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Price Premiums for Single-Name and Compound-Name Geographical Indications in Swiss Cheese Trade

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ABSTRACT

Geographical indications (GIs) have become increasingly important in agri-food markets, especially in Europe. For Swiss cheese imports and exports, we analyze whether GIs are associated with higher trade prices. We find that price premiums can be obtained for both exports and imports. However, this is only the case for cheeses with single name GIs where the whole name is protected (e.g., Gruyère, Roquefort). There is no price premium for cheeses with compound names, consisting of a generic part and a geographical part (e.g., Gouda Holland, Raclette du Valais). As the generic part of the name (here Gouda, Raclette) can be used by competitors from other regions, such GI products may have difficulties in differentiating themselves. We conclude that higher prices in international cheese trade are not a matter of having a GI label or not. Rather, having a compound name seems to offset the benefit of the GI protection.

JEL Classification: Q11, Q13, Q17

1 | Introduction

Geographical indications (GIs) are becoming increasingly important in agri-food markets, particularly in Europe (Raimondi et al. 2020). GI-labeled products are often seen as premium products based on tradition and conveying information about their geographical origin. One aim of GIs is to signal the quality of a product and, thus, increase its price (Moschini, Menapace, and Pick 2008). However, empirical evidence on the success of GI products in achieving a price premium is mixed (Deselnicu et al. 2013; Leufkens 2018; Török et al. 2020). There is some initial evidence that differences in GI names may be a reason for such heterogeneous price premiums. Costanigro, McCluskey, and Goemans (2010) analyzed how nested names for wine lead to different price premiums. They find that collective parts of the name, such as the region or country of origin, contribute more to a reputation premium in lower-price segments than in higher-price segments.

This study contributes by studying the price premiums in Swiss cheese imports and exports, distinguishing between single-name and compound-name GIs. Single-name GIs fully protect the cheese's name (e.g., Roquefort and Le Gruyère). For cheese names with more than one word (e.g., Grana Padano, Parmigiano Reggiano), both the whole name and the main part of the name (here Grana and Parmigiano) are protected (European Commission 2004, 2007). This means that no other cheese containing the terms Grana or Parmigiano can be sold in the European Union (EU) and Switzerland, nor can it be registered as a GI or trademark. Compound-name GIs, on the other hand, consist of a generic and a geographical part (Viljoen 2017). For instance, the compound names Gouda Holland and Raclette du Valais are protected, but only the generic parts Gouda and Raclette are not, allowing similar-sounding non-GI competitors. Hence, we distinguish between single- and compound name, depending on whether EU law considers the main name to be generic or part of the registered

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GI. Due to a mutual recognition agreement (MRA), this also applies in Switzerland, but not necessarily in third countries. Moreover, there are cheese products that are not registered as GI, but as trademarks (e.g., Appenzeller¹) to differentiate their products, also regarding their geographical origin.

We analyzed whether cheeses with single- and compound-name GI protection achieve higher prices in international trade than non-GI cheeses. To this end, we compare the prices of single- and compound-name GI cheeses to the prices of non-GI-cheese, and to products with a registered trademark as an alternative way of branding and quality signaling, including regional attributes.

Using a detailed data set of Swiss cheese exports and imports (mostly from the EU) from 2002 to 2021 allows us to see how trade prices have developed differently over time, depending on their GI status and branding. From a policy perspective, this time span in Swiss cheese trade is a particularly interesting case study because cheese trade between Switzerland and the EU as its main trade partner was liberalized step-wise between 2002 and 2007. Consequently, stronger competition and price pressure were feared in Switzerland (Flury et al. 2005), at least for generic products, which can now easily be substituted with cheaper products from EU countries with lower production costs.² Therefore, “quality strategy” and differentiation was promoted in Switzerland, hoping to continue to remain competitive internationally despite lower border protection measures (Metz et al. 2021). One way of quality signaling, also beyond Swiss borders, could be the use of GIs, which are mutually recognized between Switzerland and the EU (IGE/IPI 2022a).³

Section 2 summarizes the current literature. Section 3 presents the background on the diversity of GIs, including the distinction by the name and role of trademarks. Section 4 presents the data and methodology used. Section 5 describes and discusses the results. Section 6 concludes.

2 | Literature Review

There are numerous studies on the potential social and cultural benefits for the origin regions of GI products, such as the protection of traditions, the landscape, and the stability of rural populations (Török et al. 2020). There is ample evidence that GIs can contribute to the above goals, but experiences vary considerably across regions and products (Ceï et al. 2018). However, our focus is more narrowly on trade prices as an indicator of economic success. In theory, the effect is quite clear: by signaling quality through the GI label, consumers face less asymmetric information about quality compared to buying non-guaranteed products, so they are willing to pay a price premium (Dogan and Gokovali 2012). This is only the case if a GI product has specific qualities due to its geographical origin, and consumers acknowledge this specificity (Barjolle and Sylvander 2000; Allaire, Casabianca, and Thévenod-Mottet 2011). However, this effect has not always been demonstrated empirically in previous studies.

In a meta-analysis of 25 studies, Deselnicu et al. (2013) found that minimally processed GI products, such as fresh produce (e.g., Mirabelles de Lorraine, Limone di Sorrento), have a higher price premium than GI products with longer supply chains, including cheese. Highly processed products with long supply chains more commonly use trademarks to build a premium reputation. The authors find that trademarks and GIs can play a similar role in product differentiation and branding and can be seen as substitutes for one another.

