

EXPLAINING WORLD WINE EXPORTS IN THE FIRST WAVE OF GLOBALISATION, 1848-1938

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**LAS EXPORTACIONES MUNDIALES DE VINO EN LA PRIMERA GLOBALIZACIÓN, 1848-1938:  
FACTORES DETERMINANTES**

**María-Isabel Ayuda<sup>†</sup>, Hugo Ferrer-Pérez<sup>§</sup> y Vicente Pinilla<sup>\*\*</sup>**

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**RESUMEN**

El objetivo de este artículo es analizar los determinantes de las exportaciones mundiales de vino en la primera globalización, teniendo en cuenta los principales países exportadores y utilizando una versión ampliada del modelo gravitacional. Nuestros resultados muestran que las exportaciones de vino común no se vieron afectadas por el aumento del tamaño de los mercados de los países consumidores, ya que en la mayoría de ellos el vino era una bebida alcohólica consumida por una minoría muy pequeña de la población. Las cosechas de los países productores, especialmente en los años anteriores, afectaron de manera significativa y positiva a sus exportaciones. A la inversa, las cosechas de los importadores les perjudicaron, ya que había un sesgo hacia el consumo de vino del país debido a razones culturales, de precio o de protección arancelaria. Finalmente, en el período de entreguerras, el comercio del vino se vio gravemente afectado por una serie de problemas externos como la Primera Guerra Mundial, la revolución soviética, la Prohibición en los Estados Unidos y la Depresión de los años treinta. Al igual que en el caso del comercio en su conjunto, la caída de los costes de transacción, en particular del transporte, favoreció las exportaciones, al menos las de vinos de menor precio y calidad. Sin embargo, la liberalización del comercio tuvo un impacto menor en el vino que en otros productos.

**Palabras clave:** Historia del vino, comercio de vino, globalización del vino.

**ABSTRACT**

The objective of this article is to analyse the determinants of world wine exports in the first wave of globalisation, taking into account the principal exporting countries and using an extended version of the gravity model. Our results show that ordinary wine exports were not affected by the increase in the size of the markets of the consuming countries, as in most of them wine was an alcoholic beverage consumed by a very small minority of the population. The harvests of the producing countries, particularly in the preceding years, significantly and positively affected their exports. And inversely, the harvests of the importers harmed them as there was a home bias in consumption due to cultural, price or tariff protection reasons. Finally, in the inter-war period, the trade of wine was severely affected by a series of shocks such as the First World War, the Soviet revolution, the Prohibition and the 1930s depression. As was the case for trade as a whole, the fall in transaction costs favoured exports, at least those of lower priced and lower quality wine. However, the liberalisation of trade had a lesser impact on wine than on other products.

**Keywords:** Wine history, wine trade, wine globalisation.

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# EXPLAINING WORLD WINE EXPORTS IN THE FIRST WAVE OF GLOBALISATION, 1848-1938<sup>1</sup>

## 1.- Introduction

In the second half of the twentieth century, the integration of the global wine market had acquired enormous depth. From the supply side, the boom in production and exports of the so-called New World countries gave rise to an intense competition in the market, as these producers challenged the consolidated position of the southern European countries (Anderson, 2004; Anderson and Pinilla, 2018b). From the demand side, the changes were perhaps even more significant. The consumption of wine grew enormously in countries where, until then, it had been a minority product among the alcoholic beverages preferred by their populations. At the same time, in countries where wine had a very solid position, its consumption decreased and other alcoholic beverages, such as beer, challenge its hegemony (Holmes and Anderson, 2017; Swinnen, 2011).

This market integration of wine occurring in the second wave of globalisation cannot be understood without examining what happened in the preceding century. This is because since the end of the 19th century new producers have emerged in the world which, with the exception of Algeria, are the countries that in the last quarter of the 20th century have challenged the hegemony of the traditional European producers. In the first wave of globalisation, an international wine market began to take shape for the first time. This clearly constituted traditional trade between the shortest distances that prevailed in the pre-industrial era between France, Portugal or Spain and Great Britain. The market extended significantly from both the supply side, with the beginning and development of wine production in the now so-called New World countries and the demand side, with the increase of consumption in northern Europe, the Americas and other regions of the world. Even so, the globalisation of supply was more important, increasing substantially in Africa, the Americas or Oceania than demand, which continued to be limited mainly to the traditional consumers of Mediterranean countries, their emigrants in other continents

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or the highest income earners of the countries in the throes of their industrialisation process.

In recent years, some studies have allowed us to expand our knowledge of the shaping of the international wine market in the first wave of globalisation from a perspective that takes into account the different participating actors (Unwin, 1991; Simpson, 2011; Pinilla and Ayuda, 2007; Anderson and Pinilla, 2018). Today we also have a solid quantitative basis that provides good serial data of international trade and wine production from the mid-nineteenth century (Anderson, Nelgen and Pinilla, 2017; Anderson and Pinilla, 2017). Furthermore, other monographic studies on producing countries have focused on the role that external markets have had in the transformation of wine growing sectors in this period, when exports were significant (Chevet et al., 2018; Federico and Martinelli, 2018; Lains, 2018; Fernández and Pinilla, 2018; Anderson, 2018; Meloni and Swinnen, 2018; Pan-Montojo, 1994; Pinilla and Serrano, 2008; Pinilla and Ayuda, 2002).

However, contrary to the second wave of globalisation, on which many studies have been conducted based on economic models analysing how the global wine market or trade flows operated, (for example, Anderson and Wittwer, 2013, 2017 and 2018; Wittwer, Berger and Anderson, 2003), for the first wave of globalisation there are practically no such studies. In particular, the gravity models, which have become the workhorse of many studies on international trade, have only been used for the first wave of globalisation to analyse the wine exports of France and Spain (Ayuda, Ferrer and Pinilla, 2018; Pinilla and Serrano, 2008).

