THE IMPACT OF PROTECTING EU GEOGRAPHICAL INDICATIONS IN TRADE AGREEMENTS

Daniele Curzi and Martijn Huysmans*

Abstract

The European Union protects over 1,000 Geographical Indications for distinctive regional foods such as Parma ham and Feta cheese. This paper tests whether external protection of Geographical Indications through trade agreements has increased exports of European Union Geographical Indications. The answer matters for trade policy, since the protection of at least some Geographical Indications has been a red line in recent trade negotiations. We use detailed export data for cheeses, covering the 2004-2019 period. The analysis uses the latest trade models that take into account the possibility of zero-trade flows for certain goods. We find that legal protection of Geographical Indications in trade agreements does not generally lead to significant additional exports above and beyond the general export-promoting effects of trade agreements. This finding should limit international fears of protected Geographical Indications widely displacing comparable products made outside of the European Union. However, while there is no significant effect across the board, more detailed analyses do find significant effects. In particular, Geographical Indications of higher quality and with higher market shares do benefit from stronger external legal protection. Based on these findings, the European Union may want to refocus its demands for protection of Geographical Indications during trade negotiations.

Keywords European Union • Geographical Indications • Intellectual Property • Quality • Specialty Foods • Trade agreements • TRIPS

JEL Codes D72 • F13 • O34 • Q17

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In recently negotiated free trade agreements (FTAs) the European Union (EU) has insisted on the protection of agreement-specific lists of its Geographical Indications (GIs). We know that extra-EU exports of EU GIs have increased from about 1B€ in 2010 to about 1.7B€ in 2017 (Chever et al. 2012: 20; AND-International 2019: 45). However, we do not know whether this growth can be attributed to the external protection of GIs in FTAs. In this paper, we use a pseudo-Poisson maximum likelihood (PPML) estimator on detailed CN8-level cheese trade data to identify the effect on exports of the protection of GIs in FTAs.

According to the World Trade Organization, a Geographical Indication (GI) is a product with "a given quality […] essentially attributable to its geographical origin" (WTO 1994, Art.22). In the European Union (EU), there are three GI schemes: for wine, for spirits, and for food. An example of a food GI is the blue cheese *Gorgonzola*, which in the EU can only be produced according to the product specification and in a number of Italian provinces around the town of Gorgonzola. Food GIs are not well protected outside of the EU single market, because they do not fall under Article 23 of the WTO Trade Related Aspects of Intellectual Property (TRIPS).

In recent trade agreements, the EU has achieved increased external protection for FTA-specific lists of its food GIs (Huysmans 2020). The lists are highly contentious. Both Greece and Italy have threatened not to ratify CETA (the Comprehensive Economic and Trade Agreement between the EU and Canada) because of insufficient GI protection (Malkoutzis 2016; Reuters 2018). In 2020, the Cypriot parliament voted not to ratify CETA, among other reasons because of insufficient protection for the Cypriot cheese *Halloumi*.

The United States strongly opposes the international expansion of EU GI protection, leading to the so-called "war on terroir" (Josling 2006). The EU will not easily convince the US to strike a trade deal protecting EU GIs (Informa Economics IEG 2016; Prescott, Pilato and Bellia 2020). Whether GI protection in FTAs actually increases EU GI exports is hence highly

relevant to scholars and all parties involved: US trade negotiators, EU governments and trade negotiators in the Commission, and pro- as well as anti-GI producers and lobbyists worldwide. The question is especially timely in light of ongoing negotiations between the EU and Australia, and potential future FTAs between the US and the EU or the UK.

Despite the importance of this issue, there is no research that we know of on whether protecting GIs through FTAs actually increases exports. This paper aims to fill that gap. We focus on the cheese sector, which covers a high share of EU GIs (about 16% by number), and for which the classification of trade data is fairly detailed. In 2007, cheese GIs accounted for over one third of EU GI turnover (DG AGRI 2012, p.4), this remains true in 2017 (AND-International 2019). At 44%, the price premium for GI cheeses is fourth among 6 categories analyzed in a meta-study by Deselnicu et al. (2013, p.212-213). Cheeses are among the most controversial GIs in trade, because cheese GIs such as *Feta*, *Asiago,* or *Fontina* are typically considered generic types of cheeses outside of the EU (Hough 2016).

In terms of methods, we use a gravity model framework. In particular, we adopt a pseudo-Poisson maximum likelihood (PPML) approach for panel data, with a battery of fixed effects and accounting for the issue of zero-trade flows. To address endogeneity concerns, instrumental variable regressions are included. We use data from EUROSTAT Comext at the CN 8-digit level on cheese exports from the EU 25 countries to the top 55 extra-EU trading partners, within the period 2004-2019. Data on GIs were taken from the EU DOOR database, which has since migrated to the eAmbrosia register. Within the HS4 code 0406 for cheese, GIs have been manually classified at the CN 8-digit level. This new data is combined with 11 FTA-specific lists of protected GIs (Huysmans 2020). The objective is to disentangle the export effect of being a listed GI on top of having a GI.

A large strand of literature on GIs started with theoretical investigations into their effect on quality in agricultural markets and on their domestic welfare implications in a context

characterized by asymmetric information (Deconinck, Huysmans and Swinnen 2015; Desquilbet and Monier-Dilhan 2015; Landi and Stefani 2015; Lence et al. 2007; Marette, Clemens and Babcock 2008; Marette and Crespi 2003; Menapace and Moschini 2012; Mérel and Sexton 2012; Moschini, Menapace and Pick 2008; Zago and Pick 2004). The overall conclusion of this literature is that GI labelling may act as a quality signal and hence a way to increase producer profits and consumer information.

In recent years, the literature has moved to studying export effects of GI labels (Curzi and Olper 2012; Duvaleix-Treguer et al. 2018; Raimondi et al. 2020; Sorgho and Larue 2014; Sorgho and Larue 2018). The main finding here is that having a GI indeed increases exports. Our research into the additional actual effect of legal protection through FTAs builds on this literature, which we review briefly below after highlighting our novel contribution.

We contribute to the literature on GIs in trade by testing empirically to what extent protection of GIs through FTAs has increased exports. We know from this literature that having a GI has a positive effect on exports, but the question we address here is whether legal protection through FTAs has any additional effect. To the best of our knowledge, this question has not been taken up in the literature before.

Apart from our novel research question, we also contribute to the literature on the trade effects on GIs by using more detailed trade data. Most recently, Raimondi et al. (2020) found that having GIs in an HS6 tariff line increases both trade and unit values. By moving to the more detailed CN8 level, it is possible to better identify the effects of having a GI endowment, before identifying for the first time any additional effect of FTA protection for GIs.

Among the first to study the trade effects of GIs were Sorgho and Larue (2014), who analyzed intra-European agri-food trade for the years 1999, 2004 and 2009. A limitation of this study is that given free movement of goods within the Single Market, intra-EU trade figures are estimates rather than true customs data. A second limitation is that their dependent variable

(agri-food trade) and main independent variable (total GIs across categories) are very aggregated, likely attenuating results. Finally, they do not include exporter-importer fixed effects. In terms of substance, Sorgho and Larue (2014) find that GIs lead to trade creation when both the exporting and importing countries have GIs. They attribute this to taste effects: importing countries with their own GIs prefer quality food items. As to extra-EU exports, they speculate that the protection of GIs by non-EU countries "should have a positive effect on EU exports" (Sorgho and Larue 2014, p.10). It is precisely this hypothesis that we seek to test.

Moving to a more disaggregated analysis, Sorgho and Larue (2018) consider cross-sectional intra-EU trade for 2019 at HS2 level. This includes for instance the category HS04 of dairy products. Given the cross-sectional approach, the validity of the estimated effects can be questioned. However, they do show that effects differ across HS2 categories, which is a limitation of our approach focusing on the specific HS4 category of cheese, HS0406.

Focusing on 220 French firms exporting cheese in 2012, Duvaleix-treguer et al. (2018) find that cheeses with PDOs have higher unit values, i.e. prices per kilo, and higher extensive margins, i.e. more export destinations. Comparing EU to non-EU destinations, they find larger estimates for EU destinations. In the conclusion of their paper, they suggest to evaluate the impact of GI protection in FTAs. We take up this suggestion.