Large differences in price premiums were also found within the category of GI cheeses. Barjolle and Jeanneau (2012) explore how different governance structures of collective GI organizations contribute to higher or lower price premiums, using French Gruyère and Cantal cheese as examples. Barjolle, Reviron, and Sylvander (2007) could show that for Swiss and French GI cheeses, the ability to obtain higher producer prices for the supplied milk depends on the quality of the collective organization management. Comparing French GI cheeses with similar non-GI products, Hassan, Monier-Dilhan, and Orozco (2011) find that GIs are equally or even more price elastic than non-GI cheese products; that is, consumers are less loyal to GIs when prices increase. This challenges the assumption that GI products are less substitutable and hence achieve higher and more stable prices.

Most previous studies either analyze retail prices and consumers' willingness to pay price premiums for GI products (Hassan, Monier-Dilhan, and Orozco 2011; Schröck 2014), or, in the case of cheese, analyze the effect of GIs on producer prices for the supplied milk (Barjolle, Reviron, and Sylvander 2007). However, our study focuses on trade prices, specifically import and export prices at the Swiss border. This provides additional insights into export performance and avoids possible confounding factors at the retail level, such as temporary promotions, package size, or store attributes (Levy et al. 2004). Import and export prices as unit values are often used as proxies for quality (Hallak 2006). By controlling for several attributes regarding product characteristics and trading partners, we estimate how much of the price premium is paid for GI or brand attributes. Previous studies dealing with GIs in international trade have mostly focused on trade volumes and how GIs benefit or hinder international trade (Raimondi et al. 2020; De Filippis et al. 2022, Curzi and Huysmans 2021)—or vice versa, how trade leads to the introduction of GIs (Meloni and Swinnen 2018). Another strand of the literature studies how GIs, which are considered nontariff measures to trade (UNCTAD 2019; Saavedra-Rivano 2012), are treated in trade agreements (Josling 2006; Huysmans 2022). To the best of our knowledge, to date, only Duvaléix et al. (2021) have estimated price premiums for GI cheese in international trade data, analyzing French cheese and butter exports. They find that the export prices of PDO (Protected Designation of Origin) varieties are 11.5% higher than those of non-PDO varieties. Curzi and Huysmans (2021) also use export data to show that GI cheeses are a very heterogeneous group; with some of higher and some of lower quality. Following the approach of Khandelwal (2010), however, they do not estimate price premiums but quality itself, assuming that, conditional on price, higher quality is assigned to products with higher market shares.

We want to add to this by splitting the GI category into single-name GIs and potentially weaker compound-name GIs, and compare their estimated price premiums.

2.1 | The Diversity of GI

In the following, we will distinguish between two types of GIs: single-name GIs, where the full name is protected, as opposed to compound-name GIs consisting of geographical elements and generic designations. There is also legal uncertainty in several trade agreements about the protection of the generic part of a compound GI name, such as the protection of Mozzarella itself, because it is part of the GI Mozzarella di Bufala Campana (Viljoen 2017). We acknowledge that the legal situation is complex and refer to O'Connor (2004) and Viljoen (2017) for more detail, but we focus on the economic implications of such compound-name GIs. There is first evidence that consumers do not value compound-name GIs as much as single-name GIs, because there are similar-sounding competitors, selling more or less similar products. In many cases, there are not only regional but also technical differences between GI products and their competitors, such as the use of non-pasteurized milk or specific bacteria (Bisig et al. 2010; de Sainte Marie et al. 2020). Bonnet and Simioni (2001) found that consumers are unwilling to pay more for compound-name GIs, such as Camembert de Normandie than for non-GI cheese that uses the generic part of the name (Camembert). We should highlight that this study was conducted in France, where there is a long tradition of GIs in agri-food products, and where consumers are comparably well informed about GIs, especially domestic ones such as Camembert. For Canadian consumers, who tend to be less GI-affine than southern and western European consumers (Huysmans and Swinnen 2019), choice experiments showed that consumers had difficulties to distinguish between an original GI product and an imitation product labeled with "type," resulting in a similar willingness to pay (Slade, Michler, and Josephson 2019). Outside Europe, there is a different understanding and less valorization of GIs, as a recent case from the United States demonstrates. After years of legal wrangle, on March 3, 2023, a US court of appeal has decided that "Gruyère" is a generic name, and not a GI. That means that the name of a product that, although it relates to the place or the region where it was originally produced or marketed, has become the common name of the product (Brittain 2023). Overall, the United States and other Anglo-Saxon countries historically prefer trademark laws to govern GI and show little support for the European sui generis system (Josling 2006; Matthews 2015). Faced with the European GI system, the US Consortium for Common Food Names makes it clear that they will only protect full GI names, including the geographical part, but not the generic part itself (CCFN 2024). While they stretch the notion of generic considerably further than the European legislation, this lends credence to our hypothesis that such compound names may be the less valuable GIs, resulting in lower price premiums. These international differences motivated us to use trade data rather than domestic data, enabling us to answer the question of whether there is a price premium for GI products in foreign markets.

