Poaching in collusion

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Abstract

We provide an infinitely repeated game in which two firms compete to attract consumers, who may incur an additional cost when purchasing from the more distant firm. Firms set discriminatory prices for closer and farther consumers and may cooperate through a market sharing rule or by poaching in collusion. We show that poaching in collusion maximizes joint profits whenever it is viable – i.e., the additional cost is sufficiently low – so that each firm profitably serves both sides of the market. We also characterize under which conditions a market sharing rule can be even less profitable than fair competition on the entire market. Finally, we demonstrate that poaching in collusion is easier to sustain in repeated interaction, even under harsh punishment codes. These results challenge the conventional view of no-poaching agreements and market-sharing rules as always being the most natural and profitable collusive strategies.

KEYWORDS: Collusion; Price Discrimination; Poaching.
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1. Introduction

Collusive agreements can take various forms and may involve the final prices, the quantities to be sold, but also the allocation of market shares and the geographical, product-based, or consumer-based division among firms, thereby creating localized monopolies. These latter arrangements can be implemented, for example, through exclusive territories clauses, no-poaching agreements and market sharing rules. The ultimate goal of this type of agreements is clearly the

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restriction of competition and the maximization of joint profits at the expense of social and consumer welfare. For this reason, detecting and sanctioning these conducts, as well as having a good understanding of the factors that facilitate the sustainability of tacit agreements, is a core mission for antitrust authorities.[1]

There is large empirical evidence of the use of no-poaching agreements among firms as a basis for collusive behavior, which has subsequently been sanctioned by antitrust authorities. In June 2025, the European Commission found that Delivery Hero and Glovo had engaged in a continuous infringement of Article 101 TFEU in the food delivery market, by implementing a collusive market sharing agreement that spanned from July 2018 to July 2022. The decision revealed a coordinated pattern of conduct characterized by geographic market allocation, where the two firms "agreed to avoid competing with each other in any national markets in the EEA. They took active steps to remove existing geographic overlaps and coordinated on entry into national markets".[2] This practice was further described as a deliberate carving-up of competitive space since they refrain from entering the markets where the rival was present and they coordinated on entry into markets where neither was present, so eliminating direct competition between them.[3] This is a paradigmatic example of a collusive behavior adopted through a geographic market division and constitutes a classic anti-competitive restriction under competition law that is severely sanctioned by the European Commission.[4]

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[1] The European Commission (2024) highlighted the immense damage of cartels on the economy and the harm for the affected parties. These elements lead to adopt several market monitoring exercises and develop new strategies to detect cartel cases also outside the leniency regime (e.g., whistleblower tools and outreach activities with external stakeholders).

[2] See the Commission Decision of case AT.40795 – Food Delivery Services, p. 20-22. The Commission has fined Delivery Hero and Glovo a total of €329 million.

[3] The collusive behavior was also facilitated also through a no-poach agreement according to which firms commit not to reach out to the rival's employees, and not to hire them even if the employees actively apply for an open position.

[4] To mention other cases, in 2007, the Commission imposed fines totaling €183 million on BP, Repsol, Cepsa, Nynäs, and Galp for participating in a cartel that shared the market for bitumen used in road

The widespread use and significance of collusive agreements involving the division of markets and customers naturally raises the question of whether such a strategy is indeed optimal for firms — i.e., whether it actually maximizes industry profits and can be sustained over the long run without being undermined by deviations. This issue is relevant both for firms seeking, even tacitly, to adopt a strategy that maximizes joint profits, and for antitrust authorities tasked with assessing whether market outcomes are the result of a fair competition or a collusive behavior. In fact, competition authorities have traditionally taken a strict stance towards no-poaching agreements and market sharing rules, while higher standards of proof are required when firms are active in the same market segment.[5] Yet, even in the absence of such explicit arrangements, firms may still be colluding, potentially adopting strategies that are not only more profitable but also easier to sustain within a tacit collusion framework.

Indeed, several well-documented cartel cases illustrate that collusion does not necessarily require market sharing, as firms may continue to serve the same consumers while coordinating on prices. For instance, in the European truck cartel, leading manufacturers aligned list prices and the timing of cost pass-through for new technologies, yet all continued to operate across the European

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construction in Spain. The cartel participants established the market shares, divided sales volumes and customers among themselves, and monitored the compliance with the agreements through the exchange of sensitive commercial information. In 2008, the Commission fined Asahi, Pilkington, Saint-Gobain, and Soliver a total of €1.3 billion for illegal market sharing regarding deliveries of car glass in Europe. In 2011, the Commission fined 17 producers of prestressing steel a total of €518 million for operating a cartel involving, among other things, quota fixing and client allocation. In 2019, the Commission fined Coroos and Groupe CECAB a total of €31.6 million because of a cartel for the supply of some types of canned vegetables to retailers. Firms agreed on market shares and volume quotas, allocated customers and markets.

