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The Political Economy of Geographical Indications

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Abstract

In this article we study the political process that governs the creation and size of new Geographical Indications (GIs). Producers can choose to apply for a GI and subsequently go through a bargaining process with the government. We derive the optimal GI area from the point of view of consumers, producers, social welfare, and the government; and we show how bargaining leads to a GI size in between the applicant's optimum and the government's optimum. Under the assumption that the non-GI good is a commodity, any GI implemented through the political process is welfare-enhancing, but not all welfare-enhancing GIs will be proposed by producers.

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Introduction

A geographical indication (GI) is a collective label, backed by government regulation, to certify the geographical origins of a product. A well-known example is the sparkling wine Champagne, produced in the Champagne region in France. Since GIs certify the geographical origin of a product, the exact geographical delimitation is the fundamental characteristic of a GI. For instance, the World Trade Organization requires that a GI product possess a "given quality, reputation, or other characteristic" that is "essentially attributable to its geographical origin" (WTO 1994; Marette et al. 2008). Likewise, for the European Union (EU), a designation of origin certifies a product "whose quality or characteristics are essentially or exclusively due to a particular geographical environment with its inherent natural and human factors" (EU 2012, Art. 5/1).[1]

In parallel with the growing importance of GIs in domestic markets and in international trade,[2] several authors have explored the economics of GIs. Zago and Pick (2004), Lence et al. (2007) and Moschini et al. (2008) show welfare gains due to the resolution of asymmetric information problems, as a GI label allows consumers to

[1] This notion that the geographical origin of a product determines its characteristics is sometimes captured by the term "terroir".

[2] While some countries consider GIs to be a way to solve information problems, others interpret them as pure protectionism. These differences of opinion have led to what Josling (2006) described as a "war on terroir". GIs are currently an issue for the ratification of the EU-Canada Comprehensive Trade and Economic Agreement (CETA), and they are being debated in the ongoing negotiations on the Transatlantic Trade and Investment Partnership (TTIP) with the United States.

The most important multilateral agreement about GIs is the Lisbon System for the International Registration of Appellations of Origin, which only has 28 members. "The signatories to the Lisbon Union agree to mutual protection of each other's GIs, so long as they are protected in the home market and included in a register kept by the World Intellectual Property Organization (WIPO)" (Josling 2006, p. 350). For wines, more agreements exist, such as the 2006 Agreement between the US and the European Community on Trade in Wine.

distinguish high quality products from low quality at the moment of purchase. Mérel and Sexton (2012) also find that GIs can increase social welfare, but also can be used to extract rents from consumers through the overprovision of quality. Desquilbet & Monier-Dilhan (2014) show that binding product quality specifications in a GI may adversely affect producers. Menapace & Moschini (2014) model GIs as enabling informative advertising, and analyze how the extent of GI protection affects consumer and producer welfare.

An issue which so far has received limited attention is how the size of a GI is determined and how this relates to the socially optimal size. This is an important issue since the essence of a GI is its specific "terroir", i.e. its geographic region of a certain size – with the size influencing rent distribution among interest groups and overall welfare. The determination of a GI's size typically involves a role for the government, so taking into account political economy considerations appears crucial.

To our knowledge, only two studies have addressed the question of how the size of a GI is determined. Langinier and Babcock (2008) model the choice of GI size as determined by club-forming producers. When fixed costs related to the GI are shared by producers, there is an optimal size that balances the benefits of expanding the club (improved cost-sharing) with the downside (lower prices). Langinier and Babcock (2008) do not consider the requirement for a GI to be approved by the government. Landi and Stefani (2013) do study the interaction between producers and government, but they do not allow for cost-sharing nor for decreases in quality as the GI region expands, features which are essential characteristics of GIs.

In this article, we study the setting of a GI's size as the outcome of a political process.

Our political economy model incorporates four salient facts about GIs. First, a larger GI area means more production and a lower price for the GI product. Second, a larger GI area means that certain fixed costs (e.g. setting up a control body and marketing the GI) can be spread over a larger number of producers (as in Moschini et al. 2008; Langinier and Babcock 2008). Third, a larger GI area may have a negative effect on (actual or perceived) quality, which affects consumer utility and the equilibrium price. Fourth, the initiative to create a GI and to propose a size is typically taken by the producer(s) with the highest quality, after which approval is sought from the government (see Tregear et al. 2007 for case studies). The applicants want to maximize their surplus, while the government's objective function is a weighted sum of social welfare and the lobby contributions of interest groups as in Grossman & Helpman (1994) and Swinnen and Vandemoortele (2008; 2011).

We model the interaction between the applicants and the government as a non-cooperative bargaining game with alternating offers as in Rubinstein (1982) and Osborne & Rubinstein (1990). By solving the bargaining game, we show that GI sizes will be in between the applicants' preferred size and the government's preferred size. The more patient the applicants, and the bigger their lobbying weight, the closer the GI will be to the applicants' optimal size. However, we also show that the politically determined GI size is still welfare-enhancing.

Finally, note that a more general contribution of the paper is that, to our knowledge, we are the first to provide an intuitive application and exposition of Rubinstein-bargaining with non-linear payoff functions.

Our article is organized as follows. First, we provide details on the institutional context of how a GI's size is determined. Then, we set up the economic model and identify the applicants' preferred GI size and the social optimum. Then we present the government's objective function and derive its preferred GI size. Next, we solve the bargaining game between the applicants and the government and discuss the results. We conclude by offering some suggestions for further research and a policy implication. In the appendix, we show that our results are robust to discontinuous changes in quality.

Institutional context of GI creation in the EU and elsewhere

Since most GIs hail from the European Union (EU), we first explain the EU regulations. In the EU, GIs are governed by regulation 1151/2012 on quality schemes for agricultural products and foodstuffs (EU 2012).[3] Two main schemes exist: the *Protected Designation of Origin* (PDO) and the *Protected Geographical Indication* (PGI). The two schemes have the same official objectives[4] and the same procedures for application, but the requirements for a PDO are more strict. For a PDO, there are three requirements: (1) a specific origin – a place, region or, in exceptional cases, a country, (2) an exclusive or essential link between this geographical origin and quality of the product, and (3) geographical confinement of all production steps within the designated origin (EU 2012, Art.5/1). For

[3] For wine, specific rules apply as per regulation (EC) 491/2009, and for spirit drinks as per regulation (EC) 110/2008. For wines, there are additional rules regarding planting rights (see Deconinck and Swinnen 2014).

[4] The official objectives of the EU GI-scheme are: "to help producers of products linked to a geographical area by (a) securing fair returns for the qualities of their products, (b) ensuring uniform protection of the names as an intellectual property right in the territory of the Union, (c) providing clear information on the value-adding attributes of the product to consumers" (EU 2012, Art.4).

a PGI, only one production step needs to happen within the protected region.[5]

The EU procedure consists of three phases: (1) the application for a GI by producers, (2) a national opposition and approval procedure, and (3) an EU-wide opposition and approval procedure. A schematic overview is provided in Table 1.

