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Adding Geographical Indication Protection to a Regional Collective Trademark: Evidence on Rural Production and Commercialisation in Japan

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Adding Geographical Indication Protection to a Regional Collective Trademark: Evidence on Rural Production and Commercialisation in Japan

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Abstract

This study examines whether Geographical Indication (GI) registration generates additional changes in rural production and commercialisation when a regional product is already protected by a Regional Collective Trademark (RCT). Using Ichida Gaki, a traditional dried persimmon from Nagano Prefecture, Japan, as a case, the study compares the RCT-only period (2007–2015) with the combined RCT-plus-GI period (2017–2023). A prefecture-year panel is analysed using two-way fixed-effects models, event-study analyses, and spatial analyses. Relative to comparison prefectures, production volume remained comparatively higher after GI registration, while shipment volume and shipment rate declined. The decline in shipment volume received the strongest empirical support and remained robust across alternative specifications, whereas pre-treatment trends limit causal interpretation for production volume and shipment rate. Spatial analyses also indicate geographically heterogeneous post-registration changes among other dried-persimmon-producing prefectures. The findings suggest that GI registration may affect rural production systems not only through brand protection but also through changes in commercialisation and institutional governance. More broadly, the study highlights the importance of evaluating layered intellectual property protection as an institutional component of rural development policy whose implications may differ across production and market participation.

Keywords: Geographical Indication; Regional Collective Trademark; Rural Development; Agricultural Commercialisation; Institutional Governance; Japan

1. Introduction

Geographical Indication (GI) protection has become an important instrument for supporting rural economies by protecting place-based agricultural products, preserving production traditions, and strengthening their market identity. By linking product names to geographical origin and specified production practices, GI systems can contribute to product differentiation, collective reputation, and the organisation of rural production. Their effects, however, depend on how GI protection interacts with existing institutions, producer organisations, and market conditions.

Previous research has examined the effects of GI protection on prices, exports, producer welfare, consumer willingness to pay, and rural development. Recent reviews show that these effects are heterogeneous rather than uniform (Menapace & Moschini, 2024), while other studies emphasise the importance of actors' strategies, collective organisation, and public policy in determining local development

outcomes (Belletti et al., 2017). Most empirical studies nevertheless evaluate GI protection as a standalone intervention by comparing GI and non-GI products or conditions before and after registration. In practice, regional agricultural products may already be protected by other intellectual property (IP) systems before obtaining GI status. This is particularly relevant in Japan, where some agricultural products registered under the Regional Collective Trademark (RCT) system have subsequently obtained GI protection. The resulting question is whether the addition of GI protection is associated with changes beyond those already achieved through trademark protection.

The distinction matters because the two systems have overlapping but different institutional functions. The RCT system primarily protects regional brand names from unauthorised commercial use, whereas the GI system additionally formalises production specifications, geographical boundaries, certification, and inspection procedures. Adding GI protection may therefore influence not only brand protection but also the organisation of production and commercialisation within rural production systems. Yet empirical evidence on these incremental effects remains limited.

This study addresses this gap through the case of Ichida Gaki, a traditional dried persimmon produced mainly in southern Nagano Prefecture, Japan. Ichida Gaki was registered as an RCT in 2006 and as a GI in 2016, creating a sequential institutional setting in which GI protection was added to an already protected regional brand. The study evaluates three outcomes—production volume, shipment volume, and shipment rate—to distinguish changes in agricultural production from changes in commercialisation. Shipment volume captures products entering commercial distribution, while shipment rate measures the proportion of production that is commercially shipped.

The analysis also examines whether post-registration changes vary geographically across other dried-persimmon-producing prefectures. This perspective is relevant to rural development because institutional changes affecting a leading regional product may have differentiated consequences across other production areas, even when the underlying mechanisms cannot be identified directly.

Empirically, the study uses a prefecture-year panel covering 2007–2023, excluding the transition year 2016. The pre-treatment period represents the RCT-only regime, while the post-treatment period represents the combined RCT-plus-GI regime. Two-way fixed-effects models, event-study analyses, and spatial analyses are used to estimate changes associated with the additional GI layer. Figure 1 summarises the sequential institutional transition and empirical identification strategy.

This study makes three contributions. First, it evaluates GI registration as an additional institutional layer rather than as a standalone policy intervention. Second, by distinguishing production volume, shipment volume, and shipment rate, it examines whether layered protection is associated differently with rural production and commercialisation. Third, it considers geographical heterogeneity beyond the protected region, extending the evaluation of GI protection to its broader territorial context. Together, these contributions show why rural development evaluations of geographical protection should consider both production and market participation within broader rural production systems.

