Empirical Evidence of Factors Affecting Fine Wine Prices Using Hedonic Price Model

The Case of Spain, France and Italy

by

Carlos Cousido Cores

A Thesis Submitted to the Faculty of the

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

In the Graduate College

The University of Arizona

2017

STATEMENT BY AUTHOR

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at the University of Arizona.

Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgement of source is made. Requests for permissions for extended quotation form or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his or her judgement the proposed use of the material is in the interest of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: _____

APPROVAL BY THESIS DIRECTOR

This Thesis has been approved on the dates shown below

_____ 5-10-17

Professors Name Date

ACKNOWLEDGEMENTS

I would like to express my gratitude to my advisor Dr. Gary Thompson for his guidance in my thesis. Besides my advisor, I would like to thank the rest of my thesis committee: Dr. Paul Wilson and Dr. Satheesh Aradhyula for their insightful comments.

Also, I am very grateful for my mother, brother and father, always loving, supporting and encouraging me through every step of my life. I am very thankful for my grandmother and grandfather; their unconditional love will always be with me. Finally, I cannot forget Tara, her motivation, knowledge and love guide me in my life.

Table of Contents

List of Figures

List of Tables

Abstract

This study focuses on a hedonic wine price analysis in three different countries: Spain, France and Italy due to their relevant economic and production impact on the wine sector. After the analysis of empirical evidence, we decided to consider extra factors that have not yet been contemplated by the literature and that might impact the overall price of wine such as the source of the data, the consumers' wine rate and the food that might have a good blend with a particular wine style.

To perform a statistical analysis, the data was collected from Wine-Searcher.com using the free version and the model used in this research considers the variables "experts and consumers rating", "wine vintage", "origin and appellation", "color", "grape/blend" and "food suggestion".

Results showed that the factors origin, appellation, grape/blend, color and experts' opinion are important features for price determination. In France and in Italy, consumers online review also play a role affecting wine prices. Another important result is the positive effect of wine bottle prices when purchased to be paired with certain food.

1 Introduction

1.1 Rationale for the study

Ranging between a couple to over thousands of dollars, the price spread between different bottles of wine can sometimes take enormous proportions. The legitimate question ensuing from that observation is thus: what factors influence the price of a bottle of wine?

Current literature analyzes both the importance of subjective and objective characteristics as well as attributes affecting wine prices by considering factors such as grape variety, vintage, region and producer size. However, to our knowledge, none of the published literature has taken into consideration a factor that is almost always present when dealing with wine. Indeed, just like in the culinary world with food-critics, the wine world has its oenophile and consumers' reviewers who post their ratings. We can easily imagine how a high-rated wine may see its overall price positively affected. Along the same lines, scholars have not looked at recommendations of specific wine types to accompany certain types of food.

1.2 Purpose of the study

This research performs a hedonic wine price analysis over three European countries: Spain, France and Italy to be able to determine the factors that influence wine prices. The choice of this reduced number of countries of study was motivated by the overall impact that these countries have on the wine sector from a consumer and production point of view. To be able to determine the factors that may have an influence on the wine price, we collected the data from the website Wine-Searcher.com considering the variables experts and consumers rating, wine vintage, origin and appellation, color, grape/blend and food suggestion. We expected to uncover similar findings as the published literature, where origin, appellation, grape/blend, color and experts' opinion are important factors that impact wine prices. An innovation in this study compared to the other ones is the

inclusion of the consumers' ratings of a bottle of wine. Findings will show that this factor does influence the overall price of a bottle (especially "excellently" rated wines). Another novelty provided by this study includes the food recommendation made when paired with certain types of wine. Results will show how this factor positively affects wine bottle prices.

1.3 Research questions

In attempting to investigate factors which may account for wine prices, this study thus raises two interrelated questions:

1. What factors influence, positively or negatively, wine prices in Spain, France and Italy?
2. Do these influencing factors similar in all three countries?

The remainder of this thesis is organized as follows. The first chapter will provide a relevant analysis of the wine sector in the three countries chosen. Chapter 2 then examines the literature to get a better perspective of past studies concerning wines prices. Chapter 3 will open with a methodology of our study followed by the statistical results of the analyzed data in chapter 4. Finally, chapter 5 will provide the reader with the conclusion, implication and the limitations of our study.

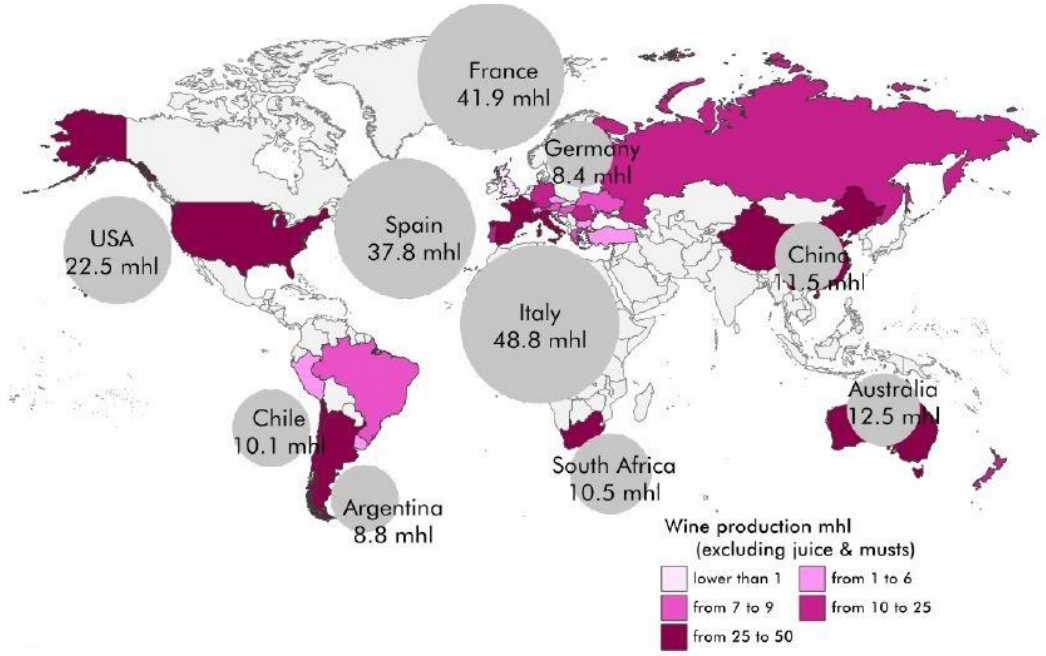
2 Wine Sector

2.1 Overview of the Worldwide Wine Production

2.1.1 Wine Production

According to International Organization of Wine and Vine (OIV), the wine production of 2016 was one of the lowest of the past two decades, reaching 259 million hectoliters (mhl), almost 15 mhl less compared with the production of the previous year. OIV reported that climate change and natural climate variability are having severe consequences on wine production. The decline severely affected countries such as Argentina and Chile, with a drop of 35% and 21% respectively. Italy is leading wine production with a total amount of 48.8 mhl for 2016, followed by France with 41.9 mhl and Spain 37.8 mhl. Then USA, Australia and China, respectively complete the top 6 countries in wine production. Figure 1 shows the total wine production including sparkling and special wines but omitting juice and musts:

Figure 1: World Wine Production 2016

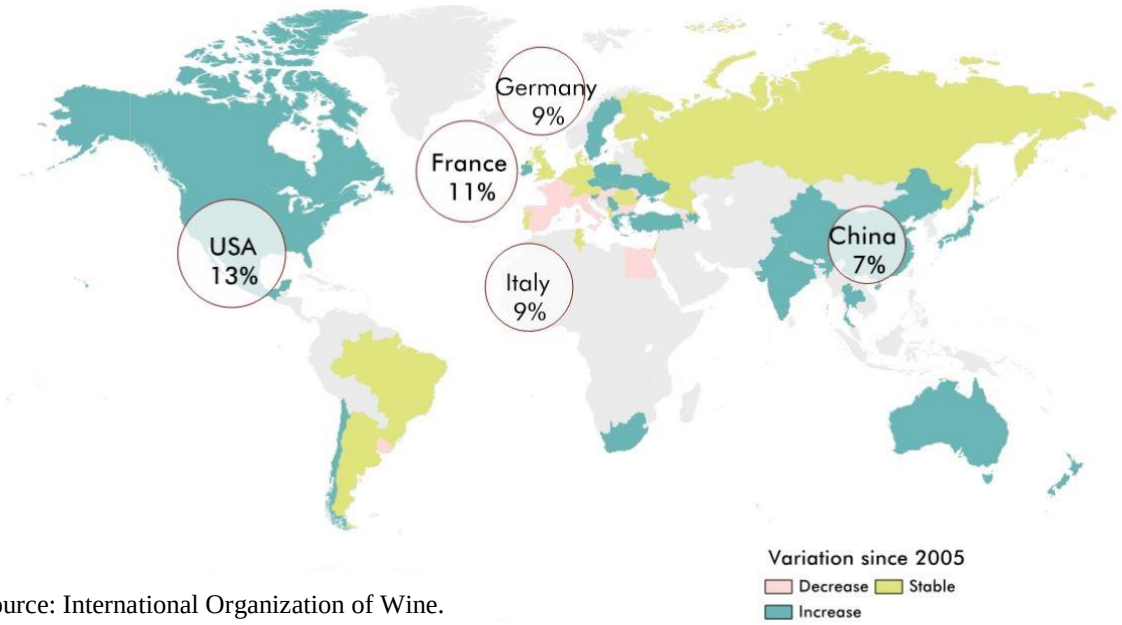


Source: International Organization of Wine.

2.1.2 Wine Consumption

Global wine consumption in 2015 was 239 million hectoliters. Since 2000, wine consumption was increasing until reaching the ceiling at 250 million hectoliters in 2007 and 2008, the beginning of the economic and financial crisis. Since then, wine consumption has declined but it seems to be established overall at around 240 million hectoliters according to OIV. The pattern of wine consumption has changed in recent years where countries in southern Europe have decreased their wine consumption. Also, there is an increase of wine consumption outside of the country where it was produced. France was the leader in wine consumption until 2011 and since then United States is the top country in wine consumption. Figure 2 presents the world wine consumption for 2015:

Figure 2: World Wine Consumption 2015



Source: International Organization of Wine.

2.1.3 Wine Grape Planting

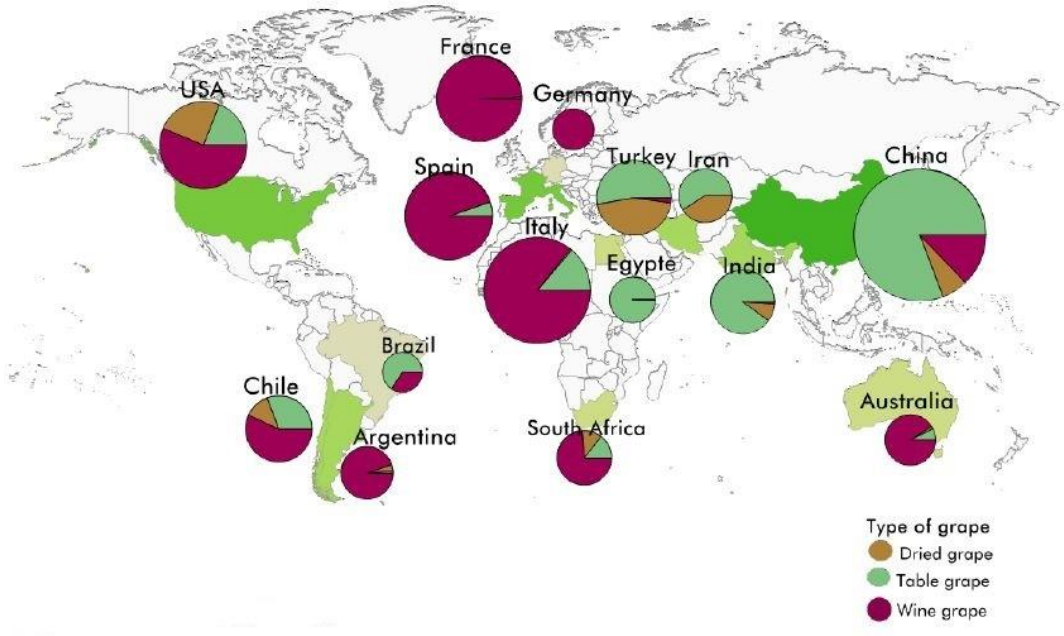
According to OIV, the total wine world planted area in 2015 was 7.5 million hectares, a modest growth of 28 thousand hectares from 2014. It is important to mention that world wine planted area includes the areas whether or not they are in actual production or the wine is harvested. However, world wine planted area since 2000 has been declining principally based on the reduction of European vineyards and also in countries such as

Iran and Turkey. Additionally, 50% of the world wine grape hectares is controlled by only 5 countries: Spain as the main leader with 14%, China 11%, France 10%, Italy 9% and Turkey with 7%. In the past years, China has been strongly increasing wine planted area to reach second country with the largest number of hectares. It is worth mentioning the consolidation of United States as the sixth country with more wine surface, reaching the 6% of total world plantings.

2.1.4 Grape Production

Although wine surfaces have decreased, since 2000 grape production has been increasing reaching in 2015 75.7 million tons (mt) according to OIV. This rise in production is thanks to an increase in yields and an improvement in viticulture procedures and techniques. Europe produced 40% of the total world grapes, while Asia 31% and America 20%. The biggest producer in 2015 was China with 12.6 mt, which represents 17% of the total world grape production. The second is Italy, with 8.2 mt, followed by the United States with 7 mt and Fance with 6.3 mt. Figure 3 presents the major grape producers by type of grape in 2015:

Figure 3: Major Grape Producers by Type of Grape 2015

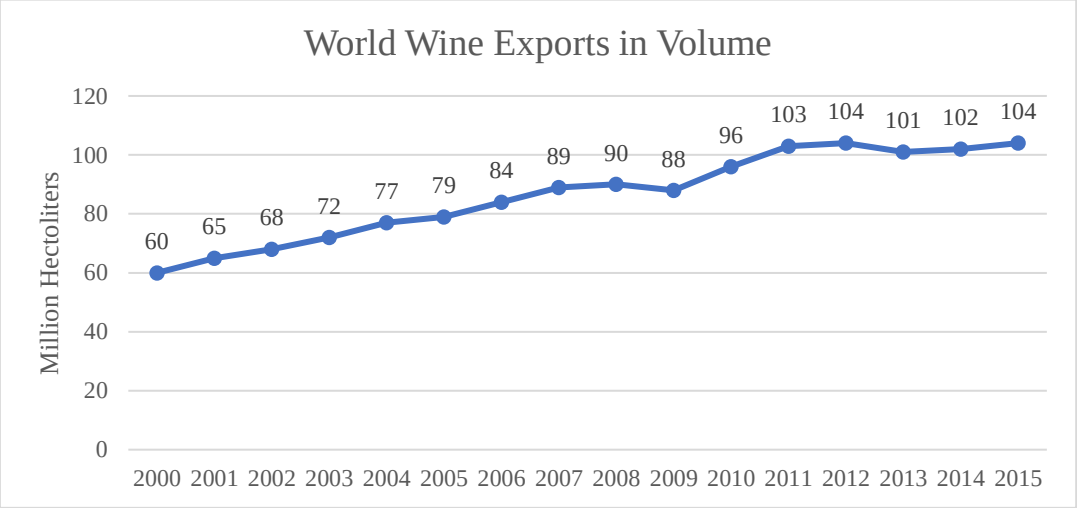


Source: International Organization of Wine.

2.1.5 Worldwide Trade

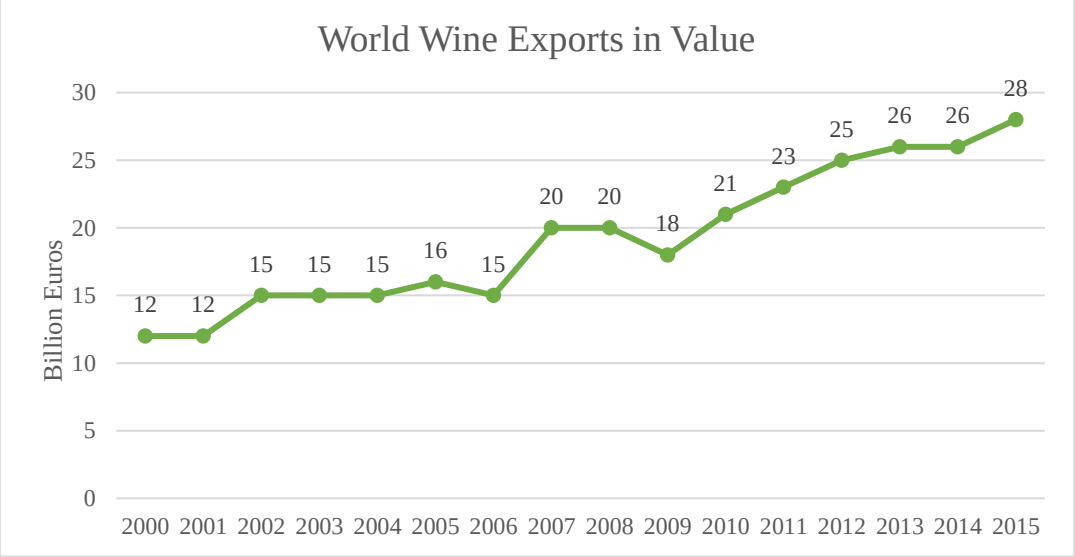
In 2015, the total exports worldwide have increased approximately 2% from 2014 reaching 104.3 million hectoliters (mhl) in terms of volume and 28.3 billion Euros, an increase of 10% from 2014. Figure 4 and 5 present the evolution in wine trade from 2000 to 2015 in value (nominal prices) and volume:

Figure 4: World Wine Exports in Volume



Source: International Organization of Wine.

Figure 5: World Wine Exports in Value

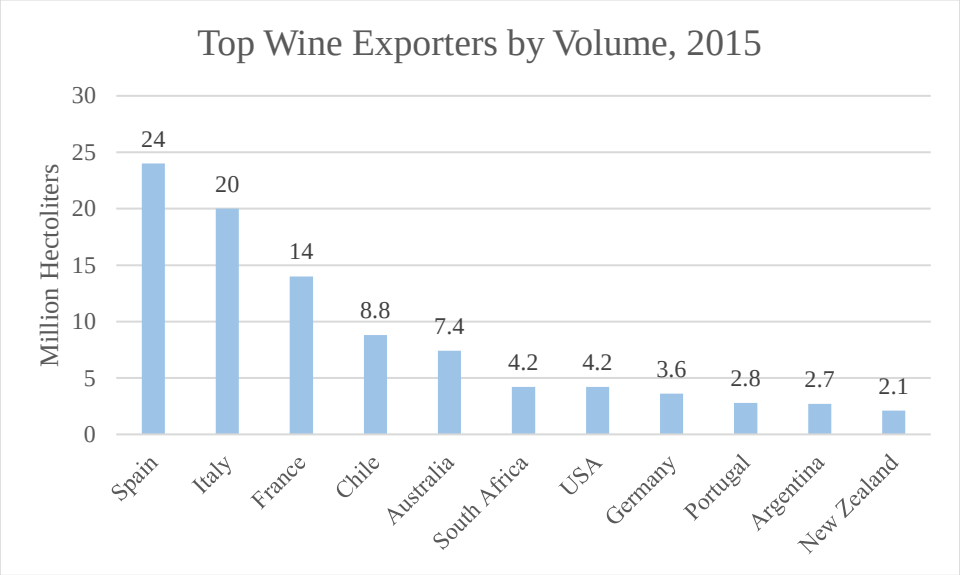


Source: International Organization of Wine.

In terms of type of product, according to OIV, exports in bottles of wine have been decreasing slightly the past years in volume but the value has increased. Also, sparkling wine continues having success and is increasing in volume and value. In the case of bulk wines, they keep increasing in volume.

