	-0.00004	-0.00001	0.00001	**calc_4**
-0.00010	-0.00020	0.00002	-0.00001	**calc_5**
-0.00009	-0.00011	0.00001	0.00005	**calc_6**
-0.00300	0.00246	0.00008	0.00025	**calc_semidryGrapeandfloral**
-0.00295	0.00239	0.00004	0.00019	**calc_dryGrapeandfloral**
-0.00312	0.00241	0.00008	0.00026	**calc_semidryFreshandfruity**
-0.00307	0.00237	0.00006	0.00020	**calc_dryFreshandfruity**
0.00170	0.00119	-0.00004	-0.00005	**calc_Fruityandtasteful**
-0.00314	0.00233	0.00003	0.00007	**calc_dryRichandtasteful**
0.00246	-0.01531	0.00005	0.00019	**calc_Semidry**
0.00169	0.00118	-0.00006	-0.00014	**calc_Spicyandmusty**
-0.00306	0.00249	0.00010	0.00025	**calc_semidryLightandrounded**
-0.00299	0.00254	0.00009	0.00031	**calc_dryLightandrounded**
0.00164	0.00117	-0.00001	0.00006	**calc_Softandberry**
0.00200	-0.01570	0.00002	-0.00046	**calc_rosAsegm**
0.00045	0.00046	0.00004	-0.00006	**calc_sweet**

0.00188	0.00156	-0.00015	-0.00088	**calc_Austereandvariegated**
0.00299	-0.00255	-0.00004	-0.00010	**calc_Whi**
	0.01512	0.00002	0.00004	**calc_Spa**
		0.00018	-0.00010	**calc_m**
			0.00108	**calc_h**

calc_b	calc_Germany	calc_Hungary	calc_Italy	
-0.00004	-0.00002	-0.00003	-0.00001	**const**
-0.00003	-0.00008	0.00003	0.00004	**calc_2**
0.00006	0.00008	-0.00001	0.00002	**calc_3**
0.00005	-0.00005	0.00006	0.00005	**calc_4**
0.00002	0.00006	0.00004	-0.00001	**calc_5**
-0.00002	-0.00008	0.00000	-0.00001	**calc_6**
0.00006	-0.00474	0.00052	0.00036	**calc_semidryGrapeandfloral**
0.00002	0.00030	-0.00010	-0.00012	**calc_dryGrapeandfloral**
0.00007	-0.00403	0.00048	0.00027	**calc_semidryFreshandfruity**
0.00000	0.00035	0.00002	-0.00018	**calc_dryFreshandfruity**
-0.00007	0.00046	-0.00010	0.00002	**calc_Fruityandtasteful**
0.00007	0.00037	0.00020	-0.00024	**calc_dryRichandtasteful**
0.00005	-0.00113	-0.00014	0.00037	**calc_Semidry**
0.00001	0.00036	-0.00006	0.00009	**calc_Spicyandmusty**
0.00004	-0.00201	0.00035	0.00006	**calc_semidryLightandrounded**
-0.00004	0.00035	0.00002	-0.00022	**calc_dryLightandrounded**
-0.00012	0.00042	-0.00006	0.00009	**calc_Softandberry**
0.00022	0.00007	0.00019	0.00024	**calc_rosAsegm**
0.00008	0.00030	0.00015	-0.00012	**calc_sweet**
0.00014	0.00055	-0.00008	-0.00062	**calc_Austereandvariegated**
-0.00006	0.00005	-0.00015	0.00019	**calc_Whi**
-0.00003	0.00007	0.00000	-0.00022	**calc_Spa**
-0.00001	0.00001	0.00005	0.00003	**calc_m**
-0.00026	-0.00001	0.00002	0.00002	**calc_h**
0.00028	-0.00007	0.00000	-0.00002	**calc_b**
	0.00402	-0.00029	-0.00044	**calc_Germany**
		0.00112	0.00000	**calc_Hungary**
			0.00034	**calc_Italy**

