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Price premiums for organic pasta and pasta produced in Sweden

– A hedonic pricing approach

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Abstract

Due to the growing interest for organically and locally produced food, several studies based on consumers' stated preferences regarding organic and Swedish-produced food products have been conducted. However, attitudes and preferences do not always convert into actions, causing a void in the research (Jörgensen, 2011). This thesis aims to detect whether the Swedish consumers are willing to pay a price premium for organic and Swedish-produced pasta, based on revealed preferences. To determine the price premiums the hedonic pricing method is applied. The dataset includes 305 observations from different geographical areas in Sweden: Uppsala, Malmö, Bunkeflostrand, Stockholm, Limhamn, Norrköping and Göteborg. The price premiums obtained for the attributes "organic pasta" and "Swedish-produced pasta" were 7,9 SEK/kg and 2,3 SEK/kg respectively, nevertheless the price premium for "Swedish-produced pasta" did not show any significance in the model. The Swedish government has an ambition of increasing the organically certified farmland with 30 % to 2030 (Näringsdepartementet, 2017). Hence the results serve as an incentive for the farmers to increase their organic production, which is conformable with the government's goal. In addition, the results provide an indication regarding how the Swedish consumers value the environmental qualities associated with organic food production.

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1 Introduction

Among the Swedish population there is a growing demand for organically and locally produced food. In 2016, the Swedish consumption of organic food products increased with 18 % and the total share of food sales in Sweden consisting of organic food was 8,7 % (Ryegård & Ryegård, 2017). This notable expansion of the organic food market has been the foundation for several studies aiming to detect why the Swedish consumer choose the organic product rather than the conventional one and whether she is willing to pay extra for it (Ekelund 2003; Ekelund 2004; Jörgensen, 2001; Statistics Sweden, 2004). However, many of these previous studies have been conducted based on consumer attitudes instead of real purchases causing a deficiency in the research, since attitudes do not always convert into real behaviour (Jörgensen, 2001). For example, Kotler & Keller (2012) argue that unexpected factors, such as influences from other people, may intervene with the consumer's purchase intentions, making the stated preference deviate from the actual consumption choice. Further on, Ekelund (2003) argues that interview objects tend to overestimate their consumption of organic food. One reason is that the respondents might feel obligated to answer that they consume more organic food than they actually do, because this is perceived as the correct answer.

According to Ekelund (2004) the Swedish consumers trust groceries that are produced in Sweden more than imported food products and nine out of ten state they want to know where the food has been produced. Despite this fact, imported food products are gaining market shares on the Swedish market (Ekelund, 2004). Consumers who prefer organically produced food often also prefer locally produced food (www, Jordbruksverket, 1, 2017). Thus, to receive a more accurate comprehension of the Swedish consumers' preferences regarding organically and locally produced food products the purpose of this thesis is to detect how much the consumers are willing to pay for the product's specific characteristic "organic" and "Swedish-produced". This is completed in monetary values by revealed preferences and therefore the results should be more accurate, assuming the retailers' price of the product is reflecting the consumer preferences. Ideally several different food products on the Swedish market would be included in the analysis, because the price premiums probably alter between different food products, especially for Swedish produced groceries. However, due to limited time and data the examination is limited to one product. Therefore as a proxy for the Swedish consumers' willingness to pay for organic and Swedish-produced groceries, pasta will be chosen as the product of interest. Pasta is chosen because it is a popular product that many people in Sweden consume daily (www, Restaurang, 1, 2010).

Knowing the Swedish consumers' price premiums for the attributes "organic" and "Swedish-produced" could be of interest for Swedish policymakers considering Sweden's recently launched food strategy. The government's goal is for 30 % of the Swedish farmland to be organically certified by 2030 (Näringsdepartementet, 2017). The government argues organic agriculture generates environmental qualities why they disburse an "environmental support" to organically certified farmers to increase these qualities (Jörgensen, 2001). However, it

should be stated that the economic aspects of the environmental benefits of organic production is highly debated and not yet fully scientifically established (Jörgensen, 2001).
In order to expand Sweden's organic food market and develop efficient policies, further understanding about the consumers' preferences regarding Swedish and organic food products is required (Jörgensen, 2001). This thesis will contribute with guidance regarding if the consumers are willing to pay a price premium for organic and Swedish-produced food products, which could be an incentive for Swedish producers to increase their organic production, as the government desires. Lastly, the results will provide Swedish producers in the production-chain, from wheat producers to pasta manufacturers, with useful insights about what implicit characteristics the consumers value and if the consumers are willing to pay an extra amount for the attributes "organic" and "Swedish-produced" there is a possibility to expand in the organic food market to increase profits.

There are different valuation methods available to determine a consumer's willingness to pay for a non-marketable good. When attempting to isolate the monetary value for an attribute associated to a product, the choice of method becomes self-evident. The hedonic pricing method gives a commodity's different characteristics, such as manufacturing method or flavour, a monetary value (Perman et al., 2011). The benefits of this method are the possibility to perceive changes in an attribute and that the estimated value is based on revealed preferences. Hence to calculate the willingness to pay for the pasta's implicit characteristics "organic" and "Swedish-produced" the hedonic pricing method is applied.

2 Literature review

The hedonic price method is a commonly used valuation method often applied on the property market (Perman et al., 2011). When a household is buying a property, they reveal their preferences for the implicit environmental attributes of the house such as air quality and recreation possibilities. By using the hedonic price model one can determine the share of the property's price that is explained by the environmental characteristics and thus obtain the willingness to pay for these attributes (Perman et al., 2011).

The model was first discussed by Waugh (1929) who was interested in the determinants of vegetable market prices. The model was thenceforth elaborated further by Lancaster (1966) and finally Rosen (1974) presented a theoretical model framework for deriving the hedonic price function. Ever since, economists have frequently applied the hedonic pricing approach to evaluate non-marketable goods such as environmental quality as well as determining consumers' willingness to pay for an agricultural commodity's different implicit characteristics. For example Maguire et al. (2004) estimated the price premium for the attribute "organic" in babyfood, based on data collected from Raleigh, North Carolina and San Jose, California. They found that the organic price premium was between 3 to 4 cents per ounce, reflecting what the consumers were prepared to pay for the babyfood to avoid pesticide exposure.

Moreover, Larue (1991) conducted a study with the hedonic pricing approach and concluded that wheat, which might appear as a homogenous product, is in fact differentiated based on country of origin and end of use. Pasta is manufactured from wheat; hence it is an end of use product. Therefore this thesis will extend Larue's (1991) research with the knowledge of how the specific attributes "organic" and "Swedish-produced" differentiates a wheat product, which might appear as homogenous.

