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FULL ARTICLE

From local to global, and return: Geographical indications and FDI in Europe

Riccardo Crescenzi[1] | Fabrizio De Filippis[2] | Mara Giua[2] | Luca Salvatici[2] | Cristina Vaquero-Piñeiro[2]

[1]Department of Geography and Environment, London School of Economics, London, UK

[2]Rossi-Doria Centre Department of Economics, Roma Tre University, Rome, Italy

Correspondence
Mara Giua, Rossi-Doria Centre Department of Economics, Roma Tre University, Via Silvio D'Amico 77, 00145 Rome, Italy.
Email: mara.giua@uniroma3.it

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Abstract

The geographical indication (GI) scheme of the European Union guarantees visibility and protection to high-quality agri-food products associated with a demarcated region of origin. This paper estimates the impact of the scheme in attracting agri-food foreign direct investment (FDI) in European NUTS3 regions, using a novel dataset and a generalized propensity score matching approach. Areas endorsed with GIs attract more FDI in agri-food-related activities than their non-GI counterparts. Positive effects, estimated for FDI inflows, related job creation and intersectoral spillovers on local employment, involves territories with lower institutional quality.

KEYWORDS
foreign direct investment, geographical indications, regional development, territorial policy, European Union

JEL CLASSIFICATION
R11, Q18, O24, C31

1 | INTRODUCTION

Growing international competition has increased concerns that local products, with their unique character and history, would be crowded out by standardized global competitors (DeSoucey, 2010; Raimondi et al., 2020). In this context, however, local areas—where agri-food production systems leverage intangible features associated with a

cultural, historical and traditional know-how that cannot be replicated elsewhere—have experienced participation in global markets with significant gains in terms of sustainable long-term development (European Commission-Joint Research Centre (EC-JRC), 2020; EC, 2021a).[1] In Europe, relevant support comes from the Geographical Indications (GIs) quality scheme, which offers protection and valorization for the authenticity of high-quality agri-food products (FAO, 2021). A GI is a sign used on agri-food products to promote their uniqueness (characteristics, reputation and quality) essentially (Protected Geographical Indications (PGI)) or exclusively (Protected Designation of Origin (PDO)) resulting from specific features of their region of origin.[2]

Compared to standard agri-food productions, GIs can generate socio-economic benefits at both producer and territorial levels, which have been documented in the literature (on GIs' economic effects: Cei et al., 2018; Crescenzi, De Filippis, et al., 2022; FAO, 2021). GIs have assumed a crucial role also in the EU trade economy, becoming a contentious issue in trade negotiations (De Filippis et al., 2022).

At the global level, GIs guarantee product tracing, authenticity and differentiation, supporting traditional modes of production in international competition (Huysmans, 2022; Teuber, 2010; UNCTAD, 2019). GI schemes make it possible to distinguish traditional expertise from their standardized counterparts, partially address an information asymmetry problem and preserve products from fraud and unfair competition (Raimondi et al., 2020). From the trade policy perspective, GIs are treated as a non-tariff measure related to intellectual property rights in trade (Chambolle & Giraud-Heraud, 2005; Saavedra-Rivano, 2012; UNCTAD, 2019), and countries adopt different approaches to protect GIs (e.g., the EU *sui generis* regulation; trademarks regulation in the USA and Australia).[3]

The existing literature has mainly focused on the effects of GIs on export/import activities and participation in global value chains (GVCs), highlighting overall positive effects (Curzi & Huysman, 2022; Josling, 2006; Mancini, 2013; Raimondi et al., 2020). On the other hand, no study has so far investigated the link between GIs and more complex forms of internationalization, such as foreign direct investment (FDI). FDI has become a central component of territorial engagement with global capital, knowledge and trade flows. It represents international transfers of capital through which a firm based in one country controls economic activity in another.[4] In 2019, European countries were some of the primary destinations of FDI in the agri-food sector. Among these activities, food-related services were the largest source of FDI inflows at 52% (EC, 2020a).

The determinants of FDI location have long remained an intriguing question to academics and policy-makers, and there is still significant debate on the factors and policies shaping the geography of FDI, in particular at the subnational level (e.g., Castellani et al., 2016; Crescenzi & Iammarino, 2017). In this context, this paper addresses the following research questions: Do GI areas experience more significant FDI inflows than other similar areas? To what extent can the EU GI scheme enhance territorial openness and, as a result, encourage local employment in rural areas and beyond?

Foreign investors can be attracted to a GI area to participate in producing food products with a high-quality worldwide reputation. These products must be produced within a specific geographical area, and anyone who wants to produce them has to set up a business within the region of origin. From an economic perspective, a structural entry barrier leads to supply limitation and, consequently, generates revenues that attract investors.

At the same time, foreign investors may be attracted by the specific territorial intangible assets that constitute a unique source of comparative advantage of which GIs are the visible "codification." Investors can leverage historical

[1]The wine sector is a clear example. Since the beginning of the 1990s, the leaders of the "Old World" countries, such as France and Italy, have been competing with "New World" countries, such as the United States and Argentina, or with China, whose vineyards are among the largest in the world (Pomarici et al., 2021).

[2]EU Reg. No.2012/1151, food; EU Reg. No.2013/1308, wine; EU Reg. No.2019/787, spirit; EU Reg. No.2014/251, aromatised wines.

[3]According to the definition provided by World Intellectual Property Organization (WIPO), the term sui generis is used in intellectual property law to describe a regime designed to protect rights that fall outside the traditional patent, trademark, copyright and trade-secret doctrines. What makes an intellectual property right system *sui generis* is the modification of some of its features to accommodate the special characteristics of its subject matter properly, and the specific policy needs which led to the establishment of a distinct system.

[4]According to the definition, FDI refers to cross-border investment, which aims to acquire a lasting management influence in an enterprise operating in a foreign economy, which may be undertaken by individuals, as well as business entities (OECD, 2009). FDI can be decomposed into two types of investments: mergers and acquisitions (M&A) and greenfield FDI.

expertise, tradition and socio-cultural values by choosing GI regions for their agri-food investment. Indeed, as stated by Crescenzi, De Filippis, et al. (2022), GIs are the formal sign of local informal institutions and territorial assets that emerge in association with locally embedded systems of production. From this standpoint therefore, GIs are directly linked with FDI because, by aiming at offering better information to consumers, they also minimize information asymmetries to international investors.

Finally, even if these are special cases linked with marginal episodes limited to renowned GIs and wealthy individuals, foreign investors can invest in a GI area as a "trophy."[5] In the case of wine, it has been demonstrated that the international reputation of a high-quality wine attracts investors interested in different activities: (i) new vineyards; (ii) supply of glass containers; as well as (iii) enotourism (Curran & Thorpe, 2014). This is, for example, the case of the Veneto region (Italy), where a US company specialized in the supply of glass, plastic, metal and closures containers for wine opened a new headquarters, and a Swiss company specialized in vetropack that invested in opening a new wine and spirits warehouse.

To address the research questions outlined above, this paper tests whether local areas with GI schemes are more attractive for international investors than similar areas, and whether this generates virtuous impacts on local employment. It leverages a new original dataset covering almost all EU Member States and the United Kingdom with detailed information on the geography of all GI areas (food and wine) and their evolution over time. Data on GIs are then complemented with data on greenfield FDI projects on *agribusiness-related* activities (from fDi Markets database)[6] and on local employment dynamics (Eurostat). By using generalized propensity score (GPS) models, we estimate how FDI inflows and jobs created change according to the number of GIs that the nomenclature of territorial units for statistics level 3 (NUTS3) regions have been granted in the 2003–2019 period.[7]

The results show that, overall, GIs generate positive impacts on FDI attraction/jobs creation and local employment dynamics. In Europe, NUTS3 with more robust GIs characterization attract more foreign investment than their counterparts, along with associated new job creation. This is true for *agribusiness-related* activities, including a wide set of economic activities linked to the whole local economy, and not only for the narrowly defined agricultural production. Furthermore, new FDI inflows in GI areas are associated with positive effects on the employment growth of higher value-added sectors, such as tourism. Foreign investors seem to be particularly interested in activities related to agri-food production with different intensities, such as manufacturing and tourism (Di Bella et al., 2019; Gerz & Dupont, 2006). FDI is therefore often driven more by the intangible value of GIs' reputation than by core productive agricultural activities. Evidence of a positive impact on connected sectors aligns with our aim to capture the potential long-term effects of GIs on the wider local economy. A reflection in this direction is even more relevant given that GIs' effect is stronger for regions that do not benefit from virtuous institutions, acting as a sort of informal replacement (cooperative and collaborative actions among producers) of formal institutions. To be effective, GIs have to be recognized: the effect of GIs in attracting FDI and jobs is reduced for non-EU investors, who are less aware of the deeper cultural meaning of the EU's GI scheme.

