Friends or Foes? Investigating collective intellectual property rights in innovation in the EU wine industry

Abstract

Collective intellectual property rights are key instruments through which regions govern shared territorial and reputational assets, yet whether they enable or constrain regional innovation remains unresolved. Drawing on a panel of 239 EU wine regions from 1996 to 2024, this study examines how geographical indications and collective trademarks relate to regional innovation, proxied by individual trademark registrations and complemented by a semantic novelty analysis of trademark descriptions. The baseline association between geographical indications and trademark activity is negative, while collective trademarks provide statistically insignificant results. Both associations, however, are institutionally contingent: while formal governance quality restructures the relationship between collective IP and innovation in terms of both quantity and quality, social trust influences only the qualitative character of innovation in trademark descriptions. These findings reframe the policy question from whether CIPRs help or hinder innovation to under what institutional conditions they produce either outcome and through which channel.

JEL code: O34, O43, R11

1. Introduction

Innovation policy has increasingly shifted its focus beyond aggregate economic growth to address where innovation occurs, how it is generated and diffused across territories, and which mechanisms sustain long-term regional competitiveness (McCann & Ortega-Argilés, 2015; Rodríguez-Pose, 2018). These concerns are particularly salient in the European Union, where innovation capacity and economic development remain unevenly distributed across highly heterogeneous regions, consequently reinforcing persistent core–periphery divides and

renewing attention to place-based development strategies (Iammarino et al., 2019; Barca et al., 2012). While much of the regional innovation debate has focused on R&D-intensive sectors, this place-based perspective is equally important for traditional industries such as agri-food and wine, where competitive advantage is built on territorial reputation, cultural heritage, and embedded local knowledge (Belletti et al., 2017). In these industries, the collective governance of place-based assets is a critical determinant of regional innovation capacity, and the institutional instruments through which that governance operates could determine regional competitiveness and survival of local firms. Yet whether these instruments enable regional innovation, and under what institutional conditions, remains an open question.

This study investigates how one such set of instruments, collective intellectual property rights, specifically geographical indications (GIs) and collective trademarks, shapes regional innovation in the EU wine industry. Geographical indications protect the link between product reputation and geographic origin, while collective trademarks enable producer associations to signal shared characteristics without a mandatory territorial link. Both instruments are designed to support collective reputation and mitigate information asymmetries by signalling origin and shared product characteristics to consumers; in practice, they operate through shared rules of use, eligibility criteria, and enforcement protocols, which make collective governance capacity a precondition for their effectiveness (Crescenzi et al., 2022; Ghafele & Gibert, 2012). Their implications for innovation, however, are not straightforward. On the one hand, CIPRs may facilitate coordination among dispersed producers, strengthen collective reputation, cluster formation, resource pooling and sustain price premia that support regional development and innovation (Castaldi et al. 2026; Ghafele & Gibert, 2012; Menapace & Moschini, 2024). On the other hand, the same rule-based protection may introduce rigidity and standardisation, reduce competitive pressure, and

encourage rent-preserving strategies that weaken incentives for experimentation and innovation (Josling, 2006).

This ambiguity motivates our central inquiry. Building on Ostrom's (1990) framework for commons governance and its extension to knowledge commons (Hess & Ostrom, 2007; Mazé, 2023), we argue that the same collective IP instrument can function as either a coordination device enabling innovation or a rent-seeking mechanism inhibiting it, depending on the quality of formal institutions and the depth of social trust in the region. To investigate this, we construct a panel of 239 NUTS-2 EU wine regions spanning 1996 to 2024, combining data on GI and collective trademark registrations, with individual trademark registrations as a proxy for regional innovation. We employ Poisson Pseudo-Maximum Likelihood (PPML) estimators with region and year fixed effects to assess how regional exposure to CIPRs shapes subsequent trademark activity and interact CIPR variables with formal institutional quality and generalised social trust to examine institutional heterogeneity. We complement these count-based measures with a semantic novelty analysis of trademark goods and services descriptions using sentence-transformer embeddings, which allows us to move beyond the volume of trademark filings and assess whether CIPRs restructure the qualitative character of regional innovation. We further examine whether these dynamics differ systematically between core and peripheral regions, where CIPRs are critical tools for economic development and composition of local institutions are different than core regions (Trippl et al., 2018). Taken together, these empirical choices lead us to move beyond the binary question of whether CIPRs help or hinder innovation towards a more institutionally grounded account of when, where, and through which governance channels collective intellectual property rights enable regional innovation.

The remainder of the paper is structured as follows. Section 2 develops the conceptual framework, where we draw on commons' governance theory and the regional innovation

systems literature to derive hypotheses on the relationship between CIPRs, institutional quality, and regional innovation. Section 3 describes the wine industry context. In the section 4, the data used will be introduced. Section 5 outlines the empirical strategy, including the PPML baseline, institutional and peripheral heterogeneity specifications, and the semantic novelty analysis. Section 6 presents the results and Section 7 discusses their theoretical and policy implications. Section 8 concludes.

2. Conceptual framework

We begin with the core premise of territorially oriented innovation systems literature: innovation is not a random process but is closely tied to the social and physical conditions in which it takes place (Doloreux & Parto, 2005; Tödtling & Grillitsch, 2015, p. 1745), including regional institutions (Cooke, 2008; Rodríguez-Pose, 2020). Within certain administrative or territorial boundaries, regional institutions support firms by stimulating knowledge creation and protection, developing human capital, and regulating economic activities (Cooke, 2008). The successful coordination of these elements is critical for establishing and maintaining "innovative regions". Building on this premise, territorial embeddedness of economic actors does not translate into uniform outcomes but can lead to different innovation trajectories depending on sector-specific dynamics (Malerba, 2002) Sectoral knowledge bases shape how territorial embeddedness of firms and other regional stakeholders translates into innovation (Asheim & Coenen, 2005). While in science-based industries, innovation requires access to codified knowledge and R&D infrastructure (Asheim, 2007), in market-based and experience-intensive sectors such as wine, innovation follows trajectories that rely more heavily on experiential learning and tacit knowledge (Giuliani & Bell, 2005), as well as symbolic knowledge related to branding and cultural values (Asheim & Hansen, 2009).