Within this context, the objective of this article is to analyse the determinants of world wine exports in the first wave of globalisation, taking into account the principal exporting countries and using an extended version of the gravity model. Therefore, we wish to analyse the overall trajectory of wine exports and provide convincing explanations of the pattern with an approach that takes all the possible explanatory factors into account. In this way, we believe that we are making a relevant contribution, not only with respect to how the international wine market took shape and developed from the mid-nineteenth century until the Second World War, but also in terms of furthering our understanding of how it subsequently integrated after the war until the present day. Studying the past enables us to gain a better insight of the present, as the current global wine market owes a lot to how it was shaped in the first wave of globalisation.

## **2.- The Formation of the International Wine Market**

Although wine production began approximately 8,000 years ago on the lands and neighbouring regions of the current Republic of Georgia, subsequently, it shifted to the west, particularly to the Mediterranean basin, until the Roman invaders introduced it in France circa 600 B.C. Subsequently, due to climate and cultural reasons (particularly the Islamic expansion in the north of Africa and the Middle East from the eighteenth century),

wine production and consumption only consolidated on the northern coasts of the Mediterranean countries. In the pre-industrial era, its international trade was quantitatively small, as the problems with conserving the product limited trade to short distances or to fortified wines, which, due to their higher alcohol content, withstood the longer journeys better. In the pre-industrial era, the three principal trade routes for European wine were in the Mediterranean; the Rhine valley, communicating production in the south of the Germany with the north of the country and the Scandinavian countries; and the route from western France, Portugal and Spain to the United Kingdom. This country was, by far, the largest importer of wine and over the centuries the composition and quantity of its imports depended not only on the changes in tastes of the British elite classes but also on the discriminatory tariffs applicable to wine from different countries and the excise duty on domestic sales (Ludington, 2018). Even so, the amount of wine marketed internationally was very modest. In the mid-nineteenth century, world trade in wine still accounted for less than 5% of production (Anderson and Pinilla, 2018b).

The emergence and formation of an international wine market occurred, therefore, mainly during the second half of the nineteenth century. From 1850, trade in wine grew significantly, and by the beginning of the 1890s it accounted for around 15% of world production, which had also increased significantly. An expanding production, coupled with an even faster-growing trade coexisted with a consumption which, during the whole of the first globalisation, was limited mainly to the populations of the European Mediterranean area or the economic elite, mainly, but not exclusively, in countries with advanced levels of industrialisation.

Nevertheless, wine was far from being a homogeneous product. Its heterogeneity is precisely one of its principal features. It is not only the production processes that enable us to differentiate the different types of wine. The wide variety of vines used for production also has a great influence (Anderson, 2013). Evidently, the enormous diversity of prices is also a logical consequence of this lack of homogeneity in the product. We can group the wine produced into two main types (although the distinctions between them are sometimes blurred): bottled high quality wine and ordinary wine sold in casks.

The formation of a new international wine market during these decades was brought about by the following factors: the increase in the consumption of high quality wines by the high income groups in European countries where wine was not a product of mass consumption (Great Britain, countries in northern Europe,...); the mass transatlantic migration which moved millions of Europeans from traditional producing countries to new lands, who either continued their traditional consumption habits importing wine from their countries of origin or began to produce it in their new countries; the phylloxera plague which blighted the European vineyards and obliged France to import massive volumes of wine to maintain its growth in international markets and to supply its population; and, finally, France's colonial expansion which was also important as military personnel, civil servants and colonists moved and demanded wine from the mother country or, as in the case of the north of Africa, expanded vine growing. Furthermore, the

drivers of the first wave of globalisation were also the key drivers of this process: the liberalisation of trade and the reduction in trade costs.

The consumption of high quality wine increased mostly in the second half of the nineteenth century among the high-income groups of those countries that were experiencing an industrialisation process, such as Great Britain, Germany, Belgium or the United States. Economic prosperity fostered the consumption of wine, which was considered as a luxury product among these groups (Imperial Economic Committee, 1933; U.S. Tariff Commission, 1939). In spite of this, the consumption of wine continued to be very low. This increase in consumption was favoured by the modern marketing methods developed by quality wine producers (almost exclusively French) which included the use of modern advertising techniques, the accreditation of the quality of their products and brands, the adaptation to the preferences of the customers in different countries, the establishment of distribution networks and a significant effort to improve the quality of their products (Guy, 2003; Simpson, 2011; Ayuda et al., 2018). Quality wine, particularly champagne, became a social marker of the emerging bourgeoisie (Guy, 2003; Harding, 2018; Desbois-Thibault, 2003).

A considerable part of the 50 million Europeans who emigrated during the hundred years after 1820 were, after approximately 1880, from southern Europe (Hatton and Williamson, 1994). This had two important consequences in the formation of the international wine market. First, expanding into another country frequently gave rise to an increase in bilateral trade due to the reduction in fixed trade costs (Peri and Requena-Silventi, 2010). Furthermore, the fact that emigrants maintained their consumption patterns generated the creation of trade in the case of food and beverages. Some studies have shown that in the first wave of globalisation this happened in the main immigrant-receiving countries such as the United States (Dunlevy and Hutchinson, 1999) or Argentina (Fernández, 2004)<sup>2</sup>. Second, it was even more important in the long term for the European colonists to import their know-how regarding vine growing and wine making. In this way, wine production in the countries of European emigration increased notably, particularly from the end of the nineteenth century. This generated a contractionary effect on the exports of the countries of origin, as, as we shall see later, it implied the raising of protectionist barriers to safeguard the emerging production from the competition of traditional producers.

