

A leader in an emerging new international market: The determinants of French wine exports, 1848-1938

María-Isabel Ayuda[†]
Universidad de Zaragoza

Hugo Ferrer-Pérez[‡]
Universidad CEU-San Pablo

Vicente Pinilla^{+*}
Universidad de Zaragoza and Instituto Agroalimentario de Aragón (IA2)

Acknowledgments: This study has received financial support from Spain's Ministry of Science and Innovation, projects ECO2015-65582-P and ECO2016-74940-P, from the Government of Aragon, through the Groups S40_17R and S55_17R, and from the European Regional Development Fund. This study has also been possible thanks to an academic stay in the Ecole de Hautes Etudes en Sciences Sociales (Paris) by the third author. The authors wish to thank Gérard Beaur, Domingo Gallego, Graham Harding, Alfonso Herranz, Miguel Martín-Retortillo, Giulia Meloni, Gilles Postel-Vinay, Marcela Sabaté, Javier Silvestre, James Simpson and participants at the American Association of Wine Economists Conference held in Bordeaux (2016), the workshop 'Crises et Changements dans les Campagnes Européennes' of the Ecole des Hautes Etudes en Sciences Sociales, Paris (2017), the Economic History Seminar of the University of Zaragoza (2018) and the workshop 'Wine Globalization: Past and Prospective' held in Adelaide (2018) for their help and advice. We also thank the editors and reviewers for their comments and suggestions. The usual disclaimers apply.

**Corresponding author: Vicente Pinilla (vpinilla@unizar.es)*

[†]Universidad de Zaragoza, Department of Economic Analysis, Faculty of Economics and Business Studies, Gran Vía 4, 50005 Zaragoza, Spain. E-mail: mayuda@unizar.es

[‡]Universidad CEU-San Pablo, Department of Applied Mathematics and Statistics, School of Economics and Business, Julian Romea 23, 28003 Madrid, Spain. E-mail: hugo.ferrerperez@ceu.es

⁺Universidad de Zaragoza and Instituto Agroalimentario de Aragón -IA2- (Universidad de Zaragoza-CITA), Department of Applied Economics, Faculty of Economics and Business Studies, Gran Vía 4, 50005 Zaragoza, Spain. E-mail: vpinilla@unizar.es

Abstract: Our objective is to study in depth the performance of France in the new international wine market that began to take shape from the middle of the nineteenth century. We analyse the main determinants of its exporting success for ordinary and high quality wine using a gravity model for both types of wine. The article shows how France lost foreign markets in the ordinary wine segment, due to its problems to maintain its exports owing to the decrease in production caused by the phylloxera plague and the growing competition from more producers who were more efficient in these types of wines. However, in the high quality wine market, the French exporters enjoyed considerable success, increasing their exports thanks to their efforts to offer a product that was highly valued abroad and the use of modern marketing and sales techniques. The exports benefited from the fall in transport costs and French colonial expansion. However, the exports of both products suffered the strong impact of a series of major events, such as the First World War, the Russian Revolution, the Prohibition in the United States and the Great Depression. Our case study of wine shows that the collapse of the first globalisation was not the same for all products.

I. Introduction

The first globalisation was marked by the international integration of the goods markets and a rise in trade. The latter was due to outward shifts in both the import demand and export supply curves, mostly produced by industrialisation, the liberalisation of trade, mainly through the signing of bilateral trade agreements, and the reduction in sea and land transport costs as well as other trade costs.¹ When new international markets emerge and trade increases it is interesting to study how the countries involved compete to obtain advantageous positions. Obviously, the initial conditions are not the same for all parties. The most dynamic players in international trade during the period preceding the first globalisation enjoyed certain advantages and benefited from the strong growth that they had been experiencing since the mid nineteenth century. Nevertheless, the first wave of globalisation gave rise to many opportunities. We know that Great Britain became the absolute leader in the trade of textiles thanks to its technological advantage, although its previous favourable position in this market also contributed to securing its leadership. On the other hand, in the case of many agricultural products, the biggest winners were those countries or territories which, until the nineteenth century, were not particularly prominent in the trade of these products or did not participate at all, such as the new settler countries.²

Therefore, it is crucial to analyse the intense competition that broke out in the new international markets and to explain the causes that determined the success or failure of the different participants in these emerging markets.

Agricultural products represented a highly important part of international trade in the first globalisation. In fact, they accounted for approximately 40% of total trade until the First World War.³ It is therefore essential to study these products in order to understand the dynamics of economic integration during this period.

The international wine market has been analysed from several different perspectives.⁴ However, to the best of our knowledge, there are no studies that

¹ See Jacks, '19th century commodity market'; Jacks, Meissner and Novy, 'Trade booms'; Mohammed and Williamson, 'Freight Rates'; Findlay and O'Rourke, *Power and Plenty*; Harley, 'Late nineteenth century transportation'; Pinilla and Ayuda, 'Taking Advantage'.

² Pinilla and Rayes, 'How Argentina'; Anderson, 'Agricultural Development in Australia'

³ Federico and Tena-Junguito, 'World Trade'; Lewis, 'Rate of Growth'; Aparicio et al., 'Europe'.

⁴ See, for example, Pinilla and Ayuda, 'International Wine Market'; idem, 'Political Economy'; Pinilla and Serrano, 'Agricultural and Food Trade'; Simpson, *Creating Wine*, 'Selling to reluctant drinkers'; Anderson and Pinilla, *Wine Globalization*.

specifically analyse the role of France, the most relevant country in terms of the trade of wine, within the international market from a quantitative point of view based on an econometric analysis of the determinants of the evolution of its exports.

Within this context, the objective of this article is to study in depth the performance of France in this market, analysing the principal determinants of its exporting success. This country was the most important in the wine market, as, since its expansion, it maintained a leadership position, which it subsequently consolidated and still holds today. To do this, using French foreign trade statistics, we will quantify and analyse the evolution of its exports. We will also use a gravity model approach to attempt to establish the key variables that explain this evolution. Our time frame begins at the onset of the first globalisation, in 1848, the first year for which data disaggregated in terms of quality and export destinations are available and ends in 1938, just before the Second World War.

Our results reveal that during the first decades of the first globalisation, French exports grew rapidly but the phylloxera plague forced the French wine export sector to refocus on high-quality wines. In fact, there were two segmented markets governed by different forces: the high quality and the ordinary wine markets. The exports of low quality wine were affected by the fluctuations in French production, mainly during the phylloxera plague, which enabled other countries to seize a part of this market segment. Furthermore, the reduction in trade costs benefited French exports which faced a major obstacle to their continued growth in the low quality segment: wine had not become a product of mass consumption outside of the traditional consumer nations other than by its emigrants in the new world or its expatriates in the colonies. However, foreign demand boosted the growth of quality wine exports. Finally, a series of external shocks led to a fall and significant fluctuations in exports of both types of wine during the interwar period. These included the First World War, the establishment of the new Soviet State, the Prohibition in the United States or the Depression of the 1930s.

After this introduction, Section 2 explains how the international wine market was integrated in the first wave of globalisation. The article continues with a section that explains the evolution of French wine exports. Section 4 analyses the diverging trends of French exports of quality wines and ordinary wines. Subsequently, we will explain the econometric model considered and the characteristics and sources of the data set used.

Next, we will present the results obtained before drawing the main conclusions in the final section.

II. The integration of the wine market

Wine is far from being a homogeneous product. Its heterogeneity is precisely one of its principal features. There are many different types of wine depending not only on colour or alcoholic strength but also on the enormous variety of vines that exist.⁵ As well as being an industrial process, the results obtained are also very diverse. In the first globalisation, like today, this heterogeneity of the product was highly important.⁶

Low quality wine was fully integrated into the daily diet of the population of the countries on the northern coasts of the Mediterranean, particularly in the west and of their emigrants who had settled in other continents. In countries such as France, Italy, Spain or Portugal it was by far the most consumed alcoholic beverage.⁷ In non-producing western countries, wine was not consumed regularly by wide segments of the population until much after the Second World War. Therefore, increases in income did not translate into increases in consumption, contrary to what occurred with other Mediterranean horticultural products.⁸ Therefore, the expansion of wine exports was restricted by the limited progress in the globalisation of its consumption. An essential factor is the cultural traditions of different countries with respect to the consumption of other alcoholic drinks and their logical preference for them when the trade of wine was still insignificant. This cultural tradition can be explained by the specialisation of each country in beverages that could be produced at a lower cost. Furthermore, according to contemporary authors, the price of ordinary wine was much higher in non-producing countries than beverages with which it competed, such as beer or spirits, which may also have limited its expansion.⁹ Alcoholic drinks, such as beer or spirits, benefited from reduced production costs thanks to technological innovations derived from the Industrial Revolution. Other factors, such as fraudulent products or the failure to create buyer-driven commodity chains also influenced demand¹⁰.

⁵ Anderson, *Wich winegrape*.

⁶ Gouy, 'L'exportation des vins' indicated that, on average, the difference in price between bottled wine and wine sold in casks was enormous. In France bottled wine cost around 10-15 francs per bottle and bulk wine 30 centimes per litre. In the case of higher quality wines, the ratio was 1:1,000.

⁷ Anderson, Nelgen and Pinilla, *Global Wine Markets*.

⁸ See Pinilla and Ayuda, 'Market Dynamism'; idem, 'Taking advantage'.

⁹ Anderson, Meloni and Swinnen, "Global Alcohol Markets"; Gouy, 'L'exportation des vins français'.

¹⁰ Simpson, *Creating wine*.