The initiative to establish a GI is taken by producers. Typically the process starts with an initial phase of informal exchange and bargaining with the national regulators (see Tregear et al. 2007; Landi and Stefani 2013; Teuber 2011). The official application procedure starts when producers submit the necessary draft documents to their national government (EU 2012, Art. 49/2). [6] The member state (MS) then checks whether the application meets the formal conditions. If so, it initiates a "national opposition procedure", during which those opposed to the application can express their objections. If there is opposition, the applicant is expected to hold talks with the opposition, potentially with government mediation. Yet even if the reconciliation talks fail, the government can still decide to grant approval. After approval, the MS publishes its decision and the

[5] An example of a PDO is Parmesan cheese ("Parmigiano Reggiano", IT/PDO/0117/0016), produced in a region consisting of parts of the provinces Parma, Reggio Emilia, Bologna, Modena and Mantova. All production steps have to take place in the designated area: at least 75% of the feed has to be grown there, the cows have to be reared there, and the minimum 12-month maturing must be carried out there. The final packaging must also occur within the region. An example of a PGI is Dutch Gouda cheese ("Gouda Holland", NL/PGI/0005/0328). The cheese has to be manufactured somewhere in the Netherlands, and the milk has to be sourced at Dutch dairy farms. There are no restrictions on the origin of the feed or on the place of packaging.

[6] Formally, the application process requires two documents. The first one is the so-called "single document", which contains "the main points of the product specification", "a description of the link between the product and the geographical environment" (EU 2012, Art.8/1) and the proposed geographical delimitation. The EU clarified the requirements for the geographical delimitation in implementing regulation EU 668/2014, Art.2: "[…] the geographical area shall be defined in a precise way that presents no ambiguities, referring as far as possible to physical or administrative boundaries." The second document is the "product specification", which contains "a description of the method of obtaining the product and, where appropriate, the authentic and unvarying local methods" (EU 2012, Art. 7).

corresponding product specification.

The EU has given some leeway to the member states in specifying the national procedure. [7] This has resulted in somewhat different national procedures. But while the particulars may vary, the national procedures all follow the official application and opposition period and rules for MS decision-making.

After national approval, the application goes to the EU for final approval. The European Commission (EC) checks whether the necessary conditions are met, and if so, makes the application documents public and launches an opposition period of three to five months. If there is no opposition, the GI is registered. In case there is opposition, and the EC judges it admissible, the applying MS has to seek a compromise with the opposition in a period of maximum 6 months. If a compromise is reached, the GI is registered. If there is no compromise, the EC decides on the issue.

GI schemes in other countries

There are two main approaches to GIs (Giovannucci et al. 2009; Josling 2006). Most countries (111 countries including the EU MSs) use a specific or so-called "sui generis" system for GIs. In 55 other countries (including the US), GIs are covered by a generic trademark or certification system. This means that GIs can be requested by any individual

[7] As an example, In France, a request to create or change a GI area needs to be submitted at the *Institut National d'Appellations d'Origine* (INAO). If the INAO deems the application admissible, it will appoint a committee to study the request. In addition, it will nominate consultants to study the proposed geographical area. The consultants formulate "delimitation principles", on the basis of which an expert panel, working together with the applicant, will eventually propose a delimitation of the GI area, which is then subject to a two-month opposition procedure. After the opposition procedure, during which the applicants have to respond to any legitimate opposition, the INAO will have a final vote on the application. In case the application is approved, the Ministry of Agriculture will make the decision official. (INAO 2011)

producer, and that there is no need for a proof of a causal link between geographical origin and product quality.

Even within countries that take the generic trademark approach, there may be specific systems for some sectors. One example is the US scheme of American Viticultural Areas (AVAs).[8] Producers file a petition for an AVA label at the US Alcohol and Tobacco Tax and Trade Bureau (TTB). The TTB checks the petition and publishes a notice of proposed rulemaking (NPRM) to solicit public comments (CFR 2014, §9.14). The TTB then reviews potential comments and prepares a final rule for publication, with or without changes. The procedure is hence similar to the EU procedure for requesting GIs, except for the fact that the TTB can impose a size without approval from the initiating producers.

Implications for the model

It is clear from the description of the institutional context that all GI procedures involve an initiative from the producers and a process of bargaining with the government. In our model we capture these two features. To keep the model tractable, we assume a single regulatory authority called "the government".

The economic model

Consider a region with a continuum of producers indexed by their distance i from the

[8] An AVA is a "grape-growing region having distinguishing features as described in part 9 of the TTB regulations, in Title 27 of the Code of Federal Regulations, (27 CFR part 9) and a name and a delineated boundary as established in part 9 of the TTB regulations. The use of an AVA name on a label allows vintners and consumers to attribute a given quality, reputation, or other characteristic of a wine made from grapes grown in a certain area to its geographical origin. Thus, the establishment of AVAs allows vintners to describe more accurately the origin of their wines to consumers, and, in turn, helps consumers to geographically identify wines that they may purchase" (AVA manual for petitioners). A well-known AVA is the one in Napa Valley, California.

center of the region. All producers in the region produce one unit of the same type of product (e.g. a specific type of cheese) but vary in the quality of their production. Their product quality is $\sigma(i) > 0$ which is weakly decreasing as we move away from the center: $\sigma_i \equiv \partial\sigma/\partial i \leq 0$.[9]

We assume that both the location and the corresponding quality of a producer are determined exogenously.[10] The simplifying assumption that the quality of a product depends only on its geographical origin can be defended on two grounds. First, objective aspects of the region (such as the soil, the micro-climate and local traditions) may influence the actual quality of the product. Second, even if there was no real link between terroir and objectively verifiable quality, consumers might attach intrinsic value to a product's origin.[11]

An assumption that is sometimes made in the literature is that entry is free so that producers are perfectly competitive inside the GI region (e.g. Mérel and Sexton 2012; Moschini et al. 2008), which implies that producer rents will be competed away. In our model, entry is restricted in the sense that production is constrained by the available land within the GI region. Once the GI size is set, quantity thus becomes exogenous. The

[9] Throughout, subscripts denote partial derivatives to simplify notation. We assume a continuous quality function in the main text for expositional convenience, and show in the appendix that the results with discontinuous quality are similar.

[10] As in Zago and Pick (2004), we abstract from the possibility that producers themselves can make a choice over the level of quality to be attained. For frameworks with an endogenous discrete choice between high and low quality, see Langinier and Babcock (2008) and Moschini et al. (2008). For continuous endogenous quality, see Mérel and Sexton (2012).

[11] A similar assumption is made by Desquilbet and Monier-Dilhan (2014), who assume that the PDO label has a positive image, which confers some 'status' characteristic on the product. In an empirical paper on the protection of German apple wine from Hesse, Teuber (2011) concludes that for local consumers, psychological factors such as supporting an authentic product and supporting the local economy are key, while for distant consumers the quality aspect of a GI label is more important (Teuber 2011).

appropriateness of this assumption depends on the specific GI at hand; it seems most appropriate to study GIs such as Champagne, with small areas and high utilization rates.

Given these assumptions, producers can only affect their profits by influencing consumers' quality perception through the use of a GI. Without a GI, consumers are unable to distinguish products from different producers. A GI allows them to distinguish between products from the GI region and those from outside. Consistent with the seminal work of Moschini et al. (2008) we assume that without a GI, products are essentially undifferentiated commodities with zero profits and that the price of this non-GI good is unaffected by the introduction of the GI. We normalize its price to 1.

