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What Drives the Premium for Origin Based Labels?

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Abstract:

Geographical indications (GI) have become a common mean of product differentiation in food markets, and a vast number of studies have estimated the price premium captured by specific GI products. We collected 30 valuation studies conducted across the globe, compiling a total of 183 estimates of GI premia for wine, cheese, coffee, meat, produce, olive oil and grain products. The average premium is 13.3%, with a rather large standard deviation (24.59%). We show that models accounting for product characteristics and institutional framework (PDO, PGI, trademarks) can explain a large portion of this variance. GIs capture the highest percentage premium in markets for products with short supply chains and relatively low added value (e.g. fresh produce), while premia are lower for wine and olive oil, where alternative means of product differentiation (e.g. branding) exist. Controlling for product characteristics, GIs adopting stricter regulations (PDO) yield larger premia than less regulated ones (PGI).

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1. Introduction

Agricultural and foods products have long been associated with unique characteristics and heritage aspects of their origin. Geographical names have been used since classical times to identify products of exceptional quality; for example, historical documents reveal the notoriety of olive oils from Baetica in Rome (Blasquez et al., 1992). Through the ages, a number of products identified by their origins emerged and, more recently, have established a niche in food and beverage markets. Well-known examples of Geographical Indications (GIs) are the wines of Bordeaux and Porto, the cheeses of Parma and Rochefort, and the hams from Parma and Bayonne. In general, the association of food products and geographic names identifies unique agro-ecological conditions, typical animal breeds and plant varieties, and human know-how. These conditions are often associated with the definition of *terroir* (see Joslin 2006). In addition, the names of GI products may signal specific modes of production, and commonly rely on the collective reputation of numerous producers.

In today's food system, the principal role of GIs is providing consumers with an instrument to identify food choices with preferred attributes or higher quality; while offering producers a means to differentiate their products and obtain higher prices. Arguably, a measure of a GI's success lays in its ability to provide sufficient product information and assurances so that producers can capture a price premium in the marketplace. Based on this criterion, not all GIs have been equally successful: while numerous studies document how GI-labeled products often commend a premium (relative to commodities in the same product category), the statistical and economic evidence of these price differentials varies substantially.

One possible explanation lies in the heterogeneous nature of the products and markets in which GIs have been used. While indications of origin have mainly been used in Southern European countries, they are becoming increasingly common in Northern Europe, the New World and in developing countries. Examples include wines from specific viticultural areas in America, Australia and New Zealand; Jamaica's Rum and Blue Mountain coffee, Basmati rice from specific regions in India and Darjeeling tea (Costanigro et al., 2009; Schamel and Enderson, 2006; Das 2006; Gautam and Bahl 2010; Deppeler et al. 2011). There are, of course, alternative marketing strategies that are independent of using origin to identify products. In the food and beverage industries, successful global brands, such as Coca-cola or Nescafe, have no

criteria determined by production location. So, what critical factors are motivating this recent surge of geographical names use? Under what conditions will GIs play a more prominent role than other differentiation strategies? This research aims to initiate this inquiry with an exploration of the existing empirical findings on GI products.

More specifically, the primary objective of this study is to (meta-) analyze the empirical literature on GIs in order to establish a link between the GI premium and specific product, market, or institutional characteristics. We consider three major dimensions: 1) broad food categories, degree of food processing and product prices; 2) existence/absence of alternative differentiation mechanism (i.e. branding) and; 3) the institutions and laws regulating the use of GIs. Our intent is to generate a set of guidelines, independent of any particular study, outlining the factors that are instrumental for a GI based product differentiation scheme to capture a price premium.

2. Background

The primary role of GIs in food markets is to provide producers with a vehicle to indentify and differentiate their products and for consumers to gather information on attributes they value. Indeed, Costanigro et al. (2010) emphasize how GIs may essentially provide a mean to broadly categorize food choices, thereby facilitating consumer learning and the articulation of quality expectations (a reputation effect). However, the reasons why consumers use GIs when selecting among foods are likely to be complex and multi-faceted. Scarpa et al. (2005) suggest a potential rationale arguing that consumers' ethnocentric preferences or home bias may explain some of the preferences for origin labeled foods. In other words, the argument is that consumers tend to prefer products from the region or country with which they identify. Another reason, suggested by Broude (2005), is that GIs may counteract the perception that increased globalization has led to overly standardized food choices imposed by international brands. Still another argument is that GIs reveal and represent some sort of authenticity, cultural heritage or the ability to trace food they eat to its origin (Herrman et al., 2010). In short, there seems to be a renewed interest in "authentic", "traditional", "wholesome" and "traceable" food which seems related to a range of factors such as increased awareness of food safety, the socio-cultural status of consuming certain

foods and renewed interest in, or nostalgia of, one's culinary heritage (Ilberry and Kneafsey, 2000).