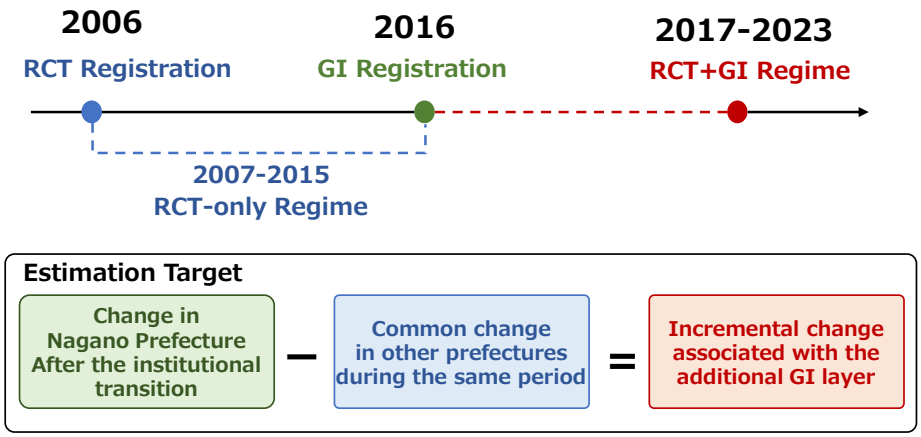


Figure 1 Sequential Institutional Protection of Ichida Gaki and Empirical Identification Strategy

2. Literature Review

2.1. Geographical Indications and Rural Development

Geographical Indication (GI) protection has been widely examined as a mechanism for strengthening place-based agricultural products and rural economies. Previous studies report effects on price premiums, market access, producer welfare, consumer willingness to pay, and local development. However, these benefits are neither automatic nor uniform. Producers may face organisational, institutional, and market barriers that limit their ability to capture the potential value of GI protection (Cardoso et al., 2022). GI schemes may also contribute to rural development by linking products with local actors, production traditions, and territorial resources (Tregear et al., 2007). Their effectiveness therefore depends on the institutional arrangements surrounding production and marketing, the capacity of producer organisations, and the degree to which protected products are embedded in local economic systems (Crescenzi et al., 2022).

This perspective is particularly important when GI protection is introduced into an already established regional production system. In such cases, the relevant question is not simply whether GI registration creates economic benefits, but whether it changes the organisation of production, commercialisation, and collective governance beyond existing forms of regional brand protection.

2.2. Layered Intellectual Property Protection and Rural Production Systems

Most empirical studies treat GI protection as a standalone intervention, typically comparing GI and non-GI products or pre- and post-registration outcomes. In practice, however, regional agricultural products may be protected sequentially by multiple intellectual property (IP) systems. Japan provides a useful setting because the Regional Collective Trademark (RCT) system was introduced in 2006 and the national GI system in 2015, allowing some regional products to obtain GI protection after earlier RCT registration.

The two systems overlap in protecting regional product identities but differ in their institutional functions. The RCT system primarily protects regional brand names, whereas GI protection also formalises production specifications, geographical boundaries, certification, and inspection. Previous Japanese research has shown that the GI system can strengthen production management and quality-control arrangements (Yagi et al., 2019), while the GI application process may clarify product specifications, reinforce cooperation among

local actors, and promote shared recognition of product attributes (Tashiro et al., 2018). These findings suggest that GI protection may operate as a form of collective governance within rural production systems rather than merely as an additional legal right.

Nevertheless, previous studies have mainly compared the characteristics or perceived effects of the RCT and GI systems rather than quantitatively estimating what changes when GI protection is added to an existing RCT-protected product. Evidence on this incremental institutional effect therefore remains limited. Addressing this gap is important for rural development research because sequential protection may alter production practices, commercialisation, and coordination among producers even when regional brand protection is already in place. This study therefore evaluates the transition from an RCT-only regime to a combined RCT-plus-GI regime as a layered institutional change in a rural production system.

2.3. Measuring Incremental Institutional Effects

Evaluating layered intellectual property protection requires measures that distinguish agricultural production from commercialisation. Previous studies often focus on production, prices, or sales value, making it difficult to identify whether institutional change affects output or the movement of that output into commercial markets. This study therefore examines production volume, shipment volume, and shipment rate separately. Production volume captures agricultural output, shipment volume captures commercial distribution, and shipment rate—the ratio of shipment to production—captures the proportion of output commercialised. Together, these measures distinguish changes in rural production from changes in market participation.

2.4. Geographical Heterogeneity in Rural Production Systems

The consequences of GI protection may extend beyond the protected area. Institutional changes affecting a prominent regional product may be accompanied by different outcomes across surrounding production areas because market conditions, production structures, and regional interactions vary geographically. Recent GI research has accordingly considered spatial heterogeneity in protected and surrounding rural areas (Raimondi et al., 2024).

