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Department of Management and Production Engineering

**Master Degree in
Management Engineering**

Master Thesis

**Taste or Reputation?
Hedonic analysis of Barbera's prices**



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*"Generosa Barbera.
Bevendola ci pare
d'esser soli in mare
sfidanti una bufera."
Giosuè Carducci*



TABLE OF CONTENTS

INTRODUCTION	5
CHAPTER ONE – MARKET DEMAND, QUALITY, AND PRICES: INTRODUCTORY ANALYSIS.....	8
1.1 EVOLUTION OF WINE DEMAND:	8
1.1.1 GLOBAL PRODUCTION AND CONSUMPTION	8
1.1.2 POSSIBLE CLASSIFICATIONS OF THE TYPICAL WINE CONSUMER	11
1.2 ANALYSIS OF THE WINE DEMAND CHARACTERISTICS:	13
1.2.1 QUALITATIVE DIFFERENTIATION	13
1.2.2 QUALITY (AND PRICE) PERCEPTION	14
1.2.3 INFORMATION ASYMMETRY	14
1.2.4 QUALITY CONVENTIONS MAP	15
CHAPTER TWO – HEDONIC PRICES AND CONSUMERS PREFERENCES	18
2.1 INTRODUCTION	18
2.2 CONSUMER'S CHOICES THEORY	18
2.3 MARKET SHAPE AND INDUSTRY ORGANIZATION	20
2.4 LANCASTER'S MODEL EXPLAINED	23
2.4.1 REFERENCE SCHEME	24
2.4.2 SOME APPLICATIONS	26
CHAPTER THREE – LITERATURE REVIEW AND APPLICATION OF HEDONIC PRICES TO WINE.....	30
3.1 HEDONIC PRICE AND ITS GENERAL EMPIRICAL APPLICATIONS	30
3.2 HEDONIC PRICE AND WINE	31
3.3 STUDIES OF HEDONIC PRICES ON WINE	32
3.3.1 WHICH VARIABLES LEAD TO WHICH RESULTS?	33
3.4 CRITIQUES TO THE MODEL	38
CHAPTER FOUR – BARBERA, MARKET ANALYSIS	40
4.1 INTRODUCTION	40
4.1.1 FROM MITH TO HISTORY	40
4.1.2. LEGISLATION	42
4.2 THE ELEMENTS OF THE MARKETING MIX THEORY	43
4.2.1 PRODUCT	43
4.2.2. PLACE	45
4.2.3 PRICE	47
4.2.4 EMPIRICAL METODOLOGIES TO DERMINE THE PRICE	50

4.2.5 POSITIONING	58
CHAPTER FIVE – EVALUATION OF AN HEDONIC PRICE FUNCTION.....	60
5.1 INTRODUCTION	60
5.2 THE CHOICE OF VARIABLES	60
5.3 THE DATA SET	69
5.4 APPLICATION OF THE UNIQUE MODEL.....	74
BIBLIOGRAPHY.....	82

INTRODUCTION

“Un buon vino è come un buon film: dura un istante e ti lascia in bocca un sapore di gloria; è nuovo ad ogni sorso e, come avviene con i film, nasce e rinasce in ogni assaggiatore.”¹ This quote from Federico Fellini, one of my favourite directors of all times, entails all the magic that both an inspirational movie and a good wine can offer. Both of them are a big passion of mine, and I believe that one of the multitude of life's gifts is to watch a good movie while drinking good wine and sharing some good company (the word *good* is repeated on purpose). For this occasion I will focus on the latter of the two: wine, and more specifically, Barbera.

The final scope of this thesis is to give an answer to a very precise question: “Which are the factors that mainly influence Barbera's price?”. To answer to this question in an accurate and precise manner, we chose to follow an analysis method proposed by microeconomic theory finalized on the identification of the consumers' preferences on each characteristic of the examined good. In order to complete this analysis based on both objective and subjective wine characteristics, we ran an estimate of an hedonic price function based on the traditional model proposed by Rosen² for differentiated products: the balance price of a good reflects the value that the market assigns to each of its characteristics. Each value is determined by the meeting between demand and offer. By studying this process, it's possible to define an hedonic price function that includes, as explicative variables, all the ones that represent wine's quality in some way. They can be grouped together in the following way: *objective characteristics* (related to the intrinsic quality of the product readable on the label), *sensorial traits* (related to the quality intended as taste and odour, expressed through rates that have been attributed to the wine by sommeliers) and finally a group of variables of a *reputational* kind (related, as we will see, to a quality of the wine measured in the long run). But which of them has greater influence on the price? This is the question that we had in mind when running the *unique model* regression in chapter five.

The thesis is subdivided into five chapters:

The *first chapter* focuses on the big picture regarding the evolution of demand and offer related to the wine industry in Italy. Special focus attention is given to the perception of the quality by consumers and to the information asymmetry that characterises the wine market.

¹ A good wine is just like a good movie: it lasts a moment and leaves a taste of glory. It is new at each sip and just like a good movie it rises again with each new taster.

² Rosen, & Scherwin. (1974). "Hedonic Price and Implicit Markets: Product Differentiation in Pure Competition". Journal of Political Economy.

The “Map of quality conventions” proposed by Eymard Duvernay³ and then elaborated by Rocchi⁴ will then be analysed as it is useful to identify the non-intrinsic wine characteristics for the consumers’ quality perception.

The *second chapter* presents the evolution process of the consumer’s microeconomics that brought to the construction of the hedonic pricing theory: starting from the traditional analysis of the demand and of the markets’ structure, the end goal is the “New Approach to Consumer Theory” proposed by Lancaster⁵, the first one who actually “decomposed” the good into all its different characteristics that compose it. The theories on hedonic prices lay its foundations right here.

The *third chapter* deep dives into a literature review, since the 90’s up to today, of publications that have used an econometric approach to examine the wine. The main questions that have been answered are the following: “Does quality matter? Which kind of effect does reputation have on the price?”.

The *forth chapter* will finally present the wine itself, Barbera: its history, its main characteristics according to the disciplinary and its market trend of the past few years. Afterwards, the marketing 4 P’s will be analysed (price, product, place, promotion), the group of the so called marketing mix theory, a set of tools used to pursue the marketing objectives in the target, which in this case will be the wine industry. With obvious reasons, between the 4 P’s, the focus will be set on price.

The *fifth chapter* finalizes the actual estimation of the hedonic model price function, following the model applied by Luigi Benfratello, Massimiliano Piacenza and Stefano Sacchetto in their 2009 publication.⁶ Before that, a short presentation on some interesting statistics on rates assigned by some of the most important wine guides in Italy and by the Wine Spectator journal, together with comments on their importance and the difficulty in maintaining objectivity. As we will see, the model applies a combination between two different approaches: the model developed by *Combris et al.*, and the one applied by *Landon and Smith*. The first one connects the price of a bottle with the sensorial traits of the wine,

³ Duvernay. (1995). "La Négociation de la qualité". In Nicolas, & Valceschini, "*Agro-Alimentaire: une économie de la qualité*".

⁴ Rocchi. (2000). "*Domanda di vino e convenzioni di qualità*". Rivista di Economia Agraria.

⁵ Lancaster, & Kelvin. (1966). "*A new approach to Consumer Theory*". Journal of Political Economy.

⁶ Benfratello, Piacenza, & Sacchetto. (2009). "*Taste or Reputation: what drives the market prices in the wine industry? Estimation of a hedonic model for Italian premium wines*". Applied Economics.

seen as quality directly related to the taste of the wine. The second does not take into consideration the sensorial traits of the wine, while its interest is based on the fame that both the wine and the producers have, hence taking into consideration the judgements of experts and guides, a way of looking at quality that will develop in the long run by building reputation.

Lastly in this introduction, but not by importance, special thanks to my Professor and Mentor Luigi Benfratello, as well as to the C.C.I.A.A. that kindly sent me a useful amount of historical data. Also, special thanks to all those who have supported me and keep doing it each day, I have you all in my heart. Well, thank you to myself as well, and to the magic world we live in.

CHAPTER ONE – MARKET DEMAND, QUALITY, AND PRICES: INTRODUCTORY ANALYSIS

1.1 EVOLUTION OF WINE DEMAND:

1.1.1 GLOBAL PRODUCTION AND CONSUMPTION

1.1.2 POSSIBLE CLASSIFICATIONS OF THE TYPICAL WINE CONSUMER

1.2 ANALYSIS OF THE WINE DEMAND CHARACTERISTICS:

1.2.1 QUALITATIVE DIFFERENTIATION

1.2.2 QUALITY (AND PRICE) PERCEPTION

1.2.3 INFORMATION ASYMMETRY

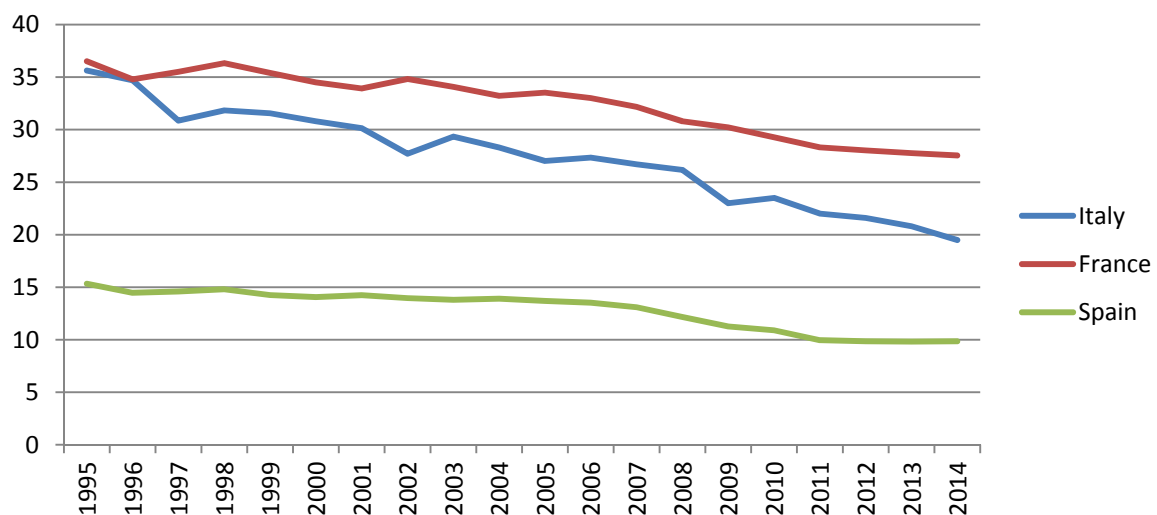
1.2.4 QUALITY CONVENTIONS MAP

1.1 EVOLUTION OF WINE DEMAND:

1.1.1 GLOBAL PRODUCTION AND CONSUMPTION

The wine demand has radically changed in the last three decades. The per capita consumption has overall globally increased (see Graph 3), while it nearly halved in the countries that are traditionally considered as main producers, in the order: Italy, France and Spain (as it can be seen in the following Graph 1).

Graph 1: Wine consumption in Italy, France, Spain⁷



⁷ OIV. (2001). *International Organization of Vine and Wine*. Retrieved from <http://www.oiv.int>.

Even though the trend has slowed during the last few years, wine has lost its traditional role as a good intended for ordinary consumption, while it is more and more addressed to specific situations. It is in fact today mainly consumed for its natural gifts in personality and genuine thrill: it is today a real *experience good*. Consumers have learned to satisfy new typologies of more abstract needs.

The consumption of wine is hence now also diffused in non-traditional markets, as well as its culture and general knowledge regarding vineyards and the whole industry in general. There are wines today from all over the globe that compete with the Mediterranean ones which are, as said, the traditional producers. The evolution of the demand towards these new kind of abstract needs, caused an increase in the importance of *quality* during the choice of wine. With time, quality differentiation has become one of the top dimensions of the wine industry marketing.

Following, an examination on both global production trends first, followed by global consumption trends of wine, excluding juice and must. All the data is measured in mhl (millions of hectolitres).

In 2017, the global wine production fell to 250mhl, a decline of 23.6 mhl compared with 2016 production. This production volume can be described as historically low. Within the European Union, the 2017 EU vinified production is estimated to be at 141mhl, a 14.6% drop compared with 2016. This situation, together with the previous examination, is also related to the result of adverse weather conditions in the main wine-producing countries. This production situation is 4.5% lower than the very low volumes produced in 2012 (147mhl). When compared with 2016, production in Italy (42.5 mhl), France (36.7 mhl) and Spain (32.1 mhl) declined by 17%, 19% and 20% respectively. Outside the European Union, developments were mostly positive: wine production in the United States remained very high (almost as high as that of 2016, estimated at 23.6 mhl) as well as the Australian production (at 13.7 mhl) that continued to grow in volume up to a return to levels from 2005. Production in Argentina grew to 11.8 mhl, but failed to return to production levels generally achieved at the start of the decade.

For a global vision, see the graph below.

Graph 2: Global wine production⁸



On the other side, worldwide consumption in 2017 is estimated to be around 243 mhl, an increase of 1.8 mhl compared with 2016. The general trend keeps growing since the drastic decrease of the last decade of the 20th century. The United States confirmed its position as the top global consumer since 2011, and saw domestic demand grow compared with the previous year (+2.9%). In Europe, there was a break in the declining consumption of traditional producers: France went to 27mhl, Italy to 22.6mhl and Spain to 10.3 mhl, although the trend keeps being the same, mainly for the reasons just discussed. Lastly, 18 mhl consumption in China⁹ (3.5% increase since 2016) and established consumption in Oceania (growth to 5.8 mhl in Australia¹⁰).

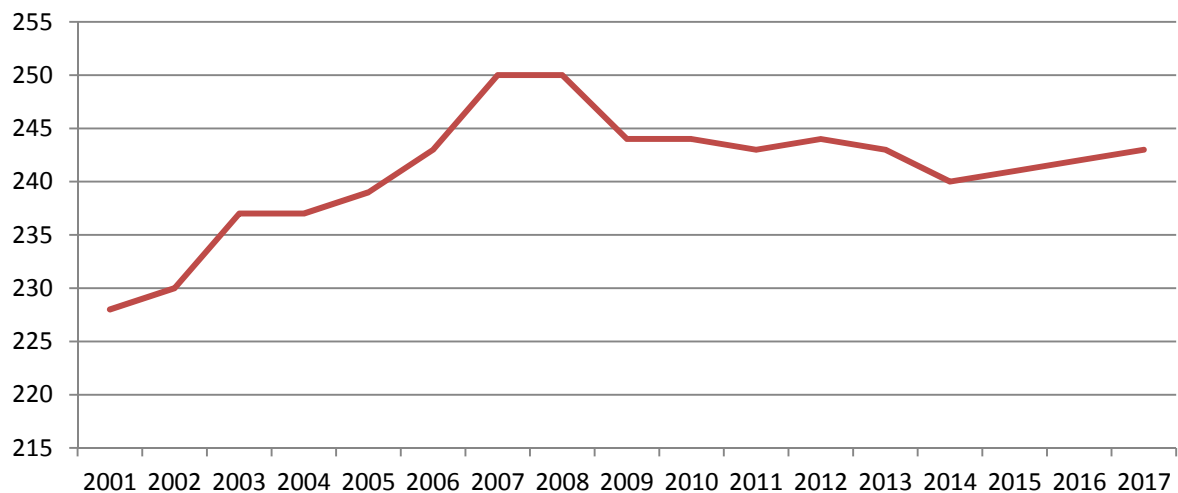
⁸ OIV. (2001). *International Organization of Vine and Wine*. Retrieved from <http://www.oiv.int>.

⁹ Galati, Tinervia, Tulone, Crescimanno, & Rizzo. (2018). "Label Style and Color Contribution to Explain Market Price Difference in Italian Red Wines Sold in the Chinese Wine Market". *Journal of International Food & Agribusiness Marketing*, 175-190.

¹⁰ Shane, Murad, W., & Freeman. (2018). "Factors influencing price premiums of Australian wine in the UK market". *International Journal of Wine Business Research*, 96-116.

For a global vision, see the following graph.

Graph 3: Global wine consumption¹¹



1.1.2 POSSIBLE CLASSIFICATIONS OF THE TYPICAL WINE CONSUMER

It is quite difficult to delineate a representative world consumer. A good practice would be to run a classification based on the nationality compensated with in depth considerations on each typology. This said, the wine market is becoming more and more international, hence it is possible to distinguish three macro areas of consumer typology, whom are easier to identify.

- In the traditional wine-growing countries, the majority of consumers have a great familiarity with wine, the way of drinking is often based on ancient habits. In Italy, for example, everyday wine is often bought in big glass jugs (called “damigiane”) directly from local producers and the propensity to change is pretty low. On the other hand, there is a parallel growing tendency to buy excellent local wines or from other regions and countries.
- A second category stands for the northern Europe countries, where the production is very low or even inexistent, but the consumption is stabilized and the general knowledge is high. Today’s tendency is to import extra European wines, together with southern Europe ones.
- A third category is recognized in the countries where wine consumption is still very new but rapidly growing: USA, Canada, Australia, Japan. Preferences and matter of drinking are similar to the countries of the second category, but consumers seem to be more

¹¹ OIV. (2001). *International Organization of Vine and Wine*. Retrieved from <http://www.oiv.int>.

enthusiastic and willing to learn more.

A different kind of classification and possibly a more interesting one has been proposed by Anderson, based on a repartition on how competent and/or interested are consumers on wine:



- *Wine expert*: A very small percentage in each country can be considered so, meaning people with a great and deep knowledge in wine. Usually, we can include in this section all the producers and more in general anyone who operates in the sector.
- *Wine student*: This category is the most interesting one for quality wines that are rich of history and culture: it's the category of emergent drinkers that are proactive and interested in learning more. The student searches for documents, experts' evaluations and honest critiques. She is willing to pay as much as required not only for the wine itself but also for courses and books. Usual advertising is not that effective on this typology.
- *Traditional consumer*: This category entails the majority of Italian and European consumers (in particular, French and Spanish ones). Generally, they are not interested in exploring new areas and they have a good knowledge of the territorial wine they drink, even though there is a growing trend of some of them transforming into wine students category.
- *Casual consumer*: People who casually drink wine, and generally always of the same kind, without paying too much attention on details. Their way of drinking is highly affected by advertising, promotions, or by advices given by the sellers in the shop, bar or restaurant.