Farmers may use GI designation to differentiate their products and avoid competition in commodity markets, where brand-based product differentiation is unfeasible. In other words, farmers and primary food processors using GI labels may have easier access to niche markets, and have the ability to extract premium prices (Bramley et al., 2009).

Policy-makers have long acknowledged consumers interest and the potential of GIs to impact product valuation, international trade flows and farm policy (Herrmann et al., 2010). Most importantly, GIs may represent a key option to raise farmers' incomes and promote rural development (Josling, 2006). After a long period of spontaneous and informal development, designations of origin have been the object of increasing policy and regulatory efforts, most notably in Europe. In the early 1990's, the European Union conferred legal protection to foods and foodstuffs with a GI through Regulation (EEC) 2081/92 (EEC Council, 1992). At the core of this regulation is the idea that products originating from certain regions are *sui generis,* in that there is a direct link that can be demonstrated between the product origin and its final quality (Herrmann et al., 2010). This link occurs either via a set of standardized processing practices typical of a region or by the concept of *terroir*. The varying strength of this link is the rationale behind the use of two labels: in the case of a PGI, either production, processing or preparation of a product need to occur in the geographical area; while for a PDO *all* stages must occur in the same region (O'Connor, 2007). In other words, PDOs have more stringent standards of production and signal a stronger link between origin and the product's attributes. Finally, this regulation confers protection from "abusive" or unwarranted use of a protected designation of origin (PDO) or a Protected Geographical indication (PGI).

While the EU legislation on GIs is perhaps the most fully articulated and comprehensive (Josling, 2006), other countries have their own systems. In the US, GIs are protected within the standard trademark system, and most often simply verify the geographical origin of a product (Menapace et al., 2009). Names or signs, which otherwise would be considered primarily geographically descriptive, can be registered as quality assurance programs (USPTO, 2011). The process of establishing and using such a verification process is straightforward. First, an agency (at a state or regional level) establishes the standards governing a GI based trademark (e.g.: Idaho Potatoes must be grown in Idaho, and must be of a specific variety, e.g. Burbank, see

O'Connor, 2007). It is up to the agency to choose how strict these standards are based on their perceptions of the existence of differentiation opportunities in the marketplace. Then, anyone who meets these standards is permitted to use the geographical name to market their product. In the case of GIs, the geographical origin is usually the main attribute that is regulated by the quality assurance program or trademark (USPTO, 2007). However, the allowance of multiple criteria suggests that trademark programs may display a weaker link between origin and product attributes than the PGI and the PDOs.

3. Methodology and Data Description

We searched several applied economic and food industry databases for studies estimating consumers' willingness to pay (WTP) or market premium for GIs in a variety of food products, and compiled all relevant information into a dataset. In total, 30 studies published in the last two decades were identified and considered for further analysis. These studies often reported estimates for more than one GI, leading to a total sample size of 192 product-specific estimates. The sample was adjusted to exclude extreme outliers, yielding a final sample size of 183 observations collected from 27 papers. Table 1 lists each study, the food product involved, the broadly defined methodological approach of each study, as well as the number of GIs examined.

(Insert Table 1 here)

As in other meta-analysis studies involving valuation of labeled attributes (Ehmke, 2006; Lusk et al., 2005), estimates of the GI premia were normalized across articles as the percentage price (or valuation) difference between labeled and unlabeled products. To construct our dependent variable, we use the formula:

$$\%\ \text{Premium} = \left(\frac{\text{Price of GI Product - Price of Reference Product}}{\text{Price of Reference Product}} \right) * 100 .$$ This specification normalizes the estimates across the different years, units of measure (i.e., kilograms, pounds, cc, etc) and currencies reported.

