RESEARCH ARTICLE

Is Mercosur promoting trade? Insights from Argentinean wine exports

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Abstract

As a consequence of the rapid and significative decrease in domestic demand, to avoid structural surplus traditional wine producing countries have been forced to export a growing share of their wine production. This article empirically investigates Argentinean trade policy on the wine sector over the last years, in order to understand its effect on export flows. An expanded gravity model was estimated through a Poisson pseudo-maximum likelihood estimator, in order to account for heteroskedasticity. The data used refer to Argentinean exports of bottled wine to all main world importers during the period 1997-2010, and account for more than 90% of total trade flows. Our results show that Mercosur membership has promoted Argentinean wine exports to other Latin American countries, but may as a whole have been counter-productive. A more open trade policy could increase Argentinean bottled wine exports by more than 5.8%. In addition, given the rise in wine imports and consumption in countries with high tariff barriers, such as China, the small number of free trade agreements could penalize Argentinean exports even more in the future.

Introduction

The world wine industry has experienced great changes in the last decades, mainly driven by the drop of consumption per capita in traditional producing countries and the growth of consumption in emerging markets (Dal Bianco *et al*., 2016). In addition, the premium wine sector has expanded significantly to the detriment of ordinary wines (Cembalo *et al*., 2014). These factors have defined a new world scenario dominated by trade. New world countries (NWC) have enjoyed an important export-led growth, while for traditional European producers exports have supported the industry, avoiding persistent surplus (Anderson, 2004). Indeed, Spain, Italy and France, the three countries with the biggest wine production and

oenological tradition, account for almost half of world production but only a third of world consumption. This has pushed these countries towards the export business and, in the global scenario, this has meant an increase in the export-consumption ratio (Anderson, 2004). While only 23.7% of world wine consumption was of imported wine in 1997, the ratio has risen to 43.1% in 2015. The new wine trade geography has also been driven by new exporting and importing countries. Indeed, only 16% of total wine exports originated from NWC in 1997, whereas these countries accounted for 30% of all wine exports in 2015. These factors have contributed to making wine a globalized beverage (Anderson & Nelgen, 2011; Dal Bianco *et al*., 2013). Aizenman & Brooks (2008) suggest additional elements that should

be taken into account when analysing wine exports, as this globalization could be the result of a larger phenomenon, connected to an increase in migration and tourist flows, mass communication and a revolution able to generate a new collective cultural identity. This globalization process has also been enhanced by world trade policy. Since 1994 – through the World Trade Organization (WTO) – there has been a gradual tariff reduction for all products, and in particular for agricultural products. Lastly, countless free trade agreements (FTAs) have been signed and wine has been an important item in most of them (Dal Bianco *et al.*, 2016).

In this context, Argentinean wine exports have grown incredibly during the period 2000-2015, with a fivefold increase in value and almost a threefold increase in terms of volume. This has led to total exports reaching a turnover of 817 million US$ and 2,701 thousand hectolitres in 2015. In terms of tariff barriers, despite taking advantage of the reduction in most favoured nation duty (MFN) imposed by the WTO, the country has signed few trade agreements, so being at a possible disadvantage against its main competitors. The unreceptive attitude of the Mercosur Union[1] towards trade agreements may be an important weakness for all industries wishing to broad their horizons. Indeed FTAs have proved to be one of the main resources to lower import duties and boost bilateral trade, which is sometimes doubled between signatory countries (Baier & Bergstrand, 2009). The intense competition in the world wine industry necessitates a better understanding of the role of customs duties in the wine trade, as well as other factors that could influence exports. The Argentinean case study is of particular interest since Argentina's exports are not explained exclusively by increased international demand. Indeed, its primary scope is to reduce surplus deriving from the fall in domestic consumption, like in European countries (Gennari *et al.*, 2013). In addition, like other NWC, Argentina is conducting an aggressive marketing policy worldwide to promote its wine[2], but this is not backed up by an appropriate trade policy aiming to increase competitiveness through decreased transaction costs. In fact, among the biggest wine producers, Argentina is not just the country that signed the fewest FTAs, but

also the only nation that has imposed a tax on exports of domestic production (5%).