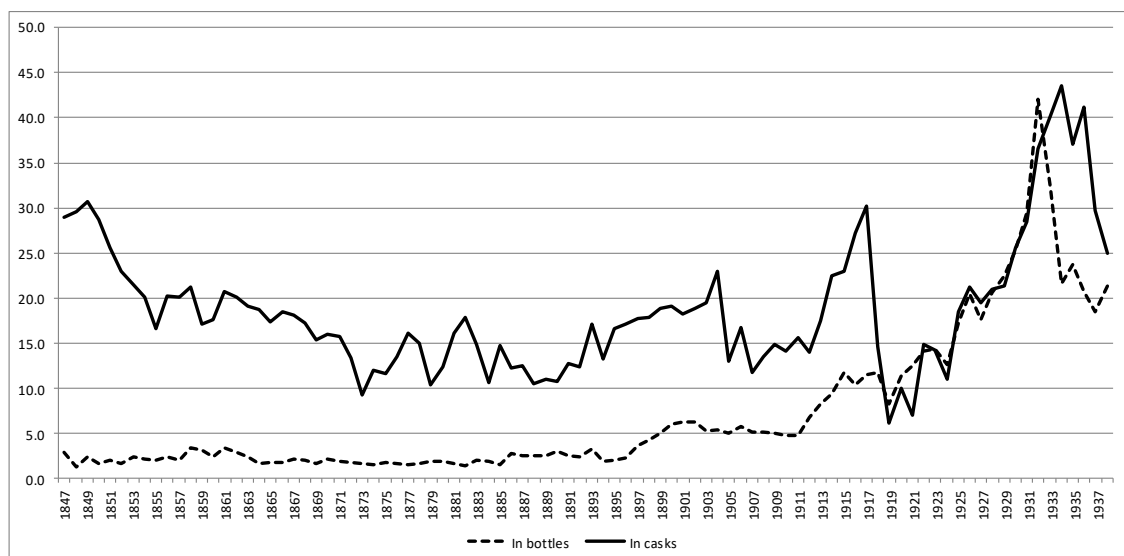
The arrival of the phylloxera plague to France in the 1870s was a determining factor, perhaps the most important, to explain how the international wine market took shape. The moment in which the phylloxera plague hit the French vineyards is fundamental as it coincided with the maximum level that exports from this country (in volume) reached until the Second World War. The drop in French production was fast and deep, and in a very few years it decreased by almost half. This had two important consequences: first, the need to continue to supply the domestic market obliged it to

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<sup>2</sup> Jacks (2005), however, finds a neutral effect of emigration on total trade between the origin and the destination in the first wave of globalisation.

import large amounts of wine, which came mainly from the neighbouring countries, particularly Spain and also Italy; second, the shock also deeply affected French exports. Therefore, it was necessary to use wine from other countries to mix them with their own in order to maintain them; furthermore, a profound process of export specialisation in France of high quality wines (mainly in bottles) began, which enabled the real value of exports to continue to increase until the end of the century; finally, the French difficulties facilitated a double process of export substitution in the low quality segment by exports from other countries such as Spain or Italy, which attempted to steal its external markets and also by domestic production in the new producing countries (Ayuda et al., 2018). In the medium term, the initial replanting of the French vineyards with highly productive hybrids that produced a wine with a low alcohol content and pale colour, required the country to import wine with a higher alcohol content and a more intense colour to mix it with and render it apt for consumption. Spain was the main supplier until the end of the nineteenth century when Algeria began to replace it and Spain was relegated to a secondary position.

**Figure 1. Wine exports to colonies over French total wine exports**



Sources: Own calculation based on Direction General des Douanes (1848-1938).

Finally, French colonial expansion also had a profound effect on the shaping of the international wine market. Most importantly, the French colonial policy in Algeria fostered the settlement of colonists from the mother country who obtained abundant land and made vines the principal crop of the agricultural exports. The expansion of production was spectacular and the free access to the French market converted Algerian exports to France into the principal trade flow in the global wine market. Wine production also grew in other French colonies in the Maghreb, such as Morocco and Tunisia, although to a much lesser degree (Meloni and Swinnen, 2018). Furthermore, the displacement of the colonists, civil servants and military personnel to the colonies stimulated wine exports from the mother country to satisfy their needs. France's exports to its colonies represented

a sizeable share of total exports from this country, particularly in the low quality wines which normally varied between 10% and 25% of the total. On the other hand, in the high quality segment they normally accounted for less than 5% (Figure 1).

The reduction in transport costs was important during the first wave of globalisation and facilitated the extension of exchanges. Not only did the fall in the navy fleets boost inter-continental trade, but the construction of railway networks facilitated the connectivity in the European continent, connecting wine producing areas with wine consuming areas.

**Table 1. Calculation of ad valorem tariffs on wine (1875-1938) (%)**

	ORDINARY WINE IN CASKS							
	1875	1885	1900	1910	1927	1929	1935	1938
Argentina	n.a.	n.a.	53	61	64	65	101	123
Australia	n.a.	n.a.	n.a.	n.a.	51	415	441	658
Austria	36	n.a.	66	108	40	33	55	123
Belgium	41	27	27	29	11	14	25	39
Brazil	n.a.	n.a.	53	85	74	43	50	63
Canada	n.a.	n.a.	45	29	51	33	24	38
China	n.a.	n.a.	n.a.	n.a.	83	78	80	80
Denmark	50	33	37	41	133	112	92	139
Germany	36	36	33	43	112	106	264	83
Italy	9	n.a.	8	18	35	33	89	85
Japan	n.a.	n.a.	n.a.	n.a.	15	22	19	29
Norway	20	18	20	79	72	57	66	50
Russia	100	141	146	140	1.705	312	n.a.	n.a.
Spain	96	n.a.	66	73	47	32	73	67
Sweden	n.a.	24	106	127	55	51	48	73
Switzerland	n.a.	n.a.	5	14	31	26	43	47
The Netherlands	75	50	56	61	57	54	135	113
United Kingdom	49	33	37	51	98	89	121	183
United States	98	81	64	70	Proh.	Proh.	182	n.a.