Several challenges emerged in compiling the data. In two of the studies where pricing information about the reference product was missing (Stefani et al., 2006; Menapace et al.,

2011), we used CPI-adjusted current market prices to calculate price differential percentages. Similarly, in a study using an experimental design where a reference price was not given (Groot et al., 2009), the median of the price treatments is used as reference price (following Lusk et al. ,2005). Furthermore, many studies (more than 25% of our sample) reported only point estimates, and not the associated standard errors. In the cases in which some measure of the precision of the estimates was provided, we found them to be extremely heterogeneous[1]. Another limiting data issue regarded the demographics of the sample, and particularly income, which was either the data was missing, or reported in inconsistent ways such as "high" or "low" based on study-specific categories. Income was considered an important variable *a priori* since studies that include a larger proportion of more affluent consumers may have inflated willingness to pay estimates.

While we acknowledge these limitations, the compiled dataset contains a wealth of information: location and period covered by the study, type of GI scheme (PDO, PGI, GI based trademarks or generic geographical references), sample size and type of data used in the original study (i.e. survey, experiment, scanner data, etc), and methodology used to estimate the price premium (hedonic methods, contingent valuation, other)[2]. The valuation estimates were also categorized by broad food classes (cheese, meat, fruit, etc) and three super-categories based on the level of processing (highly processed for cheese and wine; low/intermediate for olive oil, grain, coffee, meat; and fresh produce for fruits and vegetables). A final categorization was based on the propensity for firm branding within each product market, which we consider as another important product differentiation mechanism. Wine and olive oil where characterized as markets in which brands are almost always present, cheese and meat both may be branded or generic; while branding is more rare for grain, fresh fruits and vegetables. A description of the variables and their descriptive statistics is provided in Table 2.

(Insert Table 2 here)

[1] The metrics used included standard errors, t-statistics, exact p-values or cutoff p-values (e.g., 0.01, 0.05, and 0.1). While all these measurements could be transformed into a uniform variable, for 48 out of a total of 192 observations (25% of our sample size) no measurement of precision of the WTP estimate was reported.

[2] Methodologies coded as "other" include simple reporting of a price differential between the labeled product and an unlabeled substitute (Galli et al.), auctions/ bids (Stefani, 2005; Akaichi et al., 2009), random utility models (Botonaki et al., 2004), and contingent valuation methods (Skuras et al, 2002).

The percentage premia for all GIs vary widely from a minimum of -48.4% for Bordeaux wine in France (Combris et al., 1997) to +181.92% for Valle d'Aosta Fromadzo Cheese in Italy (Galli, 2010). The average percentage premium for GIs is 13.32% once outliers are removed[3]. While the mean WTP is positive, indicating that consumers are generally willing to pay more for GI products, there is a great deal of variability in the premium: the estimate of the standard deviation of 24.59%. It should be also noted that the majority of studies in this sample (48.4%) are based on valuations by European consumers, followed by Australian and New Zealand studies (34.9%) and, finally, North American studies (USA and Canada consumers were involved in 16.7% of the sample studies).

Figure 1 shows the broad product categories represented in our sample by the GI scheme (PDO, PGI, or trademark). From a statistical viewpoint, it would be ideal to have all product categories represented within each GI-based quality assurance scheme, with similar frequencies. Instead, PDO-protected products are mostly cheese, followed by wine, olive oil, fruits/vegetables, and meat. In contrast, the majority of PGI certified products in our sample are meats, followed by grain and olive oil; while GI trademarks are mostly used with wine products[4] (73%), and fruits and vegetables such as Washington apples. Comparing PDO and PGI product lists, it appears that, with the exception of fresh produce, the more processed products such as cheese, wine, and olive oil self-select into the more complex PDO quality assurance, while the less processed meats and grain products are mostly certified by the easier process associated with a PGI.

4. Model and Estimation Methods

We estimate three model specifications, the most descriptive of which (Model 1) takes the form:

$$\begin{aligned} \%Premium_{ij} = {} & \alpha_0 + \alpha_1(Wine_i) + \alpha_2(Cheese_i) + \alpha_3(Meat_i) + \alpha_4(Grain_i) + \alpha_5(OliveOil_i) + \alpha_6(FruitVeggie_i) \\ & + \beta_1(PDO_i) + \beta_2(PGI_i) + \beta_3(CertMark_i) + \\ & + \gamma_1(Primary\ Data_j) + \gamma_2(Conjoint_j) + \gamma_3(Hedonic_j) + \varepsilon_{ij} \end{aligned} \quad (1)$$

;

[3] We considered an outlier any observation that lies outside +/- 2 standard deviations from the mean (a total of 9 estimates were excluded through this process)

[4] Wines are coded as trademarks when the original study specifies that they are produced in a specific American Viticultural Area (AVA)

where $\%Premium_{ij}$ indicates the i^{th} estimated premium from the j^{th} study. Thus, the general modeling framework assumes that the percentage WTP/price premium for GI certified food products depends on product/market specific characteristics (as captured by the alpha coefficients), the quality assurance scheme (beta coefficients), and a series of study-specific controls (gamma coefficients) accounting for the data and methods used in each original study. The reference categories for each set of dummy variables are respectively coffee, unregulated regional designations of origin, and studies using methods "other" than conjoint and hedonic analyses (see footnote 6).

