Price Versus Non-price Incentives for Participation in Quality Labeling: The Case of the German Fruit Juice Industry[1]

Roland Herrmann[1] and Simon Bleich[2]
[1]Institute of Agricultural Policy and Market Research, Justus Liebig University Giessen, Germany
[2]Produkt + Markt Marketing Research, 49134 Wallenhorst, Germany
Roland.Herrmann@agrar.uni-giessen.de

Abstract
Quality assurance and labeling play an important and increasing role in firms' marketing strategies. In almost all cases, a price incentive has been stressed as the major incentive for firms to participate in such schemes. We argue here that important non-price incentives for participation in quality labeling may exist, too. In German retailing, it can be observed that discount retailers are listing more and more foods with quality labels. Processors may then participate in voluntary quality labeling in order to enter the large and growing market of discount retailers. The price-premium versus the market-entry hypothesis are analyzed theo-retically. We investigate then in an empirical hedonic pricing model for the German fruit juice market and for participation in the quality label of the Deutsche Landwirtschafts-Gesellschaft (DLG) which of the two hypotheses is consistent with the data. There is strong support for the market-entry hypothesis.

Keywords*: Labeling; price premium; market entry; fruit juice market; DLG award*
EconLit classification: L660; M380; Q130

1 Introduction

Quality assurance and labeling play an important and increasing role in firms' marketing strategies. Manufacturers utilize these tools in order to gain or to keep market shares on horizontally and vertically differentiated food markets. The labeling of foods may address a large number of intrinsic quality attributes valued by consumers. Those quality attributes refer to, e.g., food safety, nutrition, sensoric or organoleptic analyses, the value and function of a product or its production process. Food labels may also contain quality signals like the country or region of origin of a product or test results of quality assurance schemes with regard to, e.g., certification or traceability (CASWELL and ANDERS 2011, p. 475).
In the recent literature, quality assurance and labeling have mainly been seen as instruments of product proliferation that may lead to a price premium and, consequently, to producer gains. The main emphasis has been placed on the measurement of consumers' willingness to pay for quality attributes. It was elaborated that some willingness to pay does exist for quality attributes such as ecological (CRANFIELD, DEATON and SHELLIKERI 2009), GM-free (LUSK et al. 2006) or pesticide-free production (ROOSEN 1998) and health benefits in foods (MARETTE et al. 2010). Moreover, quality signals like the regional origin of specialty foods (LOUREIRO and MCCLUSKEY 2000) or third-party certification of production standards (JAHN, SCHRAMM and SPILLER 2005) are also associated with a positive willingness to pay. In an increasing number of studies, various quality attributes were introduced jointly and the differential marginal willingness to pay was quantified (WEST et al. 2002; GAO and SCHROEDER 2009; APRILE, CAPUTO

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and NAYGA 2012). Consequently, the introduction of quality labels has been regarded as a marketing tool to raise prices and producer gains (FOTOPOULOS and KRYSTALLIS 2003).

It has been widely ignored in this literature that price advantages are only one possible option for manufacturers to gain from increasing product quality and its labeling. Therefore, it will be analyzed in this paper what kind of incentives may drive firms in their decisions to participate in quality assurance and labeling. Two hypotheses will be formulated theoretically and it will be tested empirically for a highly differentiated food industry which one of these hypotheses is consistent with the data. The empirical analysis focuses on the German fruit juice market and on the incentives for firms to participate in a voluntary quality label, i.e. the DLG Label. The article is organized as follows.

After the Introduction, a brief overview of major developments on the German fruit juice market will be provided in Section 2. Then, in Section 3, two theoretical hypotheses will be derived. The first hypothesis refers to the traditional view that a price premium is the major incentive for participation in quality labeling. According to the second and opposite hypothesis, firms may gain mainly from non-price incentives of quality labels. In Section 4, a hedonic pricing model will be specified and, based on primary data collected for the German fruit juice market, is utilized for an assessment of the two alternative hypotheses. Conclusions will be drawn in Section 5.

2 The German Fruit Juice Market: Market Development and Quality Labeling

Some background information on the development and structure of the German fruit juice market and on voluntary quality labeling in that market will be provided first.

