

## The Value of different Quality Clues in the Italian Olive Oil Market

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### Abstract

This study focuses on high segments of the Italian olive oil market in order to assess the role and effectiveness of different quality clues in the creation of value. To meet this goal, the work relies on a hedonic price model where the price of a bottle of oil is regressed on different quality clues. The analysis covers about 1000 olive oils from Italian markets as reviewed by Slow Food guide, 2013 edition. Results indicate that the highest segments of the Italian olive oil market is increasingly sophisticated and follows the main tendencies established in the quality wine markets where many quality attributes are intensely active.

### Keywords

hedonic price, olive oil, OLS.

### Introduction

Olive oil is a condiment basically used as a seasoning and as such it is only eaten in association with other food. Differences in olive oils are traditionally related to chemical attributes (i.e. acidity or polyphenols) that basically descend from the kind of production process undergone. These differences among olive oils are conceived and perceived by consumers as forming vertical differentiation on the market. Most of the relevant quality characteristics for olive oil are experience or credence. Thus, asymmetric information is pervasive in this market. In Countries where the use of olive oil is traditional and common, consumers' choice is widely based on buying habits, although different quality clues are increasingly utilized. These are most helpful especially in Countries where consumption of olive oil is more recent. However, as the number of clues increases, their interaction becomes more complex and their effectiveness may be questioned (Hassan and Mornier-Dilhan, 2002). Among the more frequently used clues there is the Certification of the place of origin. This is a relevant claim due to the deep diversity of product features in the different production areas and due to the strong perception, especially of domestic consumers that the place of

production has, indeed, highly significant implications on product quality (Carbone et al, 2014).

Moreover, quality clues such as the variety of the olives, flavorings and other sensory attributes, reviews by experts, testing events and prizes are more and more common in recent years so as it can be said that olive oil market is following, to some extent, the example of the wine market (Cabrera et al., 2014; Dekhili et al., 2011).

The number of PDOs/PGIs has steadily increased in Europe since 1992 and in most recent years, also the olive oil sector started using extensively these kinds of certification<sup>1</sup>. Out of 42 PDO olive oils (Ismea-Qualivita, 2013), only 18 were registered in 1996/1997 and a progressive increase took place in the following years. In terms of value, PDO olive oils represent only 2% of total PDO turnover (Ismea-Qualivita, 2013) and 0.05% of total turnover of vegetable oil in Italy. The scheme for certification of origin enhances vertical differentiation between PDO and non-PDO oils. Furthermore, it creates the basis for horizontal differentiation among different PDO oils by the mean of connecting product intrinsic characteristics with different places of origin. Only in recent years the linkage with the place of origin has started to be a valued quality attribute in larger olive oil market segments (i.e., due to different flavor characteristics) (Van der Lans et al., 2001; Menapace et al. 2011, Cabrera et al., 2014, Karipidis et al., 2005).

Following these premises, this study focuses on high segments of the Italian olive oil market in order to assess the role and effectiveness of different quality clues in the creation of value. To meet this goal, the work relies on a hedonic price model where the price of a bottle of oil is regressed on different quality clues (Rosen, 1974; Thrane, 2004, Schamel, 2006; Cacchiarelli et al., 2016a).

The paper is organized as follows. Section 2 illustrates the source of data and the model specification. Section 3 reports the results of the hedonic price models and, finally section 4 concludes.

## **Methodology**

### *The source of data*

The data used for the estimation of the hedonic price model comes from one of the major Italian olive oil guides: Slow Food guide (2013 Edition). Since in the olive oil market product diversification is more recent and limited, as well as the use of experts' guides, our goal is to investigate on quite peculiar market segments where quality and attentions to quality clues are high. In this market, features on which the guides are focused may indicate recent, or even upcoming, tendencies, as compared to already well established trends of the larger market. Olive oils included in this guide represent the top market segment with a share of less than 3% of national production and an average price that is about 5 times higher than the average unit value. The analysis covers 704 producers and their 1008 oils from all over the

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<sup>1</sup> In the Italian olive oil sector there is only one PGI, the Toscano PGI olive oil. It is ruled as a PDO and is treated as such in our analysis.

country. For each producer and his/her oils the guide reports a set of information which is directly given by the producers. Prices are consumers' prices for direct sales, VAT included.

