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EU's Regulation of Geographical Indications and their Effects on Trade Flows

Daniel Leufkens
Justus-Liebig-Universität Gießen

Abstract

Nowadays one of the big issues in international trade is the so-called Transatlantic Trade and Investment Partnership (TTIP), a bilateral trade agreement between the EU and USA. In these negotiations there are still many open questions, including dealing with the European protection of geographical indications (GIs). The objective of this paper is, therefore, to evaluate the impact of different GI products and protection levels in bilateral trade partnerships between the EU itself and third countries for the purpose of food policy recommendations in current negotiation processes. Based on panel data on agri-food trade of EU member countries with all trading partners for the period from 1996 to 2010, a gravity approach is used to estimate bilateral trade effects of GIs. The findings suggest that the protection of diverting products and levels for GIs have opposite effects on EUs trade partnerships. As results, considering EUs overall trade, GIs on wines and spirits only have a trade-creating effect if these are highly protected, while for other agricultural products only lower protection levels increase bilateral trade significantly.

Key Words

geographical indication; agri-food trade; trade partnership; gravity model

1 Introduction

Negotiations about the worldwide largest free trade agreement already started in July 2013. Since then, negotiators of the USA and the EU have been trying to find reasonable compromises in numerous trade issues of the so-called Transatlantic Trade and Investment Partnership (TTIP). One of these is the European regulation of geographical indications (GI), which have a *sui generis* status in international law (ENGELHARDT, 2015). The European GI regulation distinguishes between three protection levels of a traditional speciality guaranteed (TSG), protected geographical indication (PGI), and a protected designation of origin (PDO), referring to the relationship of a product and its origin,[1] which are defined by Regulation (EU) No 1151/2012 (Reg. 1151/12) for agricultural products and foodstuffs and Regulation (EU) No 1308/2013 (Reg. 1308/13) for wine and spirits (see, e.g., JOSLING, 2006; BECKER, 2009; HERRMANN and TEUBER, 2011).

As it can be seen in Figure 1, the numbers of all EU members registered[2] GIs (added up for the years of 1996 to 2010 and distinguished by their protection level and product category) is continuously increasing. The only exception appears to be the TSG label (only available for Reg. 1151/12 i.e. for agricultural products and foodstuffs but not for wine and spirits), which has the lowest protection level of all three GI labels. This could be the reason why a TSG seems to be less attractive to register for producers compared to the PGI or PDO labels. In total more wines and spirits are registered than other agricultural products and foodstuffs. Considering the upward trend in Figure 1, it can be assumed that producers have a growing interest in registering GIs, in particular if they want to reach a larger group of consumers outside the region of origin.

Hence, it is not surprising that the European negotiating mandate aims to implement the GI *sui generis* system in the TTIP, where it says, "the negotiations shall aim to provide for enhanced protection and recognition of EU Geographical Indications through the Agreement, in a manner that complements and

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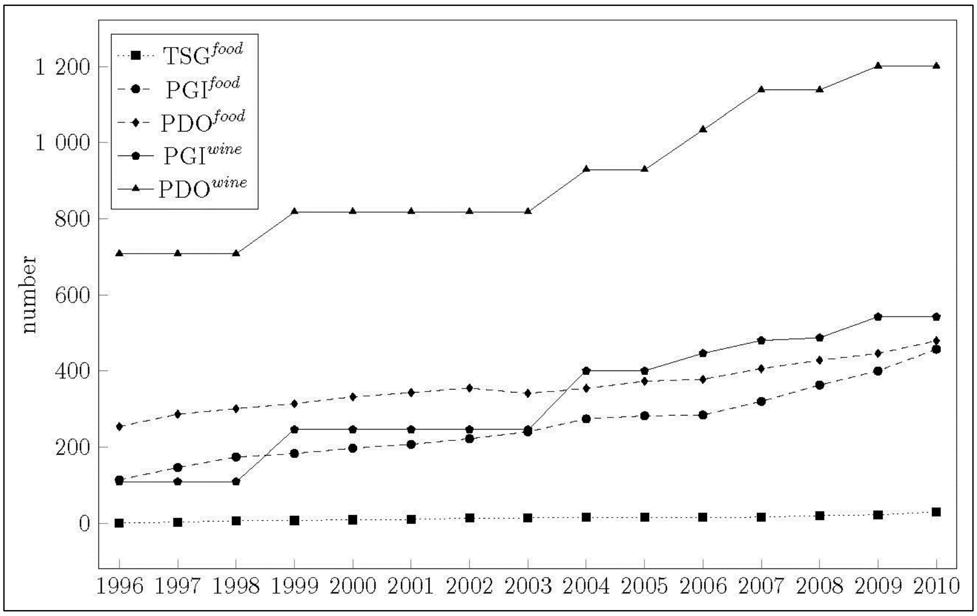
[1] To register a PDO all 'production steps' (production, processing or preparation) have to take place in the same geographical region, while for a PGI only one production step in the region is required (Art. 5 Reg. 1151/12). In the case of a TSG it is enough to prove a connection between traditional manufacturing and the product itself (Art. 18 Reg. 1151/12).

[2] To obtain the right of use for a GI the product must be registered by the EUROPEAN COMMISSION in the Database Of Origin & Registration (DOOR), which is the underlying data for Figure 1. See online http://ec.europa.eu/agriculture/quality/door/list.html?locale=en (accessed June 2017) or the E-Bacchus database see online http://ec.europa.eu/agriculture/markets/wine/e-bacchus/index.cfm?event=pwelcome&language=EN (accessed June 2017).