On the contrary, the consumption of high quality wine was restricted to high-income groups, particularly in European or western countries. Hence, it can be considered as a luxury beverage ‘chiefly connected with the ritual of entertainment’ or ‘limited to special occasions’.¹¹

The two markets emerged, integrated and grew in parallel throughout the first globalisation, although the widespread tariff liberalisation taking place during this period had a smaller scope in the case of wine. The tariffs applied to wine imports of a wide range of countries were very high, for both ordinary and high quality wine, and followed an upward trend from 1875 until the Second World War.¹² The high excise and import taxes on wine mostly sought to protect local producers of beer or spirits.¹³

Within this context, France’s prominent position in the new international market was facilitated due to three reasons: first, before 1850, France was the world’s leading wine producer; second, the country had an outstanding tradition of producing superior quality wines, which were appreciated in the European courts and among the aristocracy and bourgeoisie, which was also the case for the incipient champagne production, the clarets of the Bordeaux region and the reds of Burgundy; finally, France also had a history of exporting and was, by far, the leading country in terms of its foreign sales.

III. The evolution of French wine exports, 1848-1938

If we examine the evolution of total wine exports in terms of real value, deflating the series in current values by the French wholesale price index, we can observe a rapid and fairly sustained growth of exports until a maximum level in around 1896 (Figure 1).¹⁴ These high values remained stable until the collapse caused by the First World War. The subsequent recovery was very modest.

If we consider export quantities, the initial upturn was undermined by the oidium plague between 1851 and 1856, although after 1864 exports recovered their previous level (Figure 1).¹⁵ Exports peaked at the beginning of the 1870s but nose-dived when

¹¹ Imperial Economic Committee, *Wine*, p. 10 and U.S. Tariff Commission, *Grapes, Raisins and Wines*, p. 286.

¹² See table 1 in Ayuda, Ferrer and Pinilla, ‘How to become a leader’

¹³ Holmes and Anderson, ‘Convergence in National Alcohol Consumption Patterns’.

¹⁴ Using deflated current values implies the acceptance of the official valuations used by the French external trade statistics. The annual adjustments to the price variations were not automatic so these data should be treated with caution in the short term, but they illustrate the trend well in the long term. See Tallavignes, ‘L’exportation des vins français’, pp. 514-6.

¹⁵ The plague was successfully controlled from 1852 by applying sulphur sulphate. Lachiver, *Vins, vignes*, pp. 405-410.

France was hit by the phylloxera plague until production levels returned to normal levels in the 1890s, enabling a certain degree of recovery and growth in exports. The First World War and the turbulent period that followed caused exports to fluctuate considerably during these years with a clear downward trend. In order to gain a better understanding of this evolution we must distinguish between the different types of wine.

Insert Figure 1

We can group the wine exported from France into two main types (although the distinctions between them are sometimes blurred): bottled high quality wine and ordinary wine sold in casks. We can observe that both wines grew considerably after 1848, although the sales of the former quadrupled after starting from a significantly lower level while the sales of ordinary wine doubled (Figure 2). The main destinations for ordinary wine were Europe and Latin America and quality wines were sold in both of these markets and also in North America. This enormous increase in exports stopped abruptly in around 1875 in the case of ordinary wine and dropped in the following twenty years to levels similar to those observed before their huge growth in 1850. The losses were enormous in all markets, but much greater in those furthest away from France, such as America or Africa (Table 1). They only increased in Oceania and Asia, where French colonial penetration took place during these years. The huge fall in production due to the phylloxera obliged France to engage in mass imports from other countries, principally Spain, to supply even its domestic market.¹⁶ From the end of the nineteenth century, ordinary wine exports began to grow again but the levels reached were far lower than those previously achieved.

Insert Figure 2

However, quality wine exports continued to grow until they peaked at the beginning of the 1890s, even equalling the value of ordinary wine exports. The quality wine exports to northern European countries grew, especially to the United Kingdom which absorbed two-thirds of all the bottles exported to Europe (Table 2). Finally, the colonial market maintained a significant level of growth. In any event, we can observe

¹⁶ The trade war with Italy after the approval of its new tariff in 1887 limited the imports from this country enormously.

that until 1914, French quality wine exports remained at high levels, although they grew very slowly from the end of the nineteenth century.

Insert Table 1 and Table 2

The First World War marked the beginning of a very turbulent period and put an end to the years of growth and high sales which plummeted to levels even lower than the minimum levels of the phylloxera period. The end of the war gave rise to an ephemeral recovery to levels similar to those before the war,¹⁷ although the beginning of the crisis in 1929 dealt a harsh blow to exports and generated a marked annual instability. The lowest export levels of the post-war period were recorded in 1932 and the recovery in subsequent years was modest.

The causes of evolution of the exports of both types of wine can be classified into three types: supply-driven, demand-driven and forces related to the globalisation process, particularly the reduction in transport costs and the liberalisation of trade. Furthermore, a series of political and economic shocks also played a key part.

Beginning with the supply-driven causes, an essential factor was the arrival of the phylloxera plague to the European vineyards. France was one of the first countries hit by the plague which led to a considerable decline in production, particularly in the 1880s. The decrease in production therefore, forced a drop in exports. However, when we compare the evolution of the exports of the two types of wine, we can observe that they followed opposite trends. While ordinary wine exports plummeted due to the brutal fall in production, quality wine exports continued to grow. Furthermore, other countries took advantage of France's export weakness in two ways. First, the main European competitors, such as Spain or Italy, attempted to seize foreign markets from France, such as Latin America or some European countries. In low quality wines, France's principal rival was Spain whose exports increased formidably. The competitiveness of these Spanish exports was mostly based on their low prices.¹⁸ On the other hand, the emerging

¹⁷The Treaty of Versailles shows how important it was for the French government to secure markets for its wines. Article 269 established provisions for wine that enabled the imports of French wine by Germany with a tariff which was more favourable than the one applied on 31 July 1914. Article 274 obliged Germany, in return, to respect the laws, regulations and judicial decisions regarding the designation of origins, particularly for wines and to ban imports and exports that did not comply with these regulations.

¹⁸ See, for example, Douarché and Penic, *L'exportation des vins*; Gervais, 'La crise phylloxérique'; Pinilla and Ayuda, 'Political Economy';.

production of the new world countries, which was reaching significant volumes, sought to conquer the domestic markets with the aid of strong tariff protection.¹⁹

However, in the case of quality wines, the null effect of the fall in production on their exports can be explained by two reasons. First, the phylloxera plague arrived much later to the Champagne region, whose sparkling wines accounted for a considerable part of exports. Second, the quality wine exports adopted different strategies so as not to lose the foreign markets, such as using the accumulated stocks of aged wine or directly mixing the wines with those imported from other countries in order to maintain export levels.

The advances in the fight against phylloxera through the replantation of a substantial part of the vineyards enabled production to recover, and from 1900 output was reaching levels similar to those of the pre-phylloxera era. From this year, and with the exception of the years of the First World War, production grew slightly and therefore remained at high levels.²⁰ Within this context, ordinary wine exports recovered considerably, although they did not return to the levels of the pre-phylloxera era.

Also from the supply side, the improvement in production processes and the marketing of quality wine were crucial for the evolution of exports. Due to the vital importance of these changes, the whole of the following section of this article is dedicated to them.

From the demand side, the economic expansion of the second half of the nineteenth century in countries immersed in their industrialisation process had a different effect on both types of French wine exports. An important factor is that wine did not end up becoming a mass-consumed product in Europe outside of the traditional consuming countries, although it did become part of the alcoholic drinks consumed by the emerging middle class and the high-income social segments. The data referring to wine consumption by country illustrates what happened. While in the main producing countries such as France, Italy or Spain, wine consumption between 1860 and 1938 ranged between 75 and 150 litres per person/year, in the western industrialised countries, such as Great Britain, the United States, Germany, the Netherlands or Belgium, only one to five litres of wine per person/year were consumed.²¹ During this period, the increase in

¹⁹ Anderson and Pinilla, *Wine Globalization*.

²⁰ Chevet et al., 'France'.

²¹ Anderson, Nielsen and Pinilla, *Global Wine Markets*, pp. 192-192.

wine consumption between 1850 and 1938 chiefly took place in the traditional wine-consuming countries, whilst the initial increase in the countries of Northern Europe stopped towards the last quarter of the nineteenth century. As pointed out years ago by Leo Loubère, in Northern Europe wine was a privileged drink of the privileged class and its sales were limited by a middle and lower class preference for beer, ale, whiskey and gin.²²

In the first globalisation, the increase in trade benefited from the trade liberalisation processes taking place. In the case of wine, however, the reduction in tariffs was only important until the final decade of the nineteenth century. From then, a clear protectionist tendency took hold in many overseas countries that were increasing their production and in order to protect it they decided to increase their tariffs considerably.

Therefore, in the third quarter of the nineteenth century, wine exports took advantage of the tariff reductions that were implemented, especially the transcendent Cobden-Chevalier treaty of 1860 between France and Great Britain.²³ This tariff reduction was substantial as, for example, the customs duty per barrel was reduced by 78%.²⁴

However at the end of the nineteenth century, the emerging production of the new world countries was reaching significant volumes²⁵. Thus, the new world markets declined significantly due to the protectionism of these countries, such as Argentina, Australia, the United States or Uruguay, which raised their tariffs substantially in order to protect domestic production. Therefore, in Argentina, in 1875, the ad valorem tax on wine was increased from 25% to 40%. From 1890 onwards it did not fall below 90% once the railway had connected the producing region, Mendoza, with Buenos Aires, and the producers had lobbied to reserve the domestic market for themselves. In 1890, imported wine accounted for almost 90% of Argentina's national consumption; it was only 1% in 1918.²⁶ The North American case of wine protection was even more precocious. The development of the transcontinental railway transport led to a claim for protection by the Californian wine producers and a considerable increase in tariffs from 1875, which reached an ad valorem level of around 85% in 1910. Imports fell by more

²² Loubère, *The red and the white*, p. 265.

²³ Nye, *War, Wine and Taxes*.

²⁴ Lafforgue, *Le vignoble girondin*.

²⁵ Anderson and Pinilla, *Wine Globalization*.