[5] The OECD (2025) defines a "hard core cartel" an anticompetitive agreement, anticompetitive concerted practice, or anticompetitive arrangement that, among other things, aims at sharing or dividing markets among competitors by allocating customers, suppliers, territories, or lines of commerce. This kind of arrangements has been a priority of competition law enforcement, and the OECD proposes a number of recommendations to halt and deter such "hard core cartels".

market through their own distribution networks.[6] Other examples include the airfreight cartel, where airlines serving identical international routes colluded on surcharges related to fuel and security, and the vitamins cartel, in which chemical and pharmaceutical companies such as Hoffmann-La Roche and BASF aligned prices across overlapping markets.[7] Taken together, these cases show that collusion may involve parallel service of identical markets with coordinated pricing strategies, rather than strict segmentation of consumers.

This raises the question of whether poaching in collusion, defined as the decision within a collusive agreement to contest the same markets concurrently rather than segmenting them, may represent an optimal strategy for colluding firms. If this were the case, firms would have a less blatant instrument to maximize industry profits, which would also be more difficult for antitrust authorities to detect.

The decision to serve the same rival's market or segment of consumers becomes particularly relevant when firms can price discriminate. Consider the following example: a firm operating in a country can serve consumers living in its own country and those living in a foreign country. Each consumer bears an individual transportation cost, but being located in a different country might entail also an additional cost. This further cost may arise from various factors — e.g., tariffs imposed by countries, higher taxes and transportation expenses, product adaptation costs (consider products or services such as books and newspapers that require translation, or services like television broadcasting for which translation is not feasible). In all these cases, each firm can rather

[6] See the Commission Decision of case AT.39824. The Commission has fined six companies a total of €3.8 billion.

[7] See the Commission Decision of case AT.39258 for the airfreight cartel. The Commission has fined eleven air cargo carriers a total of €776 million. See the Commission Decision of case AT.37512 for the vitamins cartel. The Commission has fined eight companies a total of €855 million.

straightforwardly set different prices for domestic and foreign consumers. Doing so, consumers can be charged two different prices: a high price set by the domestic firm and a discounted price set by the foreign firm. This suggests that each firm has an incentive to set a high price for domestic consumers located closer to its own position, while leaving the remaining domestic consumers to the rival, which — despite facing higher costs in serving foreign consumers — can still profitably do so by exploiting the softened competition exerted through a collusive agreement.[8]

In this article, we provide a rationale for the emergence of cartels in which firms agree to poach or not to poach the rival's market or customer base. Moreover, we show how cartel stability is shaped by the adopted collusive strategy. To do this, we develop a simple theoretical model of an infinitely repeated price-setting game between two firms, located at the endpoints of a Hotelling line, which can partition consumers into two turfs — their closer and farther segments — and set discriminatory prices accordingly. The specific feature of the model concerns the additional cost borne by a consumer when purchasing from the more distant firm. This extra burden may be interpreted, from the geographical perspective, as a switching cost arising from cross-market transactions. Alternatively, under the vertical differentiation perspective, it can be understood as the effect of brand loyalty that ties consumers more strongly to the closer product.

[8] An alternative interpretation to the geographic market allocation is based on the firm's ability to collect information about consumers, profile them and price discriminate according to their purchase histories. Colombo and Pignataro (2022) reported several examples of competitive environments in which firms, in each period, inherit a new share of consumers. Firms may set different prices for consumers depending on whether they are part of the inherited customer base, a practice known as history-based price discrimination, and, following Shaffer and Zhang (2000), consumers incur some additional costs to switch the competing brand. These costs can be related both to the consumers' ex ante preference for one product and to the ex-post switching costs.

Our first result shows that firms maximize their joint profits by poaching in collusion whenever it is feasible – i.e., the additional cost borne by consumers is not too large and firms can attract even further consumers. This proves that poaching in collusion is always the most profitable strategy when consumer brand loyalty is weak (or markets are sufficiently close), so that each firm serves both sides of the market. By contrast, when consumers exhibit strong preferences for the rival's product (or markets are too distant), collusion takes the form of territorial market sharing. This implies that agreements usually classified as "hard core" cartels, such as exclusive territories clauses, no-poaching agreements and market sharing rules are not always optimal for colluding firms, provided that collusion is sustainable. This casts doubt on the prevailing antitrust stance against these arrangements.

Our second result concerns the comparison between the profits from a market sharing agreement, in which each firm serves only its own turf, with those from fair competition, where each firm seeks to attract consumers from both sides of the market – i.e., each firm poaches in competition. We show that poaching in competition is even more profitable than sharing the market when the reservation price is below a threshold, which is decreasing in the consumer's additional cost for switching. Hence, as the additional cost for consumers increases, the space of parameters where poaching in competition is more profitable also expands. This result highlights two important implications: first, when firms cannot coordinate on prices, a market sharing agreement may not be optimal and can even be less profitable than fair competition across the entire market; second, since poaching in competition represents the punishment strategy of a collusive agreement, if it is more profitable than a market sharing agreement, collusion on market shares is not sustainable — i.e., the profits during the punishment period would exceed those in collusion.