We assume that the initiative to apply for a GI is taken by the producer who has the highest quality and who is hence losing the most from consumers' lack of information. We call this producer "A", the applicant producer.[12] He proposes a size for the GI region to the government. If the government approves A's proposal, a GI region is established with a certain size x. Given our assumptions, x also equals the number of producers in the GI as well as total GI production. We define i*nsiders* I as the group of producers with $i \leq x$, and *outsiders* O as producers with $i > x$. The average quality of the insiders and thus of the GI is $s(x) \equiv \overline{\sigma}(x) = \frac{1}{x}\int_0^x \sigma(i)di$. Since quality $\sigma(i)$ is weakly decreasing in i, the same is true for average quality as a function of x: $s_x \leq 0$.

Following Moschini et al. (2008) and Langinier and Babcock (2008), we assume that managing a GI region implies costs of $F + cx$ where F represents fixed costs (e.g.

[12] Given our assumptions on quality, producer A is the producer located at the origin. We use the term "producer A" for expositional purposes; our model is fully continuous.

marketing expenses) and c denotes variable costs such as production and certification costs. The GI costs are shared by the GI producers: they pay a per-unit charge of $c + \frac{F}{x}$. Producer surplus for an insider i is then given by $\Pi^i(x) = p - c - \frac{F}{x}$, with p the price of the GI good.[13] The total surplus of insiders is $\Pi^I(x) = \int_0^x \Pi^i(x)di = (p - c)x - F$. For other producers, producer surplus is 0.

Consumers

Since at the time of purchase consumers cannot distinguish individual producers within a GI, they judge a GI product by the average quality $s(x)$ of producers in the GI region.[14] The utility from consuming the GI good is given by a utility function $u(x, s)$ where utility is concave in both quantity x and quality s, and a higher quality level increases the marginal utility of consumption ($u_x > 0, u_{xx} < 0, u_s > 0, u_{ss} < 0, u_{xs} > 0$).[15] One example of a functional form that meets these assumptions is the Mussa-Rosen demand specification.[16]

[13] In our model, all scarce factors, including land and accumulated production knowledge, are owned by producers and so all profits and rents accrue to them.

[14] This assumption corresponds to a risk-neutral attitude about quality, simplifying the analysis. If consumers were risk-averse, they would judge the GI product by a quality lower than the average. In any case, $s(x)$ is decreasing in x.

[15] Alternatively, we could work directly with an inverse demand curve as in Spence (1975). Working with the utility function makes the notation easier, however.

[16] Moschini et al. (2008) and Mérel and Sexton (2012) use the Mussa and Rosen (1978) demand specification in analyzing GIs. We use a more general demand function, so all of our results hold for a Mussa-Rosen specification as well (see Swinnen et al. 2015, Ch.2 for a review of different approaches to modeling quality). With Mussa-Rosen demand, a continuum of consumers with different taste parameters $\theta \sim U[0,1]$ obtain utility $\theta s - p$ from consuming one unit of the good (with quality s and price p). They buy at most one unit, which implies that consumer utility is $u(x, s) = sx - sx^2/2$.

Consumers maximize their utility by allocating their budget B between the GI good x and the non-GI numeraire good n. With quasi-linear utility, $U(x,s,n) = u(x,s) + n$ and consumers choose x and n to maximize $U(x,s,n)$, subject to $p * x + n \leq B$. It is easy to show that consumers behave as if they are maximizing consumer surplus $\Pi^C = u(x,s) - px$. This yields an inverse demand function for the GI good of the form

$$p = p(x,s) = u_x(x,s) \tag{1}$$

The quality-specific demand curve $p(x,s)$ is downward sloping in x ($p_x = u_{xx} < 0$) and shifts upward if quality increases: $p_s = u_{xs} > 0$.

The applicant's optimal size x^A

Producer A's profit as a function of the GI's size x is given by $\Pi^A(x) = p - c - \frac{F}{x}$. His optimal size x^A is defined by the first order condition

$$\frac{F}{x} = -(p_x + p_s s_x)x \tag{2}$$

The left hand side of this equality is the benefit from cost-sharing. A larger GI area means lower per-unit fixed costs. The right hand side is the price effect: a larger GI area means lower prices, resulting both from a larger quantity (p_x) and a lower perceived quality ($p_s s_x$) as a result of the expanded GI area. At the applicant's optimum x^A, the marginal benefit from cost sharing is equal to the marginal loss from price erosion. In Figure 1, this is achieved at point E^A with $\frac{F}{x}$ decreasing with x and $-(px_x + p_s s_x)x$ increasing with x.

The optimal size for aggregate producers x^P

Producer surplus for all producers combined is $\Pi^P(x) = \Pi^I(p-c)x - F$. The optimal size x^P is defined by:

$$p - c = -(p_x + p_s s_x)x \tag{3}$$

The right hand side of equations (2) and (3) are the same: this captures the price effect from a larger area. The left hand side is different, however. For the applicant (equation 2) the term captures the benefit from a larger area which comes from the reduction in the applicant's share of the fixed costs with a larger GI. However, for all producers combined the cost sharing effect is an internal transfer, not a gain. For aggregate producer surplus (equation 3) the left hand side term captures the marginal profit increase $(p-c)$ from extending the GI to a larger area. The surplus will increase as long as the marginal profit is larger than the price decline (the right hand term).

Note that x^A will always be smaller than x^P for any GI that is proposed by an applicant.[17] We call this difference between x^A and x^P the "club-effect", represented by arrow A in Figure 1.

So far, we have not allowed side-payments for inclusion in the GI.[18] If outsiders can make side-payments to the applicant this would of course change the applicant's optimal choice. At the margin, producers outside the GI area would be willing to pay up to their

[17] Both $\frac{F}{x}$ and $p-c$ are decreasing in x while $-(p_x + p_s s_x)x$ is increasing in x. $\frac{F}{x}$ and $p-c$ intersect with $-(p_x + p_s s_x)x$, at x^A and x^P respectively. If $x^A > x^P$, this would mean that $\frac{F}{x} > (p-c)$ for both x^P and x^A. Since producers would not be able to cover their fixed costs, they will not apply for a GI area in such a case. So for any GI application, it must be the case that $x^A < x^P$.

[18] In fact, the cost-sharing arrangement can be seen as a convenient mechanism to organize side-payments (although with a limit at F). So it is more correct to say that we have not allowed for unlimited side-payments (on top of the cost-sharing agreement).

increased profits from joining the GI area, which is $-c - \frac{F}{x}$. If these payments would be equally distributed among the insiders, the applicant would receive a share $\frac{p-c}{x} - \frac{F}{x^2}$, and his first order condition would become $\frac{\partial \Pi^A}{\partial x} = (p_x + p_s s_x) + \frac{(p-c)}{x} = 0$. This is equivalent to the first order condition for maximum aggregate producer welfare. Hence, with side-payments $x^A = x^P$. The result is intuitive: if potential entrants make full side-payments, the applicant internalizes the positive effect of increased revenues for these entrants (an application of the Coase theorem). The outcome would be similar if we modeled the GI application as a cooperative game among producers.

For the rest of the paper we assume that side-payments are not possible, but as we explained here, it is rather straightforward to adjust the analysis if we would allow for them.