2.1. Collective Intellectual Property Rights

To translate this reliance on symbolic knowledge and localised assets into sustained economic performance, regions frequently employ collective branding as a formal coordination strategy. Collective intellectual property rights are the primary formal instruments through which regions institutionalise this coordination. These instruments enable producers to pool reputational assets, signal quality to distant markets, and govern shared territorial resources collectively (Castaldi et al., 2026; Belletti et al., 2017). Geographical indications protect the link between product reputation and geographic origin, representing centuries of collective effort by local stakeholders (Crescenzi et al., 2022; Belletti et al., 2015). As place-based assets, they are central to rural development strategies across the EU. Similarly, collective trademarks are owned and regulated by a collective entity, such as a union, cooperative, or similar organization, and are designed to represent generally regionally tied stakeholders' interests (Castaldi & Mendonça, 2022; Ghafele & Gibert, 2012, p. 752). Member entities are permitted to use a collective trademark provided they adhere to the specific conditions and regulations set forth by the owning organization (European Parliament and Council, 2017, Article 76; Castaldi et al. 2026). Non-compliance with these standards may lead to the revocation of permission to utilize the collective mark (European Parliament and Council, 2017, Article 81). Moreover, akin to individual trademarks, collective trademarks mitigate information asymmetry among consumers and provide the ability to differentiate goods or services (Bruch et al., 2014). Table 1 below summarises the differences between collective trademarks, individual trademarks, and geographical indications.

Table 1: The comparison of different CIPR instruments. Source Castaldi et al. 2026, ***Territorial Basis and Governance*** **added by the author.**

Characteristics	**Individual trademark**	**Collective trademark**	**Geographical Indications**
Function	Any sign that identifies the commercial source or origin of goods/services sold in the market	Any sign that identifies the goods or services of members of a particular group	Protecting the names of products that have specific geographic origins and are recognized for their distinct characteristics or reputation associated with the area of production
Duration	Renewable 10-year periods, until infinite	Renewable 10-year periods, until infinite	Depends, often infinite
Ownership	Applicant (individual or company)	The members of the association owning the collective mark	Governments or organizations working with governmental bodies
Use/licensing	The owner of the mark	All entities complying with the conditions for membership of the association	Local producers and service providers associated with the specific region
Territorial Basis	None Required	None Required	Required by definition
Governance	Individual	Associational	Territorial consortium

Studies have yet to reach a consensus on the relationship between CIPRs and innovation. The literature establishes that CIPRs function as far more than mere legal protectionist instruments; they act as governance mechanisms that actively shape the innovation-motivated

behaviour of producers (Castaldi et al., 2026; Belletti et al., 2017). The regulatory frameworks underpinning GIs, for instance, can act as induced drivers of technological change due to compliance pressure that compels firms to upgrade their operational capabilities. Meloni and Swinnen (2018) argue that the rise of quality standards inherent to GI governance incentivises producers to innovate within their processes to ensure consistency and meet market expectations. Recent empirical evidence supports that this institutional pressure increasingly directs innovation toward sustainability. For instance, Habli et al. (2023) observe that GI regulations are adapting to mitigate environmental impacts, pushing producers to explore novel production techniques and reconfigure business models. Similarly, Silva et al. (2024) find that producers frequently incorporate innovative applications to enhance the sustainability of traditional methods. Therefore, the regulations of geographical indications and pressure for compliance motivate producers to seek more efficient agricultural methods and drive a trajectory of qualitative upgrading. Notably, by using patent data, Stranieri et al. (2023) find that GIs can foster innovation, particularly in less-developed EU regions, while exerting a slightly negative effect in technologically advanced areas. Moreover, while evidence on collective trademarks remains more limited, existing studies suggest they can stimulate innovative performance in clusters by enabling shared branding strategies that support product differentiation and market expansion (Castaldi et al., 2026; Ghafele & Gibert, 2012).

Conversely, a significant strand of literature posits that CIPRs function primarily as conservative forces that inhibit rather than stimulate innovation. Under the EU's *sui generis* system, GIs operate as protectionist mechanisms that limit competition within the economic landscape. As Josling (2006) argues, these instruments elevate producers from “the flat plains of perfect competition to the foothills of monopolistic competition.” In this view, the system bars competitors from using protected names, which eventually allowing regional

stakeholders to capture economic rents based on exclusivity. Consequently, the primary objective becomes the defence of existing market positions rather than the pursuit of innovation. Frankel (2011) supports this, noting that geographical indications are designed chiefly to safeguard tradition and thus "preserve the status quo, rather than directly enhance innovation" (p. 261). This conservative tendency is reinforced by the regulatory structure itself. EU Regulation 1151/2012 imposes strict product specifications that geographically tie production to specific regions and methods (European Parliament and Council, 2012). This narrowing of permissible processes can discourage producers from experimenting with new techniques or ingredients. The codification of traditional practices often creates a form of institutional lock-in, where the agreed-upon Code of Practice becomes difficult to amend even when market conditions or technologies change. Quiñones-Ruiz et al. (2016) highlight that the administrative burden of modifying these specifications creates a high barrier to adaptation, effectively freezing production methods in time. Therefore, firms may find themselves legally restricted from adopting modern, more efficient technologies if those technologies deviate from the traditional methods mandated by the GI specification

Furthermore, the economic structure of GIs presents inherent disincentives for individual firm innovation. As Langinier and Babcock (2008) state, the GI functions as a club good, meaning reputation is non-rivalrous but excludable, shared among all producers in the designated region. This creates a strategic dilemma: the private return to any single firm's product innovation diffuses across all users of the name, which eventually, dilutes the payoff for the innovator. While Belletti et al. (2017) argue that collective governance is designed to mitigate free-riding, the risk persists that individual firms will hesitate to invest in R&D if competitors can benefit from the resulting boost in regional reputation without incurring the costs. In addition, the same governance requirements that make CIPRs effective coordination devices can simultaneously exclude smaller or less-equipped producers who are unable to meet these

requirements, particularly where administrative capacity and technical resources are limited (Belletti et al., 2015; Castaldi et al., 2026). Therefore, these two perspectives generate competing predictions. Where collective governance succeeds in aligning producer incentives, CIPRs may sustain price premia and credible signalling that reward quality upgrading. Where it fails, club good dynamics reward adherence to codified standards rather than deviation, and the collective regime acts to preserve existing quality signals rather than encourage disruptive innovation (Langinier & Babcock, 2008; Belletti et al., 2017). We therefore propose two competing hypotheses:

H1a: *CIPR registrations are positively associated with regional innovative performance.*

H1b: *CIPR registrations are negatively associated with regional innovative performance*.