We also contribute to the literature on the "war on terroir" between the EU and the US (Huysmans 2020; Josling 2006). A key worry in the US is that through FTA protection, EU GIs will displace similar US products. Our results show that these worries may be overblown.

An anticipatory study looking at cheeses specifically was commissioned by the Consortium for Common Food Names (CCFN), a US-based anti-GI lobby group. Through models and case studies, it predicts a 13% increase in EU GI cheese exports to the US, should the US start protecting all EU GI cheeses (Informa Economics IEG 2016, p.1). This study has two main limitations. First, it assumes the US would also have to stop using partial GI names

that are not even protected within the EU, such as "Gouda" in "Gouda Holland". Second, it relies heavily on *Feta* and *Parmesan*, two highly contested products even within the EU. For one thing, the protection of "Parmesan" as the translation of "Parmigiano Reggiano" is exceptional.

We find that, on average, there is no significant positive trade effect on FTA-protected GIs when controlling for the exporting countries' GI endowments and the general trade-promoting effects of FTAs. In other words, the higher protection for a selected list of GI products does not provide any further trade effect with respect to the effects that are already provided by the GI certification and the FTA per se. More detailed analyses provide some nuance to this policy-relevant null finding: there does seem to be a significant export boost for GIs with high market shares prior to the FTA, and for FTAs with *ex officio*, i.e. administrative, GI protection.

THE PROTECTION OF GIS

PROTECTION OF GIS WITHIN THE EU

Food GIs are protected in the EU by regulation 1151/2012. It requires producers to set up a producer group, write a product specification, and undergo a national and EU-wide application process. Once a GI is granted, Article 13(b) of the regulation protects EU-wide against "any misuse, imitation or evocation, even if the true origin of the products or services is indicated or if the protected name is translated or accompanied by an expression such as 'style', 'type', 'method'."

The efficiency argument for GIs is that in the absence of credible certification, markets for high quality products may disappear (Akerlof 1970; Bonroy and Constantatos 2015). If private brands are costly for small producers, a government system with a collective GI may hence be an efficient way to provide quality (Lence et al. 2007; Moschini et al. 2008). In addition to arguments of economic efficiency, the EU also justifies its GI policy as protecting

rural livelihoods and preserving traditional culture (Broude 2005; DeSoucey 2010; European Council 2001; European Union 2012).

Violations of GI-labelling show that the labels are valuable: in 2014, GI-infringing products amounted to 4.3B€ in the EU, corresponding to about 9% of the EU GI market including wines and spirits (EUIPO 2016, p.7). Historically, GIs have been created to avoid or stop declines in reputation due to the entry of lower-quality producers using names like Burgundy, Port, and Chianti (Meloni and Swinnen 2018; Winfree and McCluskey 2005). Increasingly, developing countries are also registering GIs in the EU and setting up their own systems (Marie-Vivien and Biénabe 2017).

Even within the EU the protection of some GIs has been contested, especially for product names that some member states considered generic., i.e. describing a category or type of product rather than a specific product. Before *Feta* became a Greek PDO in 1996, cheese called *Feta* was also produced in countries like Germany, Denmark and France (Evans and Blakeney 2006, p.591-593). With *Feta* a protected GI across the single market, these producers had to start marketing their product under alternative names, such as white salad cheese. In 1999, the PDO was annulled after a successful case brought to the European Court of Justice (ECJ). However, in 2002 the Commission reinstated the PDO, and an appeal of Germany and Denmark at the ECJ failed.

With respect to imports from outside the EU, GIs can be seen as a product standard and hence a non-tariff barrier to imports (Beghin, Maertens and Swinnen 2015; Chambolle and Giraud-Héraud 2005; Swinnen and Vandemoortele 2011). A well-known case relates to *Parmesan* cheese. Kraft had to change the name of one of its products to *Pamesello* in order to be allowed to continue selling it in the EU (Babcock and Clemens 2004).

As the next section explains, after a bilateral agreement in which an EU trading partner protects a GI name, the renaming of non-GI products will also have to take place in that market.

PROTECTION OF GIS IN TRADE AGREEMENTS

According to the EU, "it is not rare that certain EU GI products suffer from […] abuse of reputation in third markets" (DG AGRI 2012, p.5). On top of the potential economic consequences, "GIs carry a strong political weight in international negotiations, in particular for certain Member States who see it as a crucial offensive interest" (DG AGRI 2012, p.4). All of this implies that "today, it would not be conceivable to negotiate a Free Trade Agreement (FTA) without an appropriate chapter on GIs" (DG AGRI 2012, p.4). However, whether protection in FTAs actually leads to more GI exports is still an open empirical question.

Through recent trade agreements, the EU has upgraded the protection of selected GIs from TRIPS Article 22 to Article 23. Under Article 22, "*Geographical indications are […] indications which identify a good as originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin*". Moreover, Article 22 prevents the misuse of information related to the origin of the product, which may lead to unfair competition and mislead the choice of the consumers (Marette et al. 2008). Under Article 23, which applies to wines and spirits, "*The use of a GI is not permitted [even] when the true origin of the good is indicated or when the GI is used in translation or is accompanied by expressions such as "kind", "style" or "type*"" (WTO 1994). This protection is much stronger than Article 22, under which food GI producers have to prove consumers are being misled (Addor and Grazioli 2005).

The EU's recent bilateral success follows unsuccessful attempts at extending the protection of Article 23 to food at the WTO (Evans and Blakeney 2006; Goldberg 2001; Huysmans 2020). Just like protection of GIs within the EU functions as a non-tariff barrier to imports, one can consider the external protection of GIs as a non-tariff export promotion

measure. The presumed goal is for EU exports of GI products to increase, as they displace competing products that can no longer use the GI name (Informa Economics 2016).

Especially the US is against further GI protection (Hughes 2006; Josling 2006; Marette et al. 2008; Matthews 2016; Montén 2006; O'Connor and Bosio 2017; Raustiala and Munzer 2007; Vittori 2010). In the *Financial Times*, Beattie (2019) speaks of "an unbridgeable philosophical gulf" between the US and the EU. US producers and the Department of Commerce argue the EU is trying to protect its producers unfairly: if the products really are superior, they should simply get a private brand or trademark. In response, the EU argues that such private branding is too expensive for traditional small producers.[1] This is why the EU created a separate form of intellectual property or a so-called *sui generis* scheme for GIs.

While the EU regulation on GIs is quite stringent, as it envisages supply control to support farmers' income and the development of rural areas, GIs in the US are protected under the trademark system. Both the EU GI's regulation and the trademark system are instruments that allow supporting products' reputation. However, trademarks are essentially private goods, while GIs can be considered public goods, since different firms producing similar products in a given area have access to it (Menapace and Moschini 2012). Overall, differences in the EU and US protecting systems reflect their different attitudes to the concept of GIs. While according to the EU, GIs are linked to product quality and a means to support the development of the underlying rural areas (preambles to EU regulation 1151/2012), the relationship between GIs and quality is more blurred in the US (Marette et al. 2008). This is because under a standard trademark system it is only certified that products meet given conditions, such as in the case of GIs the production in a given area (Menapace and Moschini 2012).

These different attitudes between the EU and US over the protection of GIs have been the subject of different disputes within the WTO. First, the US alleged discrimination by the EU toward non-EU GIs products. As a result, the EU opened up its system to the registration of

non-EU GIs. Second, the US has complained about the lack of adequate protection for existing US trademarks conflicting with EU GIs (Marette et al. 2008). In trade negotiations, this issue is known as co-existence; whereas many countries apply the "first in time, first in right" principle, the EU wants GIs to either supersede or co-exist with potential prior trademarks for the GI name in the partner country. This issue is particularly relevant in the case of the US cheese industry.

Five countries have over 70% of EU GIs: France, Greece, Italy, Portugal, Spain (Huysmans and Swinnen 2019). Naturally, these countries are the ones pushing most for external protection of EU GIs, and who might block new FTAs if not enough GIs are protected. In addition to economic motives, identity politics and so-called gastronationalism also seem to play a role (DeSoucey 2010). The latter can be inferred from the inclusion in FTAs of relatively unknown and low-sales GIs from those five Mediterranean countries (Huysmans 2020).