calc_Oceania	calc_Portugal	calc_Spain	calc_SouthAfrica	
0.00000	0.00003	-0.00001	0.00001	**const**
0.00002	-0.00021	0.00007	-0.00002	**calc_2**
-0.00006	-0.00003	0.00004	-0.00012	**calc_3**
0.00003	0.00001	0.00001	-0.00001	**calc_4**
-0.00001	0.00001	-0.00001	0.00000	**calc_5**
-0.00001	0.00004	-0.00002	0.00006	**calc_6**
0.00044	0.00046	0.00020	0.00059	**calc_semidryGrapeandfloral**
-0.00002	-0.00003	0.00002	0.00012	**calc_dryGrapeandfloral**
0.00037	0.00040	0.00015	0.00055	**calc_semidryFreshandfruity**
-0.00014	-0.00010	0.00007	-0.00005	**calc_dryFreshandfruity**
-0.00005	-0.00007	0.00007	-0.00013	**calc_Fruityandtasteful**
-0.00021	-0.00003	0.00005	-0.00017	**calc_dryRichandtasteful**
0.00012	0.00011	-0.00020	0.00035	**calc_Semidry**

0.00009	-0.00004	-0.00012	-0.00005	**calc_Spicyandmusty**
0.00019	0.00023	0.00003	0.00036	**calc_semidryLightandrounded**
-0.00007	0.00001	-0.00003	0.00003	**calc_dryLightandrounded**
0.00002	0.00006	0.00000	-0.00007	**calc_Softandberry**
0.00000	-0.00017	-0.00015	0.00009	**calc_rosAsegm**
-0.00002	-0.00005	0.00013	0.00001	**calc_sweet**
0.00016	0.00006	-0.00005	-0.00023	**calc_Austereandvariegated**
0.00004	0.00001	0.00002	-0.00004	**calc_Whi**
0.00005	0.00012	-0.00001	-0.00004	**calc_Spa**
-0.00002	0.00007	0.00002	0.00005	**calc_m**
0.00003	0.00010	0.00005	0.00019	**calc_h**
0.00001	0.00001	-0.00002	-0.00002	**calc_b**
-0.00039	-0.00038	-0.00016	-0.00044	**calc_Germany**
0.00004	0.00000	-0.00001	0.00005	**calc_Hungary**
0.00003	0.00000	-0.00002	0.00002	**calc_Italy**
0.00046	0.00000	-0.00006	0.00008	**calc_Oceania**
	0.00301	-0.00003	0.00008	**calc_Portugal**
		0.00030	-0.00005	**calc_Spain**
			0.00117	**calc_SouthAfrica**

calc_sothAmerica	calc_SouthEastEurope	calc_Sweden	calc_USA	
0.00001	-0.00003	-0.00012	-0.00001	**const**
0.00008	0.00004	0.00031	-0.00003	**calc_2**
-0.00009	0.00001	0.00007	0.00005	**calc_3**
-0.00003	0.00014	-0.00016	0.00005	**calc_4**
-0.00004	0.00005	0.00003	0.00001	**calc_5**
0.00003	0.00004	-0.00001	-0.00003	**calc_6**
0.00050	0.00099	-0.00019	0.00051	**calc_semidryGrapeandfloral**
-0.00001	0.00077	0.00029	0.00007	**calc_dryGrapeandfloral**
0.00044	0.00100	-0.00023	0.00045	**calc_semidryFreshandfruity**
-0.00014	0.00077	0.00038	-0.00001	**calc_dryFreshandfruity**
-0.00006	-0.00066	0.00023	-0.00009	**calc_Fruityandtasteful**
-0.00014	0.00063	0.00030	0.00002	**calc_dryRichandtasteful**
0.00018	0.00018	-0.00302	0.00005	**calc_Semidry**
0.00005	-0.00049	0.00003	-0.00003	**calc_Spicyandmusty**
0.00027	0.00080	-0.00001	0.00027	**calc_semidryLightandrounded**
0.00005	0.00075	0.00027	-0.00004	**calc_dryLightandrounded**
0.00004	-0.00051	0.00017	-0.00019	**calc_Softandberry**
-0.00011	0.00034	0.00006	0.00012	**calc_rosAsegm**
-0.00003	0.00009	0.00036	-0.00003	**calc_sweet**
-0.00012	-0.00090	0.00040	0.00013	**calc_Austereandvariegated**
0.00002	-0.00071	-0.00006	-0.00009	**calc_Whi**
0.00008	-0.00001	0.00009	0.00006	**calc_Spa**
0.00004	0.00008	0.00005	0.00003	**calc_m**
0.00017	0.00010	0.00018	-0.00026	**calc_h**
-0.00005	0.00006	-0.00011	0.00011	**calc_b**
-0.00041	-0.00023	0.00042	-0.00041	**calc_Germany**
0.00007	0.00004	0.00017	0.00001	**calc_Hungary**
0.00004	0.00000	-0.00006	-0.00001	**calc_Italy**
0.00009	0.00003	-0.00010	0.00002	**calc_Oceania**
0.00007	0.00002	-0.00015	-0.00004	**calc_Portugal**
-0.00004	-0.00005	0.00023	-0.00006	**calc_Spain**
0.00012	0.00008	-0.00012	-0.00002	**calc_SouthAfrica**