[5]This phenomenon is essentially linked to the wine sector. Rich individuals for whom owning vineyards, wine cellars and estates is a luxury often invest in well-known wine regions, such as Tuscany in Italy. For an example, read this article about the Tuscany wine estate bought by the singer Sting at: https://www.decanter.com/wine-news/sting-says-he-was-duped-into-buying-tuscan-wine-estate-463646/.

[6]fDi Markets tracks cross-border greenfield investment flows in a new physical project or expansion of an existing investment which creates new jobs and capital investment (i.e., greenfield foreign investment "projects". Greenfield FDI involves capital used for 'the purchase of fixed assets, materials, goods and services, and to hire workers in the host country' (UNCTAD, 2005, Training Manual on Statistics for FDI and the Operations of TNCs, p.98, unctad.org/en/docs/diaeia20091_en.pdf). Mergers & Acquisitions (M&A) and other equity investments are not tracked, while joint ventures are only included where they lead to a new physical operation. This data limitation allows us only to assess the GIs' effects on greenfield FDI attraction, while the results cannot be extended to other types of FDI. However, the sample accounts for a significant part of EU FDI. General trends of FDI in the EU showed that the number of greenfield projects is on average higher than the number of M&A deals projects (EC, 2021b). In addition, the accuracy of fDi Markets and its coherence with official statistical sources have been tested and confirmed by consolidated literature (see Crescenzi et al., 2014). fDi Markets data includes territorial-sector level information on: (i) total capital investment; and (ii) total number of jobs created.

[7]Although data on FDI provide the correspondence name of the destination areas (i.e., country, state, administrative region and city) of each single FDI project, we conduct the analysis at the NUTS3 level due to the fact that for several projects, information on destination areas are not available at a more disaggregated level. According to the EU nomenclature, NUTS3 are regional entities of between 150,000 and 800,000 inhabitants. For instance, in France, they represent Départements, in Germany, they are equivalent to Landkreise, in Spain, they correspond to Comunidades Autonomas, and in Italy they correspond to Provincia, while in the United Kingdom, they are associated with the Unitary Authorities.

The paper is organized as follows. In Section 2, we synthesize the current debate on GIs and FDI location choice by referring to the existing literature; Section 3 describes the context of GIs and FDI in Europe; Section 4 presents our empirical approach, the data and the econometric strategy, while results are reported in Section 5. Section 6 discusses some evidence on estimated heterogeneous effects before the conclusions.

2 | LITERATURE REVIEW

2.1 | GIs

As of June 2022, the EU recognized 1387 GIs in food, 1614 GI wines and 244 GI spirit drinks.[8] Italy and France, Spain and Greece have the highest number of products recognized as GI, but at least one GI exists in each EU region.[9] In 2007, Colombian coffee, American Napa Valley and Brazilian Vale dos Vinehedos were recognized as the world's first non-EU GIs. Since then, the number of GIs from non-EU countries has constantly increased. GI products and their regions of origin have become increasingly popular at the international level, together with the attention of policy-makers and scholars on the impacts of GIs (Calboli, 2021; EC, 2021d; Giovannucci et al., 2009).

According to the large literature on GIs' socio-economic impacts, the GIs policy represents an opportunity for local actors to valorize their products and territories, and for consumers to reduce information asymmetry (Sgroi, 2021). However, as pointed out by some papers such as Vaquero-Piñeiro (2021), Resce and Vaquero-Piñeiro (2022), Torok et al. (2020) and Cei et al. (2018), there is heterogeneity in the success of these productions from an economic perspective, especially at the micro level (farmers and products).

At the territorial level, there is more consensus on the benefits generated. Compared to standard agri-food productions, by linking food quality and reputation to a specific territory (Torok et al., 2020), GIs generate socio-economic spillovers, enhancing producers' and territorial welfare and development. Although without losing their core role in reducing market information asymmetry and preserving high-quality productions (Marette & Crespi, 2003; Menapace & Moschini, 2014; Moschini et al., 2008), the effects of GIs have been demonstrated empirically in terms of premium pricing, market access and income distribution (Huysmans & Swinnen, 2019) as well as rural development (Cei et al., 2018; Crescenzi, De Filippis, et al., 2022). For instance, by analyzing the case of Umana rice, Takayama et al. (2021) provide evidence of the benefits generated by GIs in the Japanese rural economy by allowing production to be economically sustainable. Though their work is limited to specific case studies, Vandecandelaere et al. (2018) and Kimura and Rigolot (2021) conclude that GIs could also contribute to address social-environmental sustainability and enhancing Sustainable Development Goals (SDGs). Thus far however, no studies empirically evaluate the effects of GIs in terms of sustainability by systematically comparing products with and without certifications.

A significant part of the positive impacts achieved by the GI scheme refers to international flows associated with GI products. According to trade barriers classification, GIs can be included in the Intellectual Property group of the non-tariff measures framework (EUIPO, 2017; UNCTAD, 2019).

The EU has strongly supported the protection of GIs at the international level, and there is optimism about the effects of GIs on trade values and quantities (see De Filippis et al., 2022, for a systematic literature review of GIs trade effects). The existing literature has mainly evaluated the impacts of GIs on export/import activities (Altomonte et al., 2013; Curzi & Huysman, 2022; Fernandez-Olmos & Diez-Vial, 2014) and participation in GVCs (Mancini, 2013). Among the more recent papers, Raimondi et al. (2020) have shown that protecting products under

[8]The updated list is available at https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/geographical-indications-register/.

[9]France and Italy were also the pioneers of agri-food quality schemes. France laid out the rules for "appellation d'origine contrôlée" (AOC) wines as early as 1935, while, in Italy, the national regulation goes back to the 1960s.

GIs results in higher trade gains, fostering trade margin and unit values. Duvaleix et al. (2021) corroborate these results finding that PDOs increase export prices by 11.5% on average. Conversely, the literature on the effects of GIs on import activities is relatively scant and limited to Sorgho and Larue (2014) and Raimondi et al. (2020), who show that the diffusion of GIs decreases EU countries' imports by exerting an anti-competitive role.

The relation between GIs and more complex forms of international activities, such as FDI attractiveness, has so far been neglected, despite global capital flows becoming an increasingly significant component of the economic value of sectors associated with agri-food production.

2.2 | FDI

FDI plays a relevant role in territorial economic connectivity, defined as the degree of inward and outward openness that shapes the local churn of skills, capabilities, production systems and economic activities (Crescenzi et al., 2014). The rich literature on the role of FDI in socio-economic development concludes that FDI is a fast route for companies to expand their business in international markets (Crescenzi et al., 2021; EC, 2020b; Hanousek, 2011; Pietrovito et al., 2016). Notwithstanding the potentially detrimental effects on employment in home economies (Crescenzi, Ganau, & Storper, 2022), FDI increases the capital stock, access to innovations, technology transfers, improvements in skills and new job opportunities in the host country (Gonzalez et al., 2017; Harding & Javorcik, 2011). The level of rurality influences the engagement of the regions in international contexts (Bolea et al., 2022) and rural areas are generally less attractive to FDI inflows (Daniele & Marani, 2011). However, at the same time, FDI may provide an opportunity to reverse the long-term trend of under-investment (Coe & Yeung, 2015) and the generalized reduction in global connectivity following the 2008 economic crisis (Crescenzi & Iammarino, 2017).

Several factors influence the choices of foreign investors, leading them to invest in a specific location that will consequently experience the benefits discussed above (Casi & Resmini, 2014; Castellani et al., 2016; Crescenzi & Iammarino, 2017). Nielsen et al. (2017) provide a comprehensive review of the existing literature showing that substantial emphasis has been placed on the critical role of structural characteristics: agglomeration economies, market size, production costs and infrastructure availability. The role of host economies' environmental performance has recently been investigated by Ascani and Iammarino (2020), while several papers have confirmed the positive role institutional quality plays (e.g., Dellis et al., 2017; Peres et al., 2018). By using health expenditure as a proxy of institutional quality, Giammanco and Gitto (2019) provide evidence of the role played by institutional quality in attracting FDI across the EU. Similar conclusions have been reached by the few studies focusing on informal institutions and intangible assets (Charron & Lapuente, 2013; Rubini et al., 2021).