2.1 Market Structure and Development

On the German beverage market, which is characterized by a declining consumption of alcoholic beverages and a strongly increasing consumption of non-alcoholic beverages (BMELV, Table 311, various years), fruit juice has been a very interesting category for decades now. Although per-capita consumption fell somewhat, i.e. from 39.6 (1990) to 36.3 (2010) liters per year and, thus, to 12.5 % of non-alcoholic beverage consumption, Germany has been the country with the highest per-capita consumption of fruit juice in the European Union. In the year 2010, the country was followed by Finland (31.2 liters per capita and year), Austria (28.7 liters) and the Netherlands (27.9 liters). Moreover, fruit juice is a typical high-value product in the beverage industry with a higher relative importance in value rather than in quantity terms. Orange juice (8.7 liters) and apple juice (8.1 liters) dominated in 2010 – as in the last decades - the per-capita consumption of fruit juices in Germany, followed by different nectars.

An essential feature of German retailing, that is also important for our analysis, is the high and increasing share of discounters. The major share of non-alcoholic beverages in Germany is distributed by discounters (GFK Consumer Scan), followed by large department stores ($\geq$ 1,500 m^2) and traditional retailers and supermarkets ($\leq$ 1,499 m^2). The discounters' market share increased from 35.0 % in 2002 to 55.3 % in 2010, at the expense of all other types of retailers. The loss of market share was particularly strong for beverage retail markets with a decline from 17.4 % (2002) to 7.6 % (2010).

2.2 Quality Labeling for Non-alcoholic Beverages in Germany

There are some major actors on the German fruit juice market and the names of those firms are well-established as quality signals and were shown to be associated with price premia (BROCKMEIER 1993, p. 181). Apart from the brands of major suppliers, quality labels provided by independent agencies represent important signals of fruit-juice quality. These quality labels seem to be of special importance for processors who are no market leaders and cannot afford to develop national brands but still produce high-quality goods. One of these labels is the DLG Label which will be analyzed in the quantitative analysis below. The DLG Label is based on a voluntary participation by individual firms in third-party quality control.

The DLG Label is awarded by the German Agricultural Society (Deutsche Landwirtschafts-Gesellschaft, DLG), an association founded in 1885 in order to promote technical and scientific progress. In the DLG Test Center Food, more than 27,000 foods are tested annually in DLG Quality Tests mainly according to sensory analysis. For several product groups, sensory analysis is complemented by "food preparation tests, inspections of the packaging and labeling, as well as chemical, microbiological and physical analyses in accredited laboratories" (DLG 2012, p. 4). DLG awards in Gold, Silver and Bronze are given annually to food products of superior quality. In two studies, the importance of such tests under the DLG label for beverage prices, have been analyzed in detail. WENZEL (2002) utilized unpublished background information of DLG tests such as chemical and sensory criteria in the explanation of prices for apple juice; she elaborated a rather strong effect of those indicators of objective juice quality on prices. SCHAMEL (2003) introduced the DLG awards directly in his hedonic price analysis for wine and detected statistically significant impacts of DLG awards as well as quality grades on wine prices.

3 Theoretical Considerations: Price versus Non-price Incentives in Quality Assurance and Labeling

The economic rationale for quality assurance and labeling schemes is based on quality uncertainty by consumers. Differentiated food markets are often characterized by an information asymmetry with regard to product quality between producers and consumers as the consumers' information on product quality is incomplete. Therefore, quality assurance and labeling schemes may provide the needed information and/or quality signals which reduce consumers' search costs. Quality assurance and labeling may thus raise consumers' welfare. If they succeed to raise society's welfare, too, they will be a useful tool to avoid market failure and to strengthen the functioning of the market mechanism (see, e.g., HERRMANN and TEUBER 2011).

In the following analysis of private incentives to join quality assurance and labeling schemes, it is not this information-economic perspective that is in our focus. The self-interest of firms to participate in such schemes is our primary interest.

We posit for the following analysis that a firm produces a high-quality product already. Many consumers, however, will not be able to distinguish the high-quality product from a lower-quality mass product. Given this background, there could be at least two motivations for a firm to participate in a voluntary labeling scheme which causes additional costs:

1. The firm can be interested in the price premium it could get in the situation with a certified quality label compared to the non-labeled market. We call this the **price-premium hypothesis** for a participation in the quality labeling scheme.
2. The firm can be interested in the label, too, since retailing firms expect from their processors that their products are quality-labeled. If a quality label allows the firm to be listed with its product by retailers and to enter a larger market, the firm's decision to

participate in the labeling scheme may raise profits even without a price premium. It is possible that larger quantities can be sold on a continuous basis. We call this the **market-entry hypothesis** for the participation in the labeling scheme.