In this respect, we find it useful to distinguish between single- and compound-name GIs. For single-name GIs, it is relatively easy to identify them and to distinguish them from competitors. This is more difficult for compound designations, as they have to compete with similar-sounding potential substitutes. Moreover, while we do not control for structural differences between GI associations, anecdotal evidence suggests that single-name GI associations tend to have stricter GI enforcement. For instance, the Grana Padano Association has embedded microchips in cheese rinds to fight cheese fraud (Pomranz 2022). In Spain, the Queso Manchego association sued a competitor using similar figurative elements as they do (Capelli and Klaus 2019). Both cases are considered single-name GIs because EU law protects the terms Grana and Manchego as part of the registered GI. In contrast, one cheese with major difficulties in enforcing its GI status is Emmentaler, or more precisely, Emmentaler Switzerland. In Switzerland, Emmentaler was successfully registered as a PDO in 2002, but it was not recognized internationally. Even in the MRA with the EU in 2011, in which all agri-food products were mutually recognized, Emmentaler was excluded. Under EU law, Emmentaler is considered a generic name. Any GI containing the term is only protected as a whole, compound-name GI. Swiss Emmentaler, with its strong export history, is now marketed internationally under the brand "Emmentaler Switzerland", that is, with a compound name, to differentiate Swiss Emmentaler from competitors selling Emmentaler from other countries (Bourdin et al. 2015). While the name and presumably the cheese originated from the region Emmental in Switzerland (Bisig et al. 2010), the non-Swiss Allgäuer Emmentaler from Germany has successfully registered a PDO, and the French Emmental de Savoie and Emmental français est-central both have a PGI (Protected Geographical Indication) status and are recognized throughout the EU. Therefore, we will consider all these Emmentaler cheeses as compound-name GIs.⁴

The GIs we have discussed so far are PDOs or PGIs that are governed by a Sui Generis Law on GI. For the EU, this is the Council Regulation 2081/92 (Council of the European Union 1992). For Switzerland, this is the PDO/PGI Ordinance SR 910.12 (Swiss Federal Council 1997). Alternatively, in Switzerland, as in several other WTO member states, a product's origin can also be protected under trademark law and is then referred to as Geographical Marks (O'Connor 2004; IGE/IPI 2022b). This is the case for Appenzeller cheese, for example. Hence, a trademark could be an alternative to PDO/PGI registration to highlight and protect a product's origin. Although the legal basis and responsibilities are different, both a PDO/PGI label and a registered trademark can signal unique product qualities and their regional origin to consumers. Indeed, many Swiss cheese brands are closely linked to their geographic origin (e.g., Appenzeller, Bündner Bergkäse, or Switzerland Swiss⁵). Previous research has shown that GI status and brand interaction, that is, when they co-exist on a product, can influence consumers' perceptions and, ultimately, their willingness to pay for GI or brand attributes (Deselnicu et al. 2013; Grunert and Aachmann 2016). Our study allows a direct comparison of price premiums for single-name GIs, compound-name GIs, and non-GI products with a trademark.

3 | Data & Methods

3.1 | Data

Our analysis is based on detailed import and export data at the Swiss border provided by the Swiss Federal Office for Agriculture. We have data on each individual trade registered at the Swiss border, from 2002 to 2021, including the trade volume and value of each shipment during this period, the trading partner country and the type of cheese traded. The cheese type is captured by the 8-digit Swiss customs commodity classification,⁶ supplemented by a 3-digit key that reveals the specific name of the cheese, or further specifies the cheese (e.g., by fat content). For instance, the 8-digit code 0406.9091 stands for semi-hard cheese. The 14 different keys then identify whether it is Appenzeller, Tilsiter, Raclette, Fromage fribourgeois, Tête de Moine, Bündner Bergkäse, St. Paulin, Bernerkäse, Winzerkäse, goat and sheep cheese, or other semi-hard cheese (no name given), with a fat content in the dry matter of < 45%, 45% to < 55%, 55% to < 65%, or ≥ 65%.

This allowed us to identify whether a certain cheese had a GI label at the time of the shipment. Therefore, we divide the cheeses into four categories, as shown in Table 1. First, there are cheeses with a single-name GI where the full name and the individual parts of the name are protected. Examples are Grana Padano from Italy (also the term Grana alone is protected) and Le Gruyère⁷ from Switzerland. Second, there are cheeses with a compound-name GI, such as Raclette du Valais and Gouda Holland. The generic terms Raclette and Gouda alone are not protected. We hypothesize that protection is weaker because the generic part of the name can be used for products from other regions. Third, there are cheeses that have no registered GI under sui generis law, but have a registered trademark and a well-known brand, such as Babybel or Appenzeller. These brands can, but must not be related to a specific region.⁸ Fourth and finally, there are cheese imports and exports without GI or brand, which are not further specified in the trade data we use (e.g., “other semi-hard cheese,” “other grated cheese”).









However, this “other” group is likely to include some smaller GI cheeses and cheese brands that are not identified by the key in our data. Our data can distinguish 98 types of cheese (8-digit code + key). Yet, there are currently 261 GI cheeses registered in the EU (EUIPO 2024). Hence, for the import side, there is a certain risk that this reference group is contaminated by cheeses with a GI status and/or brand, so that we may underestimate price premiums. However, we are confident that this effect is limited. Of these 261 registered GI cheeses, many are small designations with mostly local or domestic importance (Boga and Püül 2023; Török and Moir 2018). Swiss imports in particular are dominated by some well-known GI cheeses and bulk imports of non-differentiated low-price products, such as cream cheese and grated cheese (TSM, PSL, SCM, IP Lait, Agristat 2023). On the export side, we can rule out such a bias, as all Swiss GIs are uniquely identified in our data.

We retrieved our data on GIs, including the date of registration, from the official EU database, eAmbrosia (European Commission 2022). For Swiss cheese exports, there are eight cheese designations registered as PDO (or in French AOP; Appellation d'Origine Protégée).⁹ For imports, our data identifies 26 European cheese designations registered as PDO and 5 cheese designations registered as PGI.¹⁰

For our panel data analysis, we group the data into cheese country pairs.¹¹ On the import side, we have 346 cheese country pairs with 49 cheese types (19 GI_single, 12 GI_compound, 8 Brand, 10 other) and a total of 4379 observations. On the export side, we counted 802 cheese-country pairs with 30 cheese types (5 GI_single, 3 GI_compound, 10 Brand, 12 other) and a total of 10,189. For a full list of the cheese types included in the final sample, see Supporting Information S1: Appendix Table A2 (import) and A3 (export).