The Argentinean wine industry has experienced great changes in its structure since the beginning of 1990s. Indeed, despite wine production having remained quite stable over time, the reorganization of the sector with an improvement of cultivation techniques and oenological processes has led to a notable increase in wine quality. The main indicator of this quality improvement is the average FOB[3] price of Argentinean bottled wine exports that has more than doubled since the beginning of this century (from 1.77 to 3.83 US$/L). Argentinean wine has gradually improved its reputation and exports have gradually increased accounting for 21% of total production by 2015 (in 2000 it was just 7.7%)[4]. This is only partially due to the expansion of international trade; the increase in wine quality and improvement in winery organization have also played a fundamental role. The result is that total wine exports have increased 178.5% in volume in the period 2000-2015 – against an overall world increase of 47.5% – reaching in 2015 a quantity of 2,701,507 hL (817.4 million US$). The average price of exported wines[5] has also risen, in recognition of improved wine quality. Indeed, at the beginning of the considered period, unit price was less than 1 US$/L, while since 2015 the average price has steadily been above 3.00 US$/L. Furthermore, the number of exporting wineries has more than tripled, from 139 in 2003 to more than 380 in 2009. Brands have also enjoyed great dynamism in their attempt to profit from Argentinean success on the international markets.

However, Argentina's performance is far behind the average of NWC in terms of exported quantities. In fact, in the long term, Argentinean export growth, with a compound annual growth rate (CAGR) of 4.5%, is ranked in the middle between the OWC and other NWC (CAGR of 0.8% and 6.6%, respectively)[6]. This could be explained by the fact that, among NWC, the Argentinean wine sector and domestic consumption patterns are the most similar to those in European countries. In addition, Argentina, as a member of Mercosur, did not implement any economic policy aimed to actively develop international trade in the last 20 years. Indeed, Argentina has only signed four FTAs,

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[1] Mercosur union comprises Argentina, Bolivia, Brazil, Paraguay, Uruguay, and more recently Venezuela, as full members.
[2] The main marketing policy enacted by Argentina is the one operating through Wines of Argentina. This non-profit organization is integrated by wineries accounting for more than 95% of exports and also receives money from the state government. With an annual budget of 4.5 million US$ in 2016, it promotes consumption of Argentinean wines all over the world.
[3] Free on Board.
[4] According to Global Trade Atlas (GTA) and Organisation Internationale de la Vigne et du Vin (OIV) data, export volume was 97,014,130 L in 2000 and 270,150,731 L in 2015, production was 12,537,000 hL in 2000 and the forecast for 2015 is 13,100,000 hL.
[5] Including bottled, sparkling and bulk wines.
[6] Referred to the period 1997-2015. Old World countries comprise Italy, France, Spain, Germany, Portugal. New World Countries comprise Australia, Chile, USA, Argentina, South Africa, New Zealand. Data source: Global Trade Atlas (http://gtalogin.com/).

Table 1. Number of Free Trade Agreements (FTAs) signed by country

	Total number of FTAs	Number of FTAs signed over time		
		Before 1995	1995-2004	2005-2014 [1]
Argentina[2]	4	3	0	1
European Union	36	6	14	16
Chile	25	3	8	14
Australia	11	4	1	7
New Zealand	10	2	1	6
USA	14	1	3	11
Canada	11	1	3	7
Russia	17	11	2	4
Japan	14	0	1	13
China	13	1	3	9

[1]Including the first two months of 2015. [2]Include the Mercosur-India FTA of 2009.
Source: own elaboration from WTO RTA database (http://rtais.wto.org/UI/Public-MaintainRTAHome.aspx).

a low number if compared with its main wine export competitors, such as the EU (36), Chile (25), Australia (11) and New Zealand (10), but also more generally in comparison with other main world economies (Table 1). The low propensity for trade can be evaluated by looking at the number of FTAs signed over time. Indeed, most countries signed the majority of agreements in the last decade, while Argentina signed three of its four agreements before 1995. Then, after joining Mercosur in 1991 (it was the third FTA signed), Argentina lost the possibility of signing any FTA on its own, being bound to Mercosur foreign policy. Indeed, the FTA signed by Argentina in the last ten years, has in fact been signed by the Mercosur union, and apply to all its members.

In addition, the lack of openness towards international trade is also proved by the fact that, as mentioned previously, Argentina is the only major wine producer to have imposed a tax (of 5%) on the value of exported wines.

In terms of wine categories, more than half of Argentinean wine exports are of bottled wine, included in customs code 220421 "wine of fresh grapes in containers holding not more than 2 litres" (Table 2)[7]. Bulk wine also accounts for a big part of total exports and has increased its share, as happened in other NWC, particularly in Australia[8]. Sparkling wine has a small share of total exports. This is not surprising since Argentinean sparkling wine production is relatively small and has only increased in the last years, mainly for domestic consumption[9].