According to OIV, in 2015 Spain, France and Italy were the main leaders exporting wine in terms of volume, carrying more than 50% of the volume worldwide. With the purpose of a better perspective for the reader, figure 6 illustrates the top worldwide exporters in volume:

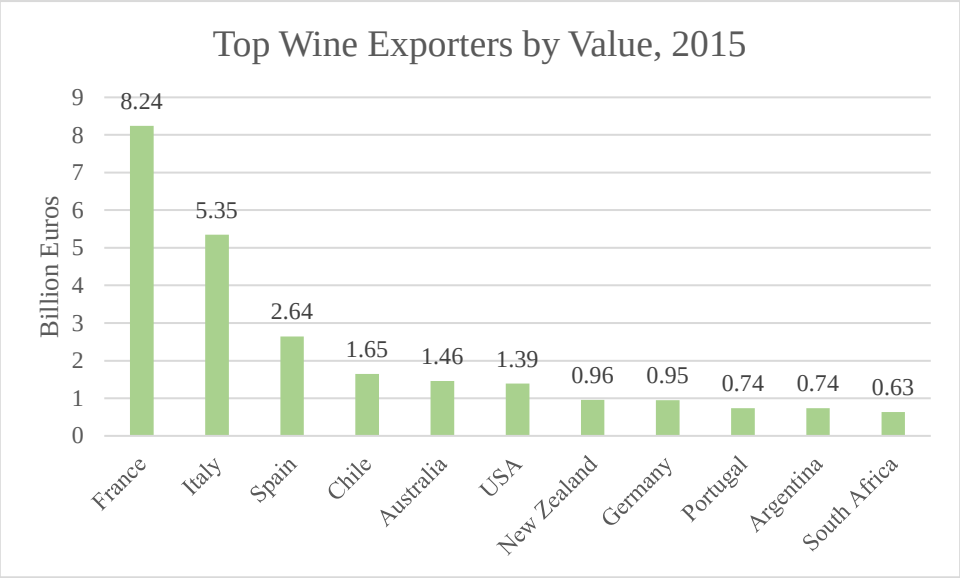
Figure 6: Top Wine Exporters by Volume 2015



Source: International Organization of Wine.

Regarding export value, France and Italy are the main leaders representing 29% and 19% of the market respectively. The next country that follows is Spain with its exports of 2.6 billion Euros accounting for 9% of the market. Figure 7 presents the top worldwide exporters in value:

Figure 7: Top Wine Exporters by Value 2015



Source: International Organization of Wine.

In 2015, the imports in terms of value reached 28 billion Euros, an increase of 9.7% from 2014. According to OIV, the top 5 importers accounted for 50% of the total market. The six main wine importers worldwide in value are United States, United Kingdom, Germany, China, Canada and Japan respectively. On the other side, imports in volume for 2015 were 102 million hectoliters, an increase of 1.3% with respect to the previous year. The main importers in volume worldwide are Germany, United Kingdom, United States, France, China, Canada and Russian Federation respectively.

The impact of Spain, France and Italy on the wine sector is unquestionable, which is the main source of country selection in this thesis. As a summary of the information presented, the table 1 provides the significant facts related to each country:

Table 1: Relevant Facts of Spain, France and Italy Related to the Wine Sector Worldwide

Country	Wine Production	Exports in Volume	Exports in Value	Planted Area
Spain	3rd	1st	3rd	1st
France	2nd	3rd	1st	3rd
Italy	1st	2nd	2nd	4th

The information regarding wine planted area, production, wine regulation and exports for Spain, France and Italy is going to be presented in the next section to give the reader a better understanding of their economic impact and importance over each country. Additionally, being familiar with this information is going be convenient in the subsequent chapter methodology, where an analysis of the hedonic price will be made.

2.2 Spain

2.2.1 Vineyard

The geographical location, climatic differences and variety of soil types makes Spain a privileged place for producing wines with very distinctive characteristics. Vines are grown in all 17 regions into which the country is divided.

According to Spain's Ministry of Agriculture, Food and Environment (MAGRAMA), the wine planted area in 2015 was around 954,659 hectares, which represents 30% of the total surface of the European Union. The evolution of the Spanish vineyard area has been decreasing in the past years for all regions except for La Rioja, Basque Country (Pais Vasco), Galicia and the Baleares Islands (Islas Baleares).

Additionally, according to *Wines from Spain*, in 2015, about half of the total wine surface was located in Castilla-La Mancha (473,268 hectares) and 49.6% of planted vineyards, followed by Extremadura (80,391 hectares) with 8.4%, Castilla y Leon (63,359 ha),

Comunidad Valenciana (62,676 ha), Catalonia (54,560 ha) and La Rioja, which is the sixth and last region over 50,000 hectares of vineyard area. The surface of the rest of the regions is below 40,000 hectares.

2.2.2 Wine classification

Wine is a highly differentiated product in many ways including vintage, producers, regions, etc. A very important distinction that the reader should be aware of is the wine regulation, which is divided into three labels in accordance with the European production model. There is rigorous control over the wine quality produced and grape-growing practices. Table 2 provides information related to wine labels and the meaning of each label:

Table 2: European Wine Classification

	Protected Denomination of Origin (PDO)	Protected Geographical Indication (PGI)	Wines
Quality check	The quality and characteristics are essentially due to its geographical origin, with the inherent human and culture factors. It possesses a certain quality, reputation or other specific characteristics attributable to its geographical origin	It possesses a certain quality, reputation or other specific characteristics attributable to its geographical origin	No label indicating origin
Grape Origin	100% of the grapes come exclusively from the geographical production area	At least 85% of the grapes must come exclusively from the geographical area	N/A
Product	Its production takes place within the geographical area	Its production must take place in the geographical area	N/A
Fermentation	Fermentation is obtained from the grape varieties from the Vitis vinifera	Fermentation is obtained from the grape varieties from the Vitis vinifera and other types of Vitis grape	N/A

Source: Wines from Spain

Spain has 90 production areas of quality wines with "Protected Denomination of Origin" (PDO), which are divided in *Vino de Pago* (VP), *Denominacion de Origen Calificada* (DOCa), *Denominacion de Origen* (DO), *Vino de Calidad de Indication Geografica* (VCIG). There are also 41 areas with "Protected Geographical Indication" (PGI) which are under the label *Vino de la Tierra*. Wines without geographical indication are labeled as *Vino de Mesa*.

Additionally, in the label, the consumer can find information regarding the aging and maturation of the wine, which in the case of Spain has three categories: *crianza*, *reserva* and *gran reserva*. Furthermore, for Rioja DOCa wines, the classification of *crianza*, *reserva* and *gran reserva* have longer periods in the barrel while also defining the use of a specific type of barrel. Table 3 presents information about the aging of wine in Spain:

Table 3: Aging and Maturation of the Wine for Spain

	DOCa Rioja Wines			
	Wine	Aging	Barrel	Type of Barrel
Crianza	Red	minimum 24 months	minimum 12months	Bordeaux Barrel with a capacity of 225 liters
	White & Rose	until 24 months	minimum 6 months	
Reserva	Red	minimum 36 months	minimum 12 months	
	White & Rose	minimum 24 months	minimum 6 months	
Gran Reseva	Red	minimum 60 months	minimum 24 months	
	White & Rose	minimum 48 months	minimum 6 months	
	Spanish Wines			
	Wine	Aging	Barrel	Type of Barrel
Crianza	Red	minimum 24 months	minimum 6 months	Maximum capacity of 330 liters
	White & Rose	minimum 18 months	minimum 6 months	
Reserva	Red	minimum 36 months	minimum 12 months	
	White & Rose	minimum 24 months	minimum 6 months	
Gran Reseva	Red	minimum 60 months	minimum 18 months	
	White & Rose	minimum 48 months	minimum 6 months	

Source: Bodega Vivanco

2.2.3 Production

According to MAGRAMA, the wine production for 2016/2017 was 42.5 million hectoliters, where 15 million hectoliters have been declared as wine for PDO, 4 million hectoliters as PGI and 7 million hectoliters as wine for varietals. The rest of the wine declared corresponds to the one that will be marketed as wine without Geographical Indication. By region, Castilla la Mancha is the main leader where the total wine production is 55.5% of Spain, followed by Extremadura (8.8%), Catalonia (7.3%), Valencia (5.9%), Castilla y Leon (5.4) and La Rioja (5%). The production of red and rose wines is dominated by Castilla la Mancha which produces 47.3% of the total production in Spain, followed by La Rioja (9.5%), Valencia (9.4%), Castilla y Leon (6.8%) and Extremadura (6%). Repeatedly, Castilla La Mancha leads the production of white wines with 63.4% of the total production, followed by Extremadura (11.4%), Catalonia (10.6%), Andalusia (3.8%) and Comunidad Valenciana (2.5%).

2.2.4 Exports

According to *Observatorio Español del Mercado del Vino* (OEMV), in 2015 Spanish exports of wine and musts reached 24 million hectoliters, with a value of 2,638 million Euros.

The average sales price for Spanish wines was 1.10 euros per liter, a decrease of 2.9%. The reason for the decline is that bulk and cheap wines have impose to wine bottles with designation of origin where is the value of the industry.

According to *Agencia Estatal de la Admistracion Tributaria* (AEAT) (Spanish Customs), wines with PDO increased in 2015 by 6.8% in value, followed by sparkling wines with an increase of 6.1%, and PGI wines, with an increase of 15.6%. On the other hand, bulk wines were stable. In terms of volume, bulk wines with and without geographical indication and PGI wine bottles where the leaders.

Spanish wine exports of still wine bottled represented 61.1% of the value and 33.2% of the volume of the total wine exports in 2015. According to AEAT, still wine bottled increased by 5.7% in value and 6.7% in volume, reaching 1,611 million Euros and 795.1 million liters in volume, being the average sale price of 2.03 Euros per liter. From these, the leaders were wines with PDO, reaching 1,197 million euros, an increase of 6.8% in value. In volume, they reached 358.5 million liters, and increase of 2.4%, where the average sale price was 3.34 Euros per liter.

The main markets in volume for Spanish wines with PDO are Germany and United Kingdom, followed by USA. Related to PGI wines, in 2015 they increased sales in volume by 28.6% and 15.6% in value. The negative point for PGI wine was the severe decrease in the average sale price of 10.1% (96 cents per liter). Also, wines with variety indication experienced an increase in volume of 15.3% and a decrease in value of 3.2%. Additionally, Spanish wines without PDO, PGI or variety indication reduced 1.1% in volume and 4.8% in value where the average price was 87 cents per liter.

Production of sparkling wines reached 168.8 million liters in 2015, an increase in volume of 0.1% and an increase 6.1% in value, reaching 435.5 million euros with an average sale price of 2.58 euros per liter.

Over all, the main markets of destination of Spanish wines according to AEAT in 2015 were France, Germany, Italy and Portugal, which represents 56.2% of the total exports. The leading destination is France with 651 million liters, followed by Germany, with 419.1 million liters, Italy, which occupies the third position, with 272.1 liters and Portugal with 209.8 million liters. On the other hand, in terms of value Germany is in first destination of Spanish wines, buying 403.4 million euros. The second one is United Kingdom, with 356.1 million euros and France is the third destination with 298 million Euros. It significant the increase in wine value bought by USA, reaching 296 million

euros (+10.9%,), where the average price is higher than 3 Euros per liter, along with Switzerland and Mexico.

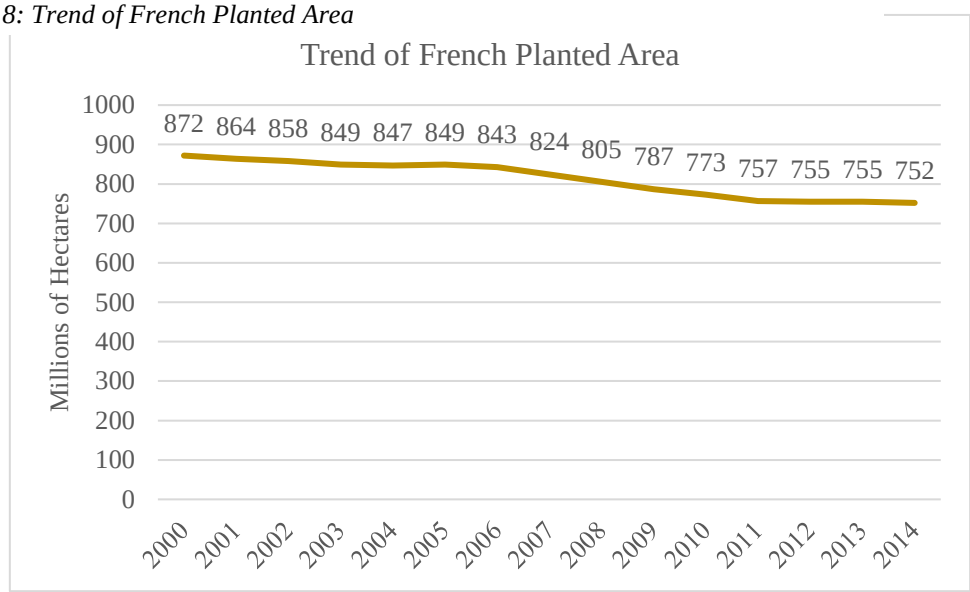
2.3 France

2.3.1 Vineyard

France has a wide range of climatic conditions that vary in its territory. For example, vineyards in Champagne, the most northly region has one of the coolest climates for wine growing. Then, the vineyards of Bordeaux and the Loire are in a more oceanic and temperate area. Burgundy and Alsace have a continental climate, with warm, dry summers and cold winters. In the case of Languedoc vineyards, are affected by Mediterranean climate with more sunshine and less precipitation.

Vineyard areas have declined sharply in the 1980s to control production surplus. Then, between 2000 and 2011, the vineyard surface decreased 13% due to a crisis in the wine sector. The grubbing up [1]of vineyard stopped in 2011 and the total surface in 2014 was 806,131 hectares. Figure 8 shows the evolution of the French vine planted area in millions of hectares:

Figure 8: Trend of French Planted Area



Source: Direction générale des douanes et droits indirects (DGDDI).

[1] Pull the vines up by the roots and replace them with other agricultural crops

According to *Observatoire de la vituculutre française*, the French region with more wine surface is Languedoc-Roussillon, representing almost 26% of the total surface, followed by Rhône-Provence Valley with 19.5%, Aquitaine with 17.1% and Charentes-Cognac with 10.4%.

Although, France has a very diversified grape variety, there are 5 grape varieties that cover 50% of the national vineyard: Merlot, Grenache, Ugni, Syrah and Cabernet-Sauvignon. It is important to mention that since 2006, the Carignan grape variety has suffered a sharp decline, losing more than 40% of its surface area (64,500 hectares in 2006/07 compared to 37,291 in 2014/15).

Even though black grape varieties are occupying the majority of the surface, they weight has been reduced in the benefit of white grape varieties since 2006.

2.3.2 Wine Classification

As in Spain, France follow the European wine regulation where its wine is classified under 3 labels: PDO, PGI and Wine. In France, PDO refers to *Appellation d'origine contrôlée* (AOP), PGI refers to *Indication géographique protégée* (IGP) and wines refers to *Vins sans indication géographique* (VSIG), wines without geographical indication. France has 357 PDO and 75 PGI appellations. Additionally, the 76% of the wines produced in France are under the category of PDO and PGI. Then, wines without geographical indication therefore represent 6% of the total volume excluding wines intended to produce Cognac (18%).

Under the PDO label, there different classifications depending on the area: Burgundy or Bordeaux. In the case of Burgundy wine, the classification is divided in: Grand Cru, Premier Cru, Village Wines and Regional Wines. On the other hand, the classification of Bordeaux wines was established at the request of the Emperor Napoleon III on the

occasion of the Universal Exposition of Paris in 1855. This classification is divided into 5 categories based on seniority:

i. The 1855 classification
    a. Red wines: there are 60 crus from the Médoc and 1 cru from Pessac-Léognan (Château Haut-Brion) based on five categories: 5 Premiers Crus, 15 Deuxièmes Crus, 14 Troisièmes Crus, 10 Quatrièmes Crus, 18 Cinquièmes Crus.
    b. Sweet white wines: there are 27 crus of the Sauternes and Barsac appellations: 1 Premier Cru Supérieur, 11 Premiers Crus, 15 Deuxièmes Crus.
ii. The Graves classification
iii. The Saint-Émilion classification: there are 64 Grands Crus classés and 18 Premiers Grands Crus classés.
iv. The Crus Bourgeois du Médoc classification

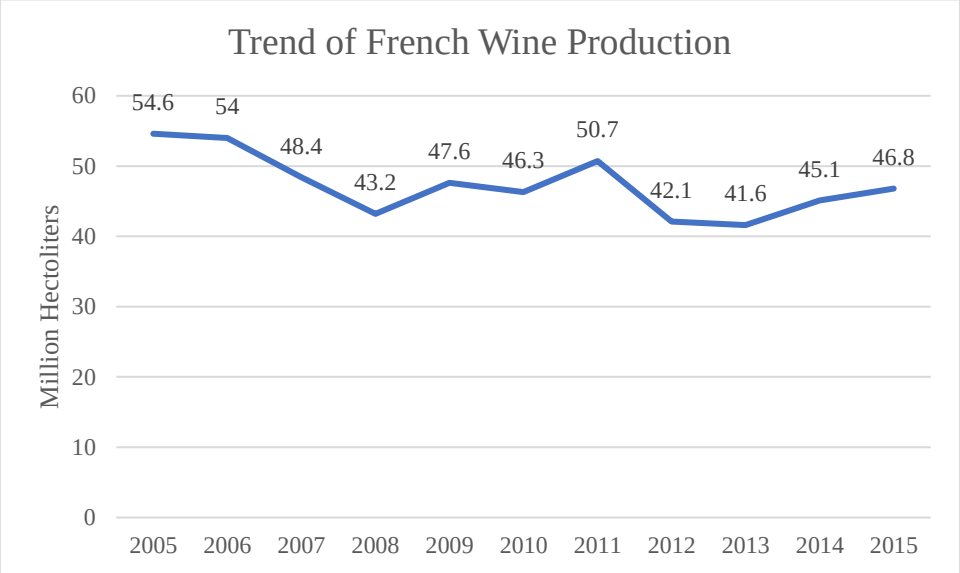
2.3.3 Production

According to *Observatoire de la vituculutre française*, the wine harvest of 2015 was 46.8 million hectoliters, which represents an increase of 4% compared to 2014. In 2015, 46% of the wines were declared PDO, 29% PGI and 6% without geographical indication. The production of 2015 is formed with a 40% of red wines, 15% rose, 25% white and the remaining 20% is destined for producing Cognac or Armagnac.

Three-quarters of French wine production is located in 4 wine-growing areas: Languedoc-Roussillon, which represents almost 25% of the total production, followed by Charentes-Cognac with 20.6%, Rhône-Provence Valley with 16.1% and Aquitaine with 13.3%. Also, by departments, half of the French production is concentrated in 34-Hérault (11.8%), 33-Gironde (11.6%), 17-Charente-Maritime, 2%) and 11-Aude (8.2%).

While the area planted with vines has decreased steadily over the last 10 years, resulting in a reduction in the national vineyard potential of about 10%, the volume varies between 40 and 50 million hectoliters, depending on the vintage. Figure 9 shows the evolution of the French wine production from 2005 to 2015 where the production of 2005 and 2006 were particularly important, with almost 55 million hectoliters.

Figure 9: Trend of French Wine Production

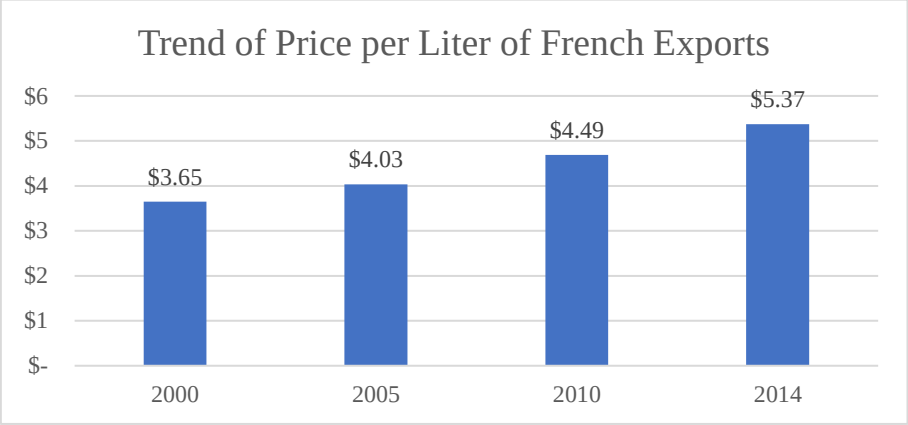


Source: Observatoire de la viticulture française

2.3.4 Exports

Since 2000, French worldwide market share in volume had decreased from 25% to 14%. However, in terms of value, France has experience a steady upward trend between 2000 and 2014, despite the slight downturn in the 2013-2014. This can be seen in the price per liter illustrated in figure 10:

Figure 10: Trend of Price per Liter of French Exports



Source: Global Trade Atlas.