Figure 1. Registered TSGs, PGIs, and PDOs from EU member countries (1996-2010)



Notes: *food* - refers to Reg. 1151/12 (incl. agricultural products and foodstuffs); *wine* - refers to Reg. 1308/13 (incl. wine and spirits). Computation based on GI products registered in the DOOR and E-Bacchus database.
Source: authors' own calculations

builds upon the TRIPS, also addressing the relationship with their prior use on the US market with the aim of solving existing conflicts in a satisfactory manner" (Art. 29 Directive ST 11103/13). Given former EU trade agreements (e.g., CETA), adopting the European GI regulation in most parts appears likely. Yet the open questions here and consequently the research objective of this paper are: whether the existence of GIs has a positive impact on agri-food trade generally; and whether GIs are valuable as trade-promoting labels in need of protection in bilateral trade agreements with the EU.

Dealing with the topic of GIs, in general, two types of research contributions can be distinguished. First, GIs are commonly analyzed in the theoretical context of product differentiation models, in which their welfare effects as quality standards are determined (e.g., LENCE et al., 2007; MÉREL and SEXTON, 2012; MENAPACE and MOSCHINI, 2012; DESQUILBET and MONIER-DILHAN, 2014). In this context a well-known result is that the European *sui generis* regulation appears to be a kind of an entry barrier or rather a nontariff trade barrier, created by a high protection level of the regional name and production (e.g., CHAMBOLLE and GIRAUD-HÉRAUD, 2005; BUREAU and VALCESCHINI, 2007; BELLETTI et al., 2007). A second branch of the literature is concerned with the empirical, evaluable willingness to pay for GI food labels (e.g., FOTOPOULOS and KRYSTALLIS, 2003; VAN ITTERSUM et al., 2007; DESELNICU et al., 2013; SCHRÖCK, 2014).

On the downside, empirical trade analyses that consider GIs are rare. Until now, the work of SORGHO and LARUE (2014) has been the only research, analyzing trade effects of GIs in a bilateral context. Using intra-European panel data for the years 1999, 2004, and 2009, the authors find that if both trading partners own GIs, these have a trade-creating effect. But in the case, when only one trading partner owns GIs, the effect is inconsistent and even trade-diverting effects are observed. A surprising result, which the authors could not explain sufficiently and which requires further research as contributed in this paper.

Hence, going beyond the results of SORGHO and LARUE (2014) this study diversifies and extends their analysis by using: (i) observations of all EU internal and external trading partners; (ii) panel data for 15 years; and by using (iii) disaggregated GI products and protection levels. Accordingly, the objective of this paper is to analyze the impact of the European GI regulation on agri-food trade, especially in bilateral trade partnerships with non-EU member countries. Furthermore, this paper not only differentiates between trade effects of the European GI policy on EU member and non-EU member countries but also distinguishes between agricultural products and foodstuffs, wine and spirits as well as between the levels of GI protection (TSG, PGI, and PDO). Thereby, the aim is to derive food policy recommendations for current EU negotiations in bilateral trade agreements, such as the TTIP.

To do so, a gravity model has been used to estimate the effects of the European GI regulation on trade based on an agri-food panel for a sample that covers the years 1996 to 2010, including bilateral trade between the EU member countries and all non-

EU trading partners. The empirical results indicate that GIs have a significant effect on intra-EU and international trade partnerships. However, the protection of diverting GI products and levels have opposite trade effects. Regarding EUs internal and external exports of wines and spirits, only the high protection level of a PDO has a trade-creating effect, while the lower protection level of a PGI has a trade-reducing effect. Considering other agricultural products, only lower protection levels of TSGs and PGIs increase trade significantly, while the impact of higher protection level of a PDO is predominantly negative. These findings suggest that a differentiation between the GIs protection standards is essential for the evaluation of their trade effects. Furthermore, considering the EU negotiations in international trade agreements higher GI protection level should only be enforced in the case of wines and spirits, while for other agricultural commodities a lower protection level should be intended.

The organization of the paper is as follows. In Section 2 a description of the conceptual model used in the analysis is given. In Section 3 the data is outlined and in Sections 4 and 5 the empirical results as well as a discussion of the findings and policy implications are presented. Finally, Section 6 concludes the paper and indicates directions for future research.

2 Empirical Model

To estimate the effects of GIs in trade partnerships, the empirical analysis of this paper relies on a gravity model approach (see, e.g., TINBERGEN, 1962; ANDERSON, 1979; BERGSTRAND, 1990; FEENSTRA, 2004). Thereby, the well-specified and theoretically funded gravity Equation of ANDERSON and VAN WINCOOP (2003) is commonly used in the following form:

$$X_{ij} = \frac{Y_i Y_j}{Y}\left(\frac{T_{ij}}{E_i I_j}\right)^{1-\sigma}, \qquad (1)$$

where X_{ij} is the monetary value of exports from the exporting country i and importing country j, Y denotes the total world GDP, which is constant across country pairs; Y_i and Y_j are the GDP of i and j. T_{ij} stands for the cost in j of importing a good from i (e.g., physical or political costs), $1-\sigma$ is the elasticity of substitution. E_i and I_j capture exporter and importer ease of market access, or country i's outward and country j's inward multilateral resistance terms (MRT).

The MRTs are determined by various bilateral trade resistances and are also a function of bilateral trade costs. To deal with those terms, Feenstra (2002) suggested including country-specific fixed effects for *i* and *j*. Other methods are also known to account for MRTs (e.g., BAIER and BERGSTRAND, 2009), but the use of fixed effects, as applied in this paper, has become the standard approach.