²⁶ Fernández, *Un mercado étnico*; Stein and Mateu, *Argentina*.

than 50%, while sales of Californian wines to the East Coast multiplied more than tenfold between 1875 and 1893.²⁷ As a result, in 1900, the production of California, which was 86% of the country's total, already represented 85% of all the wine consumed in the United States²⁸. In Table 1, we can observe a spectacular fall in sales to the United States or Argentina from the end of the century. Both countries had previously been the principal importers outside of Europe.

The trade in wine benefited from the reductions in transport costs. We should firstly highlight that from 1858 the railway network in France reached all of the wine-producing areas. This enabled a greater integration of its market and lower transport costs from producing areas to export ports or to the new European railway network, facilitating exports to neighbouring countries that produced little or no wine. So, for example, the cost of transporting wine from Montpellier to Lyon fell by 95%.²⁹ Secondly, the reduction in maritime transports costs was also substantial³⁰.

A series of political and economic shocks had a highly negative impact on French exports. First, we should remember the importance that the temperance movement had on an international scale, particularly in the more developed nations. This was particularly intense in Anglo-Saxon countries and reached its peak with the prohibition of the trade and sale of alcoholic drinks in the United States between 1920 and 1933. Thus, quality wine exports were hit hard by the prohibition of importing alcoholic beverages imposed by the United States, which closed this country's market. Some of the exports were diverted to Canada (and on a much smaller scale to Mexico) from where some were smuggled into the neighbouring country. After the end of the Prohibition, quality wine exports recovered somewhat as they were subject to lower levels of protection than ordinary wine which did not compete with local wine, given the great differences in quality.³¹

The First World War prevented exports to some important markets and also significantly reduced the production of champagne as this region was right in the middle of the western front. Also, the Russian Revolution in 1917, the civil war and the birth of

²⁷ Pinilla and Ayuda, 'Political Economy', pp. 59-60.

²⁸ Alston et al., 'United States', p. 415.

²⁹ Phillips, *French Wine*, p. 151.

³⁰ Mohammed Shah and Williamson, 'Freight Rates'.

³¹ Even during the years of the depression, French quality wine was able to access difficult markets such as North America, thanks to the bilateral agreements with this country in 1934 and 1936, which enabled exports to increase significantly (U.S. Tariff Commission, *Grapes, Raisins and Wines*, p. 260).

the Soviet Union deeply affected quality wine exports which were subject to prohibitively high tariffs (see Table 2). Finally, the economic problems generated by the crisis beginning in 1929 with the high tariffs, which became widespread over the following decade also affected exports.

In such a turbulent context with so many difficulties in order to maintain traditional markets, the colonial market was gaining weight in French wine exports due to the demand coming from the civil servants and military personnel posted in the colonies. The exports of ordinary wines were always significant as they represented between 10% and 25%. During the Great Depression their share increased even more, reaching 40%. In the case of quality wine exports, the colonial market was not significant before the First World War, usually representing less than 5% of the total export value. However, from the lead up to the First World War, they began to increase and by the 1930s they accounted for around 20% of total exports of this type of wine, representing a remarkable change.

IV. Exports of quality wines vs. ordinary wines: two diverging trends

French wine-makers tended to specialise in the export of wines in the high quality segment. Exporters tried to take advantage of an expanding market from the mid-nineteenth century, offering a product demanded by the high income groups of other countries, particularly in Europe. This strategy was primarily adopted by three regions: Champagne, Gironde and Burgundy.³² The phylloxera plague gave rise to the most dangerous moment in the French wine-making sector. As no other country had previous experience in combating this plague, France went to great lengths to find the most suitable remedy and the role of its scientists was fundamental. The high costs involved drove those regions more specialised in high quality wines to reinforce this orientation, improving their production technology and investing in marketing to obtain the best possible distribution of their production. Throughout the first third of the twentieth century, this would be the principal direction in the evolution of the French export sector, as in the low quality sector, competing with other countries with lower costs was becoming increasingly more complicated. However, the improvement in quality, the accreditation of brands or public intervention to protect this high quality production

³² Chevet et al, 'France'; Simpson, *Creating wine*.

through the creation of the appellations of origin, was not sufficient to overcome a series of external shocks, which in the 1930s placed the producers in an enormously difficult situation: the First World War, the Soviet Revolution and the loss of the Russian market, the Prohibition in the United States and the Great Depression successively hit the French wine export sector with extreme harshness.³³

Since the 1850s, quality wine exporters made a considerable effort to increase their sales abroad. There are two fundamental aspects of these efforts. First, the most important in the long term, was the work carried out to improve the quality of the product and the development of modern marketing techniques and strategies to ensure a good distribution of production. On the other hand, in the short term, it was necessary to compensate for the fall in production caused by the phylloxera plague just when sales were increasing substantially.

With respect to the improvement in quality, the exporters of the regions specialised in higher quality wines were concerned about this issue early on. They modernised their production with the aid of modern oenology, seeking to adopt vine-growing processes with the most advanced techniques once this discipline had enabled them to understand the chemical and biological fundamentals. There was close interaction between producers and the new oenological laboratories.³⁴ The development of modern oenology is illustrated by Louis Pasteur in his book published in 1866, which became a basic wine-making text, providing an increasingly scientific knowledge of the fermentation process and the role of yeasts. Significant efforts were also made to improve vine growing, particularly with respect to the fight against plagues. While modern chemistry found effective remedies for oidium and mildew fairly quickly, in the case of phylloxera, the fight was long and the only effective solution was finally to graft European plants to resistant rootstocks of vines native to the United States. In the end, it was the official science that found the definitive solution for phylloxera.³⁵

In the case of champagne production, a series of major problems had to be overcome, such as the amount of sugar required and the control of the fermentation

³³ Taking into account the nominal exchange rate of the franc and the variations in the general price index, the prices of French wine in foreign markets decreased significantly from the beginning of the twentieth century until 1928. The delay of France in abandoning the gold standard increased these prices temporarily. Subsequently, after France left the gold standard, the prices dropped again.

³⁴ Paul, *Science, Vine and Wine*.

³⁵ Gale, *Dying on the Vine*.

process.³⁶ The reduction in the amount of sugar necessary for the second fermentation required the quality of the wine to be carefully improved. These improvements in wine-making were made thanks to the development of organic chemistry and the role of applied research developed in specialised laboratories, such as the one built at the headquarters of Moët et Chandon.³⁷

Also, in Bordeaux, throughout the second half of the nineteenth century, Roudié exemplified the progress made in wine growing and making.³⁸ Advances were made in oenological research, culminating in the first third of the twentieth century with the work of the influential scientists Jean Ribéreau-Gayon and Emile Peynaud.³⁹

Regarding the marketing of the product, it is important to highlight that fundamental progress was made in several directions. First, quality wine producers were concerned about the accreditation of the quality of their products. In order to expand exports, it was essential to address the problems of asymmetric information that existed between the seller and the consumer. The accreditation of quality sought to solve two important problems: fraud in the product sold and the mislabelling of wines, which was particularly important when generic terms were used, such as Bordeaux or Champagne.⁴⁰ The classifications established in the mid nineteenth century in Gironde or Burgundy sought to accredit brands and guide consumers in a complex market, particularly abroad. Champagne producers also sought to accredit their brands and these companies were undoubtedly the forerunners of French wine exporters. In this case, their efforts were focused on the creation of brand-name identifications. This included the double identification of the region of origin and the product, usually with the name of the family of the company on the label.⁴¹ The reputation of the producer was therefore a key element. Furthermore, the producers organised themselves so as to ensure the reputation of their wine. In 1882, the *Syndicat du commerce du vin de Champagne* was formed by the most important producers in order to prevent imitations. Finally, in the twentieth century, they were able to establish a designation of origin in order to guarantee that the wines used came from a defined region.⁴²

³⁶ Forbes, *Champagne*; Wolikow and Wolikow, *Champagne*; Faith, *The Story of Champagne*.

³⁷ Desbois-Thibault, *L'extraordinaire aventure*.

³⁸ Roudié, *Vignobles et vignerons*

³⁹ Paul, *Science, Vine and Wine*

⁴⁰ Simpson, *Creating Wine*, pp. 81-82.

⁴¹ Guy, *When Champagne*.

⁴² Simpson, *Creating Wine*.

The champagne producers also used modern advertising techniques to promote their products and took great care in the design of the bottles and labels. They organised promotional shows, made extensive use of the printed press and from the beginning of the nineteenth century they began to communicate intensely with clients, organising wine-tasting events in their principal markets. Their greatest success was to establish champagne as an essential beverage in large social celebrations (launching ceremonies of ships and later planes, reception banquets for dignitaries or parties, cabarets...) and private events (christenings, weddings...). Establishing the status of champagne did not happen by chance. It was the fruit of the efforts made to “distinguish” the consumers of this product from the rest of the population. In short, they managed to convert champagne into the ‘obligatory adjunct’ to the social rituals of the emergent bourgeoisie of Europe.⁴³ Even in England, champagne became a vehicle to display one's social status with the development of a ladder of brands, whose value and ranking was well known to interested consumers.⁴⁴ At the beginning of the 1880s, this symbolic nature of champagne as the beverage of the emergent bourgeoisie had become firmly established.⁴⁵ Modern sales networks were also set up with permanent representatives of the brands who carried out these marketing tasks and established contact with clients in order to identify their preferences. Subsequently, the producers adapted their sparkling wines to the individual tastes of each country.⁴⁶

It was important to maintain stable relationships with the agents, who earned between 4% and 8% of sales. There were two fundamental figures: the *voyageur-représentant* and the *agent-résident*. The former travelled to increase the sales of the house and the latter became residents in the destination market.⁴⁷ In 1891, Moët et Chandon was represented by 10 agencies in France and 19 abroad. At the beginning of the nineteenth century, the owner of Deutz was clear about how their agent should be: ‘un bel homme, à la santé de fer, sociable, honnête, célibataire e jeune. Et, bien sûr, un ardent

⁴³ Guy, *When Champagne*, p. 11.

