Home Bias in Consumption: A Comparison between Wine and Beer

Präferenz für heimische Produkte: Ein Vergleich zwischen Wein und Bier

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Abstract

This paper investigates the determinants of home bias in consumption in the beer and wine markets across 15 'old' member states of the European Union (EU) during the period 2000-2009. Two main results are obtained using a theory-driven gravity equation. Firstly, the home bias in beer consumption is several orders of magnitude higher than that of wine. Secondly, and interestingly, consumer preferences seem to be driving the home bias in the wine sector. In contrast, the home bias in beer is widely attributable to the home market effect, namely firms tend to localize near the consumers in order to minimize the high trade costs associated with beer exports.

Key Words

border effect; home market effect; preferences; wine and beer trade

Zusammenfassung

Der Beitrag analysiert die Bestimmungsfaktoren der Präferenz für heimisches Bier und heimischen Wein in den 15 alten EU Mitgliedsstaaten zwischen 2000-2009. Unser theoriebezogenes "Gravitationsmodell" führt zu zwei Hauptschlussfolgerungen. Erstens liegt die Heimatsmarkt-Präferenz für Bierkonsum um mehrere Größenordnungen höher als jene für Wein. Zweitens spielen interessanterweise die Vorlieben der Verbraucher eine ausschlaggebende Rolle für die Heimatsmarkt-Präferenz im Weinsektor. Im Biersektor dagegen ist die Präferenz für nationales Bier dem Heimatsmarkt-Effekt zuzuschreiben: um hohe Transportkosten zu vermeiden, haben Brauereien die Tendenz sich in der Nähe der Endverbraucher niederzulassen.

Schlüsselwörter

Grenz-Effekt; Heimatmarkt-Effekt; Präferenzen; Wein- und Bierhandel

1 Introduction

The disproportionate market share of domestic products over products coming from the international market is a subject that occurs frequently in the literature on international trade. This "home bias" in consumption, or "border effect", has been documented both across and within countries, showing that within country trade is disproportionally higher than cross-border trade (McCallum, 1995; Anderson and van Wincoop, 2003). For example, the seminal contribution of McCallum (1995) showed that trade between two Canadian provinces was on average 22 times (or 2200%!) greater than their trade with US states, after allowing for size and transport costs.

This intriguing finding subsequently stimulated research to assess the relative importance of border effect on international as well as intra-national trade. At the same time, a large body of literature has investigated the main reasons behind the border effect, focusing in particular on three main determinants (Chen, 2004): (i) border costs related to policy barriers (tariff and non-tariff barriers); (ii) consumer home bias in preference; (iii) supply-side factors such as co-location of intermediate and final goods firms, and specialization forces due to globalization (Hillberry, 2002; Anderson and Yotov, 2010).

The small number of papers that have investigated the determinants of border effect in the beer and wine sectors have specifically focused on consumer preferences and taste, without paying much attention to supply-side conditions and the forces of globalisation (see Lopez and Matschke, 2007; Friberg et al., 2011). However, in recent decades both sectors have experienced a strong process of internationalisation requiring further investigation into the causes determining the border effect.

The aim of this paper is to estimate the border effect in the beer and wine sectors across the European Union (EU) markets. More specifically, the property of the common market, characterized by no virtual presence of policy related border barriers (tariffs and NTBs) and exchange rate volatility,[1] is examined in order to investigate the role of consumer preferences as opposed to other important explanations of the border effect, stemming from firms localization choices, a phenomenon that has rarely been investigated in the agri-food sector.

The focus on the beer and wine market – two important sectors for many EU countries – has several potential advantages. Firstly, these two sectors have experienced an intensive globalization process, although in quite different ways. Globalisation in the wine market has primarily come about through a process of trade integration. In contrast, the level of trade integration in the beer market is significantly lower, and the process of internationalization is primarily due to direct foreign investment (FDI) (SWINNEN, 2011). Secondly, the beer and wine sectors also present differences in conditions of supply and demand. In fact, while the two sectors are both traditionally based on small and medium enterprises, with important geographical links, the beer market worldwide has recently experienced a significant increase in industry concentration through intense transnational acquisitions and mergers. Furthermore, beer and wine consumption patterns have changed significantly in the last 20 years (COLEN and SWINNEN, 2010). In many "beer-drinking nations" such as Belgium, Germany, and the UK, the relative share of beer in total alcohol consumption is declining whereas that of wine is increasing. In parallel, the trend is exactly the opposite in "wine-drinking nations" such as France, Spain, and Italy.

These differences in supply and demand conditions as well as in globalization patterns offer an ideal case study or a quasi-natural experiment to investigate the role played by consumer preferences versus supply-side conditions in explaining the border effect. More specifically, the main aim of this paper is to contrast the traditional explanation of the border effect, linked to consumers preferences (home bias in preferences), with the alternative based on the choice of localisation made by firms in order to minimize trade costs – the so-called 'home market effect' hypothesis (see KRUGMAN, 1980; CAFISO, 2011). This issue is investigated using a theory-driven gravity equation applied to bilateral beer and wine trade flows across 15 'old' EU member states during the period 2000-2009.

The contribution of this paper lies in the clarification of the relationship between the magnitude of the border effect and its main determinants in two important food sectors. Hypotheses are postulated about these relationships, and whether or not these hypotheses are supported by the data is verified. Moreover, the analysis of the border effect in the beer and wine sectors provides us with potentially useful insight for business and policy makers.