Among scientific articles on hedonic pricing, organic and locally produced food products, not many studies have been performed on the Swedish market. However, Schollenberg (2012) estimated the price premium for Fair Trade labelled coffee in Sweden, with the underlying assumption that Sweden is a country with a considerably high public awareness about environmental and social issues. Schollenberg's (2012) results indicate there is a 38 % paid premium attached to Fair Trade labelled coffee. The common assumption regarding Swedish citizens' awareness about environmental matters could be a contributing factor to the, sometimes overestimated, stated willingness to pay for organic food. This is in line with Ekelund's (2003) conclusions regarding the phenomenon where consumers tend to exaggerate their consumption of organic food because they perceive that choosing the organic alternative is the right answer.

Further on, non-published papers limited to specific areas in Sweden, focusing on organic and Swedish-produced groceries, have been written. Möller (2015) conducted a research about the willingness to pay for Swedish- and organically produced honey, based on data collected from grocery stores in Uppsala. Möller (2015) concluded that the price premium for Swedish-produced honey was 37 SEK/kg and 14 SEK/kg for organic honey respectively. By using a wider set of data, this thesis wishes to contribute with a further understanding about the Swedish consumers' preferences regarding organically and locally produced groceries and how much they are willing to pay for them, with pasta as the subject of the analysis. These findings could also be of guidance to analyse the disparity between the Swedish consumers stated preferences and actual consumption behaviour.

3 Conceptual framework

The hedonic pricing method is one of the different valuation methods available to evaluate non-marketable goods such as environmental qualities. By applying valuation methods, it is possible to attach a monetary value to an environmental good and thenceforth determine consumers' willingness to pay for it (Perman et al., 2011). Further on, environmental qualities are commonly public goods. A pure public good is defined as being non-excludable and non-rivalrous (Perman et al., 2001). This purports one individual's consumption of the good does not interfere with another individual's possibility to consume it and individuals cannot exclude each other from consuming the good, why some consumers try to 'free-ride' i.e. use, but not pay for the environmental quality. Therefore the market fails to manage an efficient allocation of it, causing a market failure (Perman et al., 2011).

A market failure arises when the assumptions for a perfectly competitive market are not satisfied, which could lead to a situation where too little of the environmental quality is produced compared to how much is demanded why policy intervention sometimes is required (Perman et al., 2011). The ambition of the policy is to correct the market failure and provide the society with an efficient level as well as allocation of the environmental quality. Correcting the market failure will improve the economy in relation to the ambition of efficiency and increase the overall welfare (Perman et al., 2011).

The "environmental support" which is disbursed to organically certified farmers by the Swedish government with the intention of increasing the positive environmental effects (Jörgensen, 2001), is a policy implemented to correct the kind of market failure where too little of the environmental quality is produced. In theory the rule for an efficient level of supply of public goods is where the aggregated marginal willingness to pay equals the marginal cost of the public good (Perman et al., 2011). This seems straightforward in theory although to apply it practically is rather difficult. To apply the rule in practice the government needs information about the consumers' preferences and their marginal willingness to pay and this information is not available on the market (Perman et al., 2011).

According to Ekelund (2004) consumers associate organic groceries with being pesticide-free, which could be considered an environmental quality, since it implies less pesticide in the nature. The same study states Swedish-produced groceries are also associated with environmental qualities which are achieved through shorter transportation (i.e. reduced emissions) and less pesticide use. These environmental qualities consumers associate with organic and Swedish-produced food are not necessarily physically experienced by the consumer, but is still valued as a 'non-use value' (Perman et al., 2011). The 'non-use value' could be that the consumer receives a higher level of utility from knowing someone else is experiencing less pesticide exposure. The increased utility could also be derived from the existence of an environmental quality, such as knowing farmlands are being cultivated pesticide-free even though the consumer does not live in the adjacent area. These are categorised as 'altruistic values' and 'existence values' (Perman et al., 2011). If the consumers are willing to pay a price premium for the environmental qualities attached to the characteristics "organic" and "Swedish-produced", the consumers may not be 'free-riding' and the policy of environmental supports might be redundant or too extensive. Hence it is necessary with additional knowledge regarding consumers' preferences for these characteristics, for the policy to operate efficiently and not disturb the market mechanisms (Jörgensen, 2001).

4 Method

The following section discusses the hedonic price model. Initially a general explanation of the mechanisms of the model is given along with a description of how to derive the hedonic price function. Thenceforth the specific model and approach for this thesis will be explained.

4.1 Hedonic price method

In order to compute a hedonic price function relevant data of prices and attributes of the commodity chosen must be collected. When the data has been collected a price function can be derived. The price function is a function of the different characteristics which may or may not have an impact on the price and the coefficients are received through multiple regression analysis (Rosen, 1974). The partial derivative of the price function with respect to the different characteristics generates the consumers' willingness to pay or the price premium for the chosen characteristic (Rosen, 1974). These values may then be interpreted and analysed to answer the research question.

Rosen's (1974) theoretical model used to derive the hedonic price function, $P = P(\mathbf{z})$, assumes that the price, P, for which the differentiated product is sold, is a function of the different characteristics. The various characteristics of the product is represented by a vector $\mathbf{z} = (z_1, z_2,..., z_n)$. If a characteristic can vary independently the hedonic price function is linear, yet commonly the price function is nonlinear (Palmquist, 1991). The hedonic price function is deduced from observing the behaviour of consumers and firms on the market (Rosen, cited in Palmquist, 1991) and the function is originally derived through the points where the consumers' bid and producers' offer curves are tangents (Rosen, 1974). This occurs when the consumers reach utility maximisation and the producers reach cost minimization, which is shown in Figure 1 below.