2.2. Collective intellectual property rights and institutions

Yet both competing expectations in H1 rest on an implicit assumption: that the institutional environment in which CIPRs operate is homogeneous. Once this assumption is relaxed, the expected relationship between CIPRs and innovation becomes contingent on the governance conditions and informal relationships under which these instruments operate. Challenging the deterministic view of the "tragedy of the commons" (Hardin, 2000), the seminal work of Elinor Ostrom stressed that the sustainability of shared resources fundamentally relies on institutional frameworks. These frameworks must effectively integrate formal rules with informal social norms, participatory decision-making, and mechanisms for conflict resolution (Ostrom, 1990). This concept of the commons was later extended beyond physical resources and included "knowledge commons", intellectual sources created and maintained by multiple actors and are "subject to social dilemmas" (Hess & Ostrom, 2007). CIPRs can be understood as a knowledge common (Mazé, 2023). For example, a GI's shared resource includes place-based knowledge, traditional production techniques, and a collective reputation built over

generations (Belletti et al., 2017; Mazé, 2023). However, similar to the commons, the fate of these collective assets depends on the ability of local actors to develop and enforce rules, resolve conflicts, and prevent elite capture (Belletti et al., 2017).

Where CIPRs are located matters as much as what they are. In regions with strong institutions, we can expect collective organisation to be easier and transaction costs to be lower (North, 1990) and contracts to be more enforceable, and elite capture to be harder, which signals conditions that shape whether CIPRs function as coordination devices or rent-seeking instruments. (Crescenzi et al., 2022)

The regional governance literature demonstrates substantial variation in institutional quality across EU regions (Charron et al., 2014; Rodríguez-Pose & Di Cataldo, 2015). In institutionally strong environments, producers face lower barriers to consortium formation, more reliable contract enforcement, and reduced risks of elite capture. Informal institutions, particularly generalised social trust, further facilitate the cooperative behaviours necessary for effective collective governance (Putnam, 1993; Knack & Keefer, 1997). Trust reduces monitoring costs, enables credible commitments, and supports the reciprocal exchanges that underpin successful commons management (Ostrom, 1990). Where both formal and informal institutional quality are high, CIPRs are more likely to function as coordination-enabling devices that support innovation; where institutional quality is low, the same instruments may be captured by narrow interests or fail to overcome collective action problems, hence reinforcing rent-seeking over innovation. Thus, depending on the strength of governance and local institutions as well as general trust among producers, these collective resources can either empower all local producers in various mechanisms and, theoretically, encourage innovative collaborations, or be hijacked by a privileged few, who then deliberately exploit a shared heritage and turn it into a private monopoly.

Collective trademarks follow a different logic. Unlike GIs, they carry no mandatory territorial anchorage and function primarily as associational coordination devices (European Parliament and Council, 2017), so their relationship with institutional quality is theoretically less clear and we make no strong directional prediction for the collective trademark channel. Therefore, how institutional context shapes these associations and whether it does so differently for GIs and collective trademarks is an empirical question we investigate directly.

H2*: The association between CIPRs and innovation is moderated by institutional quality*

2.3. Collective intellectual property rights and peripheries

The institutional conditionality established in H2 takes on a spatial dimension when governance capacity itself varies systematically across the core-periphery divide. Literature suggests that CIPRs can serve as institutional kits to offset peripheral disadvantages. They act as effective tools within a region's legal infrastructure to facilitate the use of collective assets (Castaldi et al., 2026). Primarily, CIPRs foster the collective management of geographically rooted resources, such as toponyms and traditional knowledge, enabling resource pooling to tackle market and institutional barriers (Belletti et al., 2015; Quiñones-Ruiz et al., 2016). For instance, traditional knowledge, often treated as a non-excludable and non-rivalrous resource, is frequently neglected in conventional innovation systems that prioritise proprietary ownership (Morales et al., 2023). CIPRs provide a mechanism to integrate such knowledge into innovation systems for diverse uses and transform it into a collective asset that drives innovation. Evidence from other traditional sectors supports this potential: indigenous communities in Peru have used collective trademarks to protect cultural heritage while engaging in market-oriented innovation (Jimenez et al., 2022).

Whether wine regions, with long histories of collective governance, can similarly leverage CIPRs as institutional kits remains an empirical question. However, this potential faces a

significant structural constraint. While CIPRs suggest a promising toolkit, their implementation is contingent upon the very institutional capacity that peripheral regions often lack. These regions are frequently characterised by structural challenges, including weaker institutional frameworks, limited access to markets, and fragmented knowledge networks (Eder, 2019; Grillitsch & Nilsson, 2015). Through the lens of the regional innovation systems literature, peripheral areas are conceptualized as "institutionally and organizationally thin" spatial units due to their limited local endowments (Trippl et al., 2018). In such sparse environments, the fragmentation of local actors increases the coordination costs required for participatory governance, which oftentimes hinder the emergence of collective action (Tödtling & Trippl, 2005; Isaksen, 2001). Consequently, without robust local governance to enforce rules and facilitate trust, CIPRs in the periphery risk failing to mobilize local assets effectively or falling prey to elite capture, thereby dampening their innovation potential (Belletti et al., 2017).

The theoretical relationship between peripherality and CIPR effectiveness is thus ambiguous. On one hand, CIPRs may serve as particularly valuable institutional kits in peripheral regions that lack alternative coordination mechanisms. On the other hand, the "institutional thinness" characteristic of peripheral regions may undermine the governance capacity necessary for CIPRs to function effectively. Given this ambiguity, and recognising that peripherality may substantially overlap with the institutional quality dimension examined in H2, we explore whether peripherality exerts an independent moderating effect:

H3: The association between CIPR intensity and regional innovation differs between core and peripheral regions.