The first hypothesis is illustrated in Figure 1. Suppose that the firm initially faces the demand curve D_1 for its already existing high-quality product. The firm's supply curve is S_1, i.e. marginal costs are rising. If the firm sells on a competitive market, the equilibrium price is p_1 at which the firm sells quantity q_1. Producer surplus is equal to area (a + b). Participation in quality labeling would help consumers to better identify the high-quality product and demand would shift to the right, from D_1 to D_2. Quality labeling would induce additional costs, too. Even if the high quality was introduced in the past and no additional costs of production and quality assurance occur, there will be costs for quality control by the certification agency. Additionally, there will be marketing costs due to a new package design with the quality label. Thus, marginal costs are raised and the supply curve shifts to the left - from S_1 to S_2. This yields a new market price p_2 at which the supply curve S_2 and the demand curve D_2 intersect. For the individual firm, p_2 is a gross price from which the marginal costs of quality labeling have to be deducted in order to get the net price p'_2. As far as the label-induced shift of the demand curve is stronger than the supply shift, the individual firm receives an increasing net price. The net price after participation in the quality-labeling scheme has to be compared with the initial price in the non-labeling situation. In Figure 1, the firm gains in terms of producer surplus the area (c + d + e) due to participation in the quality-labeling scheme.

It is this incentive that has been stressed in the literature many times. Most notably, DESENICU et al. (2011) survey 16 studies in which price premia for geographical indications in food products were computed. The authors regard the price premium, compared to a generic reference product, as a success indicator for geographical indications. They estimate in a meta-study which determinants affect the price premium and to what extent.

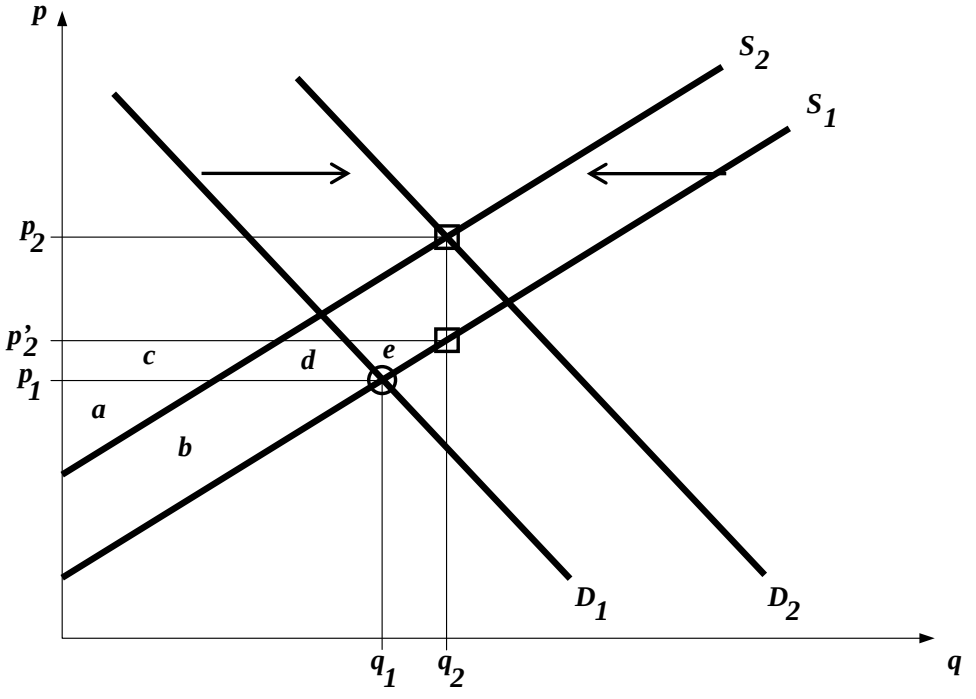

Figure 1. The Price Incentive for Participation in Quality Assurance and Labeling (Hypothesis 1)
Source: Own presentation.

The second hypothesis is illustrated in Figure 2. A situation is shown in Figure 2 in which a firm might gain from entry to a large market with a quality label even if its price premium would become negative. We posit that the firm originally produced and marketed a high-quality product already, but without a certified quality label. In this case, there was a situation of monopolistic competition for the firm. It was possible to sell the high-quality good at a price above the mass-market price, but associated with high search costs of consumers and a very small market for its product. According to Figure 2, the firm faced a demand curve D_1 for the high-quality product with an associated marginal revenue curve MR_1. Under profit maximization and with marginal costs MC_1, the optimum quantity was q_1. According to the COURNOT point *C*, the firm realized the price p_1 for q_1 under monopolistic competition. The optimum solution was associated with a producer surplus of area (*a+b+c+d*), i.e. the difference between earnings (*a+b+c+d+e*) minus variable costs (area *e*).