⁴⁴ Harding, *The Establishment of Champagne*.

⁴⁵ Vizetelly, *A History of Champagne*, p. 109.

⁴⁶ Regarding the customer orientation of the large producers: Moët et Chandon (Desbois-Thibault, *L'extraordinaire aventure*), Deutz (Kuhn, ‘Entre Aix-La-Chapelle et Aÿ en Champagne’), Pommery (Harding, *The Establishment of Champagne*) or Krug (Schalenberg, ‘Sens des affaires et transfert culturel’).

⁴⁷ Wolikow and Wolikow, *Champagne*,

buveur'.⁴⁸ Throughout the nineteenth century, merchants in other quality wine producing regions, such as Burgundy or Bordeaux also set up sales networks.⁴⁹

While in Champagne the large producers, through their brands, sought to ensure the quality of their production in an activity which required substantial capital, other exporting regions used alternative strategies. In Bordeaux, from 1870, bottling on the premises of the producer became a guarantee of authenticity.⁵⁰ Furthermore, the producers referred to their properties as “chateaux” as a guarantee of the quality of the wine. Therefore, the mentions of the chateaux on the bottles multiplied, increasing from 50 in 1850 to 1,000 in 1886 and 2,000 in 1922.⁵¹ In Burgundy, the *millesime* (vintage) defined the quality of the finest wines, but there was also a considerable promotion of the idea of the *terroir*, which demanded the exact geographical location of the product. The merchants of the Côte d’Or established a triple identification system of wines which provided precise information about the quality of the product (quality linked to the situation on the Côte, location of a nearby emblematic village and the merchant’s brand). Furthermore, they imitated Champagne and Bordeaux by implementing an “aristocratic” marketing of their wines which sought to provide guarantees of quality and used the family names of the merchants on their labels so as to give the impression of a family-run business and convey a dynastic image, using coats of arms or castles to ennoble the product. They also emphasised the longevity of the brand in order to provide an assurance of its continued excellence and good reputation. The aristocratic image became a sign of quality in order to convert the wines into icons of *savoir-vivre* and of the art of the French table for the international elite classes.⁵²

The classifications of wines, such as the one undertaken by Lavalley in 1855 for Burgundy⁵³ or the many Bordeaux classifications carried out from 1800, show a careful management of the reputation and image of the wines. Many of them were based on the relative prices of the wines and were made to help merchants establish prices, which could be an indirect reflection of their quality.⁵⁴ However, they also sought to inform the

⁴⁸ Kuhn, *ibid.*, p. 304.

⁴⁹ Laferté, *La Bourgogne et ses vins* ; Lachiver, *Vins, vignes et vignerons*,

⁵⁰ Roudié, *Vignobles et vignerons*.

⁵¹ Garrier, *Histoire sociale et culturelle du vin*, pp. 244-5.

⁵² Laferté, *La Bourgogne et ses vins*.

⁵³ Lavalley, *Histoire et Statistique*.

⁵⁴ Phillips, *French Wine*, pp. 144-6.

consumers about an enormously heterogeneous product whose quality was difficult to determine with precision.

It is important to point out that in the export business, and particularly in regions such as Champagne, Burgundy or Gironde, the principal role was played by the wine merchants rather than the producers. Not only did they market the wine but they also frequently bought the product from the wine-makers and mixed wines and bottled them. In the case of champagne, the high capital needs explain this division of functions between producers and merchants.⁵⁵ The concern about quality was important if we take into account the high prices of this type of wine. The laws of 1919, 1927 and 1935, which authorised and regulated the creation of the designation of origin, also responded to the request made by the producers of these types of wine to reinforce the reputational capital of their products.

The two divergent trends of the exports of quality and ordinary wine led to a complete reversal of the composition of French wine exports. Until the arrival of the phylloxera plague, the value of ordinary wine exports accounted for around 70% of total exports. In the last few years of the century, the exports of the two types of wine accounted for the same share and after 1910 the quality wine exports were higher.

Not all of the exporting regions of high quality wines obtained the same results. Undoubtedly, champagne is the clearest case of success. From the end of the nineteenth century, its exports accounted for around 30%-40% of the value of wine exported by France and almost 80% of bottled wine. In the first third of the twentieth century, it lost weight within the bottled wine segment (60-70%), but maintained its importance with respect to total exports.

V. Explaining the export trajectory: Theoretical framework, econometric model and data

In this section, our objective is to analyse the determinants of the evolution of French wine exports with a panel data set over the period 1848-1938. In this analysis, we should take into consideration not only the changes with respect to France's supply of exportable wine but also the changes in international demand and wine market integration, especially the reduction in transport costs and the liberalisation of trade.

⁵⁵ Simpson, *Creating Wine*.

Furthermore, bearing in mind that, as previously mentioned, the exported volumes of the different classes of wine evolved differently, we believe that, in addition to a general model for all of France's wine exports, it is even more important to also consider a model for each of the two previously defined classes of wine: ordinary wine (in casks) and quality wine (bottled). In this way, we will be able to confirm whether the determinants of the growth in trade were the same in both types of wines.

We have used gravity models with trade flows between France and its trading partners due to their highly effective capacity to explain trade between countries. Gravity model studies have achieved considerable empirical success in explaining various types of international trade flows. The underlying foundation stems from the idea that bilateral trade flows are directly proportional to the economic mass of the exporting and importing countries and inversely related to the geographical distance between them.

Despite being extensively used with relative success by applied researchers, this approach has been widely criticised, mainly because of its lack of a robust underlying economic theory and due to several econometric issues concerning specification and estimation methods. Many recent advances have been developed to deal with these issues, which we have taken into account in this work.⁵⁶

In total, our data panel covers 3,003 observations from 1848 to 1938, implying an impressive 86.1% of French wine exports, which enables us to draw sufficiently representative conclusions.

As the dependent variable we will use the real value of wine exports (current exports deflated by the French price index). As a robustness check we will re-run the regressions, using the exports at 1910 prices as the dependent variable. In the first case, the dependent variable X_{ijt} is the real value of annual wine traded between France (subscript i) and its 33 trade partners⁵⁷ (subscript $j = 1, 2, \dots, 33$) in the t period. In the second, the dependent variable is the value of annual wine traded between France and its partners in French francs at 1910 prices at year t .⁵⁸

Our first model is an extended gravity model specification for each of the two dependent variables and can be written as follows:

⁵⁶ Anderson and van Wincoop, 'Gravity with gravitas'; Baier and Bergstrand, 'Free trade agreements'; Egger and Nelson, 'Antidumping'.

⁵⁷ See appendix for the trade partners.

⁵⁸ See appendix for this series construction.

$ \begin{aligned} X_{ijt} = & \beta_1^* + \beta_2 \ln GDPpc_{jt} + \beta_3 \ln POP_{jt} + \beta_4 \ln Y_{it} + \beta_5 \ln Y_{jt} + \beta_6 \ln TC_{ijt} + \beta_7 French\ Colony_{jt} \\ & + \beta_8 M_{ijt} + \beta_9 WWI_t + \beta_{10} Dep30_t + \beta_{11} Soviet\ State_{jt} + \beta_{12} USA\ Prohibition_{jt} \\ & + \beta_{13} Time\ trend + \beta_{14} \gamma_j + \varepsilon_{ijt} \end{aligned} $	(1)
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with $\beta_1^* = \ln \beta_1$ and ε_t is assumed to be identically and independently distributed.

$GDPpc_{jt}$ represents the importer's GDP per capita at period t and POP_{jt} the importer population at period t (Maddison project, 2013). With these variables we seek to determine whether the potential foreign demand for French wine depends on the size of the importer's market, which, in turn depends on the size of its population (POP) and income per capita (GDP).

Y_{it} represents the production of wine in France and enables us to observe France's capacity to offer (export) wine depending on its harvest size, measured by production. For the quality wine models we will only use the production of the regions where these types of wine were concentrated: Bordeaux, Bourgogne and Champagne⁵⁹.

Y_{jt} reflects the size of the wine production of the trade partners and it is used to capture the so-called "home bias" as in Dal Bianco et al (2016). TC_{ijt} captures the evolution of the real transport costs of wine between France and its trading partners.⁶⁰

$French\ Colony_{jt}$, takes value 1 when the importer was a French colony, and 0 otherwise. This variable seeks to reflect, on the one hand, whether the French military personnel and officials in the colonies wanted to maintain their consumption of a product which formed part of their basic diets and, on the other hand, whether the trade between the mother country and the colonies was carried out under preferential conditions, normally with very low tariffs and sometimes without tariff protection (as in the case of Algeria which formed a customs union with France). So, we could expect, *a priori*, a higher level of trade between France and its colonies, *ceteris paribus*.

We have also introduced the variable M_{jt} which refers to the wine imported by France from its partners in order to verify whether there was any degree of monopolistic competition in international wine trade. We would expect this competition to exist in the case of quality wine.

⁵⁹ See appendix for more details.

⁶⁰ See appendix for this series construction.

Given that we do not have a variable that accurately measures the variations in the level of tariff protection, we have included a set of dummies to proxy the impact of certain political and economic situations that had a relevant direct impact on international trade. Thus, WWI_t takes value 1 for the years during the First World War; and 0 otherwise; $Dep30_t$ takes value 1 during the years of the Great Depression, 0 otherwise; $Soviet\ State_t$ takes value 1 for Russia/Soviet Union from 1917;⁶¹ and, $USA\ Prohibition_t$ takes value 1 for North America (Canada, Mexico and the United States) for the period in which the Prohibition was active, 0 otherwise⁶². According to contemporary analysts, all of these events considered in our model specification had a dramatic impact on French wine exports⁶³.