The social optimum x^*

The social optimum x^* maximizes social welfare $W(x) = \Pi^P(x) + \Pi^C(x) = u(x,s) - cx - F$, and (using $u_x = p$) is defined by:

$$p - c = -u_s s_x \tag{4}$$

The left hand side of this equation corresponds to the marginal aggregate producer profit, while the right hand side reflects the loss in consumer utility due to the expansion-related quality decrease. At the social optimum, these marginal effects need to be equal.

Figure 1 illustrates how the social optimum x^* compares to x^A. Three effects play a role. The first is the club effect, discussed earlier, which causes the difference between the applicant's optimum x^A and the aggregate producer optimum x^P. The difference between the producer optimum x^P and the social optimum x^* is caused by two sub-effects. The first effect (which one could refer to as "rent-seeking through quantity") is because producers want to restrict their output to increase prices. This effect is represented by arrow B in Figure 1 and is determined by E^Q where $p - c = -p_s s_x x$. The second sub-effect (which one could refer to as "rent-seeking through quality") is represented by arrow C in Figure 1. A change in quality only affects producers through the price effect p_s. While prices are determined 'at the margin', from the point of view of consumer surplus all infra-marginal consumers are affected by a change in quality. The direction of this effect is ambiguous. It depends on the relative impact on the marginal consumer and on the infra-marginal consumers. In Figure 1 the effect (C) is depicted as it reinforces the other two effects (A and B). However, this need not always be the case.[19] If a larger GI area would strongly reduce the willingness to pay of infra-marginal consumers while having a limited impact on the marginal consumer, it is possible that producers would desire a larger area than the social optimum.[20]

The most intuitive case is $x^A < x^*$: the applicant wants a smaller GI than socially optimal. This case holds as long as the club effect and the effect of rent-seeking through

[19] Algebraically, rent-seeking through quality counteracts the effects A and B if $-p_s s_x x < -u_s s_x$ or $u_{xs} x < u_s$ and $s_x < 0$. This corresponds to a counterclockwise rotation of demand for decreasing quality, which requires a decreasing sensitivity to quality or $p_{sx} = u_{xsx} < 0$. Note that if this effect is strong, there is scope for additional differentiation through private brands or tiered GIs. A real-world example may be the recently announced break-up of the French Beaujolais region, where the high-quality "cru"-producers are planning a break-out since December 2014 (Verchère 2014). Among other reasons, the lack of a quality image attached to the name "Beaujolais" is cited.

[20] This would require the effect C to be in the opposite direction as A and B (as in the previous footnote), and for its absolute value to be larger than the effects A and B combined.

quantity are not offset by the potentially opposing effect of rent-seeking through quality. This case is illustrated in Figure 1, and we will focus on this case in the remainder of the paper.

The political game

As discussed earlier, a peculiar aspect of GIs is the fact that producers need to apply for a GI (submit a proposal) and require government approval. We therefore model the determination of the GI size as the outcome of a bargaining game between the applicant (A) and the government (G). We first analyze the government's objective function, and then study the political equilibrium resulting from such bargaining.

The government's objective function and optimum x^G

We assume that the government maximizes a Grossman-Helpman (GH) (1994) type political objective function, consisting of a weighted sum of interest group lobby contributions and social welfare, similar to Swinnen & Vandemoortele (2008, 2011) who applied the GH model to analyze government decision-making on food and trade standards. There are three interest groups: insiders (the group of producers with $i \leq x$), outsiders (the producers with $i > x$) and consumers. We assume that all interest groups producers and consumers are politically organized and that they lobby simultaneously.

The government's objective function $\Pi^G(x)$ is a weighted sum of the lobby contributions of insiders C^I (weighted by w^I), of outsiders C^O (weighted by w^O), the contributions of consumers (weighted by w^C), and social welfare, where w^I, w^O and w^C represent the relative lobbying strengths:

$$\Pi^G(x) = w^I C^I(x) + w^O C^O(x) + w^C C^C(x) + W(x) \tag{5}$$

The optimal GI size for the government, x^G, is the level of x which maximizes its objective function. Each GI size corresponds to a certain level of surplus for specific producers (whether they are insiders or outsiders) and consumer surplus, and hence also to a certain level of interest group lobby contributions. The government receives higher contributions from an interest group if (a change in) the GI size creates more surplus for them. Conversely, the government receives less lobby contributions from an interest group if (a change in) the size of the GI decreases their surplus. As shown by Grossman-Helpman (1994) and Swinnen and Vandemoortele (2011) this induces governments to choose the size of the GI that maximizes the following weighted sum of interest group surpluses : $(1 + w^I(x))\,\Pi^I(x) + (1 + w^O(x))\,\Pi^O(x) + (1 + w^C)\,\Pi^C(x)$.[21]

A crucial difference between our model of decision-making on GIs and that of other applications of GH models is that the lobby strengths could be endogenous to the choice of the GI's size because the size of the GI determines the size of the insider and outsider groups. The optimal standard for the government, x^G, is therefore determined by the following first-order condition:

$$(1 + w^I)\frac{\partial \Pi^I}{\partial x} + (1 + w^O)\frac{\partial \Pi^O}{\partial x} + (1 + w^C)\frac{\partial \Pi^C}{\partial x} + \Pi^I \frac{\partial w^I}{\partial x} + \Pi^O \frac{\partial w^O}{\partial x} = 0 \tag{6}$$

The last two terms of the optimality condition capture the possible impact of the GI's size on the lobby strengths of the insider and outsider group. An increase in the size of the group may reinforce its impact. However, Olson's (1965) collective action predicts that

[21] See also Swinnen et al (2015) for more details and formal derivations.

larger groups become less effective at lobbying because of increased free rider problems. One can only speculate on the size of these different effects. If there is no impact, or if these opposing effects offset each other, the last two terms each drop out of the equation.

It is easy to show (and intuitive) that the government's optimal size will be in between x^A and x^*. In the specific case when all interest group have the same lobby weight $w^I = w^O = w^C$, the government's optimum is equal to the social optimum x^*. It is obvious that if some of the interest groups have stronger lobby weights, their influence on the government is stronger and the government's optimum will be closer to that interest group's optimal size.

Bargaining over GI size in a Rubinstein-setup

We now determine the political equilibrium x^e as the outcome of a political game between A and G. The structure of the game is depicted in Figure 2. First, the applicant proposes a GI of a certain size (**step 1**). The government then decides whether to accept or reject the proposal (**step 2**). If it accepts, both parties receive the corresponding payoffs. If the government rejects the proposal, it gets to make a counterproposal (**step 3**).[22] The applicant then decides whether to accept or reject the government's counterproposal (**step 4**). If A rejects it, he can make another counterproposal (**step 5**). The government can again accept or reject (step 6), and so on until both players agree on the GI's size.

[22] For instance, in the case of the cherry of Lari, presented by Tregear (2007), the idea of a GI originated with some small producers. The government quickly tried to convince them to apply for a larger area. In the end, the small producers decided not to apply for a GI because of "… fears that the production area would be widened too much under the designation, due to political pressure from public institutions […]" (Tregear 2007, p. 17).