A participation in the quality-labeling scheme may now be the entrance ticket to a large-volume market for the high-quality product, if retailers ask for quality-labeled products from the processors. The growing German market of discount retailers is a case in point. Suppose that D_2 is the retailers' demand function for the firm's high-quality product with a quality label. As price competition will be much stronger on the large-volume market, we posit that the firm can no longer set its price above marginal costs. With a certified quality label, the firm can move from its market niche and the demand curve D_1 to the large-volume market of discounters with retailers' market demand D_2. Under competitive pricing, the firm may sell q_2 where its new marginal cost curve MC_2 intersects the retailers' demand curve D_2 for the firm's product. The price consumers pay is p_2. The producer price for the firm's product falls from p_1 in the niche-market situation without quality label to the net price p'_2 on the large-volume market where the quantity sold rises substantially, i.e. from q_1 to q_2. The firm's net price is the consumer price on the market of discount retailers, i.e. p_2, minus the marginal costs of participating in quality labeling. Producer surplus with a certified quality label is now as high as area ($a+b+f+g+h$) and the impact of the quality label on producer surplus is ($a+b+f+g+h-a-b-c-d$). Compared to the non-labeling situation, the firm experiences a welfare gain if the area ($f+g+h$) exceeds area ($c+d$).

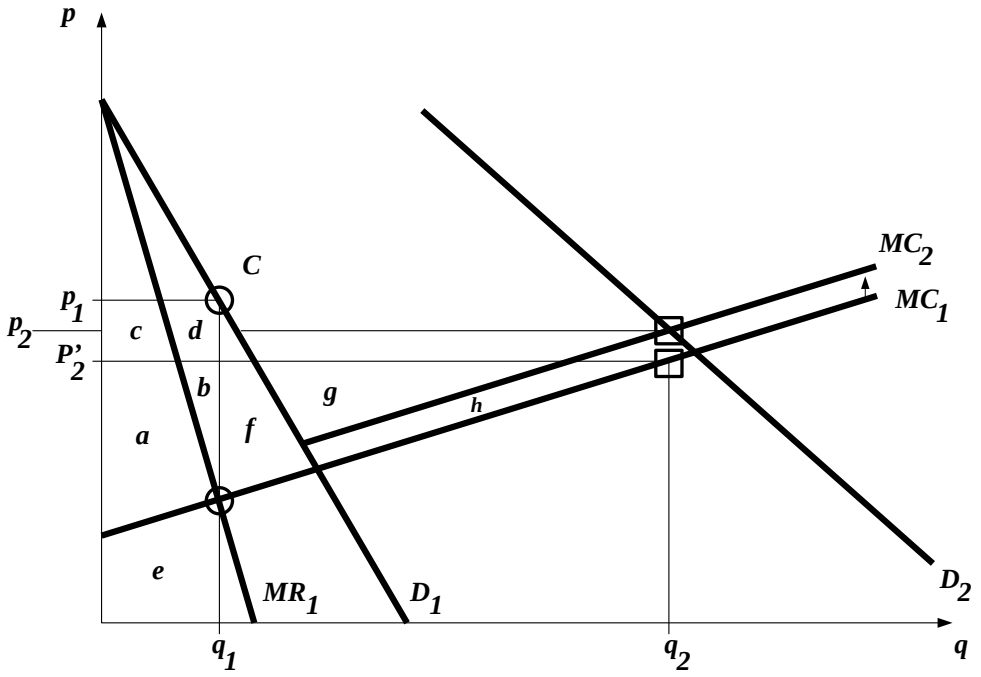

Figure 2. A Nonprice Incentive for Participation in Quality Assurance and Labeling(Hypothesis 2)

Source: Own presentation.

It is the strategy of discounters which makes the market-entry hypothesis a very plausible rationale for participation in voluntary certified labeling.

We will now provide empirical evidence for the German fruit-juice market in order to test whether one of the two hypotheses seems compatible with the findings.

4 Empirical Analysis: A Hedonic Pricing Model of the Quality-Price Linkage on the German Fruit Juice Market

In this Section, hedonic pricing models on the influence of product characteristics on the price of fruit juices in Germany will be developed, estimated and interpreted. We start with the empirical model and explain then the data. Finally, we provide the econometric estimates and the economic interpretation of results.