	TABLE WINE IN BOTTLES				CHAMPAGNE (BOTTLES)			
	1927	1929	1935	1938	1927	1929	1935	1938
Argentina	67	68	52	113	30	61	42	92
Australia	206	174	112	115	144	114	124	123
Austria	35	30	30	(*) 57	29	23	74	64
Belgium	14	19	16	31	9	16	25	39
Brazil	22	19	10	15	72	59	67	41
Canada	16	11	5	10	85	69	21	71
China	65	63	78	68	55	50	67	99
Denmark	208	196	30	59	141	124	98	150
Germany	51	52	82	132	42	19	56	75
Italy	22	22	18	13	41	8	155	(*) 61
Japan	18	25	14	26	18	22	37	28
Norway	42	38	27	22	71	60	18	27
Russia	799	767	n.a.	n.a.	362	n.a.	n.a.	n.a.
Spain	19	13	19	(*) 19	85	56	123	(*) 53
Sweden	36	34	20	39	94	83	38	29



Switzerland	14	18	19	26	22	16	29	32
The Netherlands	38	26	38	10	0	16	28	10
United Kingdom	53	49	38	72	80	73	75	101
United States	Prohib.	Prohib.	n.a.	75	Prohib.	Prohib.	n.a.	92

Notes: <sup>a</sup>Calculated as the percentage of customs duties of the value of imported wine. Specific tariffs have been obtained from the sources listed below. These are in French francs per hectolitre of wine in the case of wine in barrels or in French francs per bottle for bottled wine and champagne. For the price of wine, we have used the unit value of exports obtained from French external trade statistics: the arithmetic average of Gironde wine in barrels and wine in barrels from other parts of France exported in the corresponding year for ordinary wine; for bottled wine we have taken the arithmetic average of Gironde's bottled table wine and exported bottled table wine from the rest of France; for champagne we have done the same.

<sup>b</sup>(\*) 1937 data.

<sup>c</sup>n.a.= not available

<sup>d</sup>Prohib. means Prohibition, when imports were not allowed.

Sources: 1875-1910, Degrouilly (1910), p. 331; 1927-1938, Office International du Vin (1928-1939).

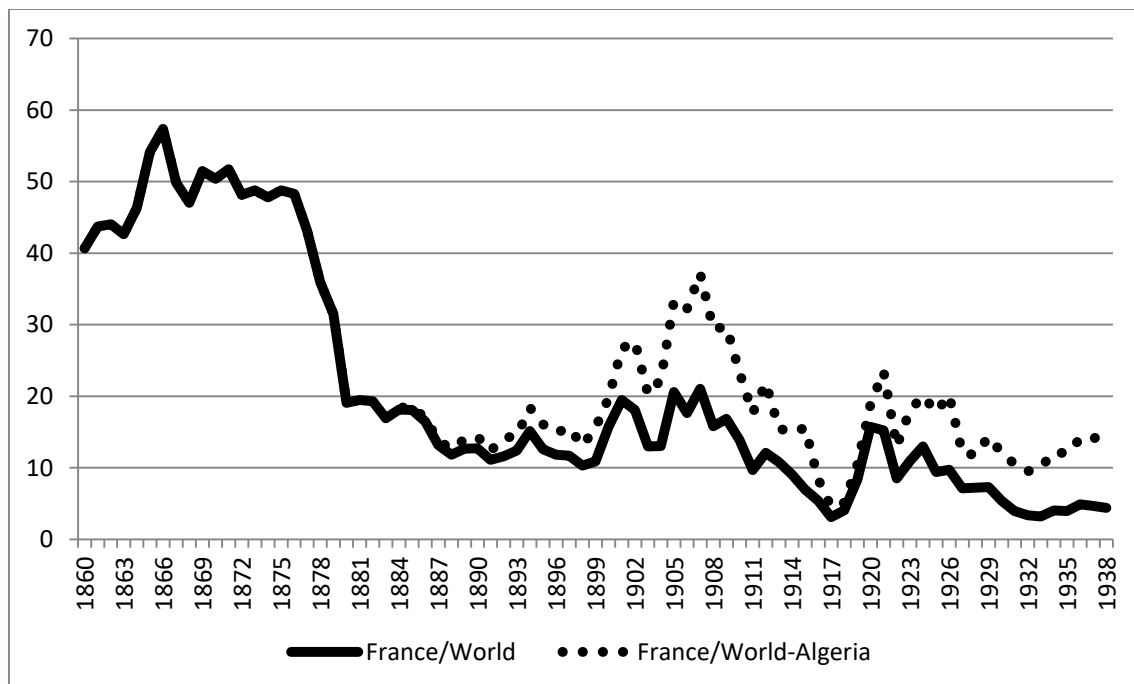
The liberalisation of the markets, developed mainly through the signing of trade agreements, implied a reduction in the tariffs. A good example is the Cobden-Chevalier treaty signed by France and Great Britain in 1860, which boosted wine exports from the former to the latter with a spectacular reduction of the tariff paid, which Lafforgue (1947) estimated at 78%. However, the widespread tariff liberalisation in the markets in the first wave of globalisation had a smaller scope in the case of wine. The high tariff barriers imposed on the trade of wine are a crucial aspect. As we can see in Table 1, the tariffs applied to wine, when entering very diverse countries, were very high, for ordinary and high quality wine, and followed an upward trend from 1875 until the Second World War. There are three very different reasons to explain this heavy tax burden on wine. In producing countries, such as Argentina, Australia, Italy or Spain, the high tariffs were a simple defence barrier to ward off foreign competition, especially France. The case of Spain, one of the largest producers, is particularly illustrative. Wine protection was high until 1879 when a bilateral trade agreement with France opened the doors of this country to Spanish wine and, in return, Spain also liberalised wine imports, especially quality wines from France. In 1892, when France withdrew from the treaty and increased its protection slightly, Spain did the same. This Spanish protectionist policy not only gave rise to significant growth in the production of quality table wine, particularly from La Rioja, but, in addition, a sparkling wine production industry emerged to replace the imports of champagne (Fernández and Pinilla, 2018). In the non-producing countries, duties on wine were considered fiscal duties meaning that their main goal was to provide public revenue. Its consideration as a luxury product justified this revenue collection option. Finally, the high excise and import taxes on wine frequently sought to protect local producers of beer or spirits (Holmes and Anderson, 2017).