It comes straightforward that this type of classification is especially useful for marketing and promotion strategies. As interest in the wine world grows, the consumers' willingness to pay proportionally grows as well, hence both resulting in the wine guides and quality products to

be mainly addressed to the wine students and wine experts categories.

The typology of consumers taken in consideration in this case is the *average* one, meaning that it's not a *wine expert* that is really able to understand and judge for himself the quality of the product intended as taste, nor it's a *casual consumer* who buys wine only by following advertising and promotions.

1.2 ANALYSIS OF THE WINE DEMAND CHARACTERISTICS:

It is nowadays a consolidated fact that demand increases with personal income, and wine is included in this phenomenon. To better understand the characteristics of the evolution of wine consumption, some fundamentals of economic theory of the demand must be introduced: qualitative differentiation, quality perception, information asymmetry and quality conventions.

1.2.1 QUALITATIVE DIFFERENTIATION

In this thesis we will analyse in great depth the approach used by Lancaster¹² in 1966 as it is used still today¹³ in wine studies as a fundamental premise for the development of hedonic price models. According to Lancaster's approach, the quality of an overall production is given by the interaction between the objective characteristics of the good taken into consideration and the kind of needs that the consumer intends to satisfy. Hence, the differentiation can be analysed by the offer side valuing the substance of wines as *technical characteristics*, who may be connected to particularities of the production process, while from the demand side the differentiation can be evaluated by taking into consideration the so called *service characteristics*, even though it's a non-trivial category to be analysed. Regarding the agro-alimentary products¹⁴, it has been proposed to apply the conceptual scheme thought by Maslow¹⁵ in 1964 regarding the *hierarchy scale on consumers' needs*. According to this approach the needs can be brought back to ordinate hierarchies and the consumer, while choosing, satisfies the less fundamental needs only when she reaches the minimum satisfaction of the more fundamental ones. The application of this study in the wine field sees the use by the consumer of both the satisfaction of nutritional primary needs and the higher

¹² Lancaster. (1966). "A new approach to Consumer Theory". Journal of Political Economy.

¹³ Ferro, & Amaro. (2017). "What factors explain the price of top quality wines?". International Journal of Wine Business Research, 117-134.

¹⁴ Delgado, Blanco, & Caldentey. (1993). "El comportamiento del Consumidor: Aplicación de la escala jerárquica Maslow-Alvensleben al consumo de vino". Revista de estudio agro-sociales.

¹⁵ Maslow. (1987, 3rd edition). "Motivation and Personality".

search for taste and for healthy (for example, with biological wines), even though the market is moving towards the latter type of satisfaction. In Italy for example it seems that consumers are more and more curious on the way in which each wine is produced, trying to overcome information asymmetry by active research strategies.

1.2.2 QUALITY (AND PRICE) PERCEPTION

Which factors count the most on the quality perception of wine by consumers? To answer to this question, Ismea¹⁶ conducted a survey in 2008 in collaboration with Ager and ACNielsen with the aim of describing the behaviour of consumers regarding their choices when buying wine. The survey has been conducted on a qualitative-quantitative basis: 2 focus groups and face to face surveys with a 601 individuals sample. Domestic consumption of Italian DOC and DOCG wines reached a value of 772 million Euros (2% Rosè, 34% whites, 64% red), mostly addressed to quality products, with particular attention to biologic wines (+47,7% from the previous year). Regarding quality guarantee, Italian consumers, especially non-habitual ones, agree on the origin element (DOC, DOCG) as the best index to be used, even before the region and the brand, but is trivial to understand that it's not the only one. More generally, the criterion applied in the purchasing decisions of equally priced wines are first of all quality (intended in this case as the origin), then previous experiences with the same bottle and then years of age and alcoholic gradation (we will see in chapter five that our obtained results are very similar, at least for objective variables taken in consideration). If prices are different, then the price itself will be a factor that highly influences the decision as well, being it a quality index itself.

1.2.3 INFORMATION ASYMMETRY

The presence of a great multiplicity of similar goods brings the consumer to face an uncertain situation connected to the match between the good's characteristics and the needs' hierarchy. For wine, this also goes along with the fact that there is high information uncertainty between the end user and the producer. Wine is in fact an *experience good*¹⁷, meaning that it is possible to reach to certain quality characteristics only during the consumption, hence after the purchase. Also, wine can be considered as a *credence good*¹⁸, a good for which some quality

¹⁶ Ismea. (2008). "Aspetti strutturali e di mercato nel comparto dei vini" DOC-DOCG.

¹⁷ Nelson. (1970). "Information and consumer behaviour". Journal of political economy.

Experience goods are opposite to *search goods*, for which it is possible to gain all the required information before the actual purchase (for example, a car or a laptop).

¹⁸ Gottschalk, & Felix. (2018). "What characterizes credence goods?".

characteristics are non-reachable even after the consumption or the purchase, for example the mean on biologic production. This information asymmetry can be overlooked by different *signals*, for example by using price as a quality indicator, as a quality promise, principally because prices are always available and they are recognized by the whole literature as an indicator of costs, who are then recognized as an indicator for quality. Even though this is true especially for experience goods, it may not be precise and of course, there are also multiple other factors that affect the situation: branding, marketing, advertising, as well as fame and reputation of the producers. These latter roles will be taken into consideration when constructing the hedonic price function in chapter five.

1.2.4 QUALITY CONVENTIONS MAP

The broad quality differentiation of the offer side and the information asymmetry between producer and end consumer that we have previously discussed, gives rise to a broader problem not only related to the object itself, but to the whole market in general. To overcome these difficulties and to decrease transaction costs, there are certain rules that are expected to be followed in each industry, to be used as *quality conventions*, useful for the wine industry as well. Wine appellation is a good example of wine quality conventions, but it's not the only one. Today's studies¹⁹ propose once again the results of an older research²⁰ on the nature of agro-alimentary markets, including wine.

The following table shows four models of quality perception. The horizontal axis is in concordance with the two dimensions of the qualitative differentiation proposed by Lancaster explained in the previous pages: *technical characteristics* and *service characteristics*. The second axis classifies the choice problems based on the involvement degree that the consumer has, a marketing concept that increases its value proportionally with the increase of the product importance to the eyes of the consumer (price, symbolic value, pleasure, ...) and inversely with the perceived risks from a wrong choice: high involvement means high intentionality in the choice (lower risk), and vice versa low involvement means incidental learning (higher risk).

¹⁹ Diaz, & Bone. (2018). "*Economics of Convention and its Perspective on Knowledge and Institutions*".

²⁰ Codron, & d'Hauteville. (1998). "*Une approche conceptuelle des relations fournisseurs – distributeurs. Cas du vin, des fruits de contre saison et des produits ultra frais laitiers*".

Table 1: Quality perception and evolution of wine demand

		Involvement degree	
		Strong	Weak
Service characteristics – structure of satisfied needs	Guarantee necessity on the choice matter	←	Folding on basic motivations for purchase
Technical characteristics – promises on the product	Guarantee necessity on the product's reliability	←	Simplification of the purchasing process

The demand evolution is represented by the four arrows, whom indicate the progressive migration to a situation in which the service characteristics' role is high and the involvement degree is strong. The changed habitudes towards a more special type of consumption leaving behind the day by day one, result in demand and supply meeting in the top left quadrant where quality matters the most, so that “lower level” productions (for example, Barbera) are changing the way in which they want consumers to label them (we will see more about this concept in the following chapters).

The different areas of the map delineate the different market sectors of the industry, with an increasing value moving from right to left and bottom up. Table 2 hypothesizes a distribution of different quality conventions for each market segment, based on the necessities that each segment has in relation to information asymmetry.

Table 2: Quality perception and quality conventions for different wine markets

	Involvement degree	
	Strong	Weak
Service characteristics – structure of satisfied needs	<ul style="list-style-type: none"> • Signals of strong connections with the territory • Experts' judgements • Brands with high symbolic value • Signals of health and safety respect (for example, biologic wines) 	<ul style="list-style-type: none"> • Commercial brands • Flexible signs with connections with the territory (IGT)
Technical characteristics – promises on the product	<ul style="list-style-type: none"> • Experts' judgements • Conformity certifications (HACCP) • VQPRD (Vin de Qualité Produit Dans Une Région Déterminée, for example DOC and DOCG) 	<ul style="list-style-type: none"> • Industrial brands • Low price

The results can be summarized in the following three points:

- Given the peculiar characteristics of the highly differentiated good and the strong information asymmetry, it is necessary to turn to a well developed structure of quality conventions that reduce consumer's uncertainty.
- The recent demand evolution keeps inducing the quality conventions to respect high standards and hence through very selective processes on different dimensions: both technical and abstract.
- The success of a certain wine production depends more and more on its capability in adapting to the changing demand.

CHAPTER TWO – HEDONIC PRICES AND CONSUMERS PREFERENCES

2.1 INTRODUCTION

2.2 CONSUMER'S CHOICES THEORY

2.3 MARKET SHAPE AND INDUSTRY ORGANIZATION

2.4 LANCASTER'S MODEL EXPLAINED

2.4.1 REFERENCE SCHEME

2.4.2 POSSIBLE APPLICATIONS

2.1 INTRODUCTION

The final price for which the product is sold depends on a multiplicity of factors: market composition (meaning the total number of enterprises in the game and the relationships between them), the cost of production, demand elasticity, the knowledge of the insiders, and the strategies undertaken by the enterprises.

In this second chapter we present an overview on the classical theory regarding the creation of the price: starting from the neoclassical consumer's theory, to the market formation, up to the development of the new approach proposed by Lancaster and to the hedonic price theory.

2.2 CONSUMER'S CHOICES THEORY

The main scope of this theory is to identify the *demand curve*, which relates the purchased quantity of a good X with its price $p(x)$.

The structure on which this theory is built is characterized by three main starting points:

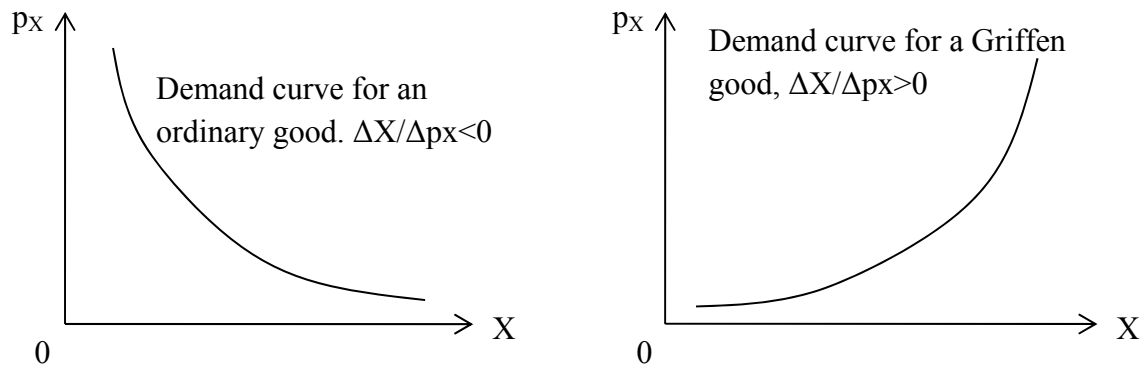
- *The choice matter* carried on by the consumer, meaning the basket of goods (or services) chosen.
- *Budget constraints*: it separates the baskets of goods available to the consumer by the one that are not available to her.
- *Consumer's preferences*:
 - ✓ *H_p: Completeness*. Given two different baskets of goods A and B , the consumer is free to order them as she likes: $A \succ B; B \succ A; B \approx A$.
 - ✓ *H_p: Satiety*. Given the basket $A(x,y)$, made by the two goods x and y , any other basket

made by a bigger quantity of x and by a quantity not less than y , or made by a bigger quantity of y and by a quantity not less than x , will be preferable.

- ✓ *Hp: Strictly convex preferences.* Given two baskets $A(x_A, y_A)$ and $B(x_B, y_B)$, we suppose $A \approx B$. If $C[tx_A + (1-t)x_B; ty_A + (1-t)y_B]$, then $C \succ A$ e $C \succ B$.

From this starting point, it is possible to draw the demand curve, which relates the demand quantity of a good x with its price $p(x)$. It's important to keep in mind that the curve can take two different shapes, depending on the type of the good: *ordinary* or *Giffen*. This latter case is verified when the quantity consumed decreases with the decrease of the price, typically for luxury goods, but not of big practical use. In its classic form (*ordinary* goods), the demand curve is downward sloping, meaning that by a price increase, the purchased quantity will decrease. See Figure 1 below.

Figure 1: Shape of a demand curve



Also, it is possible to determine the *demand elasticity* of a good x in relation to its price $p(x)$:

$$e_p = \frac{\partial X}{X} / \frac{\partial p_x}{p_x}$$

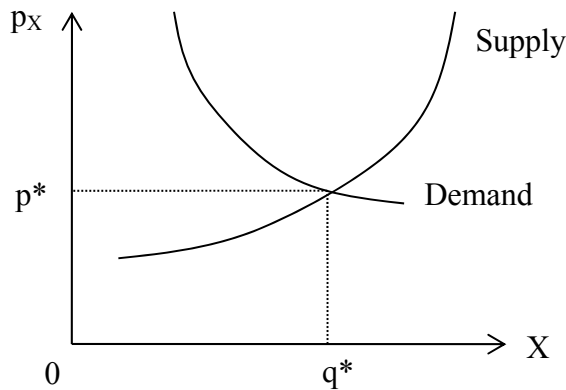
In particular, thanks to this latter concept, we can answer to a very important question to the enterprises: how do total revenues (meaning the unitary price multiplied by the sold quantity) vary in relation to a variation in prices? The answer is given by the *degree of demand elasticity*:

- $|e_p| > 1$: the goods is represented by an elastic demand curve, meaning that a reduction in prices corresponds to a bigger quantity sold. In this case, the demand is said to be *price sensitive*.

- $|e_p|=1$: a variation in price does not affect the total revenues.
- $|e_p|<1$: the demand is said to be inelastic: a reduction in prices corresponds to a reduction in total revenues and vice versa.

After having obtained the demand curve, one must ask herself: which one will be the price chosen by the enterprise? We can now introduce the concept of *break-even price* of a good, meaning the one risen by the intersection between the demanded and the offered quantity (see Figure 2 below). These are the final price and quantity that enterprises adapt on the long run in order to stay in the market and make profits.

Figure 2: break-even price



2.3 MARKET SHAPE AND INDUSTRY ORGANIZATION

Prices does not vary naturally, but as a consequence of the actions by buyers and sellers. Their characteristics and their relationships have a big impact on prices, on its variations and on the good itself. The economic analysis of the consumers' behaviour is integrated by the study of the industry organization.

The set of individuals, considered as a group, whom buy and sell a good, is considered as the *market* of that good. The description of the number and the relationships of buyers and sellers is called *market structure*. According to the neoclassical theory, the most important criterion to be considered for the market definition is the number of sellers. By taking this into account, there are three different market formats: *competition* markets, *monopoly* and *oligopoly*.

- A competition market is called so when buyers and sellers are so numerous that none of them can influence the price of the offered and demanded quantity. In this case, the existent conditions determine a price that is stable for all the operators: it will be equal to

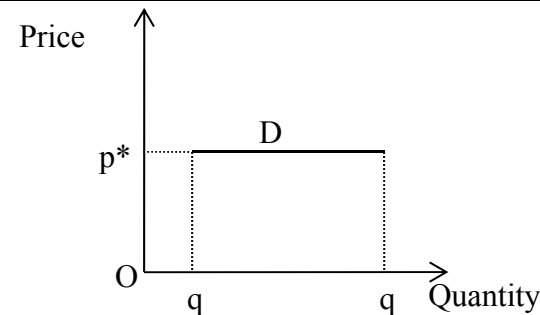
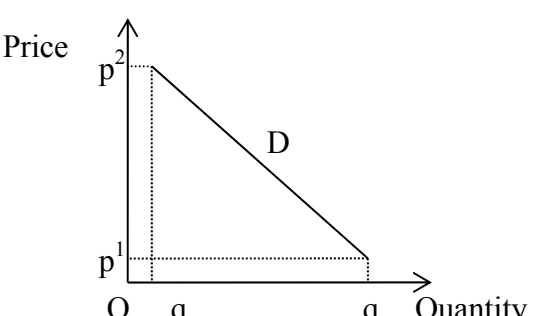
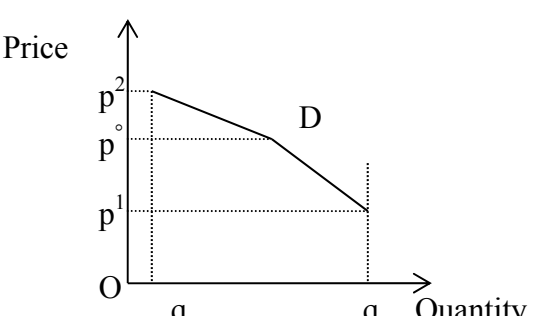
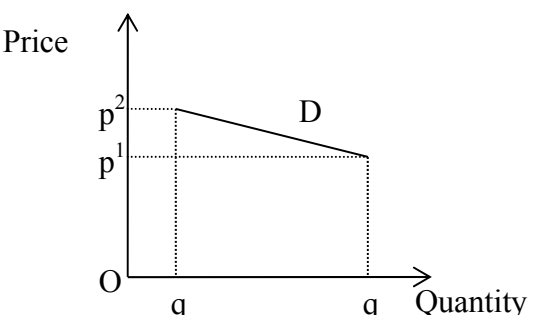
the minimum level of the average unit price of the most efficient enterprise. In a perfect competition context, the price is not unknown.