This study examines whether post-registration changes vary with geographical proximity to Nagano Prefecture. Proximity is treated as an indicator of geographical heterogeneity rather than direct evidence of competition or spillovers. The analysis therefore assesses whether the transition to layered protection was associated with systematically different changes across other dried-persimmon-producing prefectures.

2.5. Research Gap and Contribution

Three gaps remain. First, little quantitative evidence exists on the effects associated with adding GI protection to a product already protected under the RCT system. Second, previous studies rarely distinguish production from commercialisation using production volume, shipment volume, and shipment rate jointly. Third, limited attention has been paid to geographical heterogeneity across other rural production areas.

This study addresses these gaps by comparing the RCT-only and combined RCT-plus-GI regimes using prefecture-year data for 2007–2023 and applying two-way fixed-effects, event-study, and spatial analyses. By treating GI registration as a sequential institutional change rather than a standalone intervention, the study

contributes to understanding how layered intellectual property protection may shape rural production, commercialisation, and broader territorial patterns.

3. Institutional Background

3.1. The Ichida Gaki Production Region

Ichida Gaki is a traditional dried persimmon produced mainly in southern Nagano Prefecture, particularly in the Shimoina and Kamiina regions. Made from the indigenous Ichida persimmon cultivar using traditional drying techniques, it has developed a strong regional reputation and is widely recognised as a representative agricultural speciality of Nagano Prefecture.

For the present analysis, an important feature of Ichida Gaki is its dominance within Nagano Prefecture's dried persimmon sector. Ichida Gaki accounts for more than 95 per cent of dried persimmon production and shipment in the prefecture (Nagano Tourism Organization, 2024). Prefecture-level dried persimmon statistics therefore provide a reasonable proxy for annual Ichida Gaki production and shipment despite the absence of publicly available annual product-level data. Figure 2 shows Nagano Prefecture, the 12 comparison prefectures included in the analytical sample, and the principal Ichida Gaki production area in southern Nagano.

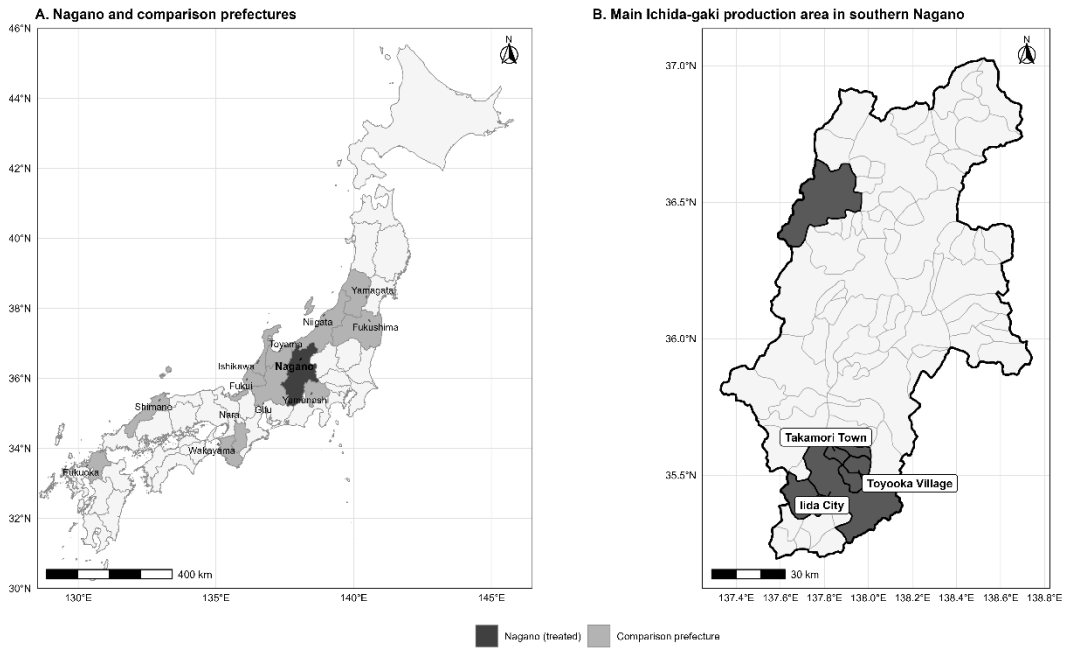


Figure 2 Study Area, Analytical Prefectures, and the Main Ichida Gaki Production Area

Note. Panel A shows Nagano Prefecture and the 12 comparison prefectures included in the analytical sample. Panel B shows the principal Ichida Gaki production area in southern Nagano, including Iida City, Takamori Town, and Toyooka Village.