The hypothesized effects of GI protection in FTAs

On its website, the EU Commision Directorate General for Trade writes the following about GI exports: "*geographical names with commercial value are exposed to misuse and counterfeiting. The abuse of geographical indications limits access to certain markets and undermines consumer loyalty. Fraudulent use of geographical indications hurts both producers and consumers*". The stated objective of GI trade policy is hence to protect foreign consumers from misinformation and EU producers from unfair competition. To the extent that such unfair competition exists and protection would be effective, the indirect objective is hence to increase EU GI exports. Our first hypothesis then, is that GI protection increases exports.

H1. The protection of EU GIs in third countries leads to increased exports.

Given that GIs may indicate product quality, and that in addition their existence may have a causal effect per se on exports, it is important to control for countries' GI endowments when testing this first hypothesis. Furthermore, tariff and non-tariff barrier decreases in FTAs will

lead to increased exports for all products.[2] As explained in the empirical section, fixed effects will be used to control for this and other potential identification issues. What we are interested in is the effect of GI protection per se, not of simply having a GI or of tariff reductions.

Our second hypothesis is related to imitations and perceived GI quality. The more GI imitations are sold on a given market, the bigger the effect one anticipates from legal GI protection through an FTA. After protection and barring infringements, sales of imitations are either displaced by EU GI exports, or by differently named substitutes, e.g. white salad cheese for *Feta*. There is no systematic data on GI imitations outside of the EU. However, given that imitations make most sense when the original product has a good reputation on a given market, inferred measures of quality may be a good proxy of imitations. This is in line with defining quality as the factor that explains high sales in spite of high prices, implying that it can be measured by market share suitably controlled for prices (Amiti and Khandelwal 2013). All of this implies that GIs of higher perceived quality – i.e. with already high market shares – will benefit more from protection.

H2. GIs of higher perceived quality benefit more from FTA protection.

Our third hypothesis relates to the strength of protection, which varies across FTAs. The stronger the protection, the less likely infringements are and hence the bigger the hypothesized effect on GI exports. A key provision is *ex officio* protection, where the administration has to actively monitor the market for breaches (Engelhardt 2015).[3] Our third hypothesis, then, is that FTAs with ex officio protection will have larger export effects on the listed GIs.

H3. GIs benefit more from ex officio FTA protection.

A limitation of our study is that some GIs have on an individual and country-by-country basis registered or trademarked their GIs in third countries. An example is the name *Roquefort*, which the Roquefort producer group registered as a GI with the Brazilian Patent and Trademark Office in 2013. On the one hand, this forms an empirical limitation on our study, because it is

not feasible to collect exhaustive data on this phenomenon. On the other hand, the whole objective of EU trade policy on GIs is to protect many GIs at once, sparing individual GI producer organizations the considerable costs and efforts of seeking protection in a third country.[4] Our research is hence still appropriate to investigate what the actual export returns have been from the EU strategy of GI protection through FTAs.

DATA

Our analysis considers extra-EU exports of cheese, and covers the period 2004-2019. In order to have a balanced panel and long time horizon, we exclude as exporters the three countries that joined the EU after 2004: Romania and Bulgaria (2007) and Croatia (2013).[5] On the importing side, we cover the EU's top 55 trading partners.[6] Our focus on cheese is motivated by the fact that this category of products comprises a large share of EU GIs. Several countries, and in particular France, Italy, Greece, Portugal, and Spain, consider some of their domestically produced cheeses important national heritages (DeSoucey 2010; Huysmans 2020). Some of these products are also exported worldwide, and thus represent an important source of income. However, as a result of their notoriety and reputation, EU GIs cheeses are among the most counterfeit agri-food products worldwide.

If we take for instance cheeses like *Parmigiano Reggiano*, *Feta* or *Roquefort*, it is not unusual to find similar products produced in extra-EU countries using similar names. This is because, thanks to their widespread consumption, these cheeses are often associated to a wider product category rather than to a specific (GI) product. The presence of several imitations has therefore triggered a high interest of EU countries to protect their GI cheeses, in particular within bilateral FTA agreements. As the objective of this paper is to study to what extent the protection of GIs in the EU FTAs affects the exports of listed products, the cheese sector represents the perfect setting for our analysis.

CLASSIFYING GIS IN TRADE CODES

A key novelty of our study is the classification of the EU GI cheeses in the most detailed trade data classification (i.e. CN 8-digit for the EU).[7] Previous studies in the literature dealing with a similar topic have used different strategies to address this issue. Agostino and Trivieri (2014), who work on EU wine exports, used the official product COMEXT CN 8-digit classification, as for wines it is specified whether products are GI or not. Duvaleix-treguer et al. (2018) for French cheese, working with firm level data, took this information directly from the list of producers. Finally, Raimondi et al. (2020) built an original classification, by associating manually all the EU GIs with the corresponding HS 6-digit product category.

In this paper we follow the strategy of Raimondi et al. (2020), refining their classification for cheeses into a higher level of detail. We classify all 235 EU cheese GIs registered by 2018 at the CN 8-digit level. Working at this level of detail is important because it allows a more precise identification of the products, which is essential in our analysis as we deal with very specific products (i.e. those that are included in FTA provisions). Following Raimondi et al. (2020), we first collected data on all the cheeses associated with a GI label for all the EU countries from DOOR database. In a second step we then manually associated each of the 235 GI cheeses to the corresponding CN-8 digit category (e.g. Brocciu Corse 04061050, Dorset Blue Cheese 04064090, Feta 04069032, Parmigiano Reggiano 04069061, Saint-Nectaire 04069079). Table A.1 in online supplementary appendix A gives an overview of the 30 CN8 codes involved.

Data on GIs are used in our empirical analysis with a double objective: first, we consider the total number of GIs in each CN 8-digit category listed for protection in a bilateral FTA. This represents our core variable, which captures whether being listed in a bilateral FTA provision may affect exports. Second, we consider the total number of GIs registered by EU

member states in each product category. We refer to this variable as the GI endowment, which suggests to what extent cheese GIs are important for the different EU member states.

INDEPENDENT VARIABLE: GIS LISTED IN FTAS

Table 1 gives an overview of FTAs with GI provisions.[8] For each FTA, it lists the type, the year negotiations were completed, the year the FTA came into provisional effect, and the number of EU food GIs protected by the FTA. Not listed in the table, but accounted for in the empirical analysis is the 2011 agreement whereby Switzerland protects all EU GIs.

The data come from Huysmans (2020), who also reports descriptive illustrations such as the listed Italian cheese GIs per agreement. For instance, in CETA with Canada 11 Italian cheese GIs were protected: Asiago, Fontina, Gorgonzola, Grana Padano, Mozzarella di Bufala Campana, Parmigiano Reggiano, Pecorino Romano, Pecorino Sardo, Pecorino Toscano, Provolone Valpadana, and Taleggio. Take the example of Asiago: this GI was classified in CN8 code 04069075; the other 3 Italian GIs in this code (Caciocavallo Silano, Montasio, and Ragusano) were not listed in CETA. In the empirical analysis, GIs are counted as listed as of the year the relevant FTA becomes provisional – for instance, 2017 for CETA.

While the strength of protection is clearly important, no comprehensive indicators have been proposed in the literature. As per H3, we will consider separately FTAs that have mandatory ex officio protection in a more detailed analysis.[9]

DEPENDENT VARIABLE: TRADE DATA

We gathered data on bilateral exports of cheese for the EU-25 countries at the CN 8-digit (HS4 chapter 0406) level from Eurostat COMEXT for the period 2004-2019. The main dependent variable for our analyses is bilateral export value in euros at the 8-digit level. For instance, exports in code 04069075 from Italy to Canada rose from about 0.3M€ in 2016 to about 0.4M€ in 2019. The question at hand is what part of this rise, if any, can be attributed to

the legal protection of Asiago in CETA. To do so, fixed effects will have to control for general or FTA-related increases in trade not due to the legal protection of GIs specifically.