Besides, the wine valuation varies depending of each market, which is partly due to the type of wine exported. For instance, according to *FranceAgriMer* (the French authority for agriculture and sea products) in 2014, popular wines with destination to Singapore had a price per liter of 21.44 Euros, followed by United States with 9.12 Euro/liter or Switzerland with 8.04 Euro/liter.

French wine exports are spread more over more than 200 destinations, according to FranceAgriMer. However, in terms of volume, 4 countries accounted for 51% of the total exports in 2014: Germany with 18%, United Kingdom with 14%, Belgium with 10% and Netherlands with 9%. In value, three countries contained 39% of the French exports in 2014: United Kingdom with 15%, United States with 14% and Germany with 10%.

In the last years, the most dynamic category has been sparkling wines and in particular, Champagne. On the other hand, PDO wines have experienced a downtrend. Also, wines with PGI and without geographical indications have been quite stable in volume. Related to still wines, 3 categories represented 63% of the total exports in 2014: PGI with 33%, Bordeaux with 19% and wines without geographical indications with the remaining 11%.

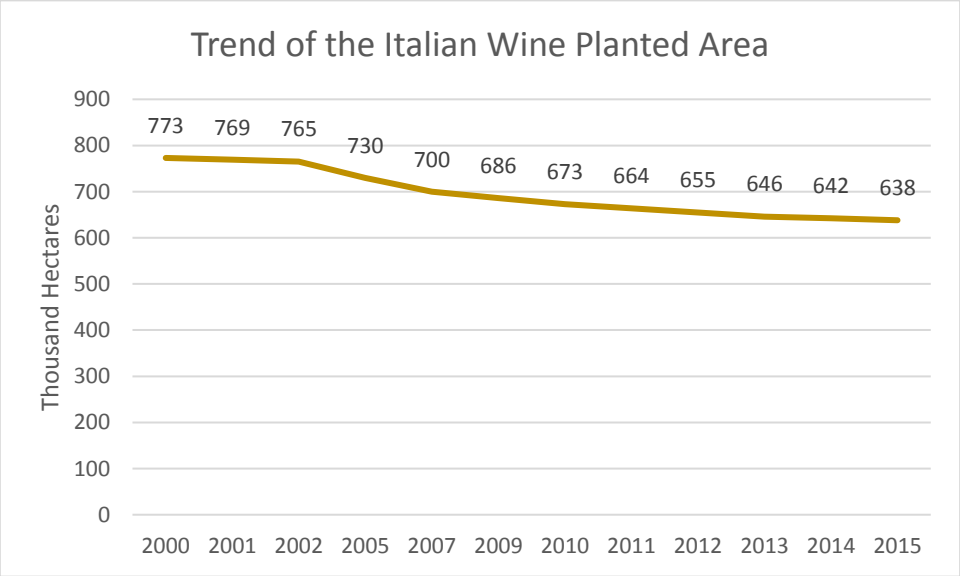
2.4 Italy

2.4.1 Vineyard

Italy produces wine to some extent in all 20 regions in which the country is divided. There are different climates and topographies where the vineyards are planted that go from the sea level as in Emilia-Romanga to the alpine as in Aosta Valley.

According to *Istituto di Servizi per il Mercato Agricolo Alimentare* (ISMEA), the Italian vineyard surface of 2015 was 638 thousand hectares, a decrease of 0.6 perfect with respect the last year. Figure 11 shows the evolution of the Italian wine planted area in the past years:

Figure 11: Trend of the Italian Wine Planted Area



Source: Istituto Nazionale di Statistica

According to *Agenzia per le Erogazioni in Agricoltra* (AGEA), the top four Italian regions in 2015 above 50 thousand hectares were Sicila, Veneto, Puglia and Toscana respectively.

The main grape varieties in Italy in 2015 according to ISMEA were Sangiovese with 53 thousand hectares, followed by Trebbiano with 37 thousand hectares and Montepulciano and Glera with 27 thousand hectares.

2.4.2 Wine Classification

As in Spain and France, Italy follows the European wine regulation where its wine is classified under 3 labels: PDO, PGI and Wine. Italian wine with PDO label is classified in *Denominazione de Origine Controllata e Garantita* (DOCG), the highest classification of an Italian wine and *Denominazione de Origine Controllata* (DOC). In the case of PGI, the Italian nomenclature *is Indicazione Geografica Tipica* (IGT). Finally, *Vino da Tavola*, which means table wine, represents the most basic level of Italian wine. Overall, there are 523 geographical denominations: 405 PDO (73 DOCG and 332 DOC) and 118 PGI.

As summery, the wine classification of the Spain, France and Italy is displayed in table 4:

Table 4: Wine Classification in Spain, France and Italy

SPAIN	PDO: 90	VP, DOCA, DO, VCIG	
	PGI: 41	Vino de la Tierra	
FRANCE	PDO:357	AOP	Bordeaux and Burgundy Crus
	PGI:75	IGP	
ITALY	PDO:405	DOCG, DOC	
	PGI:118	IGT	

Additionally, Italian wines, as occurs with Spanish ones, have a label to indicate aging and maturation of the wine, which is *riserva*. The therm *riserva* designates better quality wines and this classification can be seen in wines often located in Tuscany and Piedmont.

2.4.3 Wine Production

According to *Istituto Nazionale di Statistica* (ISTAT), the Italian wine production for 2015 was 50.1million hectoliters, an increase of 19% compared with 2014.

The wine production with PDO label was 38% of the total production reaching 19 million hectoliters. Wines with PGI label almost reached 15 million hectoliters in 2015, which

represents 30% of the total wine production. Regarding table wines, the production reached 16 million hectoliters.

In relation to the wine color, according to ISTAT in 2015, white wines were 54% of the total Italian production reaching 27 million hectoliters. On the other hand, the production of red and rose wines were 23 million hectoliters in 2015, which represents 46% of the wine production.

By region, the main leader of wine production is Veneto with 19.4%, followed by Puglia with 15.8%, Emilia Romagna with 14.7% and Sicilia with 10%.

2.4.4 Exports

According to *Istituto Nazionale di Statistica* (ISTAT), the exports in value in 2015 reached 5.353 million euros. By country, United States is the main destination with 1,264 million euros, followed by Germany 958 million of Euros, United Kingdom with 745 million euros and Switzerland with 322 million of Euros. In terms of volume, the total exports were 20 million hectoliters. The main destination was Germany with 5,523 million hectoliters, followed by United Kingdom with 3,332 million hectoliters, United States with 3,133 million hectoliters and France with 849 million hectoliters. The value of the exports of the bottled wine was 4,008 million Euros, an increase of 4.4%. The bulk wine reached 359 million euros, a decrease of 9.6%. Also, for sparkling wines, there is a considerable increase of 16.5% with respect to last year, attaining 980 million Euros. In terms of volume, Italian exports were in 2015 20 million of hectoliters, a decrease of 1.5% with respect to the previous year. The bottle wine was 12.2 million hectoliters, the same quantity that 2014. Bulk wine experienced a reduction of 12.3% related to the previous year, where it attained 5 million hectoliters. On the other hand, sparkling wine experimented an increase of 16.7% reaching 2.8 million hectoliters.

By region, the leader in exports in value is Veneto, followed by Emilia Romagna and Piemonte. In term of volume, Veneto is again the main leader, followed by Piemonte and Toscana. Figure 11 provides the share of each region in the Italian exports in volume and value for 2015:

Figure 20: Italian Wine Exports by Region 2015

Source: Istituto di Servizi per il Mercato Agricolo Alimentare

3 Literature Review

The hedonic hypothesis states that product differentiation is based on different valuable attributes or characteristics. Hence, the hedonic prices are implicit prices of the product attributes (Rosen, 1974). Econometrically, the hedonic pricing method is a regression technique where the price of a differentiated product is explained as a function of its attributes. This regression allows us to identify what characteristics of a given product are valued by consumers. From a business standpoint, the recognition of implicit prices represents an advantage that allows firms a more efficient pricing strategy for their products and the ability to focus on valuable products' characteristics according to their consumers (Roma et al., 2013).

Relevant hedonic analyses have been conducted on different areas such as automobiles (Court, 1939; Griliches, 1961; Cowling and Cubbin, 1972), housing (Witte et al., 1979; Sheppard, 1999) and even fresh vegetables (Waugh, 1928; Huang and Lin, 2007).

Past hedonic studies have been done in the wine sector to identify what attributes influence wine price. There are wine characteristics that are easy to find and evaluate on the label (grape, appellation or vintage) (Combris et al., 1997). On the other hand, sensory attributes such as taste, texture or the aromatic intensity are not provided on labels but could be elements driving consumers' purchase decisions.

The wine quality of a bottle can only be assessed when it is consumed. Also, the evaluation of sensorial attributes and overall quality of wines could be a difficult task for non-expert wine consumers (Oczkowski, 1994). Imperfect information can be overcome if the consumer is willing to learn about the attributes of the product or its reputation. For a consumer, it might be costly to find and acquire information about wine quality and sensorial characteristics (wine guides, tasting workshop, etc), hence wine ratings by taste experts or well-known producers might provide insights to reduce consumers' purchase

decision costs. As a result, expert wine tasters offer the "opinion leadership" for consumers in which sensorial and wine qualities are judge (Edwards and Mort, 1991). Additionally, consumers might primarily focus on objective characteristics because they are straightforward to observe.

It is important to mention that expensive wines are associated with higher quality attributes. This evaluation by costumers has impact and severe implications for designing wine marketing campaigns as well as producers and investment decisions and retailers (Angulo et al., 2000).

The dependent variable wine price could be obtained from diverse sources: suggested retail prices from wine guides, producer's price or retail prices. According to Combris et al. (1997), wine guides might be problematic to estimate hedonic prices due to different reasons. Firstly, not all the wines tested are included in the sample: for commercial reasons, wine of inferior quality are not included. Also, the bottles used for testing purposes might not be representative of the whole wine production. Objectivity is another issue, where the wine should be tasted by independent experts and not the author of the guide or wine producers. Additionally, it is quite important to ensure that the tasting occurs blindly: the jury should not be influenced by external factor such as the name of the wine or appellation. Finally, all the wine samples used in the process should be brought under the same conditions: avoid wine samples where some bottles are brought from the winery and others from wine shops.

Objective wine attributes corresponding to grape variety, vintage, region and producer size are found significant when explaining wine prices (Oczkowski, 1994; Roma et al. 2013). Besides, regions and grape variety are conceived by consumers as proxies for brands (Stainer, 2004).

The producer size variable has a coefficient inversely related to price. Larger producers due to scale production have the ability to reduce costs and set lower prices. On the other hand, small producers tend to focus on high-quality wines to differentiate form larger producers (Oczkowski, 1994; Roma et al. 2013). Regarding the vintage variable, the older the vintage, the higher the price due to storage costs and the time value of money (Oczkowski, 1994).

Additionally, in the study conducted by Roma et al. (2013) relating to Sicilian wines, alcoholic content and the type of containers such as barrel were found to have a positive effect on prices. Region also seems to have an effect on consumers: studies conducted in Australia showed that regions with cool climate are preferred (Oczkowsky, 1994; Schamel and Anderson, 2003).

The Bordeaux and Burgundy regions are one of the most popular areas used to perform the hedonic price method. Combris et al. (1997, 2000) have considered both sensorial and objective characteristics for Bordeaux and Burgundy wines. The results showed that using both sensorial and objective attributes what really drives the wine prices are objective attributes. Besides, for Burgundy wines, acidity, fat[2] and concentration have a positive significant effect on price (Combris et al, 2000).

In the study conducted by Lecocq and Visser (2006) on Bordeaux and Burgundy wine, the results indicate that jury grades have a positive impact on wine prices but quite small compare with the objective characteristics (ranking, vintage and appellation) which are easy to examine by a consumer.

[2] Rich wines with a low acidity content.

Related to the Bordeaux region, Cardebat and Figuet (2004), concluded that wine price depends on reputation and also quality, which confirms the results obtained by Combris et al. (1997).

Cardebat and Figuet (2009) explored other French wine regions: Alsace, Beaujolais and Provence. The hedonic estimation pointed out that the relationship between price and quality is poor for those areas. They indicated that the French wine industry has a complex classification with innumerous AOC (Appellation d'Origine Controlée) which make brand identification difficult for the occasional wine consumer.

Other studies have focused on Italian wines (Benfratello et al., 2009; Boatto et al., 2011; Roma et al., 2013). Benfratello et al. (2009), using data on two premium Italian wines, Barolo and Barbaresco, discovered that wine and producers' reputation influence more consumers' purchase decisions than taste. Regarding sensorial attributes, the study conducted by Roma et al. (2013), olfactory[3] variables seem to have more important than gustatory[4] characteristics explaining wine prices. The authors also found out that guide grades and firm reputation play an important role driving consumers wine purchase.

Angulo et al. (2000) focused on red wine from Spain and the results obtained indicate that wine prices are demarcated by the wine growing area, where Rioja and Duero wines are more expensive compared to others produced in a different region. Also, the grape vintage year is another determinant of wine prices. However, the attribute grape variety does not affect the wine prices. The final result in this study is the positive influence of expert quality ratings (Oczkowsky, 1994), where they do influence in wines with high prices but not medium ones.

[3] Regarding the smell of the wine.
[4] Regarding the taste of the wine.

The literature also evaluates a variety of different models used to estimate the appropriate hedonic price form. Different authors have used a RESET test to evaluate which functional form exhibits the best fit and frequently, the log-linear was preferred demonstrating a good level of prediction (Oczkowsky, 1994; Schamel and Anderson, 2003; Roma et al., 2013; Boatto et al. 2011). Also, Stainer (2004), Lecocq and Visser (2006) and Cardebat and Figuet (2009) have used a log-linear model. On the other hand, Landon and Smith (1998) have used the reciprocal square root model due to a better fit of the data compared with linear, semi-log, log-linear or reciprocal models. Additionally, Cambris et al. (1997) approached the estimation of hedonic price for Bordeaux wine using two different equations: applying the logarithm to the wine price and the jury grade. Additionally, Cambris et al. (2000) followed the same methodological approach for Burgundy wines with an addition: a third equation was used where the logarithm of the future quality of the wine assigned by the jury was estimated. The study conducted by Lecocq and Visser (2006) also followed the previous approach in the hedonic model, where the price and the jury grade were the dependent variable of different models.

In the approach conducted by Benfratello et al. (2009), they used a Box-Cox transformation on sensorial and reputational models to not impose any restriction to obtain the most suitable hedonic price function. After comparing both models, the reputational model is preferred for a better fit on explaining what motivates consumers' willingness to pay.

Another approach was suggested by Nerlove (1995) where the author did not use the standard hedonic model and regressed the quantity sold on price and quality attributes to discover that Swedish consumers are highly sensitive to price.

Regarding the methodology, an assortment of authors has used a stepwise procedure to identify significant repressors and eliminate the irrelevant variables (Combris et al., 1997 and 2000; Lecocq and Visser, 2006; Roma et al., 2013)

Authors have explored other variables to investigate the rationale behind wine prices. Nerlove (1995) used macro-data for the origin the wine. Roma et al. (2013) used the variable type of viticulture i.e. conventional, biological or natural, to evaluate if consumers value organic and natural wine productions. Oczkowski (1994), the variable cellaring potential has a positive effect on wine price.

Sensory attributes have been used where an independent jury tasted blindly the wine bottles (Combris et al., 1997 and 2000; Cardebat and Figuet, 2004).

Landon and Smith (1998) explored the possibility of using collective reputation indicators, where in combination with past wine quality (reputation) have a positive impact on price. Long-term reputation has a greater effect on consumers' willingness to pay for a bottle of wine rather that current quality.

Boatto et al. (2011) have considered whether the retailer's information plays a role in the consumers purchase decision. Using a random sample of large-scale retailers and specialized shops where Tocai grape variety is produced, they discovered that consumers follow the expertise regarding quality wine at large-scale retailers rather than in specialized shops. In the former, consumers are *connoisseurs*[5] and quality information is not as valuable. The added value in this context for non-expert consumers is highly relevant. Additionally, quality signals on wine label have more relevancy than brand reputation for consumers.

[5] People who are very knowledgeable about something such as food or wine.

Schamel and Anderson (2003) used a vintage rating to define sensory wine characteristics. The result of this study showed that the variable vintage rating seemed to be highly significant and have a positive impact on prices for Australian and New Zealand wines. Also, in the case of Australia, there is a trend towards an increase of regional differentiation, as in Europe.

However, even though consumers value improvements in taste attributes, producer's marketing strategy should focus on the creation of promotional events to build and maintain wine and firm reputations (Benfratello et al., 2009).

In the appendix (table 7.1), the reader can find a table with all the variables used for each wine study discussed previously.

To the best of our knowledge, no previous studies have considered an online free source of data to conduct a hedonic price research. Wine magazines, Wine spectator, etc, involve a fee and additionally, wine workshops require an investment of time and money. For any consumer, being a wine expert or not, can access a more convenient and accessible source of information through the internet and for those reasons, this research was obtained from an online search engine web site.

We are immersed in the digital era where not only influencers, but regular consumers post their opinions on products and services, which can be considered as proxies for brand reputation. In the wine sector, as previous studies have shown, wine experts influence positively wine prices. However, the effect of the opinion of regular consumers on wine prices has not been considered, and might have an effect on prices. Additionally, no previous study has considered the comparison of the three main countries leading the wine sector in production, exports in volume and value and wine planted are. Furthermore, in Spain, France and Italy, wine consumption is quite united with food, and

depending on the dish, there are wines that could are considered as good blends. As a result, food might play a role in wine selection which depending on the dish might affect the wine price.

4 Methodology

4.1 Data

The countries selected to conduct the research are Spain, Italy and France. The data was collected from Wine-Searcher.com, a database and search engine to locate, compare and purchase wines around the world. It has 8,900,253 wines and prices from 83,909 merchants worldwide. It is important to mention that the data was collected at the end of March and beginning of April of 2017 because Wine-Searcher.com is a dynamic site that is able to correct and update the information daily through manual and automated methods. Hence, the prices vary depending on when they are gathered.

This search engine offers a free and a "pro" version. The free version has limited access to wine information while the pro version offers the client extensive information related to wine prices and locations where the wine can be purchased at a better price. The data used in this research was obtained using the free version.

The wine information displayed related to each country corresponds to wines searched with most frequency by Wine-Searcher.com users. From each wine, the search engine provides information regarding the year, producer, region/appellation, country hierarchy, grape/blend, food suggestion, wine style, alcohol content, average price (ex-tax) in different currencies, weighted average score (expert score), average user rating and complementary notes about the wine bottle. It is important to mention that this information is not available for all the wines.

The years selected are 2004, 2005 and 2006. The reason for this selection relates to the period of consecutive years with the most complete information for Spanish, Italian and French wines. It should be noted that the pro version was purchased to increase the number of observations per country in a more recent period of time, but unfortunately, it

did not provide additional relevant information. Regarding France, a more recent period could have been chosen due to the availability of the data, however, it would have prevented the comparison between countries in the same years.

4.2 Variables

The average wine price is calculated by Wine-Searcher removing the 20% highest and lowest wine prices thus avoiding the average being biased by price errors. Also, the average wine price is calculated from different online retailers worldwide. We also noted that the change of currency is updated daily using Interbank exchange rates. All prices are expressed for bottles of 750 milliliters. Also, in the average price, the website viewer can select prices including auctions or not. All prices selected for this research are excluding auctions and are denominated in US dollars. We were however unable to control for inflation, due to the fact that Wine-searcher.com collects price information from different stores located in multiple countries to provide us with the average price of a bottle. With data collected over a relatively short period of time, we can safely assume that inflation would not significantly influence our study.