However, the expansion of trade encountered major obstacles that prevented further growth and therefore we can refer to a restricted globalisation. Although production became globalised, expanding from Europe to other continents such as Africa, the Americas and Australia, consumption continued to be restricted to the original

populations of the northern shores of the Mediterranean and the social elite classes of the most developed countries.

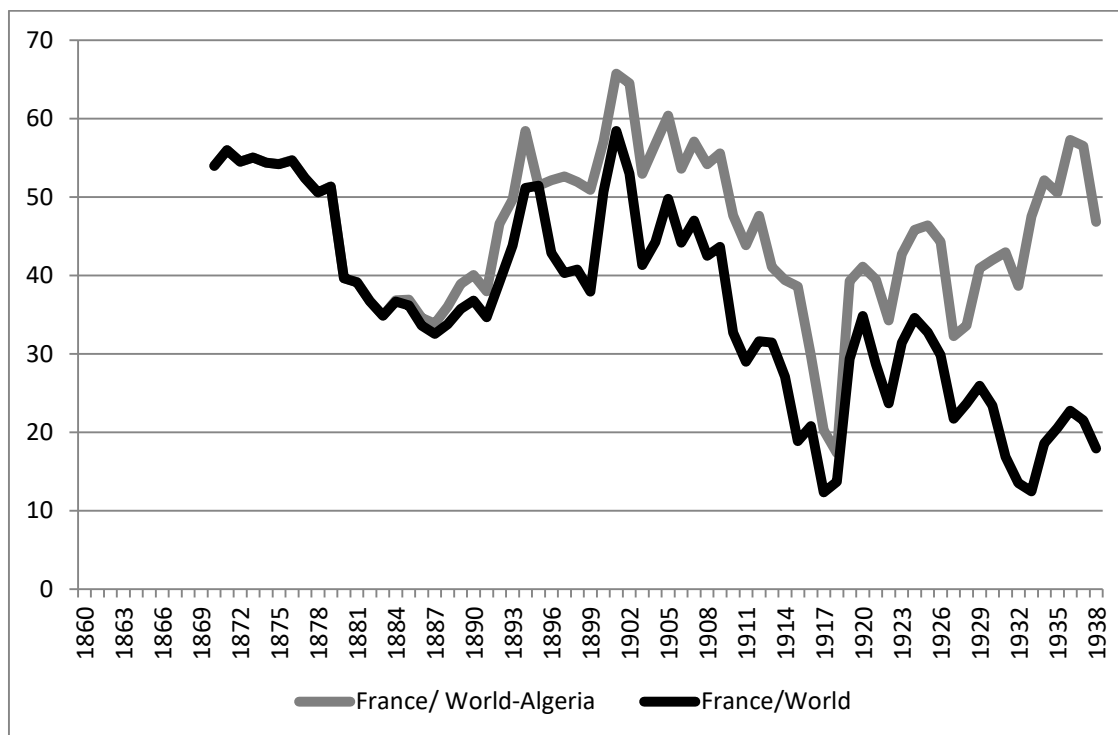
We can conclude by remarking that in the formation of the international wine market, from the outset France obtained a dominant position, leading the integration of this market (Figures 2 and 3). The configuration of the international wine market was mainly driven by its exporting dynamism. The arrival of the phylloxera plague to France reinforced the role of this country in the wine market. As well as being the principal exporting country it also became the leading importer in order to complement its shrinking production. Spain initially supplied the wines that France needed. However, from the beginning of the 1890s, the French colonial policy, seeking to settle colonists in Algeria and provide then with a viable economy, promoted the expansion of vine growing and the duty-free import of its production to the mother country (Pinilla and Ayuda, 2002). Within this context, Metropolitan France specialised in producing high quality wines for exporting or low quality wines for the domestic market. Imports from Spain, or principally Algeria, provided wines with a high alcohol content and intense colour to mix with wine produced from hybrids resulting from the replantation, which had a low alcohol content and pale colour and was not appreciated by the French consumers (Ayuda Ferrer-Pérez and Pinilla, 2019).

**Figure 2. Share of French wine exports of world totals (volume)**



Source: Anderson and Pinilla (2017)

**Figure 3. Share of French wine exports of world wine exports (current values)**



Sources: Anderson and Pinilla (2017).