*The model specification*

In the analysis of differentiated products a number of studies have adopted hedonic price model in which the price of any product is described as a function of its characteristics (Deselnicu et al., 2013; Oczkowski. 2001; Schamel and Anderson, 2003, Karipidis et al., 2005; Cacchiarelli et al., 2014; 2016b).

In this study we adopt a hedonic price approach to measure price premium associated to different quality clues in the olive oil market. In order to estimate how the different quality attributes are related to market prices we employ the following equation:

$$\text{Log } P_{oil} = \alpha_0 + \alpha_1 R + \alpha_2 Gi + \alpha_3 CuD + \alpha_4 CuM + \alpha_5 Or + \alpha_6 Mi + \alpha_7 Vol + \alpha_8 Sz + \alpha_9 Pi \quad (1)$$

Where the dependent variable is the logarithm of olive oil price ( $\text{Log } P_{oil}$ ) which is regressed on the following variables: i) R represents the area of origin which is defined at the macro-region level (i.e. Northern, Central and Southern regions). Stricter definition was not possible due to the small size of the regional sub-samples; ii) Gi is the certification of origin. According to the European Regulation, the GI system includes DOP and IGP; iii) CuD denotes the kind of plant varieties used for producing the olive oils. The variety of the raw material in itself is relevant for the nature and quality of olive oil. Olive cultivars are also related to the area of production as a consequence of the adaptation process to specificities of the local climate and environment. These are classified according to their geographical diffusion; so that we have, respectively, national, regional and local cultivars. Clearly, these variables are directly related to the territorial roots of the product; iv) CuM represents the oils made by only one cultivar: the so-called mono-cultivar olive oils. These are not so common in Italy even though their number is increasing in recent years following the tendency of product segmentation on the basis of sensory features and of territorial typicality. In fact cultivars usually used for producing mono-varietal oils are local traditional varieties that enhance the geographical typicality of the product; v) Or indicates oils from organic farming. Organic production is better established in the olive oil sector compared to the wine sector where they used to suffer from a negative reputation as their sensory quality is acknowledged not to be satisfactory (Delmas and Lessem, 2011); vi) Mi concerns the processing stage of olive oil production. In this case we estimate the price premium associated to mill on farm and to olive oil production run by a cooperative of farmers compared to mill off farm. In Italy, especially in some areas of the Country, coops suffer from a negative reputation, even though, with respect to big industrial processors they ensure stronger territorial roots; vii) Vol indicates production volumes of the producer expressed in four classes (1-50 hl, 51-100 hl, 101-500 hl and more than 500 hl); viii). Sz represents the bottle size (250 ml, 500 ml, 750 ml and 1 litre). The size of the bottle is another feature that affects sales and prices and represents an important factor in marketing strategy of the firms. Martinez et al. (2002) affirm that the smallest sizes have a useful role in introduction consumers to new olive oils

and their increasing demand over the last few years indicate an increase in the number of consumers trying a new product; ix) finally, the guide also releases the way olives are picked, so Pi indicates hand picking.

*Table 1. Number of observations and frequency for each variable included in the hedonic price model*

	Variable	obs	freq
R	North	148	0.147
	Centre	364	0.361
	South	496	0.492
Gi	Dop	159	0.158
	National Cultivar	670	0.665
CuD	Regional Cultivar	486	0.482
	Local Cultivar	748	0.742
CuM	Mono Cultivar	503	0.499
Or	Organic	475	0.471
Mi	Mill on farm	395	0.392
	Cooperative mill	135	0.134
Vol	1-50 hl	567	0.563
	51-100 hl	155	0.154
	101-500 hl	95	0.094
	>501 hl	191	0.189
Sz	bottle of 250 ml	30	0.030
	bottle of 500 ml	583	0.578
	bottle of 750 ml	329	0.326
Pi	bottle of 1 litre	59	0.059
	Hand picked	778	0.772
Poil	Price	1001	0.993
	Observations	1008	1.000