The paper is organised as follows. After a synthetic review of previous evidence, Section 2 presents basic hypotheses and predictions about the expected determinants of border effect in the beer and wine markets. The gravity equation used in the empirical analysis is derived in section 3 and the identification strategy is discussed. Section 4 introduces the data and the empirical strategy. Section 5 presents the econometric results. Finally, concluding comments are made in section 6.

2 Background and Hypotheses

2.1 Previous Evidence

From a theoretical point of view the border effect is a mix of two combined effects: the elasticity of substitution between varieties produced in different countries, and the tariff equivalent of border costs (see EVANS, 2003; ANDERSON and VAN WINCOOP, 2003).[2] The component of the border effect related to the elasticity of substitution is generally overlooked because it concerns the preferences of individuals. Interest is largely focused on border impediments to trade (CAFISO, 2011). However, it is a fact that in empirical estimations of the border effect based on trade data and the gravity equation, the resulting border effect is a mix of these two factors but disentangling their role is important because the economic implication of the border effect is totally different when home bias in con-

[1] This is only partially true as the European Monetary Union (EMU) actually involves 12 of the 15 'old' EU member states. However, the only paper investigating the effect of exchange rate volatility on the border effect is that of CHEN (2004) who before the formation of the European Monetary Union (EMU), did not find any relevant effects among the EU countries.

[2] As originally stressed by EVANS (2003), and more recently restated by CAFISO (2011), in the extreme case in which there are no border-related trade costs, a border effect can still emerge when consumers are biased towards domestic products (high elasticity of substitution). In this case, the border effect functions more as an indicator of home bias in preferences than an indicator of trade integration with respect to border related trade costs (see CAFISO, 2011: 2). This is the reason why the two terms "border effect" and "home bias in consumption" in the literature are often used with similar meaning.

Table 1. Determinants of the border effect: previous evidence

	# Industry/ sectors	Trade flow/market	Tariffs & NTBs	Consumer home bias	Localization (HME)
HEAD and MAYER (2000)	120 industries	EU-intra	+	++	
HILLBERRY (2002)	142 industries	US-intra			++
FONTAGNÉ et al. (2005)	26 industries	US-EU-JAP	+	++	0
EVANS (2003)	8-12 industries	OECD	+	0	++
EVANS (2007)	7 industries	OECD	+	0	++
CAFISO (2011)	20 industries	EU-intra		0	++
CHEN (2004)	78 industries	EU-intra	+	0	++
LOPEZ et al. (2006)	33 **food**	US-import	++	+	+
OLPER and RAIMONDI (2008a)	18 **food**	Quad-trade	++	++	
OLPER and RAIMONDI (2008b)	18 **food**	Quad-trade	++	++	+
LOPEZ and MATSCHKE (2007)	30 **beer** brands	US-sales		++	
FRIBERG et al. (2010)	1444 **wine** brands	NH-sales	0	++	

Notes: the table reports the results of a representative sample of published papers studying the determinants of the border effect in different countries and industries. (+) indicates that the respective determinant was statistically significant, but does not explain a large fraction of the border effect; (++) when the respective determinant also explain an important fraction of the border effect; (0) when the respective effect is not statistically significant; a blank means that the respective determinant was not investigated.
Source: authors' compilation

sumer preferences rather than border related costs is the main driver of the trade reduction effect of national borders.

Table 1 reports a representative sample of studies investigating the role of different border effect explanations. While the evidence does not offer a clear picture of the key determinants of the border effect, some stylized facts are apparent. Firstly, many studies focusing on the manufacturing industry have shown that a significant role is played by the choice of localisation made by firms due to the so-called home market effect (HILLBERRY, 2002; EVANS, 2003, 2007; CHEN, 2004; CAFISO, 2011). The importance of policy related border costs such as tariffs and NTBs is also relevant but significantly less than the apriori expectation (HEAD and MAYER, 2000; EVANS, 2003, 2007; FONTAGNÉ et al., 2005; CHEN, 2004). However, only a few studies on manufacturing have found that consumer home bias in preferences played a relevant role (HEAD and MAYER, 2000; FONTAGNÉ et al., 2005).

The situation in the few studies focused on food products is quite different. In line with food industry expectations – given the pervasiveness of trade protection – a prominent role is played by policy related border costs, followed by consumer home bias in preferences. However, supply-side conditions such as choices of localization made by firms and vertical specialization, appear to be less relevant and, above all, have rarely been investigated (LOPEZ et al., 2006; OLPER and RAIMONDI, 2008a, b). Moreover, the importance of home bias in preferences is apparent in the two studies that analyzed the border effect at brand level in the beer and wine sectors (LOPEZ and MATSCHKE, 2007; FRIBERG et al., 2011).

From this brief overview of the actual evidence it can be seen that in the case of food products, other than policy related border costs, the main source of the national border effect is indeed consumer home bias in preferences. In contrast, when the industry sector is considered, the home market effect plays a significant role. This paper shows that this conclusion is largely driven by aggregation bias. Indeed, working at the disaggregate level, and considering particular products, such as beer, it is in fact the case that the home market effect is an important driver of the trade reduction effect induced by national borders.