### 3.- The Evolution of World Wine Exports

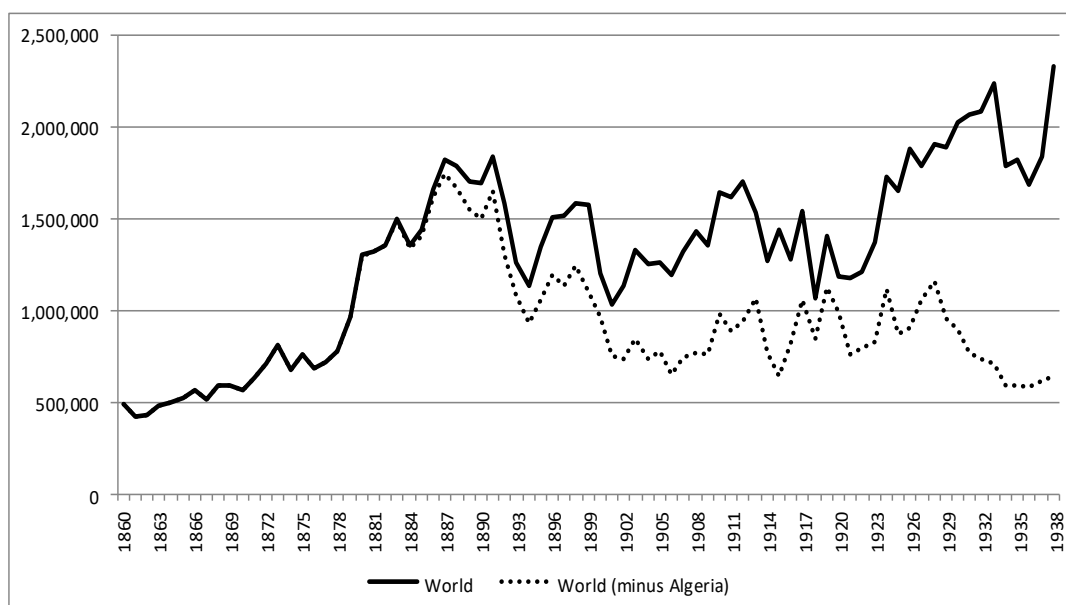
International wine exports experienced an enormously expansive first phase from the mid nineteenth century until approximately 1890 (Figure 4). World trade remained stable until the mid1920s and subsequently began to grow again, with two severe circumstantial dips caused by the First World War and the Great Depression in the 1930s. However, the picture changes substantially if we do not consider the exports of the French colony of Algeria to France as international trade.<sup>3</sup> There are no differences in the first expansive phase in which exports increased more than three-fold. But, from the beginning of the 1890s, international trade contracted significantly, reducing by approximately one third and remaining at this level until the crisis of 1929, when it plummeted to levels of the mid-nineteenth century (Anderson and Pinilla, 2018b). In other words, global wine exports only grew appreciably during the second half of the nineteenth century. All subsequent expansion was due exclusively to the exports of the French colony Algeria to the mother country.

The stagnation of the international wine trade or its contraction, if we exclude the flows from Algeria to France, can be explained partly by the serious problems caused by the war, the Depression and the creation of the Soviet state which penalised wine imports,

<sup>3</sup> As well as being a French colony, Algeria also formed a customs union with Metropolitan France and to all intents and purposes, was French territory. Practically all of the Algerian exports had France as their destination. Isnard (1954); Meloni and Swinnen (2018).

a product traditionally consumed by the Russian aristocracy with prohibitive tariffs. Furthermore, exports were affected by a series of causes specific to the operation of the wine market itself. First, the increased protectionism that took place from the end of the century. Some large importers, such as Argentina, Uruguay or the United States substantially increased their tariffs to protect their domestic production and their imports plummeted. Second, the imports from the countries in northern Europe tended to stagnate, after the appreciable growth that they had experienced from the middle of the century. Without a doubt, the non-extension of its consumption beyond the upper classes explains this stagnation. Finally, the Prohibition in the United States caused exports to this country to fall sharply.

**Figure 4. Evolution of world wine exports (volume)**



Source: Anderson and Pinilla (2017)

#### 4.- Theoretical Framework, Econometric Model and Data

The objective of this paper is to investigate the determinants of the evolution of world wine exports with a panel data set with a total of 7,025 observations from the 1848 to 1938, representing an impressive 75%-85% of world exports in volume or 75%-90% in value, which, in turn, enables us to draw sufficiently representative conclusions. In particular, we have distinguished between ordinary wine (in casks) and quality wine (bottled) to better understand the determinants of world wine exports.

To address this objective, a gravity model approach is applied due to their proved power to explain trade flows between countries.

In this model specification, we have considered the value of annual wine traded between Algeria, France, Italy and Spain (subscript  $i$ ) and their 37 trade partners<sup>4</sup>

<sup>4</sup> See appendix for the trade partners.

(subscript  $j = 1, 2, \dots, 37$ ) as the endogenous variable  $X_{ijt}$ . The variable is expressed in French francs at 1910 prices at year  $t$ .<sup>5</sup>

The following extended gravity model has been specified, first for ordinary-wine case and, second, for quality-wine case:

$$\begin{aligned}
X_{ijt} = & \beta_1^* + \beta_2 \ln GDP_{jt} + \beta_3 \ln Y_{it} + \beta_4 \ln Y_{it-1} + \beta_5 \ln Y_{it-2} + \beta_6 \ln Y_{it-3} + \\
& + \beta_7 \ln Y_{jt} + \beta_8 \ln Y_{jt-1} + \beta_9 \ln Y_{jt-2} + \beta_{10} \ln Y_{jt-3} + \beta_{11} \ln TC_{ijt} + \\
& + \beta_{12} Colony_{jt} + \beta_{13} M_{ijt} + \beta_{14} WWI_t + \beta_{15} Dep30_t + \beta_{16} Soviet_{jt} + \\
& + \beta_{17} Prohibition_{jt} + \beta_{18} GS_{ijt} + \varepsilon_{ijt}
\end{aligned} \tag{1}$$

with  $\beta_1^* = \ln \beta_1$  and the error term  $\varepsilon_{ijt}$  is the identically and independently distributed error term.