Our variable of interest is trade price, for which we use the import and export unit values in CHF/kg. To eliminate

TABLE 1 | Cheese categories for Swiss cheese imports and exports.

Category	Description	EU example (imports to CH)	Swiss example (exports from CH)
GI_single	Single-name GI: Full name and main part of the name are protected by GI		
GI_compound	Compound-name GI: Generic part of the name can be used for products from other regions		
Brand	No GI, but a registered trademark		
Other	Not further specified in the trade data (no GI, no brand)		

Note: The logos displayed for the GI categories are the brand logos the GI association requires their producers to use. For category “other,” the images are for illustrative purpose only.

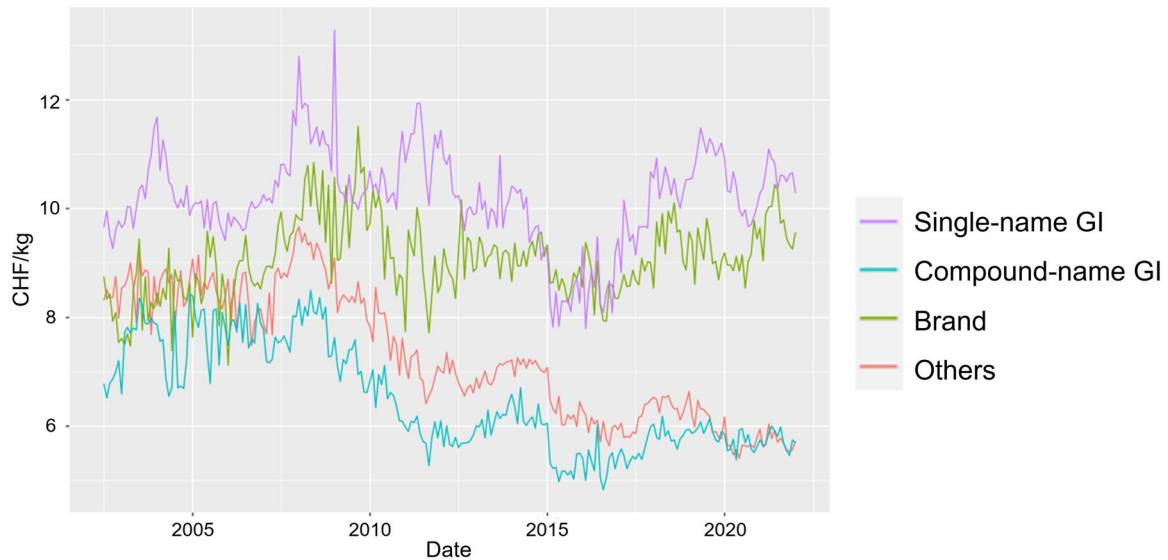


FIGURE 1 | Quantity-weighted mean import price for cheese imported to Switzerland in CHF/kg.

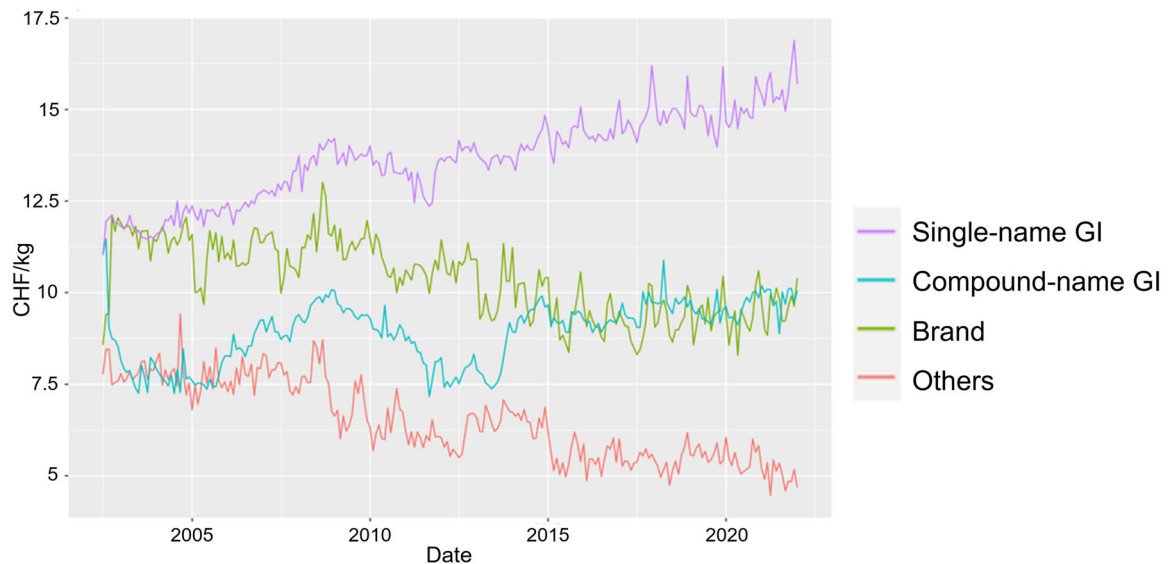


FIGURE 2 | Quantity-weighted mean export price for Swiss cheese in CHF/kg.

outliers, we winsorize the top and bottom 1% of the prices. Figure 1 shows import price development over time, displaying the quantity-weighted mean import price for cheese imports in CHF/kg. The four lines represent the prices for cheeses with a single-name GI, compound-name GI, brand, and others. Figure 2 shows the export price development for these four categories. Such a first visualization suggests that there are considerable differences between the categories, both in terms of the overall price level and in terms of price development over time. Single-name GI cheese reaches the highest price levels for both imports and exports (purple line), followed by branded cheese (green line). Interestingly, for imports into Switzerland, cheese with a compound-name GI label has the lowest prices, even lower than other cheese types without a brand and without GI.