The analysis of export concentration, estimated by the Herfindahl–Hirschman Index[10] (HHI), can contribute to a better understanding of the situation. A low value of HHI indicates that the exporting country is trading with several partners with a relatively low market share each. Whereas a high HHI indicates that exports are concentrated in few partners. In the analysed period, the overall HHI index for Argentinean wine exports (in volume) increased from 0.10 to 0.12. This change is mainly explained by the increase in share of bulk wine on total exports (up to 38.3% from 32.7%). Since bulk wine export is focused towards a few big importers (HHI for bulk wine is 0.25), an increase in bulk wine share of exports directly increases the overall HHI index. Instead, for bottled wine and especially for sparkling wine, a market diversification process was verified. This is not surprising since sparkling wine is a relatively new product for the Argentinean wine industry, requiring

Table 2. Average Herfindahl–Hirschman Index (HHI)

	1997-2000		2007-2010	
	Share (%)	HHI	Share (%)	HHI
Bottled	66.5	0.14	60.6	0.10
Bulk	32.7	0.25	38.3	0.25
Sparkling	0.8	0.24	1.1	0.11
Total	100	0.10	100	0.12

Source: Own elaboration from GTA database (http://gtalogin.com/).

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[7] Wine is exported through three different HS 6-digit codes: 220410, that refers to sparkling wine, 220421, referring to still and semi-sparkling bottled wine, and 220429 that comprises wine exported in containers holding more than two litres.

[8] Bulk wine export share in Australia increased from 12.5% in 2000 to 55.9% in 2015.

[9] According to the Instituto Nacional de Vitivinicultura (INV), Argentinean sparkling wine production increased by 160% in ten years, reaching a volume of 346,864 hL in 2012, which represents 2.9% of total domestic production. In the same year, Argentinean sparkling wine exports accounted for 41,586 hL (12.0% of production).

[10] The index was developed by the economists Hirschman (1945) and Herfindahl (1950). The index is defined as the sum of the squares of the market shares of the 50 largest firms. In our case we modified the index using market share of importing countries.

Table 3. Evolution of bottled wine exports by region (HS 220421)

Region	Thousand US$			Share (%)			CAGR[1]		
	2000	2007	2012	2000	2007	2012	2000-07	2007-12	2000-12
North America	32,395	144,020	354,392	25.9	34.3	47.9	34.8	19.7	22.1
EU	57,336	143,732	168,725	45.8	34.2	22.8	20.2	3.3	9.4
Latin America	30,430	96,783	146,479	24.3	23.0	19.8	26.0	8.6	14.0
Asia	4,203	16,734	47,633	3.4	4.0	6.4	31.8	23.3	22.4
East Europe	391	11,126	10,095	0.3	2.6	1.4	95.4	-1.9	31.1
Others	550	7,665	11,835	0.4	1.8	1.6	69.4	9.1	29.2
Total	125,305	420,060	739,159	100	100	100	27.4	12.0	15.9

[1]CAGR: compound average growth rate. *Source*: own elaboration from GTA database (http://gtalogin.com/)

the development of intense promotional efforts. In particular, the sparkling wine HHI index suggests that wineries are selling this new product together with their "traditional" products, integrating their portfolios. All in all, the analysis of HHI indexes shows that bulk wine exports are concentrated in a few countries, while bottled and sparkling wine are enjoying a market diversification process.

Basically, the decrease of HHI index in bottled and sparkling wines is due to the market export shift (in relative terms) from EU and South American countries (in particular Paraguay) to North America. Indeed, since 2004, the main destination for all wines exported was the USA. In terms of both value and volume, more than 40% of all exports were sent to this market in 2012. Despite a decrease in the HHI, a reduced market diversity is still a characteristic of Argentinean exports throughout the decade. The five main destinations for bottled wine accounted for 52% of all litres exported in 2010, rising to 70% in 2012. In value the five main countries were the destination for 54% of all exports, while in 2012 more than two thirds were exported to five countries. Although the main importing markets have changed over time, high concentration remains the main characteristic of Argentinean wine exports. Table 3 shows the evolution of Argentinean bottled wine exports by region, it is worth noting that North America almost doubled its share in the period 2000-2012, with an 11-fold increase in imported value. Instead Europe, which was the main importer in 2000 with a share of 45.8%, shows the lower increase rate, and, if these trends remain stable, it will be overtaken by other Latin American countries in few years.