Trade linkages (Jones et al., 2020) and regional market potential (Krisztin & Piribauer, 2023) have also been recognized as relevant drivers for FDI. Investors, especially in the agri-food sector, usually target foreign countries/regions with pre-existing well-established trade linkages (Conconi et al., 2016; Djokoto, 2012; Santos et al., 2021). An illustrative example is the Zespri group, the leading Australian international provider of Kiwi in Italy: after years of export from Australia to Italy, the group decided to produce the fruits directly in Italy, setting up their activities in the Latium and Emilia Romagna regions. The Latium region obtained a GI certification for its Kiwi production (*Kiwi di Latina PGI*). In this case, the acknowledgment of the GI directly attracted FDI, signalling higher quality agri-food products.

Among the risks of FDI for local economies, the literature has stressed the fact that excessive attraction of FDI, especially in economic sectors dominated by small and medium firms, could increase the risk of large multinationals buying out small independent local entrepreneurship (De Backer & Sleuwaegen, 2003; Osei & Kim, 2020). However, this effect seems to be moderate in the long-run due to the positive effects of FDI for the local economy as a whole.

3 | GIs AND FDI IN EUROPE

We built an original dataset that relies on two sources to study the relation between GIs and FDI in Europe. For the GIs, we collect information starting from the individual "codes of practice:" these documents include, for each product listed in the GI official register, detailed information on the types of productions, the year of GI acknowledgement, the territorial area of production as well as additional information on the organoleptic and natural aspects of the product (source: eAmbrosia website, EC). These documents were available only in pdf/html format. Relevant information has been extracted from the documents by means of textual scraping and digitized in a machine-readable format. This procedure has allowed us to create an original database, covering the entire spatial and temporal variation of the EU GIs for almost all EU Member States and the United Kingdom.

FDI data (value and jobs created) come from the fDi Markets-Financial Times database, the main source for measuring FDI in Europe. This database covers cross-border greenfield FDI. With a greenfield investment, a parent company starts a new venture in a foreign country by establishing new operational facilities from the ground up, creating new entities or setting up offices, buildings, plants or factories in a foreign economy.

The database does not include data for other forms of FDI (e.g., Mergers & Acquisitions (M&A)). This could be considered as a limitation of our study given that greenfield investment might be limited by physical constraints (e.g., hectares of land available for development), but it must be noted that in the EU, the majority of investment in the food sector relates to "food processing." For this sector, the constraint limiting greenfield investments is more in line with the constraints faced by all other sectors of the economy, rather than being as stringent as for primary agricultural products such as oilseeds, forestry and fishing (Punthakey, 2020; UNCTAD, 2010; Wilkinson & Rocha, 2006).[10] The lack of data about M&As limits the possibility of capturing the potential phenomenon of multinationals buying out small independent local farms.

To identify the effects of GIs on FDI inflows, we consider two different samples of FDI. The first sample includes FDI in the *agribusiness* (A) activities cluster as classified by the fDi Markets-Financial Times database. Foreign investments in this sample belong to various sectors but involve farming and farming-related new economic activities linked with one of the stages of the agri-food supply chains and connected with producing, preparing and selling farm products.[11] Examples of FDI in *agribusiness* activities refer to growing crops, supplying seeds, manufacturing farm equipment, and marketing and distributing farm products.

The second, more extensive, sample is constructed to capture inter-sectoral spillovers from GIs that stimulate the emergence of economic activities beyond the agri-food chains (Cei et al., 2018; Crescenzi, De Filippis, et al., 2022). In particular, the effects of GIs on local economies can encompass several diverse economic activities, one of which is tourism. A strong association between GIs and tourism has been demonstrated in several studies (e.g., Ciani et al., 2021; Santeramo et al., 2017), highlighting GIs' potential to transform a place into a successful touristic destination. Thus, in our second sample (*agribusiness-related* (AR) activities) we combine FDI projects included in the fDi Markets-Financial Times agribusiness cluster with all FDI projects belonging to a variety of sub-sectors likely to be affected by GIs. The complete list of sub-sectors is reported in the Supporting information. Examples of FDI projects in *agribusiness-related* activities refer, for example, to food and beverage retail, the construction of new tourism accommodation and marketing activities.

The FDI database covers the period 2003–2019. The territorial unit of analysis is the Eurostat NUTS3 level. GIs are actually acknowledged at the local administrative unit level, but the georeferencing of fDi Markets-Financial Times data did not allow us to reach this finer level of spatial disaggregation. The NUTS3 level is the most

[10]According to the UNCTAD definition, FDI to agriculture refers to investments related to crops, livestock, fishing, forestry and hunting. These are further sub-categorized as primary and processed (food, beverages and tobacco) (UNCTAD, 2010).

[11]The fDi Markets-Financial Times database categorizes FDI in clusters, sectors and sub-sectors. In the agribusiness cluster, there are FDI from different sectors (biotechnology, business services, ceramics & glass, chemicals, coal-oil-gas, communications, financial services, food & beverages, industrial equipment, metals, paper-printing & packaging, plastics, real estate, software & IT services, transportation & warehousing, wood products) but all of them have to do with the food supply chain. Sectors and sub-sectors are however not representative by themselves but only within the cluster. In other words, data on FDI in biotechnology sectors is not representative of the sector, but represents only investment projects belonging to the agribusiness cluster.

disaggregated level possible for this type of analysis. NUTS3 has already been used as the unit of analysis in other studies about GIs (Cei et al., 2018, 2021), confirming the validity of our empirical setting.

Figures 1 and 2, respectively, show the distributions of GIs and FDI in *agribusiness-related* activities for the first and the last year of our database and the countries included in our analysis.

In all 1114 NUTS3 regions covered in the analysis, the EU GIs scheme acknowledges at least one product. For most of them, this was already true in 2003, even if there has been significant growth over time (Figure 1). On the other hand, although in a context of generalized FDI stagnation since 2008, FDI in agribusiness-related activities has grown substantially over the period under analysis (Figure 2).

4 | EMPIRICAL STRATEGY

Our analysis aims at estimating the causal impact of GIs on FDI inflows in the EU NUTS3 regions from 2003 to 2019. Given the GI distribution reported in Figure 1, according to which all NUTS3 are treated (i.e., acknowledged with at least one GI) since 2003, we need to exploit the heterogeneity of the treatment in space rather than over time. To do that, we construct a treatment variable that accounts for the different levels of engagement with GIs of each NUTS3 region and use the GPS for continuous treatment with fixed effects (Hirano & Imbens, 2004). The GPS does not in fact require non-treated observations: it isolates the impact of treatment from the effect of other confounding factors by comparing units that are similar in terms of the observables correlated with treatment intensity (Hirano & Imbens, 2004).[12] Conversely, GPS allows us to resolve possible sources of self-selection and endogeneity bias that may arise in our study because GIs are not randomly assigned but are likely to be endogenously correlated with territorial factors and agri-food lobby objectives. At the same time, by exploiting matching procedures, we also address reverse-causality issues.

To capture the heterogeneous level of territorial engagement with GIs, the treatment variable is measured for each year over the period 2003–2019 using the average number of GIs (food and wine) that are acknowledged in each region, computed as the ratio between the total number of GIs of the region and the number of local administrative units (LAUs) belonging to the same region.[13] The treatment variable is the average number of GIs per LAU region that are acknowledged in each NUTS3 region.[14]

Figure 3 shows the distribution of our treatment variable at the NUTS3 level and as an average over the 2003–2019 period. Some very GI-active NUTS3 regions can be recognized in Italy, France, Germany and Spain.