The estimation Equation in a reduced log-linearized form with time dimension t and constant α is given as follows:[3]

$$\ln X_{ij,t} = \alpha + \beta_1 \ln Y_{i,t} + \beta_2 \ln Y_{j,t} + \gamma \ln T_{ij,t} + \eta_i + \theta_j + \iota_t + \varepsilon_{ij,t}, \qquad (2)$$

where $\varepsilon_{ij,t}$ is an error term assumed to be *iid*. η, θ, and ι are full sets of countries i's and j's as well as time-fixed effects that capture the MRTs and also all other unobserved country- and time-specific effects. $T_{ij,t}$ (with $\gamma = 1 - \sigma$) denotes various trade costs and takes the following form:

$$T_{ij,t} = Distance_{ij}^{\delta} \cdot \exp Z, \qquad (3)$$

where $Distance_{ij}$ represents the physical distance separating countries i and j, and Z contains classical gravity variables defined in this paper as follows:

$$Z = \zeta_1 CB_{ij} + \zeta_2 CL_{ij} + \zeta_3 LL_i + \zeta_4 LL_j + \zeta_5 Open_{i,t} + \zeta_6 Open_{j,t} + \zeta_7 RTA_{ij,t} + \sum_{n=1}^{N} \zeta_{7+n} Label_t, \qquad (4)$$

which are common border (*CB*), common language (*CL*), being landlocked (*LL*), openness to trade (*Open*), and regional trade agreements (*RTA*) with the EU (incl. EU membership).[4]

According to the literature, it can be expected that $\beta_1, \beta_2, \zeta_1, \zeta_2, \zeta_5, \zeta_6,$ and ζ_7 are positive and in-

[3] Given that the world's GDP Y is constant across country pairs and follows a steady trend over time, it is neglected from the reduced Equation 2.

[4] Following classical definitions from the literature (see, e.g., MELITZ, 2008; EGGER and LASSMANN, 2012) these variables are defined as follows: *CB* (dummy for countries *i* and *j* sharing a common land border), *CL* (dummy for countries *i* and *j* using a common official language), *LL* (dummy for country *i* or *j* being landlocked), *Open* (sum of a country *i*'s or *j*'s total exports and imports divided by its GDP), and *RTA* (dummy for countries *i* and *j* being members of the EU or have a bilateral trade agreement with the EU).

crease exports, while being landlocked (ζ_3 and ζ_4) or having a greater distance (δ) lead to higher trade costs and should be negative (e.g., ANDERSON and VAN WINCOOP, 2003; HELPMAN et al., 2008; VANCAUTEREN and WEISERBS, 2011).

Focusing on the main objective of this paper, i.e. evaluating the trade effects of GIs, *Label* refers to the agricultural *food* (Reg. 1151/12) and *wine* (Reg. 1308/13) labels of a TSG, PGI, PDO, or highly protected label (*HPL* = PGI + PDO)[5]. The conceptual framework behind this integration of GIs in the classical gravity *Z* vector of Equation 4 relies on the astion that GIs should be known as quality labels, even if the requirements for them are low (e.g., TSG; EUROPEAN COMMISSION, 2017). Given the context of information asymmetries (AKERLOF, 1970), GIs should signal a high quality product and thus create a higher demand for registered products by assuring their quality. In this case GIs should have a trade increasing effect as foreign consumers are insured that these traded products have a high quality.

Two prerequisites are, however, that consumers in other countries know the GI labels and GI products indeed have a high quality. If this is not the case and foreign consumers do not know the GI labels or the GI product quality is actually low, there should be no or even a negative trade effect. Furthermore, the European *sui generis* regulations is often criticized in the literature as regional protection strategy and nontariff trade barrier (e.g., CHAMBOLLE and GIRAUD-HÉRAUD, 2005; BUREAU and VALCESCHINI, 2007; BELLETTI et al., 2007; SORGHO and LARUE, 2014). If this criticism is true, likewise GIs should have trade diversion effects by promoting domestic consumption and reducing the domestic market for foreign products.

To include a proxy variable for GI trade effects the DOOR as well as the E-Bacchus databases provide overall numbers of registered GIs differentiated by years, products, and protection levels. Thus, following the definition of SORGHO and LARUE (2014) the variable *Label* denotes the number of respectively registered products (*RP*) in *i*, *j*, or in both countries at time *t*:

$$Label_{i,t} = RP_{i,t} \cdot D_i \tag{5a}$$

$$Label_{j,t} = RP_{j,t} \cdot D_j \tag{5b}$$

$$Label_{ij,t} = (RP_{i,t} + RP_{j,t}) \cdot D_{ij}, \tag{5c}$$

where *D* is defined as:

$$D_i = \begin{cases} 1, \text{if exporter has the respective } Label \text{ and importer does not} \\ 0, \text{otherwise} \end{cases}; \tag{6a}$$

$$D_j = \begin{cases} 1, \text{if importer has the respective } Label \text{ and importer does not} \\ 0, \text{otherwise} \end{cases}; \tag{6b}$$

$$D_{ij} = \begin{cases} 1, \text{if exporter and importer have the respective } Label \\ 0, \text{otherwise} \end{cases}, \tag{6c}$$

and leads to a maximum of 15 (n = 1,...,15) possible *Label* dummies, considering the differentiation between GI agricultural *food* and *wine* products.