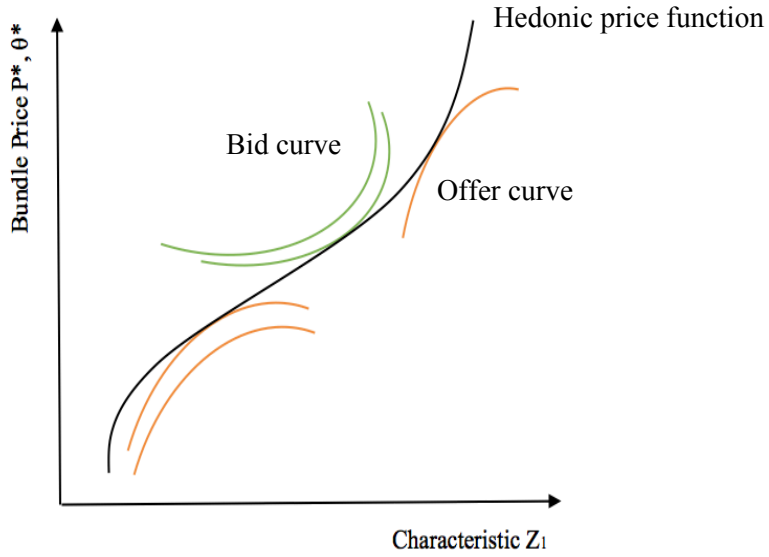

Figure 1. The hedonic price function with bid and offer curves. Source: Diagram generated based on Rosen (1974)

4.1.1 Bid curves

By consuming the differentiated product with its various characteristics and the good x, which represents the quantity of all other goods consumed, the consumer will be satisfied by maximizing the utility, given the budget constraint (Rosen, cited in Palmquist, 1991). The consumer's utility function $U(x, z_1,..., z_n)$ is a function of x and the different implicit characteristics **z** of the differentiated product. The budget constraint is given by $y = x + P(z_1,..., z_n)$ where y represents the income and the price of x is assumed to be 1. The marginal price of the characteristic, $\partial P/\partial z_i$, is required to equal the marginal rate of substitution between a specific characteristic z_i and x, according to the first order conditions of the utility maximization problem (Rosen, cited in Palmquist, 1991).

According to Rosen (1974) the consumer's bid function is $\theta(\mathbf{z}, u, y)$. The function represents the consumer's willingness to pay for a product with a specific blend of characteristics given a certain income and utility level. Further on, the slope of the bid function is interpreted as the maximum amount of money the consumer would pay to receive an extra unit of the characteristic (Perman et al., 2011). The bid function is strictly concave, which is implied by the negative second order condition (Rosen, 1974). The implicit definition of the bid function is $U(y-\theta, z_1,..., z_n) = u$. It demonstrates which bundles of characteristics the consumer is indifferent to, given a certain level of income y and utility u. When moving along a bid curve the utility and income are constant while the price and the level of the characteristic z_i vary (Perman et al., 2011). The marginal bid of z_i, θz_i, must equal the marginal rate of substitution, MU_{zi}/MU_x (Rosen, 1974). Therefore utility maximization requires the marginal bid of z_i, θz_i, to equal the marginal price, $\partial P/\partial z_i$, on the market and the total bid, $\theta(\mathbf{z}, u, y)$, must equal the price of the product $P(\mathbf{z})$.

4.1.2 Offer curves

The producers in Rosen's (1974) model decide what characteristics their product will contain and the number of units of the product to produce. The costs of production depend on both these decisions and could alter among firms depending on their different production technologies and input prices. The equation, $C(M, \mathbf{z})$, represents the firm's total cost function where M is the number of units produced and **z** is a vector of the mixture of the chosen attributes.

The firm will maximize its profits i.e. minimize costs according to the profit function $\pi = M*P(\mathbf{z}) - C(M, \mathbf{z})$ where the profit π, is determined by total revenue minus total costs (Rosen, 1974). As a reflection of the consumer side, according to the first order conditions the marginal price of the characteristic, $\partial P/\partial z_i$, must equal the marginal cost of increasing that characteristic z_i, per unit of output. From the firms' behaviour on the market Rosen (1974) computed the firms' offer functions $\phi(\mathbf{z}, \pi)$. Here ϕ is the offer, i.e. the per unit price that the firm will accept, for a product containing the characteristics **z**. The offer, ϕ, will leave the producer with a constant profit π. The offer curves represent all levels of price and quantity of the characteristic z_i, which provides the firm with the same profit π (Perman et al., 2011).

In conclusion, the market equilibrium is determined by the tangency points between the consumers' bid functions and the producers' offer curves (Rosen, 1974), as shown in Figure 1. At these points the producers are maximizing their profit and the consumers are maximizing their utility respectively and the market is combining consumers and producers such that neither of them can alter their consumption or production decisions to increase utility or profits (Rosen, 1974).

4.2 The model

Empirical studies indicate complete adjustment has not been found in hedonic models thence the hedonic equation must be established empirically, but if the characteristics of a product can be repackaged changelessly the functional form is linear (Palmquist, 1991, p. 87). Maguire et al. (2004) argue babyfood products can be repackaged and purchased in any combination. Hence the different characteristics can vary independently and the linear model is the appropriate choice (Palmquist, 1991, p. 87). Furthermore, Maguire et al. (2004) reinforced this conclusion by reasoning that to consume an additional unit of an attribute, such as "organic", the consumer must buy an additional jar of babyfood, which in their framework is carried out at a constant marginal cost per unit for the consumer. Based on Maguire et al.'s (2004) arguments, the appropriate functional form for the hedonic function in this thesis could as well be the linear model. Pasta is a similar product to babyfood in its attributes and the way it is consumed and therefore the fit of the linear model below will be tested.

$$P = \beta_0 + \beta_1 z_1 + \beta_2 z_2 + \cdots + \beta_N z_N + u_i \quad (1)$$

However according to Palmquist (1991, p. 79) the functional form of the equation is commonly nonlinear, why the exponential hedonic function beneath also will be applied.

$$P = e^{\beta_0 + \beta_1 z_1 + \beta_2 z_2 + \cdots + \beta_N z_N} + u_i \quad (2)$$

In order to run the OLS the price function is required to be linear (Stock & Watson, 2015, p. 304) and the nonlinear function can be made linear by applying the natural logarithm making the function log-linear (Palmquist 1991, p. 87), as shown below.

$$\ln(P) = \beta_0 + \beta_1 z_1 + \cdots + \beta_N z_N + u_i \quad (3)$$

The log-linear model does entail a considerable advantage in comparison to the linear model because a one unit change in one of the independent variables, **z**, is equal to a $100*\beta_1$ % change in in the dependent variable P (Stock & Watson, 2015).

To obtain the hedonic price function the coefficients of the variables i.e. the characteristics must be derived. The coefficients are obtained by the Ordinary Least Squares (OLS) using the software Gretl. Four assumptions of multiple regression must be made when computing

the OLS (Stock & Watson, 2015). The first assumption is that the error term u_i given the variables **z** has the mean value zero. The second assumption is that the values of P and **z** are independently and identically distributed, the third assumption requires that large outliers are unlikely and the last assumption is no perfect multicollinearity exists.

Two problems that could arise when completing the OLS are omitted variable bias and heteroskedasticity (Stock & Watson, 2015). Omitted variable bias occurs if two conditions are fulfilled, when the omitted variable correlates with the included regressor and it is a determinant of the independent variable. Furthermore, the error term is heteroskedastic if the variance of the error term u_i is not constant for all values of **z** which implies that the error term depends on the variables **z**. Existence of a high degree of multicollinearity is a third problem. Multicollinearity occurs when the independent variables correlate which makes it difficult to distinguish each variable's impact on the dependent variable, although it is nearly impossible to select variables which are perfectly unrelated (Lind et. al., 2015). The occurrence of these three concepts may intervene with the results of the OLS.