Although wine consumption is becoming more uniform across world and new markets are emerging, the trends of Argentinean wine exports seem not to be driven just by demand. In our work we focused on the role of tariffs as a trade restriction, since they could in particular affect trade with EU and Asia, which have relatively high import duties. Table 4 shows the tariff barriers faced by Argentinean bottled wine exports, depicting the degree of commercial openness towards a selected group of countries, and its evolution in the period 1998-2010. Specifically, due to the WTO efforts, the average tariff barrier has been reduced by 62%, decreasing from 9.61% in 1998 to 3.63% in 2010. Despite this, there are still some interesting differences between regions and countries. In particular, North American countries have the lowest tariffs, while Asian countries have the highest, denoting a different approach towards international flows and especially towards wine flows. It is worth noting that the average import tariff in 2010 was lower than the national tax on the value of exported wines (3.63% against 5%).

In this context, preferential trade agreements could play a strategic role in determining export dynamics and geography of trade. The objective of this paper was to understand the impact of the Argentinean and Mercosur trade policy on wine exports. To achieve this, the structure of Argentinean wine exports, their evolution and the tariff barriers applied in selected markets was analysed first. Secondly the impact of those tariff barriers on the international wine trade was assessed empirically through a gravity model.

Material and methods

Methodology

The estimation of international trade flows based on the gravity model can be traced to Tinbergen (1962) who first studied import and export flows applying a gravity equation. Even if since the beginning the model has generated interesting empirical results, it was only some years later that Anderson (1979) formulated the theoretical basis for this application. The theory explains that not only economic size influences the volume of trade, but also bilateral barriers affect commercial flows. Anderson & van Wincoop (2003) extended this concept

Table 4. Tariff barriers and export values for Argentina in selected countries

	1998		2010		Export variation (%)	Tariff variation (%)
	Export (millions U$D)	Tariff applied [1]	Export (million U$D)	Tariff applied [1]		
USA	18.9	3.38	223.3	1.55	1083.8	-54.1
EU [2]	32.5	6.00	142.4	5.94	337.8	-1.0
Canada	2.8	3.92	83.8	1.08	2928.6	-72.5
Brazil	2.6	23.00	53.1	0.00	1956.4	-100.0
Paraguay	17.0	4.60	28.9	0.00	70.1	-100.0
Mexico	0.6	20.00	15.0	20.00	2562.7	0.0
Switzerland	2.7	6.90	12.9	10.85	386.4	57.3
China	0.2	65.00	9.7	14.00	4808.4	-78.5
Peru	1.1	12.00	9.3	8.10	750.3	-32.5
Japan	14.4	29.23	8.8	28.10	-39.1	-3.9
Colombia	0.3	20.00	7.6	0.00	2514.3	-100.0
Uruguay	5.3	9.00	4.9	0.00	-7.9	-100.0
Chile	4.9	11.00	1.6	1.00	-66.2	-90.9
Australia	0.0	5.00	0.9	5.00	6626.3	0.0
Total [3]	103.1	9.61	602.1	3.63	483.8	-62.2

[1]For countries with different tariff lines under HS6 code, the weighted average was taken of the various tariffs applied. [2]Weighted average of main EU partner: UK, Italy, France, Spain, Belgium, Germany, Netherlands, Sweden, Denmark, Finland. [3]Weighted average of importing countries considered in this study. *Source*: own elaboration of data collected from World Integrated Trade Solution (http://wits.worldbank.org/), World Trade Organization (https://www.wto.org/), and national customs offices (https://www.cbp.gov/; http://madb.europa.eu/madb/euTariffs.htm; http://www.sat.gob.mx/Paginas/Inicio.aspx; http://www.cbsa-asfc.gc.ca/; https://www.ezv.admin.ch/ezv/en/home.html; http://english.customs.gov.cn/; http://www.customs.go.jp/english/; http://www.dian.gov.co/; https://www.border.gov.au/).

introducing the concept of "multilateral resistance" that refers to the average trade barrier that should be taken into account to correctly specify the gravity equation.