- Monopoly is a market in which a sole seller entirely provides for the whole supply. In this case, the price is chosen by this enterprise and by its decisions. Its relationship with the quantity sold allows to derive the marginal revenues trend. This said, and assumed the maximization of profits to be the objective, it is possible to identify the production volume that will be absorbed by the market, given a certain price.
- Oligopoly is a market made by a few enterprises, each of them recognizing the fact that its decisions depend on the final selling price and the supplied quantities.

Perfect competition and monopoly represent the two extremes, in between of which lays the reality of different combinations between enterprises.

The most interesting fact of this neoclassical theory's contribution is not its (low) operability but it is related to the promotion of the integration between these two opposites, resulting in a greater degree of reality approximation. Check the following table for a better understanding.

Table 3: Markets, characteristics and demand curves

Markets	Demand curve
<p>Distinctive characters</p> <ul style="list-style-type: none"> -Number, dimension and relationship between enterprises -Good's characteristics (differentiation or substitutability) -Barriers to entry 	
<p>Monopoly</p> <ul style="list-style-type: none"> -One sole seller -Substitutability -Barriers to entry 	
<p>Oligopoly</p> <ul style="list-style-type: none"> -Few enterprises with high market share -Barriers to entry -High correlation between enterprises 	
<p>Monopolistic competition</p> <ul style="list-style-type: none"> -Many enterprises -Differentiated products -Market segmentation by each operator in the sector 	

As previously discussed, the neoclassical model presents some gaps in its operability, in the sense that the enterprise that wants to forecast the demand or the one that wants to study its variations by effect of other enterprises' strategy or by variation in global wealth, cannot find the answers in this theory, which has been purely conceived to provide a gateway of reality's interpretation in a very broad sense.

This scarce operability is principally given by its main assumptions:

- perfect divisibility of the goods,
- total absence of the motivational factor by consumers,
- non-consideration of the time factor,
- no purchasing power,
- perfect information system.

The following model has been ideated by Kelvin Lancaster and implies an extension and a reformulation of the theory of consumers' choices. This new perspective gave light to factors such as brand fidelity, advertising, product differentiation and market research.

2.4 LANCASTER'S MODEL EXPLAINED

“The product of a long process of refinement from the nineteenth-century utility theorists through Slutsky and Hicks-Allen to the economists of the last twenty-five years, it has been shorn of all irrelevant postulates so that it now stands as an example of how to extract the minimum of results from the minimum of assumptions.”

Lancaster was writing these words in 1966 in his article “A New Approach to Consumer Theory”. He followed in criticizing the neoclassical theory:

“All intrinsic properties of particular goods, those properties that make a diamond quite obviously something different from a loaf of bread, have been omitted from the theory, so that a consumer who consumes diamonds alone is as rational as a consumer who consumes bread alone, but one who sometimes consumes bread, sometimes diamonds (*ceteris paribus*, of course), is irrational.”

In Lancaster's model, the main innovation relates to the fact that it does not conceive goods as direct objects of utility, but it's now the *properties* and *characteristics* of the same goods that give utility to the consumer. Consumption is hence an activity in which goods are represented

as inputs and the outputs are represented by a grouping of characteristics. Utility curves will directly classify the groupings of the characteristics and indirectly the baskets of goods, through each good's attribute.

The essence of the new approach can be summarized in three key aspects, each of which takes a different direction from the one of the neoclassical theory:

- The good itself does not provide utility to the consumer. It owns specific characteristics, whom are the ones who give actual utility to the consumer.
- Usually one good owns multiple characteristics, and one single characteristic can be owned by different goods.
- Groupings of goods may present different overall characteristics by the ones owned by each single good.

Let's take into example two Fiat Panda, a red one and a white one. The neoclassical model would consider them either as identical (ignoring an aspect that is actually relevant for consumer's choice) or as totally different (ignoring the fact that they are actually substitutes), while Lancaster's theory is more in line with the consumer: the two goods are actually associated to vectors that differ by a single component, the colour.

The structure between goods and consumers' preferences is considered to be objective: the good's characteristics or the basket of goods' characteristics are the same for all consumers, so that the personal element taken into consideration during the decision lays exclusively in the choice between characteristics and not in the allocation of the characteristics to the actual goods. This objective nature of the relation good-characteristics is crucial to the analysis and enables the distinction between objective facts, personal reactions and external phenomena as a change in relative prices.

2.4.1 REFERENCE SCHEME

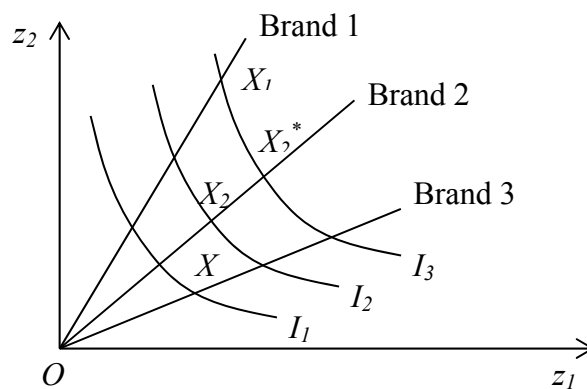
Let's analyse once again the choice problem in terms of its three main components: object, constraints and preferences. As previously discussed, the traditional model deep dives in a consumer that gains utility from the good itself and in a financial constraint given by income and price. Lancaster's key variation consist in the closer analysis of the relationship between the possession of the good and the utility given by its consumption. The goods that a consumer buys are actually never products that deliver a single service. They rather have a several number of characteristics, or attributes, and it is based on them that the consumer

derives her purchasing decision. Synthetizing:

- This theory considers as consumer's choice the actual characteristics of the good, not the good itself.
- The utility function does not rely on the different baskets of goods, but on the relationships between them.
- The financial constraint is not defined in terms of income and prices, but must be now defined also in terms of technical characteristics of each single good on the market.

Let's consider the case of a good X , assuming that it possesses only two characteristics z_1 and z_2 . Moreover, let's assume that the total purchasing volume that the consumer is bearing is predetermined. We can now describe the model through the following graph:

Figure 3: Lancaster's model explained



It's important to notice how, along the axis, we cannot find the quantity of the good but, again, its two characteristics, meaning that each point in the graph represents a particular combination between the two. Let's now assume that the good can be purchased in three different models (or brands), each of them having different combinations of the attributes: in the first model the first attribute prevails, and so on. The consumer will then be able to increase the consumption of z_1 and z_2 in fixed proportions, moving away from the origin by following one of the three lines, on each point of which it is associated a price that must be paid in order to purchase that exact combination. Having assumed a predetermined amount to be spent, the consumer will be able to reach one single point per each line, being X_1 , X_2 and X_3 . These three exact points represent for the consumer the alternatives on which he can make a choice, they are hence considered as a discontinuous constraint of budget.

Looking on how the graph is build, and approaching the problem in a conventional way, the consumer will chose X_1 because it lays on the higher indifference curve.

2.4.2 SOME APPLICATIONS

The analysis carried out by Lancaster is to be used for certain forecasts that are not possible otherwise (with the neoclassical approach), and in the meantime we can also answer to certain doubts that the neoclassical theory couldn't solve.

Let's consider as first thing a simple problem regarding the reaction of the single consumer on price decrease of a particular good. The traditional analysis tells us that in such a case the demanded quantity will simply increase, and the more the price decreases, the more the quantity increases. Let's consider though which kind of consequences there are on the consumer when only one brand sees its price decreases, and let's assume that it will be the brand 2. The lower the price, the higher the distance of X_2 from the origin. Anyway, unless X_{2*} is reached (the point in which X_1 's indifference curve intercepts line 2), we won't register an effect on consumer's behaviour. On the other side, any price decrease that brings the consumer to move beyond X_{2*} , will then result in the choice for brand 2.

Just as an information, the notion of demand curve as a downwards sloping and continuous curve is not necessarily true for this model, at least it is not true for the individual behaviour. On the other side, for the multiple demand of a product of the same brand, the demand curve can be downwards sloping and continuous only if different individuals have different preferences so that they chose the brand for which the price is decreasing, compared to the others.

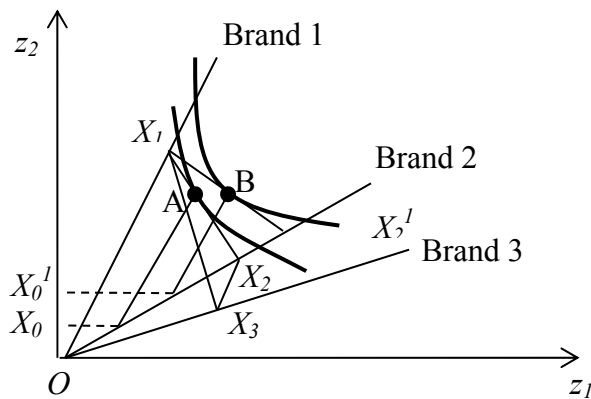
Moreover, thanks to this model it is possible to explain the phenomenon of differentiation and fidelity to the brand. The differentiation is defined as an operation that implies the offer of goods which entail a number of characteristics combined according to different proportions. We have also seen that there is no reason on thinking that the substitution between different brands of the same product should be continuous: there will always be an interval of price variation for which the consumer will buy the same product offered by one single brand. This notion is the so called "*brand fidelity*".

Now, looking at Figure 4, we realize there are certain goods for which it's of fundamental importance the relaxation of the initial assumption we had in Figure 3: the consumer is now able to combine one brand with the other.

If the brands can be combined to obtain in-between combinations, this same purchase now

leads the consumer to take a choice on the $X_1 - X_2$ and $X_1 - X_3$ lines as well. Given her preferences, the consumer will go for A 's combination. If the price of brand 2 decreases, the z_1 characteristic's price will decrease as well, because brand 2 contains a higher quantity of z_1 than brand 1. The consumer will then move to B and for the same overall expenditure, z_1 's expenditure will increase. It's not sure though that this entails a bigger purchase of brand 2 as well. Point A is reached by purchasing X_0 units of brand 2 and $A - X_0$ units of brand 1. Point B is reached by purchasing X_0^I units of brand 2 and $B - X_0^I$ units of brand 1. Given the shape of the indifference curves, X_0^I is higher than X_0 , hence this result in an increase in the demanded quantity of brand 2. However, note how we could easily have an indifferent curve that is tangent to $X_1 - X_2^I$, in a point in which X_0^I would result lower than X_0 .

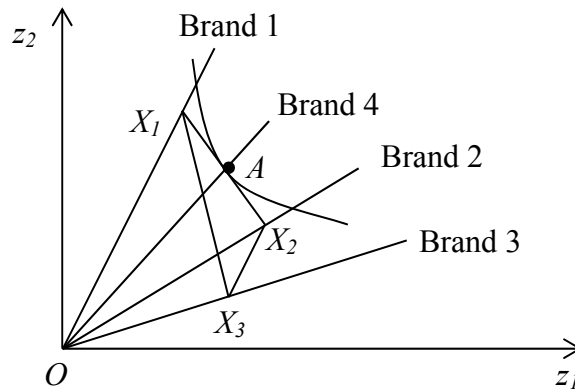
Figure 4: relaxation of an assumption: the consumer can combine one brand with the other



This analysis is extremely interesting for two main reasons. First, it shows how the modal nature (yes or no) of the reaction to a variation in price, previously emerged, depends on the fact that the consumer is able to combine different brands of the same product to finally obtain her preferred combination of characteristics. Secondly, by showing that the demand of a certain product can actually decrease with the decrease of its price, even if none of its characteristics is lower, we now know that the phenomenon of an increasing demand curve could not simply be an analytical curiosity without any practical use (something that we have though on the Griffin goods with the traditional theory).

The previous theories lead to a new kind of problem. It is reasonable to suppose that for the producers of a certain good it is actually easier (rather than for consumers) to change the proportions in which their products combine together the characteristics. Let's now look at the following Figure 5:

Figure 5: What happens if a producer adds a new brand to the portfolio



The consumer, after having established the maximum possible expenditure, will buy brand 1 until it is possible to choose from three different versions of the product. If a producer will offer a fourth version that combines z_1 and z_2 according to the shown proportions with a price that, by keeping the maximum possible expenditure as constant, enables the consumer to reach a point which is higher than A , then the consumer will switch to brand 4. If the number of consumers with similar preferences is big enough and if brand 4 entails a feasible solution in terms of technicalities, then more companies will actually aim to produce this brand.

In conclusion, with Lancaster's model a new approach to the analysis of consumer's choices has been delineated, based on the *characteristics* of the good rather than on the good itself. Many empiric studies have followed this approach while deriving hedonic price functions, namely functions that show what is the implicit price of each characteristic of which the good is made of, starting from the overall market price.

Even though we will not enter into great detail in this occasion, as I was mentioning at the very beginning the second approach that has contributed towards the theoretical framework on hedonic prices has been proposed by Rosen. Based on Lancaster's work, Rosen suggests there are competitive implicit markets where implicit prices for embodied product attributes are defined and that consumers evaluate product characteristics when making purchasing decisions. Therefore, the observed price of a given good is the linear combination of the

quality attributes where the implicit prices are the attributes' weights.²¹ Rosen supported his view on the idea that when goods can be treated as tied packages of characteristics, observed market prices are also comparable on those terms.²²

The actual theory on hedonic prices will be deepened in the following chapter by taking into consideration certain empirical studies that focus on its applications on wine.

²¹ Orrego, Defrancesco, & Gennari. (2012). *"The wine hedonic price models in the "Old and New World": state of the art."*, Padova.

²² Rosen. (1974). *"Hedonic Price and Implicit Markets: Product Differentiation in Pure Competition"*. *Journal of Political Economy*, 34-55.

CHAPTER THREE – LITERATURE REVIEW AND APPLICATION OF HEDONIC PRICES TO WINE

3.1 HEDONIC PRICE AND ITS GENERAL EMPIRICAL APPLICATIONS

3.2 HEDONIC PRICE AND WINE

3.3 STUDIES OF HEDONIC PRICES ON WINE

3.3.1 WHICH VARIABLES SHOULD BE CONSIDERED?

3.3.2 RESULTS OF THE MAIN CONTRIBUTIONS

3.4 CRITIQUES

3.1 HEDONIC PRICE AND ITS GENERAL EMPIRICAL APPLICATIONS

The analysis of hedonic prices has its origin in agricultural economy.

Frederick V. Waugh published in 1928 his pioneering study on the quality factors that determine price. He observed that prices of certain fresh vegetables would considerably vary, so he thought of connecting their prices with their physical characteristics. He then applied a regression for asparagus in a Boston market in July 1927 basing it on three different quality dimensions: colour, size, uniformity. Its intent was to determine each evaluation from consumers, thinking that it would have been useful for the producers.

Later on, Court (1939), whom the notion of “hedonic price” is actually attributed, applied the method to the cars’ industry, including in the hedonic function many different technical characteristics of a car. It was only with Griliches in 1961 that Court’s work was resumed and extended.

Griliches applied a similar regression to the one of the predecessor with the aim of finding out consumers’ preferences in relation to the cars’ *optional*, so that it would have been possible to build an appropriate measure of changes in time. Griliches’ work had a great impact on the field and since then it finally began a flourishing different amount of applications of the theory on different industries (as an example: technology, air quality, food, cars, hospitality).

Chow (1967), Cartwright (1986), Triplett (1989), Pakes (2003) and Benkard & Bajari (2012) all studied the relationship between PC’s prices and their quality characteristics, to the point that today hedonic models are officially implemented by the USA Federal State to measure their price changes.

Only recently, and with a modest extent, hedonic models have been applied to goods that are hard to measure (i.e. hospitality) and experience goods, whose quality is mainly known after purchase (i.e. food and beverages). Here are a couple of examples: Gunawardana and Harvira (1996) on Melbourne's restaurants, Harchaoui e Hamdad (2000) on classical music, Cavallo (2017) on extra-virgin olive oil, Soler and Germar (2018) on hospitality, Jun (2018) on air pollution in Seul and finally Gibbs, Guttentag, Gretzel, Morton & Goodwill (2018) on Airbnb.

Next, a literature analysis on hedonic models in the specific wine sector.

3.2 HEDONIC PRICE AND WINE

What matters in wine's changing prices? If the consumers are *experts*, the answer then is *taste*. In the case of high quality wines, and in particular in the case of the Bordeaux Grands Crus auctions, the buyers are usually well informed consumers. The existence of this kind of market guarantees a certain stability between prices and quality, which makes us understand why auctions are a good and efficient method for the sale of mature wines. Moreover, there are also certain quality indicators that correspond to the simple observable characteristics during public sales. This method is fairly easier as it does not require any sort of tasting.

On the other side, the market of "young" wines is not as efficient, as the very first buyers do not seem to give much importance to their future quality, even in the cases in which it may be forecasted (through the climate, for example). This results in a surcharge of this kind of wines. The overall result is that the market is quite unstable, principally because of the weak information carried by the consumers.

Within a competitive market, there is a very strong relationship between prices and taste if the overall consumers are experts, while if the consumers are non-experts the price is controlled by the producer and sometimes even manipulated so that it is associated to a predetermined quality level.²³ Within this kind of situation, the price does not exclusively depend on quality intrinsically, one must find a relation with other indicators that quantify certain technical characteristics.

Therefore, the differences in price are not proportionate to the differences in quality. In the case of red wines from Médoc, as an example, the *objective* indicators (production

²³ Scitovszky. (1945). "Some Consequences of the Habit of Judging Quality by Price". Review of economic studies, 100-105.

technology, climate conditions, ...) count for up to 66% on the price variation. Including the *reputation* effects (we will then see what this terminology means for wine) we can increment this percentage up to 85%.²⁴

As we have realized, it's not at all trivial to answer to the very first question: what matters in wine's changing prices? Wine is a highly differentiated product: sold and purchased with prices that vary within an extremely broad interval; also, it is produced and consumed under extremely competitive conditions. It's fairly easy to gather data on prices and quality, but it's not common for them to be connected. Wine seems to be a perfect good to be approached with hedonic price models.

Starting from these kind of considerations, encouraged by the growing global interest on wines, with the aim of clarifying some relations between prices and other factors, numerous are the studies that have been carried out during the years, many of which have followed a hedonic price approach. Some of them will be reviewed in the following paragraph.