3.2 | Empirical Methodology

In our empirical analysis, we want to investigate these cheese prices, as displayed in Figures 1 and 2, in more detail, aiming to identify how far GI and brand contribute to the prices, controlling for other factors, such as the type of cheese and trade partner attributes. We have an unbalanced panel data set with $t = 20$ years and $i = 709$ cheese country pairs for imports and $i = 803$ for exports. We apply the two-way effects random effect panel model in Swamy and Arora (1972) transformation. Thus, we account for time-fixed effects that are relevant for all cheese types, such as world price movements, trade liberalization steps, and exchange rate changes. We ran the analysis separately for the import and export data. We apply a double-log model to interpret all parameters as (semi-)elasticities.

$$\ln(\text{price}_{ict}) = \beta_0 + \beta_1 GI_single_{it} + \beta_2 GI_compound_{it} + \beta_3 Brand_{it} + \beta_4 producttype_i + \beta_5 \ln(\text{distance}_c) + \beta_6 \ln(GDP_{ct}) + \beta_7 EU_{ct} + \beta_8 MRA_{ct} + \beta_9 GI_single_{it} \times t + \beta_{10} GI_compound_{it} \times t + \beta_{11} Brand_{it} \times t + v_{ic} + e_t + \varepsilon_{ict} \quad (1)$$

As formula (1) summarizes, the dependent variable is the logarithm of the cheese price for cheese type i , traded with country c (country of origin for import data, destination country for export data) in year t . Cheese type i defines the exact cheese type using the 8-digit customs code plus 3-digit key and the precise product name, which reveals the GI-status of the product. For imports, this is the import unit value; for exports, it is the export unit value in CHF/kg at the Swiss border. β_0 is a constant. GI_single_{it} is a dummy variable taking the value of 1 for products with a single-name GI and 0 otherwise. $GI_compound_{it}$ takes the value of 1 for compound-name GIs and 0 otherwise. Similarly, the dummy variable $Brand_{it}$ is 1 for products with a brand (but no GI), and 0 for unbranded, non-GI products. $Producttype_i$ is a factor variable indicating different cheese products, such as hard, semi-hard, soft, cream, or blue cheese. To control for the product type in the most detailed way possible, we use the 8-digit Swiss customs number, but cut off the last digit, which often identifies a single cheese type, including its GI or brand status. For instance, CN04064021 is the Roquefort with proof of origin (GI), and CN04064029 is the other blue-veined soft cheese (non-GI). The resulting “CN7” number CN0406402 groups together all blue-veined soft cheese imports or exports while allowing for variation in their GI and brand attributes. Furthermore, we controlled for some characteristics of the trade partner. $Distance_c$ states the distance in kilometers between Switzerland and the origin or destination country, following the CEPII distance measure (Mayer and Zignago 2011). GDP_{ct} is the Gross Domestic Product in US Dollars per capita of the trade partner in the respective year (World Bank 2022). We also include a dummy EU_{ct} , with a value of 1 if the trade partner was part of the EU at time t , and 0 otherwise. Similarly, we check if MRAs on GIs are in place between Switzerland and the partner country at the time of the shipment, using the dummy variable MRA_{ct} . If $MRA_{ct} = 1$, an agreement ensures that the GIs of both trading partners are recognized and protected.¹² Further, we want to see how prices developed over time by interacting t (time trend, 20 years) with the GI and brand dummies (GI_single_{it} , $GI_compound_{it}$, $Brand_{it}$). Given our two-way random effects specification, the error term can be split into three elements: v_{ic} is the individual error term for a certain cheese i traded with country c . e_t is the time-dependent error term component for all years t . The residual error is the idiosyncratic error ε_{ict} for the single observations. Serial correlation and time-wise heteroscedasticity are tested and corrected for using the unconditional robust covariance matrix estimators of Beck and Katz (1995).

4 | Results & Discussion

4.1 | Import Data

The left-hand side of Table 2 displays the estimation results for the import data, which are mostly EU cheeses imported to Switzerland. Our results show that cheese types with GI labels have higher trade prices than non-GI cheeses on the Swiss border. However, this is true only for single-name GIs and not for compound-name GIs. We see that single-name GI cheese

gets on average 5.1% ($\beta = 0.0502$)¹³ higher import prices, compared to non-GI, non-branded cheese. Cheese with a compound-name GI however, does not receive a significant price premium (estimate of -1.5% [$\beta = -0.0153$], not significant at the 10% level). Similarly, there is no significant price difference between branded cheese with a registered trademark compared with non-branded cheese.

For the control variables concerning country of origin, we see that EU membership, MRA, and distance do not have a significant effect. The wealth of the country of origin is positively associated with the price. A 1% increase in GDP per capita is associated with an average price increase of 0.16%, suggesting that products from high-income (and high-cost) countries have higher prices than cheese imports from less wealthy countries. The estimates for all product types were found to be positive and significant. Because our reference category is fresh cheese of the Mascarpone or Ricotta type (CN0406101), which are very low-priced cheeses, the estimates for all other CN groups are positive, indicating higher import prices. For instance, the largest group CN0406909 includes several hard and semi-hard cheese types and achieves, on average, 52.5% ($\beta = 0.4219$) higher import prices than the fresh cheese reference category. Even higher, 103.6% ($\beta = 0.7108$), is the average price of semi-hard blue-veined cheese (CN0406408). This shows that the main driver of import prices remains the cheese type and that it is important to control for it in such a high degree of detail.