As mentioned in the literature review, the wine score is the most effective way for expert wine critics to communicate their opinion about the wine quality. Wine-Searcher.com calculates the average rate using a 100-point scale from different critics or sources such as Robert Parker, Wine Spectator or Wine Enthusiast. Table 5 presents the 100-point scale and the score explanation:

Table 5: Score Explanation

Score	Explanation
95–100	Classic: a great wine
90–94	Outstanding: a wine of superior character and style
85–89	Very good: a wine with special qualities
80–84	Good: a solid, well-made wine
75–79	Mediocre: a drinkable wine that may have minor flaws
50–74	Not recommended

Source: Wine Spectator

The variable *average user rating* indicates the wine grade given by consumer ranging from 1 to 5 stars, being 1 being the lowest grade and 5 the highest. Table 6 provides a more details about the grading criteria by consumers:

Table 6: Consumers' Rating

Grade	**Meaning**
5	Excellent
4	Very Good
3	Good
2	Fair
1	Drinkable

Source: Wine-Searcher.com

The wine styles indicate the wine color and as well as its aromatic and gustatory elements. To perform this research, we divided the wine styles into two categories: color (red or

white) and wine style (gustatory elements). Regarding the gustatory attributes, the information provided by Wine-Searcher.com for red wines is shown in table 7:

Table 7: Wine Style of Red Wines

Wine Style	Meaning
Savory and Classic	Wines that can be cellared for a long time. They are elegant and well structured
Bold and Structured	Popular wines defined by ripe fruit, firm tannins
Rich and Intense	Wine with abundant spices and filled with rich ripe fruit.

Source: Wine-Searcher.com

For white wines, the classification in the wine sample is also provided below in table 8:

Table 8: Wine Style of White Wines

Wine Style	Meaning
Aromatic and Floral	The wine flavor varies from lemon to rose and jasmine. Regularly, it has great complexity
Green and Flinty	The wine flavor exhibits cut grass and wet stone
Tropical and Balanced	The wine aromas are ripe of citrus, nectarine and passion fruit. Normally, it has a warm tropical fruit and a touch of oak.
Buttery and Complex	This wine style is based on the interaction of oak and fruit, forming a complex, honeyed character.

Source: Wine-Searcher.com

The website also distinguishes the category of desserts, which include white wines. It is defined by the following wine style in table 9:

Table 9: Wine Style of White Wines for Dessert

Dessert	Meaning
Lush and Balanced	Most desserts can be eaten with this wine style

Source: Wine-Searcher.com

The sample also considered a variable for grape/blend of the wine, region/appellation and country hierarchy. The difference between region/appellation and country hierarchy can be seen in the following example: Margaux is a French commune[6] under the appellation of AOC wines and it would be under the variable region/appellation. Margaux is in Bordeaux, and Bordeaux would be under the country hierarchy.

Information regarding the aging and maturation of a wine was only available for Spanish and Italian wines. In the case of Spain, the classification is the following: *crianza, reserva* and *gran reserva* (*riserva, for Italy).*

Classification in this sample has a different meaning depending on the country. In the case of Spain and Italy, wine production under the European regulation has the following classification in our sample: *DO*, *DOCa*, *Vino de la Tierra* for Spanish wines and *DOC*, *DOCG*, *IGT* for Italian ones. Besides, this classification is related to the variable region/appellation. In the case of France and following previous studies, wines with PDO labels have an additional classification for Burgundy and Bordeaux as it was explained in Chapter 1 under "wine sector". In this sample, the wine classification is divided as follow: Bordeaux (Cru Bourgeois, Cru Classe des Graves, Grand Cru Classe des Graves, Grand Cru, Grand Cru Classe), Burgundy (Grand Cru, Premier Cru) and Saint-Emilion

[6] It is a level of administrative division in the French Republic.

(Premier Grand Cru Classe A, Premier Grand Cru Classe B) and wines without classification (coded as “No”).

Regarding the food suggestion, there are the following options depending on the country:

Table 10: Food Suggestion by Country

Food Suggestion	Spain	France	Italy
Beef and venison	Yes	Yes	Yes
Lamb	Yes	Yes	Yes
Chicken and turkey	Yes	Yes	No
Duck, goose and game birds	No	Yes	Yes
Chilis and hot spicy foods	Yes	No	No
Fruit-based desserts	No	Yes	No
Meaty and oily fish	No	Yes	No
Shellfish, crab and lobster	No	Yes	No
Mushrooms	No	No	No
White Fish	No	No	Yes

4.3 Spanish Wines Sample

In the data for Spain, there are 135 bottles of wine including 22 of with a missing consumer or wine taster score for one or 2 years. To not reduce the sample size and use

all 135 observations, the score of the previous year was used to fill in the missing values. There are 80 producers, 19 regions/appellations, 7 country hierarchies and 24 grapes/blends. Regarding the region/appellation, Rioja represents 28% of the wine bottles in this sample, followed by Ribera del Duero with 20% and Priorat with 13.3%. Regarding the variable country hierarchy, Rioja corresponds to 43.7% of the sample, followed by Castilla y Leon with 30.4% and Catalonia with 19.3%. The majority of grape/blend are concentrated in Tempranillo and Rioja Red Blend. Regarding the the variable food suggestion, almost 96% of the wine are advised to be used with lamb. In terms of the wine style, with more than 40% in each category, Spanish wines in the sample are *rich and intense* and *savory and classic*. Also, almost 98% of the wines are red. Concerning the wine aging, *reserva* represents almost 22% of the sample, *gran reserva* 11%, *crianza* almost 7% and close to 61% of the sample does not have aging classification. In the appendix, the reader can find broader information related to every variable for the three countries.

4.4 French Wines Sample

In the sample collected for France, there are 374 wine bottles. There are 260 producers, 95 region/appellation, 37 country hierarchy, 25 grape/blend. Regarding the variable region/appellation, Saint-Emilion Grand Cru corresponds to 9.4% of the sample, followed by Margaux with 7.2% and Pauillac with 7%. In relation to country hierarchy, Medoc/Bordeaux accounts for almost 28% of the wine bottles in this sample, followed by Bordeaux with almost 18% and Rhone with 12.3%. The majority of grape/blend are concentrated in Bordeaux Red Blend with 46.3% and Pinot Noir with 20.6%. Regarding the variable food suggestion, the most popular categories are beef and venison, duck, goose and games birds and lamb. In terms of wine style, *savory and classic* accounts for the majority of the French wines in the sample with more than 70%, followed by *rich and intense* with 7%. Also, as seen in the Spain sample, the majority of wines are red with

84.2%, leaving the remaining 15.8% as white wines. The classification of French wines is dominated by *Grand Cru Classe* with 22.5% of the sample, followed by *Grand Cru* with 16.3% and *Premier Cru* with 8.3%.

4.5 Italian Wines Sample

In the sample collected for Italy, there are 251 wine bottles, 157 producers, 46 region/appellation, 21 country hierarchies, 38 grape/blend. Regarding region/appellation, Barolo corresponds to 26.3% of the sample, followed by Brunello di Montalcino with 20.7% and Toscana IGT with almost 16%. In relation to country hierarchy, Tuscany gathered 44% of the wine bottles in this sample, followed by Piedmont with almost 34%. Most grapes/blends are concentrated in Nebbiolo with close to 33% of the sample, followed by Sangiovese with 26%. Regarding the food suggestion variable, the most relevant categories are beef and venison, and lamb. In terms to wine style, *bold and structured* gathers the majority of the Italian wines with 46% of the sample, followed by *savory and classic* with almost 40%. Also, as seen in the Spanish and French sample, the majority of wines are red (97.2%), leaving the remaining 2.8% as white wines. Regarding the wine aging, only 9.2% of wines are *riserva*.

Table 11 presents a summary of the categories by country:

Table 11: Categories by Spain, France and Italy

CATEGORY	SPAIN	FRANCE	ITALY
BOTTLES OF WINE	135	374	251
PRODUCERS	80	260	157
REGION/APPELLATION	19	95	46
COUNTRY HIERARCHY	7	37	21
GRAPE/BLEND	24	25	38

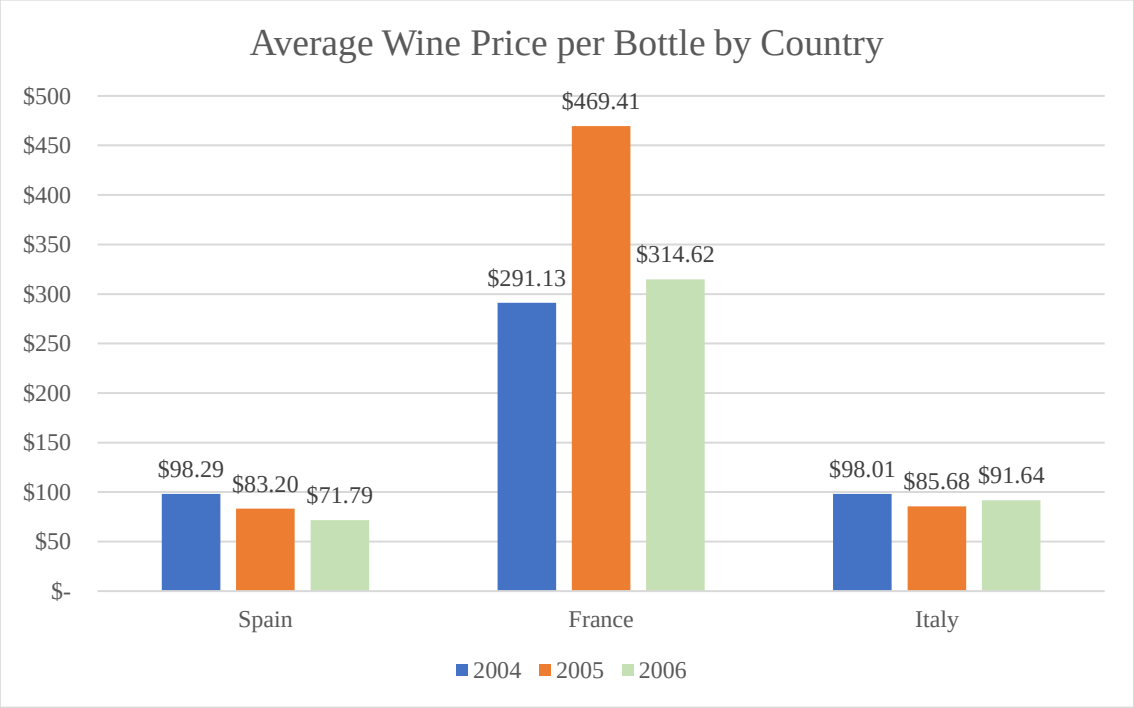
4.6 Descriptive Statistics

As mentioned, there are multiple regions/appellation, grapes/blends and country hierarchies for each country. We chose to refer to the main ones as part of this research. The information for every single variable can be found in the appendix.

When comparing the three countries, the average wine price per year is always higher in France. Italian and Spanish wine prices are quite close in 2004 and 2005, but in 2006 Italian wines have a higher price.

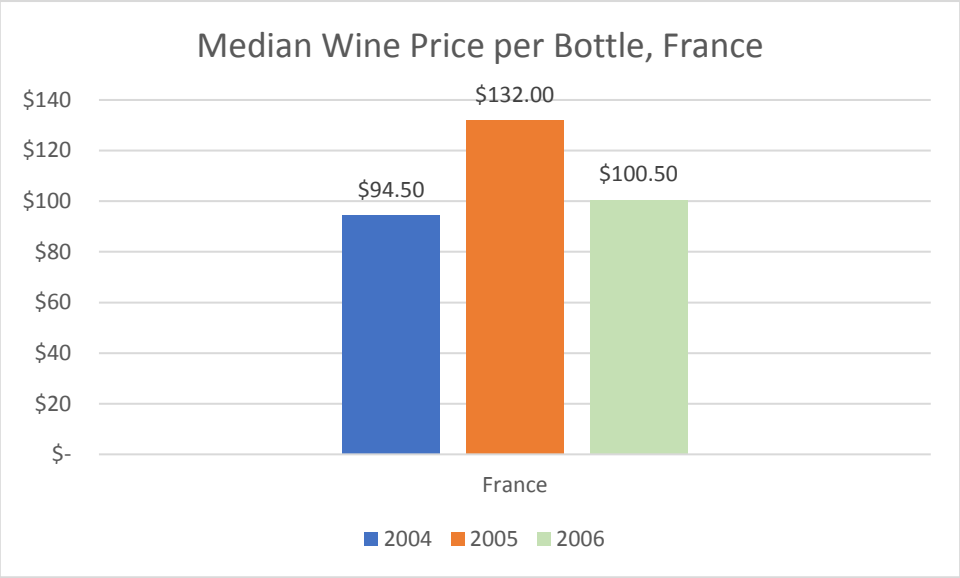
Regarding Spain, there is a downward trend in prices. This trend is not as clear in France and Italy. Figure 13 presents the average wine price per bottle per year in every country:

Figure 29: Average Wine Price per Bottle by Country



In the sample of French wines, there are several bottles with high prices that might distort the average. For that reason, the median could be a better measure for France. Figure 14 presents the median of the wine prices per bottle for France where there are not such drastic differences:

Figure 38: Median Wine Price per Bottle, France



However, the data does not fit the reality of any country. According to *Observatorio Español del Mercado del Vino* (OEMV), the exports wine value in terms euro per liter increased for every country except for Italy as it can be seen in table 12:

Table 12: Average price per liter of Spanish, French and Italian Exports

	2004	**2005**	**2006**
SPAIN	1.06	1.09	1.14
FRANCE	3.97	4.07	4.29
ITALY	2.08	1.95	1.78

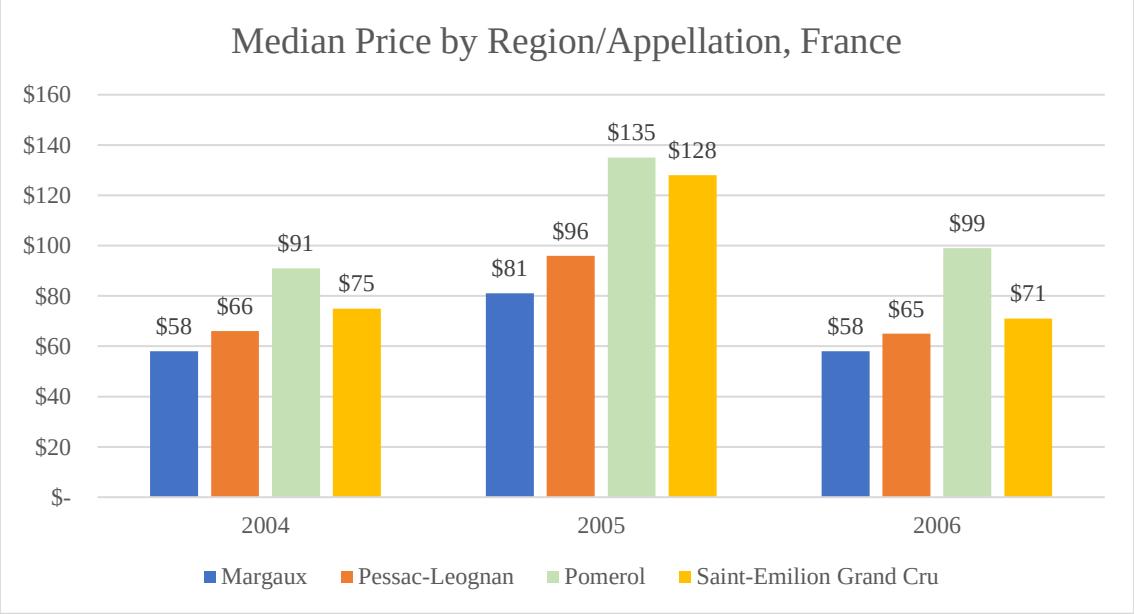
Source:Observatorio Español del Mercado del Vino

When analyzing each country individually, Spanish regions/appellations with the highest wine prices are Priorat, Ribera del Duero and Toro. By country hierarchy, Catalonia is the main leader, followed by Castilla y Leon and La Rioja. In terms of classification, *DO* wines have higher prices compared with *DOCa* and *Vino de la Tierra*.

In France, the region/appellation with the highest median wine price is Pomerol for every single year. Pessac-Leognan and Saint-Emilion Grand Cru are the following closely and

Margaux always has the lowest average price per year. Figure 15 provides a further information:

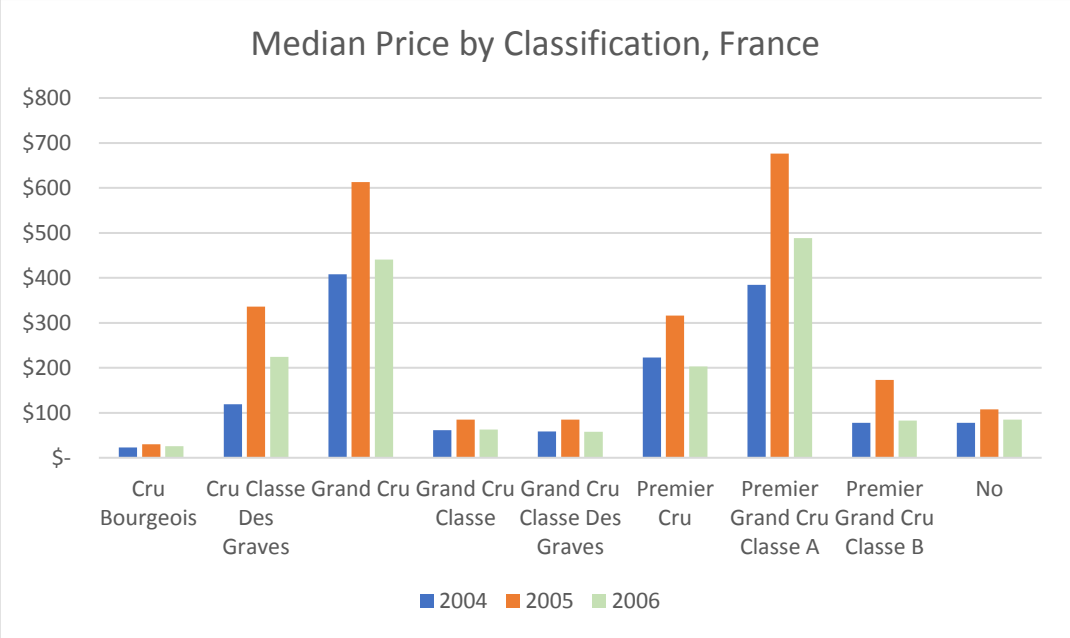
Figure 47: Median Price by Region/Appellation in France



By country hierarchy, Burgundy leads the average wine price for the three given years. Bordeaux wines have a higher price with respect to Rhone only in 2005. However, if we use the median, Burgundy stills leading wine prices, but Rhone wine has higher prices than Bordeaux.

Regarding wine classification, Grand Cru and Premier Grand Cru Classe A wines are the leaders with the highest wine median prices for all years. Follows Premier Cru and Cru Classe des Graves. Figure 16 presents more information on French wine classification:

Figure 55: Median Price by Classification of French Wines



In the case of Italy, the region/appellation with the highest average wine price in every year is Barolo, followed by Toscana IGT and Brunello di Montalcino respectively. By country hierarchy, Piedmont with average prices over 100 dollars in every given year, followed by Tuscany and Veneto respectively. Regarding the wine classification, DOC wines have higher prices than DOCG and IGT. Wines under the DOCG and IGT label are quite close in prices, but DOCG wines are slightly more expensive.

4.7 Model

Based on previous studies on hedonic wine prices, the most common functional forms (linear and log-linear) were used. However, we believe that the log-linear model fits better the data and the ordinary least square (OLS) estimator are unbiased.

The mathematical expression of the log-linear functional form linking the average price to the wine variables and attributes is:

$$\text{Ln(average\_price)}_i = \beta_0 + \beta_1 \text{D\_Year}_i + \beta 2\text{Weighted\_Average\_Score}_i + \beta_3 \text{D\_Average\_User\_Rating}_i + \beta_4 \text{D\_Region/Appellation}_i + \beta_5 \text{D\_Country\_Hierarchy}_i + \beta_6 \text{D\_Grape/Blend}_i + \beta_7 \text{D\_Color}_i + \beta_8 \text{D\_Aging}_i + \beta_9 \text{D\_Classification}_i + \beta_{10} \text{D\_Food Suggestion}_i + \beta_{11} \text{D\_Wine Style}_i + \beta_{12} \text{D\_Country}_i + \varepsilon_i$$

where D indicates that a variable is a dummy variable, β_0 to β_{12} are the regression model parameters and ε is the error term.