3.2. Sequential Institutional Protection

The institutional development of Ichida Gaki involves two successive stages of intellectual property protection (Figure 1). The first was registration as a Regional Collective Trademark (RCT) in 2006. The RCT system protects regional product names from unauthorised commercial use by granting trademark rights to eligible producer organisations.

The second stage occurred in 2016, when Ichida Gaki was registered under Japan's Geographical Indication (GI) Protection System. While the RCT primarily protects the regional brand name, GI protection also formalises production specifications, geographical boundaries, certification procedures, and inspection requirements. The GI system therefore introduced an additional layer of institutional governance into an already established rural production system.

This sequence provides the basis for the empirical analysis. Because regional trademark protection was already in place before GI registration, the institutional transition represents the addition of GI protection rather than the initial introduction of regional branding. The study therefore compares the RCT-only regime with the combined RCT-plus-GI regime to examine changes associated with the additional GI layer. Accordingly, the estimated effects should not be interpreted as the standalone effects of GI protection, but as incremental changes associated with adding GI protection to an existing RCT-protected regional product.

3.3. Institutional Changes Following GI Registration

GI registration formalised the institutional arrangements governing the production and commercialisation of Ichida Gaki. While producer organisations had already operated under the Regional Collective Trademark (RCT) system, GI registration linked use of the protected name more explicitly to registered production specifications, geographical origin, certification, and inspection requirements.

Products marketed under the GI designation must comply with these specifications, and certification procedures verify whether the requirements are met. These arrangements provided a common framework for consistent implementation across the production region, creating a more formal link between production practices, certification, and commercialisation.

GI registration therefore represented more than additional legal protection of the regional name; it added a layer of institutional governance to the rural production system. Because this study does not directly observe product quality, certification outcomes, or producer behaviour, these institutional changes are treated as potential mechanisms rather than directly tested effects.

3.4. Implications for Production and Commercialisation

The institutional changes associated with GI registration may affect production and commercialisation differently. Standardised production specifications may support production, whereas certification and inspection requirements may influence the quantity of output entering commercial distribution.

Production volume and shipment outcomes therefore need not move together. This study distinguishes agricultural output from market participation by analysing production volume, shipment volume, and shipment rate. Shipment rate, defined as shipment volume divided by production volume, indicates the proportion of output entering commercial distribution. Examining these outcomes separately allows the

analysis to assess whether the additional GI layer was associated differently with production and commercialisation.

3.5. Identification Strategy

The sequential addition of GI protection to the existing RCT framework provides the basis for the empirical identification strategy (Figure 1). The pre-treatment period is defined as 2007–2015, when Ichida Gaki was protected under the RCT system alone. The transition year, 2016, is excluded because GI registration and institutional adjustment occurred during that year. The post-treatment period begins in 2017 and represents the combined RCT-plus-GI regime.

The analysis compares changes in Nagano Prefecture after GI registration with contemporaneous changes in the comparison prefectures. The estimated treatment effect therefore captures the incremental change associated with adding GI protection to an already RCT-protected regional product rather than the standalone effect of GI protection.

Because the identifying assumptions cannot be verified directly, two-way fixed-effects estimates are complemented by event-study analyses to assess pre-treatment dynamics and by additional robustness analyses to evaluate the stability of the estimated associations.

4. Data and Methods

4.1. Study Design

This study evaluates changes associated with adding Geographical Indication (GI) protection to Ichida Gaki, which was already protected under Japan's Regional Collective Trademark (RCT) system. The analysis compares the RCT-only period (2007–2015) with the combined RCT-plus-GI period (2017–2023), excluding 2016 as the transition year. The estimated treatment effect therefore represents the incremental change associated with the additional GI layer rather than the standalone effect of GI protection.

4.2. Data Sources

The analysis uses annual prefecture-level dried persimmon statistics published by Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF) for 2007–2023, excluding 2016. The dataset covers 13 producing prefectures: Nagano and 12 comparison prefectures (Figure 2). Because outcome data for Yamanashi Prefecture in 2007 were unavailable, the common estimation sample comprised 207 prefecture-year observations.

As noted in Section 3.1, Ichida Gaki accounts for more than 95 per cent of dried persimmon production and shipment in Nagano Prefecture. Prefecture-level statistics therefore provide a reasonable proxy for annual Ichida Gaki production and commercialisation despite the absence of annual product-level data.