*Source: Our elaborations on Slowfood 2013*

As the choice of the functional form of the hedonic model is essential because it determines how marginal prices will be related to attributes, we explored, by performing the RESET test (Regression Equation Specification Error Test), a series of possible transformations of the dependent variable (e.g. log, inverse square root). RESET test has indicated, as included in equation (1), that the log-linear specification performed better than other functional forms. Log-linear specification presents a twofold advantage with respect to other ones: i) it allows obtaining residuals that are approximately normally distributed as required by selected regressions; ii) the interpretation of regression coefficients is more immediate: the dependent variable changes by  $100*(e^{\text{coef}} - 1)$  percent for a one-unit increase in one of the regressors, holding all other variables fixed. In addition, heteroskedasticity proportional to the predicted values was tested via Goldfeld–Quandt statistics.

## Results

Table 2 and figure 1 report the results of OLS estimates of hedonic price model. Although adjusted  $R^2$  shows goodness of fit, this value indicates that Italian olive oil market is well sophisticated with other attributes which influence the market prices.

*Table 2. The results of hedonic price model*

	Variable	Coefficient	Standard error
R	North	0.442*	0.0321
	Centre	0.166*	0.0281
Gi	Dop	0.123*	0.0272
	National cultivar	0.041***	0.0236
CuD	Regional cultivar	-0.046**	0.0238
	Local cultivar	-0.037	0.0242
CuM	Mono-cultivar	0.103*	0.0245
Or	Organic	0.083*	0.0198
Mi	Coop Mill	-0.029	0.0292
	Mill on farm	0.023	0.0239
Vol	51-100 hl	0.007	0.0282
	101-500 hl	-0.001	0.0312
	>501 hl	0.012	0.0292
Sz	bottle of 250 ml	0.819*	0.0762
	bottle of 500 ml	0.341*	0.0225
	bottle of 1 litre	-0.283*	0.0324
Pi	Hand picked	-0.038**	0.0218
	cons	2.445*	0.0376
	Pseudo/Adj $R^2$	0.507	
	Obs	1001	

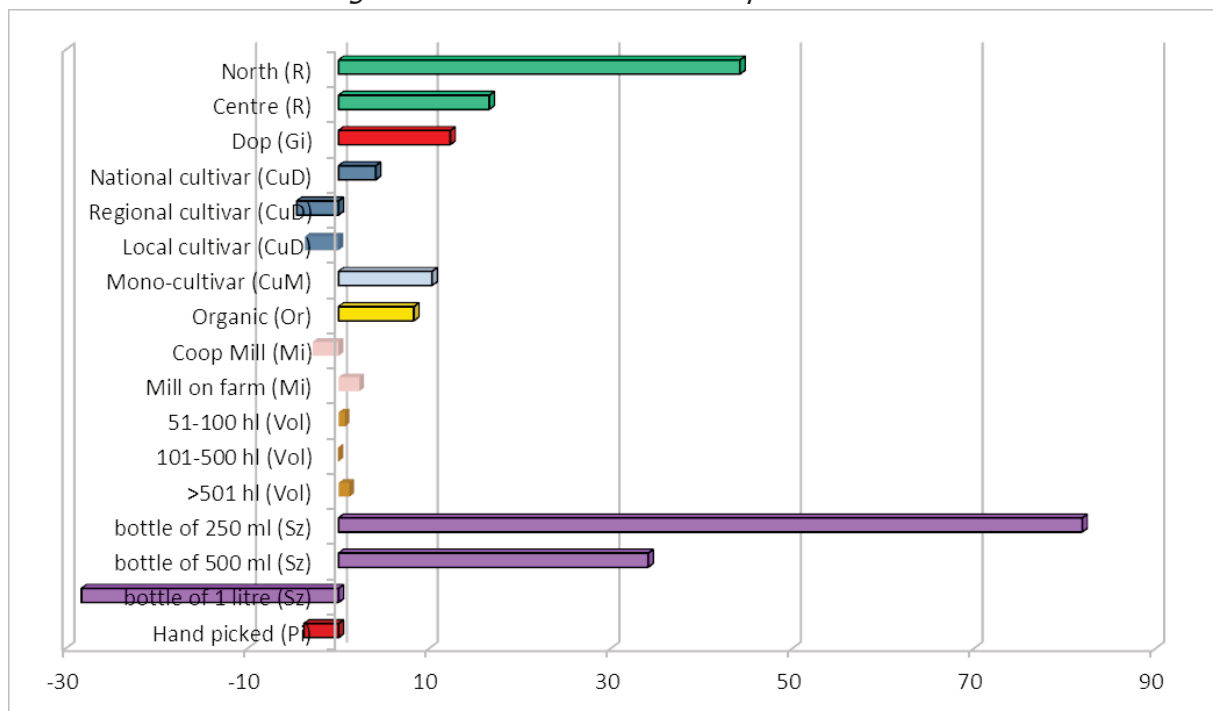
*Source: Our elaborations on Slowfood 2013*