There are two good reasons why the number of registered products can be used as a proxy variable for GI trade effects in a gravity model. First, other continuous data, for example, sales figures or product shares of GIs are difficult to obtain as these are only compiled country-specific and limited in duration (see, e.g., LONDON ECONOMICS, 2008; CHEVER et al., 2012). Second, to obtain a trade effect by GIs, the labels of TSGs, PGIs, or PDOs should be known by the consumers. Thereby, it can be assumed that the awareness of these products in a market increases with a increasing number of registered products. As a result, regarding bilateral trade, GIs should have stronger trade effects the larger the number of registered products in the domestic and foreign country are. Furthermore, it is obvious that the number of registered GIs accounts for differences across countries' GI policies and shows the countries' opportunities to exclusively trade the protected agricultural commodities (SORGHO and LARUE, 2014).

Finally, the issue of how to handle zeros in bilateral trade data in gravity models must be discussed as it affects all estimation approaches. It is caused by the problem of estimating the log-linearized form of Equation 2 and a high number of zero observations in trade data (e.g., HALLAK, 2006; HELPMAN et al., 2008). Although the empirical literature has devel-

[5] To ensure comparability of this paper with the work of SORGHO and LARUE (2014), the label *HPL* only includes the labels PDO and PGI.

oped various approaches (e.g., the Tobit estimator), the (pseudo) poisson maximum likelihood (PPML) estimator is one of the best known and most robust (SANTOS SILVA and TENREYRO, 2006). SANTOS SILVA and TENREYRO (2006: 642) argued that in the presence of heteroskedasticity (usual in trade data), the PPML estimator is consistent, even if the data is not poisson-distributed and the dependent variable is not a count variable.[6] Therefore, this paper's gravity model approach relies not only on an ordinary least squares (OLS), which leaves out pairs of countries with zero trade,[7] but also on a PPML estimator.

Table 1. Descriptive statistics (1996-2010)

	Unit	Mean	Std. dev.	Missing obs.
$X_{ij,t}^{agri}$	million USD	88.819	487.36	17,135
$GDP_{i,t}$	billion USD	619.88	828.14	0
$GDP_{j,t}$	billion USD	235.10	1042.7	2,733
$Distance_{ij}$	thousand km	6254.0	4020.8	1,515
CB_{ij}	dummy	0.0183	0.1340	1,979
CL_{ij}	dummy	0.0799	0.2711	1,979
LL_i	dummy	0.1683	0.3742	0
LL_j	dummy	0.1801	0.3842	1,515
$Open_{i,t}$	ratio	0.7214	0.3459	1,224
$Open_{j,t}$	ratio	0.6348	0.4006	16,054
$RTA_{ij,t}$	dummy	0.1739	0.3791	0
TSG^{food}	tradable number	0.7121	1.4198	0
PGI^{food}	tradable number	14.060	21.371	0
PDO^{food}	tradable number	19.530	29.143	0
PGI^{wine}	tradable number	17.719	38.697	0
PDO^{wine}	tradable number	49.990	106.68	0
Countries	206			
Observations	61,812			

Notes: *food* - refers to Reg. 1151/12 (incl. agricultural products and foodstuffs); *wine* - refers to Reg. 1308/13 (incl. wine and spirits). Summary statistics of this variables refer to the hole dataset of intra- and extra-EU agricultural exports.
Source: authors' own calculations

3 Data and Descriptive Statistics

The database used to estimate the gravity model (i.e., Equation 2) is based on an annual trade panel of EU member countries with all possible 'intra' or internal (*int*; only EU) and 'extra' or external (*ext*; only non-EU) trading partners included in the UNITED NATIONS COMMODITY TRADE (UNcomtrade) database (n = 206) for the period from 1996 to 2010. Country and time restrictions were due to the aim of displaying trading effects from the European GI food policy in the context of international trade and therefore, focused on EU member countries, since a registration of an agricultural GI in the DOOR and E-Bacchus databases were possible for the first time in 1996. Hence, 27 EU (included once they became members) plus 179 non-EU countries are observed for 15 years, which leads to an overall sample of 61,812 unbalanced country pairs. In Table 1 the descriptive statistics of variables used in the empirical estimations are given.

As the TSG, PGI, and PDO labels are limited to food and agricultural commodities (incl. wine and spirits), only the four product groups 'food and live animals' (SITC 0), 'beverages and tobacco' (SITC 1), 'oil-seeds and oleaginous fruits' (SITC 22), and 'animal and vegetable oils, fats and waxes' (SITC 4) are used for aggregated flows of agricultural exports (X^{agri}). National income (GDP) data are from The WORLD BANK (WB). Data on common variables of the gravity approach (*CB*, *CL*, and *LL*) come from CENTRE D'ÉTUDES PROSPECTIVES ET D'INFORMATIONS INTERNATIONALES (CEPII), in which *Distance* is calculated by the great-circle formula (HEAD and MAYER, 2000; DISDIER and HEAD, 2008). The variables *Open* and *RTA* are self-compiled based on import, export, and GDP data and information about EU memberships as well as established EU bilateral trade and investment agreements (see EUROPEAN COMMISSION, 2013). Likewise the TSG, PGI, and PDO registered products (*Label*) are self-counted and compiled using the DOOR and E-Bacchus databases.

4 Results

Regression results with robust standard errors are presented in Tables 2 and 3. Both models, OLS (a) and PPML (b), were estimated, based on the monetary

[6] Even regarding the two-stage Helpman-Melitz-Rubinstein model (HELPMAN et al., 2008), SANTOS SILVA and TENREYRO (2015: 103) can show that "[the two-stage] estimator is very sensitive to the presence of heteroskedasticity."