3. Wine Industry

We have considered the wine sector for our empirical setting for several reasons. Geographical indications are historically embedded within the sector and collective quality regimes dating back centuries in some European regions (Meloni & Swinnen, 2018). As of 2023, the EU alone accounts for 60% of global wine production, yet the sector undergoes rising pressures, such as climate disruption, shifting consumer preferences, and intensifying global competition. Global consumption and production in 2024 stand at their lowest levels since 1996 and 1961, respectively (OIV, 2024). These pressures create ongoing demands for innovation and adaptation, and the tension between tradition preservation and market responsiveness that characterises wine production foregrounds precisely the governance questions that motivate our inquiry.

The wine industry has also been a focal point in the innovation studies literature, particularly regarding knowledge exchange and its influence on regional innovation dynamics. Seminal contributions state the uneven distribution of knowledge spillovers within wine clusters: while some firms occupy central network positions, others remain peripheral, benefiting instead from external linkages that can outperform localised knowledge networks in growth, exports, and innovation (Giuliani & Bell, 2005; Morrison & Rabellotti, 2009). Informal cooperation, university linkages, and public research bodies further shape regional innovation systems in the sector (Dana et al., 2013; Giuliani & Arza, 2009). That said, the role of tools like CIPRs, which play a significant role in structuring producer interactions, on innovation remains underexplored.

4. Data

4.1. Independent variables and controls

Data on GIs were collected from the European Commission's eAmbrosia and GIview databases. We identified 1,633 geographical indications relevant to wine, encompassing both

Protected Designations of Origin and Protected Geographical Indications. These instruments represent the primary mechanism through which European wine regions protect place-based reputation and coordinate collective quality standards. Each GI record was geo-referenced to NUTS-2 regions based on the registered geographic area[1], and the key variable is a count of cumulative GI registrations per region-year. Additionally, we identified 193 EU collective trademarks relevant to wine products, included if their description fields mention the word "wine". Each collective trademark was geo-referenced to the NUTS-2 region of the registered owner's address.

Regional controls are drawn from Eurostat (GDP per capita, population, tertiary education share) and OECD REGPAT (patent counts). Patent applications are included as a control to account for the broader innovative capacity of the region (Rodríguez-Pose & Di Cataldo, 2015). Data on vineyard share of utilised agricultural area is derived from the Farm Accountancy Data Network. Formal institutional quality is sourced from the European Quality of Government Index (EQI), developed by the Quality of Government Institute at the University of Gothenburg and available at the NUTS-2 level for survey years 2010, 2013, 2017, 2021, and 2024 (Charron et al., 2014). The EQI captures perceived impartiality, quality of public services, and control of corruption across EU regions. Informal institutional data are drawn from the European Social Survey (ESS ERIC, 2023), waves 5–11 (2010–2022). For each biennial wave, individual-level responses are aggregated to NUTS-2 regions using the ESS post-stratification weight, which corrects jointly for sampling design and non-response (Kaminska, 2020). Three items are used: interpersonal trust, perceived fairness, and perceived helpfulness, each measured on a 0–10 scale. Following Muringani et al. (2021), each item is standardised to zero mean and unit variance and averaged into a composite. Both the EQI and

[1] Geographical indications spanning multiple NUTS-2 regions were excluded from the sample.

ESS composites are conducted at intervals rather than annually; each wave value is therefore carried forward until the next survey round (Muringani et al. 2021). Given the slow-moving nature of both institutional quality and social trust, this approach introduces minimal distortion across interpolated intervals. Both composites are standardised to zero mean and unit variance prior to analysis. As the EQI is available only from 2010 onward, institutional heterogeneity analyses are restricted to the post-2010 period.

4.2 Innovation Outcome: Trademarks

As a proxy for regional innovation, we use the count of registered and expired EU individual trademarks. The final dataset includes 31,269 EU individual wine-related trademarks geo-referenced to NUTS2 regions based on the applicant address.

Our choice of trademarks as an innovation proxy reflects both theoretical and sectoral considerations. First, trademarks provide a more accessible and cost-effective means of intellectual property protection compared to patents, making them particularly suitable for capturing innovation among small and medium enterprises that dominate the wine industry (Cohen et al., 2000; Broccardo & Zicari, 2020). Second, trademark filings provide broader geographical coverage than patents, which concentrate heavily in metropolitan areas (Castaldi, 2024b), an important consideration for wine production, which predominantly takes place in rural regions. Third, trademarks capture the marketing-driven, incremental forms of innovation characteristic of the wine industry: differentiation, brand development, packaging innovations, and market positioning rather than patentable invention (Flikkema et al., 2021). Moreover, we address the count problem in trademarking through outcome categorisation and placebo testing. We categorise trademarks into four groups: (1) all wine-related trademarks, providing the broadest measure; (2) service and product trademarks (Nice codes 30+), capturing market-facing innovation; (3) wine-specific trademarks (Nice code 33),

the most narrowly targeted measure; and (4) out-of-sector trademarks (Nice codes below 30), serving as a placebo to test whether observed associations reflect wine-specific mechanisms or general regional confounding.

We acknowledge that not all trademark registrations indicate innovation. Trademarks may be filed defensively or for imitative purposes, meaning that count increases may reflect intensified filing activity rather than product differentiation (Castaldi, 2024a; Flikkema et al., 2014). To disentangle volume from quality, we complement count-based measures with a semantic novelty analysis that evaluates whether individual filings represent substantively differentiated market signals. Building on embedding-based novelty measurement developed in patent research (Arts et al., 2018; Kelly et al., 2021), we adapt semantic similarity methods to the trademark context.