Model 2 and 3 constitute an attempt to abstract from specific product categories and investigate general product and market characteristics which may explain variations in GI premia. In Model 2 we replace the product category dummies with variables quantifying the level of processing, to obtain the specification:

$Premium_{ij} = \alpha_0 + \alpha_1 \left(HighlyProcessed_i \right) + \alpha_2 \left(Fresh\ Produce_i \right) + \beta_1 \left(PDO_i \right) + ... + \varepsilon_{ij}$. In Model 3 we focus on the degree of firm branding observed for each product :

$Premium_{ij} = \alpha_0 + \alpha_1 \left(FullBrand_i \right) + \alpha_2 \left(MixedBrand_i \right) + \beta_1 \left(PDO_i \right) + ... + \varepsilon_{ij}$

Admittedly, these two "umbrella" categories are somewhat collinear, as longer supply chains seem to be typical of markets in which brand names have developed.

As it was not possible to directly include reliable measures of the variance of the estimates in our meta-analysis, our approach was to designate statistically insignificant estimates as zero. For the remaining estimates, we follow the approach of Lusk et al. (2005) by using the sample size of the original study as a measure of precision. The argument is that, as long as a study employed a consistent estimator, we expect the variance to decrease as the sample size increases. Thus, all three models are first estimated via ordinary least squares and then by weighted least squares, where the weights are proportional to the sample size of each study. This implies that estimates of GI premia generated from a larger sample size will have a greater effect on our estimated coefficients than estimates coming from a smaller sample.

Regarding the error term of our model, it seems reasonable to assume that the residuals are uncorrelated across studies, but some degree of correlation should be expected when premium estimates are obtained from the same study. As a cautionary measure, we use a robust (clustered on the individual study) estimator of the variance-covariance matrix. Random and fixed

effect (panel) models were also estimated. For the fixed effects model, the null hypothesis that all fixed effects are jointly equal to zero cannot be rejected with a joint F-stat (prob>F=0.256). For the random effects model, the null hypothesis that within-study variances are zero tested with the Breusch-Pagan LM Test, cannot be rejected (prob>Chi^2=0.982). This suggests that the weighted OLS regression estimation method may be appropriate.

5. Results

Estimation results are reported in Table 3. Both un-weighted and weighted results are provided for Model 1, while Model 2 and 3 are presented only in the weighted version. As a robustness check, Model 1 was also estimated (via WLS) using only the data from Europe-based studies. For Model 1 the weighted model is superior to the un-weighted model in that it provides more precise estimates (lower standard errors), and overall model fit (R-squared increases from 0.245 to 0.647). Thus, we focus the discussion on the results estimated via WLS.

(Insert Table 3 here)

Perhaps surprisingly, GI labeling for grain and fresh produce commands the highest price premium, 79.8% and 58.2%, respectively. Cheeses and meats follow with a percentage increase in premium of 39.1% and 32.5%, respectively. The product groups that have the lowest percentage price increase for GI labeling are wine and olive oil, with 24.4% and 24.2% premia, respectively. All these estimates are statistically significant at the 1% level. One obvious observation is that, as average prices are quite different across product categories, this ranking may change if price premia are considered in absolute monetary terms. However, the percentage representation is preferable as it normalizes for cost of production and added value, which may also be significantly different across product categories. When only European studies are used in the estimation, the magnitude of the premia changes (and most of the significance is lost owing to the smaller sample size), but the ordinal ranking is preserved (see figure 2).

Controlling for product-specific differences, a European product with a PDO certification commands a price premium 22.9% higher than one using a non-regulated regional name. The PDO percentage premium is quite higher than the average PGI value of 2.6%. This result is in line with our expectations, considering that the PDO certification process is more complex and

requires a stronger connection between raw materials, stages of production, final product characteristics and the geographical area of production. In the US, the presence of a GI trademark is associated with an even higher price premium than the PDO, 38.7%. This finding is worthy of further discussion given that the process surrounding these designations is less involved, which would suggest less quality assurances. In terms of methodology, valuation methods such as hedonic models and conjoint analyses tend to generate higher premia estimates than the reference group of "other" methods, by an average of 59.1% and 61.9%, respectively.