3.3 STUDIES OF HEDONIC PRICES ON WINE

During the early 90's numerous studies of the hedonic models have found their application on the wine sector. Econometric models obtained by the regression of price (more specifically, of the logarithm of price) with respect to numerous wine characteristics have been estimated throughout the whole world.

The following is a list of the main contributions given to this subject during the past three decades:

- Oczkowski (1994, 2001, 2017) for high quality Australian wine,
- Nerlove (1995) for consumers' choices on Swedish wine,
- Combris *et al.* (1997) for Bordeaux, (2000) for Burgundy and (2006) for Champagne,
- Landon & Smith (1997 e 1998) for Bordeaux,
- Wade (1999) for Australian wine,
- Benfratello, Piacenza, Sacchetto (2009) for Italian premium wines,
- Delmas & Grant (2014) on eco-labelling strategies,

²⁴ Ginsburgh, M., M., & A., M. (1994). *“Red Wines of Médoc: what is Wine Tasting Worth”*. Verona: Vineyard Data Quantification Society.

The main contributions will be analysed in the following pages.

3.3.1 WHICH VARIABLES LEAD TO WHICH RESULTS?

As already mentioned, the hedonic model has been principally used for *search goods*, a product or service with features and characteristics easily evaluated before the purchase. The application that we will take into exam now differs by two aspects. The first one is related to fact that wine is an *experience good*, hence its quality and its other characteristics are difficult to be observed in advance. Second, wine is not a *durable good*, meaning that it does not yield its utility over time. Going back to the first difference, wine's labels can actually give us some information related to aging, name, producer, appellation and so on, but none related to sensorial characteristics.

Hedonic models' success depends on the choice of the variables that must represent appropriate characteristics, as well as on the correct specification of the function's format.²⁵ These choices are easier in case of durable goods; to better understand just think of a computer: speed, memory, functions and peripherals are all accessible data that can be used as performance and price indicators. For wine and food in general, the most important attributes are hidden behind the *packaging* therefore is less intuitive to draw and to have access to the right variables to be used.

Oczkowski²⁶, as an example, tries to use *objective* criteria mostly, such as the region from which the vines come from, conscious on the fact that in this way the regression is most probably precise and not influenced by external factors such as the possible subjectivity of the rates in the guides. On the other side, the author is conscious on the fact that this means that there is a group of missing variables (for example, the sensorial traits) as they cannot be built with the same degree of certainty.

The rest of the other publications in fact also focus on the *sensorial* traits of the wine. Combris *et al.*²⁷ (whose chosen variables are shown in the following Table 4) and Nerlove²⁸

²⁵ Mason, & Quigley. (1996). "Non Parametric Hedonic Housing Prices". Housing studies, 373-385.

²⁶ Oczkowski: (1994). "A Hedonic Price Function for Australian Premium Table Wine". Australian Journal of Agricultural Economics, 93-110.

(2001). "Hedonic Wine Price Functions and Measurement Error". The Economic Record, 374-382.

²⁷ Combris, Lecocq, & Visser. (2000). "Estimation of a Hedonic Price Equation for Bordeaux Wine: Does Quality Matter?". Economic Journal, 961-967.

are really the first ones to take in consideration the sensorial traits of the wine. This analysis is again possible through the use of the experts' rates in the different wine guides. Nerlove relies on the judgements carried out by the main Swedish importer, who write on *Vin och Spirit (V&S)*. Combris choses as source of information two results proposed by the French *Institut National de la Consommation (INC)* for Bordeaux and Burgundy through experts' and sommeliers' tastings. This is the first time that sensorial traits are taken into consideration during the construction of the model function: necessary traits, but not easy to determine; hence it's crucial to have access to expert, serious, professional and independent evaluations. Combris *et al.* in fact, puts in place some rules that should be taken into consideration for each data source (and by doing this, aims to criticize wine guides as they usually do not follow these five principles):

- Each and all tasted wine should be included as a sample, independently from the fact that they are considered as quality wines or not.
- The bottles of wine that are prepared for the tasting should not be included in the sample space as they are usually not representative of the cellar's production as a whole.
- For a greater objectivity, the evaluation should be made by independent experts, while most of the time it is carried out by the author of the book, whom has usually received sponsors by certain cellars and for this reason cannot be completely objective and independent.
- The tasting must be blind. The expert must not be previously influenced by the cellar name, wine type, year, appellation and so on.
- All the wines in the sample space must be purchased within the same conditions: differences in price must represent characteristic differences and not purchasing ones.

²⁸ Nerlove. (1995). "Hedonic Price Functions and the Measurement of Preferences: the Case of Swedish Wine Consumers". *European Economic Review*, 1697-1716.

Table 4: Combris *et al.* chosen variables

Sensorial traits	Objective traits
<ul style="list-style-type: none"> • Aroma's intensity • Finesse • Complexity • Body • Acid content • Flexibility • Structure • Concentration • Harmony • Tannins • Finish • Alcohol • Staleness • Reduction • Storage necessity 	<ul style="list-style-type: none"> • Classification • Red wine • White wine • Harvest 1989 • Harvest 1990 • Harvest 1991 • Bordeaux appellation • App. Côtes • App. Médoc / Graves • App. St Emilion / Pomerol/ Fronsac • App. Blancs Secs • App. Blancs Doux

On the other side, Oczkowski²⁹ and Landon & Smith³⁰ claim that the key hypothesis that determines the model's success is the *perfect information* condition proposed by Rosen, which implies that sensorial traits as well as chemical and climate ones (being attributes of which the consumer is not easily informed of) are the least attractive candidates to be included in the function, while *objective traits* are easily observable hence the ones to be included.

Still, this doesn't preclude for them the use of *quality* measures based on sensorial traits. In fact, they follow by saying that sensorial traits can actually be accessible by wine guides, whom increase the amount of information accessible to the public, by providing indications on quality matters that would not be accessible otherwise. However, just like Wade³¹, they also say that consumers don't have access to quality information on wines that have been

²⁹ Oczkowski: (1994). "A Hedonic Price Function for Australian Premium Table Wine". Australian Journal of Agricultural Economics, 93-110.

Oczkowski. (2017). "Hedonic wine price functions with different prices". Australian Journal of Agricultural and Resource Economics.

³⁰ Landon, & Smith. (1998). "Quality Expectation, Reputation and Price". Southern Economic Journal, 628-647.

³¹ Wade. (1999). "Reputation ad Its Effects on the Price of Australian Wine". Australian and New Zealand Wine Industry Journal, 82-84.

recently put to commerce. For this reason it is hypothesised that consumers also research for information based on the *reputation traits* (basically a group of variables thought as a quality measure of the *long run*), meaning the fame that a wine holds in time due to its own reputation or to its producer's one. Also this category will be added to the list of group of variables that will be used for our final regression: objective characteristics, sensorial traits, wine's reputation and producer's reputation.

So which are the main results achieved by the highlighted studies? The results of Oczowski's work are related to six statistically significant variables such as aging, vine typology, region, year of production and enterprise dimension, all of them being related to objective traits. These results are not very impressive as cannot really be compared with other group of variables. Also, the author actually confirms what was already of common knowledge: very positive years (favourable climate, quality vines, ...) have the ability to greatly influence the price, different production styles result in different pricing and of course the regions effect the results as well. What is probably missing in his works is the connection to the fact that other group of variables actually influence the price as well, overall resulting in a partial analysis.

The aim of Combris' work is to run an analysis that takes into consideration both objective and sensorial traits, to verify in which way consumers give relevance to these different attributes and how they rate the quality of the product. By running two different regressions the results lead to the fact that the *price* function is still essentially determined by the objective variables, while the *quality* of the wine (who is according to them measurable by the experts' ratings) is determined by the sensorial traits. As a result, most of the variables that are essential in defining the wine's quality are actually not relevant in defining the end price. The authors explain this phenomenon in two ways: firstly, they think that this could be related to the fact that the experts have a different taste than the average consumer's one. Secondly, the reason relates to the fact that this is actually a condition of *imperfect information*, or *information asymmetry* (opposed to Rosen's structure): some aspects are easier to be recognized by consumers (in this case, objective traits) and hence more likely to be used in the determination of their willingness to pay, even if they are not directly representative of the product's quality. Just as a curiosity, as highlighted by Delmas & Grant³², one of the results is that some producers have actually begun using the back of the labels to describe the sensorial traits of the product.

³² Delmas, & Grant. (2014). "Eco-Labeling Strategies and Price-Premium". Business & Society.

A partial answer to the quality perception problems related to the wine's price is partially solved by Landon & Smith's work by taking into consideration the *fame* of the producers intended as a long run index of the quality of the product. By examining the role of this third group of variables, and by comparing it to the one expressed by the standard quality variables (as usual, the sensorial traits), they want to understand if reputation actually provides useful information for the consumers for the determination of their willingness to pay. By using as source the world's most well-known wine journal, Wine Spectator, they realize that when running a joint regression between objective variables, sensorial traits and fame, then the ones significantly influencing the end price are the objective traits (hence confirming what previous studies had anticipated) as well as the variables of reputational kind. Their empirical evidence shows that consumers consider the long run fame as a better quality indicator than the expected sensorial characteristics of the product itself. This means that it's not immediate for an enterprise to raise a significant price premium on the product.

Based on this analysis, Benfratello *et al.* publish their "Taste or Reputation: what drives the market prices in the wine industry? Estimation of a hedonic model for Italian premium wines" article. They provide new evidence on two main aspects. First of all, in terms of methodology, they are the first ones to apply a Box-Cox transformation within this context, which does not impose *a priori* restrictions on the form of the hedonic price functions. Secondly, and even more importantly they finally give empirical light to the situation of Italian wines, never taken into consideration before, by studying Piemonte's Barolo and Barbaresco. The literature before them kept implementing, together with objective variables, either one of the two highlighted groups of variables that represented *quality* characteristics in wine: either sensorial traits (assessing the quality characteristics related to the *taste*, with all its issues related to objectivity) or fame variables (assessing the quality characteristics related to the *reputation*, meaning quality measured with a long term approach). With this article, published online in 2011, they have been the very first in jointly implementing the two different groups of variables representing quality in wine. Their results "confirm previous evidence obtained using data from countries other than Italy: the consumers' choice with respect to wine is a quite complex process which involves a variety of factors such as objective characteristics, sensorial traits and reputation. However, on the basis of a non-nested statistical test (Vuong, 1989), the LS specification is to be preferred to the CLV one". Just to be clear, the LS specifications stands for the group of variables which intends to measure quality in terms of reputational aspects, while the CLV specification stands for the variables that measure quality

in terms of taste. "As a consequence, we can infer that, although both sets of variables are relevant factors influencing consumers' preferences and their willingness to pay, the reputation acquired by wines and producers during the years is more important than taste in driving market prices."³³

It will be on these last considerations that we will run our final *unique model* regression in Chapter 5.

3.4 CRITIQUES TO THE MODEL

Even though it is not the end purpose, the previous section has briefly highlighted how big is the related literature related to the studies that have already been conducted thanks to the use of hedonic models. This now leaves us with some space for different critiques, principally related to the fact that all the models that have been used are actually a pure simplification of reality.

The main critiques moved over the years are related to the *models* itself. First of all, as mentioned above it is very hard to understand which are the right indexes to be used as they are based on the *perception* that consumers have, which in return is not material so not easy to translate into numbers. On top of it, once the decision of which indexes must be used is taken, it is also very hard to actually assess their *objectivity* when searching for the right data source (for example, wine guides are said to be lacking in objectivity when evaluating the cellar, and also their reputation and usage is so strong that they can actually influence the consumers' thought). Moreover, one of the biggest critiques is related to prices as *independent variable*: wine's prices do not only represent the consumers' willingness to pay, but most of all the reflection of the trader's ability to negotiate with suppliers.³⁴

To sum up, four are the main reasons why the use of hedonic model for wine's prices is sometimes considered as a pure statistical manipulation:

- Incoherent starting point with irrelevant database: difficult to map all the wines, making sure that the prices differ only because of characteristics related to the wine and not because of selling abilities.

³³ Benfratello, Piacenza, & Sacchetto. (2009). "Taste or Reputation: what drives the market prices in the wine industry? Estimation of a hedonic model for Italian premium wines". Applied Economics

³⁴ Unwin. (2000). "Hedonic Price Indexes and the Qualities of Wines". Journal of Wine Research, 95-104.

- Variables are strictly interdependent between them, causing a bad influence on the significance of the resulting events. The correlation between variables is very hard to take into consideration.
- The wine market does not represent a case of pure competition, typology on which Lancaster's model is based (and hence hedonic theory).
- It is not sufficiently clear what the consumer really means by *quality* of the wine, hence the drawn conclusions will never be applicable to all of the chosen market segments.

Also, we will conclude this third chapter with Oczkowski's thoughts: it would be interesting to verify if the obtained results are valid also in different national contexts, particularly: is it always true that fame influences prices more than quality?³⁵

³⁵ Oczkowski, & Doucouliagos. (2015). "Wine Prices and Quality Ratings: A Meta-regression Analysis". American Journal of Agricultural Economics.

CHAPTER FOUR – BARBERA, MARKET ANALYSIS

4.1 INTRODUCTION

4.1.1 FROM MITH TO HISTORY

4.1.2 LEGISLATION

4.2 THE ELEMENTS OF THE MARKETING MIX THEORY

4.2.1 PRODUCT

4.2.2 PLACE

4.2.3 PRICE

4.2.4 EMPIRICAL METODOLOGIES TO DERMINE THE PRICE

4.2.5 POSITIONING

4.1 INTRODUCTION

La Barbera o Il Barbera? It's feminine, of course, but no one is sure about it, exception made for the locals.

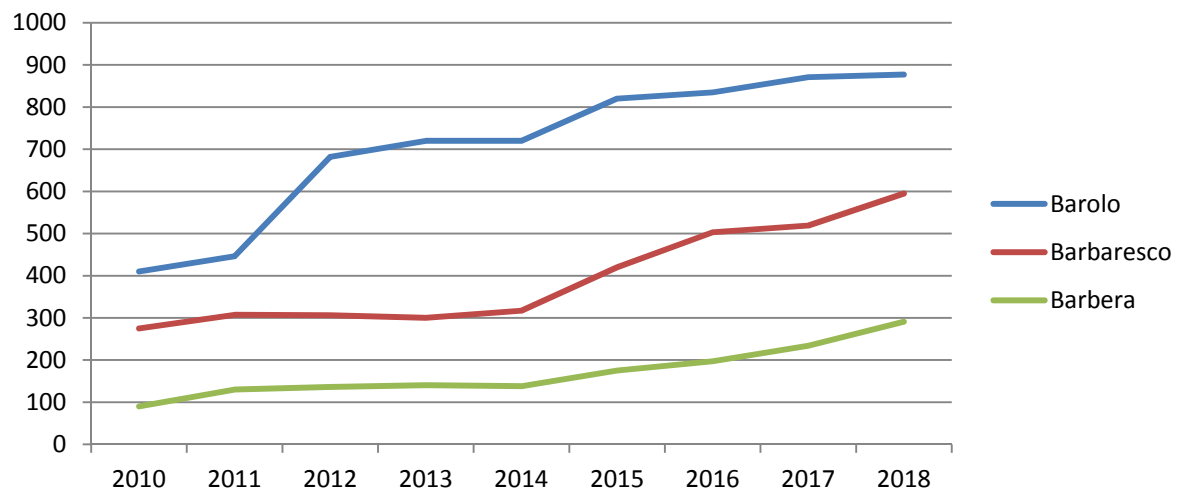
Barbera: well rooted wine within Piemonte's historical knowledge that nowadays, thanks to the entrepreneurial and innovative spirit of its multiple but little producers, it is reaching a high level of production and notoriety. We firstly want to retrace its history, in order to get to its commercial analysis of the last decades.

4.1.1 FROM MITH TO HISTORY

Barbera. If it were a profession it would be an actress, if it were an animal it would be a chameleon.³⁶ It is one of the most surprising, multifaceted and adaptable wines ever, with an incredible growth over the past 20 years.

To prove it, look at its increasing prices over the last decade, as well as its similar trend to both Barolo's and Barbaresco's prices (The prices in the following figure are expressed in Euros per Hectolitre).

³⁶ <https://www.vinicum.com/it/racconti/caratteristiche-barbera-asti-vino-del-piemonte/>

Graph 4: Prices of Barolo, Barbaresco and Barbera through the years³⁷

Gaber once used to sing “*Barbera and Champagne*”, comparing a popular wine with a high class one. Barbera used to be the everyday red wine on everyone’s table, and it still is, even though it has gained new successes as well. Why has it taken us so long to realize its potential?

The historical documentation on Barbera is unfortunately not very rich. Giorgio Gallesio, notorious ampelographer of the XIX Century, relates to Barbera in one of his publications as the “*Vitis Vinifera Montisferratensis*”.

One more trace of its existence is kept safe in Nizza Monferrato’s city hall, a land rental paper from the XVII century with the intention of growing “*de bonis vitibus berbexinis*”, which could be Barbera’s vineyard.

Finally in the XVIII century Barbera arrives to notoriety and expansion, mostly in Piemonte’s territory of *Astesana, Monferrato, Alessandrino, Tortonese, Vercellese* and *Novarese*, while it will spread throughout *Langa* (where Barbera is mainly produced at today) around 1860’s as Lorenzo Fantini testifies in his “*Monografia sulla Viticoltura e Enologia nella Provincia di Cuneo*”.

Just out curiosity, by that time many little producers started to adopt surnames similar to the quality of wine that they were growing, hence they became *Barberis*, surname still used today that has also found its diffusion as *Barbero*.

³⁷ C.C.I.A.A. : <http://www.cuneoprezzi.it/ingrosso/ALIMENTARI/index>

4.1.2. LEGISLATION

Barbera, as well as other wines, did not receive any legislative protection up until the DOC (*Denominazione di Origine Controllata*) in 1966, and for this reason it has been counterfeited and emulated, even though not in a massive way unlike for other wines due to its domestic extension at that time.