This model was the initially chosen to compare Spain, France and Italy. However, the data has been pooled to compare: (1) the three countries, (2) each country by itself, (3) Spain and France, (4) Spain and Italy and (5) France and Italy since some variables caused perfect collinearity. As a result, the variable wine style has been removed from every model owing to perfect collinearity. Also, the variables region/appellation and country hierarchy cannot be together in the regression due to perfect collinearity.

The variable "producer" was included in the regression, but due to the significant number of producers for every country, we believed it to be challenging to discuss the total 497 producers and make appropriate comments for all of them and their idiosyncrasy. Also, the experts' rate can be used as a proxy for brand reputation.

In the initial regression, every dummy for every variable was included, but due to the considerable number of dummies, the categories had to be adjusted to reduced perfect collinearity among the dummies.

Additionally, a White's procedure was used to calculate heteroskedastic-consistent standard errors. Those are the ones reported in the final results. The differences in the standard error with and without the White's procedure is relatively small. Additionally, as seen in previous studies, heteroscedasticity was not a problem.

To be able to analyze the impact of a dummy variable repressor on the level of logarithm of the average price, the percent change has been calculated using:

$$p_j=100\ (\exp\ (c_j) - 1)$$

where c_j indicates the coefficient of a dummy variable from the regression.

The subsample of Spanish wines has been analyzed, and the results are similar to the full sample. The main differences in results reside in the categories of in the subsample, where for grape/blend, region/appellation or consumer ratings there are missing variables. The results of both samples seen be reasonable based on the sample size and variables used, and for that reason, the full sample size has been chosen for further analysis.

5 Empirical Results

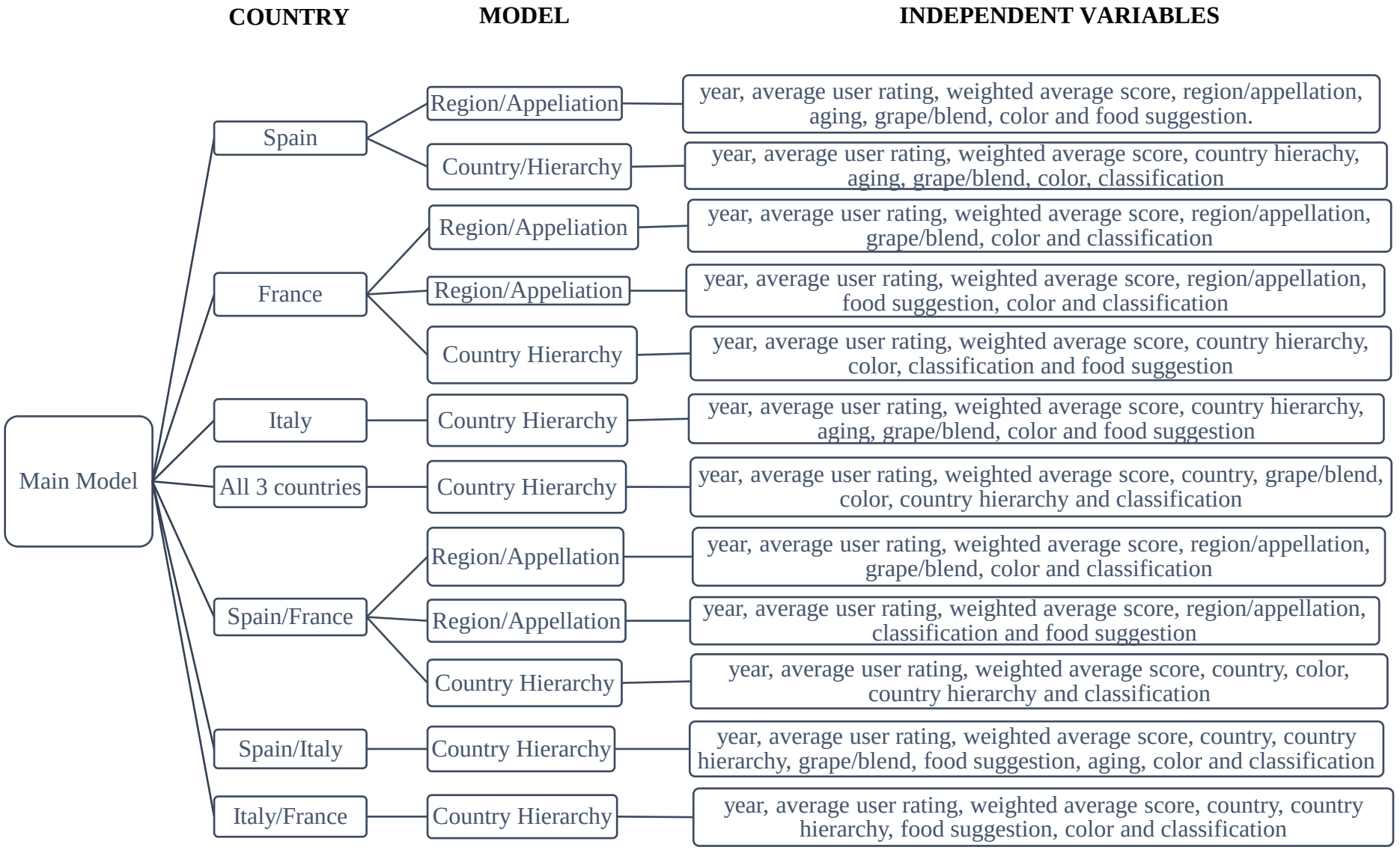
All the results from each model can be found in the appendix (from table 7.17 to table 7.23). The models presented in this section are divided into region/appellation and country hierarchy. Using both categories in the same regression causes perfect collinearity.

Furthermore, in every regression, the default value for the variable year is 2004. For the remaining categories, the default variable is underlined in tables 13 to 19 for each country and the comparisons among them. Additionally, the sample size in percentage per variable has been added in between parenthesis.

Figure 17 displays the different kinds of models estimated for each country individually, the 3 countries together and pairwise.

An analysis of each individual country has been conducted to identify which variables influence wine prices. Then, the analysis of the 3 countries was conducted to identify whether the country and origin effect of the wine is significant and have an effect on the wine price. Finally, pairwise analyses were conducted comparing Spain/France, Spain/Italy and France/Italy to verify the robustness of the results obtained in the 3 countries analysis.

Figure 63: Models



The following part will introduce the results for each country individually. Also, a table will illustrate which variables were used per category.

5.1 Spain

Table 13: Categories used in Spanish Wine Regression

Region / Appellation	Rioja (28%), Ribera del Duero (20%), Priorat (13%), Rioja Alavesa (9%), Rioja Alta (7%), Toro (4%), Castilla y Leon VT (4%), Other (15%)
Country Hierarchy	Rioja (44%), Castilla y Leon (30%), Catalonia (19%), Other (7%)
Grape/Blend	Tempranillo (47%), Rioja Red Blend (18%), Carignan-Grenache (6%), Grenache (4%), Cabernet-Merlot-Tempranillo (4%), Other (21%)
Food Suggestion	Lamb (96%), Other (4%)
Aging	Crianza (7%), Reserva (21%), Gran Reserva (11%), No (61%)
Color	Red (98%), White (2%)
Classification	DO (39%), DOCa (57%), Vino de la Tierra (4%)
Average User Rating	Excellent (0.49%), Very Good (48.15%), Good (50.12%), Fair (0.99%), Just Drinkable (0.25%)
Year	2004, 2005, 2006
Weighted Average Score	85 to 96

5.1.1 Model with Region/Appellation

In this model, the independent variables included are: year, average user rating, weighted average score, region/appellation, aging, grape/blend, color and food suggestion (see table 7.17.1 under appendix). Unfortunately, classification caused perfect collinearity with region/appellation and has been removed of the regression.

The vintage year for 2006 is significant and drives the wine price down relative to 2004 prices, which contradicts previous studies such as Angulo et al. (2000) as well as the information presented in the chapter methodology regarding the corresponding price of wine export for each country for the years 2004 to 2006. This result might reveal a limitation of the data, whether caused by the data generating process or the nature of the data itself. Indeed, the downward trend presented in wine prices for Spain in our data contradicts the information of the past upward trends in the wines exports. Regarding the

consumer's opinion, when the wine is excellent, it is significant and affects negatively Spanish wine prices. This result is the opposite of what anyone would expect. However, due to downward trend of Spanish wine prices observed in the descriptive statistics, it is not surprising. The variable weighted average score indicates that expert wine tasters influence positively wine price. With respect to the variable region/appellation, Rioja Alta wines seem to be cheaper compared with another regions/appellation. In regard to the aging of the wine, all three classifications affect negatively the wine price, which indicates that those wines are cheaper compared with wines that have not been through a longer aging and maturation process. This result contradicts previous studies such as Oczkowsky (1994), but as the vintage year and the consumers' rating could be an effect of the down trend of prices. In the case of grape/blend, Rioja Red Blend and Grenache have a positive relation with wine prices. Color and food suggestion do not seem to affect the wine price.

5.1.2 Model with Country Hierarchy

The independent variables included were the same as in the previous model but with an added variable: classification (see table 7.17.1 under appendix).

The results are the same for the variable year, consumer's and expert's tasters rate, color, aging and food suggestion. However, in the variable grape/blend there is a slight modification: Tempranillo, Rioja Red Blend and Carignan/Grenache are positive correlated with wine price. Also, regarding country hierarchy, wine from Catalonia have a positive impact on the wine price. The variable wine classification is not significant.

5.2 France

Table 14: Categories used in French Wine Regression

Region / Appellation	Saint-Emilion Grand Cru (9%), Margaux (7%), Pomerol (7%), Pessac Leognan (6%), Other (71%)
Country Hierarchy	Bordeaux (56%), Burgundy (29%), Rhone (12%), Other (3%)
Grape/Blend	Bordeaux Blend Red (46%), Pinot Noir (21%), Chardonnay (8%), Southern Rhone Red (5%), Syrah (4%), Other (16%)
Food Suggestion	Beef (51%), Duck (21), Other (28%)
Color	Red (84%), White (16%)
Classification	All variables in the sample (Cru Bourgeois)
Average User Rating	Excellent (1.78%), Very Good (45.9%), Good (51.78%), Fair (0.53%)
Year	2004, 2005, 2006
Weighted Average Score	85 to 98

5.2.1 Model I with Region/Appellation

The independent variables included are: year, average user rating, weighted average score, region/appellation, grape/blend, color and classification (see table 7.18.1 under appendix). Unfortunately, food suggestion caused perfect collinearity and has been removed of the regression.

The vintage year is not significant. With respect consumers' opinion, only wines with excellent reviews have a positive impact on the wine price. As seen in the case of Spain, the experts' rates have significant impact on the wine price, increasing it. Regarding region/appellation, Saint-Emilion Grand Cru, Margaux and Pomerol have a positive effect on wine prices. In the case of France, all grape/blend variables are significant, but only Pinot Noir and Chardonnay wines increase the price compared with Bordeaux Blend Red, Southern Rhone Red and Syrah that drive the wine price down. Also, red wines affect positively the price. Regarding wine classification, Cru Classe des Graves, Grand

Cru Classe des Graves, Grand Cru, Grand Cru Classe, Premier Grand Cru Classe A and B and wines with no classification have a positive impact on wine price.

5.2.2 Model II with Region/Appellation

The independent variables are the same as in the model I with one modification: the grape/blend is included in detriment of food suggestion (see table 7.18.1 under appendix).

The results in the following variables are the same as model I: vintage year, consumers' and experts' rate. There is a change in the variable region/appellation: Margaux and Pomerol have a positive effect on the price, while Pessac-Leognan decreases the wine price. Regarding color, red wines drive wine prices down. Also, in the variable classification, all of them have a positive effect on wine prices. Regarding food suggestion, wines used for beef and venison, duck, goose and game bird have a higher price.

5.2.3 Model with Country Hierarchy

The independent variables are: year, average user rating, weighted average score, country hierarchy, color, classification and food suggestion (see table 7.18.2 under appendix).

The vintage year 2005 affects the price negatively, as seen in Spain. The consumers' rating for excellent wines have a positive impact on wine price. As in the previous model, the experts' opinion matters and has a positive correlation with wine prices. Regarding country hierarchy, Burgundy wines affect positively the wine price. In this scenario, the variable color is not significant. In the variable wine classification, all of them are significant except for Premier Cru and they have a positive effect on wine prices. Regarding food suggestion, wines used with beef and venison have higher prices.

5.3 Italy

Table 15: Categories used in Italian Wine Regression

Country Hierarchy	Tuscany (49%), Piedmonte (34%) Veneto (6%), Other (11%)
Grape/Blend	Nebbiolo (33%), Sangiovese (26%), Bordeaux Blend Red (5%), Chianti Blend (4%), Merlot (3%), Other (29%)
Food Suggestion	Beef (57%), Lamp (39%), Other (4%)
Aging	Riserva (9%), No (91%)
Color	Red (97%), White (3%)
Classification	DOC (14%), DOCG (62%), IGT (24%)
Average User Rating	Excellent (0.66%), Very Good (66.8%), Good (32.01%), Fair (0.53%)
Year	2004, 2005, 2006
Weighted Average Score	86 to 96

5.3.1 Model with Country Hierarchy.

The independent variables included are: year, average user rating, weighted average score, country hierarchy, aging, grape/blend, color and food suggestion (see table 7.19.1 under appendix).

The variable vintage year, 2006 affects negatively the wine price, just like for Spanish wines. Similarly to the case of France, the consumers' opinion when the wine is excellent has a positive impact on price. Also, the experts' rating influences positively the wine price. Regarding country hierarchy, Veneto, Tuscany and Piedmont have a positive impact on wine prices. Analyzing the variable grape/blend, Chianti Blend wines are significant correlated with prices but not as valuable as other grape/blends. Regarding the aging of the wine, riserva wines have a positive effect on the wine price. Red wines are significant but cheaper compared with white ones. In wine classification, DOC wines impact positively prices. The variable food suggestion is not significant.

5.4 Spain vs France vs Italy

Table 16: Categories used in Spanish, French and Italian Wine Regression

Country	France, Italy, Spain
Country Hierarchy	Rioja, Castilla y Leon, Catalonia, Burgundy, Bordeaux, Rhone, Veneto, Tuscany, Piedmonte, Other
Grape/Blend	Bordeaux Blend Red, Chardonnya, Nebbiolo, Pinot Noir, Rioja Red Blend, Sangioves, Tempranillo, Other
Food Suggestion	Beef and venison, Duck, Chicken,Lamp, Other
Color	Red, White
Classification	DOC,DOCa, Grand Cru, Grand Cru Classe, Premier Cru, DOC, DOCG, No, Other
Average User Rating	Excellent, Very Good, Good, Fair, Just Drinkable
Year	2004, 2005, 2006
Weighted Average Score	85 to 98

5.4.1 Model with Country Hierarchy

The independent variables included are: year, average user rating, weighted average score, country, grape/blend, color, country hierarchy and classification (see table 7.20.1 under appendix).

The vintage year 2006 is significant and affects negative wine prices. In the data for Spanish and French wines, prices drop in 2006 and that could explain that result. Consumers' rating is significant for excellent, good and very good wines which affect positively the price. Expert wine tasters have a positive influence on wine prices. Also, French wines have higher prices compare with Spanish and Italian ones. Regarding the variable grape/blend, Bordeaux Blend Red wines drive down the price while, Chardonnay and Pinot Noir have a positive correlation with wine prices. In this scenario, red wines have positive effect on prices. Regarding country hierarchy, Catalonia, Veneto, Tuscany, Piedmont and Burgundy are significant and positive and Bordeaux is marginally

significant and positive. However, Rhone wines are not as well valued. Regarding wine classification, DOC wines have a positive effect on price.

5.5 Spain vs France

Table 17: Categories used in Spanish and French Wine Regression

Region / Appellation	Ribera del Duero, Rioja, Priorat,Rioja Alavesa, Rioja Alta, Toro, Castilla y Leon VT, Saint-Emilion Grand Cru, Margaux, Pessac Leognan, Pomerol, Other
Country Hierarchy	Rioja, Castilla y Leon, Catalonia, Burgundy, Bordeaux, Rhone, Other
Grape/Blend	Bordeaux Blend Red, Pinot Noir, Chardonnay, Rioja Red Blend, Tempranillo, Other
Food Suggestion	Beef, Chicken, Duck, Lamp, Other
Country	France, Spain
Color	Red, White
Classification	DO, Grand Cru, Grand Cru Classe, Premier Cru, Not, Other
Average User Rating	Excellent, Very Good, Good, Fair, Just Drinkable
Year	2004, 2005, 2006
Weighted Average Score	85 to 98

5.5.1 Model I with Region/Appellation

The independent variables included are: year, average user rating, weighted average score, region/appellation, grape/blend, color and classification (see table 7.21.1 under appendix). Unfortunately, food suggestion caused perfect collinearity.

The vintage year 2005 and 2006 drive the wine prices down. Once again, the expert wine tasters play an important role determining the wine price and the effect is positive. The consumer's rating is positive and significant for excellent, fair, good and very good wines. The variable country is not significant. Regarding grape/blend, Chardonnay and Pinot Noir have a positive effect on wine prices. Red wines affect significantly wine prices. The

regions/appellations Saint-Emilion Grand Cru, Margaux and Pomerol rise wine prices. Regarding wine classification, no variable is found significant.

5.5.2 Model II with Region/Appellation

The same independent variables were used as in model I, but grape/blend and color have been removed due to perfect collinearity to use instead food suggestion (see table 7.21.1 under appendix).

The results are the same for the year vintage, expert ratings, country, color, region/appellation. In this scenario, consumer ratings are significant and positive for excellent and very good wines. Regarding wine classification, Grand Cru and Premier Cru are positive and significant. The variable food suggestion indicates wines used with beef, benison, duck, goose, game bird, chicken and turkey have a higher price.

5.5.3 Model with Country Hierarchy

The independent variables included are: year, average user rating, weighted average score, country, color, country hierarchy and classification (see table 7.21.2 under appendix). Food suggestion and grape/blend were omitted due to perfect collinearity.

Again, both vintage years 2005 and 2006 are significant and negative. The consumer rating is significant and positive for excellent and good wines and the experts' rating is once again affecting positively wine prices. In the variable country, the French wine are significant and positive. Regarding country hierarchy, wines from Catalonia and Burgundy have a positive effect on prices but, wines form Rhone are not as well valued. Red wines are significant and positive. The variable wine classification is significant and positive for wines without any classification.

5.6 Spain Vs Italy

Table 18: Categories used in Spanish and Italian Wine Regression

Country	Italy, Spain
Country Hierarchy	Rioja, Castilla y Leon, Catalonia, Veneto, Tuscany, Piedmonte, Other
Grape/Blend	Nebbiolo, Sangiovese, Bordeaux Blend Red, Chianti Blend, Merlot, Other
Food Suggestion	Beef and venison, Lamp
Aging	Crianza, Reserva, Gran Reserva, Riserva, No
Color	Red, White
Classification	DO, DOCa, DOC, DOCG,Other
Average User Rating	Excellent, Very Good, Good, Fair, Just Drinkable
Year	2004, 2005, 2006
Weighted Average Score	85 to 96

5.6.1 Model with Country Hierarchy

The independent variables included are: year, average user rating, weighted average score, country, country hierarchy, grape/blend, food suggestion, aging, color and classification (see table 7.22.1 under appendix).

The vintage year 2006 is significant and negative. Consumer ratings are not significant but expert ones are and also positive. The variable country is not significant. Regarding grape/blend, Rioja Red Blend and Tempranillo are significant and have a positive effect on wine prices. Regarding country hierarchy, Catalonia, Veneto, Tuscany and Piedmont are significant and have higher wine prices. Food suggestion is not significant and wines with DOC label are significant and positive. As seen in the individual models for Spain and Italy, the aging variable is significant for both countries but Spanish wines drive down prices while Italian ones do not.

5.7 France vs Italy

Table 19: Categories used in French and Italian Wine Regression

Country	France, Italy
Country Hierarchy	Bordeaux, Burgundi, Rhone, Veneto, Tuscany, Piedmonte, Other
Grape/Blend	Bordeaux Blend Red, Chardonay, Nebbiolo, Sangiovese, Pinot Noir, Other
Food Suggestion	Beef and venison, Chichen, Duck
Color	Red, White
Classification	Grand Cru, Grand Cru Classe, Premier Cru, No, DOC, DOCG,Other
Average User Rating	Excellent, Very Good, Good, Fair
Year	2004, 2005, 2006
Weighted Average Score	86 to 98

5.7.1 Model with Country Hierarchy

The independent variables included are: year, average user rating, weighted average score, country, country hierarchy, food suggestion, color and classification (see table 7.23.1 under appendix).