Results from Model 2 suggest that the categorization by level of processing is not very useful in providing an explanation for the cross-product differences in price premia observed in Model 1. GIs in fresh produce provide the largest premium (37.7%), but the processing intercept shifters have weak significance and most of the product-specific premia seem to transfer to the PDO and PGI estimates, which increase to 34.7% and 19.15% respectively. Model 3 is slightly superior in fit (see adjusted R^2) to Model 2, and produces results that are more consistent with those obtained with the more product-driven Model 1. According to Model 3, The GI premium for fully branded products (wine and olive oil) is 29.8% lower than products not generally carrying a private label. Products that sometimes display brand names (meats, cheeses) also register a decrease in their price premium, albeit a smaller and insignificant one.

6. Discussion

A rather clear result from this analysis is that, based on the large body of existing marketing literature, GIs constitute an effective differentiation instrument in food markets. However, the magnitude of the price premium associated with GIs varies rather significantly across products. Comparing high (percent) premium (grain, fruits, vegetables and produce) and low premium products (wine, olive oil, cheese), a set of key differentiating characteristics emerge (see table 4). High GI premia seem to correspond to minimally processed foods with short supply chains, and a large number of atomistic, undifferentiated producers. In contrast, price premia are smaller when the products are processed, the supply chain long and the producers are able to establish firm brands.

Given the nature and collinearity of the data available, it is hard to determine which one of these factors is the most critical in triggering the observed differences in premium. However,

our results are consistent with the hypothesis that the extent and importance of firm branding is one of the most important factors. Indeed, the inversely proportional relationship between the presence of firm branding in a product category and the price premium that GIs can capture is quite evident (see figure 2), and robust to the type of consumers (rest of the world relative to European only). An interpretative framework for this finding is provided by Costanigro et al. (2010) who found that, at parity of quality, shifting from cheap to expensive wines induces reputation premia to migrate from collective names (viticultural areas) to brand names (specific wineries). The proposed economic mechanism hinges on search cost: when buying cheap products (such as grains, fruits and vegetables), it may not be worth it for the consumer to try to learn and differentiate across many individual producers. GIs are therefore the main product differentiation tool because they provide a simple categorization of the available choices, limiting search cost. However, it may be worth to learn about differences in quality across brand names when purchasing more expensive products (such as wine and olive oil). Indeed, individual firms can be expected to be more consistent in quality than groups of producers; and therefore firm reputations provide a better (than GIs) insurance against poor experiences.

This reasoning does not necessarily imply that GIs have little use in markets for expensive food products. As a matter of fact, the ubiquitous presence of designations of origin in wine and cheese (see figure 1) is a proof to the contrary. A possibility is that, for expensive food products, consumers may use GIs to narrow down the large choice set of competing firms to a specific group(s) of producers for which learning about individual firm differences is worth the time. Then, consumers can investigate the subset of selected brands (identified by the GI) more thoroughly, or invest in directly experiencing a specific product. This hypothesis is worthy of future investigation, as it is not testable given the secondary nature of the current data.

Regarding the institutional framework regulating GIs and its effect on price premium, several observations can be made based on this meta-analysis. In Europe, more stringent regulations for the PDO appear to secure a higher price premium than its less cogent quality assurance counterpart (PGI). Stricter regulations may signal increased benefits to consumers in the form of food safety, quality assurance, stronger cultural/ heritage connection, etc., prompting a higher willingness to pay for products that are more tightly regulated.

It is therefore surprising that the GI trademarks in the United States, representing a less stringent accreditation process than the PDO or PGI, commends a premium (38%) higher than

both PGI and PDO. Even though the results is robust to alternative econometric specifications of the model (see table 3), one caveat is that the product classes carrying PDO or PGI labels are much more heterogeneous than what we report for trademarks. Furthermore, country-specific (US vs Europe) factors, which we could not be controlled for in the model, may play a relevant role: in the absence of sample demographic controls (especially income), GI estimates across such diverse countries may not be directly comparable. Data limitations aside, there are several economic interpretations of this finding. One possibility is an advertisement effect owed to the action of the marketing orders unique to agricultural products in the US, where state or regional collaborations of producers are encouraged to do domestic and international promotions by the USDA.