The arrival of the DOC regulation brought the first and effective changes. Each producer had to announce the numbers of the yearly production right after each vintage in order to reach to the DOC stamps, meaning the official certificates stating the originality and the territoriality of the produced wine. Still today, the CCIIAA cross controls the end production with the owned vineyards and then delivers the certificates.

In 1980, the DOCG (*Denominazione di Origine Controllata e Garantita*) was also designed: added to the controls already carried out for the DOC, the DOCG also checks each wine lot before the bottling itself as a quality guarantee. One sealed sample goes through a chemical analysis to verify the minimum prerequisites imposed by the legislation, while another sealed sample is tasted by two rotating teams of six experts chaired by one president each. If the wine is *approved* it will receive the DOCG bands, in the exact number of the bottles produced. If the wine is registered as *revisable* due to a correctable defect it will go through the whole process again after the correction. If the wine is registered as *non-appropriate*, it will decay and be considered as simple table red wine.

Barbera has today three DOCG's: *Nizza*, *Barbera d'Asti* and *Barbera d'Asti Superiore*, as well as several DOC's, out of which we can mention *Alba*, *Monferrato* and *Canavese*.

Let's briefly focus on *Barbera d'Asti*'s legislation.³⁸ First of all, the wine must be obtained by an ampelographic composition of a minimum amount of 90% of Barbera type grapes. The rest 10%, if any, must come from Piemonte. Furthermore, the wine production must be within the listed 167 city halls in the Asti province, where the environmental conditions are the right ones for the vine to grow. Article 6 then lists the sensorial traits that the wine must have: the colour must be ruby red, the smell ethereal, the taste is harmonious, the minimum alcoholic gradation must be 12% and 4,5 g/l minimum acidity.

Overall, the regulation of wine has always brought to good results, because of many different

³⁸ (2014). "Disciplinare di produzione dei vini a denominazione di origine controllata e garantita: Barbera d'Asti". Alba.

reason. The production of Barbera d'Asti DOCG keeps growing each year since then: in 2017 has grown by 6,3% with over 21 million bottles produced and 530 overall producers.

4.2 THE ELEMENTS OF THE MARKETING MIX THEORY

The marketing mix, also known as the 4P theory, is defined as the set of marketing tools that the enterprise uses to pursue its marketing objectives in the target.

- *Product*: within this framework one can find all the decisions on the supply's characteristics: style, brand, package, guarantee, service pre-purchase and post-purchase. These kind of decisions go along with the product itself since the beginning of its life.
- *Price*: The determination of the price is called *pricing*, and is obviously not a trivial task. One must consider convenience, demand elasticity, applicable discounts, payment conditions, delivery conditions, price relationships, and so on.
- *Place*: all the choices concerning the distribution channels fall within this field, the management of intermediaries, the structuring of the selling network, the distributors' motivation, and so on.
- *Promotion*: all the decisions concerning all the different communication tools between the enterprise and the end consumer: the decisions regarding the advertising and promotional instruments that can be applied (in terms of financial availability and strategic choices).

4.2.1 PRODUCT

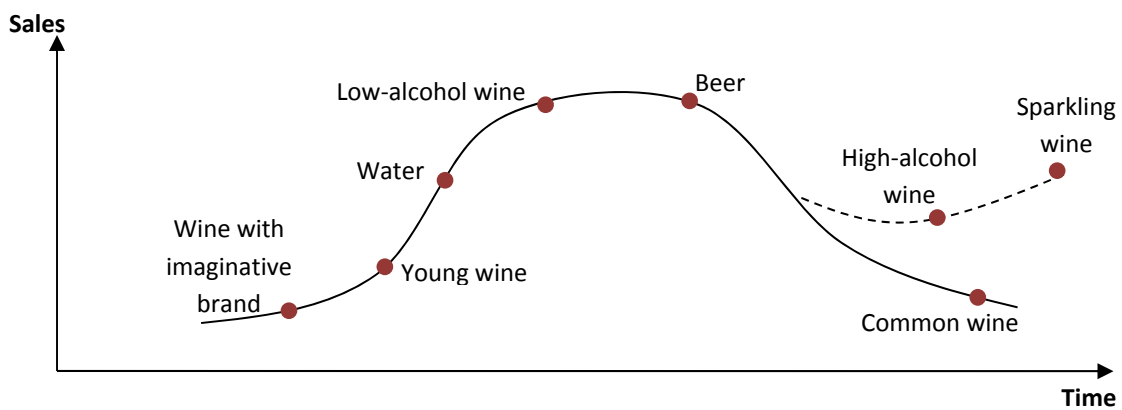
It's trivial to understand that the marketing mix elements within the wine market, can be applied either for common or more sophisticated wines, but not for both at the same time. As we have seen, Barbera is facing a great challenge because it is evolving into a more robust and well appreciated wine overtime, without any doubt it can be distinguished as a fine wine. Attention on the fact that this distinction is not exclusively about wine's appellation, but usually more with a certain average price (4€ per 0.75 litres bottle) under which the wine is not considered *fine* anymore. Below, the distinctions between the two typologies of wine:

Table 5: Marketing mix factors applied to different wine typologies

Factors	Fine wines	Common wines
<i>Product</i>	Origin appellation, limited quantity, regional vines.	No appellation, small productions, regional knowledge.
<i>Price</i>	High price, no promotional pricing.	Competitive price, sensible price, promotional pricing.
<i>Place</i>	Specialized channels.	Supermarkets.
<i>Promotion</i>	Reputation, advertising on the brand.	Mass media, advertising directly in the distribution channel.

Based on this first distinction, it's possible to trace the *productive life cycle* of the different wine typologies and of its substitutes (see the following Figure 6). Table wine production is inexorably declining, as well as its consumption, causing damages to all those small enterprises who have chosen the strategy of big volumes and affordable prices. The production is approaching to a higher level quality, starting to compete with the rest of the traditional European wine producers.

Figure 6: Hype-cycle of wine and substitutes



Going back to the product in general, there is still this idea between consumers that wine is bad for ones health in any form or quantity, due to the fact that there have been several, controversial and indiscriminate campaigns throughout the years against any type of alcoholic beverage. By here, the awareness of the fact that consumers must carry out a campaign that separates wine from the rest of the sugary alcoholic beverages and informs consumers on the

necessity of *wise* drinking.

The enterprises will have to bet on the slow recovery of their high quality products. Following, some characteristics that distinguish them:

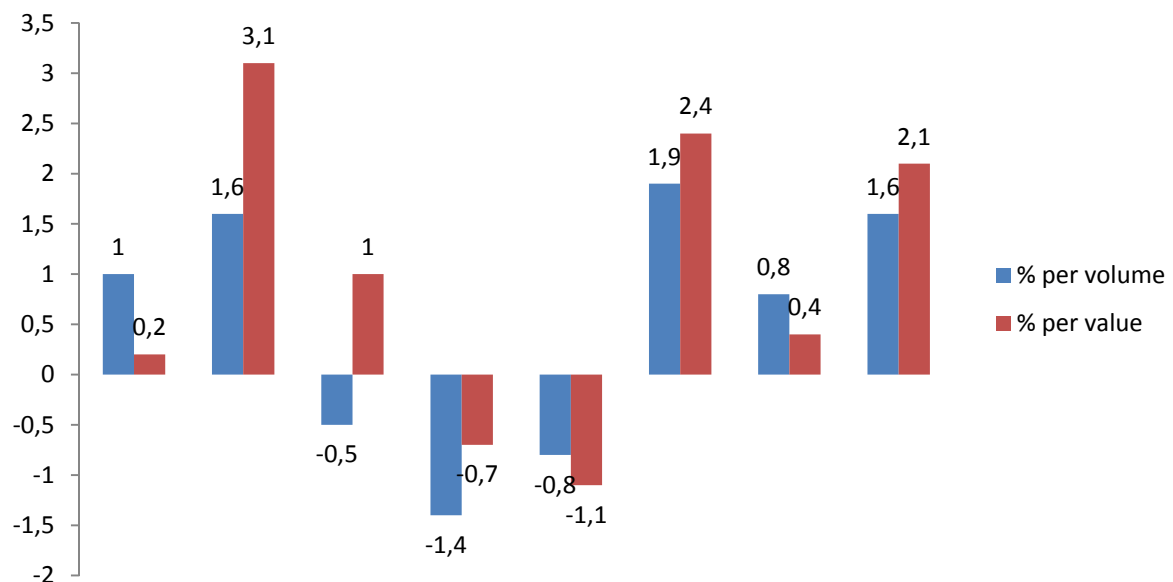
- Limited production.
- Unique production (because of terroir, climate, year, and so on).
- Pleasant good.
- Wine as status symbol.

4.2.2. PLACE

This kind of analysis is essential: the characteristics of each channel should be analysed in depth and frequently because of the constant changes in the relationships with consumers and with the supply chain. Below, the attempt of making a quick overview of the current situation.

First of all, as we can see from the Graph 5 below, after the great decrease between 2012 and 2014 connected to the Italian crisis, the general large consumption has risen again, meaning good signs for the country.

Graph 5: Trend of the large consumption per year (2010-2017)³⁹



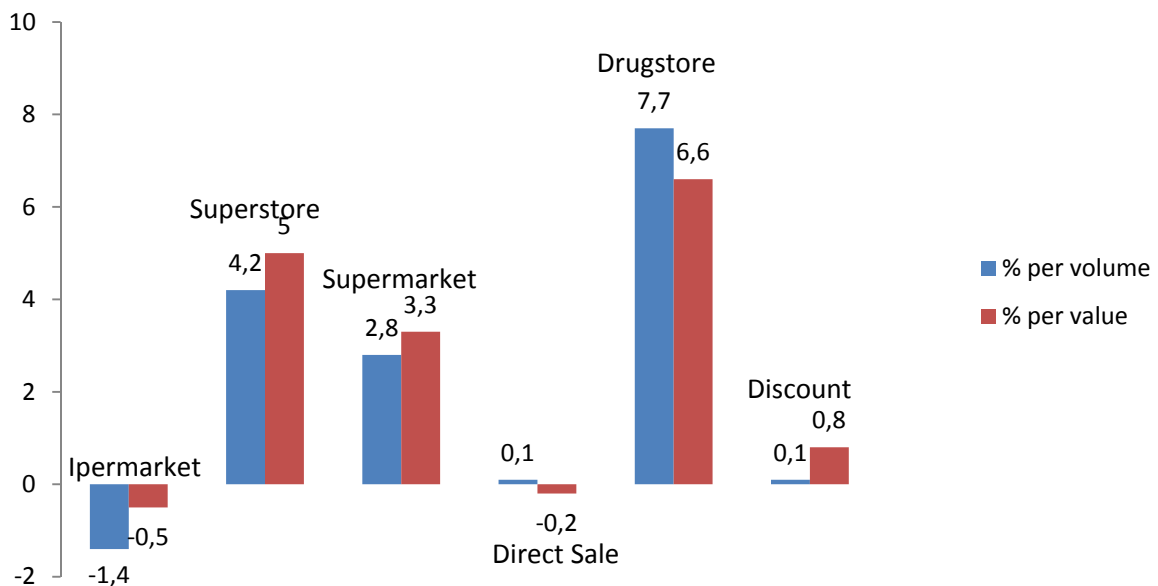
This said, it is not exactly how it used to be in the first decade on the XXI century. Consumers are unfaithful to the brand, they are more mobile, there is less propensity to buy *cheap*, while

³⁹ IRI: <https://www.iriworldwide.com/IRI/media/IRI-Clients/International/it/Formati-Distributivi.pdf>

the increasing trend to buy *quick*, and this is probably the reason why drugstores have gained such a big power, especially in bigger Italian cities (see Graph 6 below).

Also, consumers don't eat at home as much during lunch breaks, modern offices have a good and well equipped kitchen, so people don't need to buy big amounts of grocery but end up going to the drugstore on a daily basis. Also, people tend to go more and more to sophisticated restaurants every once in a while, which rises a whole new market trend of the so called *horeca* (hotel, restaurant, café) distribution channel, where many wholesalers are prioritizing their attention. The winery distribution channel is restructuring as well: *wine shops* were once a place for few connoisseurs, a sort of temple, while now it's becoming a trend between young people, not necessarily experts but simply consumers attracted by the industry's charm: many wine shops have revisited their business model and became *wine bars*, places in which you can both purchase a bottle or simply sit at a table and enjoy a nice glass of wine.

Graph 6: Trend per distribution channel in 2017 ⁴⁰



Producers (especially small scale ones) must *choose* where to stay, and it is often very hard for them to adapt: modern distribution depresses the price, but the hospitality channel is not in line with it, so the risk is that the consumer may end up finding the same wine for two very different price levels, depending on where she decides to purchase, which is not affordable in terms of brand image. Usually, producers are still afraid of the modern distribution, it guarantees high volumes but it may drastically decrease prices and, again, ruin the brand

⁴⁰ IRI: <https://www.iriworldwide.com/IRI/media/IRI-Clients/International/it/Formati-Distributivi.pdf>

image. For this reason producers usually still go for the restaurant distribution channel, bearing the involved risks.

Anyway, the choice of which distribution channel should be followed, also depends on the dimension of the enterprise itself. Usually, big players have the capacity to satisfy the volume requests of the modern distribution, while small businesses and family owned companies usually operate in niche markets, with limited production but usually with high standards.

4.2.3 PRICE

Price is the one 4P's variable that is of greater interest to us. Starting from a theoretical point of view, we will reach the empirical analysis of its determination for Barbera wine.

Pricing essentially means two things:

1. The determination of the price itself
2. The choices related to the distribution channel and other selling conditions

Let's analyse them in greater detail: the different kinds of price determination first, followed by the results of a sample analysis concerning relations between prices, distribution channels, consumption area and enterprise dimension.

The determination of the price itself

For each market situation, the *pricing* factors are related to production and distribution costs. This is the reason why *diversification* policies arise in time: seasonal prices, periodical prices and so on.

Price becomes the main strategic factor: on one side, price choices are carried out through a *price competition* policy, in which the enterprise will struggle with advertising costs because of low margins; on the other side, a marketing combination focused on strong advertising expenses (the so called psychological diversification of the product). In this latter case the enterprise applies the *non-price competition*, that does not necessarily consist in the reduction of the selling prices, but in the diversification of the products on consumers' eyes.

Price determination depends on multiple factors: fixed costs, enterprises' strategy, distribution channels and son on. Following, the possibilities that an enterprise has:

- *Market skimming*: it is a selection policy. Through this kind of strategic choice, the enterprise aims to create a high quality image with high prices, high margins, but limited quantities. High quality wines produced in appellation origins are usually the ones for

which this choice is taken into consideration.

- *Market penetration*: the objective here is to enter the market with a product that sells below the price that is perceived by the consumer, with the intention of earning soon big market shares. This choice is typically carried through by enterprises with mass production experience and cost leadership, resulting in low prices, seasonal discounts and differentiated prices.
- *Neutral pricing*: in this case, price is not that relevant if compared to the other marketing mix factors. This kind of strategic choice is not valid for wine because in this sector price determines expectations, so it cannot be left neutral.

When carrying out the determination of the price itself it's important to remember that there is the existence of the price reference values, updated each year in Italian regions at *Camera di Commercio Industria Artigianato ed Agricoltura (C.C.I.A.A.)*, to be taken as reference values the wholesale price of best year wines.

The choices related to the distribution channel

The quality of the product is by no mistake attributable to the producer, while the price is not: the wine, after being bottled by the enterprise, takes different possible roads that are obscure to the consumer, whom must trust the end seller and the proposed price. Producers and distributors should better agree on the end price to be showed to the end consumer, in order to gain more trust both on adequacy and expectation.

Following, the results of a sample analysis concerning relations between prices, distribution channels and consumption area (Table 6):

- Selling prices differ from distribution channel but also by consumption area. As an example, wholesale prices are generally lower in all areas, even though in different proportions;
- In the North, there is less of a difference between all the distribution channels (exemption made for the direct one): starting from the 100% price charged to end consumers, the difference is only from the 89% of the starting price proposed by groceries to the 79% proposed by wholesalers.

Table 6: Selling price per geographical area

	North	Centre	South
Private	100	100	100
Wine shop	88	86	92
Grocery	89	93	83
Supermarket	83	87,5	80
Restaurant	89	84,8	90
Wholesale	79	81	75

If this same kind of analysis is carried out by enterprise dimension (see Table 7), it becomes relevant how the biggest size ones are the same ones that manage to obtain the best prices in each channel, thanks to their contracting power.

Table 7: Selling price per enterprise dimension

	Small	Medium	Large	Super
Private	100	100	100	100
Wine shop	87	85	92	93,3
Grocery	91	82	90	93,3
Supermarket	80	78	85	92,3
Restaurant	87	85	90	93,3
Wholesale	80	73	80	91,6

The choices related to other selling conditions

Very briefly, the other selling conditions are formed by:

- discounts,
- delivery conditions,
- payment conditions,
- other supply conditions: packaging, optional provisions, ...

The pricing list is given to the end seller, whom must try to stick to it as much as possible to avoid differentiations by consumer and to avoid administrative problems.

4.2.4 EMPIRICAL METODOLOGIES TO DERMINE THE PRICE

How is the end price determined? It lastly really depends on the size of the enterprise.

In general, the determination of the price is related to three different factors:

- The cost of the product;
- The market demand;
- The managerial experience of the producer.

For small-medium enterprises, the determination of the final price is more practical and empirical, while for bigger enterprises the approach is much longer, scientific and usually involves a big team of accountants and marketing experts.

The two different approaches do not necessarily lead to different effectiveness. In small enterprises the admissible error of inputting costs is around 3%, hence the final profitability results don't change much. Different is the case of big ones, where produced quantities lay around millions and sometimes even billions of bottles, namely situations of higher complexity that require higher degree of attention.

Let's analyse in greater depth and break down the first point mentioned above, meaning the costs of the product, in order to gain a better understanding of the bigger picture. After this, when analysing the demand side of the market, an empirical model for price determination will be presented, based on the dataset that will be used for the hedonic price function.