The variables commonly included in the gravity model for an estimation of international flows are: distance (Disdier & Head, 2008), shared borders (McCallum, 1995), tariffs (Baier & Bergstrand, 2001), technical barriers (Maskus *et al*., 2000) and fixed costs for trade (Helpman *et al*., 2008). In McCallum's work (1995), one of the most relevant papers assessing the role of national borders using a gravity approach, international trade flows are estimated as a function of each country's output, the reciprocal distance and presence or absence of a shared border. The gravity model has been also used specifically for wine, investigating the determinants of trade within the EU (Dascal *et al*., 2002), and the role of trade policies (Pinilla & Serrano, 2008), wine quality (Seccia *et al*., 2009), geographical indications (Agostino & Trivieri, 2014), tariffs and non-tariff barriers (Dal Bianco *et al*., 2016).

In our work we tried to assess how customs duties affect Argentinean wine exports, also estimating the gain deriving from a more open trade policy. Other scholars have used the gravity equation to estimate the effect of

trade barriers on international trade. Olper & Raimondi (2008) found that policy issues, the cost of information and cultural similarity play a key role in explaining the impact of borders on trade flows. Moreover, the authors found that almost one third of trade reduction can be explained by the existence of tariffs and non-tariff barriers. Three years later, Raimondi & Olper (2011) employed a gravity model to understand the effect of tariffs reduction on 18 agricultural sectors, both in developed and developing countries. Applying a constant elasticity of substitution (CES) model of monopolistic competition (Krugman, 1980) together with a complete set of international asymmetries (Lai & Chun Zhu, 2004) the authors estimated the elasticity of substitution of different countries' exports. Their results suggest that countries with high gross domestic product (GDP) per capita would benefit more from the reduction of trade frictions (both tariffs and non-tariff barriers).

Our empirical model follows the above literature and adopts a standard CES specification. It accounts for the most common variables included in the gravity equation (GDP, distance, language), but also explores the role of national regulations (through tariffs) and importers wine production as a repulsive force to imports.

For the gravity model, the standard equation was used, which links trade flows to economic masses and distances (Tinbergen, 1962). Consensus has been reached on the use of countries' GDP as a proxy for economic masses and physical distance as a proxy for distances. For a wine gravity model, according to Dal Bianco *et al*. (2016), it seems fair to add wine production volume as a proxy for the importer's domestic supply.

The following standard CES specification was employed:

$$X_{ijt} = \mu \, P_{jt}^{\alpha} \, I_{jt}^{\beta} \, D_{ij}^{*\delta} \qquad [1]$$

where X_{ijt} stands for wine trade flows from Argentina to country j at time t; P_{it} represents the importer's production at time t, I_{jt} stands for importer's GDP at time t and D_{ij} proxies the geographical distance. After log-linearization the model becomes:

$$lnX_{ijt} = \mu^* + \alpha lnP_{jt} + \beta lnI_{jt} + \delta lnD_{ij}^* + \varepsilon_{ijt} \qquad [2]$$

where $\mu^* = ln\mu$ and the additive error ε_{ijt} is assumed to be identically and independently distributed.

Trade resistances induced by tariffs are also modeled assuming a multiplicative form; in analogy with previous studies (Jayasinghe *et al*., 2010), we augmented geographical distance including tariffs:

$$D_{ijt}^* = (1 + D_{ij}) + (1 + t_{jt}) \qquad [3]$$

where D_{ij}^* stands for the total economic distance, including physical distance and trade regulations. D_{ij} represents the pair-wise geographical distance between i and j; t_j stands for the j-specific tariff in year t. After log-linearization the model can be expressed as follows:

$$X_{ijt} = \mu^* + \alpha lnP_{jt} + \beta lnI_{jt} + \delta_1 ln(1 + D_{ij}) + \delta_2 ln(1 + t_{jt}) + \varepsilon_{ijt} \qquad [4]$$

where δ_1 and δ_2 replace the parameter δ of Eq. [1]. In order to control for multilateral resistance, we introduced importer fixed effects as an explanatory covariate. Eq. [4] then becomes as follows:

$$X_{ijt} = \mu^* + \alpha lnP_{jt} + \beta lnI_{jt} + \delta_1 ln(1 + D_{ij}) + \delta_2 ln(1 + t_{jt}) + \mu_j^* + \varepsilon_{ijt} \qquad [5]$$

where μ_j^* represents the importer fixed effects. Fixed effects model introduces an individual specific effect. For count models, with conditional mean restricted to be positive, the effect is multiplicative in the conditional mean, rather than additive (Cameron & Trivedi, 2013), then:

$$\mu_{jt} \equiv E[y_{jt}|x_{jt},\alpha_j] = \alpha_j \lambda_{jt} = \alpha_j exp(x'_j\beta), j = 1,,n, t = 1,...,T, \qquad [6]$$

where the last equality specifies an exponential functional form, and the intercept is merged into α_j, consequently it is now not included in the regressors x_{jt}. The model can thus also be expressed as:

$$\mu_{jt} \equiv exp(\delta_j + x'_{jt}\beta) \qquad [7]$$

where $\delta_j = ln\alpha_j$. For the usual case of an exponential conditional mean, the individual effect can be interpreted both as a multiplicative effect and an intercept shifter.