The trend variable is negative and significant, indicating that non-GI, non-branded cheese import prices decrease, on average, each year by 0.91%. Adding this over our observation period (19 yearly changes) leads to a price reduction of 17%. As the interaction terms of the differentiated cheeses (GI or brand) with the trend variable are not significant at the 5% significance level, we find that these cheese types also follow this negative trend in import prices. While single-name GI cheeses at least receive a significantly higher import price level, cheeses with a compound-name GI or a brand neither achieve higher prices nor more stable prices compared to the reference category.

4.2 | Export Data

The right-hand side of Table 2 shows the estimated coefficients for the export data for Swiss cheese. The estimated coefficient for GI_single is positive and significant; on average, these cheeses have 5.6% ($\beta = 0.0547$) higher prices than their non-GI, non-branded counterparts do. This estimate is very similar in size and significance to the import data. Similarly, cheese with a compound-name GI or with a registered trademark does not receive significant price premiums in exports compared to non-branded cheese (estimates of -4.6% [$\beta = -0.0450$] and $+5.0\%$ [$\beta = 0.0490$], respectively, both not significant at the 5% level).

Further, the export destination has a significant influence: for exports to EU member states, 8.1% ($\beta = 0.0779$) higher prices are

TABLE 2 | Determinants of cheese trade prices at the Swiss border (2002–2021).

	Import data (depend variable: log import price)		Export data (depend variable: log export price)		
	Estimate	Standard error	Estimate	Standard error	
(Intercept)	0.6957	0.5343	0.6647	0.1581	***
GI_single _{it}	0.0502	0.0152	0.0547	0.0270	*
GI_compound _{it}	−0.0153	0.0280	−0.0450	0.0234	.
Brand _{it}	0.0696	0.0534	0.0490	0.0331	
EU _{ct}	0.0419	0.0611	0.0779	0.0261	**
MRA _{ct}	−0.0271	0.0482	−0.0264	0.0181	
log(distance_km) _c	−0.0084	0.0391	0.0736	0.0102	***
log(GDPcap) _{ct}	0.1493	0.0388	0.0329	0.0087	***
trend	−0.0091	0.0033	0.0273	0.0238	**
GI_single _{it} × trend	0.0062	0.0036	0.0042	0.0025	*
GI_comp _{it} × trend	0.0019	0.0101	0.0025	0.0021	
Brand _{it} × trend	0.0008	0.0035	0.0004	0.0003	
CN0406102			0.1079	0.1110	
CN0406109			0.2672	0.1099	*
CN0406201	0.2712	0.1079	1.0644	0.1137	***
CN0406209	0.0356	0.0176	0.7299	0.1066	***
CN0406301	0.2309	0.1130			*
CN0406309	0.3060	0.1144	0.7598	0.1082	***
CN0406401	0.3226	0.1289	1.0841	0.1380	***
CN0406402	0.6185	0.1079	1.1822	0.1118	***
CN0406408	0.7108	0.1274	1.2975	0.1473	***
CN0406901	0.4519	0.0866	1.1316	0.1062	***
CN0406902	0.3589	0.1436			*
CN0406903	0.4832	0.0975	0.9108	0.1339	***
CN0406905	0.4798	0.1018	0.7748	0.1470	***
CN0406906	0.5013	0.2183			*
CN0406909	0.4219	0.0842	0.8893	0.1042	***
Observations	N = 4379		N = 10,189		
Adj. R ²	0.3923		0.4931		
Chisq:	571 on 15 DF, <i>p</i> < 2.22e−16		473 on 23 DF, <i>p</i> < 2.22e−16		

Note: CN are Swiss customs numbers by the first 7 digits and identify the cheese type. They are values of a factor variable with the reference CN04060101 (Mascarpone, Ricotta Romana). For an explanation of the codes, see Supporting Information S1: Appendix Table A1.

A Double-log two-way effects random effect panel model is applied. Corrected for time wise heteroscedasticity and serial correlation, using unconditional robust covariance matrix estimators of type Beck and Katz.

Significance codes: 0 “***” 0.01 “**” 0.05 “*” 0.10 “.” “1.”

realized. In addition, the Alchian–Allen (Alchian and Allen 1964) theorem of “shipping the good apples out” seems to hold: a 1% increase in trade distance is associated with a 0.0736% increase in trade prices. Moreover, wealth in the destination country is positively associated with higher prices. A 1% increase in GDP per capita is accompanied by an average cheese price increase of 0.0329%, suggesting a slightly higher willingness to pay or a higher demand for premium products in richer countries.

Again, the product type is a highly significant determinant for the price, with several CN7 groups having significant estimates compared to the reference group CN0406101 (Mascarpone/

Ricotta type fresh cheese). The largest and most relevant group for Swiss cheese exports, CN0406909, including Emmentaler and Gruyère, achieves 143.3% ($\beta = 0.8893$) higher prices and blue-veined semi-hard cheese even 2606.0% ($\beta = 1.2975$) higher prices.

Although the overall time trend is not significant for exports, the interaction term of GI_single with the time trend is significant. Each year, the price for single-name GI cheeses increases on average by 0.42%; thus, over the whole timespan (19 monthly changes), this accumulates to a price increase of more than 8% compared to non-GI cheeses. Together with the level difference

of 5.6%, this indicates that Swiss cheeses with a single-name GI also have a very strong export price performance, as the price gap to non-GI cheeses increases over time (2002–2021).