4.1 The Empirical Model

The empirical model is based on hedonic price analysis. The theoretical basis of hedonic pricing models is a consumer theory along the lines of LANCASTER (1966). According to LANCASTER and other authors of characteristics models, the characteristics of products rather than their quantities enter consumers' utility functions. This approach is consistent with differentiated product markets in which heterogeneous preferences of consumers are satisfied. When an additional product characteristic is added to a product this will affect consumers' utilities, i.e. the demand side, and/or the marginal costs of providing the characteristic, i.e. the supply side. ROSEN (1974) stressed the supply-and-demand character of hedonic pricing models. On a competitive market, implicit prices of product characteristics are affected by their implications for demand **and** supply. In COSTANIGRO and MCCLUSKEY (2011), the methodological foundation of hedonic pricing models is presented, applications to food market analysis are surveyed and future challenges are elaborated.

The basic hedonic price function is then a reduced-form model of the supply and demand for products with varying quality characteristics. The dependent variable, i.e. the price of a product i (p_i) is linked, to product i's characteristics z_{ij} with $j = 1, \ldots, n$:

(1) $$p_i = f(z_{i1}, \ldots, z_{in}).$$

In the following empirical analysis, we specify the dependent variable in logarithms and introduce various groups of independent variables:

(2) $$ln\, p_i = \alpha_0 + \sum_k \alpha_{1k} \cdot LABEL_{ik} + \sum_l \alpha_{2l} \cdot QUALITY_{il} + \sum_m \alpha_{3m} \cdot CHAIN_{im} + \varepsilon.$$

The vector $LABEL_{ik}$ captures variables that indicate whether certain quality labels k are valid for product i. The vector $QUALITY_{il}$ stands for product characteristics l that describe a fruit juice i in terms of its objective or subjective quality. Variables which comprise the product's distribution in the marketing chain as well as retailing strategies are covered under the vector $CHAIN_{im}$. Quite a number of variables, some of which are summarized in the Appendix , were used under these vectors during the specification search.

The final models shown in Section 4.3 are based on estimations in which all coefficients were statistically significant at least at the 95 %-level. They are based on the following specification for apple juice:

(3) $$ln\, p_i = \alpha_0 + \alpha_1 \cdot DLG\_LABEL_i + \alpha_2 \cdot ORGANIC_i + \alpha_3 \cdot BRAND_i + \alpha_4 ln\, PACKSIZE_i + \alpha_5 \cdot DIRECT\_JUICE_i + \alpha_6 \cdot GLASS_i + \alpha_7 \cdot CLOUDY_i + \alpha_8 \cdot REGDISTR_i + \alpha_9 \cdot LARGECITY_i + \alpha_{10} \cdot UNIFORMPRICE_i + \varepsilon_i,$$

and the following one for orange juice:

(4) $$ln\, p_I = \beta_0 + \beta_1 \cdot DLG\_LABEL_I + \beta_2 \cdot ORGANIC_I + \beta_3 \cdot BRAND_I + \beta_4 \cdot \ln PACKSIZE_I + \beta_5 \cdot DIRECT\_JUICE_I + \beta_6 \cdot GLASS_I + \beta_7 \cdot UNIFORMPRICE_I + \beta_8 \cdot BEV\_STORE_I + \varepsilon_I$$

p_i (p_I) is the price of apple juice i (orange juice I) with $i = 238$ ($I = 182$) in €/liter. The variables *DLG_LABEL*, *ORGANIC* and *BRAND* stand for the existence of a quality label – in the first two cases – and for the existence of a national brand in the latter case. For all three variables, the dummy variable becomes unity (zero) if the quality signal does exist (not exist). The signs of α_1 and β_1 indicate whether the price-premium or the market-entry hypothesis is consistent with the data. The higher α_1 and β_1, the more likely is that the price-premium hypothesis holds. However, as we cannot observe equilibrium quantities, there is only one case where we can distinguish between the two hypotheses with certainty: $\alpha_1 < 0$ *and* $\beta_1 < 0$ imply that the market-entry hypothesis is supported by the data.