0.00045	0.00005	-0.00005	-0.00003	**calc_sothAmerica**
	0.00196	-0.00008	0.00000	**calc_SouthEastEurope**
		0.00338	-0.00022	**calc_Sweden**
			0.00096	**calc_USA**

Covariance matrix for 2006 with adjusted explanatory variables

const	**calc_2**	**calc_3**	**calc_4**	
0.000036	-0.000006	0.000006	-0.000006	**const**
	0.000303	-0.000034	-0.000027	**calc_2**
		0.000250	-0.000032	**calc_3**
			0.000158	**calc_4**

calc_5	**calc_6**	**calc_semidryGrapeandfloral**	**calc_dryGrapeandfloral**	
-0.000011	-0.000009	-0.000008	-0.000035	**const**
-0.000017	-0.000020	0.000053	0.000064	**calc_2**
-0.000012	-0.000018	0.000104	0.000094	**calc_3**
-0.000007	-0.000009	-0.000004	0.000024	**calc_4**
0.000111	0.000000	0.000009	0.000030	**calc_5**
	0.000109	-0.000018	0.000014	**calc_6**
		0.004144	0.001269	**calc_semidryGrapeandfloral**
			0.001811	**calc_dryGrapeandfloral**

calc_semidryFreshandfruity	**calc_dryFreshandfruity**	**calc_Fruityandtasteful**	**calc_dryRichandtasteful**	
-0.000020	-0.000030	0.000014	-0.000031	**const**
0.000051	0.000019	-0.000004	0.000014	**calc_2**
0.000061	0.000070	-0.000039	0.000077	**calc_3**
-0.000003	0.000020	-0.000012	0.000025	**calc_4**
0.000007	0.000028	0.000001	0.000056	**calc_5**
-0.000016	0.000018	-0.000031	0.000003	**calc_6**
0.002198	0.001349	-0.000456	0.001120	**calc_semidryGrapeandfloral**
0.001263	0.001335	-0.000409	0.001164	**calc_dryGrapeandfloral**
0.002625	0.001348	-0.000435	0.001119	**calc_semidryFreshandfruity**
	0.001476	-0.000412	0.001171	**calc_dryFreshandfruity**
		0.000728	-0.000260	**calc_Fruityandtasteful**
			0.001523	**calc_dryRichandtasteful**

calc_Semidry	**calc_Spicyandmusty**	**calc_semidryLightandrounded**	**calc_dryLightandrounded**	
-0.000059	0.000025	-0.000025	-0.000039	**const**
0.000039	-0.000007	0.000032	0.000030	**calc_2**
-0.000219	-0.000015	0.000063	0.000064	**calc_3**
0.000034	-0.000005	0.000023	0.000054	**calc_4**
-0.000161	-0.000018	0.000006	0.000051	**calc_5**
0.000375	-0.000052	0.000019	0.000047	**calc_6**
-0.002319	-0.000452	0.001700	0.001284	**calc_semidryGrapeandfloral**
-0.002388	-0.000396	0.001306	0.001376	**calc_dryGrapeandfloral**
-0.002182	-0.000431	0.001603	0.001295	**calc_semidryFreshandfruity**
-0.002483	-0.000430	0.001344	0.001378	**calc_dryFreshandfruity**
-0.002438	0.000613	-0.000418	-0.000397	**calc_Fruityandtasteful**