[7] Unobserved trade values or values less than 100 USD are ignored as zero trade and left out of the OLS regressions.

value of agricultural exports from the exporting country i and importing country j over time t ($X^{agri}_{ij,t}$). With regard to SORGHO and LARUE (2014), Table 2 only contains the estimation results for the intra-EU (*int*) bilateral trade. Models 1a and 1b represent the reference agri-food trade models without any GI. Models 2a and 2b are based on the specification of SORGHO and LARUE (2014) and include GIs on the aggregated level without distinguishing between a PGI or PDO protection level (*HPL*) and excluding TSGs as well as wine and spirits.

As an extension to the model of SORGHO and LARUE (2014), models 3a and 3b contain extensive distinctions of the European GI regulation in protection levels of TSGs, PGIs, and PDOs as well as product categories of *food* (Reg. 1151/12) and *wine* (Reg. 1308/13). Furthermore, models 4 to 7 show results for the exclusive bilateral trade (*ext*) between EU and non-EU member countries as well as inclusive models (*inc*=*int*+*ext*), where the extra-EU trade only includes GIs, which are owned by EU exporters *i*. Hence, Table 3 gives one the opportunity to evaluate bilateral trade effects of GIs in non-EU trade partnerships (e.g., USA). By doing so, summarizing the regression results in short, it can be shown that GIs have significant effects on bilateral trade. In general, the lower protection levels on agricultural products and foodstuffs have trade-creating effects and the higher protection level has trade-diverting effects. The case is reversed for GIs on wine and spirits.

Table 2. Estimated gravity model results for intra-EU agricultural exports (1996-2010)

Dependent variable	ln $X^{agri}_{ij,t}$						$X^{agri}_{ij,t}$					
Estimator	(1a) OLS^{int}		(2a) OLS^{int}		(3a) OLS^{int}		(1b) PPML^{int}		(2b) PPML^{int}		(3b) PPML^{int}	
Constant	13.947***	(1.88)	14.269***	(1.87)	13.798***	(2.00)	9.454***	(1.46)	11.435***	(1.46)	11.444***	(1.64)
ln $GDP_{i,t}$	0.944***	(0.19)	0.964***	(0.19)	0.939***	(0.20)	0.677***	(0.15)	0.550***	(0.15)	0.582***	(0.17)
ln $GDP_{j,t}$	0.566***	(0.19)	0.478**	(0.19)	0.540***	(0.20)	0.699***	(0.13)	0.501***	(0.13)	0.466***	(0.14)
ln $Distance_{ij}$	-1.358***	(0.03)	-1.337***	(0.03)	-1.341***	(0.03)	-0.692***	(0.02)	-0.685***	(0.02)	-0.690***	(0.02)
CB_{ij}	0.770***	(0.05)	0.742***	(0.05)	0.743***	(0.05)	0.485***	(0.04)	0.444***	(0.04)	0.460***	(0.04)
CL_{ij}	0.487***	(0.07)	0.533***	(0.07)	0.531***	(0.07)	0.912***	(0.05)	0.967***	(0.05)	0.984***	(0.05)
LL_i	-0.859***	(0.32)	-0.853***	(0.33)	-0.810**	(0.34)	-0.593**	(0.27)	-0.775***	(0.27)	-0.711**	(0.29)
LL_j	-1.250***	(0.33)	-1.400***	(0.33)	-1.280***	(0.34)	-0.371	(0.24)	-0.676***	(0.25)	-0.682***	(0.25)
ln $Open_{i,t}$	1.475***	(0.20)	1.492***	(0.19)	1.313***	(0.21)	0.818***	(0.13)	0.684***	(0.13)	0.679***	(0.14)
ln $Open_{j,t}$	0.270	(0.20)	0.227	(0.19)	0.134	(0.20)	0.053	(0.16)	-0.103	(0.16)	-0.152	(0.16)
$HPL^{food}_{i,t}$	-		-0.004***	(0.00)	-		-		-0.007***	(0.00)	-	
$HPL^{food}_{j,t}$	-		-0.001	(0.00)	-		-		-0.004***	(0.00)	-	
$HPL^{food}_{ij,t}$	-		0.000	(0.00)	-		-		0.000	(0.00)	-	
$TSG^{food}_{i,t}$	-		-		0.035**	(0.02)	-		-		0.012	(0.02)
$TSG^{food}_{j,t}$	-		-		0.002	(0.02)	-		-		0.045***	(0.02)
$TSG^{food}_{ij,t}$	-		-		0.026**	(0.01)	-		-		0.046***	(0.01)
$PGI^{food}_{i,t}$	-		-		0.000	(0.00)	-		-		-0.003	(0.00)
$PGI^{food}_{j,t}$	-		-		0.004*	(0.00)	-		-		0.003*	(0.00)
$PGI^{food}_{ij,t}$	-		-		0.004*	(0.00)	-		-		0.000	(0.00)
$PDO^{food}_{i,t}$	-		-		-0.011***	(0.00)	-		-		-0.010***	(0.00)
$PDO^{food}_{j,t}$	-		-		-0.007***	(0.00)	-		-		-0.009***	(0.00)
$PDO^{food}_{ij,t}$	-		-		-0.006***	(0.00)	-		-		-0.002	(0.00)
$PGI^{wine}_{i,t}$	-		-		0.001*	(0.00)	-		-		-0.001	(0.00)
$PGI^{wine}_{j,t}$	-		-		-0.001	(0.00)	-		-		-0.002**	(0.00)
$PGI^{wine}_{ij,t}$	-		-		-0.001**	(0.00)	-		-		0.000	(0.00)
$PDO^{wine}_{i,t}$	-		-		0.002***	(0.00)	-		-		0.000	(0.00)
$PDO^{wine}_{j,t}$	-		-		0.003***	(0.00)	-		-		0.001	(0.00)
$PDO^{wine}_{ij,t}$	-		-		0.003***	(0.00)	-		-		0.000	(0.00)
Obs.	6,092						6,126					
Adj. R^2	0.884		0.885		0.885		0.948		0.951		0.953	
Log-Likelih.	-8,289		-8,258		-8,244		-2.7e+08		-2.6e+08		-2.5e+08	