2.2 Firm Localization Choice, Home Market Effect, and National Border

As pointed out above, one potential explanation for the trade reduction effect of the national border lies in the behavioural response of firms to trade costs (CHEN, 2004). Among others, this effect was recently investigated by CAFISO (2011), who detected a close negative correlation between the industrial geographic concentration and the magnitude of the border effect across the EU countries. The underlying logic is the following. In a standard new economic geography (NEG) model, profit maximizing firms with increasing return to scale tend to locate close to consumers in order to avoid or minimize trade costs. Thus, countries with the highest consumption of beer such as Belgium or Germany will have a trade surplus in beer because they host a more than proportional share of firms producing beer in comparison with the respective domestic consumption. This logic is just what the monopolistic competition trade literature has called the 'home market effect' (HME) (KRUGMAN, 1980). Moreover, note that the concentration of production in a particular region may also be the result of positive externalities due to (Marshallian) external economies of scale at the industry level (OTTAVIANO at al., 2002). Whatever the reasons, the result is that the production surplus is then exported abroad to those countries in which domestic production is not sufficient to cover domestic consumption. Thus, the border effect accounts for the size of this surplus relative to domestic consumption. According to this mechanism, the higher the concentration, the smaller the border effect, and *vice versa*. From this point of view, the border effect is endogenous because it is due to the firms localization decisions (see CAFISO, 2011; HILLBERRY, 2002; WOLF, 2000).

2.3 Preferences, Home Market Effect, and National Border: A Quasi-Natural Experiment

In practice, for several reasons empirically isolating the role played by the home market effect from other potential border effect explanations such as home bias in preferences and the policy component is difficult.[3] Firstly, due to data limitations, measuring the geographical concentration of production is quite a difficult task.[4] Secondly, further identification issues are raised within this logic because the border effect is endogenous to the location decisions made by firms. Finally, due to political economy motives, put an index of geographical concentration on the right-hand-side of a gravity model can add a further endogeneity problem. This is because there is consolidated evidence showing that the geographical concentration of production is positively related to the level of trade protection (see TREFLER, 1993; OLPER and RAIMONDI, 2008b). Thus, the geographical concentration index can hardly be used, unambiguously, to detect the role played by firm localization decision and HME, in a gravity-like equation. For all of these reasons, a different strategy is used in this paper to isolate the role played by the home market effect compared to the preference component of the border effect. The underlying idea is simple: to exploit key differences in beer and wine markets that make it possible to formulate some apriori expectations about which type of border effect explanations should have the most influence in the two sectors. Then, through a gravity model, whether or not these hypotheses hold true in the data can be tested.

Three interrelated peculiarities of the beer and wine sectors make this possible: the pattern of internationalisation, the level of trade costs, and lastly, specific supply side conditions. Starting from key differences in internalization patterns, figures 1 and 2 report the evolution in the beer and wine sectors of the production, trade (export), and trade over production for the EU market. The ratio of trade over production (in quantity) for wine was about 52% in 2007, but only 18% for beer. Thus, while both sectors display a significant growth in the level of production and trade, what is striking are the huge differences in the level of trade integration, with the wine market being much more integrated than beer, although the latter has experienced faster growth than the former, especially in the last decade. What are the main reasons for these marked differences? In what follows it is argued that there are essentially two reasons: differences in trade costs or transportability, and constraints on supply side conditions.

Trading in beer is costly because the unit price of beer is low and so it is like transporting 'water'. The weight to value ratio of beer is several times higher than that of wine.[5] Therefore, in order to reduce trade costs, beer producers tend to locate near their consumers through intensive FDI. The final consideration can be seen in table 2. For example, three of the major players in the EU beer markets – AbInbev, Heineken, and Carlsberg – have intensive production of their respective own brands in the host countries. This is also clearly a consequence of the great degree of industrialization of the beer production process.

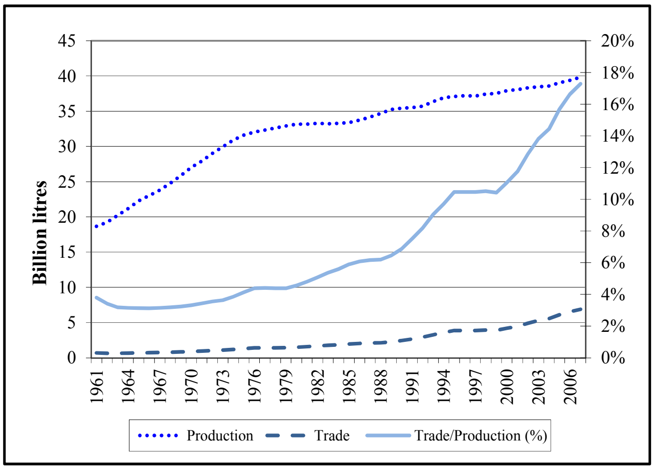
On the other hand, the situation in the wine sector is quite different. As a result of several constraints on the production side – ranging from climatic and soil conditions to protected designation of origin (PDO) regulations – producing wine abroad it is not often a real option for the majority of the (small) wine pro-

[3] For a conceptual discussion about the problems identifying the HME empirically, see DAVIS and WEINSTEIN (2003).

[4] The paper of CAFISO (2011) is a relevant exception. However, as explained in his data appendix, measuring geographical concentration at the industry level across EU countries remains problematic due to data limitation.