5 Variables

When choosing the variables to include in the hedonic price model caution must be taken to receive an accurate result. The independent variables chosen for the regression are organic, Swedish-produced, whole grain/fibre, fresh, private label or brand, spaghetti, flavoured, whether the product is purchased in a supermarket and the dependent variable in the regression is the price of pasta expressed in SEK/kg. There will not be a distinguish between different organic labels e.g. "KRAV" and "EU organic" since this thesis aims to detect the willingness to pay for the organic characteristic, regardless of the type of organic label. A geographic variable will not be included because the organic food consumers are mostly "regular Swedes" who are difficult to label in terms of demographic parameters (Ekelund, 2003). Further on Ekelund (2003) suggests that the classic demographic factors such as gender and geographic are not suitable for analysing consumption behaviour of organic food. In addition, the Swedish market for organic food products is considered a well functioned and evolved market with no isolated regional markets (Jörgensen, 2001).

5.1 Independent variables

All the chosen independent variables are binary. A binary variable, also called a dummy variable, attains only two values, 1 or 0, depending on if the observation possesses the characteristic or not (Stock & Watson, 2015). For example, if one observation is organic it will assume the value 1 and 0 if otherwise. In Table 1 below the independent variables are displayed along with a description. The interpretation of the variables' coefficients is different when dummy variables are used compared to continuous variables. The coefficient is not interpreted as the slope but as the value which depends on the existence of a certain characteristic (Stock & Watson, 2015). For example, if the coefficient of the variable organic has a value of 2 the interpretation would be that if a certain observation is organic the dependent variable, SEK/kg, increases by 2. When using many dummy variables caution

must be taken when choosing the characteristics, otherwise there is a risk for perfect multicollinearity (Stock & Watson, 2015). For example, the variables private label and branded cannot be included as separate variables in the regression since they would be perfect opposites of each other. This is called the dummy variable trap.

Table 1. Description and Prediction of the independent variables

Variable	**Description**	**Predicted value**
Organic	= 1 if organic, = 0 if otherwise	Positive
Swedish-produced	= 1 if Swedish-produced, = 0 if otherwise	Positive
Whole grain/fibre	= 1 if whole grain/fibre, = 0 if otherwise	Positive
Fresh	= 1 if fresh, = 0 if otherwise	Positive
Private label	= 1 if private label, = 0 if brand	Negative
Spaghetti	= 1 if spaghetti, = 0 if otherwise	Negative
Flavoured	=1 if flavoured, = 0 if otherwise	Positive
Supermarket	= 1 if supermarket, = 0 if otherwise	Negative

5.1.1 Organic

The growing demand among consumers for organically produced groceries have been the foundation of several studies aiming to detect why a consumer chooses the organic alternative and how much she is willing to pay for it. Among articles applying the hedonic pricing approach several of them have found a positive price premium for the characteristic "organic". Maguire et al. (2004) concluded that the consumers were willing to pay 3 to 4 cents per ounce for the organic characteristic, reflecting the expense they were prepared to pay to avoid pesticide exposure. Moreover, according to Ekelund (2004) consumers have additional positive associations with organic food except for "pesticide-free", such as "good taste" and "reliable". These associations indicate this thesis will find a positive price premium for organic pasta as well. The variable "organic" is a binary variable where 1 denotes an organic pasta product and 0 denotes a non-organic pasta product.

5.1.2 Swedish-produced

Previous literature on agricultural products and hedonic pricing has found that which country the product is produced in has significance for the price. For example Larue (1991) concluded in his article that wheat is differentiated based on country of origin, which indicates that whether the pasta is produced in Sweden or not could influence the price as well. Further on Ekelund (2004) states nine out of ten desire information about the country of origin and groceries produced in Sweden are associated with a higher food quality. These

previous results suggest that the country of origin have importance and that there is a willingness to pay for a commodity which is produced in Sweden. However, there are only three pasta products which contain the characteristic "Swedish-produced", therefore this variable might not have a significant effect on the price. If the product is produced in Sweden the binary variable "Swedish-produced" assumes the value 1 and if it is produced elsewhere, 0.

5.1.3 Whole grain/fibre

Living a healthy and wholesome life has been a solid trend in Sweden and during 2016 this trend has established even further among the Swedish population (Ryegård & Ryegård, 2017). The health-conscious consumers demand food products which contribute to a healthier lifestyle, why the supply of food products containing whole grain and fibre have increased substantially, including pasta products (www, Livsmedelsverket, 1, 2016). On count of the above stated the binary variable "whole grain/fibre" is included in the hedonic function. The price premium is expected to be positive, building on the hypothesis that consumers are willing to pay more for healthier food alternatives. If the observed pasta product contains whole grain or fibre the binary variable attains the value 1 and if not, 0.

5.1.4 Fresh

In the article written by Maguire et al. (2004) different product-type characteristics were included in the hedonic price function such as if the product contained meat. In this thesis, one of the variables describing product-type characteristics is whether the pasta product is fresh or dry. Fresh pasta is considered a luxury product (www, Restaurang, 1, 2010) and therefore it is presumed to have a positive effect on the price. Fresh pasta assumes the value 1 and dry pasta assumes the value 0.

5.1.5 Private label or brand

A private labelled product is purchased and distributed by a retailer, but produced by someone else (www, Konkurrensverket, 1, 2016). According to Konkurrensverket (2016) private label products are gaining market shares on the Swedish market and new product groups are rapidly included. Moreover Konkurrensverket (2016) argues the private label commodities are improving the commerce's margins on the behalf of the producers causing lower consumer prices. Thus, whether the pasta product is sold under private label or brand is expected to have a significant effect on the product's price, why the variable "private label" is included in the hedonic function. If the observed pasta product is categorised as "private label" it assumes the value 1 and if it is categorised as "brand" it assumes the value 0.

5.1.6 Spaghetti

As mentioned, different product-type characteristics have been applied in earlier studies when computing a hedonic price model and in this thesis spaghetti is considered a product-type characteristic. The binary variable "spaghetti" is included because it is a common pasta shape which is sold in various package sizes. If the pasta product contains the characteristic "spaghetti" it assumes the value 1 and if not it assumes the value 0.