Given this setup, and assuming there is complete and perfect information between producers and the government, the application procedure can be modeled as a game of infinite horizon bargaining with alternating offers (Rubinstein 1982).[23] As in Fishburn and Rubinstein (1982), we assume that delay is costly for both A and G, as each prefers to receive the benefits from a GI sooner rather than later. The applicant A has optimal GI size x^A and discount factor δ^A. The government G has optimal size x^G and discount factor δ^G. For the exposition we consider the case that $x^A < x^G \leq x^*$, as illustrated in Figure 1.[24]

Given that the optimal sizes are the maxima of players' objective functions, a move away from their respective optima reduces their payoffs.[25] Moving outside of the interval between the two optima makes both players worse off, so the bargaining interval is $[x^A, x^G]$. The situation is depicted in Figure 3.[26] A understands that, if he deviates too much from x^G, G will prefer to "punish" him by making a counterproposal and postponing the payoffs. In a subgame perfect Nash equilibrium, i.e. with perfect information, both players are aware of each other's incentives and can foresee future strategies. Therefore,

[23] In the EU procedure, such infinite-horizon lobbying and bargaining could occur during the informal exchanges before the official application is submitted. In conversations with staff at the French regulator INAO, several cases lasting over 10 years were mentioned. Assuming a finite bargaining horizon is hence not institutionally justified: informal exchanges imply that the actual application process may start long before the official procedure is started. Moreover, the implications of a finite horizon model are unrealistic, as this would imply that the applicant can make an ultimatum and hence always successfully propose his optimal GI size.

[24] The opposite case, $x^A > x^G$, can be analyzed in an identical way. If $x^A = x^G$, bargaining is degenerate and both players obtain their optimal size.

[25] It is easy to show from our economic assumptions that the applicants' payoff function is concave and single-peaked. Government's objective function is a positive linear combination of concave functions and is hence also concave.

[26] The graphs in this figure have been obtained by assuming Mussa-Rosen demand, and exponentially decreasing average quality.

agreement is reached immediately (Osborne & Rubinstein 1990, Theorem 3.4), and the applicant successfully proposes the equilibrium size x^e in step 1.

To derive the equilibrium outcome, we follow the approach of Sutton (1986). However, our analysis is complicated by the fact that the payoff functions are not linear, as in most applications in the literature. With non-linear payoffs, extra technicalities are required for the derivation. We have made the derivation as simple and specific to our context as possible. Readers interested in a more general and formal derivation should consult Osborne & Rubinstein (1990, Ch.3).

The equilibrium of the game, as illustrated in Figure 3 is x^e with a payoff of $Z = \Pi^A(x^e)$ for the applicant. To understand why, consider the situation at step 5 (where A can make the second round proposal). Define f as the function that maps A's payoff to G's payoff.[27] At step 5, the payoff to A of the subgame that starts there equals Z; the payoff to G is $f(Z) = \Pi^G(x^e)$. At step 4, if A refuses G's offer, he gets a payoff of Z with a delay of one period, which is worth $\delta^A Z$ to him. As a result, at step 3, G knows that if he would offer $\delta^A Z$ to A, A would accept.[28] For G, this offer to A corresponds to a payoff of $f(\delta^A Z)$ for himself. At step 2, G realizes that the value of refusing is $\delta^G f(\delta^A Z)$. At step 1, A therefore knows that G will only accept an offer of $\delta^G f(\delta^A Z)$ or more.[29] This in turn corresponds to a payoff of $f^{-1}(\delta^G f(\delta^A Z))$ for A.

Denoting the value to A at step 5 by Z, we have shown by backward induction that the

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[27] In the simple Rubinstein case, a dollar is being split between two players so this function is given by $f(\pi) = 1 - \pi$. In our case, $f(\pi) = \Pi^G([\Pi^A]^{-1}(\pi))$. Because both payoff functions are monotonous over the bargaining interval, the function f from one payoff to another is well-defined and invertible.

[28] If $\delta^A Z < \Pi^A(x^G)$, the government proposes its optimum $\Pi^A(x^G)$ instead.

[29] If $\delta^G f(\delta^A Z) < \Pi^G(x^A)$, the applicant proposes its optimum $\Pi^G(x^A)$ instead.

value to A at step 1 is $f^{-1}(\delta^G f(\delta^A Z))$. Given the infinite horizon of the game, the game starting at step 5 is strategically equivalent to the game starting at step 1. This means that the value at step 1 must be the same as at step 5, or

$$\Pi^A(x^e) = Z = f^{-1}\big(\delta^G f(\delta^A Z)\big) = g(Z) \tag{6}$$

This expression defines the political equilibrium x^e for interior solutions.[30] The applicant will propose the equilibrium size x^e in step 1 and the government will accept it, so that $Z = \Pi^A(x^e)$ and $f(Z) = \Pi^G(x^e)$.

Since the payoff functions are non-linear, we cannot derive a closed-form solution for Z.[31] However, we can draw some conclusions on how various factors affect the equilibrium. In Figure 4, we plot the equilibrium GI size x^e as a function of δ^A for three different values of δ^G. The more patient the government is (the higher δ^G), the closer the equilibrium outcome will be to its optimal value x^G. If the government is impatient (e.g. because it wants to implement the GI before its term in office ends, and the term draws to an end), it is more likely to yield to the applicant's wishes. If $\delta^G = 0$, the applicant obtains his optimal size. Similar conclusions hold regarding the patience of the applicant.

Figure 5 illustrates how the lobby strengths influence the equilibrium GI choice. When the insiders are more effective at lobbying the government (a relatively higher w^I),

[30] Allowing for non-interior solutions (cf. the previous two footnotes), the expression becomes $Z = g(Z) = f^{-1}[Max\{\delta^G f(Max\{\delta^A Z; \Pi^A(x^G)\}); \Pi^G(x^A)\}]$. Note that the solution Z is a fixed point of the function g. Since f and f^{-1} are continuous, the composite function g is also continuous. Since g is continuous, and maps from $[\Pi^A(x^G), \Pi^A(x^A)]$ back to $[\Pi^A(x^G), \Pi^A(x^A)]$, it must have a fixed point by Brouwer's fixed point theorem, and a solution is guaranteed.

[31] In the simple Rubinstein case, $f(p) = 1 - p, f^{-1}\big(f(p)\big) = 1 - f(p) = p$ and we readily obtain from (6) that $M = 1 - \delta_2(1 - \delta_1 M)$, so that $M = (1 - \delta_2)/(1 - \delta_1\delta_2)$.

the government's optimum x^G shifts towards x^A, and the bargaining interval shrinks, resulting in an equilibrium choice which is closer to the applicant's optimum.

Discussion

Our analysis has several implications. Given our assumptions, (1) the GI chosen in the bargaining process between applicants and the government is unlikely to be the social optimum; (2) however, the GI chosen will still be welfare improving; (3) not all welfare improving GIs will be proposed (and thus not implemented); and (4) the outcome depends importantly on the institutional set-up of the decision-making process.

First, as is obvious from comparing the condition for the social optimum and the condition for the equilibrium bargaining outcome, it is unlikely that these two conditions would yield the same outcome.

Second, given our assumptions, the GI chosen will still improve welfare because the applicant will only start the bargaining process if he expects to recover his share of fixed costs, i.e. $(p - c)x^e \geq F$. Otherwise there would be no application. Moreover, assuming that the non-GI good is a commodity in perfectly elastic supply, no GI means a surplus of zero for all producers and consumers. From a social welfare point of view, the value from any GI that producers are willing to implement is therefore positive, regardless of the actual size proposed. (As we emphasized, this conclusion is conditional on our assumptions and may be different under other assumptions on the benefits of GI and non-GI production.)