As far as the outcome variable is concerned, for the two samples of FDI (A: *agribusiness* and AR: *agribusiness-related*) we use:

1. the absolute dollar value of *agribusiness* and *agribusiness-related* FDI inflows ($million);
2. the value of the same FDI inflows normalized by the corresponding NUTS3 gross value added (GVA); and
3. by the value of total FDI inflows into the same NUTS3 region;
4. the number of jobs created by *agribusiness* and *agribusiness-related FDI*;
5. the number of jobs created normalized by regional GVA; and

[12]Ideally, we would have liked to quantify the causal effect of GIs on territorial attraction patterns by comparing the mean change in a NUTS3 attraction capacity before and after the acquisition of the GIs' label relative to a control group. This is unfortunately not possible because the FDI database has collected data only since 2003 when several GIs had been already recognized. A dummy variable taking the value of 1 if the NUTS3 has been acknowledged the status of GI would not have had time variability The treatment is therefore not binary (Is the NUTS3 acknowledge with a GI, or not?) but rather continuous.

[13]The treatment variable is calculated as $GI\,treatment = \sum GI_{ij}/LAU_j$, where i are the LAU2 belonging to each NUTS3 j.
We have also replicated the analysis by considering the total number of GIs produced in the NUTS3, without considering the number of municipalities included within the region of origin. Given that this variable does not capture the territorial diffusion of GIs, we decided to include it as control in our estimations, rather than the main treatment variable.

[14]Results are consistent also considering the municipalities' area as the weighting factor of the treatment variabel (GIs) instead of the number of LAUs of the NUTS3.

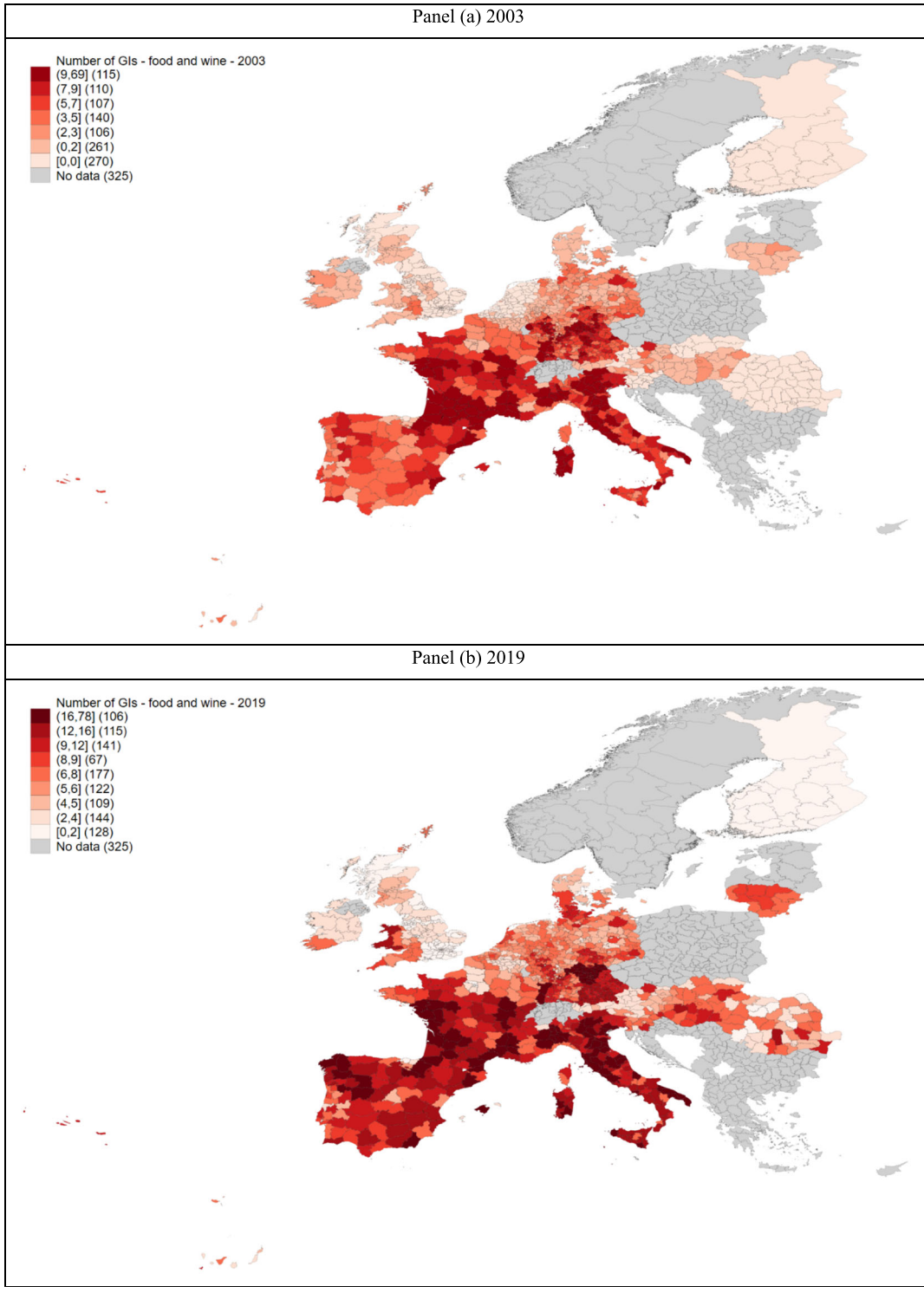


FIGURE 1 Geographical indications (GIs) by NUTS3, range and number of NUTS3, 2003 (a) and 2019 (b). *Source*: Authors' elaboration of eAmbrosia data.

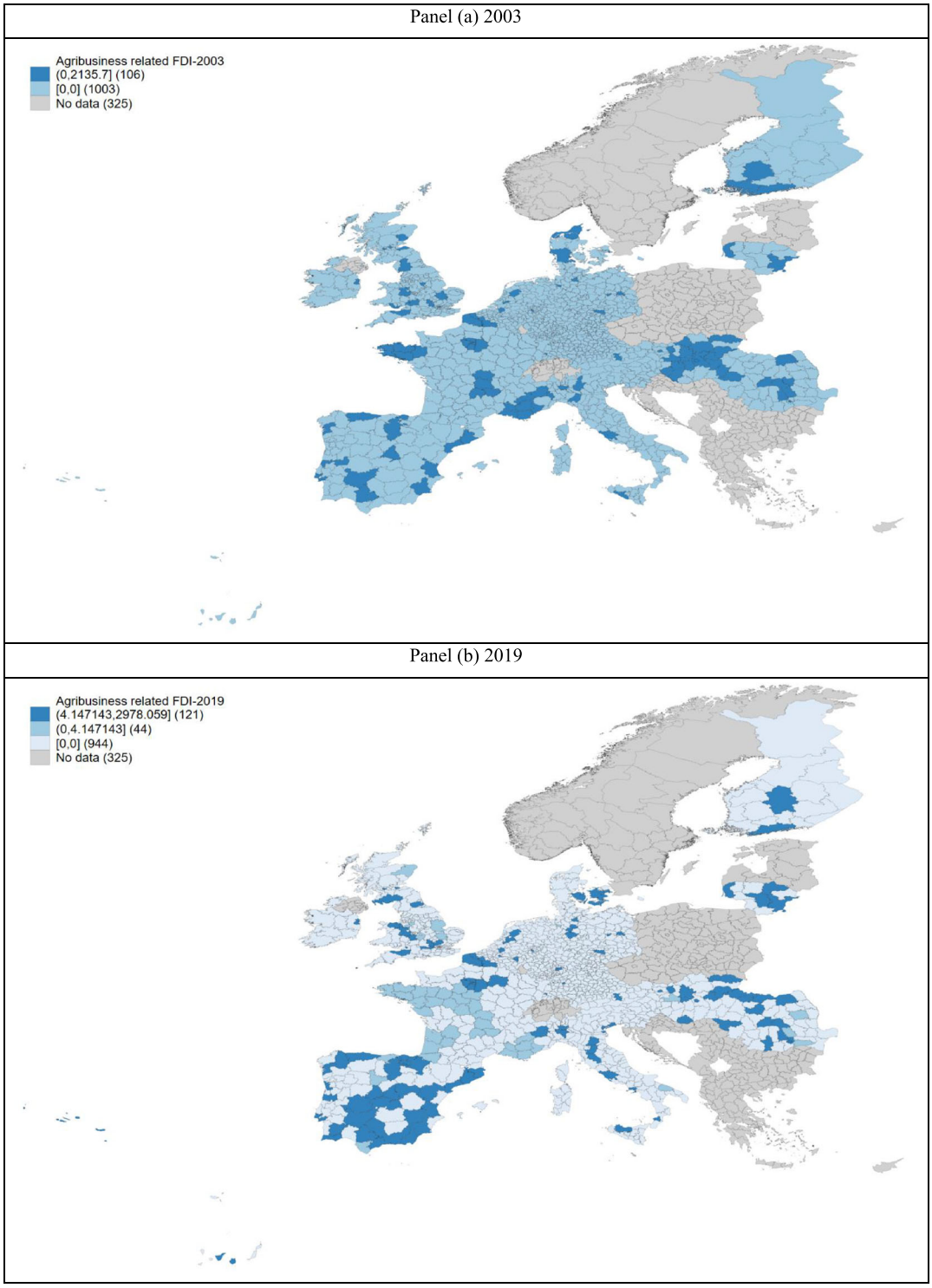


FIGURE 2 *Agribusiness-related* foreign direct investment (FDI) by NUTS3, million $, range and number of NUTS3, 2003 (a) and 2019 (b). *Notes*: FDI inflows, capital expenditure. *Source*: Authors' elaboration of fDi Markets data.