In addition to export value, we also consider as dependent variables extensive and intensive trade margins. However, we do not rely on widely diffused trade margins measures such as the simple count of exported products or some export concentration index (Cadot, Carrère and Strauss-Kahn 2011; Persson and Wilhelmsson 2016). This is because such measures, although very clear, have the drawback that they consider that all exported products have the same economic weight. To overcome this limitation, we follow Feenstra and Kee (2008), who developed a theoretically-founded procedure to decompose bilateral trade values into their respective extensive and intensive margins considering the economic weight of the exported products. This procedure is close to the count of the number of the exported varieties, but it considers the weight that exported products have with respect to the overall imports in a given country. A detailed description of the Feenstra and Kee (2008) methodology used to measure extensive and intensive trade margins, as well as the main results obtained when considering these dependent variables, are reported in online supplementary appendix B.

EMPIRICAL STRATEGY

The objective of this paper is to empirically analyse the export performance of GI cheeses that are included in EU bilateral FTA provisions, which thus receive higher protection. We rely on a structural gravity-type model, which is one of the most widely used methodologies to properly test the relationship between bilateral trade flows, trade costs and importing and exporting countries characteristics. Specifically, our analysis relies on the estimation of the following structural gravity equations:

$$(1)\ X_{ijct} = \beta_0 + \beta_1 ListedGI_{ijct} + \beta_2 GIendowment_{ict} + \beta_3\ Log\ (1 + Tariff_{ict}) + \gamma_{ijt} + \gamma_{ct} + \varepsilon_{ijct}$$

where X_{ijct} is our dependent variable (i.e. export value), *i* refers to an EU-25 exporting country, *j* to an (extra-EU) importing country, *c* to a CN8 product category and *t* to a given year.[10]

$ListedGI_{ijct}$ accounts for the number of GI cheeses that are included in bilateral FTA provisions between an EU country *i* and the importing country *j*, for a product category *c* at time *t*. For instance, for $i = Italy, j = Canada, c = 04069075, t = 2017$: $ListedGI_{ijct} = 1$ since 1 Italian GI (Asiago) in this CN8 code was listed in CETA, which came into provisional effect in 2017. The $GIendowment_{ict}$ variable refers to the number of GIs registered in the EU country *i*, in the product category *c* at time *t,* and allows controlling for the regular GI endowment in the EU exporting countries. For instance, Italy has 4 GIs in CN8 code 04069075: *Asiago*, *Caciocavallo Silano*, *Montasia*, and *Ragusano*. All 4 have been registered before 2004, so the GI endowment for Italy in this CN8 code is a constant 4 for the period under study. Equation (1) also controls for bilateral tariffs, imposed by country *j* to country *i*, for exports on product *c* (HS 6-digit) at time *t*.

Our analysis exploits the bilateral trade time invariant variability through country pair-time (exporter-importer-time) fixed effects γ_{ijt}. Economically, these fixed effects control for instance for increases in exports from *i* to *j* thanks to lower tariff and non-tariff barriers if there is a trade agreement at time *t*. In our empirical strategy, we also account product-time (γ_{ct}) fixed effects. It is worth noting that our empirical strategy follows the structural gravity literature, by accounting for multilateral trade resistance (Anderson and Van Wincoop 2003). This is because our bilateral-time fixed effects (γ_{ijt}) nest the usual exporter-time (γ_{it}) and importer time (γ_{jt}) fixed effects. Economically, the product-time fixed effects control for instance for changes in production or consumption patterns not related to the protection of a specific GI in a specific country. Finally, ε_{ijct} is the error term.

When estimating equation (1), our main coefficient of interest is β_1. It is worth highlighting that the inclusion of country-pair-time fixed effects (γ_{ijt}) allows our structural gravity equation to identify β_1 exploiting the bilateral variation in the number of GI cheeses that are included in FTA provisions over the considered period. Specifically, the effect revealed by the estimation of β_1 should be interpreted taking as a reference those products that are not included in FTA provisions (either GI or not-GI). The contemporary inclusion of the Listed GIs and GI endowment variable allows β_1 to account for additional effect of FTA provisions on GI exports that goes beyond the potential effect exerted by the regular GI endowment, which has been for instance recently estimated in Raimondi et al. (2020). [11]

Our preferred method to estimate equations (1) is the Poisson Pseudo Maximum Likelihood (PPML) estimator. As our empirical analysis considers zero trade flows, the PPML estimator is particularly suitable. This is because, first, it allows avoiding the well-known incidental parameter issue occurring in a panel fixed effects model when running for instance a probit model in the first stage of a Heckman selection model in the presence of many zeros.[12] Second, as highlighted by Santos Silva and Tenreyro (2006; 2011), PPML proved to be a consistent estimator in the presence of heteroscedasticity and measurement errors.

It is worth mentioning that, although the PPML estimator has been largely used in the literature dealing with gravity models, some recent contributions have questioned whether PPML can be really considered the best estimator in this framework (Camarero, Montolio and Tamarit 2020). Among various contributions, Gómez-Herrera (2013) compared the most widely used estimators of gravity models, and came to the conclusion that, when dealing with a large share of zero observations and in presence of heteroskedasticity, the Heckman sample selection model is the best option. Burger, van Oort and Linders (2009) provide evidence that in presence of overdispersion, the best estimator is the Binomial Pseudo Maximum Likelihood, as the PPML would lead to inconsistent estimations. Moreover, the authors suggest that when

the incidence of zero observation in the sample is particularly relevant, the most suitable estimators are the Zero-Inflated Negative Binomial and Zero-Inflated Poisson model. Despite this evidence, Santos Silva and Tenreyro (2011) provided further support to the use of PPML in gravity model, demonstrating that this estimator is consistent even when considering overdispersion and with high incidence of zero trade observation. More recently, Head and Mayer (2014), provided further evidence that the use of the PPML leads to consistent results in presence of overdispersion, and discouraged researchers from using negative binomial estimators in this case. Supported by the evidence presented in these last works, we consider in our analysis the PPML as the most suitable estimators. [13]

In our empirical analysis we instead control for potential problems of overcorrection, which may derive from the use of a large number of dummy variables to account for the multilateral resistance effects (Clark et al. 2004; Liu 2009; Agostino and Trivieri 2014). To address this issue, we use the *Bonus Vetus* OLS (BVOLS), as suggested by Baier and Bergstrand (2009). Further details on this methodology are reported in online supplementary appendix C.

HETEROGENEITY IN THE TRADE EFFECT ACROSS GIS OF DIFFERENT PERCEIVED QUALITY

After estimating the average trade effect of GIs listed in FTA provisions, we test whether our result masks some heterogeneity. Specifically, in a first step, we make more explicit our control for product quality, by investigating whether quality exerts any effect in determining the export performance of GIs listed in FTAs. We do that, by estimating product quality with the Khandelwal, Schott and Wei (2013) methodology, which takes into account prices as well as quantities. This approach allows inferring quality at the product level using trade data, as a residual from the estimation of a demand function, and it is based on the simple presumption that "*conditional on price, a variety with a higher quantity is assigned higher quality*"

(Khandelwal, Schott and Wei 2013, p. 2187). More details are reported in online supplementary appendix D.

Product quality is widely acknowledged to be a fundamental determinant of countries' exports, as it is often considered a pre-condition for export success (Amiti and Khandelwal 2013; Curzi and Pacca 2015).[14] The role of quality is particularly important in the food sector, where different food scares have triggered an increase attention of consumers toward food attributes, and the way food is produced (Caswell and Mojduszka 2006; Grunert 2005; Curzi, Raimondi and Olper 2015). Therefore, food quality has become a fundamental condition to satisfy consumer demand (Grunert 2005). Moreover, when considering GIs, as shown by McCluskey and Loureiro (2003), in order to receive any GI premium, quality is an essential attribute. This is because the consumer "*must perceive high eating quality in order for the food product to command a premium. This was particularly important for socially responsible and origin-based products*'' (McCluskey and Loureiro 2003, p.101). Therefore, the success of GIs in any importing country strictly depends on their perceived quality.