The vintage year 2006 is significant and negative. Wines where the consumer's opinion is excellent have a positive effect on the price. Once again, the experts' rating is significant and positive. French wines, as in the comparison with Spain, have higher prices. Regarding grape/blend, Bordeaux Blend Red is significant and negative, while Chardonnay and Pinot Noir are significant and have a positive effect on price. Red wines are significant and positive. Related to country hierarchy, Veneto, Tuscany and Piedmont and significant and positive. DOC wines affect positively wine prices. Regarding food suggestion, wines used with beef, venison, chicken and turkey have higher prices.

Table 20 provides a summary of the country, region/appellation and country hierarchy effect from the pairwise and three country analysis. The results reported correspond to all

significant variables whether positive or negative. The effect of the country over the wine bottle's price is also provided in U.S dollars for the different regions and country hierarchy of the study. As aforementioned, the percentage change of a dummy variable has been calculated and is provided in the table.

Table 20: Country, Region/Appellation, Country Hierarchy Effects

EFFECT	ALL 3 COUNTRIES	SPAIN VS FRANCE	SPAIN VS ITALY	FRANCE VS ITALY
COUNTRY	France 77.93%	France[7] 67.31%	-	France 98.80%
REGION / APPELLATION	-	Only for French Wines[8]: Saint Emilion Grand Cru 29.68%, Margaux 23.79%, Pomerol 42.82%	-	-
COUNTRY HIERARCHY	Catalonia 53.66%, Veneto 39.12%, Tuscany 27.68%, Piedmont 111.60%, Burgundy 59.55%, Bordeaux 24.61%, Rhone -23.70%	Catalonia 41.9%, Burgundy 240.39%, Rhone -26.02%	Catalonia 62.03%, Veneto 30.73%, Tuscany 25.59%, Piedmont 144.38%	Only for Italian Wines: Veneto 31.89%, Tuscany 29%, Piedmont 147.94%

As it can be seen, the results regarding the variable country from the comparison of Spain, France and Italy is a robust result because it was significant and positive for every model. Additionally, under the category country hierarchy we can observe which locations have

[7] Using the country hierarchy model
[8] Model I used (higher t value)

a positive or negative impact on wine prices. These findings show consistency across the different models applied.

6 Conclusion, implications and limitation of the study

The conducted research aimed at providing new empirical evidence on factors and attributes affecting wine prices and considering variables that have not been looked upon is the current literature. Using a free online source of data accessible to any wine consumer while considering additional elements that could influence wine price such as consumers' rating or suggested food for a particular wine, we found significant results across the three analyzed countries: Spain, France and Italy.

The analysis, in the case of Spain, which is the data set with the most limitations, the experts' wine grade, the origin, and the grape/blend seem to be valuable for consumers. For French wines, we observed how consumers' opinion for high quality wines, the experts' rating, the wine classification and the food that accompanies the wine drive wine prices. Additionally, depending on the grape/blend and origin or appellation of the wine, the consumer has certain preferences which affects wine prices positive and negatively. In the case of Italy, the consumer rating for high quality wines, the experts' opinion, the origin, aging and wine appellation have a positive impact on wine prices. On the other hand, grape/blend and color did not seem relevant for the consumer.

Regarding the comparison of the three countries, French wines seem to have a higher reputation among consumers, which explains the positive effect on the bottle of wine price. Additionally, it appeared that the origin of the wine is important for consumer, and depending on the location, wine bottles have a higher or lower price, which seems perfectly reasonable. The same situation occurs with the grape/blend of the wine. Furthermore, the consumers' and experts' opinion have positive impact on the wine prices, especially the latter. The color of the wine is an attribute that affects positively the wine price. Additionally, appellation has a positive effect on wines prices for Italian wines.

In the scenario of Spanish and French wines, the experts' and consumers' rate for high quality wines (namely "excellent" and "very good") seem to be relevant to determine wine prices. The origin of the wine is an important decision factor for the consumer, where the location drives wine prices. Moreover, it was noticed that only the factor regions and French appellations affect the wine price, which might be due to the limitations of the data for Spanish wine. Also, the color has a positive influence on wine price. In the only model where food suggestion was used, it appeared that the consumed food affects the choice of wine.

Regarding the comparison on Italian and Spanish wines, the experts' rating is an important factor affecting wine prices. The grape and origin of the wine have a positive effect on wine prices and appears to be relevant for consumers. Also, for Italian wines, the aging and appellation of the wine are valuable attributes, which have a positive effect on wine prices.

Finally, for Italian and French wines, the results follow a very similar trend as in the previous analysis. Overall, French wines have a bigger impact on wine prices and are more expensive and valuable. The color, the appellation for Italian wines and classifications for French wines as well as the food that accompany the wine have a positive effect on the price. Regarding the origin and grape/blend, we observed how the consumer has certain preferences that drive down or up the wine price.

The implications of these results are multiple and might be useful to three different groups of individuals. First, it might give wine producers in Spain, France or Italy the tools to make informed decision when choosing the kind of wine production they want to invest in. Indeed, being aware of what factors might influence the wine prices might help them

decide where they would like to position their product on the market and choose accordingly the type of grape/blend and color they want to plant.

This study also has pricing implication that might be relevant to wine retailers or restaurant owners who are not sure how to price their wine bottles and stay reasonable to costumers. Consumers represent another group we might think of when assuming the pricing implications of this study. Indeed, this study provides the reader with elements that would help them make better purchase decision when buying wine keeping in mind what factors may make the price of a bottle increase and maybe even being able to recognize overpriced or inexpensive bottles.

While this study might inform a wide array of population, it is important to discuss the limitation of the data we used to obtain our results. The sample size is not relatively the same for all three countries with the Spanish data set being the smallest. Moreover, there are numerous regions/appellations, grape/blend and country hierarchies with few wine bottle observations that had to be regrouped in order to perform the analysis. Regarding the wine price, it does not follow the trend observed for 2004, 2005 and 2006.

Also, we wanted to mention a factor that was not considered in the data because of the lack of information provided by our data source and that might be valuable for future research. Sustainable wine production has been a common practice for wine producers and some wine companies foster environmental friendly practices when producing and marketing wines, which represents an important strategy used by wineries as product differentiation and competitive advantage to increase sales. It would be interesting to see how sustainable wines affect the overall wine prices in each country.

7 Appendix

7.1 Table: Review of Previous Studies

		Subjective Attributes			*Objective Attributes*								
					Origin		Grape						
Author	*Price*	Sensory Attributes	Jury Grade	Reputation (Past Jury Grade)	Area / State	Region, geographical indication, appealltion	Color	Variety	Vintage	Producer Size	Ranking	Cellaring Potential	*Wine Location*
Oczkowski (1994)	Sugested retail prices from wine guide	No	Yes	No	No	Yes	No	Yes	Yes	Yes	No	Yes	Australian table wine
Combris et al. (1997)	Producer's price	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	No	Bordeaux (France)
Combris et al. (2000)	Producer's price	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	No	Burgundy (France)
Cardebat and Figuet (2004)	Producer's price	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	Yes	Bordeaux (France)
Landon and Smith (1997)	Sugested retail prices from wine guide	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Bordeaux (France)
Angulo et al. (2000)	Sugested retail prices from wine guide	No	Yes	No	No	Yes	No	Yes	No	No	No	Yes	Spanish red wines
Nerlove (1995)	FOB market pricek	Yes	No	No	Yes	No	Yes	No	No	No	No	No	Import wines in Swedish
Steiner (2004)	Retail Prices	No	No	No	No	Yes	No	Yes	Yes	No	No	No	Australian wines in Britain
Schamel and Anderson (2003)	Sugested retail prices from wine guide	No	No	No	No	Yes	No	Yes	Yes	No	No	No	Australian & New Zealand wines
Lecocq and Visser (2006)	Producer's price	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	Bordeaux and Burgundy (France)
Cardebat and Figuet (2009)	Producer's price	Yes	Yes	No	No	Yes	No	No	Yes	No	No	No	Alsace, Beaujolais and Provence (France)
Benfratello et al. (2009)	Producer's price	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	No	Barolo and Barbaresco (Italy)
Roma et al. (2013)	Producer's price	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Sicialian wines (Italy)
Boatto et al. (2011)	Retail Prices	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	Tocai wine grape (Italy)

7.2 Table: Top exporters in volume (millions of hectoliters) worldwide

Country	2011	2012	2013	2014	2015	Variation in % 2014-2015
Spain	22	21.4	18.2	22.3	24	7.5%
Italy	23.5	21.2	20.3	20.4	20	-2%
France	14.7	15	14.5	14.3	14	-2.3%
Chile	6.3	7.5	8.8	8.1	8.8	8.6%
Australia	7	7.2	7.1	7	7.4	6.4%
South Africa	3.6	4.2	5.3	4.2	4.2	0.6%
USA	4.2	4	4.2	4	4.2	3.5%
Germany	4.1	4	4	3.9	3.6	-6.6%
Portugal	3.1	3.4	3	2.8	2.8	-1.2%
Argentina	3.1	3.7	3.1	2.6	2.7	1.9%
New Zealand	1.5	1.8	1.8	1.9	2.1	11.5%
Total	103	104	101	102	104	1.9%

Source: International Organization of Wine

7.3 Table: Top exporters in value (billions of Euros) worldwide

Country	2011	2012	2013	2014	2015	Variation in % 2014-2015
France	7.2	7.8	7.8	7.7	8.2	6.8%
Italy	4.4	4.7	5	5.1	5.4	5.3%
Spain	2.2	2.4	2.6	2.5	2.6	4.4%
Chile	1.2	1.4	1.4	1.4	1.6	18.9%
Australia	1.4	1.5	1.3	1.3	1.5	15.6%
USA	1	1.1	1.2	1.1	1.4	26.4%
New Zealand	0.6	0.8	0.8	0.8	1	13.9%
Germany	1	1	1	1	1	-2.4%
Portugal	0.7	0.7	0.7	0.7	0.7	1.8%
Argentina	06.	0.7	0.7	0.6	0.7	16.8%
South Africa	0.5	0.6	0.6	0.6	0.6	6%
Total	23	25	26	26	28	9.8%

Source: International Organization of Wine

7.4 Table: Top importers in volume (millions of hectoliters) worldwide

Country	2011	2012	2013	2014	2015	2015/2014 Variation (%)
Germany	16.1	15.3	15.2	15.4	15.1	-2.0%
UK	13.3	12.8	11.8	13.6	13.6	0.0%
USA	10.2	11.7	11.7	10.7	11	3.0%
France	6.7	5.4	6	6.9	7.8	12.0%
China	3.7	3.9	3.8	3.8	5.6	45.0%
Canada	3.6	3.8	3.7	3.8	4.1	7.0%
Russian Federation	5	4.9	4.9	4.7	4	-14.0%
World Total	99	99	99	101	102	1.3%

Source: International Organization of Wine

7.5 Table: Top importers in value (billions of euros)

Country	2011	2012	2013	2014	2015	2015/2014 Variation (%)
USA	3.5	3.9	3.9	4	4.9	20.0%
UK	3.4	3.9	3.6	3.6	3.9	9.0%
Germany	2.4	2.4	2.6	2.6	2.5	-4.0%
China	1	1.2	1.2	1.1	1.8	61.0%
Canada	1.4	1.5	1.5	1.5	1.6	10.0%
Japon	0.9	1.2	1.2	1.2	1.3	9.0%
World Total	23	25	25	26	28	9.7%

Source: International Organization of Wine

7.6 Table: Total grape production (millions of tons) worldwide

Total Grape Production (millions of tons)						Production in 2014 (in %)		
	2011	2012	2013	2014	2015	Fresh Grape	Dried Grape	Wine Grape
China	9.2	10.6	11.6	12.3	12.6	75%	6%	12%
Italy	7.1	6.9	8	6.9	8.2	15%	0%	85%
USA	6.5	6.8	7.8	7.1	7	17%	18%	45%
France	6.6	5.4	5.5	6.1	6.3	1%	0%	99%
Spain	5.7	5.3	7.4	6.1	6	4%	0%	85%
Turkey	4.3	4.2	4	4.2	3.6	49%	41%	2%
Chile	3	2.8	2.9	2.8	3.1	27%	13%	49%
India	1.2	2.2	2.5	2.6	2.6	80%	10%	1%
Argentina	3	2.4	2.9	2.7	2.4	2%	3%	75%
Iran	2.1	2.2	2	2.2	2.1	53%	37%	0%
South Africa	1.7	1.8	2	2	2	19%	7%	73%
Australia	1.6	1.7	1.8	1.7	1.7	6%	2%	92%
Egypt	1.3	1.4	1.4	1.6	1.6	90%	0%	0%
Brazil	1.5	1.5	1.4	1.5	1.5	50%	0%	24%
Germany	1.3	1.2	1.1	1.2	1.2	0%	0%	98%
World Total	69.2	69.5	76.8	75.1	75.7	36%	8%	48%

Source: International Organization of Wine

7.7 Table: World wine consumption (millions of hectoliters) worldwide

World Consumption (in mhl)				World Share			
	2013	2014	2015	2000	2005	2010	2015
USA	30	31	31	9.0%	11.0%	11.0%	13.0%
France	28	28	27	15.0%	14.0%	12.0%	11.0%
Italy	22	20	21	14.0%	11.0%	10.0%	8.0%
Germany	20	20	20	5.0%	5.0%	6.0%	9.0%
China	16	15	16	9.0%	8.0%	8.0%	8.0%
United Kingdom	13	13	13	4.0%	6.0%	5.0%	5.0%
Argentina	10	10	10	6.0%	5.0%	4.0%	4.0%
Spain	10	10	10	6.0%	6.0%	4.0%	4.0%
Russian Federation	10	10	9	2.0%	4.0%	5.0%	4.0%
Australia	5	5	5	2.0%	2.0%	2.0%	2.0%
Canada	5	5	5	1.0%	2.0%	2.0%	2.0%
Portugal	5	5	5	2.0%	2.0%	2.0%	2.0%
South Africa	4	4	4	2.0%	1.0%	1.0%	2.0%
World Total	243	240	239	-	-	-	-

Source: International Organization of Wine

7.8 Table: Spanish Wine Production in 2016/2017 by Region and Color

	Wine Production				**Total**	**%**
	Red/Ros	%	White	%		
ANDALUCIA	64917	0.3%	816608	3.8%	881525	2.1%
ARAGON	1207923	5.8%	146327	0.7%	1354250	3.2%
ASTURIAS	1668	0.0%	401	0.0%	2069	0.0%
BALEARES	35493	0.2%	17092	0.1%	52585	0.1%
CANARIAS	24969	0.1%	23455	0.1%	48424	0.1%
CANTABRIA	303	0.0%	500	0.0%	803	0.0%
CASTILLA LA MANCHA	9865338	47.3%	13744265	63.4%	23609603	55.5%
CASTILLA Y LEON	1413835	6.8%	878032	4.1%	2291867	5.4%
CATALUÑA	813979	3.9%	2303885	10.6%	3117864	7.3%
EXTREMADURA	1263020	6.0%	2463645	11.4%	3726665	8.8%
GALICIA	89859	0.4%	326201	1.5%	416060	1.0%
C.MADRID	64198	0.3%	49233	0.2%	113431	0.3%
MURCIA	713505	3.4%	31577	0.1%	745082	1.8%
NAVARRA	712588	3.4%	79360	0.4%	791948	1.9%
PAIS VASCO	650673	3.1%	97608	0.5%	748281	1.8%
LA RIOJA	1992675	9.5%	139835	0.6%	2132510	5.0%
C.VALENCIANA	1961760	9.4%	546629	2.5%	2508389	5.9%
TOTAL	20876703	100.0%	21664653	1000%	42541356	100.0%

Source: Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente

7.9 Table: French Wine Production in 2015 by Color and Classification

	PDO	%	PGI	%	Without Geographical Indication	%	Used in the production of Cognac or Armagnac	Total
Red	10840490	51%	6576654	49%	1239580	47%	0	18656724
Rose	3249370	15%	3200570	24%	365586	14%	0	6815526
White	7266770	34%	3609531	27%	1051530	40%	9447551	21375382
Total	21356630	100%	13386755	100%	2656696	100%	9447551	46847632

Source: Observatoire de la viticulture française

7.10 Table: French Wine Production by Region, 2015

	Volume (hl)	%
Alsace-Est	1006847	2.1%
Aquitaine	6229104	13.3%
Bourgogne-Beaujolais-Savoie-Jura	2520597	5.4%
Champagne	2034717	4.3%
Charentes-Cognac	9650029	20.6%
Corse	384693	0.8%
Languedoc-Roussillon	11601170	24.8%
Sud-Ouest	2773205	5.9%
Val de Loire-Centre	3118621	6.7%
Vallee du Rhone - Provence	7524147	16.1%
Without Region	4500	0.0%
Total	46847630	100.0%

Source: Observatoire de la viticulture française

7.11 Table: France Vineyard Surface by Region, 2015

Regions	Surface (ha)	%
Alsace-Est	16943	2.1%
Aquitaine	137815	17.1%
Bourgogne-Beaujolais-Savoie-Jura	54294	6.7%
Champagne	34332	4.3%
Charentes-Cognac	83557	10.4%
Corse	6286	0.8%
Languedoc-Roussillon	208978	25.9%
Sud-Ouest	42107	5.2%
Val de Loire-Centre	64264	8.0%
Vallée du Rhône - Provence	157236	19.5%
Aucun bassin viticole	319	0.0%
Total	806131	100.0%

Source: Observatoire de la vituculutre française

7.12 Table: Italian Wine Production by Region

Region	2011	2012	2013	2014	2015
Veneto	8,71	7,74	9,148	8,281	9,733
Puglia	5,777	5,338	5,908	5,43	7,932
Emilia Romagna	6,455	6,273	7,396	6,958	7,382
Sicilia	4,823	5,169	7,282	4,539	5,634
Abruzzo	2,283	2,443	2,728	2,273	2,985
Toscana	2,495	2,098	2,657	2,778	2,825
Piemonte	2,683	2,366	2,58	2,402	2,467
Friuli-Venezia Giulia	1,267	1,281	1,073	1,367	1,872
Lazio	1,205	1,365	1,571	1,302	1,696
Campania	1,726	1,542	1,644	1,183	1,614
Lombardia	1,313	1,222	1,301	1,424	1,41
Trentino-Alto Adige	1,113	1,21	1,362	1,029	1,23
Marche	741	918	1,039	915	959
Sardegna	486	503	638	746	794
Umbria	860	637	706	670	765
Calabria	302	400	370	314	404
Molise	255	319	319	297	232
Basilicata	113	189	178	102	87
Liguria	77	46	46	63	79
Valle d'Aosta	20	17	20	15	14
Italy	42,705	41,074	47,966	42,088	50,112

Source: Istituto Nazionale di Statistica

7.13 Table: Italian Main Grapes (thousands of hectares), 2015

SANGIOVESE	53
TREBBIANO	37
MONTEPULCIANO	27
GLERA	27
PINOTGRIGIO	25
MERLOT	24
CATARRATTO	22
CHARDONNAY	20

Source: Istituto di Servizi per il Mercato Agricolo Alimentare

7.14 Spain

7.14.1 Table: Table Region/Appellation

Region/Appellation	**Wine Bottles**	**%**
Bierzo	2	1.5%
Campo de Borja	1	0.7%
Castilla y Leon VT	5	3.7%
Catalonia	1	0.7%
Conca de Barbera	1	0.7%
Jumilla	3	2.2%
La Mancha	1	0.7%
Malaga	1	0.7%
Manchuela	1	0.7%
Monstsant	2	1.5%
Penedes	4	3.0%
Priorat	18	13.3%
Ribera del Duero	27	20.0%
Rioja	38	28.1%
Rioja Alavesa	12	8.9%
Rioja Alta	9	6.7%
Sandon de Duero	1	0.7%
Toro	6	4.4%
Valdepenas	2	1.5%
Total	135	100.0%