-0.002703	-0.000314	0.001146	0.001222	**calc_dryRichandtasteful**
0.029757	-0.002391	-0002270	-0.002465	**calc_Semidry**
	0.000820	-0.000398	-0.000389	**calc_Spicyandmusty**
		0.002141	0.001366	**calc_semidryLightandrounded**
			0.002156	**calc_dryLightandrounded**
calc_Softandberry	**calc_rosAsegm**	**calc_redsegm**	**calc_sweet**	
0.000031	-0.000096	-0.000106	-0.000039	**const**
-0.000021	-0.000005	-0.000228	0.000054	**calc_2**
-0.000033	-0.000183	-0.000152	0.000033	**calc_3**
-0.000010	0.000018	0.000023	0.000047	**calc_4**
-0.000028	0.000008	-0.000024	0.000013	**calc_5**
-0.000042	0.000202	0.000265	-0.000014	**calc_6**
-0.000470	-0.002641	-0.002717	-0.000029	**calc_semidryGrapeandfloral**
-0.000443	-0.002353	-0.002428	0.000075	**calc_dryGrapeandfloral**
-0.000444	-0.002555	-0.002623	-0.000018	**calc_semidryFreshandfruity**
-0.000442	-0.002438	-0.002443	0.000027	**calc_dryFreshandfruity**
0.000672	-0.002492	-0.002313	-0.000017	**calc_Fruityandtasteful**
-0.000286	-0.002619	-0.002587	-0.000087	**calc_dryRichandtasteful**
-0.002433	0.022807	0.022735	-0.000337	**calc_Semidry**
0.000643	-0.002427	-0.002326	-0.000012	**calc_Spicyandmusty**
-0.000414	-0.002517	-0.002582	0.000031	**calc_semidryLightandrounded**
-0.000409	-0.002520	-0.002580	0.000084	**calc_dryLightandrounded**
0.000998	-0.002563	-0.002396	-0.000033	**calc_Softandberry**
	0.031284	0.022942	-0.000156	**calc_rosAsegm**
		0.023309	-0.000325	**calc_redsegm**
			0.002188	**calc_sweet**
calc_Austereandvariegated	**calc_Whi**	**calc_Spa**	**calc_m**	
0.000068	0.000021	0.000091	-0.000014	**const**
-0.000174	-0.000016	-0.000058	-0.000011	**calc_2**
-0.000076	-0.000084	0.000191	-0.000007	**calc_3**
0.000022	-0.000022	0.000003	0.000002	**calc_4**
0.000037	-0.000037	0.000042	0.000004	**calc_5**
-0.000034	-0.000013	-0.000226	0.000008	**calc_6**
-0.000535	-0.001331	0.002576	0.000036	**calc_semidryGrapeandfloral**
-0.000542	-0.001331	0.002353	0.000006	**calc_dryGrapeandfloral**
-0.000509	-0.001313	0.002502	0.000037	**calc_semidryFreshandfruity**
-0.000474	-0.001346	0.002434	0.000028	**calc_dryFreshandfruity**
0.000504	0.000403	0.002360	-0.000032	**calc_Fruityandtasteful**
-0.000300	-0.001179	0.002598	0.000016	**calc_dryRichandtasteful**
-0.002686	0.002494	-0.022767	0.000058	**calc_Semidry**
0.000483	0.000379	0.002325	-0.000040	**calc_Spicyandmusty**
-0.000487	-0.001332	0.002491	0.000042	**calc_semidryLightandrounded**
-0.000412	-0.001382	0.002525	0.000032	**calc_dryLightandrounded**
0.000472	0.000409	0.002432	-0.000026	**calc_Softandberry**