Notes: panel data by country pair (exporter-importer). Fixed exporter, importer, and year effects not reported. Coefficients with *(**, ***) are significant at the 10(5, 1)%-level. Robust standard errors reported in parentheses. *food* - refers to Reg. 1151/12 (incl. agricultural products and foodstuffs); *wine* - refers to Reg. 1308/13 (incl. wine and spirits).
Source: authors' own calculations

Table 3. Estimated gravity model results for EU exclusive and inclusive agricultural exports (1996-2010)

Dependent variable	$\ln X_{ij,t}^{agri}$				$X_{ij,t}^{agri}$				$\ln X_{ij,t}^{agri}$				$X_{ij,t}^{agri}$			
Estimator	**(4a) OLS^{ext}**		**(5a) OLS^{ext}**		**(4b) $PPML^{ext}$**		**(5b) $PPML^{ext}$**		**(6a) OLS^{inc}**		**(7a) OLS^{inc}**		**(6b) $PPML^{inc}$**		**(7b) $PPML^{inc}$**	
Constant	22.152***	(1.09)	21.813***	(1.16)	12.741***	(1.05)	11.936***	(1.20)	16.788***	(0.93)	16.231***	(0.98)	9.517***	(0.87)	9.896***	(0.97)
$\ln GDP_{i,t}$	0.417***	(0.15)	0.493***	(0.16)	0.570***	(0.15)	0.699***	(0.16)	0.653***	(0.13)	0.767***	(0.14)	0.686***	(0.12)	0.638***	(0.14)
$\ln GDP_{j,t}$	0.839***	(0.05)	0.839***	(0.05)	0.569***	(0.05)	0.568***	(0.05)	0.840***	(0.05)	0.855***	(0.05)	0.633***	(0.05)	0.623***	(0.05)
$\ln Distance_{ij}$	-1.963***	(0.04)	-1.964***	(0.04)	-0.889***	(0.04)	-0.888***	(0.04)	-1.541***	(0.03)	-1.566***	(0.03)	-0.644***	(0.02)	-0.656***	(0.02)
CB_{ij}	0.604***	(0.08)	0.605***	(0.08)	0.835***	(0.06)	0.836***	(0.06)	0.525***	(0.05)	0.507***	(0.05)	0.532***	(0.03)	0.548***	(0.04)
CL_{ij}	1.266***	(0.04)	1.267***	(0.04)	0.631***	(0.04)	0.631***	(0.04)	1.242***	(0.04)	1.241***	(0.04)	0.866***	(0.03)	0.892***	(0.03)
LL_i	-2.323***	(0.26)	-2.348***	(0.28)	-0.918**	(0.27)	-0.751**	(0.30)	-1.765***	(0.23)	-1.635***	(0.24)	-0.598***	(0.22)	-0.633***	(0.25)
LL_j	-1.266***	(0.30)	-1.268***	(0.30)	-1.522***	(0.23)	-1.525***	(0.23)	-1.318***	(0.31)	-1.293***	(0.31)	-1.545***	(0.24)	-1.562***	(0.24)
$\ln Open_{i,t}$	0.767***	(0.15)	1.038***	(0.15)	0.716***	(0.15)	0.826***	(0.16)	0.889***	(0.13)	0.961***	(0.13)	0.816***	(0.11)	0.657***	(0.12)
$\ln Open_{j,t}$	0.264***	(0.05)	0.264***	(0.05)	0.096*	(0.06)	0.093*	(0.06)	0.243***	(0.05)	0.244***	(0.05)	0.081	(0.07)	0.046	(0.07)
$RTA_{ij,t}$	0.015	(0.06)	0.016	(0.06)	-0.078	(0.06)	-0.086	(0.06)	0.398***	(0.04)	0.397***	(0.04)	0.399***	(0.04)	0.359***	(0.04)
$TSG_{i,t}^{food}$	-		-0.065***	(0.02)	-		-0.024	(0.02)	-		-0.030**	(0.01)	-		-0.002	(0.02)
$TSG_{j,t}^{food}$	-		-		-		-		-		0.089***	(0.02)	-		0.061***	(0.01)
$TSG_{ij,t}^{food}$	-		-		-		-		-		0.024*	(0.01)	-		0.053***	(0.01)
$PGI_{i,t}^{food}$	-		-0.005***	(0.00)	-		0.001	(0.00)	-		0.001	(0.00)	-		0.004***	(0.00)
$PGI_{j,t}^{food}$	-		-		-		-		-		0.004*	(0.00)	-		0.003	(0.00)
$PGI_{ij,t}^{food}$	-		-		-		-		-		0.001	(0.00)	-		0.000	(0.00)
$PDO_{i,t}^{food}$	-		0.010***	(0.00)	-		0.001	(0.00)	-		0.001	(0.00)	-		-0.007***	(0.00)
$PDO_{j,t}^{food}$	-		-		-		-		-		0.013***	(0.00)	-		-0.008***	(0.00)
$PDO_{ij,t}^{food}$	-		-		-		-		-		0.010***	(0.00)	-		-0.001	(0.00)
$PGI_{i,t}^{wine}$	-		-0.003***	(0.00)	-		0.000	(0.00)	-		-0.002***	(0.00)	-		0.000	(0.00)
$PGI_{j,t}^{wine}$	-		-		-		-		-		0.000	(0.00)	-		-0.002**	(0.00)
$PGI_{ij,t}^{wine}$	-		-		-		-		-		-0.003***	(0.00)	-		0.000	(0.00)
$PDO_{i,t}^{wine}$	-		0.000	(0.00)	-		0.001	(0.00)	-		0.002***	(0.00)	-		0.001	(0.00)
$PDO_{j,t}^{wine}$	-		-		-		-		-		-0.001	(0.00)	-		0.001*	(0.00)
$PDO_{ij,t}^{wine}$	-		-		-		-		-		0.001	(0.00)	-		0.001	(0.00)
Obs.	31,324				38,167				37,416				44,293			
Adj. R^2	0.722		0.723		0.954		0.955		0.772		0.772		0.976		0.977	
Log-Likelih.	-60,322		-60,299		-2.1e+08		-2.1e+08		-70,746		-70,681		-5.2e+08		-5.0e+08	