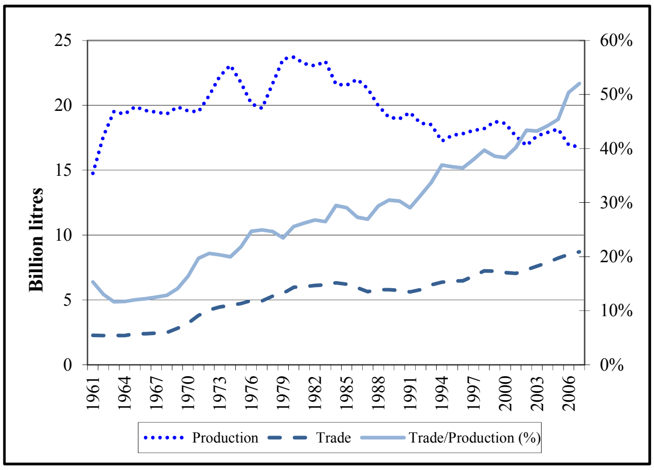
[5] In the period under study and considering the total EU trade, the average unit value for beer was about 0.85 €/litre compared to a value of about 2.77 €/litre for wine. This means that the transportability (weight to value ratio) of wine is more than 3 times higher than that of beer.

Figure 1. EU15 beer production, trade and trade over production



Source: authors' computation from FAOSTAT

Figure 2. EU15 wine production, trade, and trade over production



Source: authors' computation from FAOSTAT

ducers. This is not to say that FDI in the wine industry is unimportant, but it is clearly not possible to produce "Bordeaux" or "Brunello di Montalcino" near American or Russian consumers. Therefore, French and Italian wine producers must export these wines.

These differences in the beer and wine markets offer an ideal case study to investigate the role played by consumer preferences *vs.* home market effect in explaining the border effect. This is because we know apriori which kind of border effect explanation should be ruled out. Indeed, as discussed above, because wine producers find several constraints to localize abroad their production, the HME hypothesis should be irrelevant, and the bulk of the border effect explanation should be found in the consumer home bias in preferences, *ceteris paribus*. In contrast, the low transportability of the beer associated with the important role played by FDI, and also as a consequence of there being few constraints on the production side, suggests that the HME hypothesis should be relevant in explaining the beer border effect. The next section of this paper describes the strategy used to test these two hypotheses empirically.

3 Theory and the Empirical Approach

The gravity equation is based on the monopolistic competition trade model of DIXIT and STIGLITZ (1977) and of KRUGMAN (1980). Monopolistic competition is not the only model that can be used to

Table 2. Plants, production, and market share in the host country of three big players in the European beer market

Country	Heineken			Ab Inbev			Carlsberg		
	# plants	Own brand production in host countries	Market Share	# plants	Own brand production in host countries	Market Share	# plants	Own brand production in host countries	Market Share
Belgium	3	No	11.3%	4	n.a.	57.6%			
France	3	Yes	27.6%	0	No	10.0%	3	Yes	32.0%
Italy	4	Yes	31.3%	0	No	8.0%	1	Yes	8.0%
The Netherlands	4	n.a.	46.9%	2	Yes	15.8%			
Finland	2	Yes	27.9%				1	Yes	50.0%
Germany	11*	No	n.a.	5	Yes	9.4%	4	Yes	3.0%
Spain	4	Yes	29.1%						
United Kingdom	5	Yes	26.5%	3	Yes	21.8%	2	Yes	14.4%
Greece	3	Yes	71.9%				1	No	11.0%
Russia				10	Yes	15.8%	10	Yes	39.7%
Denmark							1	n.a.	62.0%

Notes: * Heineken in Germany has capital in local breweries but does not produce its own brand.
Source: authors' computation is based on information on the firms' website and other sources.

derive a gravity-like equation.[6] However, it is perhaps the most appropriate to model international trade in wine and beer, given the high level and growing importance of intra-industry trade in these sectors. In the derivation of the gravity model presented in this paper, the structure proposed by HEAD and MAYER (2000) offers the advantage of estimating the border effect in a rigorous framework by explicitly taking into account of the role of preferences.

3.1 A Theory Based Gravity-Like Equation

The model set-up combines consumer CES utility function with 'iceberg' trade costs and the property of the monopolistic competition trade model *a la* Dixit-Stiglitz-Krugman (D-S-K).

Therefore, let m_{ij} be the value of imports of country i from j, and $\sigma > 1$ be the elasticity of substitution between home and foreign varieties. τ_{ij}, is used to denote the 'iceberg' trade costs that include all the transaction costs associated with moving goods across space and national borders, with $\tau_{ii} = 1$ and $\tau_{ij} \geq 1$. These trade costs determine the country i delivery price, $p_{ij} = p_j\ \tau_{ij}$, for a product imported from j. v_j defines the value of production in j, and Y_i the country i consumers total expenditure on goods from all sources (varieties) k, including domestic sources. Then, the (log) value of bilateral imports of country i from j is

$$(1)\quad \log m_{ij} = \log Y_i + \log v_j - (\sigma - 1)\log \tau_{ij} - \sigma \log p_j + (\sigma - 1)\log a_{ij} - \log\left\{\sum k\, a_{ik}^{\sigma-1} v_k \left(p_k \tau_{ik}\right)^{1-\sigma}\right\}$$

where the term a_{ij} is the preferences country i consumers' for country j products. The first two terms in the bilateral imports equation (1) capture the effect of country size. The third term captures the effect of bilateral trade costs, while the fourth and fifth terms respectively capture international differences in prices and preferences. The final term is the log summation of some highly non-linear terms relating to variables of all countries, and comes from the denominator of the CES price index. The correct estimation of the bilateral import equation (1) needs to take account of the influence of this unobserved non-linear term that clearly depends on parameters that are already in the equation to be estimated. However, the interesting manipulation first proposed by HEAD and MAYER (2000) working with the so-called log odds ratio specification can be followed.[7]