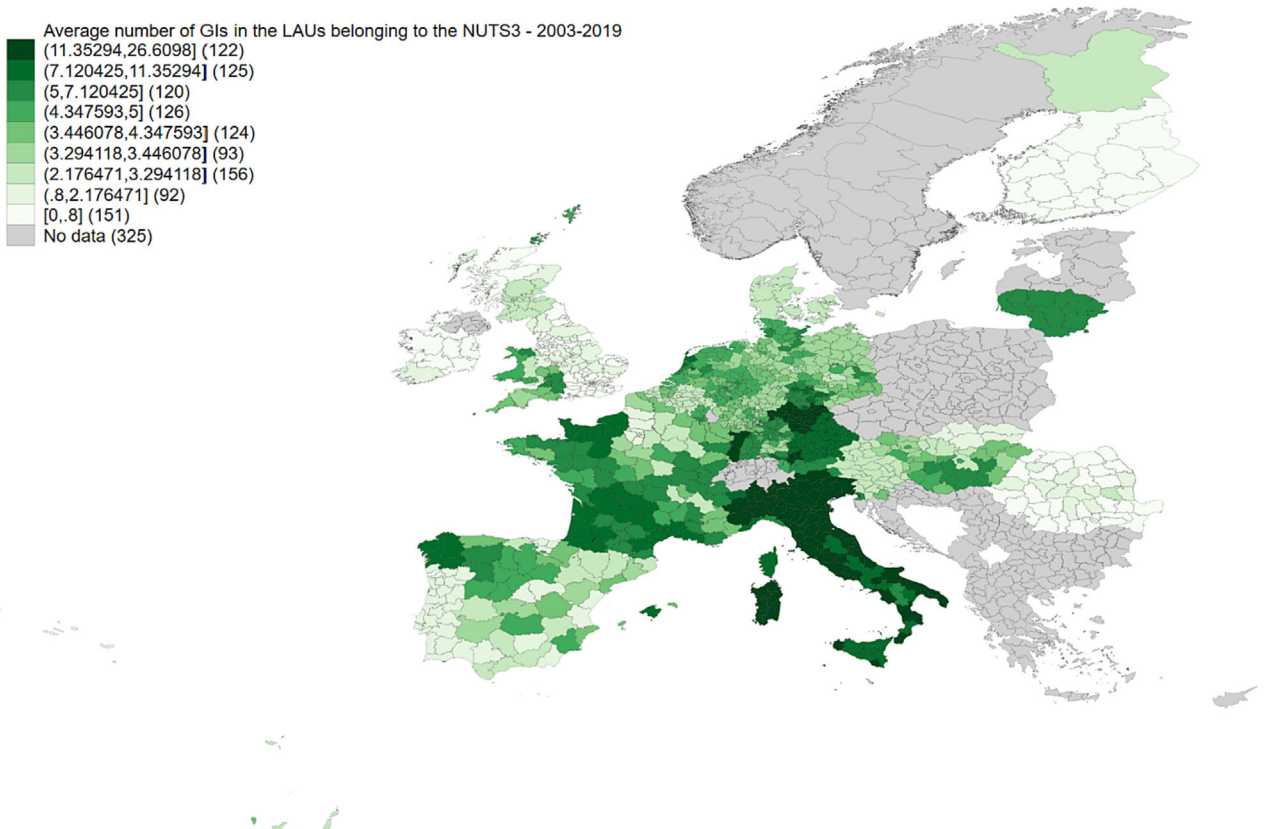


FIGURE 3 Geographical indications (GIs) treatment by NUTS3, range and number of NUTS3, average 2003–2019. *Note*: The figure reports the samples of countries considered for the analysis: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Lithuania, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, United Kingdom and Ireland. *Source*: Authors' elaboration of eAmbrosia data.

6. by the total jobs created by FDI in the same region.

The estimation of the GPS starts by regressing the GI treatment variable on a set of contextual socio-economic and topographic variables that are well-known drivers of FDI, as well as a series of variables capturing relevant aspects of the GI phenomenon in each NUTS3 and neighbouring areas: the presence of historical GIs and a dummy accounting for leading countries and the average number of GIs in neighbouring areas[15] (the full list of the variables is reported in Table S1 and descriptive statistics can be found in Table S2). The model is also augmented by a variable accounting for years since the first GI was recognized in the NUTS3. This variable allows us to control for a potential trend noise generated by the fact that the number of GIs is always positive and increasing.

Given the significance of the covariates and that the balancing and normal distribution assumptions are satisfied,[16] the different groups of treatment can be considered identical in terms of their observable characteristics (Hirano & Imbens, 2004; Kluve et al., 2012). Therefore, the possible unobservable remaining difference in treatment intensity across units is independent to the potential outcome. Hence, we estimate the dose–response function to assess whether there is a causal link between the treatment and the outcome variables (i.e., the six variables capturing different measures of FDI inflows and of FDI jobs created, as described above; Hirano et al., 2003).

5 | RESULTS

Looking at the *agribusiness* sample of FDI, the sign of the relationship between the GI treatment variable and the six outcomes is positive, with a dose-response function that increases with the increase of the treatment, but the lower and upper bounds of the dose-response functions are not above zero for all levels of the treatment, suggesting that the effect of the treatment is not significant for all its values (Figures S1 and S2).[17]

Within the *agribusiness-related* sample of FDI, instead GIs turn to generate a positive and significant causal effect on all our six outcomes measuring FDI inflows and FDI jobs created. This evidence suggests that GIs are more effective in attracting FDI connected to the whole local economic system rather than the actions narrowly related to the agricultural production process.

Figure 4 summarizes the relationships of the GI treatment variables with outcomes 1–3, while the results for outcomes 4–6 are reported in Figure 5.[18]

In the case of the absolute values of FDI inflows expressed in million $ (Figure 4a), the dose–response functions (left) indicate that FDI generally increased with a higher number of GI products, and not in a linear way: foreign investment decreases until the 0.4 level, then increases, especially for higher levels of the treatment. On the right, the treatment effect function, reporting the change in FDI inflows due to increases in the treatment variable, shows a clear and significant positive relation. The results are confirmed by normalizing FDI values on the NUTS3 GVA (Figure 4b) or on the total FDI inflows of the NUTS3 (Figure 4c).

With outcomes 4–6, we consider the number of new jobs directly generated by FDI instead of the FDI values.[19] In this case we also found a positive and significant impact of the GI treatment variable on the jobs directly generated by FDI inflows, if they are considered as absolute (Figure 5a) or normalized on the NUTS3 GVA (Figure 5b) or

[15]As highlighted by Huysmans and Swinnen (2019), the primary users of the GI quality scheme are the southern EU Member States, which register seven times more food GIs *per capita* than in other EU countries. Italy, France and Spain lead, both in terms of numbers and revenues (EC, 2020a).