A perhaps more intriguing framework is offered by Shapiro's (1983) and Menapace et al (2010) theoretical analysis on firm reputations, minimum quality standards and GI labels. Both articles model premia for high quality as (lagged) returns from investment in quality: because reputations develop slowly over time, a price premium (above cost of production) is necessary to induce firms to produce at any quality level above the minimum standard imposed on all firms. The farther away a firm moves from the minimum standard in the quality spectrum, the longer it will take to build the reputation, the larger the premium needs to be[5]. Under this framework, a GI shortens the lag between producing at high quality and developing a corresponding reputation by providing a credible minimum quality standard in addition to (and exceeding) the one enforced on all firms. Thus, that the cost of a reputation for high quality is larger when GIs do not impose additional quality controls (as in the US trademark system), lower when they do, and even lower when multiple certifications segment the quality spectrum (as PGIs and PDOs do). Thus, GI labels would benefit consumers by lowering the market price of high quality food products.

7. Conclusions and future research

Agricultural and foods products have long been associated with unique quality attributes strongly associated with the agro-ecological characteristics and human skills of their origin. GIs formalize this connection, typically leading to positive price premia. In this study, we investigated how price premia for GIs vary by product, regional designation, and intrinsic product characteristics.

[5] See Figure 3 in Shapiro (1983), page 670, for a graphical representation.

Agricultural produce and minimally processed foods benefit the most from the association with GIs if one believes the primary gain is securing the highest percentage price premium. We interpret this finding in light of the fact that, in addition to GIs, products with valued added characteristics and longer supply chains may use private brands for differentiation. In other words, brands and GIs may play a similar role in product differentiation, and thus, be substitutes for each other.

Regarding the institutional framework, we find that, within the same country, quality assurance schemes with higher quality standards such as the PDO receive a higher premium than less stringent ones (PGI). When multiple labeling schemes with different minimum quality standard coexist (as for PDOs and PGIs in Europe), the price premium associated with the labels is lower than when a single label is used (as for the GI trademark in the US). Our interpretation is that reputations for high quality are easier to achieve (and thereby less costly for the consumer) when multiple quality assurance schemes segment the quality spectrum.

This analysis identified a number of possibilities for future research both from a consumer's and producer's perspective. As mentioned above, consumers may be using a GI label to narrow the set of choices when searching for certain types of food categories. We envision using experimental methods to test this hypothesis, varying the labels across products and labeling options. From a producer's perspective it would be interesting to explore what motivates or prevents them from using a GI available in their location, given that these designations seem to be an accessible way to differentiate their output and get a premium. Another would be to formally evaluate GI use and branding in the context of alternative product and advertising strategies.

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Table 1
Summary of GI valuation studies included in the final analysis:

No.	Authors	Year	Food Category	Methods	No. of Estimates
1	*Akaichi et al.	2009	Fruit-Veggie	Other	1
2	Ali et al.	2007	Wine	Hedonic	1
3	Bombrun et al.	2003	Wine	Hedonic	12
4	Bonnet et al.	2001	Cheese	Other	1
5	Botonaki et al.	2004	Wine	Other	1
6	*Centner et al.	1989	Fruit-Veggie	Other	1
7	Combris et al.	1997	Wine	Hedonic	3
8	Costanigro et al.	2009	Wine	Hedonic	7
9	Fotopoulos et al.	2001	Olive Oil	Conjoint	1
10	Fotopoulos et al.	2003	Fruit-Veggie	Conjoint	2
11	Galli et al.	2010	Cheese	Other	31
12	*Groot et al.	2009	Fruit-Veggie	Conjoint	2
13	Hassan et al.	2006	Cheese/ Meat	Hedonic	2
14	Ittersum et al.	2007	Cheese/ Fruit-Veggie/ Meat	Other	6
15	Loureiro et al.	2000	Meat	Hedonic	6
16	McCluskey et al.	2007	Fruit-Veggie	Conjoint	1
17	Menapace et al.	2011	Olive Oil	Conjoint	3
18	Mesias et al.	2010	Meat	Other	1
19	Mtimet et al.	2006	Wine	Conjoint	2
20	Oczkowski et al.	1994	Wine	Hedonic	20
21	Quagrainie et al.	2003	Fruit-Veggie	Other	5
22	Sanjuan-Lopez et al.	2009	Fruit-Veggie	Hedonic	3
23	Santos et al.	2005	Olive Oil/ Cheese/ Wine	Hedonic	13
24	Schamel et al.	2003	Wine	Hedonic	47
25	Schamel et al.	2006	Wine	Hedonic	6
26	Schamel et al.	2007	Meat	Hedonic	2
27	Skuras et al.	2002	Wine	Other	1
28	Stefani et al.	2005	Grain	Conjoint	3
29	Stefani et al.	2006	Grain/ Meat/ Fruit-Veggie	Other	5
30	Teuber et al.	2010	Coffee	Hedonic	3