To do this, $j = i$ in equation (1) simply needs to be set to allow an equation for country imports from itself, $\log(m_{ii})$. Then, the elimination of the non linear unobserved price index of the importing country as well as its total expenditure will be obtained by subtracting the specification of the country's imports from itself from equation (1), yielding

$$(2)\quad \log\left(\frac{m_{ij}}{m_{ii}}\right) = \log\left(\frac{v_j}{v_i}\right) - (\sigma - 1)\log\left(\frac{\tau_{ij}}{\tau_{ii}}\right) - \sigma \log\left(\frac{p_j}{p_i}\right) + (\sigma - 1)\log\left(\frac{a_{ij}}{a_{ii}}\right)$$

Equation (2) establishes a relationship between the relative amount consumers spend on foreign and domestic goods and their relative price net of transport costs, and represents the theoretical counterpart of the empirical gravity-like specification used in this paper.

3.2 Empirical Specification

Before deriving an estimable equation, it is necessary to model both the trade costs and the preference component of equation (2). Two elements of bilateral trade costs are considered: physical transport costs, d_{ij}, proportional to distances from i and j, and costs due to the presence of an international border, b_{ij}. Thus, the trade costs function will be equal to $\tau_{ij} = d_{ij}^{\rho} b_{ij}$, where $(b_{ij} - 1)$ is the tariff equivalent of all trade barriers associated with the presence of an international border, and ρ is the distance elasticity.

In the specification of consumer preferences, a_{ij}, it is simply assumed that consumers prefer goods produced in a contiguous country (C_{ij}) and that the sharing of cultural features (L_{ij}) generates greater similarity in taste. L_{ij} and C_{ij} are two dummy variables that take a value 1 when country i and country j (for $i \neq j$)

[6] The first theoretical derivation of a gravity-like model was made by ANDERSON (1979). DEARDORFF (1998) derived gravity equations from the Heckscher-Ohlin model, BERGSTRAND (1989) from models with monopolistic competition, while EATON and KORTUM (2002) derived theirs from Ricardian models. See ANDERSON and VAN WINCOOP (2004) for a review of this literature.

[7] Another theoretically-consistent way of estimating equation (1), but under symmetric assumptions about trade costs and preferences, is to follow ANDERSON and VAN WINCOOP (2003) and FEENSTRA (2004), including fixed effects for source and destination countries.

speak a common language and/or share a common border (0 otherwise).

Plugging in (2) the specifications of the trade costs and for simplicity omitting the consumer preference proxies L_{ij} and C_{ij} yields the following log odds specification of the (relative) bilateral trade equation

$$(3) \quad \log\left(\frac{m_{ij}}{m_{ii}}\right) = (\sigma - 1)\alpha b_{ij} + \log\left(\frac{v_j}{v_i}\right) - (\sigma - 1)\rho \log\left(\frac{d_{ij}}{d_{ii}}\right) - \sigma \log\left(\frac{p_j}{p_i}\right) + \varepsilon_{ij}$$

Equation (3) represents our basic specification to infer the border effect in the EU beer and wine markets. Taking the antilog of the estimated border dummy coefficients, exp(α), that is, the constant term in the equation (3), gives the border effect of the respective trade flow considered, namely the degree to which intra-country trade exceeds international trade after controlling for size, transport costs, preferences, and relative prices. Note that the border dummy capture both the average level of border related costs of the importing country and any other unspecified trade costs between i and j, such as unspecified preferences or other supply side factors like the home market effect.

Equation (3) is estimated by OLS because this environment does not have zero trade flows since in order to estimate the border effect, beer and wine production data are requires so that the intra-country trade flows can be measured (see below). Consequently, this is only possible in countries with some level of production. All countries producing beer or wine in the EU-15 sample presented in this paper have exported at least a small quantity to other EU-15 producers. This is why the gravity estimate in this study do not suffer from standard selection bias problems due to zero trade flows, and thus do not require a more complex estimation procedure such as the Heckman two step estimator.[8]

Finally, it is important to note that the relative nature of the odd gravity specification used here is like a first-difference panel model estimator – and thus equivalent to a fixed effects specification – that, notoriously, increases the variance to be explained compared to the estimations in levels (see COMBES et al., 2005). Consequently, we expect lower explanatory power compared to traditional or fixed effect gravity specifications as the variables are computed as differences compared to internal flow used as the reference.

3.3 Hypotheses Testing

The following procedure was used to test the hypotheses formulated about the role played by consumer preferences for home goods and the Home market effect. First of all, the *average* border effect for the EU-15 members was estimated by running the gravity equation (3) separately for wine and beer. Secondly, a specific control for consumer preference was introduced into the model. Specifically, the stock of immigrants in country i from j was added, measured as the share of the native population of the importer country i. As recently shown by BRATTI et al. (2012), this variable should capture the consumer preference component of the border. To the extent to which immigration affects trade flows primarily through preferences, then a reduction of the border effect proportional to the role played by preference should be detected. Therefore, let α' the border coefficients estimated after controlling for the share of immigrants. Then, the variation in the border effect will be measured as: $\Delta HB = \exp(\alpha' - \alpha) - 1$.