5.1.7 Flavoured

Pasta is retailed with different flavours and colours, usually adding for example spinach or tomato to obtain a green respectively red pasta (www, Restaurang, 1, 2010). In addition to the product-type variables "whole grain/fibre", "fresh" and "spaghetti" a binary variable indicating whether the pasta is flavoured is added in the regression. Flavouring the pasta should require additional workload and time, why it is expected to find a positive effect on the price if the pasta product is flavoured. In the dataset, 1 denotes flavoured pasta and 0 denotes non-flavoured pasta.

5.1.8 Supermarket

A supermarket is typically a larger store with lower prices than for example a convenience store. In the article by Maguire et al. (2004) different store characteristics were included in the regression, one of them was whether the babyfood was purchased in a convenience store. The variable had a high level of significance and a positive impact on the price. Therefore the characteristic "supermarket" is expected to be significant as well and have a negative influence on the price of pasta. If a specific observation holds the characteristic it assumes the value 1, otherwise it assumes the value 0.

5.2 Data

The data is collected from the market research firm Mintel which holds data for all food products sold in Sweden, among other countries (www, Mintel, 2017). The dataset from Mintel contains a sample of prices and implicit characteristics for all pasta products on the Swedish market, with a total number of 305 observations. The data has been collected by Mintel's "shoppers" who are hired by Mintel as "ghost shoppers" to collect price data as well as other information of different food products. The "shopper" is meant to represent any other consumer on the Swedish market. The samples are collected from various stores in the geographical areas Uppsala, Malmö, Bunkeflostrand, Stockholm, Limhamn, Norrköping and Göteborg which range between rural, suburban and urban areas. One shortcoming in the dataset is that it is unknown how the different stores and geographical areas have been chosen. A sampling method which is not randomized could lead to correlation between the independent variables and the error term causing a bias in the estimator (Stock and Watson, 2015). This is not believed to be conjectural, but in the analysis of the results consideration of this phenomenon will be taken.

The size of the dataset is of great importance for the significance of the results and a small dataset could cause poor and imprecise results (Stock & Watson, 2015). Previous studies, using both qualitative and quantitative methods, on organic food consumption have been based on datasets consisting of approximately 200–400 observations, indicating that the dataset from Mintel is sufficient. In conclusion, the prospect is that the results obtained from the dataset will be representative for all consumers on the Swedish market. Table 2 below displays mean values, medians, minimum and maximum values for all variables.

Table 2. Descriptive statistics

	Mean	Median	Minimum	Maximum
Organic	0,22295	0	0	1
Swedish-produced	0,0098361	0	0	1
Whole grain/fibre	0,17049	0	0	1
Fresh	0,088525	0	0	1
Private label	0,38361	0	0	1
Spaghetti	0,10492	0	0	1
Flavoured	0,049180	0	0	1
Supermarket	0,95082	1	0	1
SEK/kg	36,603	31,8	6,8	139,6
ln SEK/kg	3,4617	3,4595	1,9169	4,9388

The mean of a dummy variable represents the share of the dataset which contains the specific characteristic (Stock & Watson, 2015). As displayed in Table 2, approximately 22 % of the observations are organic, 1 % of the observations are Swedish-produced and the mean price per kilo is 36,6 SEK. The lowest price of pasta observed is 6,8 SEK/kg and the highest price observed is 139,6 SEK/kg, hence there is a large range of pasta prices. Thus to receive more legitimate results, some outliers were removed from the dataset. Since all the independent variables are binary the minimum value for all observations is 0 and the maximum value is 1.

Compared to the study regarding price premiums for organic and Swedish-produced honey, written by Möller (2015), some findings are similar. Möller (2015) concluded approximately 21 % of the observations were organic and 28 % were Swedish-produced. Hence the share of observations containing the characteristic “organic” is almost identical for both datasets. Of the 305 observed pasta products, 22 % were organic. However, only 1 % of the pasta products were produced in Sweden. Thus the market share of Swedish-produced pasta is significantly smaller compared to the market share of Swedish-produced honey. Moreover Maguire et al.’s (2004) article about willingness to pay for organic babyfood also carries resemblance in the data. The dataset evinces approximately 21 % of the observed products were organic which corresponds almost exactly with the pasta observations. Another interesting discovery is that 1 % of the babyfood products were sampled in a convenience store and 95 % of the 305 observations of pasta are sampled in a supermarket. This indicates supermarkets and other larger stores having a majority, as sampling stores in the dataset, is plausible.

6 Results

The following section comprises the results from the linear (Table 3) and nonlinear (Table 4) regressions where the fit of both models is analysed. In line with Palmquist's (1991, p. 79) reasoning the nonlinear functional form fitted the data best, thence the results from the nonlinear regression are analysed further. Lastly tests of relevance are performed for the nonlinear model. The tests of relevance include controlling for multicollinearity, heteroskedasticity and a joint hypothesis test.

6.1 Linear model

Table 3. Results from the linear regression

Model 1: OLS, using observations 1-305. Dependent variable: SEK/kg.					
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	58,8166	5,01921	11,72	2,61e−26	***
Organic	7,60635	2,64722	2,873	0,0044	***
Swedish-produced	−3,43069	10,9386	−0,3136	0,7540	
Whole grain/Fibre	−4,81793	2,92927	−1,645	0,1011	
Fresh	17,1633	4,01271	4,277	2,56e−05	***
Private label	−14,0012	2,27973	−6,142	2,63e−09	***
Spaghetti	−13,7238	3,53610	−3,881	0,0001	***
Flavoured	9,59530	5,26439	1,823	0,0694	*
Supermarket	−19,1780	4,98273	−3,849	0,0001	***

Mean dependent var	36,60295	S.D. dependent var	21,25294
Sum squared resid	103175,3	S.E. of regression	18,66990
R-squared	0,248612	Adjusted R-squared	0,228305
F(8, 296)	12,24222	P-value(F)	3,90e−15

The linear model shows a 1 % level of significance for the variables “organic”, “fresh”, “private label”, “spaghetti” and “supermarket”. The three stars mark this rightmost in Table 3 (Stock & Watson, 2015). The independent variable “flavoured” is significant at a level of 10 %, indicated by the single star and “Swedish-produced” and “whole grain/fibre” show no significance at all. In addition, “Swedish-produced” had a rather large standard error of 10,9386, compared to the other independent variables. Further on, 25 % of the variation in prices of pasta can be described by the variables, which is explained by R-squared. However, in a multiple regression the value of R-squared should not be stressed too much, since when an additional variable is added, R-squared will increase consistently (Stock and Watson, 2015). Due to this effect, there is another measure of fit for multiple regressions called the adjusted R-squared. The adjusted R-squared does not always increase when another variable is added. The adjusted R-squared for the linear model is 23 %. Concluding, the linear model does not appear to be a perfect fit for the data.