4.3. Outcome Variables

Three outcomes are analysed to distinguish agricultural production from commercialisation: production volume, shipment volume, and shipment rate. Production volume is the annual quantity of dried persimmons

produced (tonnes). Shipment volume is the quantity entering commercial distribution through channels including cooperatives, wholesalers, retailers, direct sales, electronic commerce, and gift markets, excluding self-consumption. Shipment rate is defined as:

$$Shipment\ Rate = \frac{Shipment\ Volume}{Production\ Volume}$$

and measures the proportion of production entering commercial distribution. These indicators allow production and commercialisation to be examined separately. Table 1 reports descriptive statistics for Nagano Prefecture; annual observations are provided in Supplementary Table S7.

Table 1 Descriptive Statistics of Outcome Variables (2007–2023, excluding 2016)

Variable	Mean	SD	Min	Max	Unit
Production volume	3,242.7	1,072.3	1,870	5,787	tonnes
Shipment volume	1,822.3	505.0	1,145	2,615	tonnes
Shipment rate	0.624	0.261	0.267	0.979	ratio

4.4. Treatment Variable

The Additional GI indicator equals 0 during the RCT-only period (2007–2015) and 1 during the combined RCT-plus-GI period (2017–2023). Because RCT protection preceded GI registration, the variable captures the additional GI layer rather than the standalone effect of GI protection.

4.5. Two-Way Fixed-Effects Model

The primary analysis uses the following two-way fixed-effects (TWFE) model:

$$Y_{it} = \alpha_i + \lambda_t + \beta(Nagano_i \times AdditionalGI_t) + \varepsilon_{it}$$

where Y_{it} denotes the outcome variables for prefecture i in year t. The term $\alpha_i$represents prefecture fixed effects, and λ_t represents year fixed effects. Prefecture fixed effects control for time-invariant regional characteristics, while year fixed effects absorb shocks common to all prefectures.

The interaction term $Nagano_i \times AdditionalGI_t$ constitutes the difference-in-differences treatment indicator. Its coefficient, β, estimates the Nagano-specific post-registration change relative to contemporaneous changes in the comparison prefectures. Standard errors are clustered at the prefecture level.

4.6. Event-Study Specification

To assess dynamic changes and the plausibility of parallel pre-treatment trends, the following event-study model is estimated:

$$Y_{it} = \alpha_i + \lambda_t + \sum_{k \neq -1} \beta_k \, (Nagano_i \times D_k) + \varepsilon_{it},$$

where D_k denotes event-time indicators relative to GI registration in 2016; 2015 is the omitted reference year. A joint Wald test of the pre-treatment coefficients assesses whether they are jointly equal to zero,

providing evidence on the plausibility of the parallel-trends assumption (Callaway & Sant'Anna, 2021; Roth et al., 2023).

4.7. Geographical Heterogeneity Analysis

For prefectures other than Nagano, geographical heterogeneity is examined using:

$$Y_{it} = \alpha_i + \lambda_t + \delta(AdditionalGI_t \times Closeness_i) + \varepsilon_{it}$$

where Closeness_i is a standardised measure of geographical proximity based on the negative distance from Nagano Prefecture, with higher values indicating greater proximity. The coefficient δ indicates whether post-registration changes vary systematically with proximity. Distance is interpreted as an indicator of geographical heterogeneity, not as direct evidence of competition or spillovers.

4.8. Robustness Checks

Robustness is assessed through leave-one-post-year-out estimations, which sequentially omit each year from 2017 to 2023; supplementary synthetic control analyses (Supplementary Table S9 and Figures S4–S6); and a sensitivity analysis excluding the 2015 reference year. These checks assess whether the main estimates depend on particular post-treatment years, counterfactual construction, or the choice of reference year.

4.9. Interpretation of Estimated Effects

The estimated coefficients represent incremental changes associated with the transition from the RCT-only to the combined RCT-plus-GI regime, not the standalone effect of GI protection. Their causal interpretation depends on the outcome-specific evidence on pre-treatment trends.

5. Results

5.1. Descriptive Changes in Nagano Prefecture

Figure 3 shows contrasting changes in the three outcomes across the institutional transition. Mean production volume increased from 2,836 tonnes during the RCT-only period to 3,766 tonnes during the combined RCT-plus-GI period, an increase of 32.8% (Table 2). In contrast, mean shipment volume declined from 2,141 to 1,412 tonnes (−34.0%), while shipment rate fell from 0.815 to 0.379 (−43.6 percentage points). These descriptive changes should not be interpreted causally.

Supplementary Figures S1 and S2 show that production partially recovered relative to its 2015 level by 2022–2023, whereas shipment volume and shipment rate remained substantially lower, with the post-transition changes developing gradually rather than being driven by a single year.



Figure 3 Nagano Dried Persimmon Production Volume, Shipment Rate and Shipment Volume Before and After the Additional GI Layer.