It is expected that $\Delta HB_{Wine} > \Delta HB_{Beer}$, namely the reduction in the border effect due to consumer preferences is expected to be higher for wine than beer. This is because the increase in the demand for country of origin wine (immigration effect) in the wine sector should translate directly into an increase in trade flows, *ceteris paribus*. In contrast, this effect should be lower in the beer sector because the increased demand induced by immigration can be partially satisfied from the host country production of the foreign beer. Similarly, we can also measure the trade creation effect induced by immigration. Following COMBES et al. (2005) this is measured as $(\overline{X}_{ij})^{\vartheta}$, where $\overline{X}_{ij}$ is the average share of immigrants from j to i in the sample, and ϑ is the estimated coefficient of the immigrant variable.

Next, the following procedure was used to test the second hypothesis, namely, whether or not the HME is only relevant in explaining the beer border effect. Firstly, we classify each EU-15 country as "wine-drinking nations" or "beer-drinking nations" on the basis of their respective consumption and production patterns of wine and beer (see data section).

[8] Given the logarithmic trasformation of the gravity equation, in presence of (many) zero trade flows, the OLS estimator can indeed bias the results due to sample selection problems.

Then, specific border coefficients for wine (beer)-drinking nations were estimated for both the beer and wine gravity models and the corresponding other groups of countries. If the HME is only relevant in explaining the beer border effect, the following results is to be expected:

$$HB_{\text{Beer-drinking-nations}} < HB_{\text{Other-countries-group}},$$

$$HB_{\text{Wine-drinking-nations}} > HB_{\text{Other-countries-group}}.$$

This is the result of two differentiated effects. Firstly, as a consequence of the HME, in beer drinking nations like Germany or Belgium there is an overproduction capacity that is exported abroad. Consequently, the border effect for those countries where the production takes place should be relatively small. Secondly, as an effect of FDI in beer, an important part of intra-national trade in the "other-countries group" will be satisfied by foreign production in the host country (see table 2), generating an 'artificial' increase of the border effect. The situation is different in the wine sector. Indeed, intra-national trade will be very low (low internal production) for countries that lie in the "other-countries group", and most of the wine consumption can be only satisfied through imports, generating a relatively lower border effect.

4 Data and Variables

The data required to implement equation (3) primarily involves bilateral exports and production data in a comparable industry classification. The bilateral export data for beer and wine come from the EUROSTAT Comext database. In contrast, production data are taken from the EUROSTAT Prodcom database. The annual data for EU-15 countries for the years 2000-2009 was collected.[9]

Intra-country trade data was also need to estimate home bias. However, these figures were not available for the EU countries. As is frequently found in the literature, a country's 'imports' from itself are calculated as the difference between total production and total exports to the rest of the world (WEI, 1996). Moreover, other explanatory variables such as international and intra-country distances as well as other gravity-standard bilateral variables, e.g. common language[10] and contiguity, are collected from the Centre d'Etude Prospectives et d'Informations Internationales (CEPII) database.[11] The empirical implementation of equation (3) also needs to control for relative price (importer to exporter price). However, this price term is problematic, first and foremost due to data constraints at sectoral level, and second because the price term is obviously endogenous to bilateral trade flows (see HEAD and MAYER, 2000). Consequently, this term is abstracted in the final specification. Note that while omitting the price term may clearly affect the *absolute* magnitude of the estimated border effects, it should also be noted that this is not a relevant problem for the identification strategy because it is largely based on *variation* of border effects, after the inclusion of migration variables, or on the consideration of different country aggregations (see section 3.3).

Furthermore, data for the bilateral stock of immigrants are obtained from OECD (see DUMONT et al., 2010), and refers to 1999. Thus, because of the simultaneity between trade and immigration flows, using immigration values at the starting period of the analysis strongly reduces problems of endogeneity bias. Moreover, the immigration data is used to both consider the stock of total immigrants and also split according to the level of education, in terms of *primary, secondary*, and *tertiary*, respectively. The underlying idea is that the level of education is positively correlated with the income level of the immigrants, and could affect the preference patterns toward beer and wine consumption differently.

Finally, production and consumption data (from FAO source) are used to classify the beer and wine drinking nations, respectively. "Wine-drinking nations" are: France, Greece, Italy, Portugal and Spain, and the "Beer-drinking nations" are: Belgium, Germany, Denmark, Ireland, the United Kingdom, and The Netherland.

9 The investigation is limited to the EU-15 countries (instead of EU-25) for both practical and conceptual reasons. Firstly, in order to estimate the border effect, production data to measure intra-country trade is needed. However, this data is lacking for many of the New Member States and years covered by the analysis. Secondly, conceptually, the EU enlargement of 2004 to include the New Member States represents a trade integration episode with a direct effect on the magnitude of the border effects. This 'policy shock' introduces a potential confounding effect with respect to the main purpose of the analysis.

10 Given the well known low variability of the language dummy among the EU countries, this dummy is stated as being equal to 1, when at least 5% of the population in the country considered speaks another EU language.

11 See the CEPII distance database at http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

5 Results

Table 3 reports the results for the first hypothesis, that is, how much the preferences component of the border is relevant in the beer and wine markets. Columns (1) and (6) report the benchmark gravity equations for wine and beer, respectively. Generally speaking, the model works quite well. All the standard gravity covariates except one have the expected sign and are very significant. Relative production has a positive and significant effect on bilateral trade flows, with an estimated coefficient of less than one, but nevertheless very similar for both the beer and wine sectors. Working at product level, an estimated production coefficient of less than 1 can be considered to be a standard result (OLPER and RAIMONDI, 2008a). The distance coefficient is negative and very significant, with an order of magnitude in the range of actual estimates. As expected, the distance coefficient in the beer sector is 26% higher in absolute value than that of wine (−0.91 vs. −0.72), confirming our conjectures about the magnitude of transport costs in the two sectors. Regarding the wine sector, two countries sharing a common border tend to trade 153% (*exp*(0.93)−1) more than otherwise, a value that reaches 228% (*exp*(1.19)−1) in the beer sector. In contrast, while sharing the same language has a negative effect for wine but a positive one for beer, both coefficients are never significantly different from zero. This result is probably due to multicollinearity between the contiguity and language dummies as in the sample, the EU member countries that share a common language also share a common land border, with the exception of Belgium and Austria.