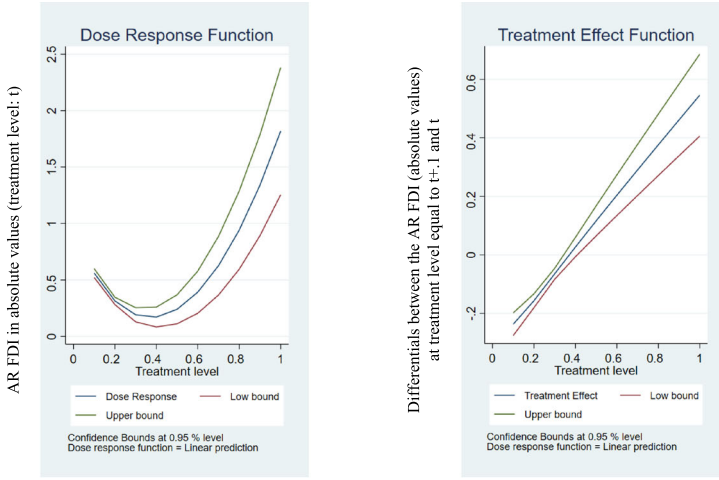
[16]For all the estimations provided in this paper, the normality test provides evidence that the assumption of normality is statistically satisfied at the 0.05 level. The balancing property is satisfied at a level lower than 0.01 (two-sided *t*-test).
The validity of the GPS estimation again depends on balancing of the covariates. For the sake of brevity, we suppress the documentation of balancing here, but results are available from the authors upon request.

[17]Table S3 reports results for the test of the polynomial parameterization of the conditional expectation of the outcome as a function of the observed treatment and the estimated GPS.

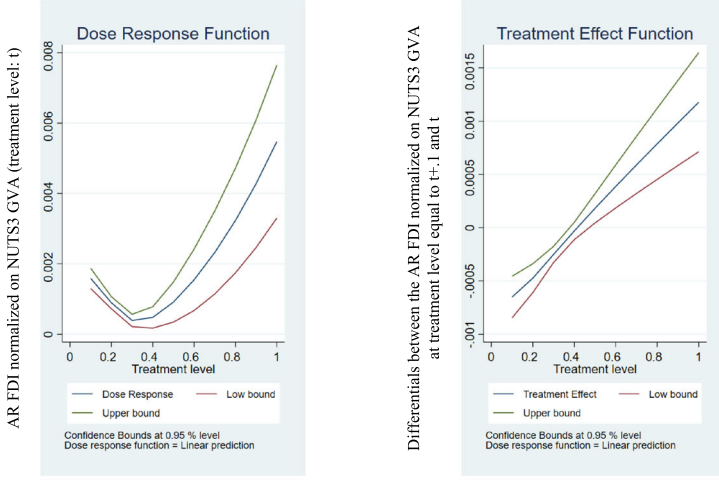
[18]Table S4 reports results for the test of the polynomial parameterization of the conditional expectation of the outcome as a function of the observed treatment and the estimated GPS.

[19]Jobs created are provided in fDi Markets-Financial Times database as an estimation based on the total amount of capital investment of the FDI deals.

(a) AR FDI in absolute values ($million)



(b) AR FDI normalized on the NUTS3 Gross Value Added (GVA)



(c) AR FDI normalized on the NUTS3 total FDI inflows

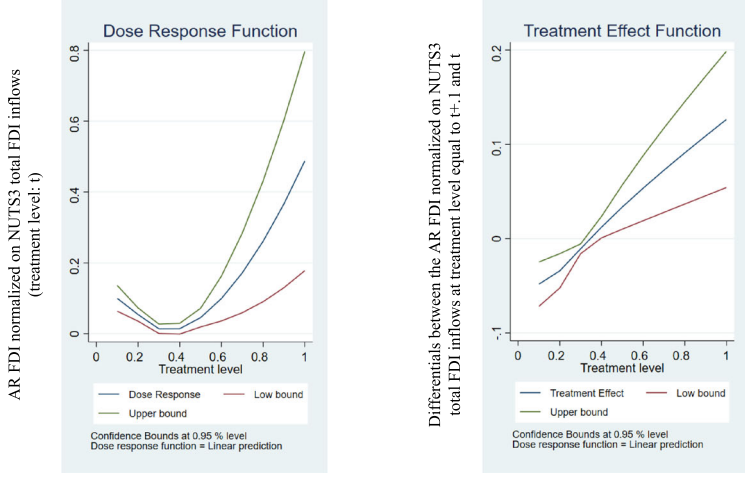


FIGURE 4 Legend on next page.

FIGURE 4 The impact of geographical indications (GIs) on *agribusiness-related* (AR) foreign direct investment (FDI) inflows (a, b, c). *Notes*: The left side panel of the figures reports the dose-response function providing graphical representations of the relationship between GIs and FDI inflows; the right side panel depicts the treatment effect function, that is, the first derivative of the respective dose-response function. The middle line refers to the function, while the top and bottom lines represent 95% confidence intervals. We use bootstrap methods to obtain the dose-response function standard errors and confidence intervals, which are included in the figures as lower and upper bounds (Bia & Mattei, 2008). Models have been estimated with the constant. For Million $ FDI we use the inverse hyperbolic sine transformation (an equivalent of log transformation). Gross value added (GVA) is considered at constant prices. Countries included in the sample: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Lithuania, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, United Kingdom and Ireland.

on the total FDI jobs created in the NUTS3 (Figure 5c). The positive findings for direct job creation are particularly relevant, given that most GIs are produced in rural areas where low employment levels are one of the main long-term challenges and where improvements in job market opportunities are also crucial for demographic trends.

More generally, all the results obtained suggest that, regardless of the outcome, the treatment effect functions are monotonic, with a minimum necessary treatment intensity and without a maximum desirable treatment level, after which the level of investment starts to decrease: NUTS3 with a lower level of engagement in GI productions obtain lower FDI inflows and jobs created in *agribusiness-related* activities than NUTS3 with a higher level of GI engagement.

Potential market saturation (i.e., number of GIs) and competitiveness among different GIs produced in the same local area are not obstacles to the benefits of internationalization. Conversely, the presence of a higher number of products and areas involved in the GI schemes seems to drive FDI attractiveness. This evidence suggests that GIs' spatial and sectorial concentration, commonly observed in GI countries (Charters & Spielmann, 2014; Huysman & Swinnen, 2019; Vaquero-Piñeiro, 2021), are not an obstacle to FDI attraction.

To verify the validity of our results, we perform a series of robustness and sensitivity tests. In particular, we first conduct a placebo test estimating the impact of GIs on two outcomes for which we do not expect any impact: (i) the absolute values of the total FDI inflows in the NUTS3 region (all industries); and (ii) the absolute values of the FDI inflows in the NUTS3 in non-agribusiness-related sectors. As expected, the lower and upper bounds of the dose–response functions are not above zero for all levels of the treatment. Figure S3 (panel C) confirms the presence of not significant effects for most of the treatment intervals.

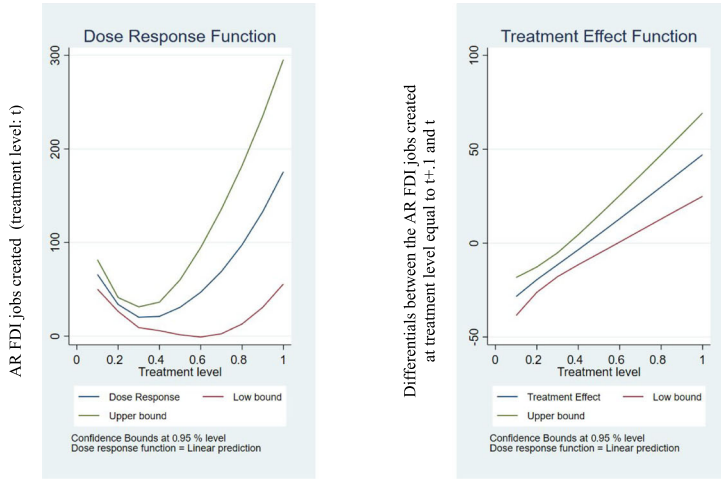
5.1 | GIs in local economies

The positive causal impacts of GIs we estimated so far are associated with FDI inflows and new jobs directly generated by FDI inflows. In other words, we accounted only for the estimated number of new jobs in the new FDI. However, the effects of GIs in attracting foreign investment might involve the whole local labour market by creating new job opportunities in other activities not directly set up thanks to FDI. It is acknowledged that GI productions tend to spur an economic reorganization of the production areas towards higher value-added activities (Crescenzi, De Filippis, et al., 2022; FAO, 2021). To what extent the effect of GIs in attracting FDI has spillover consequences in terms of local job market dynamics is not testable by using job FDI data.