Analysis of the product's costs

As said, the initial base for the determination of the end price is the initial cost of the product, that may be broken down in the following way:

- Grape costs;
- Direct costs of manufacturing;
- Indirect costs of transformation, administration and go-to-market.

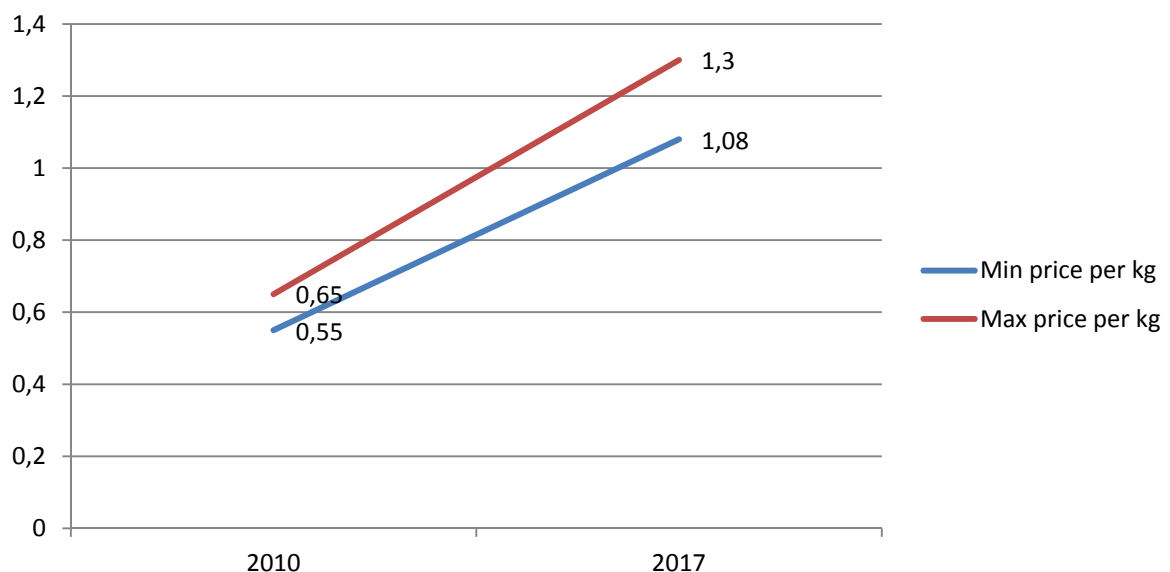
Let's analyse them one by one.

Grape costs

At the end of each year's harvest, the C.C.I.A.A.⁴¹ detects the grapes' price that has been shown through the market, either expressed with a punctual number or within a range.

See in the following graph the cost of 1kg of grape for Barbera d'Alba production during the 2017 harvest compared to the 2010 one:

Graph 7: Min price and Max price for 1 kg of Barbera's grape⁴²



On this yearly updated data, each enterprise determines its end price after having followed different typologies of empirical/scientific calculations, either if the wine is directly produced or bought from third parties.

⁴¹ "Camera di Commercio Industria Artigianato ed Agricoltura"

⁴² C.C.I.A.A. : <http://www.cuneoprezzi.it/ingrosso/ALIMENTARI/index>

These ranges to be taken into consideration naturally variate each year, based on different factors:

- Grape kind, of course;
- Climate conditions, for example during excellent vintages with low production the price increases dramatically;
- Demand conditions, for example the increasing necessity of quality wines through the years.

Grapes then go through the ageing process, where their cost increases by a 1,5 factor, which will remain constant by law until the bottling phase, where they will be distributed in a standard 0,75 l bottle. Just to clarify, if 1 kg of grapes (representing 1L of wine) initially costed 2€, after aging it will have risen to 3€, and in the end standard bottle it will be valorised to 2,25€.

Direct costs of manufacturing

To the cost obtained so far, the account now sums up the manufacturing costs, meaning the cost of subsidiary material: bottles, capsules, caps, labels, and so on. Usually these costs are contained within a range that can vary from 30 cents to 1,25€ (8-25 cents for the cap, 15-41 cents for the bottle, 5-15 cents for the label, 2-10 cents for the capsule).

Keep in mind that these costs may vary, for example in the cases in which the label is commissioned to artists with the aim of producing limited edition bottles. It basically all depends on how the enterprise wants to present its product to the end consumer: higher the image quality, higher the manufacturing costs.

Indirect costs of transformation, administration and go-to-market

These amounts represent the biggest contribution to the end price of the product, and are not trivial to be determined. These costs can be divided in the following way:

- *Aging costs*: depreciation costs during the aging period, as well as barrique and tonneau costs;
- *Direct transformation costs*: labour and electric energy;

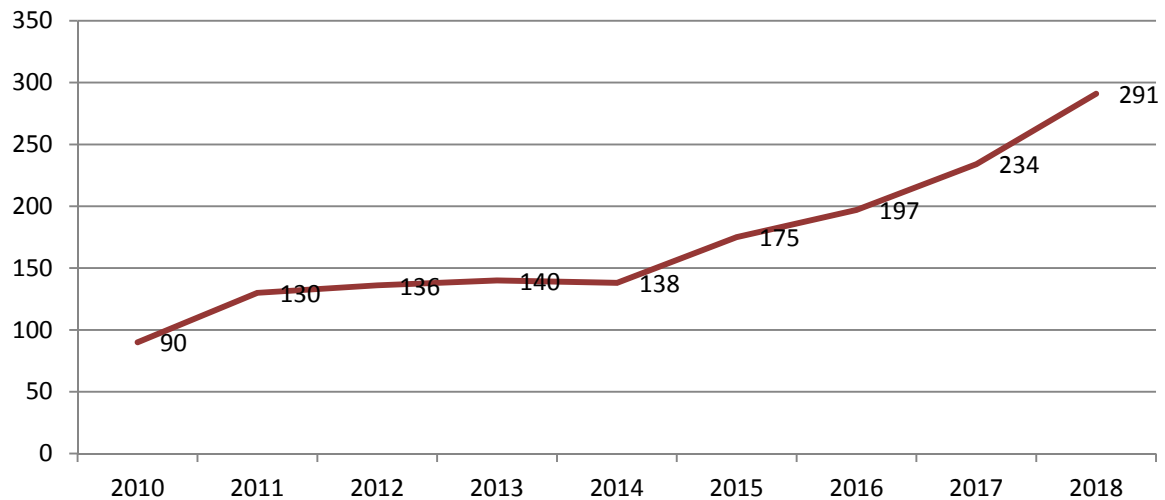
- *Indirect transformation costs*: depreciation costs of machines, filters, barrels, as well as maintenance costs. Just to understand the difficulty in their determination, the range price can vary from few hundreds to multiple millions euros;
- *Direct commercial costs*: agents' provisions (usually 15% of the price), as well as transport costs (usually 5% of the price);
- *Indirect commercial ad administrative costs*: promotional expenses, as well as administrative labour.

The above costs can be assigned to the product in many different ways, using different methods. Following, two of them are the highlighted ones.

In one case, the aim is to determine a k factor by aggregating *all* of these costs and dividing by the total numbers of bottles produced by the company, regardless of the wine typology. This obtained k factor, that could amount to around 0,5€, will be summed to the previous cost obtained (2,25€), deriving in a total initial price of 2,75 € per bottle, on top of which the producer will add the desired margins. This approach is very practical, but entails a problem related to the fact that the k factor will be distributed among all wines, hence to the lower quality ones (for example wines that do not need aging) will be given indirect costs that are too high and vice versa. This method is usually taken into consideration by small medium enterprises, where the minor computational complexity is considered more useful than the rigorous correctness of the method applied.

A second alternative is given by the sole adoption of direct costs: they are the only ones attributed to the product, resulting in a value that, subtracted to the price, will result in a contribution margin given exactly by each bottle. This fairly complex methods is applied by big enterprises that engage a team exclusively for the control of indirect and fixed costs.

On top of this, it all ends up in understanding the evolving demand side of the market, and being able to adapt the calculated prices to it. Following, a graph that shows the average price of Barbera throughout the years. As previously seen, the trend keeps increasing year by year: since 2010, the average price has massively risen up by 230%. (The prices are measured per hectolitre).

Graph 8: Barbera's average price per hectolitre⁴³

An empirical model for price determination: the weight of adopted strategies.

As previously analysed and understood, the final selling price of a bottle of wine depends on many different factors, not only on its initial costs. As mentioned at the beginning, one of them is the demand factor: increasing demand by consumers causes the price to increase as well if the supply is high enough, while if not producers will revise their listing prices not to lose market share.

One very important element that connects demand with supply, even though it's hardly quantifiable in economic terms, is the company's image: for some of the most world famous wines, the price is strongly impacted by the label. It is on these external factors that hedonic price models concentrate: how big is the weight given by fame and reputation?

Let's analyse three strategies proposed by Michael Porter in 1980:⁴⁴

- Cost leadership;
- Cost differentiation;
- Focus on differentiation or on low prices.

⁴³ C.C.I.A.A.

⁴⁴ Porter. (1980). "Competitive Strategy".

See the table below and the advantages that each choice brings:

Table 8: Porter's Competitive Strategy

COMPETITIVE ADVANTAGE			
TARGET	Entire sector	The client perceives uniqueness DIFFERENTIATION	Low prices COST LEADERSHIP
	One particular segment	FOCUS	

Cost leadership:

- Considering low economies of scale during transformation, the contained production costs must rely on three phases to be kept as low as possible: supply of raw material, packaging and access to distribution channels.
- *Constraints:* considering the high bargaining power of buyers, margins are low and hence the enterprise must take actions on high volumes.
- *Products:* the typical product is a common wine, not aged, with low alcoholic gradation.
- *Producers.* Typical producers are the ones of bulk wine. The strategy is defined as *product oriented*.
- *Critical success factors.* A perfect control of production costs is required, through contained end prices and high production phases knowledge.

Cost differentiation:

- In order to reach this kind of differentiation, one must act through a brand communication that entails an image of products with good quality/price relationship.
- *Constraints.* High advertising costs, high branding costs.
- *Products.* Appellation wines with high standards and usually high prices.
- *Producers.* Usually the producers of this category are the ones that already enjoy a high reputation, or the international enterprises that exploit a *market oriented* strategy, which highlights the company brand: both horizontal and vertical differentiation.

- *Critical success factors.* High quality standards of raw material, brand trust by consumers, coherent access to distribution channels.

Focus on differentiation:

- Niche market segment of consumers, limited market share, territorial market target.
- *Constraints.* Disincentives in dimensional growth not to alter flexibility and in order to avoid investments which wouldn't return the required expectations.
- *Producers.* Small scale enterprises that operate on a limited range of products. It's not about marginal enterprises, but about high flexibility and low cost ones, that have made a conscious choice on the niche market
- *Critical success factors.* Cost control, price policy, product differentiation in the respect of competitors.

Focus on costs:

- This strategy is implemented by those enterprises that decide that their competitive advantage is based on a cost leadership on a preselected consumers' segment.
- *Producers.* Small scale enterprises that aim to conquer small market shares not yet occupied by others by imposing competitive prices. This strategy could also be applied big bigger enterprises looking for niche markets.
- *Critical success factors.* High attention to quality, even though maintaining low costs, low economies of scale, small productions. This position is considered as one of the most vulnerable.

Following, a map of strategic groups of producers selected from the sample that will be used in chapter five for the construction of the hedonic price function (A table of the wines taken into consideration for the development of the graph is included as well).

The assumption here is that the useful variables are considered to be the price per bottle (assuming that it entails the producer's willingness to adopt a certain strategy) and the overall produced bottles per year (intended as an index of market coverage).

Graph 9: Producers' adopted strategies

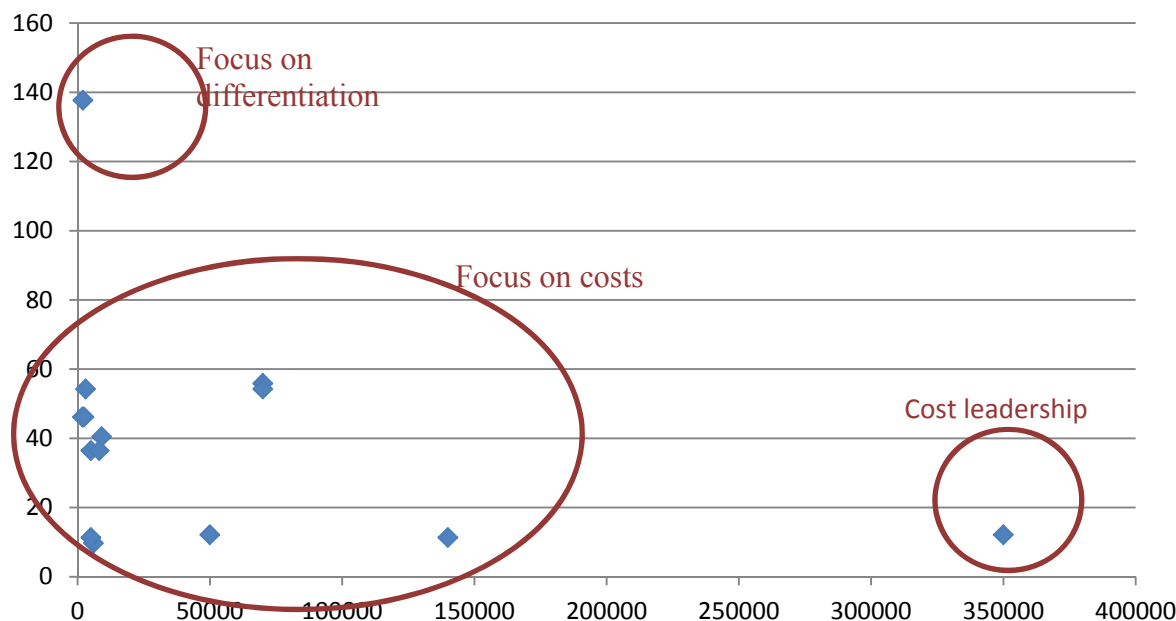


Table 9: Wines taken into consideration for the graph

Name:	Wine:	Price (€):	Bottles produced:
MARCO PORELLO	Barbera d'Alba Filatura 2015	9,72	6000
BRAIDA DI GIACOMO BOLOGNA	Barbera d'Asti Bricco dell'Uccellone 2014	55,89	70000
BRAIDA DI GIACOMO BOLOGNA	Barbera d'Asti Bricco dell'Uccellone 2015	54,27	70000
CASTELLO DEL POGGIO	Barbera d'Asti 2014	11,34	140000
COPPO	Barbera d'Asti Riserva della Famiglia 2009	137,7	2000
DANTE RIVETTI	Barbera d'Alba Alabarda 2009	46,17	1800
FERDINANDO PRINCIPIANO	Barbera d'Alba La Romualda 2014	54,27	3000
GIUSEPPE CORTESE	Barbera d'Alba 2015	11,34	5000
LA SPINETTA	Barbera d'Asti Superiore Bionzo 2013	40,5	9100
MICHELE CHIARLO	Barbera d'Asti Superiore Nizza La Court Vigna Veja 2011	46,17	2400
PICO MACCARIO	Barbera d'Asti Superiore Epico 2014	36,45	5000
PICO MACCARIO	Barbera d'Asti Lavignone 2016	12,15	350000
VIETTI	Barbera d'Asti La Crena 2015	36,45	8200
VILLADORIA	Barbera d'Alba Tardòc 2016	12,15	50000

4.2.5 POSITIONING

Finally, the fourth element of the marketing mix. Following, the elements of the positioning component and their analysis:

- Advertising,
- Promotion,
- Collateral instruments.

Advertising:

Advertising communication has a central information role and persuasion function toward consumers or distributors. It entails multiple and different factors:

- The *actual* communication: it has the function to inform and it may use multiple diffusion forms, both large band instruments (television, radio, newspapers, magazines) and limited band instruments, meaning instruments with limited diffusion.

Only a few bigger players have access to national television though, it's not very common for wine producers to use it as an advertising channel both because of high costs but also because of commercial strategic choices.

Concerning the printed advertising, there are three channels that are broadly used by wine producers: newspapers, magazines and specialized editions. Some producers use them all indistinctly, others prefer to focus on one of them, usually the specialized wine books, guides and magazines (both national and international). These evaluations have a very high impact on consumers' behaviour, as we will see in the following chapter.

- *Mail order*. This is an advertising channel that is not broadly used by wine producers, again, for both economic and strategic reasons. Within the Langa territory, where Barbera is produced, there are only a very few producers that advertise through mail order, and generally are the ones that do not exclusively sell wine, but also other local products such as truffles and cheese.
- *Other forms of advertising*: Medium to big enterprises use these channel for their advertising purposes, such as posters, billboards and commercial material directly in the point of sales.

- *Internet advertising and e-commerce*: even though these themes would need a chapter on their own, what we can say is that it is under everyone's eyes that digital advertising is influencing more and more the behaviour of consumers. Even though grocery online shopping is still not that widespread, especially in Europe, the trend is increasing. In Italy, people are buying wine through online channels more and more: the percentage rose from 9%⁴⁵ in 2016 to 11%⁴⁶ in 2018. Think about the massive success of the e-commerce wine website www.tannico.it, which was born only 5 years ago and has already more than 14000 selling products today and over 1 billion of bottles sold, expanding both in B2B and B2C markets.

Promotion:

Promotion is to be seen as a complementary asset to advertising, as it entails two focused motivations: the motivation to buy by the consumer or by the distributor through premiums and discounts, as well as the motivation to sell by retailer.

Its two main advantages are the following: it's a *temporary* advantage that ends whenever the purchase is completed and it offers a *practical* advantage as well that stimulates the purchases focusing on different factors rather than the product itself.

Collateral instruments:

The collateral instruments are intended as the group of three different factors: public relations, technical propaganda and franchising, out of which the first format is the most useful to wine producers. The public relations sector entails each initiative coherent with the diffusion of the enterprise's popularity, as well as of its brand image. In practice, part of this grouping are mainly fairs (Vinitaly is the biggest example in Italy), interviews releases for magazines and newspapers, articles published for guides and specialized books, university speeches, and so on.