Third, since GI areas will only be proposed if producers can recover their fixed costs, there exists a range of potential GIs which would have a positive impact on social welfare but which are not profitable from the producers' point of view. Since the initiative to apply for a GI lies with the producers, such GIs will not be proposed, and thus not implemented. While all proposed GIs are therefore welfare-increasing, not all welfare-increasing GIs will be proposed.

Fourth, the institutional setup of the application process affects the outcome. It is interesting to compare what our model predicts would be the political equilibrium under an institutional set-up such as that of the American Viticultural Areas (AVAs) compared to that of the EU GI scheme. As explained in section 2, once the applicant has started the process, the American regulator TBT can unilaterally impose a size on the applicant. In theory, a rational TBT will always exercise this option and impose x^G. In equilibrium, only those applicants for whom $\Pi^A(x^G) \geq 0$ apply for an AVA label, and they immediately propose x^G. While this increases the desirability of proposed GIs from the point of view of the government's objective function, the expectation of lower surplus also implies that a wider range of potential GIs will not be proposed.

Conclusion

In this article, we developed a theoretical model to study both the socially optimal size of a GI area and the political equilibrium. Our analysis started from four key facts about GIs. First, a larger GI area means more production and lower prices. Second, a larger area allows fixed costs to be spread over more producers. Third, a larger GI area may have a negative effect on (actual or perceived) quality, which reduces consumers' utility and willingness to pay. Fourth, the initiative to establish a GI is taken by producers, who engage in bargaining with the government.

Based on this, we derived the socially optimal GI size x^* and the applicant's optimal size x^A. The applicant's optimum x^A is smaller than the social optimum x^* as long as the club-effect and the effect of rent-seeking through quantity are not offset by the effect of rent-seeking through quality. The government's optimal GI size depends on the relative lobbying weights of insiders, outsiders and consumers. We modeled the bargaining between applicants and the government and showed that the initial proposal of the applicant should be such that it is optimal for the government to accept it immediately. The more the applicant is patient and the government is not, the closer the outcome is to the applicant's optimum. Importantly, while this secures the applicant economic rents above those that are socially optimal, the GI will still improve consumer welfare, as long as consumers have the choice of buying the non-GI commodity: any proposed GI will be welfare-enhancing. On the other hand, since producers need to cover fixed costs, not all welfare-enhancing GIs will be proposed.

Our analysis could be extended in several ways. First, while we have assumed symmetric information between producers and the government, producers may have better information on supply and demand conditions, which might create more complicated bargaining dynamics. Second, changes are often made to existing GIs. A natural question is therefore whether current modification rules generate socially desirable changes to GI sizes.[32] Third, our model does not distinguish between domestic and foreign consumers of the GI product. Adding trade to the model would create the possibility of extracting rents from foreign consumers, whose surplus is not counted in the government's objective function; such an extension could shed light on the debate around GIs in international trade (Josling, 2006). Finally, our theoretical framework shows that determining a socially optimal GI area requires information on how a change in quality would affect infra-marginal consumers; information on this impact cannot be derived from changes in market prices alone. One option is to complement technical assessments, which currently dominate the evaluation of GI applications,[33] with analyses of effects on consumer utility, e.g. through willingness to pay experiments.

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[32] Current EU rules prescribe a procedure identical to the application, if the modifications are not minor.

[33] One example is the French project "Zonage" conducted in the Champagne region over the period 1990-1995. In this project, the region was divided in 200 000 parcels of 50 meters by 50 meters. In every parcel, a 1.5 meter deep hole was dug to collect information on the soil (Stevenson 2007).

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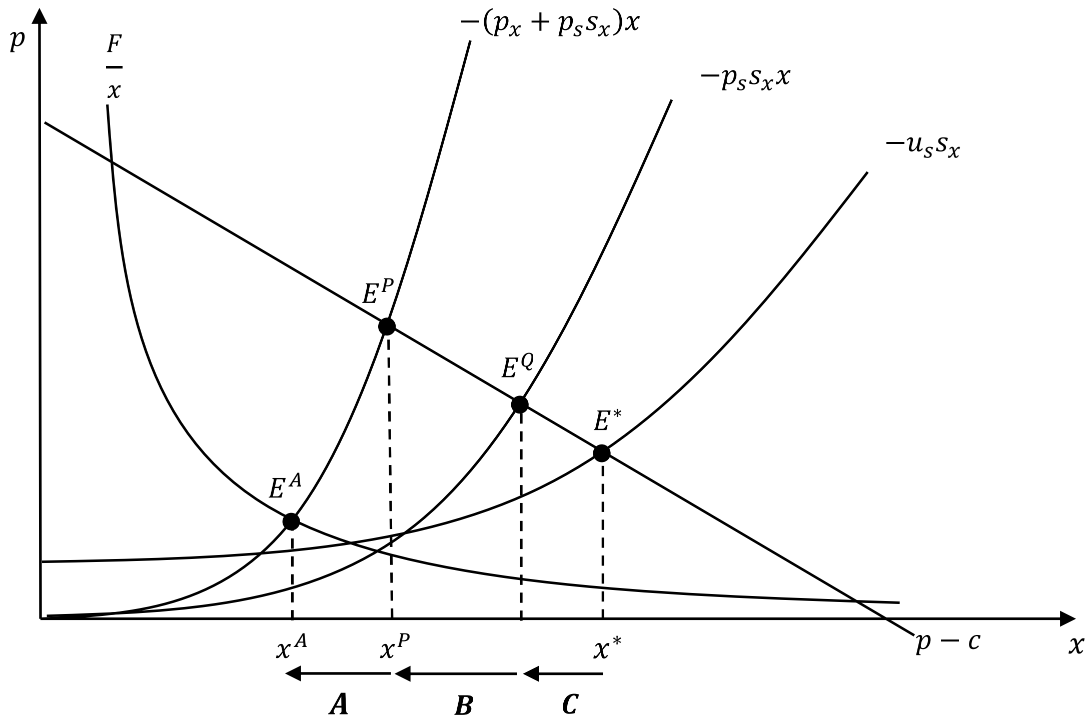
Tables and figures

EU GI application	Procedural step	Duration
Producer proposal	Informal bargaining with national government	Unspecified
	Official submission to national government	Unspecified
National procedure	Admissibility check	Unspecified
	National opposition procedure	“reasonable period”
	National reconciliation	Unspecified
EU-wide procedure	Admissibility check and official publication	Max. 6 months
	Opposition period – notice of opposition	3 months
	Opposition period – reasoned statement	Max. 2 months
	Admissibility check of opposition	Max. 2 months
	Consultations and reconciliation	Max. 6 months
	Admissibility check of modified documents	Max. 6 months
	Final decision by EU Commission	Unspecified
	Publication of registration or rejection	Unspecified

Table 1. Summary of GI application procedure in the EU



A: Club effect	(direction always as drawn)
B: Rent-seeking through quantity	(direction always as drawn)
C: Rent-seeking through quality	(direction ambiguous)