In terms of the estimated border effect in the wine sector, intra-national trade is about 9.5 (*exp*(2.25)) times higher than international trade. The same value for beer is 117.9 (*exp*(4.77)). Therefore, as expected the home bias in beer is of several order of magnitude greater than that of wine, suggesting a huge difference in the level of trade integration between the two sectors, a result in line with the causal observation discussed above. So what are the reasons for these big differences?

This intriguing question is answered by first analysing the role of consumer preferences. The stock of immigrants is added to the specification in columns (2) and (7). Its estimated coefficient is positive and very significant, confirming that immigration is an important determinant of bilateral trade flows. The average trade creation effect of immigration is equals to 141% for wine and 101% for beer, values that present the same order of magnitude as the findings of COMBES et al. (2005) and OLPER and RAIMONDI (2008a), who found an average migrant effect of ap-

Table 3. Border effect and preferences in wine and beer: regression results

	WINE					BEER				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log relative production	0.63***	0.57***	0.51***	0.60***	0.59***	0.58***	0.54***	0.57***	0.52***	0.51***
	(0.03)	*(0.03)*	*(0.03)*	*(0.03)*	*(0.03)*	*(0.05)*	*(0.05)*	*(0.05)*	*(0.05)*	*(0.05)*
Log relative distance	-0.72***	-0.60***	-0.43***	-0.69***	-0.68***	-0.91***	-0.77***	-0.83***	-0.76***	-0.69***
	(0.11)	*(0.10)*	*(0.10)*	*(0.11)*	*(0.11)*	*(0.09)*	*(0.10)*	*(0.10)*	*(0.09)*	*(0.10)*
Contiguity	0.93***	0.42	0.26	0.61*	0.50	1.19***	0.92***	1.04***	0.93***	0.91***
	(0.35)	*(0.35)*	*(0.34)*	*(0.36)*	*(0.34)*	*(0.18)*	*(0.19)*	*(0.19)*	*(0.19)*	*(0.19)*
Common language	-0.14	-0.37	-0.26	-0.41	-0.61	0.36	0.20	0.30	0.10	-0.03
	(0.47)	*(0.42)*	*(0.41)*	*(0.42)*	*(0.41)*	*(0.24)*	*(0.24)*	*(0.24)*	*(0.24)*	*(0.24)*
Home Bias	-2.25***	-2.04***	-1.85***	-1.45***	-1.09***	-4.77***	-4.86***	-4.72***	-4.40***	-4.29***
	(0.41)	*(0.37)*	*(0.35)*	*(0.42)*	*(0.39)*	*(0.26)*	*(0.26)*	*(0.26)*	*(0.25)*	*(0.25)*
Log immigrant-total		0.48***					0.27***			
		(0.06)					*(0.05)*			
Log immigrant-primary			0.58***					0.13***		
			(0.05)					*(0.04)*		
Log immigrant-secondary				0.35***					0.34***	
				(0.06)					*(0.05)*	
Log immigrant-tertiary					0.50***					0.46***
					(0.07)					*(0.06)*
Obs.	546	546	546	546	546	1259	1259	1259	1259	1259
R^2	0.54	0.59	0.62	0.57	0.59	0.28	0.30	0.29	0.31	0.32
Immigration effects (%)										
A Home Bias		-18.9	-33.0	-55.1	-68.7		9.4	-4.9	-30.9	-38.1
Trade creation		141.3	107.4	83.0	58.2		110.1	95.8	74.2	56.8

Notes: OLS regressions; in parenthesis robust standard errors (see text). *, **, and *** indicate significant level at 10%, 5% and 1% level, respectively.
Source: authors' estimation, see text

proximately 75%. A similar effect is detected in terms of border effect reduction, equal to 73% for wine but only 41% for beer. The latter result suggests that preferences represent a very important determinant of the border costs, especially in the wine market. Moreover, note that when controlling for immigration, a strong reduction in the contiguity effect is also detected but only for wine, where the estimated coefficient is no longer significant.

After controlling for total immigration, the residual of border effect is examined. The home bias in the wine sector, equal to only 2.5 (*exp*(0.93)), has largely disappeared, while the home bias in beer, equal to 68.7 (*exp*(4.25)), is still very high. Therefore, to the extent to which immigration controls for preference, this is a clear indication that preference represents a key component of the border effect in the wine market, but not for beer where other determinants of the border are at work, *ceteris paribus*.

The subsequent columns of table 3 test whether or not the effect of migration on the border effect could also be related to the 'quality' of immigrants in terms of education level. Interestingly, migrant stock with tertiary schooling matters the most in both the beer and wine markets. There is a possible interpretation of this result in terms of income effect: the more educated people are, on average, better informed about product characteristics. If imported products are of superior quality and thus more expensive, as the growing literature on trade has recently shown (see BALDWIN and HARRIGAN, 2011; CURZI and OLPER, 2012), it is not surprising to find that migrants with tertiary schooling exert the strongest reduction effect on the preference component of the border. Finally, note that when tertiary schooling is considered, the wine border effect totally disappears, reinforcing the idea that preferences explain the bulk of the wine border effect.