6.2 Nonlinear model

In the second model a nonlinear functional form was tested. To run the OLS the nonlinear function was made linear by applying the natural logarithm making the function log-linear (Palmquist 1991, p. 87). The derivation process is explained in section 4.3. Table 4 displays the results from the regression with the nonlinear function. When running the OLS a model without the variable “spaghetti” was tested. This lead to a 7 % lower adjusted R-squared, why “spaghetti” was reasoned to be an important variable for explaining the price of pasta and it was put back into the model.

Table 4. Results from the nonlinear regression

Model 2: OLS, using observations 1-305. Dependent variable: lnSEK/kg.					
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	3,96853	0,117739	33,71	2,41e−103	***
Organic	0,259677	0,0620975	4,182	3,81e−05	***
Swedish-produced	0,0759598	0,256594	0,2960	0,7674	
Whole grain/Fibre	−0,0587475	0,0687136	−0,8550	0,3933	
Fresh	0,509646	0,0941286	5,414	1,27e−07	***
Private label	−0,368635	0,0534770	−6,893	3,29e−11	***
Spaghetti	−0,449517	0,0829483	−5,419	1,24e−07	***
Flavoured	0,224511	0,123490	1,818	0,0701	*
Supermarket	−0,444875	0,116883	−3,806	0,0002	***

Mean dependent var	3,461746
Sum squared resid	56,77312
R-squared	0,310774
F(8, 296)	16,68340

S.D. dependent var	0,520540
S.E. of regression	0,437951
Adjusted R-squared	0,292146
P-value(F)	2,11e−20

The levels of significance for the independent variables are equivalent to the linear model. As in the linear model the variables “organic”, “fresh”, “private label”, “spaghetti” and “supermarket” have significance at a 1 % level. The variable “flavoured” shows a 10 % level of significance and “Swedish-produced” and “wholegrain/fibre” have no significance at all. However, the R-squared is improved in the nonlinear model. Here the R-squared claims 31 % of the variation in prices of pasta is explained by the variables, compared to 25 % for the linear model. Similar results can be observed for the adjusted R-squared, where 29 % of the variation in prices is explained by the variables. A positive impact of the variables “organic”, “Swedish-produced”, “fresh” and “flavoured” on the price of pasta was predicted, which turned out to be a correct hypothesis (Table 1). “Whole grain/fibre” also had a positive predicted value, which was not consistent with the hypothesis. The variables with a negative effect on the dependent variable “lnSEK/kg” were “private label”, “spaghetti” and “supermarket”. This was conformable with the predictions. As stated “whole grain/fibre” and “Swedish-produced” did not show any significance, thus it cannot be concluded the variables have any effect on “lnSEK/kg”.

The interpretation of the coefficients for the log-linear model is as follows; a one unit change in one of the independent variables is equal to a 100*β_i % change in the dependent variable "lnSEK/kg" (Stock & Watson, 2015). If the pasta product is organic, the price per kg will increase with 26 % and if it is Swedish-produced the increase will be 8 %. The variable with the largest effect on the price of pasta is "fresh", where the occurrence of this characteristic causes the price per kg to increase with 51 %. Of all the significant variables, whether the pasta product is flavoured or not has the smallest price effect of 22 %. With the coefficients obtained from the regression, the hedonic price function is derived. All coefficients are rounded off to two decimals.

$$P = e^{3,97+0,26\times z_1+0,08\times z_2-0,06\times z_3+0,51\times z_4-0,37\times z_5-0,45\times z_6+0,22\times z_7-0,44\times z_8} \quad (4)$$

To calculate the price per kg when the pasta product has none of the chosen characteristics, all independent variables are given the value 0 and a "base price" of 53 SEK/kg is obtained.

$$P = e^{3,97+0,26\times 0+0,08\times 0-0,06\times 0+0,51\times 0-0,37\times 0-0,45\times 0+0,22\times 0-0,44\times 0} = 53 \quad (5)$$

The average price is calculated by inserting the mean values of the independent variables in the hedonic price function, which yields an average price of 30,3 SEK/kg. As stated, the price premium is obtained by the partial derivative of the price function with respect to the different characteristics (Rosen, 1974) and since the hedonic function is nonlinear, they are expressed in percentages. The price premium in monetary values for each characteristic is calculated by multiplying each variable's coefficient with the average price.

$$P = e^{3,97+0,26\times 0,22+0,08\times 0,01-0,06\times 0,17+0,51\times 0,09-0,37\times 0,38-0,45\times 0,1+0,22\times 0,05-0,44\times 0,95} = 30,3 \quad (6)$$

The price premiums for organically and Swedish-produced pasta are 7,9 SEK/kg and 2,3 SEK/kg respectively, but as previously stated, the characteristic "Swedish-produced" shows no significance in the model.

6.3 Tests of relevance

The results of the regression are questioned if a high level of multicollinearity exists between the independent variables (Lind et. al., 2015). Firstly, a correlation matrix is computed to test for multicollinearity. If the variables have a correlation between -0,7 and 0,7, a problem occurring when using both variables together is unlikely. The correlation matrix (Table 5) for the pasta variables suggests there is no problem with multicollinearity.

Table 5. Correlation matrix

	Organic	Swedish-produced	Whole grain/fibre	Fresh	Private label	Spaghetti	Flavoured	Super-market
Organic	1							
Swedish-produced	-0,0534	1						
Whole grain/fibre	-0,1172	-0,0452	1					
Fresh	-0,0283	-0,0311	-0,1106	1				
Private label	0,1282	-0,0786	-0,1604	0,1577	1			
Spaghetti	0,0994	0,0743	0,0155	-0,0314	-0,0721	1		
Flavoured	-0,1218	-0,0227	-0,1031	0,3028	0,0388	-0,0779	1	
Supermarket	0,0125	0,0223	0,0628	-0,0893	-0,0077	0,0284	-0,0885	1

A further precise test of multicollinearity is the variance inflation factor or VIF (Lind et. al., 2015). The VIF test only includes the independent variables. To compute the test the independent variables take turns being the dependent variable and the regressions are run repeatedly. The formula for the variance inflation factor is as follows; $VIF = 1/(1-R^2)$. A result higher than 10 indicates a strong correlation and the variable should be removed from the analysis (Lind et.al., 2015). The results of the test are displayed in Table 6 beneath and no problem with multicollinearity is detected.