Including the fixed effects in the model allows us to account for multilateral resistance (Feenstra, 2004), thus avoiding bias. Another issue deriving from the log-linearized model estimated by OLS is that the interpretation of coefficients as elasticities could be highly misleading in the presence of heteroskedasticity. We addressed this issues estimating Eq. [5] both with OLS and a Poisson Pseudo-Maximum Likelihood (PPML) estimator, originally proposed by Silva & Tenreyro (2006). The PPML estimator has been widely adopted in recent agro-food studies (Jayasinghe *et al*., 2010; Raimondi & Olper, 2011; Xiong & Beghin, 2012, Winchester *et al*., 2012, Philippidis *et al*., 2013, Dal Bianco *et al*., 2016); the analysis consists of assuming an additive error in Eq. [1] and estimating the model by the PPML estimator. Another common problem of gravity estimation is the presence of zero as dependent variable: since the log-normal model cannot deal with zero-valued trade flows. Several solutions have been proposed. The most widely used are the Heckman two-stage sample selection, the Tobit and some variation of the Poisson model. However, since the dataset used did not contain any zero trade data, there was no need to test these estimators. According to that, we performed gravity estimation using OLS and PPML estimators. Estimations were made through STATA 12 software, both were performed using robust standard errors. Estimation results are reported in the following section.

Data

To evaluate the impact of the main variables commonly used in a gravity equation, as well as the influence of customs duties on bottled wine exports, a dataset was compiled including all the main Argentinean trade partners for the period 1997-2010[11]. The dataset represents 90.4% of Argentinean bottled wine exports in the considered period, with a coverage ratio higher than 85% in every year.

The dataset for our model was compiled from multiple sources. Data on export values was retrieved from

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[11] The group of 23 countries comprises Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Finland, France, Germany, Japan, Italy, Mexico, Netherlands, Paraguay, Peru, United Kingdom, Russia, Spain, Sweden, Switzerland, USA, Uruguay.

Table 5. Descriptive statistics

Variable	Unit	Source[1]	Type of variable	Mean	SD[2]	Minimum	Maximum
Exports	U$D FOB[3]	GTA	Continuous	10,038,279	21,900,000	3,024	223,292,290
PPP GDP[4]	Hundred million U$D	World Bank	Continuous	157,000,000	258,000,000	18,262,239	1,441,940,000
Distance	km	CEPII	Continuous	9,266	5,024	530	19,099
Importer's wine production	Thousands hectolitres	OIV	Continuous	9,161	112	0	60,535
Tariff barrier	Percentage	WTO / WITS	Continuous	9.68	10.298	0	65
Language	1: same 0: different	CEPII	Dummy	0.304	0.4608	0	1

[1]GTA: Global Trade Atlas (http://gtalogin.com/); World Bank (http://www.worldbank.org/); CEPII: Centre d'Études Prospectives et d'Informations Internationales (http://www.cepii.fr/); OIV: Organisation Internationale de la Vigne et du Vin (http://www.oiv.int/); WTO: World Trade Organization (https://www.wto.org/); WITS: World Integrated Trade Solution (http://wits.worldbank.org/). [2]SD: standard deviation. [3]FOB: Free on board. [4]PPP GDP: Purchasing power parity gross domestic product

the Global Trade Atlas[12] (GTA) at eight-digit level of Harmonized System (HS) of Classification. Tariff barriers were retrieved from the WTO Tariff Analysis Online Database, World Integrated Trade Solution (WITS) database and national customs offices. Geographical distance between Argentina and the importer partner was collected from the Centre d'Études Prospectives et d'Informations Internationales (CEPII) gravity dataset, which calculates distance between countries considering the 25 most populated cities of each country, then weighted by the share of the city in the overall country population (Mayer & Zignago, 2011). Share of a common official language was obtained from the CEPII dataset. GDP was retrieved from the World Bank, and it is estimated in purchasing parity power terms at current prices (PPP GDP)[13]. Lastly, wine production of the importer country comes from the Organisation Internationale de la Vigne et du Vin (OIV) statistical database (StatOIV Extracts). All information was retrieved for the period 1997-2010.