The variables *PACKSIZE*, *DIRECT_JUICE*, *GLASS* and *CLOUDY* belong to the vector *QUALITY*. They are indicators of objective or subjective fruit-juice quality. *PACKSIZE*, as a metric variable, measures the package size of a fruit juice sold. *DIRECT_JUICE* takes the value unity (zero) if fruit juice is processed from fresh fruit directly (from fruit concentrate). *GLASS* indicates that the package of the fruit juice is a glass bottle (another material than glass) if the variable is unity (zero). *CLOUDY* stands for a clouded (clear) apple juice if the value of the dummy variable is unity (zero).

The variables *REGDISTR*, *LARGECITY*, *UNIFORMPRICE* and *BEV_STORE* are part of the vector *CHAIN*. They capture facts about how fruit juices are marketed by retailers and processors in the marketing chain. The dummy variables illustrate whether the processor of a fruit juice is distributing the fruit juice only regionally (*REGDISTR*=1) or nationwide (*REGDISTR*=0), whether the price observation comes from the larger city (*LARGECITY*=1) or the smaller city (*LARGECITY*=0), and whether the fruit was distributed by a beverage retail market (*BEV_STORE=1*) or not (*BEV_STORE=0*). In some cases, it was observed that some national brands were sold at the same or nearly the same price. The dummy variable *UNIFORMPRICE* received the value unity (zero) if this situation was given (not given).

Apart from models (3) and (4), alternative model specifications will be presented in Section 4.3 which refer to the detailed awards of the DLG Label rather than its existence. The variable *DLG_LABEL* in equations (3) and (4) will then be substituted by the awards *GOLD*, *SILVER* and *BRONZE*, respectively.

4.2 Data

Two primary data sets were collected and used in the following empirical analysis. Data refer to juices supplied in December 2010 in the retailing sector of two German cities: (i) Cologne and (ii) Baden-Baden. Cologne stands for larger and Baden-Baden for smaller West German cities. The study covered 182 juices offered in Cologne, namely 105 apple juices and 77 orange juices, and 238 juices in Baden-Baden, namely 133 apple and 105 orange juices. For all juices sold, the following product characteristics were collected and incorporated: producer, brand, retailer, price, size and type of packaging, and quality labels.

The individual juices were then assigned to DLG awards provided in three different editions of the magazine "DLG Test Lebensmittel": 04/2008, 05/2009 and 05/2010. Older issues of the magazine which contained awards for fruit juices, too, were ignored as firms are allowed to advertise their DLG awards for 24 months only after its receipt. Thus, 145 fruit juices could be identified that had received a Gold, Silver or Bronze award under the DLG label. Among these were 88 apple and 57 orange juices.

Descriptive statistics of the sample of juices are summarized in the Appendix. 238 apple and 182 orange juices are covered in the sample. There was a mean price of 1.29 €/liter for apple juice and 1.41 €/liter for orange juice. In some respects, the sample of apple juices is very similar to the sample of orange juices. In both cases, the private-label share of all juices was between 30 and 40 % and the share of national brands dominated. Moreover, the share of organic fruit juices was low compared to conventional ones. The conventional share was close to 90 % on both markets. Similar is also the share of products with DLG award: It ranges between 30 and 40 % for both apple and orange juice.

A difference is that more regional suppliers are active on the market for apple juice (28.6 compared to 17 %) and that glass packaging is clearly more important for apple juice (36.6 compared to 26.4 %) compared to orange juice. Even stronger is the difference with regard to the role of direct juice: Its share is as high as 48.7 % for apple juice, but only 12.6 % for orange juice. This difference is plausible as high transport costs for oranges will lead to a stark cost advantage of processing orange juice from fruit concentrate rather than from fruits directly. For apple juice, the importance of the market segment of cloudy juice is visible (48.7 %). In the case of orange juice, there is an interesting market segment with fruit pulp, but it is rather small and covers only 6.6 % of all juices.

4.3 Results and Interpretation

The five selected estimations are presented in Table 1. In the first place, all estimations are inconsistent with Hypothesis 1 but consistent with Hypothesis 2. Apparently, the evidence supports the market-entry hypothesis. Participation in the quality-labeling scheme for apple and orange juices is, ceteris paribus, associated with a lower price than non-participation.