7.14.2 Table Country Hierarchy

Country Hierarchy	**Wine Bottles**	**%**
Andalucia	1	0.7%
Aragon	1	0.7%
Castilla la Mancha	4	3.0%
Castilla y Leon	41	30.4%
Catalonia	26	19.3%
Murcia	3	2.2%
Rioja	59	43.7%
Total	135	100.0%

7.14.3 Table Grape/Blend

Grape/Blend	**Wine Bottles**	**%**
Bordeaux Blend Red	1	0.7%
Cabernet - Carignan - Grenache	2	1.5%
Cabernet - Grenache - Merlot - Syrah	2	1.5%
Cabernet - Merlot - Syrah	1	0.7%
Cabernet - Merlot - Tempranillo	5	3.7%
Cabernet - Tempranillo	2	1.5%
Cabernet Franc - Cabernet Sauvignon	1	0.7%
Cabernet Sauvignon	1	0.7%
Cabernet - Grenache - Syrah	1	0.7%
Carignan - Grenache - Syrah	2	1.5%
Carignan - Grenache - Tempranillo	2	1.5%
Carinena - Grenache	8	5.9%
Grenache - Tempranillo	1	0.7%
Grenache	5	3.7%
Macabeo	1	0.7%
Mencia	2	1.5%
Monastrell - Tempranillo	1	0.7%
Monastrell	1	0.7%
Muscat of Alexandria	1	0.7%
Rare Red Blend	4	3.0%
Rioja Red Blend	25	18.5%
Syrah	1	0.7%
Syrah - Tempranillo	1	0.7%
Tempranillo	64	47.4%
Total	135	100.0%

7.14.4 Table Food Suggestion

Food Suggestion	**Wine Bottles**	**%**
Beef and Venison	3	2.2%
Chicken and Turkey	2	1.5%
Chilis and Hot Spicy Foods	1	0.7%
Lamb	129	95.6%
Total	135	100.0%

7.14.5 Table Wine Style

Wine Style	**Wine Bottles**	**%**
Aromatic and Floral	1	0.7%
Bold and Structured	17	12.6%
Buttery and Complex	1	0.7%
Rich and Intense	58	43.0%
Savory and Classic	57	42.2%
Tropical and Balanced	1	0.7%
Total	135	100.0%

7.14.6 Table Color

Color	**Wine Bottles**	**%**
Red	132	97.8%
White	3	2.2%

7.14.7 Table Aging

Aging	**Wine Bottles**	**%**
Crianza	9	6.7%
Reserva	29	21.5%
Gran Reserva	15	11.1%
No	82	60.7%
Total	135	100.0%

7.15 France

7.15.1 Table Region/Appellation

Region/Appellation	**Wine Bottles**	**%**
Alsace	1	0.3%
Bandol	2	0.5%
Barsac	3	0.8%
Batard-Montrachet	2	0.5%
Beaune Les Greves	1	0.3%
Bienvenues-Batard-Montrachet	1	0.3%
Bonnes-Mares	3	0.8%
Bordeaux	3	0.8%
Bordeaux Superieur	1	0.3%
Chablis Butteaux	1	0.3%
Chablis Forets	1	0.3%
Chablis Grand Cru Les Clos	3	0.8%
Chablis Grand Cru Valmur	1	0.3%
Chablis Montee de Tonnerre	1	0.3%
Chambertin Clos-de-Beze	3	0.8%
Chambolle-Musigny Les Amoureuses	4	1.1%
Chambolle-Musigny Les Cras	1	0.3%
Chambolle-Musigny Premier Cru	1	0.3%
Chambolle-Musigny	3	0.8%
Charmes-Chambertin	1	0.3%
Chassagne-Montrachet Les Grandes Ruchottes	1	0.3%
Chateau-Grillet	1	0.3%
Chateauneuf-du-Pape	21	5.6%
Chevalier-Montrachet	1	0.3%
Clos de la Roche	3	0.8%
Clos de Tart	1	0.3%
Clos de Vougeot	3	0.8%
Clos des Lambrays	1	0.3%
Clos Sainte Hune	1	0.3%
Cornas	2	0.5%
Corton Grand Cru	1	0.3%
Corton-Charlemagne	3	0.8%
Cote Rotie	9	2.4%
Cotes de Bordeaux Castillon	1	0.3%
Cotes de Bourg	1	0.3%
Cotes du Rhone	3	0.8%
Crozes-Hermitage	1	0.3%
Domaine Dujac	1	0.3%
Echezeaux	3	0.8%
Gevrey-Chambertin Clos Saint-Jacques	4	1.1%
Gevrey-Chambertin	3	0.8%

Grands Echezeaux	1	0.3%
Griotte-Chambertin	1	0.3%
Haut-Medoc	15	4.0%
Hermitage	9	2.4%
IGP Alpilles	1	0.3%
IGP Pays d'Herault	1	0.3%
IGP Saint-Guilhem-le-Desert	1	0.3%
La Grande Rue	1	0.3%
La Romanee	1	0.3%
La Tache	1	0.3%
Lalande-de-Pomerol	1	0.3%
Le Chambertin	3	0.8%
Le Montrachet	5	1.3%
Le Musigny	5	1.3%
Listrac-Medoc	1	0.3%
Margaux	27	7.2%
Medoc	2	0.5%
Meursault Charmes	1	0.3%
Meursault Perrieres	3	0.8%
Meursault	2	0.5%
Morey-Saint-Denis La Bussiere	1	0.3%
Morey-Saint-Denis	1	0.3%
Moulis-en-Medoc	2	0.5%
Nuits-Saint-Georges Clos de la Marechale	1	0.3%
Pauillac	26	7.0%
Pessac-Leognan	24	6.4%
Pomerol	25	6.7%
Pommard Clos des Epeneaux	1	0.3%
Pouilly-Fume	1	0.3%
Puligny-Montrachet Clavaillon	1	0.3%
Puligny-Montrachet Clos de la Mouchere	1	0.3%
Puligny-Montrachet Les Pucelles	1	0.3%
Puligny-Montrachet	1	0.3%
Richebourg	7	1.9%
Romanee-Conti	1	0.3%
Romanee-Saint-Vivant	3	0.8%
Ruchottes-Chambertin	1	0.3%
Saint-Emilion Grand Cru	35	9.4%
Saint-Emilion	1	0.3%
Saint-Estephe	14	3.7%
Saint-Julien	20	5.3%
Saumur-Champigny	1	0.3%
Sauternes	9	2.4%
Savennieres Coulee de Serrant	1	0.3%
Volnay Champans	1	0.3%

Volnay Clos des Chenes	1	0.3%
Volnay Clos des Ducs	1	0.3%
Volnay Santenots	1	0.3%
Vosne-Romanee Aux Brulees	1	0.3%
Vosne-Romanee Aux Malconsorts	1	0.3%
Vosne-Romanee Aux Raignots	1	0.3%
Vosne-Romanee Cros Parantoux	2	0.5%
Vosne-Romanee Les Suchots	1	0.3%
Vosne-Romanee	1	0.3%
Total	374	100.0%

7.15.2 Table Country Hierarchy

Country Hierarchy	W.Bottles	%
Alsace	1	0.3%
Alsace Clos Vineyards,Alsace	1	0.3%
Anjou, Loire	1	0.3%
Beaune Premier Cru, Beaune, Cote de Beaune, Burgundy	1	0.3%
Bordeaux	67	17.9%
Chablis Grand Cru, Chablis, Burgundy	4	1.1%
Chablis Premier Cru, Chablis, Burgundy	3	0.8%
Chambolle-Musigny Premier Cru, Chambolle-Musigny, Cote de Nuits, Burgundy	5	1.3%
Chambolle-Musigny, Cote de Nuits, Burgundy	9	2.4%
Chassagne-Montrachet Premier Cru, Chassagne-Montrachet, Cote de Beaune, Burgundy	1	0.3%
Corton Grand Cru, Cote de Beaune, Burgundy	3	0.8%
Cote de Beaune, Burgundy	4	1.1%
Cote de Nuits, Burgundy	8	2.1%
Cotes de Bordeaux, Bordeaux	2	0.5%
Cru, Vosne-Romanee, Cote de Nuits, Burgundy	1	0.3%
Flagey-Echezeaux, Cote de Nuits, Burgundy	4	1.1%
Gevrey-Chambertin Premier Cru, Gevrey-Chambertin, Cote de Nuits, Burgundy	4	1.1%
Gevrey-Chambertin, Cote de Nuits, Burgundy	9	2.4%
Medoc, Bordeaux	104	27.8%
Meursault Premier Cru, Meursault, Cote de Beaune, Burgundy	4	1.1%
Morey-Saint-Denis Premier Cru, Morey-Saint-Denis, Cote de Nuits, Burgundy	1	0.3%
Morey-Saint-Denis, Cote de Nuits, Burgundy	6	1.6%
Nuits-Saint-Georges Premier Cru, Nuits-Saint-Georges, Cote de Nuits, Burgundy	1	0.3%
Pommard Epenots, Pommard Premier Cru, Pommard, Cote de Beaune, Burgundy	1	0.3%
Provence	2	0.5%
Puligny-Montrachet Premier Cru, Puligny-Montrachet, Cote de Beaune, Burgundy	3	0.8%
Puligny-Montrachet, Cote de Beaune, Burgundy	9	2.4%
Rhone	46	12.3%
Saint-Emilion, Bordeaux	35	9.4%
Sauternes, Bordeaux	3	0.8%
Savennieres, Anjou, Loire	1	0.3%
Upper Loire, Loire	1	0.3%
Vin de Pays - IGP	3	0.8%
Volnay Premier Cru, Volnay, Cote de Beaune, Burgundy	4	1.1%
Vosne-Romanee Premier Cru, Vosne-Romanee, Cote de Nuits, Burgundy	5	1.3%
Vosne-Romanee, Cote de Nuits, Burgundy	14	3.7%
Vougeot, Cote de Nuits, Burgundy	3	0.8%
Total	374	100.0%

7.15.3 Table Grape/Blend

Grape/Blend	**Wine Bottles**	**%**
Bordeaux Blend Red	173	46.3%
Bordeaux Blend White	4	1.1%
Cabernet - Mourvedre - Syrah	1	0.3%
Cabernet - Syrah/Shiraz	1	0.3%
Cabernet Franc	1	0.3%
Cabernet Franc - Merlot	9	2.4%
Cabernet Sauvignon - Merlot	5	1.3%
Chardonnay	30	8.0%
Chenin Blanc	1	0.3%
Grenache - Mourvedre	2	0.5%
Grenache (Garnacha)	3	0.8%
Marsanne	1	0.3%
Marsanne - Roussanne	1	0.3%
Merlot	3	0.8%
Pinot Noir	77	20.6%
Rare Red Blend	1	0.3%
Riesling	2	0.5%
Roussanne	1	0.3%
Sauvignon Blanc	2	0.5%
Sauvignon Blanc - Semillon	11	2.9%
Semillon	5	1.3%
Southern Rhone Red Blend	20	5.3%
Syrah	16	4.3%
Syrah - Viognier	3	0.8%
Viognier	1	0.3%
Total	374	100.0%

7.15.4 Table Food Suggestion

Food Suggestion	**Wine Bottles**	**%**
Beef and Venison	191	51.1%
Chicken and Turkey	28	7.5%
Duck, Goose and Game Birds	77	20.6%
Fruit-based Desserts	12	3.2%
Lamb	47	12.6%
Meaty and Oily Fish	12	3.2%
Shellfish, Crab and Lobster	7	1.9%
Total	374	100.0%

7.15.5 Table Color

Color	**Wine Bottles**	**%**
Red	315	84.2%
White	59	15.8%
Total	374	100.0%

7.15.6 Table Wine Style

Wine Style	**Wine Bottles**	**%**
Bold and Structured	19	5.1%
Buttery and Complex	23	6.1%
Green and Flinty	19	5.1%
Rich and Intense	26	7.0%
Savory and Classic	270	72.2%
Tropical and Balanced	5	1.3%
Dessert - Lush and Balanced	12	3.2%
Total	374	100.0%

7.15.7 Table Classification

Classification	**N**	**%**
Cru Bourgeois	7	1.9%
Cru Classe Des Graves	2	0.5%
Grand Cru	61	16.3%
Grand Cru Classe	84	22.5%
Grand Cru Classe Des Graves	10	2.7%
Premier Cru	31	8.3%
Premier Grand Cru Classe A	4	1.1%
Premier Grand Cru Classe B	15	4.0%
No	160	42.8%
Total	374	100.0%

7.16 Italy

7.16.1 Table Region/Appellation

Region/Appellation	**Wine Bottles**	**%**
Aglianico del Vulture	1	0.4%
Alta Valle della Greve IGT	1	0.4%
Amarone della Valpolicella Classico	9	3.6%
Amarone della Valpolicella	1	0.4%
Barbaresco	12	4.8%
Barbera d'Alba	1	0.4%
Barbera d'Asti	1	0.4%
Barolo	66	26.3%
Bolgheri	8	3.2%
Brunello di Montalcino	52	20.7%
Carignano del Sulcis	1	0.4%
Carmignano	1	0.4%
Chianti	1	0.4%
Chianti Classico	10	4.0%
Chianti Rufina	1	0.4%
Colli della Toscana Centrale IGT	1	0.4%
Colli di Salerno IGT	1	0.4%
Contea di Sclafani	1	0.4%
Contessa Entellina	1	0.4%
Cortana	1	0.4%
Faro	1	0.4%
Isola dei Nuraghi IGT	2	0.8%
Langhe	6	2.4%
Lazio IGT	1	0.4%
Marche IGT	1	0.4%
Maremma Toscana	2	0.8%
Montefalco Sagrantino	3	1.2%
Morellino di Scansano	1	0.4%
Noto	1	0.4%
Roccamonfina IGT	1	0.4%
Sforzato di Valtellina	1	0.4%
Sicily	1	0.4%
Soave Classico	1	0.4%
Taurasi	2	0.8%
Terre Siciliane IGT	1	0.4%
Torgiano Rosso Riserva	1	0.4%
Toscana IGT	40	15.9%
Tuscany	1	0.4%
Umbria IGT	2	0.8%
Valdarno di Sopra	1	0.4%
Valpolicella	1	0.4%

Valpolicella Classico	1	0.4%
Venezia Giulia IGT	2	0.8%
Verona IGT	3	1.2%
Vigneti delle Dolomiti IGT	1	0.4%
Vino Nobile di Montepulciano	2	0.8%
Total	251	100.0%

7.16.2 Table Country Hierarchy

Country Hierarchy	**Wine Bottles**	**%**
Amarone della Valpolicella, Veneto	9	3.6%
Basilicata	1	0.4%
Campania	2	0.8%
Campania IGT, Campania	2	0.8%
Chianti, Tuscany	11	4.4%
Friuli-Venezia Giulia	2	0.8%
Lazio	1	0.4%
Marche	1	0.4%
Piedmont [Piemonte]	85	33.9%
Sardinia	3	1.2%
Sicily	6	2.4%
Soave, Veneto	1	0.4%
Torgiano, Umbria	1	0.4%
Toscana IGT, Tuscany	2	0.8%
Trentino-Alto Adige	1	0.4%
Tuscany	111	44.2%
Umbria	5	2.0%
Valpolicella, Veneto	1	0.4%
Valtellina, Lombardy	1	0.4%
Veneto	2	0.8%
Veneto IGT, Veneto	3	1.2%
Total	251	100.0%

7.16.3 Table Grape/Blend

Grape/Blend	**Wine Bottles**	**%**
Aglianico	3	1.2%
Aglianico - Piedirosso	1	0.4%
Barbera	2	0.8%
Bordeaux Blend Red	12	4.8%
Cabernet - Merlot - Sangiovese	4	1.6%
Cabernet - Merlot - Syrah	1	0.4%
Cabernet - Nero d'Avola	1	0.4%
Cabernet - Petit Verdot	1	0.4%
Cabernet - Sangiovese	7	2.8%
Cabernet - Sangiovese - Syrah	1	0.4%
Cabernet Franc	1	0.4%
Cabernet Franc - Cabernet Sauvignon	1	0.4%
Cabernet Sauvignon	1	0.4%
Cabernet Sauvignon - Merlot	4	1.6%
Carignan (Carinena)	2	0.8%
Chardonnay	2	0.8%
Chardonnay - Pinot Blanc	1	0.4%
Chardonnay - Sauvignon Blanc	1	0.4%
Chianti Blend	10	4.0%
Corvina	2	0.8%
Corvina - Rondinella	1	0.4%
Garganega	1	0.4%
Grenache (Garnacha)	1	0.4%
Grenache - Sangiovese	1	0.4%
Merlot	8	3.2%
Merlot - Sangiovese	5	2.0%
Merlot - Syrah	1	0.4%
Montepulciano	1	0.4%
Montepulciano - Sangiovese	1	0.4%
Nebbiolo	82	32.7%
Nero d'Avola	4	1.6%
Rare Red Blend	3	1.2%
Rare White Blend	1	0.4%
Ribolla	1	0.4%
Sagrantino	3	1.2%
Sangiovese	66	26.3%
Syrah	1	0.4%
Valpolicella Blend	12	4.8%
Total	251	100.0%

7.16.4 Table Food Suggestion

Food Suggestion	**Wine Bottles**	**%**
Beef and Venison	144	57.4%
Duck, Goose and Game Birds	2	0.8%
Lamb	98	39.0%
Mushrooms	1	0.4%
White Fish	6	2.4%
Total	251	100.0%

7.16.5 Table Aging

Aging	**Wine Bottles**	**%**
No	228	90.8%
Riserva	23	9.2%
Total	251	100.0%

7.16.6 Table Color

Color	**Wine Bottles**	**%**
Red	244	97.2%
White	7	2.8%
Total	251	100.0%

7.16.7 Table Wine Style

Wine Style	**Wine Bottles**	**%**
Bold and Structured	116	46.2%
Green and Flinty	6	2.4%
Rich and Intense	28	11.2%
Savory and Classic	100	39.8%
Tropical and Balanced	1	0.4%
Total	251	100.0%

7.17 Spain Results

7.17.1 Table: Model with Region/Appellation and Country Hierarchy

	Model Region/Appellation			**Model Country Hierarchy**		
Variable	Parameter Estimate	t Value	% Change	Parameter Estimate	t Value	% Change
Intercept	-22.866	-10.68	-	-23.14	-12.08	-
d_2005	-0.033	-0.53	-3.25	-0.032	-0.52	-3.15
d_2006	-0.151	-2.48	-14.02	-0.152	-2.49	-14.1
d_Excellent	-0.739	-7.18	-52.24	-0.687	-7.28	-49.69
d_Fair	0.786	1.55	119.46	0.758	1.4	113.4
d_Good	0.05	0.57	5.13	0.052	0.6	5.34
d_Very_Good	0.07	0.74	7.25	0.043	0.45	4.39
Weighted_Average_Score	0.294	12.27	34.18	0.295	13.61	34.31
rs_Riber_Duero	0.076	0.67	7.9	-	-	-
rs_Rioj	-0.08	-0.76	-7.69	-	-	-
rs_Priorat	0.018	0.18	1.82	-	-	-
rs_Rioja_Alav	-0.164	-1.23	-15.13	-	-	-
rs_Rioja_Alta	-0.305	-2.04	-26.29	-	-	-
rs_Toro	-0.218	-1.56	-19.59	-	-	-
rs_Cast_Leon_VT	-0.086	-0.54	-8.24	-	-	-
cs_Rioja	-	-	-	0.166	0.94	18.06
cs_Cast_Leon	-	-	-	0.037	0.31	3.77
cs_Catalonia	-	-	-	0.46	2.76	58.41
d_Crianza	-0.458	-3.55	-36.75	-0.441	-3.7	-35.66
d_Gr_Reserva	-0.34	-4	-28.82	-0.33	-4.19	-28.11
d_Reserv	-0.35	-3.97	-29.53	-0.367	-4.66	-30.72
gs_Tempranillo	0.127	1.45	13.54	0.274	3.26	31.52
gs_Rioj_Red_Blend	0.242	2.33	27.38	0.333	3.36	39.51
gs_Carign_Grenach	0.135	1.35	14.45	0.04	0.39	4.08
gs_Grenach	0.633	3.23	88.33	0.593	3.06	80.94
gs_Cabernt_Merl_Tempran	0.064	0.38	6.61	0.292	1.71	33.91
d_Red	0.228	1.26	25.61	0.077	0.4	8
d_Lamb	-0.001	-0.01	-0.1	0.054	0.36	5.55
d_DO	-	-	-	0.08	0.53	8.33
d_DOCa	-	-	-	-0.156	-0.77	-14.44