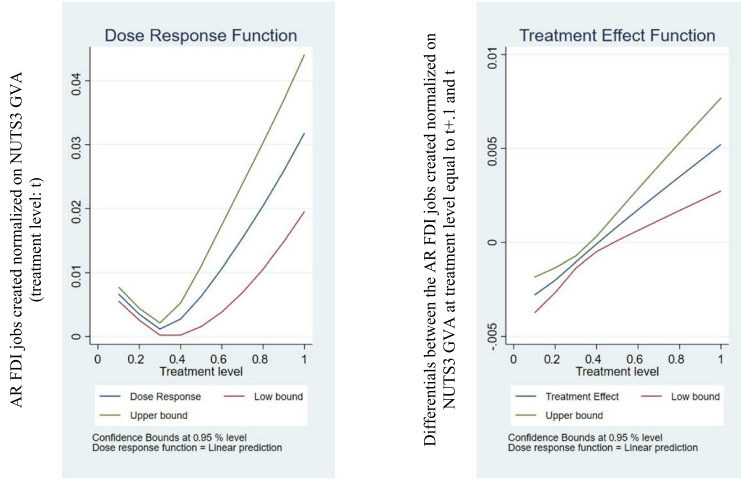
To investigate this latter issue, we rely on Eurostat data on employment in NUTS3 regions by sector and replicate the analysis to capture the change in the composition of local employment structure among economic sectors.[20]

[20]Statistical Classification of Economic Activities (NACE).

(a) number of AR FDI jobs created



(b) number of AR FDI jobs created normalized on the NUTS3 Gross Value Added



(c) number of AR FDI jobs created normalized on the NUTS3 total FDI jobs created

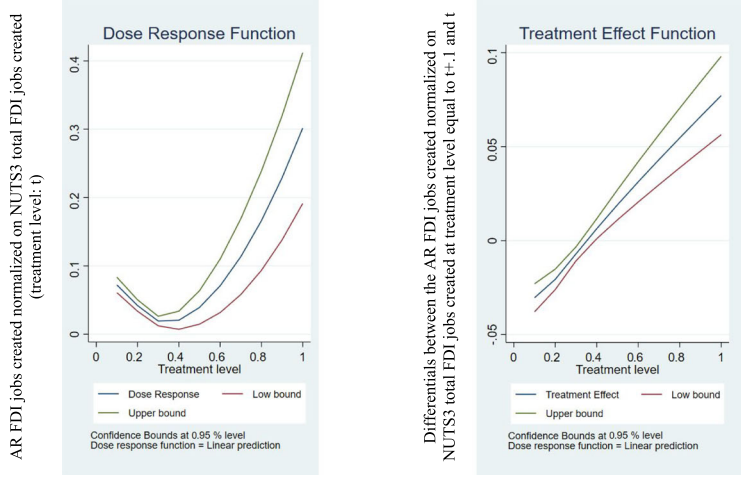


FIGURE 5 Legend on next page.

FIGURE 5 The impact of geographical indications (GIs) on *agribusiness-related* (AR) foreign direct investment (FDI) jobs created (a, b, c). *Notes*: The left side panel of the figures reports the dose-response function providing graphical representations of the relationship between GIs and FDI jobs created; the right side panel depicts the treatment effect function, that is, the first derivative of the respective dose-response function. The middle line refers to the function, while the top and bottom lines represent 95% confidence intervals. We use bootstrap methods to obtain the dose-response function standard errors and confidence intervals, which are included in the figures as lower and upper bounds (Bia & Mattei, 2008). Models have been estimated with the constant. The number of jobs created is measured in terms of the estimated number of new people employed thanks to each investment. GVA is considered at constant prices. Countries included in the sample: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Lithuania, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, United Kingdom and Ireland.

To account for the effect of GIs that materializes through the attraction of FDI inflows, our treatment is now captured by the interaction term between the original GI treatment variable and an FDI dummy variable equal to 1 if FDI inflows are recorded in the same NUTS3 region. As for the baseline model, the treatment variable is regressed on the contextual observable covariates affecting FDI and GIs diffusion in each NUTS3.[21] Positive employment growth is recorded in response to treatment for both agricultural and non-agricultural sectors. The treatment effect functions in Figure 6 reveal that at the maximum level of treatment, an increase in the treatment is associated with around 30,000 additional employees for the manufacturing sector (including the manufacture of food products; Figure 6a); 20,000 additional employees for the food and services activities (i.e., wholesale and retail trade, transport, accommodation and food service activities, information and communication; Figure 6b); and with less than 10,000 additional employees for agriculture (Figure 6c).[22] Overall, the positive effects of GIs channelled to the local economy through FDI drive the local economy towards a sectorial composition favouring non-farming activities with higher value-added (Crescenzi, De Filippis, et al., 2022).

6 | THE IMPACT OF GIs IN HETEROGENEOUS SCENARIOS

In this section, we qualify the impacts estimated by testing if they are influenced by certain conditions of the local areas or of the foreign investors. We focus on the conditioning role played by regional institutional quality, on the relevance of previous exposure of the area to foreign investments, and the EU/non-EU origin of foreign investors.

Institutional quality plays a role in facilitating FDI attraction (e.g., Peres et al., 2018; Rubini et al., 2021). It is widely accepted that FDI exhibits a stronger aversion to economic contexts with weaker economic institutions. Accordingly, we divide the sample of our NUTS3 regions into two sub-samples according to the European Quality of Government Index (EQI) level of the region to which they belong, and we re-estimate our GPS model.[23] The effect of GIs is confirmed to be positive and significant for the sample of NUTS3 belonging to regions with weaker institutions only (where regional institutions are good, GIs seem to be less relevant since foreign investors are already attracted by supportive formal institutions; Figure S4).[24] Conversely, areas belonging to institutionally weaker

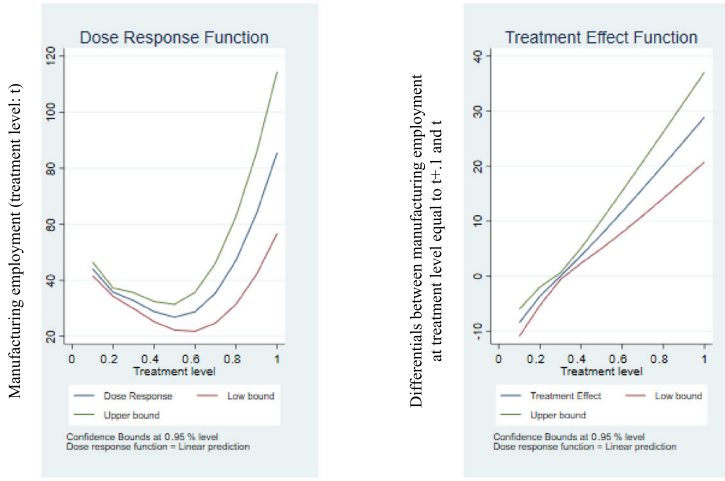
[21]The variables used are the same of the main model (Table S1) as we had already included all the available observable variables that could separately and jointly affect the presence of FDI and sectorial employment.

[22]Referring to the nomenclature used so far (*agribusiness* vs. *agribusiness-related*), if we had the opportunity of distinguishing activities within the NACE category (for instance, manufacture of food products within manufacturing), we would classify these activities as *agribusiness-related* ones. However, data are not available at a disaggregated sectoral level. Estimation of the dose-response function and treatment effect are available under request for all the sectors under analysis.

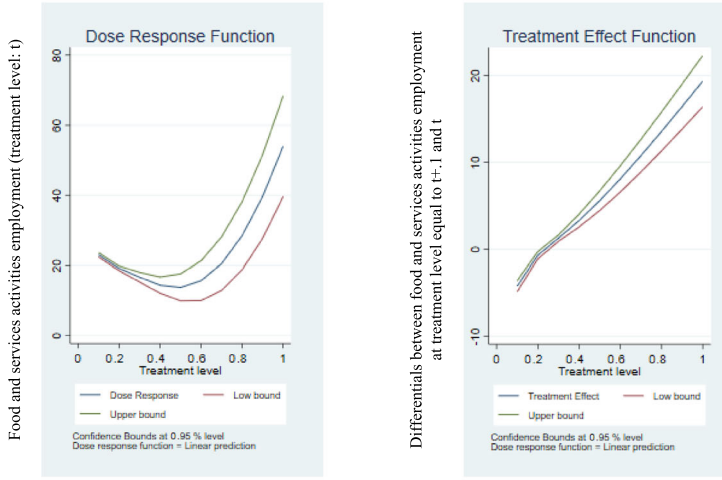
[23]The EQI regional (NUTS2) index is based on four indicators (control of corruption, government effectiveness, rule of law, and voice and accountability) combined into one composite index (equal weighting) (Charron et al., 2014). This index is available only for 2010, 2013 and 2017, hence we have reconstructed data for ante-2010 years. To split the sample, we used the mean of the EU EQI index.