*1\*means significant at 1%; \*\*means significant at 5%; \*\*\*means significant at 10%*

Starting to analyze the detailed results of the estimates, it can be seen that variables related to the place of origin are associated with significant price premium. Olive oils from northern and central regions worth more compared to products from southern regions. Specifically, the first get 44.2% and the second 16.3% more than the third (that is the benchmark). The certifications of origin affect prices: DOP/IGP olive oils get an average price premium of +12.3% compared to non-certified olive oils. Coming to the role of the plant variety, our sample shows interesting results. National cultivars get a price premium of about +4%, regional ones negatively affect prices (-4.6%) and, finally, local ones coefficient is not significant. These results are, probably, a consequence of a lack of information on the consumers' side about these peculiar varieties. Differently, mono-cultivar oils -regardless to the specific cultivar utilized- are associated to average price premium of 10.3% with respect to oils that mixes different kind of olives. Furthermore, in the Italian olive oil market, organic certification affects positively prices (+8.3%). This result confirms the role played by organic production in this sector with respect to the wine market where organic productions continue to suffer from a negative reputation (Delmas and Lessem, 2011). Moreover, production volumes of the producer are not related to market prices, as showed by the coefficients of

the various dimensional classes which are not statistically significant. As well as the processing stage of olive oil production does not seem to be very important in price determination. In fact, OLS estimates show coefficients no statistically significant both for mill on farm and for the use of cooperative of farmers. On the contrary, bottle size confirms to be a strategic factor in the olive oil market. Compared to bottle of 750 ml smaller sizes get a price premium, respectively, of +81.9% (250 ml bottle) and +34.1% (500 ml bottle) while 1 litre bottle is negatively correlated (-28.3). Finally, concerning the way olives are picked, hand picking negatively affects prices (-3.8%).

Figure 1. The results of hedonic price model



Note: The bars without border line denote that the coefficients are not statistically significant

## Conclusion

Marketing strategies in the olive oil sector seems to be increasingly inspired by the examples of wine, with an increasing role for different quality clues which create horizontal and vertical product differentiation. In the present study a hedonic price approach was applied via OLS for Italian olive oil market to estimate how the product specific attributes affect prices. Data were collected from one of major Italian olive oil guides (Slow Food guide, 2013 Edition). The results indicate that some factors play an important role in the olive oil market. Specifically, prices of olive oils reflect the area of origin with high and significant price premium for oils coming from Central and Northern Regions compared to product from Southern Regions. The certifications of origin (DOP/IGP), though valuable, bring a smaller additional value indicating that the olive oil price seems to be more sensitive to farm location than to the certification of origin. Bottle size represents a crucial factor in the marketing

strategy. Specifically, smaller sizes get a relevant price premium compared to bigger ones. National olive varieties are associated with positive price premium compared to regional and local cultivars while mono-varietal oils gain higher prices confirming this tendency over the last few years. Organic production method is associated with positive price premium compared to conventional method while production volumes and processing stage of olive oil production do not seem to be important in price determination.

Overall, results indicate that the highest segments of the Italian olive oil market is increasingly sophisticated and follows the main tendencies established in the quality wine markets where many quality attributes are intensely active.

In order to obtain a more complete picture of the relationship between olive oil characteristics and price, in the next step of research it could be useful the use of quantile regression models. In effect, while OLS shows how the various quality clues affect, on average, prices the quantile model is able to detect additional patterns (location, scale and skewness shifts) related to the effects of the covariates allowing to investigate on the different market segments.

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