Table 1. Quality Labels and Other Determinants Affecting Fruit Juice Prices in Germany

Explanatory Variables	Apple Juice		Orange Juice	
	Model 1	Model 2	Model 3	Model 4
Constant	-0.0467	-0.0489***	-0.3089***	0.0145
	(-1.25)	(-1.29)	(-5.92)	(0.54)
DLG_LABEL	-0.2084***		-0.0887**	
	(-5.41)		(-2.60)	
GOLD		-0.2209***		-0.0841
		(-3.97)		(-1.54)
SILVER		-0.2206***		-0.1062*
		(-5.60)		(-2.23)
BRONZE		-0.1484*		-0.0932**
		(-2.10)		(-2.65)
BRAND	0.1627***	0.1639***	0.2476***	0.2450***
	(4.07)	(4.13)	(6.16)	(5.96)
ln PACKSIZE	-0.3463***	-0.3487***		-0.2110***
	(-8.90)	(-8.85)		(-7.08)
PACKSIZE [b)]			-0.2853***	
			(-6.31)	
CLOUDY	0.1116**	0.1068**		
	(2.82)	(2.80)		
REGDISTR	0.2412***	0.2413***		
	(4.01)	(3.91)		
LARGECITY	-0.1223**	-0.1235**		
	(-2.89)	(-2.92)		
UNIFORMPRICE	0.2591***	0.2624***	0.1319***	0.1334***
	(6.55)	(6.55)	(3.40)	(3.45)
ORGANIC	0.1703**	0.1705***	0.3507***	0.3578***
	(3.27)	(3.19)	(7.14)	(7.40)
DIRECT_JUICE	0.1038**	0.1107**	0.3049***	0.3198***
	(2.66)	(2.86)	(6.88)	(6.78)
GLASS			0.0952*	0.1291**
			(2.02)	(2.67)
BEV_STORE			0.0950*	
			(2.01)	
$\bar{R}^2$	0.531	0.529	0.572	0.574
F	30.87***	25.24***	31.18***	28.08***
n	238	238	182	182

[a)] Heteroscedasticity–robust t-values according to White are computed. All variables are explained in the text.

***, **, * indicate the 99.9 %-, 99 %-, 95 %-levels of statistical significance for two-sided tests. - [b)] Model 3 is a general log-lin model, i.e. the variable *PACKSIZE* is not converted into logarithms.

Source: Authors' computations.

The coefficients of the variable *DLG_LABEL* are statistically significantly negative in Model 1 (apple juice) and Model 3 (orange juice), and the coefficients of the disaggregated DLG awards *GOLD*, *SILVER*, and *BRONZE* are significantly negative, too. In general, the negative price premium is higher for apple juice than for orange juice. Our rationale for the negative coefficients is that quality-labeled products are becoming more and more the standard on the growing market for discounters in German grocery retailing. Apparently, it is attractive for those processors, who do not offer the leading brands, to enter this growing and stable market. This even holds if a negative price premium occurs compared to a more individual market segment in a hypothetical situation without DLG award.

It is important to control for a number of other determinants of fruit juice prices. In the following interpretation, we concentrate mainly on the results of Models 1 and 3. **National brands** capture significantly higher prices than their counterparts and the price premia of

national brands are clearly higher for orange than for apple juice. **Organic fruit juice** realizes a price premium compared to conventional fruit juices, too, that is again significantly higher for orange than for apple juice. Whereas the price premium associated with the characteristic *ORGANIC* is higher than that for *BRAND* in the case of orange juice, the two premia are nearly identical for both variables in the case of apple juice. A significant price premium is earned by **direct juice** relative to juice from concentrate, both for apple juice and – to a larger extent – for orange juice.

A cost-oriented determinant of fruit juice prices is the **package size**. A one-percent increase in the package size lowers the price of apple juice by 0.35 % (Model 1) and of orange juice by 0.21 % (Model 4). Fruit juice prices are rising if processors' market position is so strong that their brands are **uniformly priced**, and more so for apple than for orange juice.

Some other price determinants are only significant for either apple or orange juice. For **cloudy** apple juices, a price premium can be captured compared to clear apple juices. **Regionally distributed** apple juices also receive a price advantage compared to nationally distributed juices and, in general, apple juice is cheaper in the **large city** than the smaller city. A significant positive price difference occurs for orange juice sold in beverage retail markets compared to other retail stores.

Table 2 allows additional findings on the magnitude of the impact of the dummy variables. As Table 1 contains equations with the logarithm of prices as a dependent variable and many dummy variables on the right-hand side, the approach by HALVORSEN and PALMQUIST (1980) is applied. With a DLG award, a negative price premium of 18.8 % for apple juice and of 8.5 % for orange juice occurs. However, high positive premia are associated with other characteristics of fruit juice, too. For apple juice, it is 29.6 % if firms can realize uniform pricing for their products, 18.6 % for organic apple juice and 17.7 % for national brands. For cloudy and direct apple juice, the price premia are higher than 10 %, too.