⁴⁵ <http://www.nielsen.com/it/it/insights/reports/2016/connected-commerce.html>

⁴⁶ <http://www.nielsen.com/it/it/press-room/2017/connected-commerce.html>

CHAPTER FIVE – EVALUATION OF AN HEDONIC PRICE FUNCTION

5.1 INTRODUCTION

5.2 THE CHOICE OF VARIABLES

5.3 THE DATA SET

5.4 APPLICATION OF THE UNIQUE MODEL

5.5 CONCLUSIONS

5.1 INTRODUCTION

The empirical studies presented earlier in the third chapter give light to the main problems connected to the creation of a wine's hedonic model. In general, there are two main models that can be used:

- $P=f(O, S)$

This first model is typical of Combris' approach. In this case, the O represents the objective variables (year, alcoholic gradation and so on), while S is a vector that includes sensorial traits (taste, bouquet, colour, and so on)

- $P=f(O, M, Q, Fp, Fw)$

This second typology is typical of Landon and Smith's studies. Q represents the quality characteristics described by specialized guides and magazines (Wine Spectator and Gambero Rosso as an example), Fp represents the enterprise's fame while Fw the one of the wine itself. Lastly, M represents all the variables regarding the production and commercialization methods (number of bottles, year of sale, and so on). The sensorial traits have been left aside in this case.

For this occasion, just like *Benfratello et al.*, we decided to integrate the two models into a unique methodology in order to get to a Barbera's price hedonic function with accuracy and precision.

5.2 THE CHOICE OF VARIABLES

It's common sense to choose the variables *ad hoc* for the typology of wine that is taken into consideration. In our case, some differences must be taken into account between the characteristics of the wines previously analysed and Barbera. First of all, the production is

much more limited, just think at the average 20 million production of Barbera's bottles compared to the 650+ million bottles produced for Bordeaux. A second difference is related to the fact that previous studies usually encompassed more than one wine and delivered a result generally valid for the wine as a *good* in general, while in this case the wine taken into consideration is only one. Lastly, within the 530 Barbera producers there is not a high hierarchy, meaning that their reputation does not really depend on any official classification.

Following, the list of variables used in our case and their explanation.

Table 10: Variables used for the determination of the hedonic price function

Variable	Abbreviation	Description	Source
Price	P	Price to the end consumer	WS
Cellar name	CELLAR	Producer's name on label	WS
Wine name	NAME	Wine's name on label	WS
Year of production	YEAR	Before aging	WS
Year of sale	ISSUE	After aging	WS
Sensorial traits			
Olfactory characteristics	COMP	1 otherwise	WS
		2 if there are olfactory characteristic	
Tannins	TANN	1 otherwise	WS
		2 if there are fine tannins	
Intensity of aroma	IOA	1 discreet aroma	WS
		2 classic	
		3 strong	
Persistence	PERS	1 short finish	WS
		2 medium	
		3 long	
Finesse of aroma	FINESSE	1 otherwise	WS
		2 finesse of aroma	
Body structure	STRUCT	1 otherwise	WS
		2 medium body	
		3 full body	
Harmony	HARM	1 unbalanced	WS
		2 balanced	
		3 well balanced	

Objective variables			
Alcoholic Gradation	ALC		VITAE
Number of bottles produced	NUM_BOTT	# of bottles	VITAE
Appellation of origin	ORIGIN	0 if DOC 1 if DOCG	VITAE
Best year of overall production	BEST_YEAR	1 if 2001, 2004, 2011, 2015	CONSORZIO
Years of aging	AGING	# of aging years	WS
Geographical denomination	DEN	0 Alba 1 Asti 2 Nizza Monferrato	WS
Indication of "Barrique" or "Reserve" on the label	PLUS	0 otherwise 1 if it is Riserva or Barrique,	VITAE
Indication of "Superior" on the label	SUP	0 otherwise 1 if superior	VITAE
Biologic methodology	BIO	0 if conventional 1 otherwise	VITAE
Single wine reputation			
Tannico	ECTANN	0 otherwise 1 if >90/100	TANN
Vitae (AIS)	ECVIT	0 otherwise 1 if >3	VITAE
Maroni	ECMAR	0 otherwise 1 if >82/100	MARONI
Gambero Rosso	ECGAM	0 otherwise 1 if 3bicchieri	GAMBERO
Veronelli Star	ECVER	0 otherwise 1 if >93/100	VERONELLI
Bibenda	ECBIB	0 otherwise 1 if >3	BIBENDA
Espresso	ECESP	0 otherwise 1 if >18/20	ESPRESSO
Wine Spectator	VSPE	0 otherwise 1 if >90/100	WS

Producer's reputation			
Number of stars obtained	FIT	#stelle (each star means that 3bicchieri have been won 10 times)	GAMBERO
Number of reviews	PREST	#of reviews	WS
Number of citations	FAMA	(2007-2017)	WS(top100)& CIV DEL BERE

Price:

Price is the only dependent variable of the model. Its value is expressed in USD and it has not been of easy determination because of different factors. First of all, the difficulty in the decision on which kind of price to be taken into consideration, as of course different choices have been made in previous studies. Mainly, the decision was around the choice to adapt either the price modelled by producers for distributors or the price payed by the end consumer. In this case, the latter one has been taken into consideration. Second, the problem related to the fact that was essential to make sure that all the prices came from one single source, in order to avoid distortions and being sure the numbers were comparable. For this reason, we chose to use the ones listed by Wine Spectator, as the Italian guides were not precise enough nor entirely listed. Following, the website's statement regarding their pricing list: "Almost every wine features a Release Price, which is the suggested retail price upon first release - the price a consumer will typically pay at a retail store or direct from the winery, not taking into account any sale prices or wine club member discounts. It is listed in U.S. dollars. When the suggested retail price is not available, we publish the prevailing wholesale price with a standard mark-up added. If a price has not yet been set, such as for a wine reviewed pre-release or in a barrel tasting, \$NA will be displayed. While wine prices do vary by market and may fluctuate over time, release prices can serve as a useful guide."⁴⁷

Sensorial traits:

This typology of variables in particular is very important because they represent the actual and direct quality of the product itself: taste. Their importance is relevant, but most of all it is important to understand that it's not easy to derive this kind of data in an objective way because wine is a product of which we cannot know the actual quality before its purchase (as

⁴⁷ <http://help.winespectator.com/support/solutions/articles/29593-what-is-the-release-price-included-in-your-wine-reviews->

explained in chapter one), hence special attention was needed. Rosen defines the variables of the generic hedonic model as *objectively measurable*, but the debate on whether or not it is possible to call so this particular typology is still ongoing. Anyway, the critical point has been on understanding that it was fundamental to make sure that the source was reliable and unique. We then chose to rely on Wine Spectator's judgement, once again, because it would have been unique and most of all reliable due to its global reputation within the industry, as well as very careful on both high quality and lower quality wines (Italian guides only rate the best ones, which is not great if we want to gain a complete idea of the big picture). Following their methodology: "Wine Spectator editors review more than 15,000 wines each year in blind tastings, providing scores, tasting notes and drink recommendations. We set stringent standards for ourselves and rely on the proven ability and experience of our editors as tasters and critics. We follow the guidelines below in order to maintain the integrity of our tastings: Tastings take place in our New York and Napa offices. Additional tastings, organized by our staff, take place at independent sites in the wine regions of Europe. All tastings are conducted in private, under controlled conditions. Wines are always tasted blind, in flights organized by grape variety, appellation or region. Bottles are bagged and coded, and corks and caps are removed. Tasters are told only the varietal and/or region of the wine and the vintage. They do not know the name of the winery or price of the wine while tasting. We have developed this tasting methodology through more than 30 years of experiment and experience. We believe it ensures that our tasters remain impartial and that our reviews are unbiased and fair."⁴⁸

After finding all the reliable sommeliers' judgements on each wine, their translation into dummy variables has not been trivial as well. In this case, we chose to use the basics of *textual statistics*, by allocating 1 to the most recurrent words.

- In the case of dichotomous (binary) variables, if the key word was not mentioned, it has been hypothesized that this meant the wine did not possess that specific sensorial trait. This of course must not be intended as a missing sensorial trait always related to the missing explanation of it: if in some few cases it was actually specified, we treated them in the same way of the ones in which it was not specified.
- In the case of polychotomous variables, the hypothesis that has been made is the following: when the sensorial trait was not mentioned, the number in the middle between

⁴⁸ <http://help.winespectator.com/support/solutions/articles/29640-how-does-wine-spectator-taste-and-evaluate-wines-for-its-ratings->

the other two was assigned.

Following, the examined characteristics, inspired by the classification grid used by the AIS sommeliers:

- COMP: Dichotomous variable that represents the presence of olfactory characteristic.
- TANN: Dichotomous variable that represents the presence of *fine* tannins.
- IOA: Polychotomous variable that describes the complexity and the intensity of the aroma between discreet, classic and strong, focusing on the presence of distinctive floral and spicy traits.
- PERS: Polychotomous variable that reports the persistence of the wine's aromas in its finish, divided between short, medium and long.
- FINESSE: Dichotomous variable that represents the sensitivity and the delicacy of the aroma.
- STRUCT: Polychotomous variable that entails the structure of the wine's body, divided between low, medium and full.
- HARM: Polychotomous variable that expresses wine's structure as well as its balance and harmony between its components.

Objective variables:

The objective variables concern the main characteristics that are also written on the wine's label. They are called so because it has been fairly easy to find access to their value without serious doubts of committing errors. Being in trust of the fact that what was written in the used sources was true, in this case it has not been as important to make sure that the final data set derived from one single source, even though the starting point has always been that AIS guide, Vitae 2018. The explanation of each of them is trivial hence left to the reader by going back to the previous table in which they are all listed.

Single wine reputation:

By looking at the specialized guides and magazine's success, it is evident how consumers highly rate their judgement on the single wine reputation, being it objective or not (as previously discussed). Within our study field, we decided to include all the ratings of the most well-known Italian wine guides, plus the one of Wine Spectator, that is already known by the

reader as one of the most well know global wine magazines, very important to be taken into consideration also in order to add an international perspective.

Before the actual examination of each of them, we initially thought it would have been interesting to analyse the *correlation* indexes between them. The reason why we then decided not to analyse it is due to the fact that during the construction of the database, for each book the *missing* rates have erroneously been associated to the *non-excellence* rates (both coded as 0). For this reason the values in the table were too low and actually not comparable to reality.

Even if it's not proved at this point, still the impression while working on the data is that the rates were actually very broad and diverse, even though ideally it shouldn't be so (what the rates in the book describe should be as objective as possible). The authors, on the other side, believe and have no problem in disclosing that this great diversity is given by the fact that the Sommeliers that rate the wines have very different subjective taste, which is subjective by definition, even though Robert Parker specifies that a scientific approach to it is actually possible. As if the fact that we are relying on rates that are officially declared as subjective wasn't enough, this uncomfortable result leads to different thoughts as well, even though the real and in depth answer to this (un proven in this thesis) low correlation is not trivial and out of our scope. Due to the fact that, as we will see, reputation influences so much the end price and hence is of a great matter to the producers, are the guide's rates really objective? In other words, are the intermediaries taking some sort of advantage because of their importance in the market trends? Wine guides should probably not be used as a source to assess the quality of the wine itself, even though the regression will show very different results.

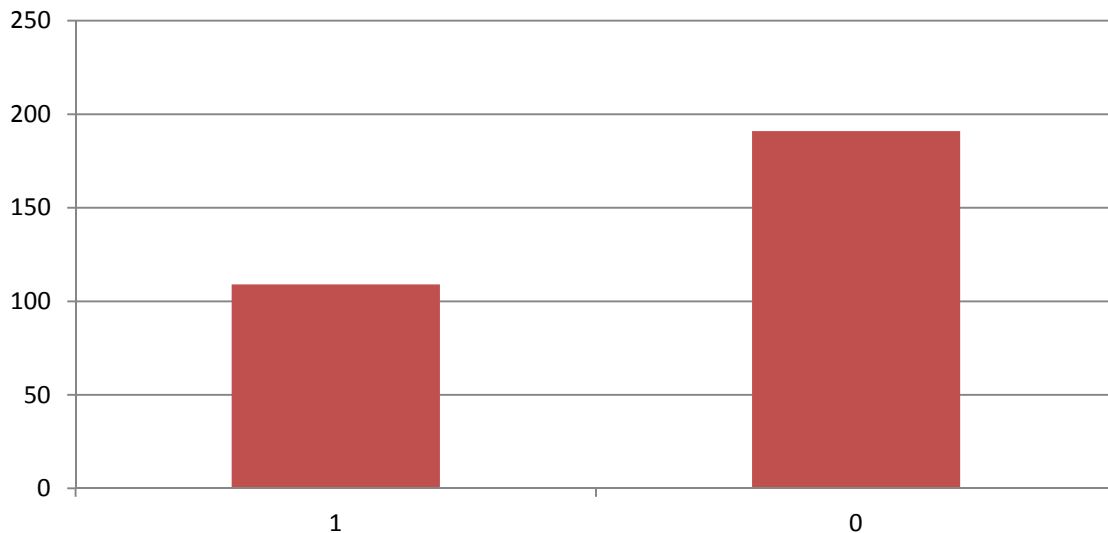
We can now proceed with the description of each single variable, together with the *excellence* threshold used for the transformation into dichotomy:

- ECTANN: 1 if the wine obtained a rating >90/100 on the wine e-commerce website, Tannico.it
- ECVIT: 1 if the wine obtained a rating >3 on Vitae, the guide written by AIS (Associazione Italiana Sommelier)
- ECMAR: 1 if the wine obtained a rating >82/100 on Maroni's Guide
- ECGAM: 1 if the wine obtained the "3 Bicchieri" rating on Gambero Rosso
- ECVER: 1 if the wine obtained a rating >93/100 on Veronelli's guide

- ECBIB: 1 if the wine obtained a rating >3 on Bibenda
- ECESP: 1 if the wine obtained a rating $>18/20$ on Espresso's guide by Alessandro Masnaghetti
- VSPE: 1 if the wine obtained a rating $>90/100$ on Wine Spectator

The above numbers that present the line between excellence and non-excellence are different for each guide as they are the thresholds decided by each author, above which the wine can be considered as an excellent one. Following, an average of responses rated as excellence between all the guides regarding Barbera wine, based on the number of times that a wine in the data set has been rated with 1 in the case of single wine reputation variables:

Table 11: Average Response of excellence between wine guides and WS



Producer's reputation:

This last category of variables is not directly connected to the good itself, rather to the reputation of its producer, independently of what is the result of his work. As it's known, the brand of the enterprise represents an *expected quality* of the product and has direct influence on the final price to end consumers.

A producer's *fame* is never easy to assess, and especially in this case because there isn't any sort of historical fame classification, nor modern judgements by reviewers of global fame. We then decide to introduce three different variables within this category:

- FIT: it counts the number of *stars* that each producer has (each star means that the "Tre bicchieri" award has been won 10 times). This variable reflects the total number of "Tre

Bicchieri” awarded by Gambero Rosso’s reviews, given to each producer irrespectively of the kind of wine produced.

- PREST: this variables expresses the number of grades given by WS to the producer’s wines throughout his whole career. The hypothesis in this case is that the international fame is strictly proportional to this number.
- FAMA: this is a dummy variable that takes the 1 value if one of the following is true :
 - ✓ At least one of the wines produced by the enterprise has been rated as in the world’s *top 100* Wine Spectator list at least once in the past 10 years (2007-2017).⁴⁹
 - ✓ At least one of the wines produced by the enterprise has been rated as *excellence* within at least three of the main Italian wine guide books.⁵⁰

⁴⁹ <http://top100.winespectator.com/>

⁵⁰ Civiltà del bere. (2018). "*Delle guide vini 2018 – Il top*".

5.3 THE DATA SET

The data set that has been constructed for this analysis is made of 300 wines and 133 different producers, from 2015 to 2017.⁵¹

In the following table, descriptive statistics of the considered variables. In particular, for continuous variable we reported their mean and standard deviation, while for discontinuous variables we decided to report their percentage frequency with which each value takes place.

Table 12: Descriptive Statistics of the used data set

Variable	Mean	σ	%=0	%=1	%=2	%=3	Min	Max
price_usd	28,70	15,41673	-	-	-	-	12	170
complexity	-	-	-	82,67%	17,33%	-	1	2
intensity of aroma	-	-	-	72,67%	22,67%	4,67%	1	3
persistence	-	-	-	36,33%	43,00%	20,67%	1	3
finesse	-	-	-	91,00%	9,00%	91,00%	1	2
structure	-	-	-	93,33%	4,33%	2,33%	1	3
alc	14,19	0,55573	-	-	-	-	12,5	16
(num_bott)/10000	2,35	4,57774	-	-	-	-	0,14	35
best_year	-	-	46,33%	53,67%	-	-	0	1
aging	2,68	1,05259	-	-	-	-	1	8
plus	-	-	98,33%	1,67%	-	-	0	1
ectann	-	-	96,00%	4,00%	-	-	0	1
ecvit	-	-	94,33%	5,67%	-	-	0	1
ecgam	-	-	96,67%	3,33%	-	-	0	1
ecver	-	-	97,67%	2,33%	-	-	0	1
ecbib	-	-	63,67%	36,33%	-	-	0	1
vspe	-	-	69,33%	30,67%	-	-	0	1
fit	0,38	0,6022	-	-	-	-	0	3

We will present two different kinds of regressions: the ones in which have been taken in consideration all the variables in each single group (one group at the time), and then the final regression, the so called *unique model*, where only the chosen variables have been taken into account, regardless from the provenience group. It is in fact very important to note that not all the variables of the initial data set have been used in the final regression of the model. The reason why, previous to the construction of the unique model that we will analyse in the

⁵¹ The technique used to extract relevant data (WS in our case) from the internet is called *scraping*, and it has been possible through the use of the following software: *Octoparse*.

following paragraph, we constructed a single regression for each group of variables, is due to the fact that in this way it has been possible to understand which ones were more significant in their own group. The selection has been made by extracting only the variables that were significant by 15% in their typology (objective, sensorial traits or reputational), meaning that their p value was not higher than 15%. Following, the regressions of all the original variables per group for a better understanding of the big picture.