$GDP_{jt}$  represents the importer's GDP at period  $t$  (Bolt and Van Zanden, 2013). With this variable we seek to determine whether the potential foreign demand for wine depends on the size of the importer's market.

$Y_{it}$  represents the production of wine in the exporting nations and enables us to observe their capacity to export wine depending on harvest size.  $Y_{it-1}$ ,  $Y_{it-2}$  and  $Y_{it-3}$  are the 1, 2 and 3 lagged values of exporter countries' wine production, respectively. These three variables try to measure the effect of the harvest of previous years on the supply of wine for export. These lagged variables can be significant given that the harvest usually took place in September but the first wines for export were not available until November or later. In the case of quality wine, harvests from previous years can be even more important, because this type of wine requires ageing. Therefore, it is expected that the export capacity depended more on the harvest from the previous year or earlier, mostly for quality wines.

$Y_j$  captures the size of the wine production of the trade partners and it is used to capture the so-called "home bias" (Dal Bianco et al, 2016).  $Y_{jt-1}$ ,  $Y_{jt-2}$  and  $Y_{jt-3}$  represent the corresponding lagged values of importer's wine production. With these lagged variables we seek to determine the importance of the harvests of previous years so as to determine the demand for wine bought from abroad.

$TC_{ijt}$  reflects the evolution of the real transport costs of wine between the exporters and their trading partners.<sup>6</sup>

$Colony_{jt}$  is a dummy variable that takes value 1 when the importer was a colony of the exporter country, and 0 otherwise. This variable seeks to measure, on the one hand, whether the trade between the mother country and the colonies was carried out under

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<sup>5</sup>See appendix for this series construction.

<sup>6</sup>See appendix for this series construction.

preferential conditions, normally with very low tariffs and even without tariff protection and, on the other hand, whether the metropolitan officials and military personnel in the colonies wanted to maintain their consumption of wine. So, we could expect, *a priori*, a higher level of trade between the metropolis and its colonies, *ceteris paribus*.

$M_{ijt}$  is used to reflect the level of monopolistic competition in international wine trade and it is the wine imported by the exporters from their partners.

Furthermore, due to the lack of variables that may accurately measure the change of the level of tariff protection, we have also included a set of dummies to proxy the impact of certain political and economic situations that had a relevant direct impact on international trade and in particular on world wine exports, according to contemporary analysts:

$WWI_t$  that takes value 1 for the years during the First World War; and 0 otherwise.

$Dep30_t$  that takes value 1 during the years of the Great Depression, 0 otherwise.

$Soviet_{jt}$  that takes value 1 for Russia/Soviet Union from 1917.

$Prohibition_{jt}$  that takes value 1 for the period in which the Prohibition was established across North America (Canada, Mexico and the United States), 0 otherwise.

As for other transaction costs, we have included a dummy variable for the exchange rate regime,  $GS_{ijt}$ , as transport is only a part of international transaction costs (Jacks, Meissner and Novy, 2011). The variable takes value 1 if the two trading partners belonged were on the Gold Standard, and, 0 otherwise

We have also included in the model specification other dummy variables (one for each trade partner) to capture the so-called ‘multilateral resistance terms’ which, in turn, may prevent the model from obtaining biased estimates. In some models, we have also included a trend term.

We have used the Poisson pseudo maximum-likelihood (PPML) estimator, proposed in Santos Silva and Tenreyro (2006), to estimate the models. This PPML estimator takes into account the presence of zero values in the dependent variable<sup>7</sup> as it specifies the dependent variable at levels, so it has the advantage of producing more efficient estimates than the OLS method. This method also produces robust estimates to heteroscedasticity (Sören and Bruemmer (2012); Staub and Winkelmann (2013); Kareem and Kareem (2014); Piermartini and Yotov (2016).

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<sup>7</sup> See appendix for the number of zeros.

## 5.- Results

Table 2 show the results of the gravity models for the two kind of wines. In order to analyse the robustness of our estimates, for the main variables, we present two estimations (1) without a trend term and (2) with a trend term.

Our results show, first, that the increase in the market size of importing countries only affected the volume of high quality wine exports. This result can be explained because in almost all of the most relevant importing countries, with the notable exception of France, wine was not the alcoholic drink consumed by the majority of the population: beer or spirits were the favourite drinks. Consequently, a preference for other locally produced drinks had developed. Furthermore, in these countries, even the price of ordinary wine was higher than the local drinks, which also benefitted from reductions in production costs derived from the technological innovations of the industrial revolution (Anderson, Meloni and Swinnen, 2018). Therefore, the expansion of wine exports was restricted by the limited progress in the globalisation of its consumption.