Note. The RCT-only period is 2007–2015; 2016 is excluded as the transition year; and the combined RCT-plus-GI period is 2017–2023.

Table 2 Summary Statistics by Institutional Period

Outcome	Period	N	Mean	Median	SD	Min	Max
Production volume (tonnes)	RCT-only period	9	2,836	2,383	1,234	1,870	5,787
Production volume (tonnes)	Combined RCT-plus-GI period	7	3,766	3,969	525	2,978	4,374
Shipment volume (tonnes)	RCT-only period	9	2,141	2,302	344	1,755	2,615

Shipment volume (tonnes)	Combined RCT-plus-GI period	7	1,412	1,170	363	1,145	2,047
Shipment rate	RCT-only period	9	0.815	0.860	0.165	0.452	0.979
Shipment rate	Combined RCT-plus-GI period	7	0.379	0.366	0.097	0.267	0.516

5.2. Two-Way Fixed-Effects Estimates

Table 3 reports the baseline two-way fixed-effects (TWFE) estimates. The Nagano × Additional GI coefficient was positive for production volume (β = 0.429, SE = 0.140, p = 0.010), corresponding to an estimated 53.6% increase relative to the comparison prefectures. In contrast, shipment volume declined by an estimated 36.6% (β = −0.455, SE = 0.146, p = 0.009), while shipment rate decreased by 52.4 percentage points (β = −0.524, SE = 0.045, $p < 0.001$).

These estimates indicate divergent post-registration changes in production and commercialisation. However, their causal interpretation depends on the pre-treatment dynamics examined in the event-study analysis. Leave-one-post-year-out and reference-year sensitivity analyses produced qualitatively similar estimates (Supplementary Tables S4 and S5).

Table 3 Baseline Two-Way Fixed-Effects Estimates

	Production volume	**Shipment volume**	**Shipment rate**
Nagano × Additional GI	0.429**	−0.455**	−0.524***
	(0.140)	*(0.146)*	*(0.045)*
Observations	207	207	207
R^2	0.938	0.937	0.491
Adjusted R^2	0.928	0.927	0.411
Within R^2	0.014	0.018	0.197
Adjusted Within R^2	0.009	0.012	0.193

Notes. All models include prefecture and year fixed effects, with prefecture-clustered standard errors in parentheses. Production and shipment volumes are log-transformed; shipment rate is estimated in levels. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

5.3. Event-Study Dynamics

Figure 4 presents the event-study estimates relative to 2015, with 2016 excluded as the transition year. The estimates show annual Nagano–comparison differences before and after GI registration and provide evidence on the plausibility of parallel pre-treatment trends.