-0.002350	0.002440	-0.022939	0.000075	**calc_rosAsegm**
-0.002236	0.002532	-0.022714	-0.000007	**calc_redsegm**
-0.000036	-0.000058	0.000205	0.000058	**calc_sweet**
0.004609	0.000307	0.002322	-0.000003	**calc_Austereandvariegated**
	0.001349	-0.002494	-0.000027	**calc_Whi**
		0.022701	-0.000037	**calc_Spa**
			0.000074	**calc_m**
calc_h	**calc_b**	**calc_Germany**	**calc_Hungary**	
0.000038	-0.000005	-0.000013	-0.000013	**const**
-0.000003	0.000006	-0.000027	0.000032	**calc_2**
0.000005	0.000010	0.000008	-0.000005	**calc_3**
0.000023	-0.000006	0.000025	0.000010	**calc_4**
0.000006	-0.000009	0.000026	0.000041	**calc_5**
0.000032	-0.000022	0.000032	0.000003	**calc_6**
-0.000030	0.000004	-0.000879	0.000029	**calc_semidryGrapeandfloral**
0.000018	-0.000012	0.000076	-0.000023	**calc_dryGrapeandfloral**
-0.000026	0.000015	-0.000708	0.000024	**calc_semidryFreshandfruity**
-0.000011	-0.000015	0.000002	-0.000022	**calc_dryFreshandfruity**
0.000109	-0.000026	0.000045	0.000000	**calc_Fruityandtastefful**
0.000009	-0.000003	0.000064	0.000038	**calc_dryRichandtasteful**
-0.000089	0.000008	-0.000282	-0.000353	**calc_Semidry**
0.000076	-0.000003	0.000045	0.000028	**calc_Spicyandmusty**
0.000000	-0.000004	-0.000262	0.000041	**calc_semidryLightandrounded**
0.000029	0.000003	0.000100	-0.000013	**calc_dryLightandrounded**
0.000099	0.000029	0.000035	0.000003	**calc_Softandberry**
-0.000417	0.000058	0.000066	0.000001	**calc_rosAsegm**
-0.000196	0.000008	0.000104	-0.000091	**calc_redsegm**
-0.000127	0.000044	0.000065	0.000085	**calc_sweet**
-0.000218	0.000079	0.000061	0.000040	**calc_Austereandvariegated**
0.000043	-0.000018	-0.000028	-0.000044	**calc_Whi**
0.000248	-0.000008	-0.000019	0.000050	**calc_Spa**
-0.000084	0.000001	-0.000008	0.000022	**calc_m**
0.000388	-0.000121	0.000044	-0.000014	**calc_h**
	0.000176	-0.000025	-0.000017	**calc_b**
		0.000748	0.000024	**calc_Germany**
			0.001020	**calc_Hungary**
calc_Italy	**calc_Oceania**	**calc_Portugal**	**calc_Spain**	
-0.000001	0.000000	-0.000007	-0.000006	**const**
0.000012	0.000001	-0.000020	0.000026	**calc_2**
-0.000032	-0.000004	0.000017	0.000008	**calc_3**
0.000016	0.000005	0.000012	-0.000005	**calc_4**
-0.000008	0.000006	0.000017	-0.000006	**calc_5**
-0.000005	-0.000018	0.000022	-0.000008	**calc_6**
0.000002	0.000061	0.000076	0.000065	**calc_semidryGrapeandfloral**
-0.000034	0.000040	0.000018	0.000034	**calc_dryGrapeandfloral**
-0.000014	0.000053	0.000065	0.000056	**calc_semidryFreshandfruity**
-0.000069	-0.000008	0.000038	0.000045	**calc_dryFreshandfruity**
-0.000005	-0.000025	-0.000023	0.000018	**calc_Fruityandtastefful**
-0.000076	-0.000010	0.000044	0.000050	**calc_dryRichandtasteful**
0.000334	-0.000006	0.000059	-0.000210	**calc_Semidry**

0.000001	0.000022	-0.000040	-0.000072	**calc_Spicyandmusty**
-0.000047	0.000042	0.000050	-0.000001	**calc_semidryLightandrounded**
-0.000126	0.000033	0.000045	-0.000005	**calc_dryLightandrounded**
-0.000004	-0.000020	-0.000010	-0.000031	**calc_Softandberry**
0.000260	0.000022	-0.000009	-0.000066	**calc_rosAsegm**
0.000281	-0.000253	0.000011	-0.000040	**calc_redsegm**
-0.000043	0.000047	0.000026	0.000044	**calc_sweet**
-0.000206	0.000023	-0.000019	-0.000053	**calc_Austereandvariegated**
0.000083	-0.000016	-0.000016	-0.000005	**calc_Whi**
-0.000281	0.000017	0.000021	0.000034	**calc_Spa**
0.000008	-0.000004	0.000002	0.000013	**calc_m**
0.000011	-0.000003	0.000041	0.000014	**calc_h**
-0.000020	-0.000002	-0.000018	-0.000014	**calc_b**
-0.000060	-0.000037	-0.000037	-0.000035	**calc_Germany**
-0.000018	0.000001	-0.000016	-0.000025	**calc_Hungary**
0.000187	-0.000019	-0.000008	-0.000015	**calc_Italy**
	0.000238	-0.000008	-0.000028	**calc_Oceania**
		0.000414	0.000006	**calc_Portugal**
			0.000217	**calc_Spain**