Figure 1. Applicant's optimal size x^A versus the social optimum x^*

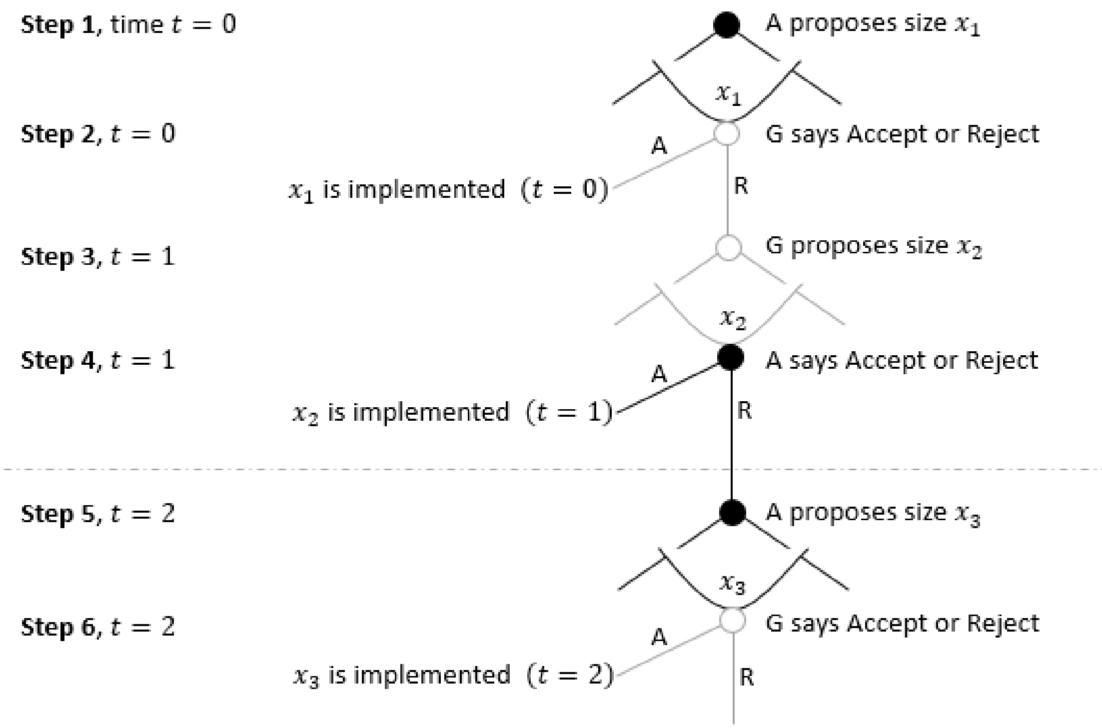


Figure 2. The structure of the bargaining game over GI size

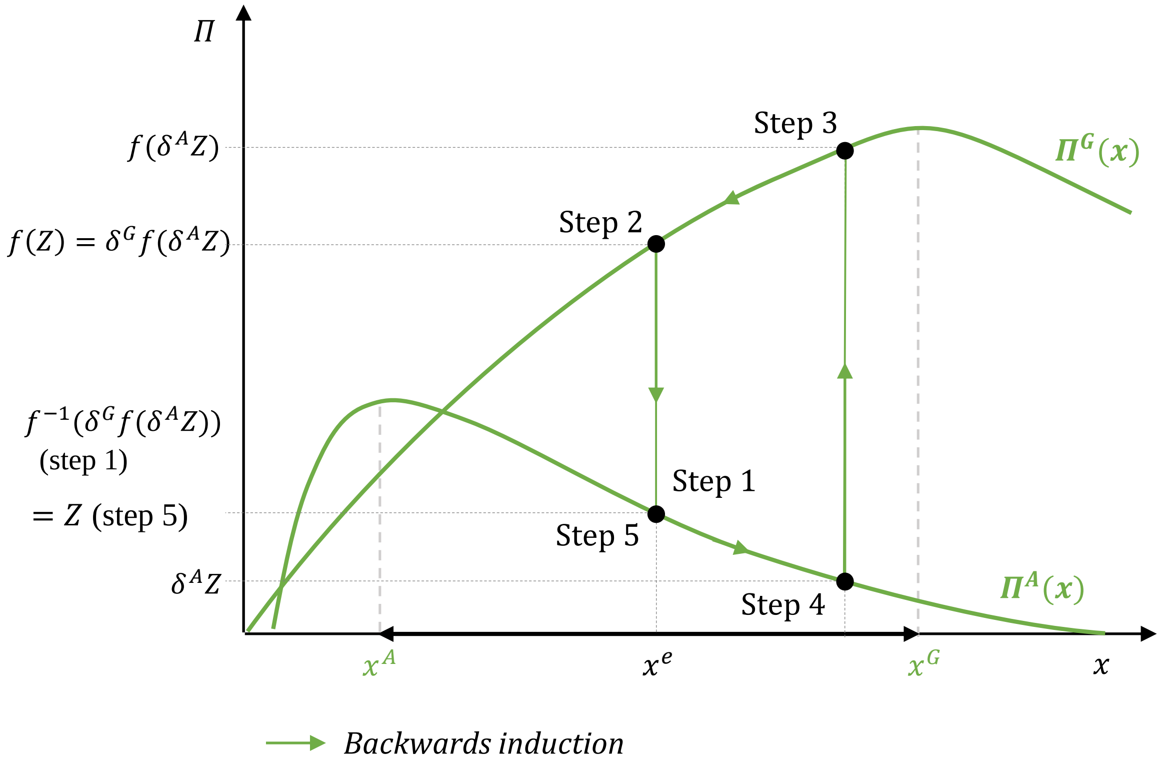


Figure 3. Bargaining over GI size: equilibrium identification

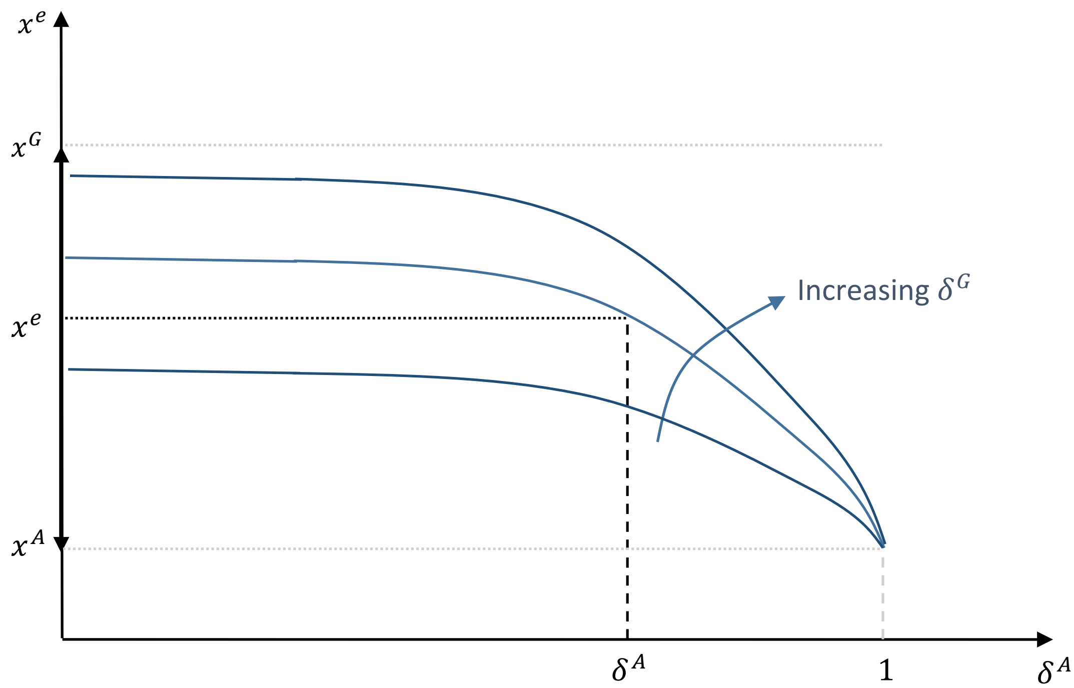


Figure 4. Equilibrium GI size as a function of δ^A

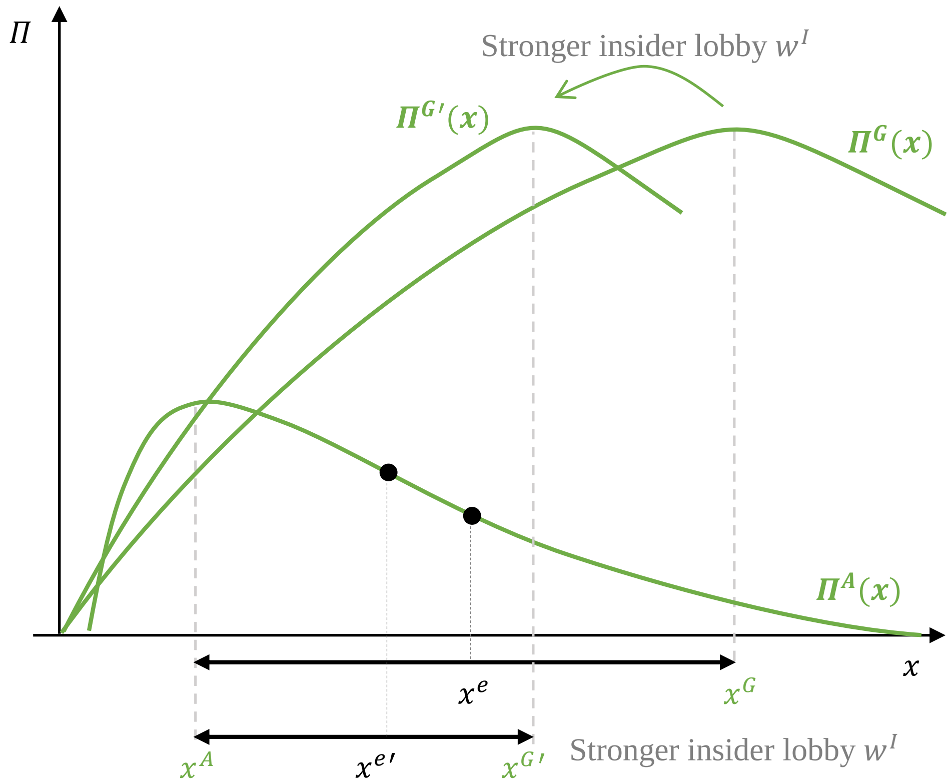


Figure 5. Equilibrium GI size with different lobby strengths

Appendix: discontinuous changes in quality

Our model assumes a continuous quality function. In reality, the conditions (such as soil quality) which create “terroir” may change more abruptly. In the next paragraphs, we show that such potential discontinuities do not alter the main mechanisms of the model.

Assume, for instance, that there is a core region with high intrinsic quality, a discontinuous break at a certain point $\hat{x}$, and a surrounding area with much lower quality. In this scenario, the quality function $\sigma(i)$ denoting the quality σ at distance i is no longer continuous and decreasing but rather a step function, as shown in Figure 6.[34]