Notes: panel data by country pair (exporter-importer). Fixed exporter, importer, and year effects not reported. Coefficients with *(**, ***) are significant at the 10(5, 1)%-level. Robust standard errors reported in parentheses. *food* - refers to Reg. 1151/12 (incl. agricultural products and foodstuffs); *wine* - refers to Reg. 1308/13 (incl. wine and spirits).
Source: authors' own calculations

Looking at the results in detail, first of all, regarding the adjusted R^2, and log-likelihoods, all estimations (1 to 7) have a good model fit and include in almost all parts highly significant (1%-level) coefficients. The traditional gravitation variables satisfy, in general, the expectations in signs and size based on literature predictions (see, Section 2; e.g., ANDERSON and VAN WINCOOP, 2003; HELPMAN et al., 2008; VANCAUTEREN and WEISERBS, 2011). Accordingly, the economic size (GDP), a common border (*CB*) and language (*CL*), the openness to trade (*Open*) as well as regional trade agreements (*RTA*) have significant trade-creating effects. While greater physical distances (*Distance*) and being landlocked (*LL*) reduce trade. In comparison with the reference agri-food trade models (1, 4, and 6) the explanation of all models increases slightly by adding GI variables, while the previous coefficients remain almost constant.

Considering initially the GI models 2a and 2b for the intra-EU trade, which do not distinguish between different protection levels and products of GIs, the OLS estimator implies a significant trade-reducing effect if the exporting country *i* has a PDO and/or PGI and the PPML estimator also shows trade-decreasing effects if the importing country *j* has a GI. While Sorgho and Larue (2014) found a trade-creating effect if both trading partners own GIs, their results for the OLS and PPML estimator were inconsistent when only one trading partner owns GIs. Hence, the extension of the data set allows us to estimate more consistent coefficients and points to a significant negative trade effect if both trading partners own GIs.

In addition to these results, distinguishing between GI products (*food* and *wine*) and protection levels (TSG, PGI, and PDO), a more in-depth analysis can be presented for the first time. But even if the OLS and PPML estimator results are similar-looking, it should not be forgotten that the PPML estimator is more consistent and reliable in the context of trade data (SANTOS SILVA and TENREYRO, 2006). Due to that and the clearly higher R^2 the result descriptions refer primarily to the PPML models. Thus regarding model 3b for the intra-EU trade, significant and consistent (i.e. comparing with OLS) trade-increasing effects are estimated for the TSG and PGI label on *food*s. Thereby, the PDO label on *food*s as well as the PGI label on *wine*s owned by the importing country *j* leads to a trade-decreasing effect.

The model 3b also suggest a very interesting result, considering exclusively intra-EU trade. Looking at the *food* category of GIs, the lower protection levels of a TSG or PGI seems to have a positive trade effect, whereas the higher protection level of a PDO clearly has a trade-reducing effect. The reverse case applies to the *wine* category, where at least the lower protection level of a PGI predominantly has a trade-reducing effect. The result holds true regardless of whether only the PPML or also the OLS estimator is considered. These results will be discussed later in Section 5.

Expanding the intra-EU trade sample to an international level, the results seem to be much more ambiguous. Regarding Table 3, the models 4 and 5 of exclusive trade partnerships between EU member and non-EU countries have the weakest explanatory power. Only the OLS estimator leads to significant coefficients for the GIs, while their signs are contrary to the intra-EU models. The reason for this could be that only a very small number of GIs are traded outside the EU, while the number of observations increases considerably, which is why the coefficients become rather insignificant especially in the PPML case (i.e. OLS obs. < PPML obs.).

However, if one looks at the overall international trade (*inc*) the estimation results are more consistent and include significant coefficients for a high number of GI variables in model 7b. Thereby, again opposite effects between the *food* and *wine* categories can be observed. While, likewise to the intra-EU models, lower protection levels (TSG and PGI) for *food* products have trade-creating and higher protection levels (PDO) trade-diverting effects, the effects are reversed for *wine* products. This is now also true if the importing country *j* has a PDO on *wine*, which has a trade-creating effect. Hence, due to the wide-ranging differentiation of GI products and protection levels, the trade effects of GIs can be estimated considerably better and allow a sufficiently differentiated analysis of the individual label effects in a bilateral trade context.