To test whether product quality affects the export performance of GI products listed in FTA provisions, we estimate the following gravity equation using OLS:[15]

$$(2)\quad x_{ijct} = \beta_0 + \beta_1 ListedGI_{ijct} + \beta_2 ListedGI_{ijct} * Q_{ijct} + \beta_3 GIendowment_{ict} +$$

$$+ \beta_4 Q_{ijct} + \beta_5 Log\,(1 + Tariff_{ict}) + \gamma_{ijt} + \gamma_{ct} + \varepsilon_{ijct}$$

where x_{ijct} is the export value of country *i* to country *j*, for a product *c* at time *t*. Quality Q_{ijct} enters in equation (2) both directly and interacted with our main variable of interest ($ListedGI_{ijct}$). The coefficient β_2 in equation (2) will suggest to what extent product quality represents a determinant of exports for GI products listed in bilateral FTAs. However, the relationship between quality and our dependent variable may clearly suffer from a simultaneous bias, which would make our results unreliable. To address this endogeneity

concern, we adopt an Instrumental Variable approach, which will be described in the next section.

In a second step, we test whether the effect is heterogeneous considering the market share that GIs listed in FTA provisions have in the destination markets. The idea is to empirically assess whether the most successful GIs products can further increase their exports in the destination markets when listed in bilateral FTA provisions. To do that, we follow Chen and Novy (2018) and Fiankor, Haase and Brümmer (2020), by including the interaction between our $ListedGI_{ijct}$ variable and predicted market shares per good into equation (1) as follows: [16]

$$(3)\ MS_{ijct} = \beta_0 + \beta_1 ListedGI_{ijct} + \beta_2 ListedGI_{ijct} * \widehat{MS}_{ijct} + \beta_3 GIendowment_{ict} +$$

$$+ \beta_4\, Log\,(1 + Tariff_{ict}) + \gamma_{ijt} + \gamma_{ct} + \varepsilon_{ijct}$$

For a more extensive description of the methodology used to generate predicted market share, see online supplementary appendix E. Following Chen and Novy (2018), we divide bilateral products predicted market shares ($\widehat{MS}_{ijct}$) in equally-sized intervals (two and three intervals), and we interact them with our Listed GIs variable. We do that to analyse how the GI trade effect varies with the increase in market share. Economically, this specification allows to test H2, which holds that GIs of higher perceived quality (higher market share) benefit more from FTA protection. Note that we estimate equation (3) both including market share in logarithmic form, and in level to consider the zero trade issue. While in the former case we use OLS, in the latter we rely on a PPML estimator. Due to space constraints, we focus on the results obtained using PPML. Results obtained using OLS are reported in Table F.6 in online supplementary appendix F.

DEALING WITH ENDOGENEITY CONCERNS

A final note on equation (1) is devoted to the existence of potential endogeneity concerns in the relationship between our Listed GI variable and the different trade variables denoted in

equation (1) with X_{ijct}. When estimating equation (1), the interpretation of our main results as causal may be questioned due to the potential occurrence of the following concerns: omitted variable, selection and reverse causality biases. However, potential omitted variable and selection biases, as widely acknowledged in the literature (Baier and Bergstrand 2007), are remarkably reduced by the presence of a high number of fixed effects in our specification (1). Reverse causality may arise, as suggested by Raimondi et al. (2020), if the request of a GI certification is advanced by a country for a particular product in relation to previous level of trade flows and/or reputation gained by that product in a destination market. This surely holds for GI certifications within the EU market. However, this problem is even more severe for our Listed GI variable if we consider the extra-EU markets. This is because EU Member States can lobby to have their GI products included in FTAs in light of the market share they have on the extra-EU markets (Huysmans 2020).

To address the above potential endogeneity concerns in the estimation of equation (1), we propose an Instrumental Variable (IV) approach.[17] In our identification strategy we use as instrument for $ListedGI_{ijct}$ a dummy variable that takes the value of one if the following conditions are both satisfied, and zero otherwise. First, the exporting country *i* has product *c* at time *t* listed in a bilateral FTA with a country different from *j*, also excluding countries that are in the same FTA with the EU as *j*. Second, the exporting country *i* has an FTA with country *j* and has any other product different from *c* at time *t* included in the FTA. A similar approach has been employed by Fontagné and Orefice (2018) and Curzi et al. (2020) dealing with Specific Trade Concerns raised on Sanitary and Phytosanitary (SPS) and Technical Barrier to Trade (TBT) measures.

The rationale behind the use of this instrument is the following: the probability for an exporting country *i* involved in a FTA with a country *j* of having a GI product *c* included in a list of highly protected products at time *t* is positively associated to two conditions. First, the

probability that the GI product *c* is included in provisions within any other FTAs. Second, the presence of other products different from *c* in the same FTA. The contemporaneous occurrence of these two conditions should be presumably exogenous to the inclusion of a GI product in a bilateral FTA. For a given product, the same product being listed in other agreements, or other products being listed in the same agreement, can have no direct effect on sales of that given product. This instrument has been used in the estimation of equation (1), and also as interaction term in equations (2) and (3).

Endogeneity concerns may also arise when considering our quality variable in equation (2). In this case, the existence of a simultaneity bias is quite evident. To address this concern, similarly to the GI endowment variable, we instrument this variable considering average product quality in adjacent industries, and so considering exports of country *i* at time *t* in any other product category different from *c*. This variable can be considered a plausible instrument as quality in different product category is likely to be highly correlated with the one of the endogeneous regressors, but it does not have a direct impact on the exports in the considered product.[18]

Similar approaches to the one we propose to instrument product quality have been earlier put forward by Chen and Mattoo (2008) and Fontagné et al. (2015), who both consider the trade and standards relationship, in addition to Raimondi et al. (2020) who instead analyse the case of GIs. These authors suggest that the credibility of this kind of IV approach is based on the consideration that products within an industry share similar characteristics. From this perspective, the instrument is positively correlated with the endogenous regressor. Moreover, the endogenous regressor is instrumented considering values of different product categories, which are thus unlikely to have a direct effect on the dependent variable. It is worth mentioning that while the above authors have built their instrument using products belonging to quite broad industry categories (i.e. HS 2-digit sector), our analysis takes into account products in a narrower defined product category (i.e. HS 4-digit industry). If you take for instance the whole

2-digit HS 04 chapter, it is possible to find within this category any kind of dairy produce (e.g. milk, butter, cheese) but also other products such as bird's eggs, honey, and other edible products of animal origin, not elsewhere specified or included. If we instead consider 8-digit products within the HS 4-digit category 0406, we can only distinguish between different types of cheeses. We believe that this reinforces the credibility of our IV approach, as the finer is level of disaggregation the higher is the correlation between products (and so between the endogenous variable and the instrument). However, despite this correlation, products belonging to different categories are unlikely to have a direct effect on the dependent variable, thus reassuring about the validity of our strategy. [19]

RESULTS AND DISCUSSION

This section presents the main results for our hypotheses. As a reminder, the objective of our analysis is not to assess whether FTAs work, or whether GIs per se lead to more sales. We know from the literature that partner countries lowering tariffs and non-trade barriers leads to more exports. We also know that GI products are likely to be sold more easily and at higher prices, i.e. they are of higher perceived quality. Moreover, we are not interested in assessing whether FTAs including GI provisions works better than other FTAs. Such analyses should be framed in a different setting. The contribution of this paper is to assess whether the legal protection of GIs in FTAs leads to any additional exports above and beyond the factors mentioned previously.

MAIN RESULTS

Table 2 presents our main results of estimating the trade effect for GI cheeses included in FTA provisions using the PPML estimator.[20] Our main results are presented in column 1, and suggest that GI cheeses included in bilateral FTA provisions do not experience a significant trade effect. In contrast, the GI endowment variable results to be positively and significantly associated with exports to extra-EU countries, a result in line with Raimondi et al. (2020). [21]

These results thus suggest that H1 is not confirmed: FTA provisions protecting a list of EU GI cheeses in the signatory destination countries do not have a significant effect in promoting the export performance of these products. Countries' regular GI endowments, more than the protection of GIs within bilateral FTAs matters in determining the performance of EU cheese exports.

The results in column 2 and 3 are robustness checks for the estimation of equation (1). Specifically, these additional estimations have the objective to address potential concerns of collinearity between the Listed GIs and GI endowment variables. These concerns may arise because these two variables could have the same value when all the GI cheeses in a country-product line are listed in bilateral FTA provisions. To address this concern, we first replaced our GI endowment variable with a dummy variable assuming the value of 1 if an EU country has one or more GI cheeses in a product line, and zero otherwise. In this way, the results concerning our Listed GI variable should be read as additional effect on top of a regular GI endowment. Second, to avoid collinearity, we dropped all the observations where the Listed GIs and GI endowment variables assume the same values. The results in columns 2 and 3 suggest that our main findings are not significantly affected by this robustness check. Note moreover that, bilateral tariffs, as expected, show a negative (although non-significant) effect on countries' exports; their non-significance is likely related to the inclusion of our battery of fixed effects, mainly importer-time.