The results are qualitatively similar to those presented in the main text. In the bottom panel of Figure 6, we derive the social optimum. Since s_x jumps from zero to a negative value at $\hat{x}$, the utility effect $-u_s s_x$ has a similar jump. Moreover, the equilibrium price of the GI product p will also have a kink at $\hat{x}$. If $p - c$ and $-u_s s_x$ intersect to the left or to the right of $\hat{x}$, the results are identical to those in the main text. However, it is possible that the two curves do not intersect, but that $p - c$ passes through the discontinuity as illustrated. In this case, the social optimum is $x^* = \hat{x}$ and the border of the socially optimal GI region coincides with the natural discontinuity in quality. The larger the gap between the quality levels on both sides of $\hat{x}$, the larger the jump in $-u_s s_x$ and the more likely it is that the social optimum coincides with the discontinuity. Similar analyses can be made for the optimum of the applicant, producers and the government.

[34] Note that even with a discontinuous quality function $\sigma(i)$ the average quality function $s(x)$ is continuous. But s_x, the derivative of average quality with respect to the size will be discontinuous.

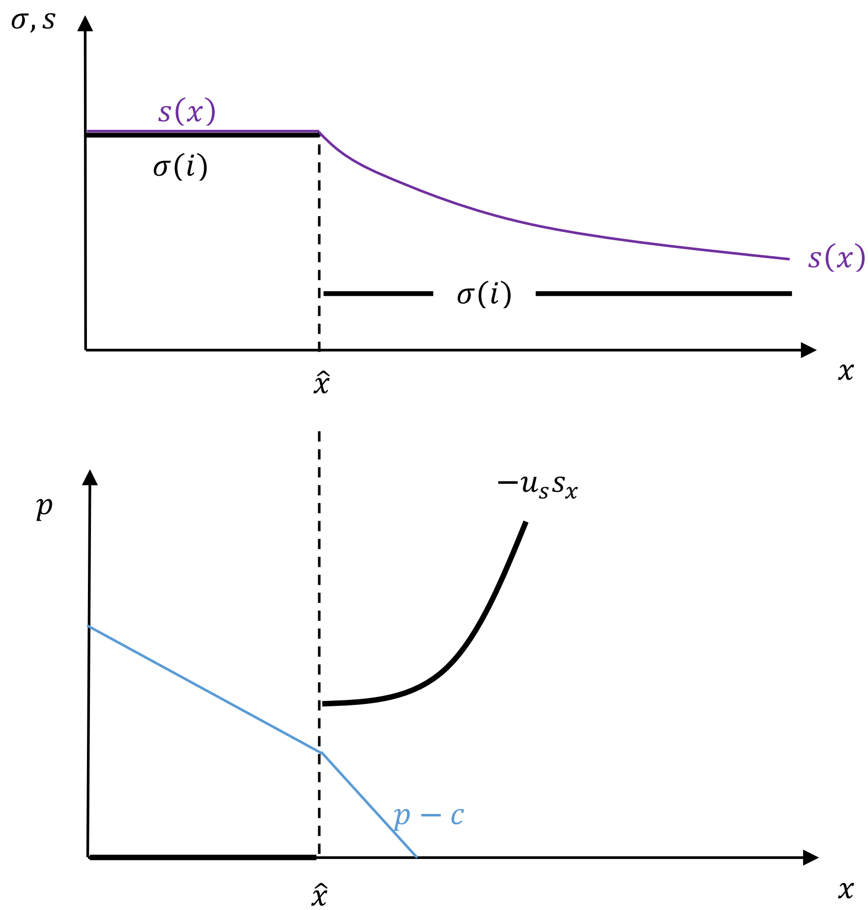


Figure 6. Discontinuous Changes in Quality