[24]Table S5 reports results for the test of the polynomial parameterization of the conditional expectation of the outcome as a function of the observed treatment and the estimated GPS.

(a) manufacturing



(b) food and services activities



(c) agriculture

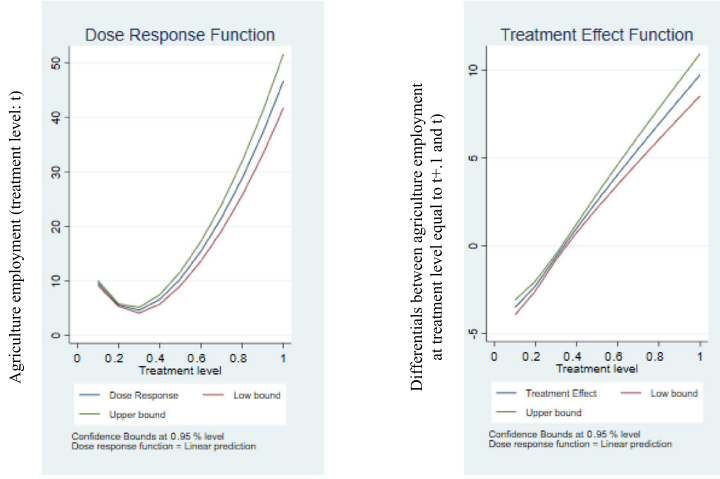


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FIGURE 6 Effects of geographical indications (GIs) on employment by sectors. *Notes*: The left side panel of the figures reports the dose–response function providing graphical representations of the relationship between treatment (here the interaction term between the original GI treatment variable and an FDI dummy equal to 1 if FDI inflow) and employment (number of people); the right side panel depicts the treatment effect function, that is, the first derivative of the respective dose–response function. The middle line refers to the function, while the top and bottom lines represent 95% confidence intervals. We use bootstrap methods to obtain the dose–response function standard errors and confidence intervals, which are included in the figures as lower and upper bounds (Bia & Mattei, 2008). Models have been estimated with the constant. Employment (thousand persons) by NUTS 3 regions and NACE classification (*source*: Eurostat). Countries included in the sample: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Lithuania, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, United Kingdom and Ireland.

regions can find in the GIs an opportunity to offer supportive local conditions and capabilities specifically to foreign investors: in this case, GIs can work as a sort of "institutional plumber" able to replace the role usually played by good regional institutions.

Given their international reputation, GI areas that were highly internationalized could have been more prone to attract FDI than other GI areas (Barry et al., 2003). Given that the 2008 financial crisis triggered a generalized stagnation of FDI flows, we use data on FDI inflows recorded before 2009 to cluster NUTS3 by their long-term internationalization level. Then, we re-estimate our GPS model for the two samples (NUTS3 above or below the mean of pre-2009 FDI). In this case, the two dose response functions are not significant for different levels of the GI treatment (Figure S5) suggesting that the GIs effects does not depend on previous FDI attraction.[25]

The existence of a specific regulatory framework for GIs of the EU might imply that European investors are better at recognizing the value of GIs. Investors outside Europe might be less aware of the local assets that a GI area can offer or can be simply less sensitive to GIs *per se*. Here we verify to what extent the recognized value of GIs mediates FDI attraction. We distinguish between FDI from the European Union (EU FDI) and from outside the European Union (non-EU FDI). By re-estimating our GPS model, we found that the positive impact of GIs is significant only for intra-EU FDI, that is, GIs are more effective in attracting EU (vs. non-EU) investors, which are more familiar with GI regulations (lower lack of information) and culturally closer to host economies (Figure S6).[26] To ensure that the EU GIs scheme delivers at its best, a capillary and global diffusion of the scheme needs to be pursued: an increment of EU GIs recognized in international treaties, a stronger openness of the EU scheme towards GI products from all over the world and a mutual acknowledgement of the different existing schemes are key in this regard.

7 | CONCLUSIONS

Intangible assets, such as historical know-how, socio-cultural traditions and local habits, which by definition are community-based and not replicated elsewhere, might increase the competitiveness of territories and their attractiveness to capital and skills. With this starting point, one of the main objectives of the European GI scheme is to preserve high-quality local production at the national and international levels. This paper aims to investigate empirically the effectiveness of the GI scheme in leveraging historical socio-cultural expertise to foster openness and global competitiveness in (rural) local areas.

[25]Table S6 reports results for the test of the polynomial parameterization of the conditional expectation of the outcome as a function of the observed treatment and the estimated GPS.

[26]Table S7 reports results for the test of the polynomial parameterization of the conditional expectation of the outcome as a function of the observed treatment and the estimated GPS.

According to our analysis, a formal acknowledgement of historical know-how and high-quality reputation can transform local expertise, socio-cultural assets, and natural and human local characteristics into global connectivity. In particular, our results suggest that the GI scheme allows NUTS3 characterized by territorially embedded systems of production to be more attractive for international investors than similar areas, generating potential virtuous impacts on local employment and capital endowment. Without the acknowledgement of GIs, those territories would have attracted less FDI. In particular, the presence of GIs seems relevant for attracting FDI in those activities linked to the agri-food sector, also if not directly involved in narrowly defined agricultural production.

The results are corroborated in several models and with a series of tests. The limitation that must be considered is the lack of data on M&A that allows us to only assess the GIs' effects on greenfield FDI attraction, excluding the M&A part of the foreign investment. Due to the lack of data on domestic national investment, we are not able to investigate whether the foreign investments attracted by GIs are multiplicative or substitutive relative to domestic ones. Finally, a product-level analysis would make it possible to estimate how specific GI products might attract specific types of investment.

The recent adoption of the EU's Resilience and Recovery Facility (RRF) and the new scheme of the Common Agricultural Policy (CAP) suggest a growing consensus on the pivotal role expected to be played by agri-food systems and rural areas in mastering the transition towards a sustainable economy (Matthews, 2020). From this perspective, this paper offers relevant policy implications.

Over recent decades, the urban centralization of past development policies has led to an erosion of both private companies and public social and infrastructural services in rural areas. The GI scheme can be considered one of the few policy tools that has attracted new investments in rural areas (Huguenot-Noel & Vaquero-Piñeiro, 2022). The additional opportunities generated may encourage people to live and work in the GI areas, contrasting unfavourable demographic trends and economic stagnation that have characterized many rural areas for decades.

Even with the growing role of global standardization in supply chains, GIs are a concrete example of how local peculiarities and added values cannot be replicated elsewhere, if correctly valorized, can support territories within the global competition arena. Certainly, to be consistent with EU objectives, this policy needs to support internationalization, the attraction of international investors and the expansion of the scale of production, while preserving traditional local actors and small farmers.

The design of policies that preserve local skills and recognize them at a global scale should therefore be promoted, especially in those territories characterized by lower investments, such as rural areas, with special attention to the prevention of local producer shrinks.

Finally, our results align with the hypothesis that the highest returns from policy efforts come from the possibility of relying on strong local stakeholders: we found that the GI scheme can play a particularly significant role in those NUTS3 regions that belong to regions that do not benefit from virtuous institutions, acting as a sort of replacement able to signal the quality of the local system, counterbalancing the difficulties encountered by territories characterized by low contextual attractiveness and territorial competitiveness. From this perspective, a community-based and territorial-oriented approach supporting local informal institutions in the context of national and supranational policies is key.

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ORCID

Riccardo Crescenzi https://orcid.org/0000-0003-0465-9796
Mara Giua https://orcid.org/0000-0001-8923-437X
Luca Salvatici https://orcid.org/0000-0003-1791-1663
Cristina Vaquero-Piñeiro https://orcid.org/0000-0002-1378-3361

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SUPPORTING INFORMATION

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