5. Methodology

5.1 Empirical Strategy

Our empirical strategy employs panel data regression with lagged CIPR variables, incorporating region and year fixed effects to control for time-invariant regional heterogeneity and common temporal shocks. Region fixed effects absorb time-invariant characteristics that might confound CIPR–innovation associations; year fixed effects absorb EU-wide trends in wine trademark filing, policy changes, and other macroeconomic conditions. Given the count nature of our dependent variable and the prevalence of zeros, we implement a Poisson Pseudo-Maximum Likelihood estimator with high-dimensional fixed effects. PPML provides consistent estimates under weaker distributional assumptions than negative binomial models and handles zeros naturally (Correia et al., 2020; Silva & Tenreyro, 2006). The baseline specification is:

(1) $TM_{rt} = \alpha_r + \delta_t + \beta_1 GI_{r,t-1} + \beta_2 CT_{r,t-1} + \gamma' \mathrm{X}_{rt} + \varepsilon_{rt}$

where TM_{rt} denotes trademark registrations in region r in year t; $GI_{r,t-1}$ is lagged GI exposure; $CT_{r,t-1}$ is lagged collective trademark exposure; X_{rt} is a vector of controls including log GDP, log population, tertiary education share, patent applications, and vineyard share of utilised agricultural area; α_r and δ_t capture region and year fixed effects respectively. Standard errors are clustered at the regional level. Descriptive statistics for all variables are reported in Table 2, and pairwise correlations among key variables are provided in the appendix.

Table 2. Descriptive Statistics

Variable	Mean	SD	Min	Max	N
Dependent variables					
Trademarks (all classes)	5.96	13.87	0	198	5,447
Trademarks (wine, Cl. 33)	1.47	5.12	0	92	5,447
Trademarks (food/bev, Cl. 30+)	3.06	8.07	0	117	5,447
Trademarks (placebo, Cl. <30)	0.63	2.52	0	78	5,447
Key regressors					
Geographical indications	0.16	1.13	0	50	5,447
Collective trademarks	0.02	0.17	0	4	5,447
Institutional variables					

Institutional quality	0.01	1.00	−2.53	2.89	2,581
Social trust	−0.08	1.00	−2.96	2.13	2,637
Controls					
log GDP	10.27	1.10	6.69	13.70	5,447
log Population	14.11	0.87	10.15	16.34	5,447
Tertiary education (%)	25.88	10.09	3.6	62.1	5,447
Patent applications	203.54	470.57	0	3,808	5,447
Vineyard share of UAA	0.022	0.049	0	0.465	5,447

5.2 Institutional Heterogeneity

Formal institutional quality is measured using the EQI composite described in Section 4, standardised to zero mean and unit variance. This restricts the institutional analysis to the post-2010 period. The model is shown below:

(2) $TM^R_t = \alpha^R + \delta_t + \beta_1 CT^R_{t-1} + \beta_2 GI^R_{t-1} + \beta_3 EQI^R_{t-1} + \beta_4 (CT^R_{t-1} \times EQI^R_{t-1}) + \beta_5 (GI^R_{t-1} \times EQI^R_{t-1}) + \gamma' X^R_t + \varepsilon^R_t$

where β_2 and β_1 capture the baseline associations of GI and collective trademark registration with regional trademark activity, respectively, β_4 and β_3 capture how these associations vary with formal institutional quality, and $\gamma' X^R_t$ denotes the vector of regional controls. As both composites are standardised, the interaction coefficients are directly interpretable as the change in the GI or CT and innovation association per one standard deviation increase in institutional quality. To distinguish the role of formal governance from informal cooperative

norms, we estimate a parallel specification replacing the EQI composite with the generalised social trust index described in Section 4:

(3) $TM^R_t = \alpha^R + \delta_t + \beta_1 CT^R_{t-1} + \beta_2 GI^R_{t-1} + \beta_3 TRUST^R_{t-1} + \beta_4 (CT^R_{t-1} \times TRUST^R_{t-1}) + \beta_5 (GI^R_{t-1} \times TRUST^R_{t-1}) + \gamma' X^R_t + \varepsilon^R_t$

where β_4 analogously captures whether the GI–innovation association is moderated by generalised social trust rather than formal governance capacity.

5.3 Peripheral Heterogeneity

A distinctive feature of CIPRs is their potential to valorise place-based assets in economically lagging territories. We interact GI registration with a time-varying indicator of peripherality:

(4) $TM^R_t = \alpha^R + \delta_t + \beta_1 GI^R_{,t-1} + \beta_2 CT^R_{,t-1} + \beta_3 PERIPH^R_t + \beta_4 (GI^R_{,t-1} \times PERIPH^R_t) + \beta_5 (CT^R_{,t-1} \times PERIPH^R_t) + \gamma' X^R_t + \varepsilon^R_t$

We define peripheral regions as those that fall simultaneously in the bottom quartile of both GDP per capita and tertiary education share in each year, allowing regions to enter and exit peripheral status as their relative rankings shift over time. This dual criterion identifies regions that are structurally disadvantaged along both economic output and human capital dimensions. The coefficients β_3 and β_4 capture whether the association between CIPR registration and innovation differs systematically between core and peripheral regions.

5.4 Semantic Novelty Analysis

An important question is whether CIPR registration crowds out private trademark filings or simultaneously restructures the qualitative composition of trademarking activity. To address this, we develop a text-based semantic novelty analysis exploiting the Goods & Services textual descriptions accompanying every EUIPO trademark filing. Our approach adapts the text-based novelty measurement pioneered in the patent literature by Arts et al. (2018) and

Kelly et al. (2021) to the trademark context, where textual descriptions of goods and services provide a detailed, machine-readable record of what each filing covers.

We encode each trademark's goods and services description using the all-mpnet-base-v2 sentence-transformer model (Reimers & Gurevych, 2019; Song et al., 2020), which maps text into 768-dimensional embedding vectors optimised for semantic similarity. Text undergoes minimal preprocessing to preserve the full semantic richness required for transformer-based encoding (Reimers & Gurevych, 2019). For textual data, we use descriptions of trademarks under Nice 33 class.

We define the novelty of a trademark filed at time t as its semantic dissimilarity from a baseline set of prior trademarks. We compare each trademark with existing regional trademark stock and EU stock. First, we construct Within-Region Novelty using an expanding cumulative baseline of all prior trademarks filed in the same NUTS-2 region and measure the average cosine distance to the $k = 5$ nearest neighbours (Arts et al., 2018). This captures how much a new filing differentiates from local incumbents. Second, we construct EU-Wide Novelty by extending this baseline to all prior EU filings, which removes any mechanical correlation between regional stock size and measured novelty (Arts et al., 2018). In addition to these novelty measures, we construct Within-Region Homogeneity. For each region-year, we compute the average pairwise cosine similarity across all trademarks filed in that region and year. A higher value indicates that filings cluster semantically, while a lower value reflects greater descriptive heterogeneity across the portfolio. We also adapt the portfolio homogeneity approach of Whalen et al. (2020) to regional trademark filings and compute the average pairwise cosine similarity across all trademarks filed in a given region and year.