For the export data, we need to mention that there are few top export cheeses that make up most of the trade. The *GI_single* category, despite covering five different cheese types, is dominated by Gruyère price development. A total of 40.8% (1108 out of 2719) of the observations in the *GI_single* category are Gruyère exports, which have developed very well throughout the observation period. In particular, the Gruyère GI association is able to exercise a high level of control over milk production quantities, preventing the risk of excess milk supply (Flütsch 2012; Finger, Listorti, and Tonini 2017). The *GI_compound* category is dominated by Emmentaler, which has not only a lot of competition from close substitute products but also a very particular history, and several reasons why it has difficulties in obtaining good prices in export markets (Hacker 2014; Rutschi 2022). In total, 56.3% (1059 out of 1882) of the observations are Emmentaler exports, 40.2% are Raclette exports and the remaining 3.5% are Berner Alpkäse and Hobelkäse exports. Hence, when interpreting Swiss export results, we need to keep in mind which specific cheese types are behind these categories, rather than drawing general conclusions.

5 | Discussion

When comparing the import and export results, we see that for both sides, cheese with single-name GI protection achieves a price premium of around 5%, but those with compound-name GI protection do not. Indeed, it is not about registering a GI but about how well it differentiates a product from competitors. Single-name GIs seem to have an advantage over compound-name GIs, who have to compete with similar-sounding non-GI products, using the generic name part, such as Gouda or Raclette. This confirms our initial hypothesis that single-name GIs offer stronger GI protection than compound-name GIs, and achieve higher price premiums in international trade. Certainly, within these groups, there are differences in individual GIs, depending on how well the collective association is managed (Reviron and Chappuis 2011). Our results only concern the aggregate level, and at this level, we can say that it matters whether a GI protects the full name, so that the GI product is perceived as unique without close non-GI substitutes.

The 5% price premium is a rather low estimate, compared to the existing literature. However, previous studies mostly deal with retail prices, while we are looking at wholesale prices. It is therefore possible that the mark-up between wholesale and retail prices is proportionally higher for GI cheeses than for non-GI cheeses. Higher mark-ups for highly differentiated products are a common phenomenon in retail, exploiting consumers' higher willingness to pay for premium products (Brand 2021). On the import side, we potentially underestimate the price premium, because there may be some GI cheeses without a tariff key that identifies them as such, so they end up in the reference category. This is especially the case for blue

cheeses (CN0406408) and other hard and semi-hard cheeses (CN0406909), both of which we exclude as a robustness check (Supporting Information S1: Appendix B).

For non-GI but branded products, we do not find a significant price level effect for Swiss imports or exports. While certain brands may achieve high and stable prices, our aggregate analysis does not find that branding alone leads to price premiums in international trade. The number of brands with geographical marks under trademark law (IGE/IPI 2022b) is rather small in our sample; therefore, we cannot conclude in a general sense that regional protection via trademark law is less effective in the European context than via PDO/PGI sui generis law.

5.1 | Robustness Checks

We conduct several robustness checks, shown in Supporting Information S1: Appendix B. As an alternative to the random effects model with a time trend, we estimate a model with yearly dummies (Model B1), capturing time-fixed effects. Here, the estimated price premium for single-name GIs is higher (8.0% for imports, 11.2% for exports), because we only have a mean level estimate. In our main model, in addition to an initial level difference of around 5%, we see that prices for single-name GIs also increase over time ($GI_single_{it} \times trend = 0.0062$ and 0.0042).

Model B2 excludes blue-veined semi hard cheese (CN0406408) and other semi-hard and hard cheese (CN0406909) from the analysis, because we suspect that these categories contain many unidentified GI cheeses, which could lead to an underestimation of the GI price premium. Indeed, the estimated price premium for single-name GI cheese is now 9.8%; the estimates for compound-name GIs and brand remain insignificant. Because CN0406909 is such a large category, we lose many observations ($N = 2882$ instead of 4379) and hence statistical power.

We further split GIs into PGI and the somewhat stricter PDO. This proved irrelevant in our case, perhaps because PDO is the dominant label in the cheese market. Further, we checked whether small trade quantities somehow biased our results and excluded all transactions of less than 20 kg per shipment. This did not affect our results, except for decimal figures.

5.2 | Limitations

The focus of this study is limited in that it analyzes only trade prices at the Swiss border. We are aware that a price premium in cross-border trade is only one of many indicators of the success of a GI product. In addition to a potential direct price premium, GI products may improve market access. GI organizations may have lower marketing and negotiation costs because the involved commercial partners are controlled by the GI organization, leading to increased international trust (Reviron, Chappuis, and Barjolle 2004). Furthermore, we acknowledge that higher prices do not inherently equate to

higher profits or economic success, as highlighted by Török et al. (2020). Stricter GI requirements can increase costs and potentially adversely affect profits. Similarly, GIs with lower prices could still achieve economic benefits through higher sales volumes, which is something our study does not cover.

Another limitation is that within the GI categories, we did not have additional information regarding branding. A Gouda Holland cheese could be sold without a brand under the budget line of a discounter or under the well-established brand Frau Antje. Hence, our category “Brand” only applies to non-GI cheeses, and we cannot estimate interactions between brands and GI protection. We suggest that future research should further investigate the qualitative attributes that make some GIs more successful than others. Alternative distinguishing criteria could be the governance structure of the collective organization, ranging from loose coordination systems to strong collective associations (Reviron and Chappuis 2011), how established the individual GI products are (Teuber 2011), or the winning of awards and prizes (Paroissien and Visser 2020). Furthermore, it would be interesting to combine our distinction between single- and compound-name GIs with the framework of Khandelwal (2010). This approach has been used to estimate quality in agri-food trade (Curzi and Pacca 2015) and as a tool to distinguish GIs of higher and lower quality (Curzi and Huysmans 2021). Ultimately, quality remains a multi-dimensional concept, even within the group of GI products. Our proposition to distinguish GIs by name is a small contribution to capturing such perceived quality and, ultimately, price differences.