5 Discussion

According to SORGHO and LARUE (2014: 10): “GIs increase the thickness of the border between EU countries. This home-bias is not surprising because a country’s GI products are possibly most appreciated at home, when the evoke culture and trading most vividly.” The “home bias” argument of SORGHO and LARUE (2014) addresses the well-known criticism that GIs are often used as regional protection strategy and nontariff trade barrier (e.g., CHAMBOLLE and GIRAUD-HÉRAUD, 2005; BUREAU and VALCESCHINI, 2007; BELLETTI et al., 2007; SORGHO and LARUE

2014). However, considering the results of this study, particularly, the differentiation between the GIs protection standards, this interpretation seems to be very limited.

Initially, regarding the empirical results of the PPML models for agricultural products and foodstuffs, only the high protection level of a PDO indicates negative trade effects, while the lower protection levels of a TSG or PGI increase the intra-EU trade. Particularly interesting is that the positive trade effect of a TSG is also the greatest GI effect in size. This could be the reason why the GI coefficients in models without TSGs (2a and 2b) are negative.

Therefore, instead of accusing the European GI regulation of creating a home bias, it seems to be more appropriate to attribute the quality argument here. It can be argued that GIs only have a positive trade effect if they represent a credible quality signal for the consumer in foreign markets. *Vice versa*, if the quality signal is not credible or even negative, GIs should have no or even negative trade effects. Here, it should be noted that the European GI regulation implicates a higher quality level by the higher protection level of a PDO, as the geographical requirements are higher than for a TSG or PGI (Art. 5 Reg. 1151/12).

By observing positive trade effects for the lower and negative trade effects for the higher protection levels of agricultural products and foodstuffs TSGs and PGIs seem to be positive quality signals in foreign markets, while PDOs obviously do not meet their quality signal requirements. This applies in particular if we consider the strong effect of a TSG in size. However, it is quite interesting that the case seems to be reversed for wine and spirits, which show a negative trade effect for PGIs but a trade-creating effect for the PDO, at least in the inclusive model. Regarding the decades-long discussion on the protection of GIs in the context of the *terroir* concept (e.g., GIOVANNUCCI et al., 2009) and the former limitation on wines and spirits (e.g., TRIPS), this result appears very comprehensible in an international trade context.

Accordingly, foreign consumers seem to have a great interest in highly protected i.e. high-quality wines and spirits certified by a PDO label but apparently do not perceive a PDO as quality signal in the case of agricultural products and foodstuffs. In contrast, a PGI on wines or spirits seems to be a negative quality signal, while the indication of origin on agricultural products and foodstuffs without high-quality requirements (TSG or PGI) seems to be valuated by foreign consumers.

Even if the GI trading effects are most clear in the inclusive PPML model, these effects can also be observed in the OLS models. However, the more ambiguous effects in the extra-EU trade models might indicate that European GIs are less well-known in more distant (non-EU) markets and therefore lead to less robust coefficients.

Considering these results in the context of trade agreements between the EU and non-EU countries, the aim of adopting and enforcing the European GI regulation in bilateral agreements (see, e.g., Art. 29 Directive ST 11103/13) should be reconsidered. Thereby, a differentiation between the GI products and protection levels makes good economic sense and prevents conflicts about the level of quality requirements at least for agricultural products and foodstuffs. In this case the trade values of TSGs and PGIs seem not to be driven by a higher protection i.e. quality level, but merely by the geographical origin. In contrast, regarding wine and spirits the higher quality level of a PDO seems to be worthy of protection, while the lower PGI level is not. Hence, these findings suggest that a differentiation between GI products and protection levels is essential for the evaluation of their bilateral trade effects.

6 Conclusion

This paper evaluated the impact of the European GI regulation in bilateral trade partnerships between the EU and third countries in the context of current trade negotiations such as the TTIP. A gravity model approach was used to estimate bilateral trade effects of GIs based on panel agri-food trade data from all EU member countries and their EU and non-EU trading partners for the period from 1996 to 2010. In addition to previous works, this paper not only differentiated between trade effects of the European GI food policy among and beyond EU member countries, but also distinguished between agricultural products and foodstuffs, wine and spirits as well as between different protection levels of GIs.

The main result was that the European GI regulation leads to significant trade effects in the intra-EU as well as extra-EU bilateral trade. In general, a trade-creating effect of the GI regulation would be expected, as its aim is to reduce information asymmetry by the protection of high-quality products from fraud. However, the empirical results of this paper suggest, that within the framework of distinctions between different protection levels and product categories of GIs, only the lower protection levels for agricultural products and foodstuffs as well as the higher protection level for wines and spirits have trade-creating effects. In contrast, the higher protection level for agricultural products and foodstuffs as well as the lower protection level for wines and spirits have trade-diverting effects.

To derive policy recommendation of these results for the current trade negotiations between the EU and non-EU countries, certainly the most important implication is to differentiate between the GI products and protection levels. Consequently, in the case of agricultural products and foodstuffs it seems to be more important to protect a low level of geographical origin instead of high geographical production requirements. But regarding the categories of wines and spirits the case is *vice versa* and high geographical production requirements are reasonable for positive trade effects. Hence, the ongoing international trade negotiations offer the chance to partially revise the current EU regulation of GIs.

This paper tried to contribute a food policy recommendation in the current bilateral negotiations between the EU and third countries, as it provided significant effects of the European GI regulation in the international trade context. The results, however, are restricted to the observed countries, and time period, and further research could focus on trade effects of GI certifications in third countries or even evaluate the overall emerging welfare effects created by the European GIs trade policy.

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Contact author:
DR. DANIEL LEUFKENS
Institute of Agricultural Policy and Market Research
Justus-Liebig-University Giessen
Senckenbergstr. 3, 35390 Giessen
e-mail: daniel.leufkens@agrar.uni-giessen.de