We aggregate all three trademark-level scores to region-year panels, and estimate the novelty regressions using OLS with region and year fixed effects:

(5) $\text{Novelty}^{R}_{t} = \alpha^{R} + \delta_{t} + \beta_{1}\text{CIPRs}^{R}_{t-1} + \gamma' X^{R}_{t-1} + \theta \ln(N_{p})^{R}_{t-1} + \varepsilon^{R}_{t}$

where β_1 captures the association between lagged CIPRs registration and regional semantic novelty, and θ controls for the size of the respective regional stock for within-region novelty, and the full EU filing archive for EU-wide novelty. For each specification, we include the natural logarithm of the number of prior trademarks in the respective baseline. We include ln(N) to account for the mechanical reduction in average nearest-neighbour distance as the archive grows (see e.g. Arts et al., 2018 for discussion of archive size effects). To examine whether the semantic novelty and CIPRs registration link is institutionally conditioned, we extend the novelty regressions by interacting CIPRs registration with the standardised EQI and TRUST composites, which mirrors the institutional heterogeneity approach in Section 5.2. The interaction specifications take the form:

(6) $\text{Novelty}^{R}_{t} = \alpha^{R} + \delta_{t} + \beta_{1}\text{CIPRS}^{R}_{t-1} + \beta_{2}(\text{CIPRS}^{R}_{t-1} \times \text{EQI}^{R}_{t-1}) + \beta_{3}\text{EQI}^{R}_{,t-1} + \gamma' X^{R}_{,t-1} + \theta \ln(N_{p}^{R})_{t-1} + \varepsilon^{R}_{t}$

and for trust:

(7) $\text{Novelty}^{R}_{t} = \alpha^{R} + \delta_{t} + \beta_{1}\text{CIPRS}^{R}_{,t-1} + \beta_{2}(\text{CIPRS}^{R}_{,t-1} \times \text{TRUST}^{R}_{,t-1}) + \beta_{3}\text{TRUST}^{R}_{,t-1} + \gamma' X^{R}_{t-1} + \theta \ln(N_{p})^{R}_{t-1} + \varepsilon^{R}_{t}$

6. Results

6. 1 Baseline Results

Table 3 presents the baseline PPML estimates investigating the relationship between collective intellectual property rights and individual trademark applications. The results indicate a consistent negative association for GIs across the primary specifications. In the

aggregate model (Column 1), a one-unit increase in lagged GI registrations is associated with a 4.1% reduction in trademark applications. This crowding-out effect remains robust within the food and beverage sector (Column 2), showing a 4.4% decrease. In contrast, collective trademarks do not provide statistically significant results across any of the samples. Notably, the association between GIs and trademarks in the wine sector (Column 3) is statistically insignificant, which signals that the crowding-out dynamic may be mitigated by the specific institutional setup governing wine trademarks. Finally, the placebo test on non-food categories (Column 4) yields insignificant coefficients for both IP types. This confirms that the observed dynamics are driven by sector-specific mechanisms rather than broad, spurious regional trends. These results are consistent with our hypothesis 1b for geographical indications, which show a negative average association with regional trademark activity, while neither hypothesis is supported for collective trademarks.

Table 3. Baseline PPML: GI protection and trademark activity

	(1) All TM	**(2) Food/Bev 30+**	**(3) Wine Cl. 33**	**(4) Placebo <30**
A. Key regressors				
GI registrations (t−1)	−0.041***	−0.044***	−0.034	−0.043
	(0.013)	(0.015)	(0.021)	(0.029)
Collective trademark (t−1)	0.011	0.022	−0.039	−0.013

	(0.028)	(0.021)	(0.035)	(0.110)
B. Controls				
ln(GDP p.c.)	0.870**	1.196***	1.888***	0.367
	(0.357)	(0.396)	(0.581)	(0.556)
Vineyard share	−0.208	−0.078	0.930	−0.707
	(0.550)	(0.495)	(0.765)	(1.965)
ln(Population)	−2.313***	−2.338**	−1.917	−1.409
	(0.879)	(1.082)	(1.482)	(1.532)
Tertiary education	−0.000	−0.013	−0.060***	0.023
	(0.012)	(0.016)	(0.022)	(0.023)
Patents)	0.000	−0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Region FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	5,396	5,199	4,379	4,751

Pseudo R^2	0.760	0.717	0.715	0.537

**** p<0.01, ** p<0.05, * p<0.10.*

6.2 Institutional Heterogeneity

Table 4 reports models that interact CIPR variables with institutional quality, testing whether the association between GIs or collective trademarks and trademark activity varies alongside the institutional environment. Panel A presents the interaction with formal institutional quality. The GI × EQI interaction coefficient is positive and highly significant across all three outcome specifications. This indicates that the association between GIs and trademark applications is more positive in regions with higher governance quality. Conversely, the CT × EQI interactions are statistically insignificant throughout, which suggests that the link between collective trademarks and trademarking activity does not systematically vary with formal institutional quality. Panel B evaluates whether generalised social trust conditions these CIPR relationships. Across all specifications, the GI × Trust interaction is statistically insignificant. This near-zero estimate in the wine sector is particularly notable: despite the intensive inter-producer coordination characteristic of the industry, no significant moderation by social trust is observed. These results suggest that the relationship between GI registration and trademarking in the wine sector is primarily aligned with formal governance capacity rather than informal social capital, which suggests a channel for regional efforts focusing on innovation in the wine industry. Therefore, we confirm the second hypothesis for the formal institutional channel: the CIPR–innovation association is significantly moderated by governance quality, though not by social trust.