We have included a time trend (Time trend) to avoid a situation whereby the coefficient of certain variables that are growing over time may be simply capturing this trend effect and a dummy variable for each trade partner, γ_j , (to capture the so-called ‘multilateral resistance terms’), to account for the unobserved trade barriers between each country and all of its trading partners so that the omitted relevant variables problem is addressed when the effects on trade flows are evaluated. Furthermore, this also prevents the model from producing biased results. This dummy also controls for the so-called “unobservable bilateral heterogeneity.” In this way, in our specific case of a single product, the inclusion of a variable with a different value for each pair which is constant over time would control for both “multilateral resistance” and “unobservable heterogeneity”. Therefore, we have included importer’s fixed effects⁶⁴ to control for the possible bias caused by the omission of relevant variables and for the endogeneity of the institutional variables, but not country-time fixed effects. The inclusion of the latter would imply that our model would not be estimable because there would be more variables than observations.

We have also estimated a second extended gravity model adding some new variables to strengthen our analysis:

⁶¹It should be remembered that the elite classes of the Russian empire used to be characterised as relevant consumers of French wine and the disruption of the empire’s economic power and the reduced participation of the new state in international trade might have affected wine imports. Tariffs on wine imports in the new Soviet State rose until prices reached unaffordable levels.

⁶²The prohibition of alcohol forced the wine imported by the United States to be reduced to almost zero, except for the sacramental wine and the wine for medicinal purposes.

⁶³ See Douarché, *La crise viticole*.

⁶⁴ As in Cardamome, ‘Preferential trade agreements’; Dal Bianco et al., ‘Tariffs and non-tariffs’.

$ \begin{aligned} X_{ijt} = & \beta_1^* + \beta_2 \ln GDPpc_{jt} + \beta_3 \ln POP_{jt} + \beta_4 \ln Y_{it} + \beta_5 \ln Y_{it-1} + \beta_6 \ln Y_{it-2} + \beta_7 \ln Y_{it-3} \\ & + \beta_8 \ln Y_{jt} + \beta_9 \ln Y_{jt-1} + \beta_{10} \ln Y_{jt-2} + \beta_{11} \ln Y_{jt-3} + \beta_{12} \ln TC_{ijt} \\ & + \beta_{13} French\ Colony_{jt} + \beta_{14} M_{ijt} + \beta_{15} WWI_t + \beta_{16} Dep30_t + \beta_{17} Soviet\ State_{jt} \\ & + \beta_{18} USA\ Prohibition_{jt} + \beta_{19} GS_{ijt} + \beta_{20} French\ Language_j + \beta_{21} Time\ trend \\ & + \beta_{22} + \varepsilon_{ijt} \end{aligned} $	(2)
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Additionally, we have introduced lagged values of French wine production (Y_{it-1} , Y_{it-2} and Y_{it-3}). With these variables we seek to determine whether the supply of wine for export depended solely on the production of the same year or also on that of previous years. This is important as, given that the harvest usually took place in September, the first wines for export were not available until November or later. Furthermore, in the case of quality wine, which requires ageing, harvests from previous years were even more important. Therefore, it is expected that the export capacity depended more on the harvest from the previous year or earlier, mostly for quality wines.

We have also included lagged values of importer's wine production (Y_{jt-1} , Y_{jt-2} and Y_{jt-3}), Y_{jt} , to take into account the importance of the harvests of previous years so as to determine the demand for wine bought from France.

As transport is just a part of international transaction costs we have also included a dummy for the exchange rate regime, GS_{ij} , that takes value 1 if both countries belonged to the gold standard and 0 otherwise.⁶⁵

Finally, we have also included a variable to consider the possibility of French being the language spoken in the importer country, $French\ Language_j$, because everything else being equal this should reduce barriers to trade with France.

To estimate the models, we have used the Poisson pseudo maximum-likelihood (PPML) estimator.⁶⁶ This PPML estimator has the advantage of producing more efficient estimates of the regressions in (1) and (2) than the OLS method, because it takes into account the presence of zero values in the dependent variable⁶⁷ as it specifies the dependent variable at levels. This method also produces robust estimates to

⁶⁵ As in Jacks, Meissner and Novy, 'Trade booms'.

⁶⁶ Proposed in Santos Silva and Tenreiro, 'Log of gravity'; ibidem, 'Further Simulation'.

⁶⁷ See appendix for the number of zeros.

heteroscedasticity.⁶⁸

We have estimated the same two models for each type of wine: total exports of French wine, (Table 3); bottled wine exports (quality wine) (Tables 4), and wine exports in casks (ordinary wine) (Table 5).

VI. Results and discussion: The determinants of French wine exports

Table 3 depicts the results of the models estimated for the total exports of French wine. The first column indicates the name of the variables, the rest of the columns report the estimates of the four alternative PPML estimates depending on the dependent variable used and on the independent variables included. In estimates (1) and (2), the dependent variable is the real value of exports; to test for robustness, in estimates (3) and (4) the dependent variable is the value of exports at 1910 prices. The last rows in the table show the number of observations used in each model and the usual goodness of fit measure, R^2 .

Insert Table 3

The level of income and the size of the population of the importers did not affect the volume demanded. This was because in the majority of the importing countries, wine was not consumed by the masses but by a small elite group. In this way, the aforementioned changes in terms of both income and population did not affect imports.

The results show that exports had a positive relationship with the volume of wine production in France. It is natural to think that the volume of the harvest partially conditioned export possibilities and in this sense the phylloxera plague suffered in France was a key factor as the strong fall in production seriously affected the volume of exports. When we include the lagged values of French wine production in the models we can observe that these variables are also significant. As we would expect, the coefficient of the harvest of the previous year is higher than that of the current year.

The production of the importing countries is also a significant variable and in this case has a negative sign. The interpretation is clear: when France's trading partners had abundant harvests or were important wine producers, their imports were low, either due to sufficiently severe tariff instruments to prevent their entry or the simple preference of their consumers for the national product due to its lower price or characteristics. Also, in

⁶⁸ See, for example, Sören and Bruemmer, 'Bimodality'; Staub and Winkelmann, 'Consistent Estimation'; Kareem and Kareem, 'Gravity models'; Piermartini and Yotov, 'Estimating trade'.

this case the coefficient of the lagged importer's production is significant and the coefficient for the previous year's production is higher.

As we would expect, transport costs are significant and have a negative sign which implies that, on the one hand, exports were greater in closer destinations (with lower costs) and also, when transport costs fell (rose) exports increased (decreased). In our case, we have clear evidence to show that, overall, during the first wave of globalisation, the reduction in maritime freights boosted market integration and the growth of trade.

Also predictably, being a French colony positively influenced the imports of French wine received for reasons that we have already explained.

The evidence regarding the existence of monopolistic competition is not robust as this variable is significant in only one of the four models.

It is important to note that the dummies introduced to capture the impact of specific economic or political shocks are all significant and have the expected effect. So, the First World War slowed French wine exports, which is natural given the complications that the war implied for trade. The 1930s Depression and the ensuing wide range of protectionist instruments that were used also caused French wine exports to fall. Furthermore, the birth of the new Soviet state also had a significant impact on exports, reducing them as a consequence of the prohibitive tariffs that were imposed and the State's monopoly of foreign trade. As expected, the Prohibition in the United States significantly and negatively affected French wine imports.

As we could expect, the membership of France and its partners to the gold standard boosted exports by reducing the costs of trade. The variable that considers whether the importing country is French speaking is not significant, which is understandable if we take into account that these countries were very important consumers of beer (Belgium, Switzerland, Canada).

We also consider that the estimates of the econometric models used to explain the evolution of wine exports in accordance with their quality are highly interesting. We can see them in Tables 4 (quality wine) and 5 (ordinary wine).

Insert Table 4 and Table 5

As in the model for total wine, the GDP per capita and the population of the importing country are not significant for ordinary wine. However, in models (1) and (2)

for quality wine, the population of the importer is significant and with coefficients that indicate that an increase in the importing country of 1% generated an increase in exports of around 0.5%.

We can observe that the variations in French production positively affected ordinary wine exports (Table 5). For quality wine exports the results are less robust, as the variable is significant for real value exports (Table 4). When we introduce production lagged values, these variables are significant for some of the previous years. In the case of quality wine exports, the production of previous years tends to boost exports, particularly those of the harvest of three years before, which is understandable if we take into account that these wines were aged before being sold. During the phylloxera plague, ordinary wine exports plummeted due to the difficulties encountered by France to supply its own domestic market. In contrast, the lucrative high quality wine market remained stable. When the harvest diminished, the best part was reserved for exports and producers resorted to mixing French wine with imported wine in order to maintain exports or they marketed wines from previous years, which they had in stock, taking advantage of higher prices.⁶⁹

On the other hand, the wine harvests of importing countries mainly influenced ordinary wine imports, with a negative and significant coefficient. In the case of quality wine, the coefficient has the expected sign, but is only significant for exports in real values. Furthermore, the coefficients are significantly higher for ordinary wine. The lack of robustness can be explained by the fact that French quality wine did not usually have very much competition in this segment, although in some countries where it had gained market share, such as Spain, a trade war beginning in 1891 gave rise to considerable increases in tariffs and a partial replacement of the French wines with domestic production.⁷⁰ When we introduce importer's lagged production into the model, it is significant in the model of exports of wine in casks but, in general, it is not significant in the exports of bottled wine.

The reduction in transport costs throughout the first wave of globalisation significantly influenced trade in both types of wine, increasing exports. In the case of the models with exports in real values, the coefficients are high, which implies that every 1%

⁶⁹ Roudié, *Vignobles et vignerons*.

⁷⁰ Fernández and Pinilla, 'Spain'.

fall (increase) in transport costs generated increases (decreases) in exports of between 0.4% and 0.8%.