Table 6. Results of VIF-test

Variables	R2	VIF-value
Organic	0,058662	1,06231768
Swedish-produced	0,019314	1,019694377
Whole grain/fibre	0,058238	1,061839403
Fresh	0,120371	1,136842919
Private label	0,070023	1,075295411
Spaghetti	0,026754	1,027489453
Flavoured	0,118141	1,133968129
Supermarket	0,015627	1,01587508

Further on, to receive reliable results the standard errors are required to be homoskedastic, although this is rarely the case (Stock & Watson, 2015). Therefore White's Test was performed to control for heteroskedasticity. The null hypothesis of the White's Test is that heteroskedasticity is not present i.e. the standard errors are homoskedastic and the alternative hypothesis is that heteroskedasticity is present. Since the p-value is 0,406954 (Table 7), it is larger than 0,05 the null hypothesis cannot be rejected and the interpretation is no heteroskedasticity is present.

Table 7. Results of White's Test

Unadjusted R-squared = 0.092059
Test statistic: TR^2 = 28.078122,
with p-value = P(Chi-square(27) > 28.078122) = 0.406954

Another relevance test conducted to investigate the credibility of the results from the nonlinear regression is a test of joint null hypotheses. The null hypothesis, H_0, is that none of the chosen variables explain the variation in the price of pasta, demonstrated by the coefficients being equal to zero (Stock & Watson, 2015). Since the hedonic price function in this thesis includes eight variables, there are eight restrictions, q, imposed on the nonlinear regression model. The alternative hypothesis, H_1, is that one or more of the equalities in the null hypothesis do not hold (Stock & Watson, 2015).

$$H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$$
$$H_1: \beta_i \neq 0 \; for \; at \; least \; one \; i = 1, \dots, 8$$

When testing the joint hypothesis, the F-statistic is applied. The joint null hypothesis is rejected if at least one of the equalities, under the null hypothesis, is false which is illustrated by the F-statistic being greater than the conducted p-value of the F-statistic. Thenceforth the F-test is computed in Gretl and the results are displayed in Table 8 (see Appendix 1). Table 8 (see Appendix 1) deduces that the F-statistic is equal to 16,6834 and the p-value is equal to 2,11103e−20, which corresponds to the results in Table 4. The F-statistic is greater than the p-value and the null hypothesis is rejected, which vindicates the overall model is significant.

7 Conclusion and discussion

In order to establish consumers' willingness to pay for a product's implicit attributes, the hedonic pricing method can be applied. The purpose of the thesis was to investigate the Swedish consumers' preferences regarding organic and Swedish-produced pasta to distinguish whether they are willing to pay a price premium for these characteristics. The price premiums for organic and Swedish-produced pasta were 7,9 SEK/kg and 2,3 SEK/kg respectively, although the variable "Swedish-produced" did not show any significance in the regression analysis. According to the results, if the pasta product is organic, fresh, branded or flavoured it is considered as more exclusive by the consumers. Whole grain/fibre was also predicted as an exclusive characteristic, however this variable had a negative effect on the price per kg and did not show any significance. A possible explanation could be that wholegrain and fibre pasta is contemplated as basic products and therefore the consumers are not willing to pay extra for this characteristic. If the product is private labelled, spaghetti-shaped or bought in a supermarket, the consumers experience it as less exclusive.

Considering Ekelund's (2004) arguments stating consumers associate groceries produced in Sweden with a higher food quality and less pesticide use, it would have been reasonable to expect a significant price premium for Swedish-produced pasta. Moreover, Möller (2015) found a positive price premium for Swedish-produced honey of 37 SEK/kg. The insignificant price premium for Swedish-produced pasta could be explained in several ways. Firstly, it could depend on the low supply of Swedish-produced pasta products on the market; hence only 3 of the 310 observations in the dataset contained the characteristic "Swedish-produced". The variable had a negative value in the linear model, which also makes it questionable. In addition, the consumers may not associate Swedish-produced pasta with positive environmental qualities as argued, why they are not willing to pay a price premium for this characteristic. This in comparison to Swedish honey, where it is suggested consumers are willing to pay for the external effect "pollination" (Möller, 2015) and there are probably other products for which the consumers are willing to pay for environmental qualities associated with the characteristic "Swedish-produced" as well. The price premium for organic pasta of 7,9 SEK/kg is contemplated as more credent. It had a positive impact on the price and a 1 % significance level in the linear and the nonlinear model. Compared to other studies on the willingness to pay for organic groceries (Jörgensen, 2001; Maguire, 2004; Möller, 2015), the price premium appears plausible and it is suggested the Swedish consumers appreciate the environmental qualities proposed by organic production.

If the willingness to pay for organically produced pasta is correct it is an incentive for Swedish producers to increase their production of organically produced food, to gain profits. This is in line with the government's goal of increasing the organically certified farmland to 30 % by 2030 (Näringsdepartementet, 2017). Furthermore, the results are an indication of how extensive the environmental support ought to be to operate efficiently and whether the policy intervention is necessary. The results suggest consumers pay a price premium of 7,9 SEK/kg for organic pasta, interpreted as the willingness to pay for the environmental qualities associated with organic food production. Hence the consumers do not appear to be 'free-riding', but instead they are paying for the utility that they receive from the environmental qualities. Assuming the environmental qualities proposed by organic production have public good properties, the rule for an efficient level of supply is where the aggregated marginal willingness to pay equals the marginal cost (Perman et al., 2011). Thus, if the support together with this price premium is too extensive i.e. does not meet the rule of efficiency, there is a risk of stimulating the production too much and causing excess supply on the market. This could lead to a decline in prices causing a reduced effect on production from the environmental support, which aims to increase environmental qualities.

There are some weaknesses of the hedonic pricing method. It is assumed that the consumers have perfect information regarding the products' prices and characteristics, otherwise it is not reasonable to contend the consumers' marginal willingness to pay for a characteristic is equal to its implicit price (Perman et al., 2011). This might lead to an over- or underestimated price premium. As mentioned, the hedonic pricing method is commonly applied on the property market where it could be expected that the buyers have all information about the house, due to the large size of the investment (Perman et al., 2011). Food expenses on the other hand are a relatively small share of the household's budget compared to housing expenses, why it is not evident the consumers have all the information about the food product. Thereof applying the hedonic price method on a food product could be dubious, even though it has been frequently utilised in previous studies. Another weakness of the hedonic price method is that it does not include quantities. Thus, although the price of the product reflects what implicit attributes the product consists of, it is not certain it is ever purchased. Estimating demand curves and price elasticities, where the calculations include quantities, could have been a more proper method to approach the problem in that sense.

In conclusion, the results of the thesis show similarities with previous findings about consumers' preferences regarding organic food. The results imply consumers' stated preferences about organically produced food, found in previous studies, correspond to the actual consumption behaviour. Concerning Swedish-produced food products no conclusions can be made, due to the insignificant results. Further studies based on revealed preferences of various food commodities are needed to elaborate the knowledge of how the consumers value the characteristics "organic" and "Swedish-produced", since this thesis is limited to pasta products.