As previously mentioned, the inclusion of a large number of dummy variables may lead our estimations to suffer from problems of overcorrection. To address this issue, we also ran our main specification using the *Bonus Vetus* OLS (BVOLS). A similar approach has been proposed, among various authors, by Agostino and Trivieri (2014) when estimating the trade effect of GIs on EU wine exports. The results, presented in Table C.1 of online supplementary appendix C are in line with those presented in Table 2.

Moreover, in our analysis we further test potential heterogeneity of the results by first distinguishing between potential different effects of Listed PDO vs Listed PGI variables, and, second, considering exports of the main GI producers.[22] The results of these estimations are presented in Table F.2 of online supplementary appendix F. None of these tests however provide further insights on potential heterogeneity in our results, as neither the distinction between Listed PDO vs Listed PGI products, nor the restricted sample of main GI exporters present statistically significant results. These additional tests instead seem to reinforce our main result, and thus suggesting that GIs listed in bilateral FTA provisions do not significantly affect exports.

As explained in the methodological section, equation (1) may suffer from some endogeneity biases. To address these potential problems, especially reverse causality bias, we instrumented our Listed GI variable by relying on a GMM IV Poisson model.[23] The results obtained with the IV approach are reported in column 4. Overall, the main results still hold. The IV estimator provides higher coefficients for our Listed GI variable, thus suggesting the existence of a downward bias.[24]

The results concerning extensive and intensive trade margins, as well as products' unit values are reported in Table B.1 in online supplementary appendix. Overall, the results suggest that protection of GIs in FTAs has an additional effect on trade margins with respect to regular GI endowment only when considering the intensive margin. The results on the extensive trade margin are consistent with those presented in Table 2, and thus suggest that GI Endowment more than the higher protection guaranteed by the FTA provisions is an important determinant of EU GI cheese exports. When considering export unit values the results suggest that protecting GIs through FTAs does not have a significant price effect. For more details, see online supplementary appendix B.

Taken together, these results provide evidence that seem to contradict the strong EU expectations of an export promoting effect of higher legal protection of GIs in bilateral FTAs. A potential explanation for this overall (null) result may stem from the fact that the ad valorem tariff reductions resulting from the enforcement of the FTAs, make more expensive EU food products relatively cheaper in the destination countries than before, in line with the findings of Hummels and Skiba (2004). As a consequence, consumers in FTA signatory EU partners increase their consumption of original EU GI products. So, tariff reduction represents per se a meaningful protection against the misuse of EU names of GI products such as Parmesan or Feta. Results on the intensive margin provide some nuance to the overall null effect: GIs that were already exported to the counterparty before the legal FTA protection do seem to benefit from being listed. A second potential explanation for the overall null effect is that many FTAs have entered into force only recently; significant effects may take time to materialize.

HETEROGENEOUS EFFECTS ACROSS GIS AND FTAS

In this section, we analyse H2 and H3 on whether the protection of GIs through FTA provisions may provide any heterogeneous export promoting effect. For the purpose of testing H2, as explained in the methodological section, we consider heterogeneity with respect to two different, although related, dimensions, namely product quality and market share in the destination markets.

Table 3 presents the results concerning product quality, obtained through the estimation of equation (2) with OLS. The results in column 1 show that, as expected, product quality is positively and significantly associated to country-product exports. This result is largely consistent with the existing literature on trade and quality, which has been briefly summarized in Section 5.1. Moving to the core of this analysis, in column 2 we show that the interaction between Listed GI and quality is associated to a positive and significant effect on country-product exports. This finding suggests that the positive effect exerted by FTA GI protection

leads to an export-promoting effect that is increasing in the quality of GI products. This finding reinforces the idea that product quality is an important determinant of the success of exported products, also when considering GI products: only GIs of high perceived quality benefit from being listed. This finding is in line with evidence from McCluskey and Loureiro (2003), who find that perceived quality is a key element for the success of GI products. As explained in the derivation of H2, a likely explanation is that they were more likely to be imitated to begin with.

The results presented in column 2 of Table 3 are confirmed when using our IV strategy by running equation (2) with a Two-Stage Least Squares (2SLS) approach.[25] As shown at the bottom of Table 3 in column 3, the F-test on the first stage presents a value well beyond the critical threshold, and thus we can reject the weak instrument hypothesis.[26] It is worth mentioning that the coefficient of the interaction term estimated with IV increases substantially in the magnitude, suggesting the existence of a downward bias.[27]

Overall, the results presented in Table 3 suggest that quality is an important driver for the success of listed GI products in FTAs. From this perspective, our findings suggest that the higher legal protection in general does not guarantee a higher export performance, but as per H2 it does seem to work for products of perceived higher quality.

Table 4 presents the results concerning the effects of GI listing on exports, considering potential heterogeneity with respect to country-product market share in the destination markets. For this purpose, following Chen and Novy (2018) and Fiankor et al. (2020), we estimated separate coefficients of our Listed GI variable by intervals of predicted market shares, as shown in equation (3). To prevent spurious results due to the arbitrary number of intervals, we do this for two and three intervals.

The results in column 1 of Table 4 are obtained by dividing the data in two intervals, based on the median value of the predicted market share distribution. In line with our main findings, when the Listed GI variable is interacted with the first interval of predicted market share, which

in our case corresponds to lower market share, the coefficient is not significant, negative but very close to zero. In contrast, when the Listed GI variable is interacted with the second interval of predicted market share (i.e. higher market share), the coefficients show a positive and significant effect.[28]

Column 2 of Table 4 present the results for three market share intervals, and again suggest that the protection of GIs in FTAs leads to a positive trade effect that is increasing in their market share in the destination markets. Note that when estimating the same model as in column (2) with our IV strategy, our main results still hold (see column 3). It is worth mentioning that when considering the first interval in the different specifications, the results are even negative. However, the latter result is not confirmed when using our IV approach. Overall, like the heterogeneous effects depending on quality, these market share results suggest that being listed in a shortlist of products to which a higher legal protection is guaranteed is not a sufficient condition for increased exports. The results in Table 4 suggest that there exists, however a positive and significant effect that is conditional on a high market share in the destination markets prior to protection.

H3 concerns heterogeneity across FTAs: it holds that *ex officio* protection leads to more GI exports. Table 5 presents the results. While the main analysis found no significant effect of legal FTA protection, a significant effect does appear when limiting the explanatory variable to *ex officio* protection.[29] This is consistent with H3 and more generally indicates that FTAs with stronger legal GI protection have a positive effect on GI exports. However, given that this variable is measured at the FTA level, other FTA characteristics could be confounding this result, and it should be interpreted with care.

CONCLUSION

This paper analyses whether higher protection of GIs in EU bilateral FTAs affects the export of GI products. The focus is on EU cheeses, which encompass a large number and value

share of EU GIs, and whose protection is strongly opposed by US producers. We manually classified GIs into CN 8-digit categories, and set our analysis looking at export flows from the EU-25 to the top 55 extra-EU partners, over the period 2004-2019. Our analysis relied on a structural gravity-like model, accounting for zero-trade flows issues through a PPML estimator. Our main results suggest that GI products listed in bilateral FTA provisions do not show any significant additional exports purely from the legal protection of being listed. Rather, countries' GI endowments, whether protected or not, are associated to higher export performance.

The overall null finding of GI protection in FTAs is nuanced by results taking heterogeneity across products and FTAs into account. First, there are significant positive export effects for products of perceived high quality in destination countries prior to the FTA. This is consistent with well-established original GI products displacing local or third-country imitations after those are forced to rename. Second, there are significant effects on listed GI exports for FTAs that stipulate mandatory ex officio protection, i.e. administrative checks rather than only legal recourse for GI producers to sue infringing parties.