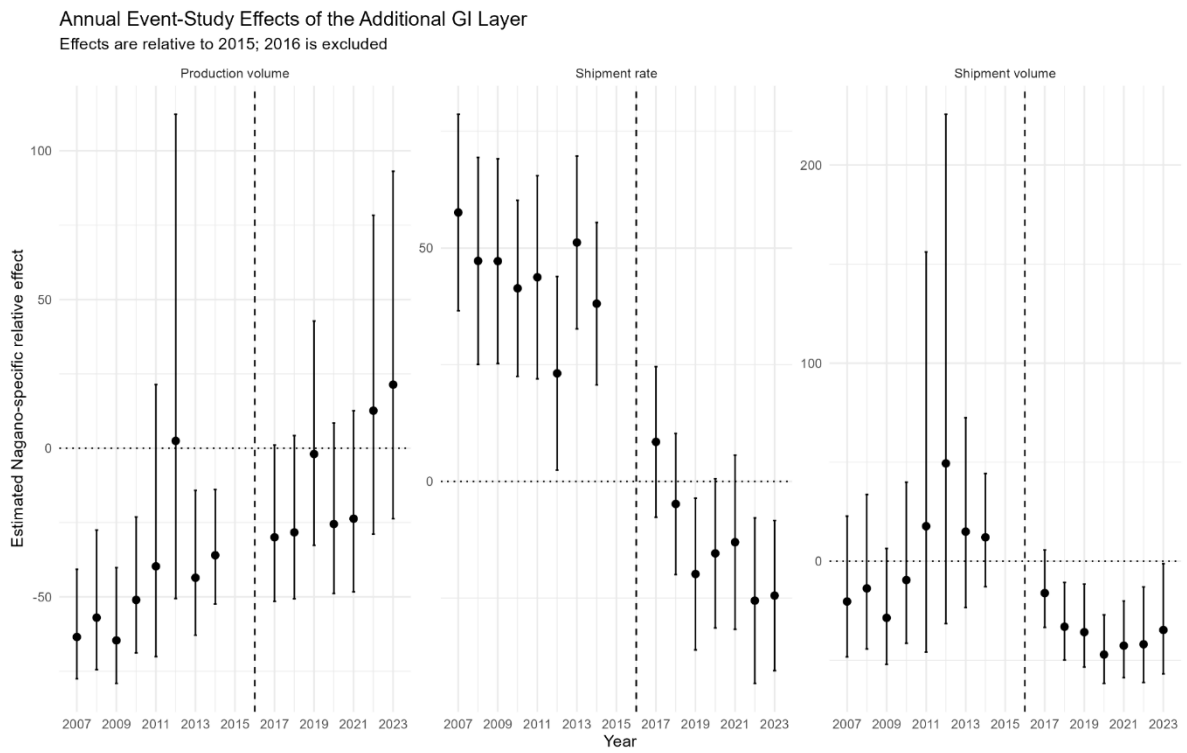


Figure 4 Event-Study Estimates for the Transition from the RCT-Only to the Combined RCT-Plus-GI Regime.

Note. Estimates are relative to 2015; 2016 is excluded as the transition year. Error bars indicate 95% confidence intervals.

5.3.1. Production volume

For production volume, the joint Wald test rejected the null that all pre-treatment coefficients were zero ($\chi^2(8) = 29.50$, $p < 0.001$), indicating that the parallel-trends assumption is not well supported. None of the post-treatment annual coefficients was statistically significant at the 5% level. The positive average TWFE estimate should therefore be interpreted as a post-registration association rather than a consistently positive annual effect.

5.3.2. Shipment volume

For shipment volume, the joint Wald test did not reject equality of the pre-treatment coefficients to zero ($\chi^2(8) = 10.07$, $p = 0.260$), providing the strongest support for parallel pre-treatment trends among the three outcomes. The 2017 coefficient was negative but not statistically significant; from 2018 through 2023, all annual coefficients were negative and statistically significant. This persistent pattern supports a sustained post-registration decline in shipment volume.

5.3.3. Shipment rate

For shipment rate, the joint Wald test rejected equality of the pre-treatment coefficients to zero ($\chi^2(8) = 184.18$, $p < 0.001$), indicating that the parallel-trends assumption is not supported. Post-treatment coefficients became generally negative from 2018 onward, with statistically significant declines in 2019,

2022, and 2023. The corresponding TWFE estimate should therefore be interpreted as an adjusted relative association rather than a causal effect. Overall, shipment volume provides the strongest empirical evidence of a post-registration change, whereas the production-volume and shipment-rate estimates are constrained by pre-treatment dynamics.

5.4. Leave-One-Post-Year-Out Sensitivity

The leave-one-post-year-out analysis produced qualitatively stable estimates when each year from 2017 to 2023 was omitted in turn. Production estimates remained positive, shipment-volume estimates remained negative, and shipment-rate estimates remained negative across specifications. Excluding 2020 produced similar results, indicating that the shipment-volume finding was not driven by the first major year of the COVID-19 pandemic. Complete results are reported in Supplementary Figure S3.

5.5. Geographical Heterogeneity

Supplementary Table S6 shows geographical heterogeneity among prefectures other than Nagano. Greater proximity to Nagano was associated with less favourable post-registration changes in both production volume ($\beta = -0.327$, $p = 0.003$) and shipment volume ($\beta = -0.316$, $p = 0.002$). No significant pattern was observed for shipment rate.

These results indicate systematic geographical heterogeneity in production and shipment outcomes. Because geographical proximity does not identify the underlying mechanism, the estimates should not be interpreted as direct evidence of competitive spillovers.

6. Discussion

The results suggest that adding Geographical Indication (GI) protection to an already Regional Collective Trademark (RCT)-protected product was associated with different changes in production and commercialisation. Production volume remained comparatively higher in Nagano, whereas shipment volume and shipment rate declined. Among these outcomes, the decline in shipment volume received the strongest empirical support. Geographical heterogeneity was also observed in production and shipment outcomes among other producing prefectures. These findings suggest that layered intellectual property protection may influence rural production systems through institutional mechanisms extending beyond brand-name protection.

6.1. From Brand Protection to Institutional Governance

GI registration formalised production specifications, certification requirements, and inspection procedures beyond the legal name protection provided by the RCT system. Such arrangements are consistent with previous research describing GI systems as forms of collective governance based on shared geographical boundaries, production practices, and product specifications (Quiñones-Ruiz et al., 2016).