As in the case of the model for total exports, we can observe that being a French colony had a positive effect for ordinary wines.⁷¹

The variable M_{ijt} is only significant for wine exported in bottles, which shows that there was some degree of monopolistic competition in international wine. Wine producing countries, usually of lower quality wines, were also importers of French quality wine. In the cases where the exports to France were large, this promoted imports from France, as high quality wine was a differentiated product which high-income consumers appreciated in countries where there the consumption of wine was widespread, such as Italy, Spain or Portugal. However the impact was not high as the coefficients are very low.

With respect to the variables which we introduced to verify the impact of the aforementioned external political and economic shocks, in this case no significant differences are observed between the exports of the two types of wine, which were negatively affected by them in both cases. Perhaps it is interesting to highlight the much higher impact of the Prohibition on quality wine, as this type of wine was preferably exported to the United States. When we add the variable of whether the country is a member of the gold standard or not and whether it is French-speaking, the results are different. Membership of the gold standard only favoured the exports of quality wine and the estimates for the French language variable lack robustness, as it is only significant and positive in a model of the quality wine exports in real values and not in the case of exports in casks.

VII. Conclusions

When the international wine market began to emerge during the first wave of globalisation, France already had a leadership starting position due to its level of production, trade and technology. In this emerging and expanding market, the wine producers and merchants went to great lengths to provide consumers with a product that was perceived as having a high quality and also to “invent” new traditions that would stimulate their economic activity, such as the case of champagne and its conversion into a

⁷¹ In the model of the exports of bottled wine, the estimates of the model do not converge, so we cannot obtain results due to the approximate multicollinearity with the fix effects. Therefore, in this model we have had to eliminate this variable and are unable to determine its effect.

beverage for celebrations. The increase in the size of the market of the importing countries also favoured quality wine exports. In the ordinary wine segment, the low level of consumption outside of the traditional producing countries meant that economic growth did not benefit exports. In this way, during the first decades of the first globalisation, exports grew rapidly and France's position was strengthened. However, an unexpected event was to give rise to serious difficulties, obliging the French export sector to re-orientate itself to some degree.

The arrival of the phylloxera plague to France and its subsequent significant impact on its production gave rise to two major consequences. First, the high demand for wine in France to supply the domestic market and to maintain its level of exports boosted the formation of the international wine market. France became the world's leading wine importer, fostering the development of the sector in other countries, first Spain, and later Algeria. However, at the same time, the French weakness enabled other producing countries in Europe to compete with French wine in foreign markets and the emerging production in the New World to develop. Consequently, French merchants significantly redirected their exports towards the higher quality segment in which, until the First World War, trade increased even more. In the ordinary wine segment, although exports began to grow again after the phylloxera plague, they did not recover their pre-plague levels or their hegemonic position in the global market. Our econometric analysis, based on a gravity model approach, highlights that the increases in production in different countries harmed the export possibilities of French wine, particularly in the low quality segment. Furthermore, it illustrates how the variations in French production mostly affected the exports of low quality wine. However, even the producing countries that competed with France imported its high quality wine which was perceived as a differentiated product by high-income consumers. Our results also show that the fall in transport costs boosted wine exports.

After the First World War, a series of serious events significantly harmed the exports of all types of wine from France. In addition to the war, the loss of the Russian market after the Bolshevik Revolution, the North American Prohibition and finally, the Great Depression of the 1930s with its harsh measures to restrict imports, dealt a harsh blow, not only to the exports of French wine, but also to the very functioning of the wine sector as an integrated market.

In short, the case of wine has shown us that the collapse of the first globalisation was not exactly the same in all types of product, and that, in this case, when the final collapse occurred with the Great Depression, this market was already seriously injured. As wine could be considered as a luxury product in many countries, it was particularly sensitive to regulations (the Prohibition, protectionist measures during the Depression of the 1930s) or political shocks (World War, Russian Revolution).

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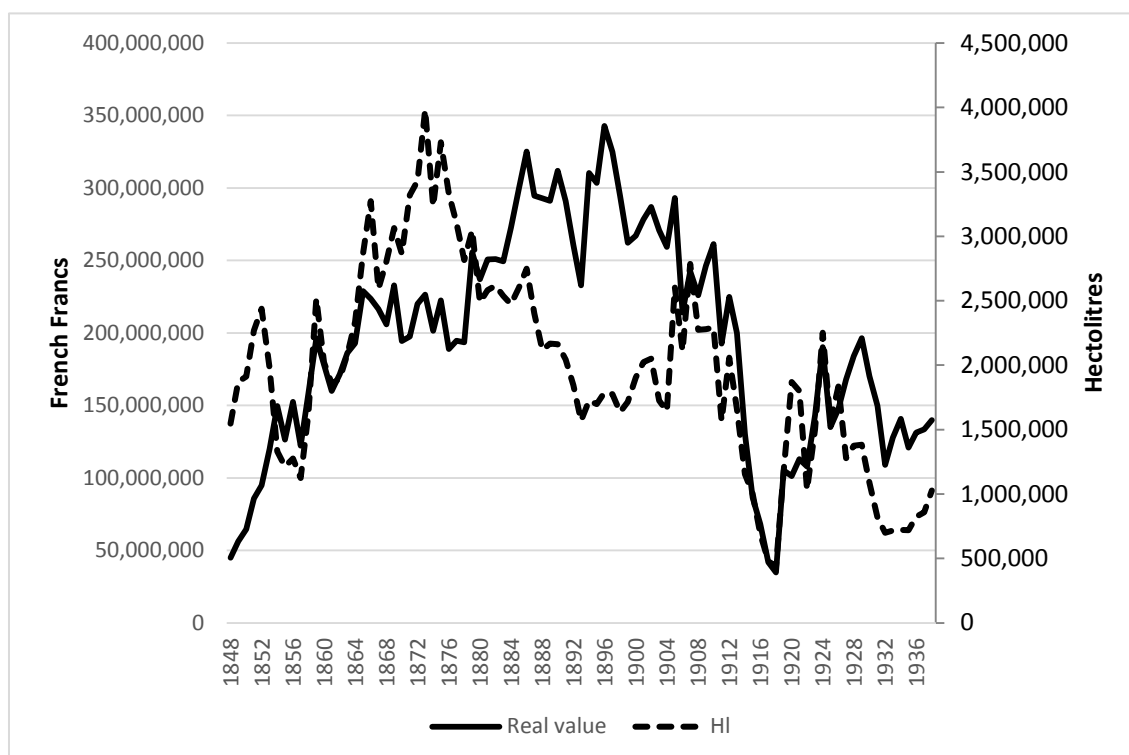
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Figures

Figure 1. French exports of wine

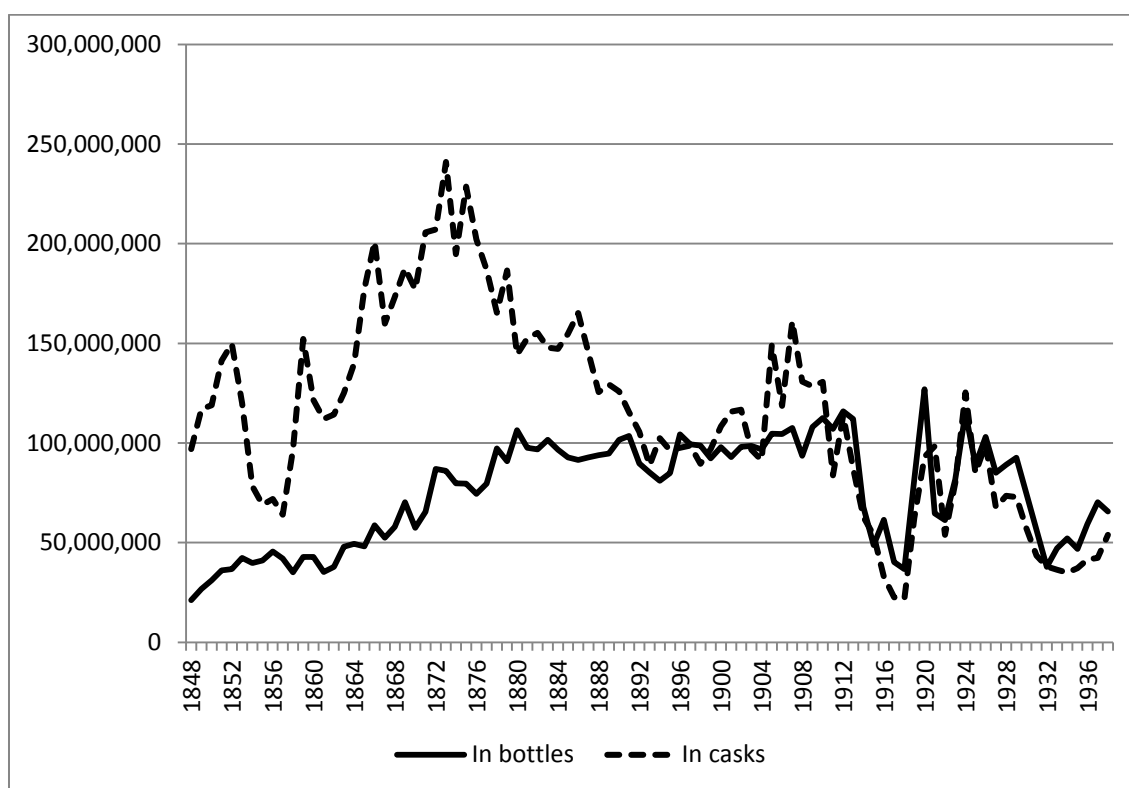


Notes: For real value exports, we have deflated exports at current prices by the French wholesale price index (Mitchell, *International Historical*, pp. 890-891).

Sources: Own calculation based on Direction General des Douanes, *Tableau General*.