*Excluded from final sample due to outlier estimates

Table 2
Description of variables:

Variable	Description	Mean	St. Dev.	Min	Max
WTP (%)	Value of the product in percentage price premium (+/ -) %	19.15	36.1	-48.4	181.92
WTP no outliers	Observations lying outside +/- 2 standard deviations from the mean are excluded	13.32	24.59	-48.4	90.6
WINE	Binary variable coded 1 if the product is in Wine Category, 0 otherwise	0.55	0.5	0	1
CHEESE	Binary variable coded 1 if the product is in Cheese Category, 0 otherwise	0.21	0.41	0	1
COFFEE	Binary variable coded 1 if the product is in Coffee Category, 0 otherwise	0.02	0.13	0	1
MEAT	Binary variable coded 1 if the product is in Meat Category, 0 otherwise	0.08	0.26	0	1
FRUIT/VEGGIE	Binary variable coded 1 if the product is in Fruit/Veggie Category, 0 otherwise	0.09	0.29	0	1
OLIVE OIL	Binary variable coded 1 if the product is in Olive Oil Category, 0 otherwise	0.04	0.19	0	1
GRAIN	Binary variable coded 1 if the product is in Grain Category, 0 otherwise	0.03	0.16	0	1
PDO	Binary variable coded 1 if product is PGI, 0 otherwise	0.34	0.47	0	1
PGI	Binary variable coded 1 if product is PDO, 0 otherwise	0.07	0.26	0	1
TRADEMARK	Binary variable coded 1 if product is defined as a Trademark or AVA (for wines) in original paper, 0 otherwise	0.14	0.34	0	1
REGIONAL	Binary variable coded 1 if product is regional (no specific geographic regulation), 0 otherwise	0.45	0.5	0	1
PRIMARY DATA	Binary variable coded 1 if primary data, 0 if secondary data sources are used	0.16	0.36	0	1
CONJOINT	Binary variable coded 1 if methodology is Conjoint, 0 otherwise	0.07	0.27	0	1
HEDONIC	Binary variable coded 1 if methodology is Hedonic, 0 otherwise	0.65	0.48	0	1
OTHER	Binary variable coded 1 if methodology is not Conjoint,	0.27	0.45	0	1

	Hedonic; 0 otherwise				
LOW/INTERMEDIATE PROCESSED	Binary variable coded 1 if product involves low to intermediate processing, 0 otherwise(meat, grain, olive oil, coffee)	0.15	0.35	0	1
HIGHLY PROCESSED	Binary variable coded 1 if product involves a high level of processing, 0 otherwise (cheese, wine)	0.76	0.36	0	1
FRESH PRODUCE	Binary variable coded 1 if product is retailed fresh, 0 otherwise (fruit/ veggies)	0.09	0.29	0	1
FULL-BRAND	Binary variable coded 1 if product is most likely to have a brand (wine, olive oil), 0 otherwise	0.59	0.49	0	1
MIXED-BRAND	Binary variable coded 1 if product could have a brand (meat, cheese), 0 otherwise	0.27	0.45	0	1
NO BRAND	Binary variable coded 1 if product most likely does not have a brand (fruit/veggie, grain, coffee), 0 otherwise	0.14	0.34	0	1

Table 3. Estimation Results[a]