Next, table 4 investigates the second hypothesis as to whether or not the HME could represent a potential explanation for the big border effect detected in the beer market. In order to do this, regressions were run splitting the country sample into "wine (beer)-drinking nations" and "other" countries, respectively. As discussed above, the hypothesis is that as an effect of the HME, "beer-drinking nations" should present an over-production capacity that is exported abroad. Consequently, the border effect is expected to be relatively small for those countries where high production takes place. In contrast, exactly the opposite result should be expected in the wine sector, that is, "wine-drinking nations" should have a relatively high border effect compared to other countries due to consumer preferences for home goods.

The most relevant regressions are reported in columns (2) and (5), while regressions in columns (1)

Table 4. Border effect and home market effect in wine and beer: regression results

	WINE			BEER		
	(1)	(2)	(3)	(4)	(5)	(6)
Log relative production	0.63***	0.66***	0.59***	0.58***	0.57***	0.53***
	(0.03)	*(0.03)*	*(0.03)*	*(0.05)*	*(0.05)*	*(0.05)*
Log relative distance	-0.72***	-0.75***	-0.62***	-0.91***	-0.80***	-0.66***
	(0.11)	*(0.11)*	*(0.11)*	*(0.09)*	*(0.09)*	*(0.10)*
Contiguity	0.93***	1.19***	0.62*	1.19***	1.15***	0.88***
	(0.35)	*(0.35)*	*(0.36)*	*(0.18)*	*(0.18)*	*(0.18)*
Common language	-0.14	-0.69	-0.72	0.36	0.33	0.16
	(0.47)	*(0.49)*	*(0.45)*	*(0.24)*	*(0.24)*	*(0.24)*
Log immigrant-total			0.46***			0.27***
			(0.06)			*(0.05)*
Home Bias						
Benchmark	-2.25***			-4.77***		
	(0.41)			*(0.26)*		
Wine (beer) drinking nations		-2.78***	-1.34***		-3.93***	-3.40***
		(0.41)	*(0.41)*		*(0.26)*	*(0.27)*
Others		-1.86***	-0.74*		-5.20***	-4.67***
		(0.42)	*(0.40)*		*(0.28)*	*(0.28)*
Obs.	546	546	546	1259	1259	1259
R^2	0.54	0.55	0.60	0.28	0.29	0.32

Notes: OLS regressions; in parenthesis robust standard errors (see text). *, **, and *** indicate significant levels at the 10%, 5% and 1% level, respectively.
Source: authors' estimation, see text

and (4) are benchmarks for comparison. What these additional regressions show is that traditional wine producers in the wine sector tend to have a border effect of about 16.1 (*exp*(2.78)), that is, more than twice as high as that of the other countries, equal to 6.4 (*exp*(1.86)). In contrast and in line with the hypothesis, exactly the opposite result is detected in the beer sector. Indeed, the border effect for the traditional beer producers is equal to 50.9 (*exp*(3.93)), thus more than three times lower than that of the other countries group, where it reaches about 181 (*exp*(5.20)), just what the home market effect hypothesis should predict. This counterintuitive effect is due to the fact that in the "other-countries group", as an effect of F DI in beer, an important part of intra-national trade will be satisfied by foreign production in the host country, generating an 'artificial' increase in the border effect. Finally, note that similar results are also detected when we control for the stock of immigrants (see columns (3) and (6)).

In summary, the evidence above broadly confirms the hypotheses. Firstly, the estimated border effect in the wine sectors in the EU-15 is largely attributable to home bias in preferences. Secondly, while preferences are still relevant in the beer sector, the magnitude of the border effect primarily appears to be explained by firm localization choices and the resulting home market effect in an environment where trade costs matter.

6 Conclusions

This paper re-examines the trade reduction effect induced by national border focusing on two particular sectors of the food industry: the beer and wine markets. More specifically, several apriori expectations about the determinants of border effect across the EU-15 countries were formulated. By exploiting the heterogeneity in trade costs, internationalization behaviour, and production characteristics of the two sectors, empirical evidence was found for attributing part of the border effect differences in the beer and wine trade to the home market effect. Indeed, in the wine sector, where the HME effect should be irrelevant, it was found that consumer preferences play an important role, captured here by immigration flows. In contrast, albeit the preference component is still important in the beer industry, the bulk of the border effect explanation is attributable to the home market effect, that is, firms tend to locate near the consumers to minimize trade costs, endogenously increasing the border effect.

These findings may have potential implications for both business and policy makers. Firstly, there is clear evidence that international trade plays a more prominent role in the wine industry than it does for beer, suggesting that free trade agreements, together with quality standards like labeling schemes, can further increase trade integration and welfare. The fact that the level of trade integration in the EU is significantly higher than in the world market, supports this conclusion.[12] Secondly, FDI emerges as a prominent firm strategy in the beer market to expand influence abroad, which is also a reaction to high beer transport costs. Therefore, it is the regulatory environment and international (bilateral) agreement on capital flow that matters the most in facilitating further market integration. Finally, given the documented influence of transport costs in beer, technological innovation in this sector appears to be a fundamental strategy to increase international trade integration.

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[12] The ratio of trade over production in 2007 at the world level was above 30% for wine, and 6.5% for beer, thus significantly lower that the corresponding figures at the EU level (see figure 1 and 2).

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