**Table 2: Results of the Gravity models estimated by PPML**

<b>VARIABLES</b>	<b>HIGH Quality (1)</b>	<b>HIGH Quality (2)</b>	<b>LOW Quality (1)</b>	<b>LOW Quality (2)</b>
<b>I_GDPj</b>	-0.0628 (0.1330)	1.0970*** (0.2983)	-0.0226 (0.1736)	0.2530 (0.3115)
<b>I_esc_Yi</b>	0.1276** (0.0614)	0.1916*** (0.0623)	0.3731*** (0.1138)	0.3800*** (0.1044)
<b>I1I_esc_Yi</b>	0.2989*** (0.0656)	0.3396*** (0.0725)	0.6368*** (0.1002)	0.6456*** (0.1009)
<b>I2I_esc_Yi</b>	0.0883*** (0.0326)	0.1316*** (0.0357)	0.1543*** (0.0461)	0.1621*** (0.0443)
<b>I3I_esc_Yi</b>	0.0957 (0.0791)	0.1616** (0.0700)	0.2336*** (0.0555)	0.2542*** (0.0542)
<b>I_esc_Yj</b>	-0.1389* (0.0792)	-0.1853*** (0.0718)	-0.1748** (0.0683)	-0.1812*** (0.0662)
<b>I1I_esc_Yj</b>	-0.1875*** (0.0507)	-0.2184*** (0.0463)	-0.2490*** (0.0608)	-0.2477*** (0.0587)
<b>I2I_esc_Yj</b>	-0.0167 (0.0612)	-0.0534 (0.0600)	-0.0866 (0.0594)	-0.0956* (0.0528)
<b>I3I_esc_Yj</b>	-0.0365 (0.0570)	-0.0858 (0.0564)	0.0496 (0.0737)	0.0339 (0.0732)
<b>I_esc_Mij</b>	0.0103 (0.0122)	0.0143* (0.0075)	0.0264 (0.0184)	0.0276 (0.0171)
<b>I_TCij</b>	-0.0139 (0.1082)	-0.0104 (0.0975)	-0.2251** (0.1028)	-0.2170** (0.1095)
<b>Colony</b>	1.9356 (1.4123)	2.2680 (1.5916)	1.4890* (0.8702)	1.4922 (0.9142)
<b>Dep30</b>	-0.4171** (0.2120)	-0.0721 (0.2270)	-0.2272*** (0.0807)	-0.1737 (0.1276)
<b>WWI</b>	-0.6612*** (0.2531)	-0.4663* (0.2760)	-0.2280** (0.0972)	-0.1865* (0.0981)
<b>Soviet</b>	-4.9934***	-4.4530***	-5.2473***	-5.1368***

	(0.3153)	(0.3352)	(0.3087)	(0.3308)
<b>Prohibition</b>	-1.9861***	-2.4354***	-1.9076**	-2.0188**
	(0.7600)	(0.8096)	(0.8242)	(0.8303)
<b>GSij</b>	0.1058	0.1317	-0.0624	-0.0733
	(0.1713)	(0.1543)	(0.1192)	(0.1164)
<b>Constant</b>	1.5864	-9.6974***	-0.1096	-3.4942
	(1.5777)	(2.4490)	(3.9107)	(3.8180)
<b>Country Pair FE</b>	YES	YES	YES	YES
<b>Trend</b>	NON	YES	NON	YES
<b>Observations</b>	6,196	6,196	6,494	6,494
<b>R-squared</b>	0.5660	0.5946	0.9216	0.9233

**Note:** Robust standard errors in parentheses (clustered by country-pairs)

\*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%

As we would expect, exports were highly conditioned by the production of the exporting country, and given that the majority of output was usually sold in the northern hemisphere, in the year following the harvest, the production of the previous year was even more important. Even the production of years previous to this influenced the level of exports. These results help us to gain a good understanding of the effects of the phylloxera plague in France and its impact on its exports.

Domestic production in importing countries had a negative relationship with wine exports, which enables us to conclude that there was a home bias in wine consumption. The existence of a local harvest, in some cases abundant, determined competitive prices of home production (in the traditional producing countries) and in the new producing countries it generated tariff protection giving rise to a strong increase in local production.

Decreasing trade costs boosted exports only for low quality wine, while quality wine, a product that we can consider as a luxury product, was not affected by them. This is not surprising if we take into account that the price of transport represented a much lower proportion of the final price in quality wine than in ordinary wine.

Colonial wine trade was only significant for low quality wine, although when we introduce a trend into the model it is no longer significant. This is also the case for other variables that reflect certain specific circumstances. It is reasonable to think that the civil servants from the mother country or the majority of displaced troops, while maintaining their consumption habits, did not have sufficiently high purchasing power so as to buy high quality wine.

The results of the quality wine model seem to show monopolistic competition, although this is probably due to the role of France as an importer of low quality wine and an exporter of high quality wine.

Finally, one of the most important results of our study is that economic and political shocks have a strong impact on wine exports, as those included in the model significantly affected the exports of both quality and ordinary wine. The events that had



an overall impact, such as the First World War or the 1930s depression negatively affected exports. Furthermore, other local shocks, such as the establishment of the Soviet state or Prohibition in the USA severely affected exports to these countries.

## **6.- Conclusions**

In the first wave of globalisation, for the first time an international wine market began to take shape, in which France had a key role, first as an outstanding exporter and from the arrival of the phylloxera plague also as the leading importer. From the end of the nineteenth century, new producing countries emerged which were to play a fundamental role in the global market a century later. The United States, Argentina or Australia increased their production with the help of strong tariff protection. Furthermore, Algeria became the world's leading wine exporter in terms of volume as a result of French colonial policy.

In this expanding market, exports grew quickly, particularly at the end of the century when the arrival of the phylloxera plague to France had a crucial effect on the market. French exports had to be redirected towards quality wine, due to its production problems and the severe competition from the growing output of other countries such as Spain or Italy.

From the end of the nineteenth century, global exports began to stagnate, although this does not take into account the enormous flow of wine from Algeria to France, at least in volume. This was due to the protectionist policies of the new producing countries and the stagnation of demand in the industrialised European countries, as wine did not become a product of mass consumption which can be seen in the fact that the increase in the size of the market of importing countries only affected the exports of high quality wine.

The production of exporting countries positively determined to a great extent the flow of exports. On the contrary, the production of the importers negatively affected the sales of the exporting countries as there was a home bias, either due to their competitiveness or to tariff protection. The reduction in transport costs significantly benefited the exports of ordinary wine, while it was not important for quality wine, as these costs represented only a small part of its final price.

Finally, a series of external shocks such as the First World War, the Soviet revolution or the 1930s depression seriously harmed wine exports. Furthermore, the Prohibition of wine consumption in the United States also affected the volume of exports. All of this highlights the sensitivity of the trade of wine to regulations, trade policies and the economic climate.

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