Variable	Model Estimator Data	Model 1 OLS all	Model 1 WLS all	Model 1 WLS Europe	Model 2 WLS all	Model 3 WLS all
Wine		28.44**	24.41***	-10.36		
		(12.52)	(3.55)	(15.30)		
Cheese		17.06	39.09***	6.40		
		(15.33)	(7.41)	(15.25)		
Meat		37.14**	32.54**			
		(16.11)	(14.50)			
Fruit/Veggie		22.13	58.16***	9.30		
		(14.48)	(16.38)	(17.54)		
Olive Oil		23.13	24.15***	-8.62		
		(16.31)	(6.94)	(14.66)		
Grain		41.91**	79.77***	47.96***		
		(19.05)	(15.18)	(12.88)		
Full Brand						-30.19*
						(14.70)
Mixed Brand						-16.76
						(14.23)
Highly Processed					6.51	
					(8.95)	
Fresh Produce					37.69*	
					(19.74)	
PDO		14.90**	22.86***	28.03***	34.69***	23.36***
		(6.65)	(6.52)	(5.66)	(9.18)	(5.13)
PGI		13.39	2.59	6.13	19.15	-1.54
		(11.88)	(15.26)	(16.26)	(12.34)	(5.37)
Trademark		33.11***	38.65***		38.63***	38.81***
		(5.03)	(3.55)		(3.50)	(3.52)
Primary Data		-19.04**	2.39	3.96	-0.36	1.16
		(7.94)	(10.78)	(12.06)	(10.01)	(10.48)
Conjoint		20.62*	61.84***	63.59***	50.91***	62.34***
		(10.83)	(13.68)	(14.91)	(10.20)	(13.48)
Hedonic		-7.91	59.08***	60.20***	56.18***	58.10***
		(6.63)	(7.07)	(6.69)	(8.77)	(7.38)
Constant		-16.12	-83.11***	-55.96***	-62.30***	-27.67*
		(13.96)	(7.07)	(17.20)	(16.48)	(14.79)

Adjusted-R2	0.251	0.647	0.781	0.640	0.643
F-stat	0.295	-	195.85	129.89	130.81
	(0.000)	-	(0.000)	(0.000)	(0.000)
Obs.	183	183	85	183	183

a: SE in parentheses, ***significant at 1%, **significant at 5%, *significant at 10%

Table 4
Product Characteristics influencing GI price premium

Characteristic	High Percent Premium	Low Percent Premium
Product	Grain, fruits, vegetables, agricultural produce	Wine, olive oil, cheese
Length of Supply Chain	Short	Long
Numbers of Producers	More (farmers)	Less (Food Industry)
Brand Names	Generally No	Generally Yes
Processing level	Generally Low	Generally High
Product/ Quality Differentiation	Lower, depends on product variety cultivar	Higher, depends on food processor

Figures

Figure 1. Product categories by quality assurance scheme

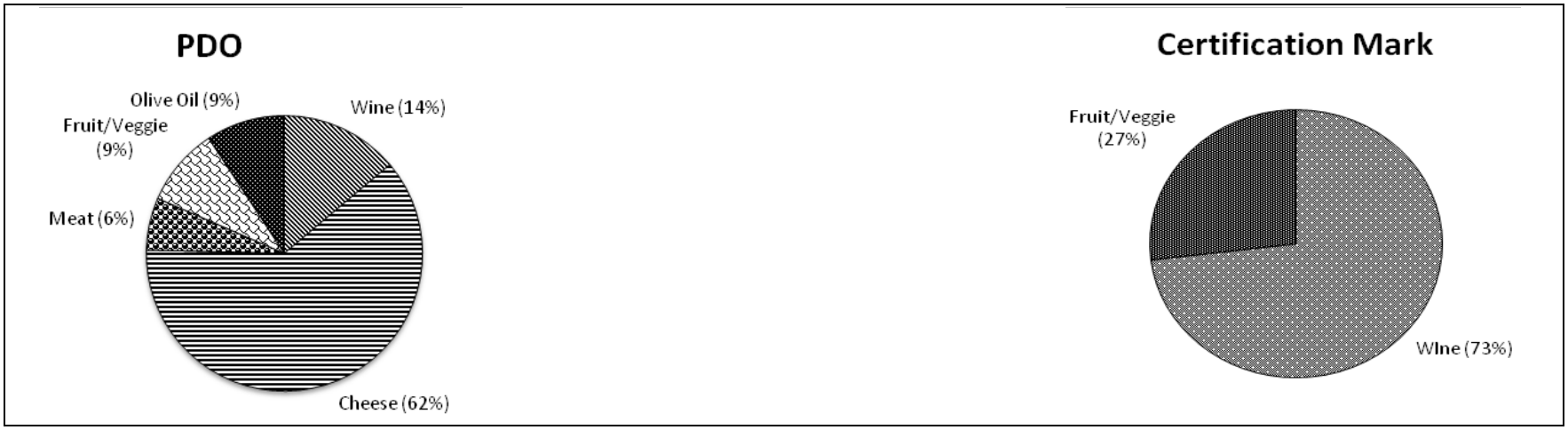

Figure 2
Price premia across product groups (comparison between all data and European data)