Our results are surprising and relevant for producers, lobbyists and trade negotiators worldwide, and suggest that the EU may want to limit the products it seeks legal protection for, or focus instead on the promotion of GIs in markets where they are not yet known let alone imitated. Of course, the protection under administrative action of precisely those products that are already well-known and likely imitated will be the most difficult. As GI producers might say: imitation is the sincerest form of flattery, but imitators do not like being told to stop.

Taking our results to bear on the US-EU "war on terroir", EU-Australia, UK-US and UK-EU trade negotiations, it seems GIs, and especially well-known cheeses, will remain a controversial topic. The US and the UK may find it relatively costless and easy to concede protection for GIs that are currently not being imitated and hence cannot be considered generic.

But precisely those products where EU GI producers would benefit from protection, are of course also the products that would hurt US and third country producers. Still, our results may somewhat limit the fear of US producers of being completely displaced by EU GI cheeses.

Finally, our results should be interpreted with some caveats. First, our analysis provides insights into the short- to medium-run effect of GI protection in bilateral FTAs. To the extent that displacing imitations takes some time, or to the extent that the protection is proactive, i.e. for products not yet well established nor imitated in the counterparties, there may be more long-term effects of GI protection. We cannot exclude that in the long run the listing of GIs in FTAs will guarantee higher export performance across the board. Second, we only focus on the cheese sector. Although this is perhaps the most relevant sector in terms of GIs, our results may be not confirmed considering other sectors. Future research should look at longer time horizons and more sectors to investigate the issue further.

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Tables to be included in the main manuscript

TABLE 1: FTAS WITH GI PROVISIONS

Partner	Type	Negotiated	Provisional	Listed GIs
South Korea	FTA	2009	2011	60
Andean	FTA	2010	2013	34
Central America	AA	2010	2013	88
Ukraine	DCFTA	2012	2016	811
Georgia	DCFTA	2013	2014	805
Moldova	DCFTA	2013	2014	852
South Africa	EPA	2014	2016	110
Canada	CETA	2014	2017	143
Singapore	FTA	2014	2019	83
Vietnam	FTA	2015	2020	59
Japan	EPA	2017	2019	78

TABLE 2: EU GI CHEESES INCLUDED IN FTA PROVISIONS AND EXPORT PERFORMANCE

Dep. Variable: Export Value (ijct)	(1)	(2)	(3)	(4)
	PPML	PPML	PPML	IV-PPML
Listed GIs (ijct)	-0.074	0.004	-0.066	0.067
	(0.047)	(0.048)	(0.118)	(0.052)
GI endowment (ict)	0.330***		0.323***	0.302***
	(0.044)		(0.042)	(0.026)
Dummy GI endowment (iht)		2.543***		
		(0.139)		
Log (1+Tariff) (ijct)	-0.404	-0.079	-0.406	-0.450***
	(0.406)	(0.388)	(0.408)	(0.058)
Observations	241150	241150	238250	241150

Note: Table reports the results of estimating (1) using PPML estimator with importer-exporter-time and product-time fixed effects. Results in column 3 refer to the estimation of the same model than in 2, but excluding all cases where the number of Listed GIs is equals to GI endowment. The results presented in column 4 are obtained using our proposed IV approach through a GMM IV Poisson estimations, where the endogenous variable is Listed GI, which has been instrumented following the approach described in the empirical approach section. Standards errors, clustered at the exporting-importing-product level are reported in parentheses. *, **, *** indicate significance at 90%, 95% and 99% confidence levels, respectively.

TABLE 3: EU GI CHEESES INCLUDED IN FTA PROVISIONS AND PRODUCT QUALITY

Dep. Variable: (log) Export Value (ijct)	(1)	(2)	(3)
	OLS	OLS	2SLS
Listed GIs (ijct)	0.522***	0.108	0.088
	(0.131)	(0.130)	(0.261)
Quality (ijct)	1.182***	1.180***	1.179***
	(0.027)	(0.027)	(0.027)
*Listed GIs (ijct)*Quality (ijct)*		1.005***	1.337**
		(0.219)	(0.533)
GI endowment (ict)	0.125***	0.125***	0.125***
	(0.017)	(0.017)	(0.017)
Log (1+Tariff) (ijct)	-0.086	-0.076	-0.067
	(0.274)	(0.275)	(0.276)
F-test			13.166
Observations	26584	26584	26584

Note: Table reports the results of estimating (2) using OLS with importer-exporter-time and product-time fixed effects. The results presented in column 3 are obtained using our proposed IV approach through a 2SLS, where the endogenous variables are: Listed GI and the interaction between Listed GI and Quality. These variables are instrumented using the IV for the Listed GI variable and the interaction of this instrument with the IV for quality. For more details on the identification strategy see the empirical approach section. Kleibergen-Paap F-test is reported at the bottom of the table. Standards errors, clustered at the exporting-importing-product level are reported in parentheses. *, **, *** indicate significance at 90%, 95% and 99% confidence levels, respectively.

TABLE 4: HETEROGENEOUS EFFECTS WITH RESPECT TO PREDICTED MARKET SHARE

Dep. Variable: Market share *(ijct)*	(1)	(2)	(3)
	PPML	PPML	IV-PPML
*Listed GIs (ijct) * Predicted Share (1st Interval)*	-0.015	-0.038	0.055
	(0.041)	(0.045)	(0.057)
*Listed GIs (ijct) * Predicted Share (2nd Interval)*	0.114***	0.075**	0.233***
	(0.040)	(0.037)	(0.042)
*Listed GIs (ijct) * Predicted Share (3rd Interval)*		0.229***	0.319***
		(0.073)	(0.056)
GI endowment (ict)	0.206***	0.206***	0.194***
	(0.022)	(0.022)	(0.021)
Log (1+Tariff) (ijct)	0.064	0.064	0.060**
	(0.242)	(0.242)	(0.024)
Observations	196926	196926	196926

Note: Table reports the results of estimating (3) using PPML with importer-exporter-time and product-time fixed effects. The results presented in column 3 are obtained using our proposed IV approach through a GMM IV Poisson estimations, where the endogenous variable is Listed GI (interacted with the different Predicted Shares), which has been instrumented following the approach described in the empirical approach section. Standards errors, clustered at the exporting-importing-product level are reported in parentheses. *, **, *** indicate significance at 90%, 95% and 99% confidence levels, respectively.

TABLE 5: HETEROGENEOUS EFFECT WITH RESPECT TO EX OFFICIO PROTECTION

Dep. Variable: Export Value (ijct)	(1)	(2)
	PPML	IV-PPML
Listed GIs (ijct) - Ex officio	0.212	0.373**
	(0.220)	(0.150)
GI endowment (ict)	0.317***	0.312***
	(0.044)	(0.021)
Log (1+Tariff) (ijct)	-0.410	-0.417***
	(0.406)	(0.062)
Observations	241150	241150

Note: Table reports the results of estimating (1) using PPML with importer-exporter-time and product-time fixed effects. The results presented in column 2 are obtained using our proposed IV approach through a GMM IV Poisson estimations, where the endogenous variable is Listed GI (interacted with the Ex officio dummy), which has been instrumented following the approach described in the empirical approach section. Standards errors, clustered at the exporting-importing-product level are reported in parentheses. *, **, *** indicate significance at 90%, 95% and 99% confidence levels, respectively.

FOOTNOTES

1 In practice, some GIs are also produced by large firms or groups such as the French dairy group Lactalis.

[2] The literature on trade and quality has shown that that high-quality goods – such as GIs, presumably – will make up a larger share of exports the larger per-unit trade costs and the lower ad valorem tariffs (Hummels and Skiba 2004). This implies that FTAs with ad valorem tariff decreases would increase GI exports even more than non-GI exports, irrespective of GI protection.

[3] Another provision is whether products are subject to grandfathering clauses. For instance, under CETA existing Canadian producers calling their cheese "Feta" retain the right to do so. Yet over 11 recent FTAs, only 27 cases of such grandfathering exist (Huysmans 2020). Hence grandfathering seems less important than *ex officio* protection, which applies to all GIs in an FTA.

[4] With the Geneva Act of the Lisbon Agreement having come into force in February 2020, producers may soon be able to register their GIs in all 31 member countries with a single application. The World Intellectual Property Organization administers the multilateral GI registry. Two key limitations of this system for EU GIs are the limited number of members (once the EU countries are excluded) and the possibility for members to reject applications.