This institutional perspective offers one possible interpretation of the empirical results. Production remained comparatively high, while shipment volume declined relative to the comparison prefectures. The additional GI layer may therefore have affected commercialisation differently from agricultural output by

changing the institutional conditions governing production, compliance, and market participation. However, the present data do not identify the mechanism directly. Annual information on certification outcomes, product quality, producer income, prices, and marketing decisions was unavailable, and the shipment measure does not represent GI-certified shipments specifically. The findings should therefore be interpreted as consistent with institutional changes in the rural production system rather than as evidence that GI registration improved product quality or economic value.

More broadly, the results highlight the value of distinguishing production from commercialisation when evaluating GI systems. Conventional indicators such as production volume or price premiums may not capture institutional changes affecting how agricultural output enters commercial markets. Analysing production volume, shipment volume, and shipment rate separately therefore provides a more differentiated assessment of how layered intellectual property protection may shape rural production and market participation.

6.2. Geographical Heterogeneity in Rural Production Systems

The geographical analysis showed less favourable post-registration changes in production and shipment volume among prefectures closer to Nagano. Several mechanisms may underlie this pattern, including differences in competitive conditions, production structures, climate, or market environments across other producing areas.

However, geographical proximity is only an indirect indicator of regional interaction. The analysis cannot distinguish competitive effects from other geographically correlated factors, and the results should therefore be interpreted as evidence of geographical heterogeneity rather than direct market spillovers. Nevertheless, they suggest that institutional changes affecting a prominent regional product may be associated with outcomes extending beyond the protected production area.

6.3. Implications for Rural Development Policy

The findings have three implications for rural development policy. First, production and commercialisation should be assessed separately because institutional changes may affect agricultural output and market participation differently. Evaluations based on output alone may therefore overlook how rural producers participate in commercial markets.

Second, adding GI protection to an existing regional trademark should not be expected to improve all performance indicators simultaneously. Its role may extend beyond expanding output or shipment to strengthening production standards, certification, and collective governance.

Third, geographical heterogeneity suggests that rural development evaluations should consider other producing areas as well as the protected region. More broadly, GI systems may be understood not only as branding instruments but also as institutions shaping rural production, market participation, and collective governance.

6.4. Limitations and Future Research

Several limitations should be noted. First, parallel pre-treatment trends were not supported for production volume or shipment rate, and only one prefecture received the treatment. Their TWFE estimates should therefore be interpreted as adjusted relative associations rather than definitive causal effects. Shipment volume provides stronger evidence because its pre-treatment dynamics were more consistent with the identifying assumption.

Second, the analysis relies on prefecture-level statistics rather than annual product-level data. Although Ichida Gaki accounts for more than 95% of Nagano's dried persimmon production and shipment, the data include a small share of other products. Moreover, MAFF shipment data represent commercial shipments generally and should not be interpreted as GI-certified shipment volume.

Third, annual information on producer income, prices, product quality, certification outcomes, and consumer demand was unavailable. Incorporating such measures would help clarify how institutional changes affect the economic and developmental outcomes of GI protection.

Fourth, synthetic control estimates are supplementary because pre-treatment fit was weaker for production and shipment volume than for shipment rate. Longer time series or additional comparable treated regions could improve future counterfactual analyses (Abadie, 2021).

Finally, geographical proximity does not identify the mechanisms underlying regional heterogeneity. Future studies could incorporate transport networks, interregional trade, wholesale-market linkages, and retailer-level data to examine how GI-related institutional changes interact with surrounding rural economies.

7. Conclusion

This study examined the changes associated with adding Geographical Indication (GI) protection to Ichida Gaki, a regional agricultural product already protected under Japan's Regional Collective Trademark (RCT) system. The results indicate contrasting patterns in production and commercialisation following the transition to combined RCT-plus-GI protection. Production volume remained comparatively higher, whereas shipment volume and shipment rate declined relative to the comparison prefectures. Among these outcomes, the decline in shipment volume received the strongest empirical support. Geographical heterogeneity was also observed across other dried-persimmon-producing prefectures.

The study contributes to GI research by treating registration as an additional institutional layer rather than a standalone intervention and by distinguishing agricultural production from commercialisation. This perspective shows that stronger geographical protection need not be associated with uniform changes across production and market participation. It also highlights the role of GI protection as an institutional arrangement involving production standards, certification, and collective governance within rural production systems.

Although causal interpretation is limited for some outcomes, the findings support evaluating GI policy not only by agricultural output but also by market participation and collective governance within rural production systems. Future research incorporating certification, prices, producer income, and market linkages could clarify how these institutional changes translate into broader rural development outcomes.

Data availability

The data analysed during this study are derived from publicly available official statistics. The processed dataset and analysis code are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest

The author declares that there are no competing interests.

Ethical approval

Not applicable. This study is based exclusively on publicly available aggregated statistical data and does not involve human participants or animals.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

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