For an easier understanding, note that the variables that will have *** next to their coefficient are significant by 1%, while the variables that have ** next to their coefficient are significant by 5% and lastly the variables that have * next to their coefficient are significant by 10%.

Regarding the *sensorial* traits, by looking at the following table 14, the first thing that comes to mind is the fact that a high average of variables impacts significantly the dependent variable. This probably means that if these were the only variables that a consumer was forced to rely on when determining the quality of a wine, then she would probably slowly become more aware in the recognition of this group of variables, resulting in a higher significant impact on the end price.

For obvious reasons, this is not possible, to the point that as we will see in the following paragraph the sensorial traits are actually less significant when compared to the all the others that are easier to determine and to rely on to the eyes of the average consumer.

In general, the impact of the sensorial traits (taken in consideration in their own group) is negative. This is probably due to the fact that Barbera is still today seen as an *easy* wine, and for this reason the complexity of its taste and aroma is not appreciated. This result is in fact unique if compared to the one of different wines, for which the sensorial traits actually still have a low impact in significance but at least with a positive trend.

This is of course a personal hypothesis. What is sure though is that the significance of the negative sensorial traits decreases when taken into consideration with the other variables as well in the unique model. This means that when these variables are considered on their own, there are other omitted ones that distort the coefficients, so the results must not be taken into account with absolute certainty of the numbers showed in the table.

Table 13: Regression of the "Sensorial Traits" variables

VARIABLES	(1) logp	(2) logp
complexity	-0.172** (0.083)	-0.172** (0.083)
tannins	0.025 (0.057)	0.025 (0.057)
int_of_aroma	0.288*** (0.062)	0.288*** (0.068)
persistence	0.070** (0.032)	0.070** (0.033)
finesse	-0.308*** (0.099)	-0.308*** (0.087)
structure	-0.103** (0.067)	-0.103** (0.046)
harmony	0.013 (0.057)	0.013 (0.048)
Constant	3.355*** (0.178)	3.355*** (0.150)
Observations	300	300
R-squared	0.107	0.107

Homoschedasticity standard errors in parentheses of column (1).

Heteroschedasticity robust standard errors in parentheses of column (2).

*** p<0.01, ** p<0.05, * p<0.1

Regarding the *objective* variables, please see from the following table 15 that their significance is equally impactful, and in opposition to the sensorial traits their sign will actually remain so even in the unique model. What is interesting to note is that the fact that their impact on the price is high (even though not comparable to the reputation traits), and this is most probably related to the fact that these variables are *easy to read* even for the average consumer that we have been analysing: these variables are usually written on the label, or at least, by definition, objective and easy to assess. As an example, most consumers know (or think) that the number of aging years for a wine, especially if in barrique, is a synonym of quality, and for this reason it results in a higher willingness to pay. Same thing for the number of bottles produced: the less the final quantity, the higher the elite and the higher the attention dedicated to the bottle, and for this reason the higher the perception of quality.

Table 14: Regression of the "Objective" variables

VARIABLES	(1) logp	(2) logp
alc	0.253*** (0.037)	0.253*** (0.039)
num_bott_2	-0.008** (0.005)	-0.008** (0.004)
origin	0.065 (0.095)	0.065 (0.079)
best_year	-0.065 (0.048)	-0.065 (0.052)
aging	0.143*** (0.024)	0.143*** (0.023)
den	0.017 (0.077)	0.017 (0.058)
plus	0.320** (0.161)	0.320** (0.204)
sup	-0.059 (0.050)	-0.059 (0.048)
bio	-0.015 (0.044)	-0.015 (0.042)
Constant	-0.671 (0.524)	-0.671 (0.569)
Observations	300	300
R-squared	0.354	0.354

Homoschedasticity standard errors in parentheses of column (1).

Heteroschedasticity robust standard errors in parentheses of column (2).

*** p<0.01, ** p<0.05, * p<0.1

Regarding the *reputation of the wine* itself and the *reputation of the producer*, the comments rely on the following Tables 16 and 17. There is no doubt on the fact that the overall significance of these variables is elevated. This means that the importance given to the rates of the guides is enormous, which is good because it's the easiest way that the consumer has to increase her awareness of the topic, but on the other side some doubts naturally arise: how objective are the tastings carried out by the sommeliers? As previously analysed, the correlation of the rates between different books is probably very low, which is worrying, even though the authors are the first one stating that according a bit of subjectivity is obvious and not problematic. Even if this was true, what is really worrying is the intrinsic fact itself: due to the fact that reputation traits are so important, how objective is the role that these intermediaries have? Is there some sort of relationship between them and the producers?

Table 15: Regression of the "Wine's Reputation" variables

VARIABLES	(1) logp	(2) logp
ectann	0.373*** (0.107)	0.373*** (0.136)
ecvit	0.235*** (0.075)	0.235** (0.135)
ecmar	0.019 (0.057)	0.019 (0.058)
ecgam	0.409*** (0.124)	0.409*** (0.105)
ecver	0.634*** (0.145)	0.634*** (0.144)
ecbib	0.138*** (0.044)	0.138*** (0.044)
ecesp	0.062 (0.115)	0.062 (0.156)
vspe	0.177*** (0.045)	0.177*** (0.049)
Constant	3.091*** (0.030)	3.091*** (0.028)
Observations	300	300
R-squared	0.304	0.304

Homoschedasticity standard errors in parentheses of column (1).
Heteroschedasticity robust standard errors in parentheses of column (2).
*** p<0.01, ** p<0.05, * p<0.1

Table 16: Regression of the "Producer's reputation" variables

VARIABLES	(1) logp	(2) logp
fit	0.237*** (0.042)	0.237*** (0.042)
prest	0.00027 (0.00042)	0.00027 (0.00045)
fama	-0.011 (0.067)	-0.011 (0.070)
Constant	3.152*** (0.034)	3.152*** (0.033)
Observations	300	300
R-squared	0.126	0.126

Homoschedasticity standard errors in parentheses of column (1).
Heteroschedasticity robust standard errors in parentheses of column (2).
*** p<0.01, ** p<0.05, * p<0.1

These questions arise naturally but it's very difficult to have a scientific answer to them as data is missing. Anyway, as previously announced, in the following paragraph we will analyse the application of the considered (significant) variables in the unique and final model.

5.4 APPLICATION OF THE UNIQUE MODEL

As announced, the end goal of this section is the estimation of the final hedonic price function. Before that, a brief explanation on how the regression is constructed, for which it has been used the *Ordinary Least Squares* method (OLS)⁵²:

The regression, by having used a log-linear model, will take the following format:

$$\ln Y_i = \alpha + \bar{\beta} \ln \bar{X}_i + \bar{\gamma} \bar{D}_i + \eta_i \quad i=1, \dots, n$$

Y is the dependent variable, so in this case the end price to the consumer, α is a constant, $\bar{\beta}$ and $\bar{\gamma}$ are the parameter's vectors to be esteemed, \bar{X}_i is the vector of continuous⁵³ regressor, \bar{D}_i is the vector of the dummies⁵⁴ in the function, η is the error term and n is the total number of observations.

It is now useful to open a small parenthesis on the correct interpretation of the coefficients that will result from the regression. In the case of a continuous variable X_i , the coefficient β_k associated to it is given by the following equation:

$$\beta_k = \frac{\partial \ln Y}{\partial \ln X_k} = \frac{X_k}{Y} \cdot \frac{\partial Y}{\partial X_k} = \varepsilon_{YX_k}$$

We can now see that the β_k parameter actually measures the constant elasticity of Y with respect to the k^{th} characteristic. It's very important to keep this in mind and to know that for this reason the β_k parameter can be read as the percentage variation on Y due to a percentage increase of X_k .

On the opposite side, dummy variables are considered under a discreet modality that can be dichotomous or polychotomous, meaning that the derivative actually doesn't exist. For this

⁵² Software used for the regression: Stata14

⁵³ Meaning alc, (num_bott)/10000, aging and fit

⁵⁴ Meaning complexity, intensity of aroma, persistence, finesse, structure, best_year, plus, ectann, ecvit, ecgam, ecver, ecbib and vspe

reason, the coefficient of a dummy variable measures the discontinuous effect on Y by the presence of the factor represented by the variable. Even though we will not enter into greater detail, the percentage impact on Y given by the dummy is given by the following:

$$\phi = [\exp(\gamma) - 1] * 100$$

As already discussed, there have been two main methods taken into consideration as hedonic price model, the one applied by *Combris et al.*, and the one applied by *Landon and Smith*. In the following, we will follow an integrated approach between the two. Just to recall, the model developed by *Combris et al.* puts in relation the price of a bottle with the sensorial traits of the wine, while the experts judgments are excluded for two main reasons: first of all they do not represent intrinsic characteristics of the wine and second of all they are not considered as independent. The results are related to the fact that the sensorial traits that determine its quality do not have relevant effect on the price, exception made for the variables that are of easier identification by the consumer. On the other side, the second reference model is given by the one applied by *Landon and Smith*, who does not take into consideration the sensorial traits of the wine, while their interest is based on the fame that both the wine and the producers have, hence taking into consideration the judgements of experts and guides. The results on the wine's price are pretty impressive, even though with different intensities.

Our integrated model takes into consideration both sensorial traits and fame characteristics, hence the hedonic price equation is expressed in the following way:

$$P = f(O, S, Q, F_p, F_w),$$

where O represents the objective characteristics, S the sensorial traits, Q the quality characteristics described by specialized guides and magazines, F_p the producer's reputation and F_w the wine's reputation.

The final function includes 17 variables, represented in the following table. R^2 is 0.531, while \bar{R}^2 (the corrected coefficient) is 0.505, so overall the results are satisfying.

Table 14: Results of the hedonic price function: unique model

		(1)	(2)
VARIABLES		logp	logp
Sensorial traits	complexity	-0.041 (0.064)	-0.041 (0.058)
	int_of_aroma	0.138*** (0.050)	0.138** (0.055)
	persistence	-0.005 (0.024)	-0.005 (0.022)
	finesse	-0.104 (0.077)	-0.104 (0.074)
	structure	-0.069 (0.051)	-0.069 (0.043)
Objective characteristics	alc	0.120*** (0.035)	0.120*** (0.040)
	(num_bott)/10000	-0.008** (0.004)	-0.008** (0.003)
	aging	0.134*** (0.017)	0.134*** (0.014)
	plus	0.167 (0.143)	0.167 (0.152)

		(1)	(2)
VARIABLES		logp	logp
Wine reputation	ectann	0.245*** (0.090)	0.245* (0.130)
	ecvit	0.132** (0.064)	0.132 (0.098)
	ecgam	0.211* (0.108)	0.211** (0.082)
	ecver	0.295** (0.129)	0.295** (0.117)
	ecbib	0.108*** (0.039)	0.108** (0.042)
	vspe	0.080** (0.041)	0.080** (0.039)
Producer's reputation	fit	0.151*** (0.031)	0.151*** (0.034)
	Constant	1.118** (0.511)	1.118** (0.552)
	Observations	300	300
	R-squared	0.531	0.531

Homoschedasticity standard errors in parentheses of column (1).
Heteroschedasticity robust standard errors in parentheses of
column (2).

*** p<0.01, ** p<0.05, * p<0.1

As we have already seen, the variables that have *** next to their coefficient are significant by 1%, while the variables that have ** next to their coefficient are significant by 5% and lastly the variables that have * next to their coefficient are significant by 10%. The differences between the homoschedasticity standard errors and the heteroschedasticity robust standard errors has never been significant and for this reason its analysis is not relevant.

The variables that are significant by 1% (following the homoschedasticity standard errors column) are the alcoholic gradation, the number of aging years, the votes given by Tannico and Bibenda and lastly the fame variable fit (representing the producer's reputation).

Overall, unlike the previous situation in which they have been taken in consideration by themselves, the sensorial traits do not have a big significant impact on the price, which is kind of disappointing as in a world in which everyone is aware of the sensorial traits (meaning when they are considered on their own), then these are absolutely impactful. The only significant and positive sensorial trait of the function is given by the intensity of aroma (meaning the variable that divides the wine's aroma between discreet, classic and strong), with an overall impact of +13% on the price. Probably this is given by the fact that the aroma is an easier trait to assess and understand by the average consumer, while for the correct understanding of the others a much greater expertise is required. On the contrary in fact, the other sensorial traits (complexity, persistence, finesse and structure) do not have a significant impact on the price. This enigmatic result is not at all of easy understanding, but it could be given by the fact that Barbera is still seen as a very *easy* and *day to day* wine (even though its international fame has increased quite a lot in the last decade), and for this reason its complexity is seen as something that is in contrast with how consumers like to look at it, resulting in a decreasing willingness to pay.

As expected, objective variables have a significant impact on the price even when in the context of the overall picture that takes into consideration all the groups of different variables. For example, the alcoholic gradation still impacts significantly with a +12.3% increase on the final price, while the total number of bottles produced still has a small negative impact on the price, probably meaning that a smaller yearly production is connected to greater attention to each bottle, and for this reason greater quality results are perceived by the average consumer. Lastly, the variable representing the number of aging years of the wine has a big +12% impact on the price, probably because it is at the same time a variable that can be easily assessed by the consumer and as well a variable that is usually connected to high standard wines.

At the very beginning of the construction of the data set, we thought that there would have been a correlation between the price and the year in which the grapes have been harvested, due to the fact that climate changes result in best and worst vintages. This is something that happens for wines like Barolo and Barbaresco, to the point that there is an official list carried out by the C.C.I.A.A. that each year rates the quality of the vintage. Although this is very important for some wines, the results show that this is not true for Barbera, so this probably means that its overall quality is kept constant throughout the years. Also, this is probably related to the fact that there is not such a list for Barbera's grapes, and for this reason the average consumer may not even take this factor into consideration when judging the final quality of the wine.

On the third side of the function, both wine's reputation traits and producer's reputation traits result in the biggest and overall highly significant impact of the whole function. As an example, the variable *fit* (who relates to the fame of the producer regardless from the typologies of wines sold) results in an overall massive +14.6% increase in the price, as well as the variable *ecbib* (that represents the vote expressed by Bibenda) impacts on the average consumer's willingness to pay with a +12% increase on the price. The results are clear: the variables in the reputation group are the most effective factors of all.

5.5 CONCLUSIONS

Based on the obtained results we can now draw the following conclusions in reference to the considered variables.

Let's firstly analyse the sensorial traits. We can confirm what others have studied previously: if wine's quality is measured in terms of direct observations of the sensorial characteristics, then only the intensity of aroma, which represent the most recognizable trait, is recognized as a variable that significantly and positively influences the price. The other considered sensorial traits do not have a significant impact on the price, as we said, most probably because of how the consumers see the wine as a day to day product rather than a very sophisticated one. Anyway, what we can say with certainty is that the only variable that really is significant on the price trend, hence the only sensorial trait that really matters to end consumers is the intensity of a wine's aroma.

Moving to objective characteristics, the situation changes. Their overall variation has a much more significant change in the price, being led by the alcoholic gradation and the aging (both

resulting in around +12% increase on the price). Of great interest also the +19% increase on the price if the wine is labelled with *reserve* or *barrigue* terms. Lastly, a small comment on the biological productions. Even though the variable *bio* (as mentioned, it took into consideration the production of biologic wines and vineyards) has been taken into consideration during the construction of the data set, it has then been deleted by the model because its influence on the end price was not significant enough during the regression of objective characteristics.

But if quality is intrinsically represented by sensorial traits, and it should at the same time be the one influencing the price, then how can we explain this major difference between the results of the sensorial traits compared to the others? Lévy Garboua⁵⁵ writes that “when in presence of *asymmetry of information*, the rational consumers gather data regarding a characteristic only if the total marginal cost to gain access to this information is less than the overall marginal utility generated by it”. Being it costly both in terms of time, money, and competency acquisition, the general wine consumer is hence not interested in gathering that much information on the actual quality of the wine represented by sensorial traits, because this would mean deep diving in the world of tasting, book reading and wine courses, which is not something that each wine consumer is interested in. The average consumer generally decides to attribute its willingness to pay choice based on objective characteristics that can be read on the label and on reputational traits that either the wine or its producer hold. Anyway, even if such a difference actually does exist, this doesn't mean that there necessarily is a contradiction between these two groups of variables.

Lastly, wine's and producer's reputation significantly effects the price as well, and actually with even greater influence. As we have seen, the guides (who are related to the reputation of the wine itself) result in the higher overall impact on the price: +23% for *Tannico's* evaluation, +13% in the case of an excellence given by the *Associazione Italiana Sommelier*, +21% on the price for an excellence of *Gambero Rosso*, nearly +30% by *Veronelli's* excellence, +21% of the most significant variable of *Bibenda's* evaluation and +8% of *Wine Spectator's* excellence. Lastly, but not by importance, also the variable *fit* that describes the producer's reputation, is significant by 1% and has an overall increase on the price by nearly 15%, measured by the number of red stars that a producer has on the *Gambero Rosso* guide

⁵⁵ Garboua, L. (1976). "La nouvelle théorie du consommateur et la formation de choix". *Consommation*, 628-647.

(just as a reminder, each star means that the “3 Bicchieri” award has been won 10 times by the producers by one of her produced wines). As it has been verified, the guides cover a first class role as communication tools. For this reason producers highly invest on them: succeeding in having an excellence on one of the guides means having a product that undiscussed in quality terms. This may be intended as their choice to reflect the market, admitting that the sale of each wine is an objective measure of the different consumers' taste, divided into different market segments.

In conclusion, a single producer that enjoys of a high fame on its wines, can think of increasing the price because of the increased willingness to pay that the fame entails, resulting in a *price premium*. This said, if on one side the empirical analysis realizes the possibility to reach to the variables for which a certain wine will benefit from the *price premium*, on the other side is still very difficult to understand the exact interactions between demand and supply that each characteristic implies.

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