Table 4. Institutional heterogeneity: CIPR interactions with EQI and Social Trust

	(1) All TM	(2) Food/Bev 30+	(3) Wine Cl. 33
Panel A: Formal institutional quality (EQI)			
GI (t−1)	0.016	0.004	0.053
	(0.021)	(0.027)	(0.045)
Collective TM (t−1)	−0.031	0.029	0.074
	(0.024)	(0.030)	(0.053)
EQI (z-score)	0.016	−0.095	−0.041
	(0.102)	(0.121)	(0.129)
GI × EQI	0.079***	0.081***	0.117***
	(0.025)	(0.028)	(0.040)
CT × EQI	−0.075	0.034	0.193
	(0.059)	(0.086)	(0.151)
Region FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
N	2,388	2,279	1,909
Pseudo R^2	0.785	0.750	0.741

Panel B: Generalised social trust

GI (t−1)	−0.050	−0.061	−0.034
	(0.050)	(0.041)	(0.060)
Collective TM (t−1)	−0.006	0.044	0.042
	(0.024)	(0.035)	(0.069)
Trust (z-score)	−0.052	−0.070	−0.025
	(0.057)	(0.079)	(0.100)
GI × Trust	0.078	0.043	−0.008
	(0.096)	(0.065)	(0.058)
CT × Trust	0.007	0.064	0.099
	(0.039)	(0.104)	(0.179)
Region FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
N	2,404	2,320	1,840
Pseudo R^2	0.778	0.738	0.734

*SE clustered at NUTS-2. *** p<0.01, ** p<0.05, * p<0.10.*

6.3. Peripheral Heterogeneity

Table 5 reports whether the association between CIPRs and trademark activity varies according to regional peripherality. The results indicate that the baseline negative association

for GIs is concentrated almost entirely in core regions. In peripheral regions, however, the interaction term is positive but provides statistically insignificant results. For collective trademarks, the food and beverage specification provides a large and highly significant positive interaction with peripherality. This indicates that while statistically insignificant in the broader sample, collective marks are associated with substantially higher trademark activity in lagging regions. Our results offer partial support for the third hypothesis: peripherality significantly moderates the collective trademark channel, while the GI channel shows no statistically significant difference by peripherality.

Table 5. Peripheral heterogeneity: CIPR registrations × peripherality

	(1) All TM	**(2) Food/Bev 30+**	**(3) Wine Cl. 33**
GI registrations (t−1)	−0.041***	−0.044***	−0.035
	(0.013)	(0.015)	(0.021)
Collective TM (t−1)	0.011	0.028	−0.011
	(0.028)	(0.018)	(0.026)
Peripheral	0.054	—	−0.118
	(0.080)		(0.159)
GI × Peripheral	0.007	0.020	0.121
	(0.112)	(0.126)	(0.115)

CT × Peripheral	−0.105	1.108***	—
	(0.098)	(0.181)	
Controls / Region & Year FE	Yes	Yes	Yes
N	5,396	5,199	4,379
Pseudo R^2	0.760	0.717	0.715

**** p<0.01, ** p<0.05, * p<0.10. '—' =/omitted.*

6.4. Semantic Novelty Analysis

Finally, Table 6 presents baseline OLS results for semantic novelty. As collective trademarks exhibit no statistically significant association with regional trademark activity in the baseline results, we focused on the GI registration channel. For wine-specific trademarks, homogeneity declines marginally. This decline informs us the modest semantic diversification in the trademark portfolio following GI registration. Thus, while trademark counts decline after GI registration, surviving filings have richer vocabulary in their trademark description field. Within-region and EU-wide novelty show near-zero and statistically insignificant associations.

Table 6. Semantic novelty: Baseline OLS results

	(1) Within-Region	**(2) EU Wide**	**(3) Homogeneity**
GI registrations (t−1)	0.000	−0.000	−0.005*
	(0.002)	(0.001)	(0.002)

Region FE / Year FE	Yes	Yes	Yes
N	2,416	2,416	1,802
R^2	0.380	0.158	0.326

*** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 7 examines whether formal institutional quality moderates the GI–novelty relationship for wine trademarks. Across within-region and EU-wide specifications, the key interaction term GI × EQI is statistically insignificant. However, the exception is the homogeneity outcome: the GI × EQI coefficient is negative and statistically significant, while the EQI main association is positive. This combination implies that GI registration is associated with greater within-region semantic homogeneity in weak-governance environments. However, this convergence effect is attenuated and ultimately reversed as formal institutional quality improves.

Table 7. GI × EQI interaction: semantic novelty outcomes

	(1) Within-Region	**(2) EU-Wide**	**(3) Homogeneity**
GI registrations (t−1)	−0.002	−0.002	−0.010**
	(0.004)	(0.002)	(0.004)
GI × EQI	0.002	0.000	−0.014**
	(0.004)	(0.002)	(0.006)
EQI (z-score)	0.012	0.004	0.052***
	(0.012)	(0.005)	(0.019)

Region FE / Year FE	Yes	Yes	Yes
N	1,359	1,359	1,031
R^2	0.495	0.207	0.370

**** p<0.01, ** p<0.05, * p<0.10.*

Finally, Table 8 replicates the interaction specification replacing EQI with the standardised social trust composite. For wine trademarks, the GI level coefficient on within-region novelty is positive and significant. This signals that at mean trust levels GI registration is associated with greater semantic novelty within regions. The interaction term GI × Social Trust is negative and statistically significant. Here, the results indicate that this diversification effect is dampened in high-trust regions. In other words, in low-trust wine regions producers respond to GI status through semantic differentiation, while in high-trust regions, producers tend to lean on convergence on shared identity. The remaining novelty outcomes show no significant moderation by trust.