Table 2. The Percentage Impact of Quality Labels and Other Characteristics on Fruit Juice Prices in Germany[a)]

Explanatory Variables	Apple Juice	Orange Juice
DLG_LABEL	-18.8	-8.5
GOLD	-19.8	-8.1
SILVER	-19.8	-10.1
BRONZE	-13.8	-8.9
BRAND	+17.7	+28.1
CLOUDY	+11.8	
REGDISTR	+27.3	
LARGECITY	-11.5	
UNIFORMPRICE	+29.6	+14.1
ORGANIC	+18.6	+42.0
DIRECT_JUICE	+10.9	+35.6
GLASS		+10.0
BEV_STORE		+10.0

[a)] Computed with the equation by HALVORSEN/PALMQUIST (1980), on the basis of the regression coefficients of the dummy variables shown in Table 3. The results are based on Model 1 for apple juice and on Model 3 for orange juice. The results for the variables *GOLD, SILVER* and *BRONZE* are based on Models 2 and 4 respectively.

Source: Authors' computations.

In the case of orange juice, some characteristics are associated with even higher percentage price premia: organic orange juices gain a premium of 42.0 %, direct juices of 35.6 % and the national brands of 28.1 % compared to their counterparts.

5 Conclusions

The literature on quality assessment and labeling is dominated by contributions in which the existence of a price premium is viewed as the major incentive for participation. However, there may be other incentives for firms to participate in voluntary quality labeling. Discounters in particular offer an increasing share of quality-labeled products. Participation in voluntary quality labeling may become a pre-condition for food manufacturers to enter the growing market of discount retailers. We called this the market-entry hypothesis and analyzed for the German fruit juice market whether participation in the voluntary DLG quality labeling is consistent with either the market-entry hypothesis or the traditional price-premium hypothesis. The analysis confirms for orange and apple juice that the voluntary DLG award is associated with a negative price premium. This is only consistent with the market-entry hypothesis.

It seems that the leading juice manufacturers have invested in private quality reputations already and realized a price premium for their reputation – as indicated by the coefficient of the *BRAND* variable. Apparently, they do not need to participate in voluntary quality labeling such as the DLG label additionally. Manufacturers whose private quality reputation is still lower find it more attractive to participate in voluntary DLG labeling and use its collective reputation for entering new markets and signaling the quality of their products.

It might be that the main result of this paper is fruit-juice specific. SCHAMEL (2003), e.g., found that DLG quality labeling induced price premia for award-winning wines. What can be observed, however, for some other markets like ice cream or beer is that the situation seems to be similar to fruit juice. Participants in voluntary labeling on those markets are not the leading manufacturers who have already an established high-quality reputation for their products. They are rather followers who cannot afford to establish strong national brands as indicators of private reputation but have to signal the quality of their products with indicators of collective reputation to retailers and consumers. Therefore, it seems necessary and interesting to analyze in future research whether the market-entry hypothesis is a much more general explanation for participation in quality labeling than for fruit juices alone.

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Appendix: Descriptive Statistics on the Data Base: Product Characteristics of Fruit Juices in the Sample[a)]

Product Characteristics	Apple Juice		Orange Juice	
	n	%	*n*	%
Cloudy	110	46.2		
Clear	128	53.8		
With fruit pulp			12	6.6
Without fruit pulp			170	93.4
Direct juice	116	48.7	23	12.6
Juice from concentrate	122	51.3	159	87.4
Tetrapak/Elopak	94	39.5	78	42.9
PET	57	23.9	56	30.8
Glass	87	36.6	48	26.4
Discounters	33	13.9	29	15.9
Supermarkets, large department stores, other retailers	173	72.7	128	70.3
Beverage retail markets	32	13.4	25	13.7
Private label	77	32.4	65	35.7
National brand	161	67.6	117	64.3
Regional supply	68	28.6	31	17.0
Nationwide supply	170	71.4	151	83.0
Organic production	26	10.9	15	8.2
Conventional juices	212	89.1	167	91.8
No DLG award	150	63.0	125	68.7
With DLG award	88	37.0	57	31.3
Gold	35	14.7	17	9.3
Silver	38	16.0	28	15.4
Bronze	15	6.3	12	6.6
Package with DLG label	36	15.1	20	11.0
Package with any label	49	20.6	30	16.5

[a)] The total sample consists of 238 apple juices and 182 orange juices.
Source: Own presentation and computations.