Figure 2

French exports by type of wine (value at 1910 constant prices in French francs)



Notes: We have multiplied the quantities exported in hectoliters of each type of wine by its unit value in 1910. The differences in prices between the different types of wine were substantial. In 1910, the unit values in French francs of a hectolitre of each of the different types of wine were: 77 (ordinary wine from Gironde); 60 (ordinary wine from the rest of France); 200 (bottled wine from Gironde); 125 (bottled wine from the rest of France); 392 (champagne and other sparkling wines); 125 (liquor wines in casks); 175 (liquor wines in bottles).

Sources: Own calculation based on Direction General des Douanes, *Tableau General*.

Tables

Table 1. Destination of French exports of wine in barrels (thousands of French francs at 1910 prices))

	1847-49	1850-59	1860-69	1870-79	1880-89	1890-99	1900-09	1910-19	1920-29	1930-38
United Kingdom	1,271	1,714	8,176	15,059	15,288	14,209	10,612	7,083	6,184	4,074
Germany	15,189	11,670	13,617	28,777	19,286	17,122	21,304	11,257	19,411	2,563
The Netherlands	4,591	4,882	5,119	7,542	6,366	5,489	5,697	3,723	3,499	1,361
Belgium	6,524	7,178	10,058	14,491	12,817	12,710	15,438	9,377	17,357	7,748
Switzerland	8,406	6,931	18,627	34,016	16,855	9,088	20,153	6,616	12,591	7,974
Rest of Europe	12,941	24,282	17,574	7,515	5,599	3,333	5,274	3,173	2,577	1,617
EUROPE	48,921	56,657	73,171	107,399	76,211	61,950	78,478	41,229	61,618	25,336
United States	8,922	10,913	9,386	10,057	3,472	1,289	762	596	0	14
Canada	0	0	12	20	0	0	1	37	311	185
NORTH AMERICA	8,922	10,913	9,398	10,077	3,472	1,289	763	633	311	199
American French Colonies	4,428	3,291	4,390	4,215	4,292	4,401	4,058	2,153	1,847	3,232
Argentina	1,481	2,879	12,871	22,720	23,315	8,495	5,164	3,622	383	99
LATIN AMERICA	12,347	13,121	33,281	46,143	39,048	18,165	13,240	7,848	3,117	3,610
Asian French Colonies	46	110	74	0	683	2,407	5,334	2,735	3,628	2,457
ASIA	274	397	316	329	2,383	2,987	6,392	2,949	4,550	2,684
African French Colonies	25,978	19,767	22,860	21,995	13,345	6,648	7,023	4,705	6,138	7,411
AFRICA	30,665	23,122	28,753	26,366	15,427	7,877	7,948	5,390	6,894	7,594
Oceanian French Colonies	0	0	0	0	1,332	1,683	1,988	1,025	803	232
OCEANIA	0	33	410	897	1,332	1,683	1,988	1,025	803	232
Not assig.	1,096	1,972	5,857	8,327	8,870	7,775	12,885	8,094	7,639	3,178
WORLD	102,225	106,214	151,185	199,537	146,743	101,725	121,693	67,168	84,932	42,833
French Colonies	30,451	23,168	27,324	26,210	19,651	15,482	19,868	11,218	13,055	14,207

Notes: We have multiplied the quantities exported in hectoliters of each type of wine by its unit value in 1910. French Colonies are included in the World total. Their sum appears in the last row only to show the importance they had in total exports. Sources: Own calculation based on Direction General des Douanes, *Tableau General*.

Table 2. Destination of French exports of bottled wine (thousands of French francs at 1910 prices)

	1847-49	1850-59	1860-69	1870-79	1880-89	1890-99	1900-09	1910-19	1920-29	1930-38
United Kingdom	4,553	6,278	14,846	29,914	41,197	41,273	29,232	22,805	22,026	13,144
Germany	3,362	3,341	3,300	6,100	5,287	5,207	5,826	2,440	2,983	334
The Netherlands	268	361	319	903	596	1,158	995	1,145	3,009	1,708
Belgium	1,445	3,364	3,821	8,292	13,726	16,133	27,203	13,265	18,149	5,535
Switzerland	216	281	367	519	733	742	1,135	1,482	1,404	722
Rest of Europe	3,835	4,946	4,443	7,359	5,454	4,493	7,701	8,174	6,737	3,718
EUROPE	13,679	18,571	27,096	53,088	66,994	69,006	72,093	49,312	54,310	25,162
United States	4,411	10,773	8,111	7,859	8,096	7,928	7,026	6,449	296	7,501
Canada	0	0	0	0	0	10	294	480	1,895	1,022
NORTH AMERICA	4,411	10,773	8,111	7,859	8,096	7,938	7,320	6,930	2,191	8,523
American French Colonies	156	290	327	567	451	359	368	477	1,541	2,112
Argentina	228	417	1,158	2,014	2,051	1,066	3,540	4,835	2,602	1,158
LATIN AMERICA	3,858	5,994	7,724	11,135	10,166	6,041	6,791	8,550	8,083	4,307
Asian French Colonies	0	0	0	0	126	580	1,249	869	2,887	1,973
ASIA	548	940	1,353	1,465	992	997	2,450	1,914	5,748	3,513
African French Colonies	414	672	772	805	1,414	1,612	3,000	4,330	9,315	9,327
AFRICA	488	1,070	2,149	2,010	2,121	1,953	3,653	5,181	12,247	10,221
Oceanian French Colonies	0	0	0	0	0	9	10	3	113	39
OCEANIA	0	122	139	104	0	223	41	182	256	59
Not assig.	742	1,772	3,537	4,071	8,076	7,939	7,912	6,371	8,039	4,929
WORLD	23,727	39,243	50,109	79,732	96,445	94,098	100,261	78,439	90,874	56,715
French Colonies	529	892	1,067	1,372	1,992	2,865	5,545	6,175	14,819	14,279

Notes: We have multiplied the quantities exported in hectoliters of each type of wine by its unit value in 1910. Sources: Own calculation based on Direction General des Douanes, *Tableau General*.

Table 3: Results of the Gravity models estimated by PPML. Total exports of French wine

VARIABLES	(1) Real Value Wine Exports	(2) Real Value Wine Exports	(3) Wine Exports at 1910 prices	(4) Wine Exports at 1910 prices
Ln GDP _{pcjt}	0.596 (0.490)	0.569 (0.419)	0.178 (0.420)	0.146 (0.388)
Ln POP _{jt}	0.237 (0.326)	0.320 (0.289)	0.0995 (0.277)	0.184 (0.258)
Ln Y _{it}	0.462*** (0.0749)	0.248*** (0.0439)	0.250*** (0.0826)	0.0881*** (0.0306)
Ln Y _{it-1}		0.346*** (0.0854)		0.221*** (0.0850)
Ln Y _{it-2}		0.141*** (0.0366)		0.162*** (0.0263)
Ln Y _{it-3}		0.199*** (0.0568)		0.167*** (0.0579)
Ln Y _{jt}	-0.326*** (0.0520)	-0.148*** (0.0233)	-0.308*** (0.0515)	-0.118*** (0.0263)
Ln Y _{jt-1}		-0.0816 (0.0625)		-0.147*** (0.0431)
Ln Y _{jt-2}		-0.167*** (0.0399)		-0.0780** (0.0316)
Ln Y _{jt-3}		-0.0453 (0.0334)		-0.0689** (0.0316)
Ln TC _{ijt}	-0.688*** (0.102)	-0.586*** (0.112)	-0.161** (0.0764)	-0.109 (0.0909)
French Colony _{jt}	5.648*** (0.944)	6.099*** (1.025)	5.717*** (0.995)	6.031*** (1.071)
M _{jt}	3.87e-05 (0.00217)	0.00193 (0.00170)	0.000392 (0.00116)	0.00208* (0.00106)
WWI _t	-0.577*** (0.130)	-0.202 (0.190)	-0.771*** (0.173)	-0.612*** (0.213)
Dep30 _t	-1.210*** (0.162)	-1.070*** (0.170)	-0.673*** (0.173)	-0.644*** (0.167)
Soviet State _t	-5.737*** (0.223)	-5.484*** (0.211)	-5.818*** (0.208)	-5.706*** (0.200)
USA Prohibition _t	-2.537** (1.019)	-2.382** (1.005)	-1.910* (1.055)	-1.848* (1.054)
GS _{ijt}		0.519*** (0.169)		0.251** (0.117)
French Language _j		0.370 (1.624)		1.787 (1.404)
Time trend	-0.0258*** (0.00752)	-0.0331*** (0.00727)	-0.00361 (0.00717)	-0.00786 (0.00715)
Constant	1.850 (2.712)	2.198 (2.648)	5.045** (2.346)	6.496** (2.580)
Importer FE	Yes	Yes	Yes	Yes
Observations	3,003	2,904	3,003	2,904
R-squared	0.762	0.808	0.753	0.785

Notes: Clustered robust standard errors in parentheses. ***, ** and * denote significant at 1%, 5% and 10%, respectively.