References

Brännlund, R. & Kriström, B. (2012). *Miljöekonomi*. 2nd. edition. Lund: Studentlitteratur AB.

Ekelund, L. (2003). *På spaning efter den ekologiska konsumenten. En genomgång av 25 svenska konsumentundersökningar på livsmedelsområdet*. Uppsala: Centrum för uthålligt lantbruk, Sveriges Lantbruksuniversitet. (Ekologiskt lantbruk, 39). Available: https://www.slu.se/globalassets/ew/org/centrb/epok/aldre-bilder-och-dokument/publikationer/ekolantbruk39.pdf

Ekelund, L. (2004). *Hur väljer vi mat?* Alnarp: Sveriges Lantbruksuniversitet. (SLU Rapport, 2004:68). Available: http://www.vaxteko.nu/html/sll/stiftelsen_lantbruksforskning/rapport_slf/RSLF68/RSLF68D.PDF

Genfors, B., Söderström, J. & Bel Habib, H. (2016). *Egna varumärken på livsmedel – Exemplet konsumtionsmjölk.* Stockholm: Konkurrensverket. (Konkurrensverket Rapport, 2016:7). Available: http://www.konkurrensverket.se/globalassets/publikationer/rapporter/rapport_2016-7.pdf

Jordbruksverket (www.jordbruksverket.se)
1. Svensk och närproducerad mat blir allt mer efterfrågad [2017-03-01]
http://www.jordbruksverket.se/pressochmedia/nyheter/nyhetsarkiv20092015/nyheter2014/svenskochnarproduceradmatbliralltmerefterfragad.5.724b0a8b148f52338a35f49.html

Jörgensen, C. (2001). *Prisbildning och efterfrågan på ekologiska livsmedel.* Lund: Livsmedelsekonomiska institutet. (SLI Rapport, 2001:1). Available: http://www.agrifood.se/files/sli_rapport_20011.pdf

Kotler, P. & Keller, K.L. (2012). *Marketing management*. 14th. edition. Global edition, Harlow: Pearson Education Limited.

Lancaster K. (1966): A new approach to consumer theory. *Journal of Political Economy*, Vol. 74(2), pp. 132–157. Available: http://www.journals.uchicago.edu/doi/abs/10.1086/259131 [2017-03-29]

Larue, B. (1991). Is Wheat a Homogeneous Product? *Canadian Journal of Agricultural Economics*, Vol. 39(2), pp. 103–117. Available: http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7976.1991.tb03560.x/full [2017-03-29]

Lind, D.A., Marchal, W.G. & Wathen, S.A. (2015). *Statistical Techniques in Business & Economics*. 16th. edition. New York: McGraw Hill Education.

Livsmedelsverket (www.livsmedelsverket.se)
1. Fullkorn [2017-04-24]
https://www.livsmedelsverket.se/livsmedel-och-innehall/naringsamne/kolhydrater/fullkorn

Maguire, K.B., Owens, N. & Simon, N.B. (2004). The Price Premium for Organic Babyfood: A Hedonic Analysis. *Journal of Agricultural and Resource Economics,* Vol. 29(1), pp.132–149. Available: http://ageconsearch.umn.edu/bitstream/31144/1/29010132.pdf [2017-03-08]

Möller, A. (2015). *Price premiums of honey - focusing on organic and Swedish production.* Swedish University of Agricultural Sciences. Department of economics. Bachelor thesis. Available: http://stud.epsilon.slu.se/8619/7/moller_a_151116.pdf [2017-03-08]

Näringsdepartementet (2017). *En livsmedelsstrategi för Sverige – fler jobb och hållbar tillväxt i hela landet.* Stockholm: Regeringskansliet. Available: http://www.regeringen.se/4908a7/contentassets/13f0fe3575964442bc51816493165632/handlingsplan_lms_170207.pdf

Palmquist, R.B. (1991). Hedonic Methods (77–119) in Braden, J.B & Kolstad, C.D (eds). *Measuring the Demand for Environmental Quality*. Netherlands: Elsevier Science Publishers B. V.

Perman, R., Ma, Y., Common, M., Maddison, D. & McGilvray, J. (2011). *Natural resources and environmental economics.* 4th. edition. Harlow: Pearson Education Limited.

Restaurang.se (www.restaurang.se)
1. Pastan – den svenska vardagsfavoriten [2017-03-23]
http://restaurang.se/kuriosum.php?id=66

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, Vol. 82(1), pp. 34–55. Available: http://www.jstor.org/stable/1830899 [2017-03-08]

Ryegård, C. & Ryegård, O. (2017). *Ekologisk livsmedelsmarknad: Rapport om den ekologiska branschen sammanställd av Ekoweb.nu.* Lidköping (Ekoweb, 2017). Available: http://paper.agriprim.se/split_document.php?subfolder=Ekoweb/&doc=Marknadsrapport%202017%20red.pdf

Schollenberg, L. (2012). Estimating the hedonic price for Fair Trade coffee in Sweden. *British Food Journal,* Vol. 114(3), pp. 428–446. Available: http://www.emeraldinsight.com/doi/abs/10.1108/00070701211213519 [2017-03- 08]

Statistics Sweden (Statistiska centralbyrån) (2004). *Attityder till ekologiska livsmedel.* Available: http://www.scb.se/statistik/_publikationer/JO9999_2005A01_BR_JOFT0502.pdf

Stock, J.H. & Watson, M.W. (2015). *Introduction to Econometrics*. 3rd. edition. Pearson Education Limited.

Waugh, F.V. (1929). Quality factor influencing vegetable prices. *Journal of Farm Economics*, Vol. 10(2), pp. 185–196. Available: http://www.jstor.org/stable/1230278?seq=1#page_scan_tab_contents [2017-03-29]

Appendix

Appendix 1: F-test

Table 8. Results of F-test

Test statistic: Robust F(8, 296) = 16,6834, with p-value = 2,11103e−20					
	Coefficient	*Std.error*	*t-ratio*	*p-value*	
const	3,46175	0,0298060	116,1	6,81e−254	***
Organic	0	0	NA	NA	
Swedish-produced	0	0	NA	NA	
Whole grain/Fibre	0	0	NA	NA	
Fresh	0	0	NA	NA	
Private label	0	0	NA	NA	
Spaghetti	0	0	NA	NA	
Flavoured	0	0	NA	NA	
Supermarket	0	0	NA	NA	
Standard error of the regression = 0,52054					