Table 8. GI × Social Trust interaction: semantic novelty outcomes (Wine Class 33)

	(1) Within-Region	**(2) EU-Wide**	**(3) Homogeneity**
GI registrations (t−1)	0.022**	−0.001	−0.002
	(0.010)	(0.003)	(0.010)
GI × Social Trust	−0.028**	−0.002	−0.018
	(0.013)	(0.003)	(0.016)
Social Trust (z-score)	−0.008	−0.001	0.010

	(0.006)	(0.003)	(0.011)
Region FE / Year FE	Yes	Yes	Yes
N	1,531	1,531	1,197
R^2	0.447	0.210	0.352

**** p<0.01, ** p<0.05, * p<0.10.*

7. **Discussion**

The central finding of this study is that the relationship between CIPRs and regional innovation is fundamentally institutionally conditional. GI registration carries a negative average association with trademark activity in the broadest specifications. However, with the improvements in formal institutional quality, GI registration is associated with substantially more wine-related trademarks. This pattern directly addresses the theoretical impasse between scholars who view CIPRs as innovation-enabling coordination devices (Meloni & Swinnen, 2018; Durand & Fournier, 2017) and those who see them as conservative, rent-preserving instruments (Josling, 2006; Frankel, 2011). Both camps are right, but conditionally. The constraining view describes what happens by default when governance is absent, while the enabling perspective describes what emerges when Ostrom's (1990) conditions for effective commons management are met. The resolution lies not in choosing between these perspectives but in recognising that the institutional environment determines which tendency prevails.

This reframing has consequences for how we understand the club good problem emphasised in prior literature (Langinier & Babcock, 2008; Belletti et al., 2017). The chronic free riding on collective reputation, where individual firms underinvest in innovation because the returns diffuse across all users of the protected name, is a structural feature of GI regimes. But its

severity is not inherent to the instrument itself. Where governance capacity can align individual and collective incentives through monitoring and regulating, the club good structure transforms from a disincentive into a platform for coordinated upgrading. The results indicate that this change operates primarily through formal institutional channel, not through informal, trust-based channels. Thus, we can assume that with the absence or weakness of formal governance, even despite the collective trust among them, producers tend to default to rent-preservation over experimentation.

A further question is whether GI registration suppresses innovation outright, or does it primarily displace routine and imitative filings while leaving substantive differentiation intact? For wine-specific trademarks, GI registration does not shift average novelty but marginally reduces within-region homogeneity. This suggests a selective displacement: producers establish a shared reputational baseline through GIs and shift their trademarking habits toward differentiation. This restructuring is governed by formal institutional quality. At low governance quality, GI registration increases within-region homogeneity due to standardisation pressures. As governance improves, this effect reverses, promoting portfolio diversification. While stronger governance independently links to greater semantic convergence, its interaction with GIs pushes toward differentiation. Social trust, on the other hand, moderates qualitative innovation outcomes exclusively through the local channel. It shapes how distinct producers' textual descriptions are from one another within the same region and year. Where trust among producers is low, GI registration encourages semantic differentiation: producers write more distinct, varied descriptions to stand out from their neighbours. Where trust is high, producers instead coordinate around shared language and converge on a common identity. Trust and formal institutions therefore serve structurally different functions: effective governance secures individual differentiation, while social trust

enables collective coordination that reinforces shared identity at the cost of individual distinctiveness.

Moreover, the results for collective trademarks depart from GIs in ways that illuminate the role of territorial anchorage. The average CT effect on innovation is near zero in most specifications, with a modest positive association emerging only for food and beverage trademarks. Yet collective trademarks show a large, positive, and significant association with innovation, specifically in peripheral regions for food and beverage categories, suggesting that CTs serve a fundamentally different function depending on where they operate. In well-resourced regions with thick institutional environments, CTs add little to already available coordination mechanisms. In peripheral regions characterised by institutional and organisational thinness (Trippl et al., 2018), they may represent one of few available tools for associational coordination of market-oriented activity. The fact that formal institutional quality does not moderate CT effects reinforces this reading: without territorial anchorage, there is no governance channel connecting the regional environment to the instrument's impact. The explanation traces to a structural difference between the two instruments. GIs are legislatively defined by the link between product characteristics and geographic origin, creating alignment between collective reputation and regional developmental outcomes (Crescenzi et al., 2022). Collective trademarks carry no such territorial requirement; reputation benefits flow to association members regardless of location, dispersing returns rather than concentrating them regionally. The peripheral result points to a logic of scarcity-driven utility: where coordination mechanisms are few, even non-territorial collective instruments fill institutional voids that would otherwise remain empty. We, therefore, may position CTs as complements to GIs in peripheral development strategies, which are effective not through territorial embeddedness but through the logic of institutional absence. In addition, we emphasise GIs and collective trademarks are not interchangeable developmental

tools and their implications, including their link with innovation is context-based and approached with caution in policymaking.

8. Conclusions

The debate over whether collective IP protection helps or hinders innovation has persisted partly because both sides describe mechanisms operating in different institutional environments. Our results suggest that capabilities of collective IP instruments differ and GIs function as institutional enablers. With effective formal governance, GIs can promote innovation both quantitatively and qualitatively. The distinction between formal institutions and social trust as governance channels should be also noted. These are not interchangeable inputs into collective IP management but structurally different forces that shape innovation in opposing directions. Formal governance may secure the conditions for individual differentiation within collective structures; social trust sustains the collective coherence that strengthens shared reputation, as the semantic novelty results show.

Several limitations warrant attention and point toward future research. First, our innovation measure relies on EU-wide trademark registrations rather than national filings, which typically capture SME activity oriented toward localised markets; country-specific analyses incorporating national trademark data would deepen understanding of local dynamics. Second, we measured governance quality and social trust at the general regional level rather than through sector-specific metrics tailored to the wine industry, potentially limiting precision regarding industry-specific mechanisms. Third, we treat GIs as homogeneous despite considerable variation in consortia's legal capacity and economic power; stronger organisations enforce rights more effectively and shape innovation incentives differently than weaker ones facing free-riding and collective action problems (Belletti et al., 2017). This uniform treatment reduces precision in capturing how enforcement strength affects regional

outcomes. Fourth, our findings emerge from wine, where territorial reputation is unusually central to competitive advantage and collective quality regimes have centuries of historical depth (Meloni & Swinnen, 2018); generalisation to other traditional industries requires empirical verification. The EU institutional context shapes both CIPR instruments and the institutional heterogeneity we exploit; whether similar patterns would emerge under weaker GI protections or in contexts with less variation in subnational governance quality remains an open question. Finally, while our econometric framework identifies significant associations and interactions, qualitative case studies are needed to explore the specific governance practices that build trust and enable successful innovation within CIPR frameworks, and to compare these with failed attempts.

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