6 | Conclusion

Our results show that in Swiss cheese imports and exports, only products with single-name GI protection, which covers the full name (e.g., Roquefort, Gruyère), obtain a significant price premium. This also includes GIs with more than one word (e.g., Grana Padano, Parmigiano Reggiano), where both the whole name and the main part of the name (here Grana and Parmigiano) are protected. Both imports (mostly from the EU) and exports (from Switzerland) have a price premium of approximately 5% compared with non-GI cheese. In contrast, GI cheese with a compound name (e.g., Camembert de Normandie, Raclette du Valais), which allows competitors to use the generic part of the name (here, Camembert, Raclette), does not have significantly higher prices than non-GI cheese. Hence, we conclude that is not about having a registered GI, but about the specificity and exclusivity of the GI and about avoiding direct competition with non-GI substitutes. This is a relevant finding for actors who consider a new GI registration. They should consider that compound-name GIs may have difficulties in achieving a price premium, at least in foreign markets.

Policymakers should be aware of these differences, too. When promoting a “quality strategy,” as is the case in Switzerland, treating all GIs equally and neglecting a supposedly small detail such as the GI name may reduce the desired effects. Whether this name-effect also holds in domestic markets is yet to be determined. It could well be that domestically, GI is known better and consumers find it easier to distinguish a

compound-name GI from a competing product using the generic part of the name. In either way, policymakers and private market actors should be aware of the name difference and think about ways in which compound-name GIs could be promoted more successfully in the future.

An alternative for such cheeses that do not have strong GI protection can be branding via registered trademarks. In our sample, however, we do not find a significant price premium for branded cheese products compared with similar non-branded products. While individual cheese brands manage to signal quality differentiation beyond borders and realize high trade prices, we could not find a significant aggregate effect. This is true for imports and, perhaps more remarkably, for Swiss exports. Several Swiss brands, such as Appenzeller or Bündner Bergkäse have their geographical origin as the core of their brand. However, at least in this Swiss trade context, there seems to be an advantage of single-name GIs over trademarks. However, brand associations may want to learn from what makes single-name GI cheeses successful. Overall, we want to highlight that we found the product type (blue-veined, soft, herb cheese, etc.) to be the main driver of import and export prices. Hence, before diving into the details of GIs and branding, the primary focus of a quality strategy should be on the high-end processing and refinement of (cheese) products.

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Ethics Statement

The author has nothing to report.

Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The author has nothing to report.

Endnotes

¹In Swiss trademark law, geographical names such as “Appenzeller” can be used and protected as geographical marks (IGE/IPI 2022b). Yet, it remains a brand and is regulated by trademark law, in contrast to the agri-food GIs which are registered at the Federal Office for Agriculture and regulated by the PDO/PGI Ordinance SR 910.12 (Swiss Federal Council 1997).

²Later evaluations of the policy changes showed that the cheese trade liberalization did not lead to a crowding-out effect of Swiss cheese by foreign products. Despite a significant increase in imports, the domestic cheese production could be further increased (BAKBASEL 2012). While there is no longer a direct border protection through tariffs, there is still considerable support for Swiss milk producers in the form of direct payments, and even a dedicated cheese processing aid (Finger, Listorti, and Tonini 2017; Metz et al. 2021).

³There is a mutual recognition agreement (MRA) with the EU from 1999 for wine and spirits, and the mutual recognition for all other agri-food products including cheese (exception: Emmentaler) from 2011 (Annex 12 of the Agreement on Trade in Agricultural Products). On top of that, Switzerland has active MRAs for GIs with Mexico (2000), Russia (2010), Jamaica (2013), and Georgia (2018) (IGE/IPI 2022a).

⁴We are aware, that from a legal perspective, the correct GI name is Emmentaler, and Emmentaler Switzerland is the brand, as defined in trademark law. However, given that we use trade data and from an international consumers' perspective, "Emmentaler Switzerland" is the main reference for Emmentaler from Switzerland.

⁵Switzerland Swiss is a cheese brand similar to Emmentaler, popular in non-EU exports.

⁶The Swiss System is similar to the international Harmonized System (HS), but even more detailed. Consult www.tares.ch for further information.

⁷Note that there is a homonymous designation in France, registered as a PGI.

⁸Geographical marks under Swiss trademark law are included in this brand category.

⁹There are currently 12 cheese designations registered as PDO/AOP in Switzerland, but only 8 of them are exported sufficiently so that we include them in our data set.

¹⁰The Swiss AOP is equivalent to the European PDO, indicating that the product was produced, processed, and refined in the defined region. PGI is less strict, indicating that the product was either produced, processed or refined in the applicable region. As there are only very few PGI cheeses, we do not further distinguish between the two legal certification schemes.

¹¹Examples for cheese country pairs would be Mozzarella-France or Mozzarella-Italy for imports into Switzerland, depending on the country of origin. For exports from Switzerland, this could be Sbrinz-Germany or Sbrinz-USA, depending on the destination country. To maintain a panel data structure, and thus preserve the time series properties of the data, it is important to have unique (cross-sectional) groups. To this end, we treat combinations of the cheese type i and the trading partner country c as one group.

¹²Note that MRAs are often part of trade agreements, which may also lead to lower or even zero tariffs. Our study does not include tariff data because of many non-linearities in the Swiss tariff system and because cheese trade is fully liberalized with the most important trade partner, the EU—which is captured by the EU variable.

¹³To transform the semi-logarithmic coefficients (β) of the dummy variables into percentage changes, we use the formula by Halvorsen and Palmquist (1980): $((e^\beta) - 1) \times 100$.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.