Tariff barriers were calculated basing on the MFN tariffs, chosen as reference of the national tariff levels, then adjusted according to the duty defined by FTAs, if any[14]. If the importer applies a specific tariff, this has been converted into an *ad valorem* equivalent (AVE) making use of the average import price as reference. For this estimation, the most widely used methodology consists of estimating a weighted average for each product category (*e.g.* HS 6) using the share of the single products (HS8). This approach has been criticized for its endogeneity (Anderson & Neary, 2003; Bouët *et al*., 2008) and solutions include using world import data for weighting (Leamer, 1974) or a representative sample of countries' import data (Bouët *et al*., 2008). Cipollina & Salvatici (2008) suggest using the average tariff of the last three years with an obvious problem of tariff ups and downs. As suggested by Anderson & Neary (2003), Bouët *et al*. (2008) and Cipollina & Salvatici (2008), in this study the median of the tariffs at HS 8 digit level has been used, since this approach allows the influence of tariff peaks to be minimized.

Table 5 summarizes the descriptive statistics of the variables used in the analysis.

Results

The results obtained with OLS[15] and PPML[16] estimators are reported in Table 6. All coefficients present the expected sign, when statistically significant. OLS results indicate that, as expected, the greater the physical distance between countries, the lower the trade flows. Indeed, according to the coefficient, an increase in distance of 1% leads to a decrease in trade of 1.35%. The magnitude of this coefficient is slightly higher than what is found in the recent literature on both agricultural products and wine export (Dascal *et al*., 2002; Disdier & Head, 2008; Dal Bianco *et al*., 2016), and may suggest that transaction costs have a higher incidence for Argentinean wine. This

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[12] www.gtalogin.com

[13] PPP GDP refers to the gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the US$ has in the USA.

[14] During the analyzed period Argentina signed (as a Mercosur member) just one free trade agreement with Chile, that entails a reduction in the Most Favoured Nation (MFN) tariff since 2004.

[15] Ordinary Least Squares.

[16] Poisson Pseudo Maximum Likelihood.

Table 6. Model estimates

Variable	OLS[1]		PPML[2]	
	β	p-value	β	p-value
Distance	- 1.352***	0.000	- 1.221***	0.000
PPP GDP	1.119***	0.000	1.056***	0.000
Importer wine production	- 0.457***	0.000	- 0.322***	0.000
Tariff	- 0.454***	0.000	- 0.678***	0.000
Language	0.448	0.875	0.012***	0.000
Constant	0.397	0.863	0.952***	0.000

[1]R^2 (ordinary least squares, OLS): 0.4979. [2]Pseudo R^2 (Poisson Pseudo Maximum Likelihood, PPML): 0.7172

could be due to the lesser reputation of Argentinean wines in comparison with those that come from more prestigious countries, such as EU countries and New Zealand (Anderson, 2004). Indeed, it is reasonable to expect that transaction costs – that are not directly linked to the product value – affect more the ordinary (low reputation) wines. The per capita GDP has a positive effect on wine flows in line with the literature, indicating that an increase in average income of 1% lead to a growth in wine imports of 1.12%. The importer's volume of wine production showed a negative effect on trade, reducing wine imports each time the country increases its domestic production. However, the magnitude of its coefficient (0.457) indicates that distance has a three times bigger impact on wine flows than importer's production volume.

As expected, tariffs have a negative impact on trade, quite similar to the impact of importer's production. Tariffs impact (-0.454) is similar to the one found in other studies on wine exports (Raimondi & Olper, 2011; Dal Bianco *et al*., 2016), and it can be expected that the national tax on exported wine exerts the same friction on trade. Lastly, in contrast with previous studies on the wine trade using the gravity equation (Seccia *et al*., 2009; Dascal *et al*., 2002; Dal Bianco *et al*., 2016), the language between partners is not statistically significant. This can probably be explained by the long-term expertise of Argentinean exporters in dealing in languages different than Spanish. Another possible explanation is related to the fact that, in the USA – the main import market for Argentinean wine – a high percentage of the population speak Spanish, although it is not an official language.