calc_SouthAfrica	calc_sothAmerica	calc_SouthEastEurope	calc_Sweden	
0.000010	-0.000002	-0.000003	-0.000066	**const**
-0.000016	-0.000034	-0.000042	0.000068	**calc_2**
-0.000022	-0.000002	0.000073	-0.000028	**calc_3**
0.000019	0.000004	0.000004	-0.000137	**calc_4**
-0.000033	-0.000003	0.000013	0.000095	**calc_5**
-0.000035	0.000009	0.000017	-0.000011	**calc_6**
0.000076	0.000057	0.000201	-0.000089	**calc_semidryGrapeandfloral**
0.000038	0.000011	0.000036	0.000068	**calc_dryGrapeandfloral**
0.000075	0.000053	0.000184	-0.000104	**calc_semidryFreshandfruity**
0.000028	0.000003	0.000175	0.000091	**calc_dryFreshandfruity**
-0.000042	-0.000026	-0.000072	0.000192	**calc_Fruityandtastefful**
-0.000085	-0.000008	0.000115	0.000137	**calc_dryRichandtasteful**
0.000064	0.000073	-0.000115	-0.003546	**calc_Semidry**
0.000026	0.000016	-0.000046	0.000131	**calc_Spicyandmusty**
0.000053	0.000045	0.000143	-0.000046	**calc_semidryLightandrounded**
-0.000006	0.000030	0.000146	0.000061	**calc_dryLightandrounded**
-0.000031	-0.000004	-0.000058	0.000155	**calc_Softandberry**
0.000037	0.000004	-0.000176	-0.000143	**calc_rosAsegm**
0.000007	0.000011	-0.000146	-0.000124	**calc_redsegm**
0.000034	0.000024	-0.000106	0.000058	**calc_sweet**
-0.000092	-0.000005	-0.000075	0.000110	**calc_Austereandvariegated**
-0.000003	-0.000007	-0.000151	0.000025	**calc_Whi**
0.000006	0.000012	0.000185	0.000189	**calc_Spa**
-0.000019	0.000009	0.000024	-0.000023	**calc_m**
0.000021	0.000028	0.000049	0.000089	**calc_h**
-0.000037	-0.000020	-0.000029	-0.000026	**calc_b**
-0.000068	-0.000033	-0.000019	0.000166	**calc_Germany**
-0.000037	-0.000005	0.000011	0.000140	**calc_Hungary**
-0.000006	-0.000004	-0.000032	-0.000060	**calc_Italy**
0,.000013	0.000004	-0.000018	-0.000043	**calc_Oceania**
-0.000010	0.000011	0.000021	-0.000046	**calc_Portugal**
-0.000031	-0.000017	-0.000010	0.000095	**calc_Spain**

0.000363	0.000012	-0.000015	-0.000125	**calc_SouthAfrica**
	0.000151	0.000013	-0.000049	**calc_sothAmerica**
		0.000697	-0.000024	**calc_SouthEastEurope**
			0.006953	**calc_Sweden**
			calc_USA	
			-0.000009	**const**
			-0.000004	**calc_2**
			0.000019	**calc_3**
			0.000007	**calc_4**
			0.000017	**calc_5**
			0.000010	**calc_6**
			0.000101	**calc_semidryGrapeandfloral**
			0.000085	**calc_dryGrapeandfloral**
			0.000087	**calc_semidryFreshandfruity**
			0.000050	**calc_dryFreshandfruity**
			-0.000055	**calc_Fruityandtasteful**
			0.000018	**calc_dryRichandtasteful**
			0.000061	**calc_Semidry**
			-0.000036	**calc_Spicyandmusty**
			0.000076	**calc_semidryLightandrounded**
			0.000049	**calc_dryLightandrounded**
			-0.000097	**calc_Softandberry**
			0.000090	**calc_rosAsegm**
			0.000058	**calc_redsegm**
			0.000027	**calc_sweet**
			0.000017	**calc_Austereandvariegated**
			-0.000064	**calc_Whi**
			-0.000042	**calc_Spa**
			0.000002	**calc_m**
			-0.000041	**calc_h**
			0.000015	**calc_b**
			-0.000034	**calc_Germany**
			0.000000	**calc_Hungary**
			-0.000020	**calc_Italy**
			-0.000006	**calc_Oceania**
			-0.000002	**calc_Portugal**
			-0.000019	**calc_Spain**
			-0.000006	**calc_SouthAfrica**
			-0.000006	**calc_sothAmerica**
			-0.000004	**calc_SouthEastEurope**
			-0.000067	**calc_Sweden**
			0.000283	**calc_USA**