Table 4: Results of the Gravity models estimated by PPML. Wine exports in bottles (high quality)

VARIABLES	(1) Real Value Wine Exports	(2) Real Value Wine Exports	(1) Wine Exports at 1910 prices	(2) Wine Exports at 1910 prices
Ln GDP _{pcjt}	0.486 (0.542)	0.281 (0.485)	0.0621 (0.496)	-0.0980 (0.472)
Ln POP _{jt}	0.416 (0.386)	0.521* (0.314)	0.392 (0.260)	0.438* (0.238)
Ln Y _{it}	0.139*** (0.0469)	0.131*** (0.0371)	0.0425 (0.0508)	0.0477 (0.0399)
Ln Y _{it-1}		0.0381*** (0.0133)		-0.00649 (0.0291)
Ln Y _{it-2}		0.0313 (0.0260)		0.0700** (0.0290)
Ln Y _{it-3}		0.134*** (0.0254)		0.0866*** (0.0230)
Ln Y _{jt}	-0.182** (0.0805)	-0.128*** (0.0409)	-0.113 (0.0841)	-0.0745 (0.0650)
Ln Y _{jt-1}		-0.0954* (0.0568)		-0.102* (0.0531)
Ln Y _{jt-2}		-0.0153 (0.0447)		0.0565 (0.0498)
Ln Y _{jt-3}		-0.0188 (0.0835)		-0.0190 (0.0713)
Ln TC _{ijt}	-0.738*** (0.130)	-0.452*** (0.0856)	-0.190* (0.113)	0.00106 (0.0812)
M _{jt}	0.00342*** (0.00126)	0.00391*** (0.00112)	0.00503*** (0.000833)	0.00507*** (0.000998)
WWI _t	-0.551*** (0.150)	-0.100 (0.216)	-0.706*** (0.177)	-0.456** (0.216)
Dep30 _t	-1.309*** (0.203)	-1.159*** (0.247)	-0.822*** (0.186)	-0.733*** (0.199)
USA Prohibition _t	-2.743*** (0.983)	-2.747*** (1.023)	-2.184** (1.046)	-2.195** (1.076)
GS _{ijt}		0.682*** (0.121)		0.420*** (0.0921)
French Language _j		0.669 (1.542)		6.683*** (1.420)
Time trend	-0.0125 (0.00774)	-0.0147* (0.00779)	0.00695 (0.00614)	0.00577 (0.00626)
Constant	-1.764 (3.904)	4.480 (2.845)	-10.00 (8.549)	-6.643 (8.954)
Importer FE	Yes	Yes	Yes	Yes
Observations	2,983	2,884	2,983	2,884
R-squared	0.858	0.893	0.823	0.844

Notes: Clustered robust standard errors in parentheses. ***, ** and * denote significant at 1%, 5% and 10%, respectively. *Some regressors and observations excluded to ensure that the estimates exist.

Table 5: Results of the Gravity models estimated by PPML. Wine exports in casks (low quality)

VARIABLES	(1) Real Value Wine Exports	(2) Real Value Wine Exports	(3) Wine Exports at 1910 prices	(4) Wine Exports at 1910 prices
Ln GDP _{pcjt}	0.655 (0.571)	0.729 (0.532)	0.158 (0.528)	0.201 (0.521)
Ln POP _{jt}	0.292 (0.333)	0.392 (0.344)	0.0742 (0.329)	0.192 (0.361)
Ln Y _{it}	0.569*** (0.0742)	0.243*** (0.0506)	0.423*** (0.0730)	0.134*** (0.0349)
Ln Y _{it-1}		0.505*** (0.0755)		0.395*** (0.0802)
Ln Y _{it-2}		0.217*** (0.0548)		0.232*** (0.0420)
Ln Y _{it-3}		0.249*** (0.0694)		0.223*** (0.0705)
Ln Y _{jt}	-0.368*** (0.0793)	-0.150*** (0.0444)	-0.375*** (0.0928)	-0.129*** (0.0494)
Ln Y _{jt-1}		-0.0650 (0.0591)		-0.157*** (0.0423)
Ln Y _{jt-2}		-0.246*** (0.0569)		-0.162*** (0.0538)
Ln Y _{jt-3}		-0.0543 (0.0505)		-0.0945* (0.0546)
Ln TC _{ijt}	-0.618*** (0.0879)	-0.626*** (0.166)	-0.162** (0.0822)	-0.200 (0.149)
French Colony _{jt}	4.858*** (0.325)	5.224*** (0.460)	4.688*** (0.361)	4.934*** (0.518)
M _{jt}	-0.000721 (0.00385)	0.00193 (0.00309)	-0.00243 (0.00300)	0.000825 (0.00310)
WWI _t	-0.749*** (0.146)	-0.418* (0.229)	-0.926*** (0.207)	-0.819*** (0.266)
Dep30 _t	-1.311*** (0.225)	-1.142*** (0.219)	-0.699*** (0.222)	-0.658*** (0.222)
Soviet State _t	-4.752*** (0.300)	-4.408*** (0.314)	-4.832*** (0.321)	-4.663*** (0.326)
USA Prohibition	-2.622** (1.112)	-2.340** (1.074)	-1.845* (1.102)	-1.684 (1.080)
GS _{ijt}		0.380 (0.248)		0.130 (0.187)
French Language _j		-1.790*** (0.567)		0.295 (1.303)
Time trend	-0.0329*** (0.00905)	-0.0431*** (0.0103)	-0.00991 (0.00983)	-0.0164 (0.0109)
Constant	2.826 (3.992)	0.706 (3.779)	6.741* (3.795)	5.042 (3.111)
Importer FE	Yes	Yes	yes	Yes
Observations	2,808	2,715	2,808	2,715
R-squared	0.675	0.734	0.674	0.726

Notes: Clustered robust standard errors in parentheses. ***, ** and * denote significant at 1%, 5% and 10%.

respectively. [†]Some regressors and observations excluded to ensure that the estimates exist.

APPENDIX: DATA FOR THE ECONOMETRIC MODELS

Countries: The trade partners of France included in the model are those for which individual data are provided in the statistics: Austria, Belgium, Denmark, Germany, Greece, Norway, Spain, Italy, Russia, Sweden, Switzerland, The Netherlands, United Kingdom (from Europe), Canada and United States (from North America), Argentina, Brazil, Chile, Colombia, Cuba, Equator, Peru, Mexico, Uruguay and Venezuela (from Latin America), Algeria, French Sub-Saharan Africa, Morocco and Tunisia (from Africa), French Indochina, Japan and European Asian colonies (from Asia), and Australia (from Oceania).

Wine types: The wine export series has been constructed based on France's foreign trade statistics which classify wine into seven categories. We have grouped them into just two: ordinary wine (low quality wine) and bottled wine (high quality wine) according to their unit values. Ordinary wine includes: Vins ordinaires en futailles de la Gironde, Vins ordinaires en futailles d'ailleurs, Vins de liqueur en futailles. Bottle wine includes: Vins ordinaires en bouteilles de la Gironde, Vins ordinaires en bouteilles d'ailleurs, Vins de Champagne et autres vins mousseux, Vins de liqueur en bouteilles. Note that in the French foreign trade statistics the meaning of 'vins ordinaires' corresponds to table wines.

French production: For the quality wine models, as an alternative to the independent variable of total French wine production, which indicates the exporting capacity of the country, we have used the production of the departments of the three regions where the production of this type of wine is concentrated: Bordeaux, Bourgogne and Champagne. We have included the production of the following departments: for Bordeaux wine (Gironde), Bourgogne wine (Côte d'Or) and champagne (Aisne, Aube, Marne, Haut-Marne and Seine-et-Marne). Throughout the period, the production of these seven departments represented around 10% of total French production. We consider this new series of regional output to be a reasonable proxy for (unobservable) changes in the production of quality wine. The data for 1850 to 1874 are from Galet and have been provided to us by Gilles Postel-Vinay from the article Banerjee et al. ⁷² The data for the

⁷² Galet, P., *Cépages et vignoble de France* (Montpellier, 1957-1962); Banerjee, A., Duflo, E., Postel-Vinay, G. and Watts, T., 'Long-Run Health Impacts on Income Shocks: Wine and Phylloxera in Nineteenth-Century France', *The Review of Economics and Statistics*, 92 (4) (2010), pp. 714-728.

period 1875-1935 are from the *Annuaire Statistique de France* and have been provided to us by Giulia Meloni drawn from the article Haeck et al.⁷³ For 1936-38, we have drawn the data directly from the *Annuaire Statistique de France*. It was necessary to estimate the production of some years for which no data are available.

Transport costs: In gravity models, the distance between the two trading partners is commonly used to approximate the transport costs between them, which are very difficult to measure for each pair of trading countries. In our case, instead of proxying transport costs with distance, we can use real transport costs. Our variable is time-varying and hence permits us to examine its evolution over time. To calculate the cost of transporting wine, we have used its cost per tonne from Marseille to Saint Petersburg in 1910⁷⁴. We have subsequently obtained an annual series, in nominal terms based on freight rates calculated by Federico and Tena for wheat between the port of London and Odessa⁷⁵. We have subsequently deflated this series with a wholesale price index from France to obtain the real costs⁷⁶ (Mitchell, 1992:890-891). Subsequently, we have taken into account the distance between France and each destination country in order to obtain specific freight series for the trade between France and each country. This implies the assumption that transport costs per tonne/mile were similar for wine and wheat, and proportional to the distance for each destination.

We cannot measure the impact of the construction of the railway network on transport costs, but it was significant. According to Loubère in France, after the construction of the railway network, the cost of transport was reduced to 3% of the final price of ordinary wine and 1% of quality wine⁷⁷.

Zero values: The model explaining the total exports of French wine contains 23% of zeros in the endogenous variable, implying that 690 of the observations out of the 3,003 were zero. As for the model for bottled wine exports (high quality), we found 30% of zeros, 899 of the observations of the volume of exports were zero. Finally, we found

⁷³ Haeck, C., Meloni, G. and J. Swinnen, 'The Value of Terroir. A historical analysis of the Bordeaux and Champagne geographical indications', LICOS Discussion Paper 408 (2018). Available at <https://feb.kuleuven.be/drc/licos/publications/dp/dp-408>.

⁷⁴ Degroully, P., *Essai historique et économique sur la production et le marché des vins en France* (Paris/Montpellier, 1910).

⁷⁵ Federico, G. and Tena-Junguito, A., 'World trade, 1800-1938: a new data-set', *IFCS - Working Papers in Economic History*, 16-01 (2016).

⁷⁶ Mitchell, B. R., *International Historical Statistics, Europe, 1750-1988* (London, 1992)

⁷⁷ Loubère, L. A., *The Red and the White: A History of Wine in France and Italy in the Nineteenth Century* (Albany, 1978).

36% of zeros in the dependent variable of the model explaining wine exports in casks (low quality), implying 1,087 zero observations.