The results of the OLS estimation are then confirmed through the PPML model. As expected, since the OLS model tends to overestimate the role of distance and GDP (Silva & Tenreyro, 2006), the coefficients' magnitude of these two variables are slightly lower in the PPML model. The greatest impact on the wine trade corresponds to variations in distance, followed by the importer's wine

production. With this estimator, the impact of tariff barriers is greater than in the OLS regression and its coefficient is twice the importer's production coefficient. The ever-increasing interest in diversity, especially true for the wine industry, can help to explain this reduced effect of national production. In other words, even if the home country increases its wine production, consumers will still look for and buy foreign wines. Instead, an increase in tariff barriers, with the consequent increase in retail prices, will definitely have a negative impact on sales and trade. Another difference in the PPML model is the impact of shared-language. In this model, if countries have the same language, the wine trade marginally increases. As this increase is absolutely minor we confirm our hypothesis of Argentinean wineries' expertise in world markets serving as a bridge for exporting to non-Spanish speaking countries.

Discussion

The geography of world wine consumption has been changing in the last decades, with a reduction in the wine consumption gap (per capita) among countries. The consequence is that nowadays almost half the wine produced is exported, depicting international trade as a defining characteristic of the wine sector. In this study we assessed Argentinean exports of bottled wine in the period 1997-2010 through a gravity model. As predicted, our results show that wine flows can basically be explained by the importing countries' economic size and trade policies. The general economic performance of each country, measured by the per capita GDP, was found to have a direct and positive impact on wine imports. This result confirms previous findings and gives useful information for wineries, private and public agencies, which should focus their commercial and political efforts in those countries showing a positive growing economic trend. Domestic

wine production – in terms of volume – also seems to influence the wine trade, even if this impact is far from being strong. This can be explained by the export growth that occurred in the last decades, which made wine one of the most globalized products in the world (Anderson & Nelgen, 2011). Consumers are nowadays used to buying and enjoying wines from different countries, often being desirous to taste new type of wines. Thus, it seems that an increase in the domestic supply can only partly affect demand for foreign wines. Even if these two variables – GDP and domestic wine production – have been identified as central in influencing trade, the high impact of tariffs suggests that the greatest efforts should be made in trade policy, at both national and supranational level. Since the weighted average import duty of Argentinean wine was 3.63% in 2010, our results suggest that the complete removal of customs duties would lead to a 2.46% increase in Argentinean bottled wine exports (according to PPML coefficient), considering the market share of importing countries as stable. The increasing importance of China as a new market – with a high tariff on imported wine – suggests that in the future the negative effect of customs duty on Argentinean exports could be even stronger. International negotiations over tariff barriers are thus essential for the growth of Argentinean wine exports. The Mercosur membership has probably contributed to the growth of Argentinean wine exports to other Latin American countries, but it may be counter-productive in a global scenario. The lack of free trade agreements with the main wine markets (EU, North America and Asia) may represent an important weakness for Argentinean wineries, especially when these are compared with Chilean, European or Australian ones. In addition, Argentina has a national tax of 5% on wine exports. Its effect was not evaluated through a gravity equation since its level has remained stable over the analyzed period. Despite being without any theoretical foundation, it is reasonable to expect the impact of this national tax as equivalent to that of an import duty. According to this, applying the same PPML coefficient found for import duty, it is expected to produce an export reduction of 3.39%. Indeed, since national tax is higher than the AVE average of import tariffs, Argentinean exports are likely to be more penalized by national policy than import duties. All in all, empirical results suggest that a pro-trade Mercosur and Argentinean foreign policy could strongly influence wine exports. Sales could grow up to 5.85%, which corresponds to an additional turnover of 47.8 million US$ per year. Our results seem to be in line with those provided by Sanjuán & Resano (2015), who estimated, for beverages and tobacco products, an export increase of 7.8% from Mercosur to the EU, after tariffs removal.

This research is not exempt from future improvement. In particular, we did not assess the impact of non-tariff barriers, the importance of which is growing strongly (Disdier *et al.*, 2008). However, we can expect similar or stronger results than those found for tariff-barriers. Other explanatory variables that may be assessed are exchange rate volatility and foreign direct investments. The first generates uncertainty and leads to a decrease in foreign trade when traders are risk adverse (Cho et al., 2002), while the second improves economic growth and competitiveness (Borensztein *et al.*, 1998). In a wine industry like the Argentinean one, driven by a relative small number of big companies and characterized by a high volatility of Argentineas peso, the inclusion of these regressors could be important to explicate export dynamics.

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