[5] By the end of 2019, they only had 3 cheese GIs registered, only 1 of which was registered by the end of 2018.

[6] As suggested by Rose (2017), we acknowledge the importance of including many trading partners to reduce the bias in the multilateral resistance term that arises in estimations with time-varying country fixed effects. Our data account for more than 95% of the extra-EU exports in the considered period. We decided not to further extend our database to the remaining trading partners, which account for less than 5% of trade, as their inclusion would considerably increase the number of zero-trade observations, and thus making our estimation cumbersome.

Note in addition that, within our sample of 55 trading partners, we include both countries that are EU partners in FTAs and countries that do not have any FTAs with the EU. The sample also covers developed as well as developing countries.

[7] Note that the DOOR database, from which we collected data on EU GIs, does not provide an official product classification. It only provides broad product categories that do not map to HS trade classifications. Further note that as of 1 Jan 2020, the Commission has transitioned from the DOOR database to the eAmbrosia database.

[8] The EU uses different names for its FTAs. Those with South Korea, the Andean countries (Columbia, Peru and since 2017 Ecuador), Singapore and Vietnam are called FTAs. The FTA with the Central American countries (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama) is called an Association Agreement (AA). Deep and Comprehensive Free Trade Agreements (DCFTAs) have been concluded with Georgia, Moldova and Ukraine. Canada and the EU agreed on a Comprehensive Economic and Trade Agreement (CETA). Economic Partnership Agreements (EPAs) where signed with the South African Development Community and with Japan.

[9] The FTAs that have mandatory ex officio protection, are those with: South Korea per Art. 10.22 (Engelhardt 2015, p.800), Central America per Art.244 (Engelhardt 2015, p.809), Georgia per Art.175 (Engelhardt 2015, p.812), Moldova per Art.301, Canada per Art.7.4 (Engelhardt 2015, p.814), Vietnam per Art.6.8, Japan per Art.14.28. The ones that do not have mandatory ex officio protection, are those with: Andean countries (Engelhardt 2015, p.807), Ukraine per Art.207, Singapore per Art.10.19, Switzerland per Art.13.

[10] As explained in section 4, we use in addition export value alternative dependent variables, namely extensive margin, intensive margin and unit value. It is worth highlighting that exports' unit value refers to 8-digit product categories (CN8), while trade margins are built at the 4-digit

level (HS4). To save space, we present the results of the analysis we obtained using these dependent variables in online supplementary appendix B.

[11] Note that the contemporary inclusion of both the $ListedGI_{ijct}$ and , $GIendowment_{ict}$ variables may lead to some concerns about their correlation. This is because these two variables could assume the same value in case all the GI cheeses in a country-product line are listed in bilateral FTA provisions. As we explain in details in the results section, our empirical strategy controls also for this potential problem.

[12] Note that, in our main estimations, the share of zero observation in the estimation sample is 78%.

[13] Moreover, the large number of observations (due to the high incidence of zero trade observation) and the presence of several fixed effects prevent us from testing the robustness of our results to the use of negative binomial estimators, as suggested for instance by Burger et al. (2009). This is because, in the absence of any command allowing to manage high-dimensional fixed effects (as for instance does *ppmlhdfe* in STATA), the estimation is unlikely to converge.

[14] The role of quality as determinant of exports has formed its basis from the firm heterogeneity literature, and especially considering the seminal contribution by Melitz (2003). The seminal Melitz model, identifies productivity as key determinant allowing firms to have a better performance on the export market. Inspired by this model, a new strand of literature developed, which explicitly considered firms' heterogeneity in terms of quality (Verhoogen 2008; Baldwin and Harrigan 2011; Fajgelbaum, Grossman and Helpman 2011; Crozet, Head and Mayer 2012; Curzi and Olper 2012). These contributions provide theoretical and empirical evidence that higher productive firms have better export performance as they export high-quality products.

[15] Note that we estimate equation (2) using OLS instead of PPML because, in line with the growing body of literature dealing with this topic, assigning a value of zero quality to zero trade flows is meaningless. The same holds when we consider exports' unit value.

[16] It is worth noting that the simple inclusion of import shares would lead to a simultaneity bias, as our listed GI trade effect would perfectly vary with the values assumed by the dependent variable. To avoid the occurrence of this problem, we first estimated predicted market shares by regressing exporting countries product market share in the importing countries, over a set of fixed effects. In a second step, we add the interaction term between our main variable of interest $ListedGI_{ijct}$ with our predicted market shares, obtaining the following equation

[17] Note that, as we look for a causal relationship only when considering our Listed GIs variable, we do not use any instrument to deal with the potential endogeneity of the GI endowment variable. Moreover, a causal relationship between EU countries GI endowment and EU exports has been already demonstrated in Raimondi et al. (2020), and therefore it is beyond the scope of this paper.

[18] As previously mentioned for the GI endowment variable, in our empirical estimations we only instrument the interaction between Listed GIs and product quality, and thus we do not use any instrument for the linear term. This is because, similarly to the GI endowment variable, we are not interested in identifying a causal relationship between export value and product quality *per se*.

[19] An example may better clarify our identification strategy. Take for instance the France cheese sector and our quality variable. We argue that quality is likely to be endogenous to our dependent variable (i.e. export value). Consider now a product such as *Roquefort* (CN 0406401000), which enjoys an outstanding worldwide reputation among the blue cheeses. According to our IV strategy, the estimated quality of *Roquefort* should be positively correlated to the average quality of products belonging to the French cheese sector (estimated excluding

the contribution of *Roquefort*). Considering the reputation of this sector, this appears as a plausible assumption. Moreover, we can also argue that is unlikely that our dependent variable (i.e. export value of *Roquefort*) is simultaneously determined with our instrument, estimated as the average quality all the other French cheeses with the exception of *Roquefort*. A limitation of this argument is that consumers may try Roquefort cheese based on the average quality of other French cheeses. However, the main goal of this paper is to identify the causal effect of FTA protection on exports, rather than the causal effect of quality.

[20] Note that we present summary statistics for our main variables of interest used in our empirical analysis in Table F.1 of online supplementary appendix F.

[21] Note that, if we would consider our Listed GIs variable alone while omitting the GI endowment control, the coefficient of the Listed GI variable turns positive and significant. This highlights the importance of controlling for countries' regular GI endowment.

[22] We considered as main GI producers the following countries: France, Greece, Italy, Portugal and Spain.

[23] Note that we run our GMM IV PPML using the STATA command *ivpoisson*..

[24] Note that, to test for the overidentification restriction, in our identification strategy we propose an alternative IV approach, by using separately the two variables that constitute the conditions to be satisfied in our identification strategy. Specifically, we instrument our Listed GI variable, first, using a dummy variable that takes the value of 1 if the exporting country *i* has a product *c* at time *t* that is listed in a bilateral FTA with a country different from *j*, and zero otherwise. Second, we use a dummy variable that takes the value of 1 if the exporting country *i* has an FTA with country *j* and has any other product different from *c* at time *t* included the FTA with j, and zero otherwise. The results are reported in column 1 of Table F.3 of Appendix F. The reported p-value (0.54) suggests that our instruments successfully passed this test.

[25] Note that first stage regressions are reported in Table F.4 of online supplementary appendix F.

[26] Note that we test for the overidentification restriction following the same strategy proposed for the IV estimation in Table 2. The results are shown in column 2 of Table F.3 of online supplementary appendix F. The reported p-value (0.44) suggests that our instruments successfully passed this test.

[27] Note that we also provide an alternative estimation of product quality, which still relies on the Khandelwal et al. (2013) methodology, but where we use data on trade elasticity from Fontagné, Guimbard and Orefice (2019). This source provides data at the HS 6-digit level that, contrary to the data from Broda and Weinstein (2006) used to estimate product quality for the estimations presented in Table 3, are not country specific. The same set of estimations presented in Table 3 are thus replicated using this alternative data source. The results for this robustness check, presented in Table F.5 of online supplementary appendix F, are totally in line with to those in Table 3.

[28] Table F.6 in online supplementary appendix F presents the same set of estimations obtained using OLS instead of PPML.

[29] Table F.7 in online supplementary appendix F presents the same set of estimations obtained using OLS instead of PPML.