Sample Size: 135 Bottles of Wine

7.18 France Results

7.18.1 Table: Model I and II with Region/Appellation

	Model I			Model II		
Variable	Parameter Estimate	t Value	% Change	Parameter Estimate	t Value	% Change
Intercept	-18.931	-16.48	-	-19.893	-16.26	-
d_2005	-0.066	-1.48	-6.39	-0.084	-1.77	-8.06
d_2006	-0.044	-1.04	-4.3	-0.049	-1.1	-4.78
d_Excellent	0.985	3.76	167.78	1.033	3.77	180.95
d_Good	-0.065	-0.55	-6.29	-0.023	-0.17	-2.27
d_Very_Good	0.112	0.82	11.85	0.139	0.91	14.91
Weighted_Average_Score	0.251	19.3	28.53	0.265	19.11	30.34
rf_Saint_Emil_Grand_Cru	0.134	2.03	14.34	0.07	0.97	7.25
rf_Margaux	0.17	3.56	18.53	0.135	2.76	14.45
rf_Pessac_Leognan	-0.022	-0.27	-2.18	-0.225	-2.66	-20.15
rf_Pomerol	0.265	3.19	30.34	0.17	1.96	18.53
gf_Bordx_Blend_Red	-0.213	-2.81	-19.18	-	-	-
gf_Pinot_Noir	1.045	9.67	184.34	-	-	-
gf_Chardonnay	1.192	8.75	229.37	-	-	-
gf_Souther_Rhone_Red	-0.586	-6.14	-44.35	-	-	-
gf_Syr	-0.302	-3.64	-26.07	-	-	-
d_Red	0.425	4.79	52.96	-0.415	-4.95	-33.97
d_Cru_Clas_Grav	0.533	2.73	70.4	0.697	3.7	100.77
d_Grand_Cru	0.466	3.61	59.36	1.066	8.19	190.37
d_Grand_Cru_Clas	0.3	3.62	34.99	0.263	3.05	30.08
d_Grand_Cru_Clas_Grav	0.32	2.17	37.71	0.41	2.84	50.68
d_No	0.338	4.13	40.21	0.468	5.56	59.68
d_Premier_Cru	0.117	0.8	12.41	0.782	5.84	118.58
d_Prem_Grand_Cru_A	0.996	6.86	170.74	0.992	6.57	169.66
d_Prem_Grand_Cru_B	0.321	2.78	37.85	0.357	2.94	42.9
d_Beef	-	-	-	0.374	5.38	45.35
d_Duck	-	-	-	1.058	10.64	188.06

Sample Size: 374 Bottles of Wine

7.18.2 Table: Model with Country Hierarchy

Variable	Parameter Estimate	t Value	% Change
Intercept	-20.775	-17.19	-
d_2005	-0.094	-2.07	-8.97
d_2006	-0.051	-1.17	-4.97
d_Excellent	1.032	3.88	180.67
d_Good	-0.006	-0.05	-0.6
d_Very_Good	0.176	1.18	19.24
Weighted_Average_Score	0.271	19.93	31.13
cf_Burgundy	1.116	7.19	205.26
cf_Bordeaux	-0.034	-0.29	-3.34
cf_Rhone	-0.175	-1.53	-16.05
d_Red	0.075	0.81	7.79
d_Cru_Clas_Grav	0.441	2.7	55.43
d_Grand_Cru	0.548	4.32	72.98
d_Grand_Cru_Clas	0.33	3.95	39.1
d_Grand_Cru_Clas_Grav	0.278	2.16	32.05
d_No	0.464	5.69	59.04
d_Premier_Cru	0.223	1.54	24.98
d_Prem_Grand_Cru_A	1.018	7.67	176.77
d_Prem_Grand_Cru_B	0.4	4.12	49.18
d_Beef	0.285	2.46	32.98
d_Duck	0.217	1.49	24.23

Sample Size: 374 Bottles of Wine

7.19 Italy Results

7.19.1 Table: Model with Country Hierarchy

Variable	Parameter Estimate	t Value	% Change
Intercept	-16.681	-13.53	-
d_2005	-0.02	-0.48	-1.98
d_2006	-0.139	-3.47	-12.98
d_Excellent	1.084	4.84	195.65
d_Good	0.058	0.5	5.97
d_Very_Good	0.115	0.95	12.19
Weighted_Average_Score	0.227	16.21	25.48
ci_Veneto	0.24	2.82	27.12
ci_Tuscany	0.305	4.3	35.66
ci_Piedmont	0.833	4.59	130.02
gi_Nebbiolo	-0.057	-0.32	-5.54
gi_Sangiov	0.01	0.13	1.01
gi_Bordx_Blend_Red	-0.114	-1.16	-10.77
gi_Chianti_Blend	-0.255	-2.77	-22.51
gi_Merlot	0.051	0.4	5.23
d_Riserva	0.197	2.82	21.77
d_Red	-0.515	-2.02	-40.25
d_DOC	0.217	3.32	24.23
d_DOCG	-0.022	-0.29	-2.18
d_Beef	0.354	1.32	42.48
d_Lamb	0.136	0.53	14.57

Sample Size: 251 Bottles of Wine

7.20 Spain vs France vs Italy Results

7.20.1 Table: Model with Country Hierarchy

Variable	Parameter Estimate	t Value	% Change
Intercept	-22.282	-28.4	-
d_2005	-0.052	-1.83	-5.07
d_2006	-0.11	-3.89	-10.42
d_Excellent	0.964	4.94	162.22
d_Fair	0.401	1.93	49.33
d_Good	0.168	2.78	18.29
d_Very_Good	0.252	3.81	28.66
Weighted_Average_Score	0.283	32.69	32.71
d_France	0.576	2.72	77.89
d_Italy	0.02	0.11	2.02
ga_Bord_Blend_Red	-0.143	-2.49	-13.32
ga_Chardonnay	0.756	4.18	112.97
ga_Nebbiolo	-0.184	-1.32	-16.81
ga_Pinot_Noir	0.74	3.59	109.59
ga_Rioja_Red_Blend	0.043	0.38	4.39
ga_Sangiovese	0.096	1.4	10.08
ga_Tempranillo	0.131	1.45	14
d_Red	0.307	4.83	35.93
cs_Rioja	-0.051	-0.27	-4.97
cs_Cast_Leon	0.096	0.75	10.08
cs_Catalonia	0.429	2.58	53.57
cf_Burgundy	0.467	1.99	59.52
cf_Bordeaux	0.22	1.93	24.61
cf_Rhone	-0.27	-2.43	-23.66
ci_Veneto	0.33	3.93	39.1
ci_Tuscany	0.244	3.43	27.63
ci_Piedmont	0.749	5.42	111.49
d_DO	0.007	0.05	0.7
d_DOCa	-0.064	-0.32	-6.2
d_Grand_Cru	0.195	1.82	21.53
d_Grand_Cru_Clas	-0.046	-0.88	-4.5
d_Premier_Cru	-0.141	-1.1	-13.15
d_No	0.082	1.4	8.55
d_DOC	0.179	2.72	19.6
d_DOCG	-0.069	-1.03	-6.67

Sample Size: 760 Bottles of Wine

7.21 Spain vs France Results

7.21.1 Table: Model I and II with Region/Appellation

	Model I			Model II		
Variable	Parameter Estimate	t Value	% Change	Parameter Estimate	t Value	% Change
Intercept	-22.642	-22.92	-	-22.636	-	-22.92
d_2005	-0.081	-2.12	-7.78	-0.084	-8.06	-2.12
d_2006	-0.087	-2.35	-8.33	-0.088	-8.42	-2.35
d_Excellent	0.893	3.76	144.24	0.844	132.57	3.76
d_Fair	0.514	1.98	67.2	0.446	56.21	1.98
d_Good	0.151	2.37	16.3	0.109	11.52	2.37
d_Very_Good	0.248	3.37	28.15	0.207	23	3.37
Weighted_Average_Score	0.289	26.24	33.51	0.292	33.91	26.24
d_France	0.378	1.49	45.94	0.248	28.15	1.49
ga_Bord_Blend_Red	0.073	1.26	7.57	-	-	-
ga_Chardonnay	1.247	9.25	247.99	-	-	-
ga_Pinot_Noir	1.367	14.74	292.36	-	-	-
ga_Rioja_Red_Blend	0.032	0.27	3.25	-	-	-
ga_Tempranillo	0.065	0.66	6.72	-	-	-
d_Red	0.176	2.64	19.24	-	-	-
rs_Riber_Duero	0.045	0.37	4.6	0.073	7.57	0.66
rs_Rioj	-0.118	-0.45	-11.13	-0.094	-8.97	2.64
rs_Priorat	0.28	1.11	32.31	0.226	25.36	0.37
rs_Rioja_Alav	-0.096	-0.35	-9.15	-0.057	-5.54	-0.45
rs_Rioja_Alta	-0.37	-1.33	-30.93	-0.342	-28.97	1.11
rs_Toro	-0.151	-1.02	-14.02	-0.139	-12.98	-0.35
rs_Cast_Leon_VT	0.071	0.25	7.36	0.104	10.96	-1.33
rf_Saint_Emil_Grand_Cru	0.259	4.63	29.56	0.183	20.08	-1.02
rf_Margaux	0.213	4.44	23.74	0.172	18.77	0.25
rf_Pessac_Leognan	0.027	0.42	2.74	-0.054	-5.26	4.63
rf_Pomerol	0.356	4.25	42.76	0.221	24.73	4.44
d_DO	0.088	0.34	9.2	0.087	9.09	0.42
d_Grand_Cru	0.144	1.35	15.49	0.601	82.39	4.25
d_Grand_Cru_Clas	0.011	0.2	1.11	-0.031	-3.05	0.34
d_Premier_Cru	-0.184	-1.43	-16.81	0.319	37.58	1.35
d_No	0.058	0.94	5.97	0.104	10.96	0.2
d_Beef	-	-	-	0.226	25.36	1.26
d_Chicken	-	-	-	0.628	87.39	9.25
d_Duck	-	-	-	1.062	189.21	14.74
d_Lamb	-	-	-	-0.031	-3.05	0.27

Sample Size: 509 Bottles of Wine

7.21.2 Table: Model with Country Hierarchy

Variable	Parameter Estimate	t Value	% Change
Intercept	-24.083	-24.68	-
d_2005	-0.096	-2.52	-9.15
d_2006	-0.09	-2.44	-8.61
d_Excellent	0.8	3.44	122.55
d_Fair	0.372	1.37	45.06
d_Good	0.072	1.44	7.47
d_Very_Good	0.169	2.73	18.41
Weighted_Average_Score	0.303	27.63	35.39
d_France	0.514	2.82	67.2
cs_Rioja	-0.037	-0.26	-3.63
cs_Cast_Leon	0.133	1.18	14.22
cs_Catalonia	0.349	2.53	41.76
cf_Burgundy	1.224	9.52	240.08
cf_Bordeaux	0.139	1.28	14.91
cf_Rhone	-0.301	-2.73	-25.99
d_Red	0.318	5.25	37.44
d_DO	0.054	0.55	5.55
d_Grand_Cru	0.192	1.77	21.17
d_Grand_Cru_Clas	-0.032	-0.63	-3.15
d_Premier_Cru	-0.121	-0.95	-11.4
d_No	0.125	2.14	13.31

Sample Size: 509 Bottles of Wine

7.22 Spain vs Italy Results

7.22.1 Table: Model with Country Hierarchy

Variable	Parameter Estimate	t Value	% Change
Intercept	-20.172	-18.4	-
d_2005	-0.017	-0.49	-1.69
d_2006	-0.151	-4.35	-14.02
d_Excellent	0.49	1.57	63.23
d_Fair	0.381	1.26	46.37
d_Good	0.033	0.43	3.36
d_Very_Good	0.056	0.68	5.76
Weighted_Average_Score	0.266	21.73	30.47
d_Italy	-0.105	-0.56	-9.97
ga_Nebbiolo	-0.157	-0.84	-14.53
ga_Rioja_Red_Blend	0.254	2.53	28.92
ga_Sangiovese	0.105	1.51	11.07
ga_Tempranillo	0.207	2.46	23
d_Red	-0.347	-1.3	-29.32
cs_Rioja	0.172	0.93	18.77
cs_Cast_Leon	0.075	0.64	7.79
cs_Catalonia	0.482	2.95	61.93
ci_Veneto	0.268	3.19	30.73
ci_Tuscany	0.227	3.28	25.48
ci_Piedmont	0.893	4.71	144.24
d_Beef	0.352	1.25	42.19
d_Lamb	0.184	0.69	20.2
d_DO	0.105	0.7	11.07
d_DOCa	-0.106	-0.52	-10.06
d_DOC	0.195	2.99	21.53
d_DOCG	-0.075	-1.04	-7.23
d_Crianza	-0.558	-5.18	-42.76
d_Gr_Reserva	-0.438	-5.8	-35.47
d_Reserv	-0.415	-5.65	-33.97
d_Riserva	0.178	2.48	19.48

Sample Size: 386 Bottles of Wine

7.23 France vs Italy Results

7.23.1 Table: Model with Country Hierarchy

Variable	Parameter Estimate	t Value	% Change
Intercept	-20.205	-18.4	-
d_2005	-0.048	-0.49	-4.69
d_2006	-0.092	-4.35	-8.79
d_Excellent	0.991	1.57	169.39
d_Good	-0.019	1.26	-1.88
d_Very_Good	0.1	0.43	10.52
Weighted_Average_Score	0.26	0.68	29.69
d_France	0.687	21.73	98.77
ga_Bord_Blend_Red	-0.252	-0.56	-22.28
ga_Chardonnay	0.787	-0.84	119.68
ga_Nebbiolo	-0.203	2.53	-18.37
ga_Pinot_Noir	1.381	1.51	297.89
ga_Sangiovese	0.033	2.46	3.36
d_Red	0.271	-1.3	31.13
cf_Burgundy	0.091	0.93	9.53
cf_Bordeaux	0.179	0.64	19.6
cf_Rhone	-0.214	2.95	-19.27
ci_Veneto	0.276	3.19	31.78
ci_Tuscany	0.254	3.28	28.92
ci_Piedmont	0.908	4.71	147.94
d_Grand_Cru	0.203	1.25	22.51
d_Grand_Cru_Clas	-0.047	0.69	-4.59
d_Premier_Cru	-0.137	0.7	-12.8
d_No	0.05	-0.52	5.13
d_DOC	0.194	2.99	21.41
d_DOCG	-0.029	-1.04	-2.86
d_Beef	0.201	-5.18	22.26
d_Chicken	0.481	-5.8	61.77
d_Duck	-0.214	-5.65	-19.27

Sample Size: 625 Bottles of Wine

8 References

Agenzia per le Erogazioni in Agricoltra (AGEA). www.agea.gov.it. Accessed 17 March 2017

Agencia Estatal de la Adminstracion Tributaria. www.agenciatributaria.es. Accessed 15 March 2017

Benfratello, L., Piacenza, M., & Sacchetto, S. (2009). Taste or reputation: what drives market prices in the wine industry? Estimation of a hedonic model for Italian premium wines. Applied Economics, 41(17), 2197-2209.

Boatto, V., Defrancesco, E., & Trestini, S. (2011). The price premium for wine quality signals: does retailers' information provision matter?. British Food Journal, 113(5), 669-679.

Bodega Vivanco. vivancoculturadevino.es/es/. Accessed 15 March 2017

Cardebat*, J. M., & Figuet, J. M. (2004). What explains Bordeaux wine prices?. Applied Economics Letters, 11(5), 293-296.

Cardebat, J. M., & Figuet, J. M. (2009). Estimation of a hedonic price equation for Alsace, Beaujolais and Provence wines. Applied Economics Letters, 16(9), 921-927.

Combris, P., Lecocq, S., & Visser, M. (1997). Estimation of a hedonic price equation for Bordeaux wine: does quality matter?. The Economic Journal, 107(441), 390-402.

Combris, P., Lecocq, S., & Visser, M. (2000). Estimation of a hedonic price equation for Burgundy wine. Applied Economics, 32(8), 961-967.

Court, A.T. (1939), “Hedonic price indexes with automotive examples”, The Dynamics of Automobile Demand, General Motors, New York, NY, pp. 98-119.

Cowling, K., & Cubbin, J. (1972). Hedonic price indexes for United Kingdom cars. The Economic Journal, 82(327), 963-978.

EU Wine Market Data Portal. ec.europa.eu/agriculture/wine/statistics_es. Accessed 14 March 2017

FranceAgriMer. www.franceagrimer.fr. Accessed 16 March 2017

Global Trade Atlas. www.gtis.com. Accessed 19 March 2017

Griliches, Z. (1961). Hedonic price indexes for automobiles: An econometric of quality change. In The Price Statistics of the Federal Goverment (pp. 173-196). NBER.

Huang, C. L., & Lin, B. H. (2007). A hedonic analysis of fresh tomato prices among regional markets. Review of Agricultural Economics, 783-800.

International Organization of Wine (OIV). www.oiv.int. Accessed 14 March 2017

Istituto di Servizi per il Mercato Agricolo Alimentare (ISMEA). www.ismea.it. Accessed 19 March 2017

Istituto Nazionale di Statistica (ISTAT). www.istat.it. Accessed 20 March 2017

Italian Wine Central. italianwinecentral.com. Accessed 20 March 2017

Jan van Garderen, K., & Shah, C. (2002). Exact interpretation of dummy variables in semilogarithmic equations. The Econometrics Journal, 5(1), 149-159.

Landon, S., & Smith, C. E. (1997). The use of quality and reputation indicators by consumers: the case of Bordeaux wine. Journal of Consumer Policy, 20(3), 289-323.

La Sommeliere. es.lasommeliere.com. Accessed 21 March 2017

Lecocq, S., & Visser, M. (2006). What determines wine prices: Objective vs. sensory characteristics. Journal of Wine Economics, 1(01), 42-56.

María Angulo, A., María Gil, J., Gracia, A., & Sánchez, M. (2000). Hedonic prices for Spanish red quality wine. British Food Journal, 102(7), 481-493.

Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente (MAGRAMA). www.mapama.gob.es. Accessed 15 March 2017

Nerlove, M. (1995). Hedonic price functions and the measurement of preferences: The case of Swedish wine consumers. European economic review, 39(9), 1697-1716.

Observatoire de la viticulture française. www.observatoire-viti-france.com. Accessed 16 March 2017

Observatorio Español del Mercado del Vino (OEMV). www.oemv.es. Accessed 21 March 2017

Oczkowski, E. (1994). A hedonic price function for Australian premium table wine. Australian Journal of Agricultural and Resource Economics, 38(1), 93-110.

Registros Viticolas de las Comunidades Autonomas. http://www.mapama.gob.es/es/estadistica/temas/estadisticas-agrarias/agricultura/encuestas-de-vinedo/. Accessed 17 March 2017

Roma, P., Di Martino, G., & Perrone, G. (2013). What to show on the wine labels: a hedonic analysis of price drivers of Sicilian wines. Applied Economics, 45(19), 2765-2778.

Rosen, S. (1974). Hedonic prices and implicit markets: product differentiation in pure competition. *Journal of political economy*, *82*(1), 34-55.

Schamel, G., & Anderson, K. (2003). Wine quality and varietal, regional and winery reputations: hedonic prices for Australia and New Zealand. Economic Record, 79(246), 357-369.

Sheppard, S. (1999). Hedonic analysis of housing markets. Handbook of regional and urban economics, 3, 1595-1635.

Steiner, B. E. (2004). Australian wines in the British wine market: a hedonic price analysis. Agribusiness, 20(3), 287-307.

Vins de Bordeaux. www.bordeaux.com. Accessed 22 March 2017

Waugh, F. V. (1928). Quality factors influencing vegetable prices. Journal of farm economics, 10(2), 185-196.

Wines from Spain. www.foodswinesfromspain.com. Accessed 18 March 2017

WineFolli. winefolly.com. Accessed 2 April 2017

Wine-Searcher. www.wine-searcher.com. Accessed 8 April 2017

Witte, A. D., Sumka, H. J., & Erekson, H. (1979). An estimate of a structural hedonic price model of the housing market: an application of Rosen's theory of implicit markets. Econometrica: Journal of the Econometric Society, 1151-1173.