Finally, we study the sustainability of a tacit cartel characterized by poaching and no-poaching in collusion. We prove that poaching in collusion is not only the profit maximizing strategy for two colluding firms, but it is also easier to sustain. This implies that, if firms aim to collude by maximizing the joint profits in the long run, a market sharing agreement can be an optimal strategy if and only if the additional costs that consumers incur to purchase from the more distant firm prevent firms from poaching. Otherwise, there is no reason for a firm to agree with a rival not to enter a market where the rival is already active, as observed, for instance, in the above-mentioned food delivery cartel. This result holds even with an alternative harsher punishment code, according to which firms share the market equally and they set a price at their marginal cost. We show that, contrary to conventional wisdom, no-poaching agreements can serve as a facilitating device to intensify competition during the punishment period, thereby sustaining collusion over a wide range of discount factors. These findings suggest that antitrust authorities should carefully evaluate exclusive territories clauses, no-poaching agreements, and market-sharing rules not only as instruments for extracting consumer surplus, but also as tools that contribute to the stability of a collusive agreement.

This paper contributes to the literature on optimal collusive strategies among firms operating in markets where consumers exhibit heterogeneous horizontal preferences. Moreover, the emergence of a vertical preference for one of the products on sale — arising from geographical factors or brand loyalty — allows the paper to address the open question of under which conditions poaching in collusion can be both profitable and sustainable when firms compete in prices and consumers patronize one product.

There is a substantial body of literature investigating how trade costs — i.e., the expenses incurred by firms to export their products — affect collusive strategies and, in particular, the sustainability of cooperative agreements. Pinto (1986) was the first to show, within a homogeneous-good, quantity-setting framework, that firms optimally serve only their own country and trade liberalization undermines the collusive stability. Instead, Bhattacharjea and Sinha (2015) show that lower trade costs increase the stability of a cartel when price-setting firms share the market equally. However, the literature has shown that the optimal collusive strategy may, in certain contexts, involve firms not limiting themselves to market sharing but instead serving multiple markets simultaneously. This happens when firms compete on quantities and products are imperfect substitutes. In this framework, Ashournia et al. (2013), Bond and Syropoulos (2008), and Fung (1991) identify conditions under which poaching is more profitable and show how trade costs influence collusive sustainability. In a price-setting game, Akinbosoye et al. (2012) study collusion both with and without poaching, highlighting that the efficient cartel prescribes monopoly pricing in the domestic market for any level of trade costs, with exports taking place only when trade costs are sufficiently low.[9]

Our analysis departs from the above-mentioned models in several crucial aspects, mechanisms, and interpretation. First, the mentioned papers, trade costs are borne by firms, so that the poaching price incorporates the export cost, making consumer switching less attractive. In our framework, by contrast, trade costs are borne by consumers, in line with the interpretation of tariffs or domestic preferences.[10] As a result, a firm engaging in poaching offers a price discount relative to the rival's domestic price. Second, while the literature assumes

[9] Notice that their framework differs substantially from ours. In their setting, the domestic monopoly price is unaffected by trade costs or by the rival's ability to attract nearby consumers, whereas in our model the price charged on a firm's own turf depends directly on the rival's chance to poach distant consumers, with trade costs acting as a constraint that allows firms to sustain higher prices.

[10] For example, in the food industry, a product's country of origin might matter to some consumers, and many consumers prefer domestic goods rather than those from other countries (Vabo and Hansen, 2016, Yeh and Hirsch, 2023).

identical demand functions across countries, we allow for different, although symmetric, demand structures. We incorporate consumer heterogeneity through a Hotelling framework, thereby considering the spatial dimension that has not been considered in earlier contributions. Finally, the rationale for poaching in collusion also differs. In the literature, poaching is optimal only when products are imperfect substitutes, since consumers purchase both goods and cartel members gain from serving overlapping demands. In our setting, instead, each consumer buys only one good, and poaching is nevertheless optimal because it enables firms to charge higher prices to consumers located closer to them, even if they no longer set a monopoly price over their entire turf.

Our paper relates also to the literature dealing with the relationship between collusion and price discrimination. In recent years, economists have often focused on the impact of improved information about consumer preferences, and thus of firms' enhanced ability to set more precise discriminatory prices, on the sustainability of collusion.[11] Liu and Serfes (2007), Peiseler et al. (2021) and Colombo and Pignataro (2022) explicitly examine how greater informational accuracy affects collusive equilibria. In Liu and Serfes (2007), consumers are divided into subsegments along the Hotelling line, and a higher number of subsegments reflects a higher degree of information accuracy. Peiseler et al. (2021), by contrast, study how the quality of signals influences the sustainability of a fully collusive agreement. However, both models rest on the assumption that the optimal collusive strategy always corresponds to minimizing transportation costs, so that firms simply split the market in two, with each firm serving its own turf. Instead, in Colombo and Pignataro (2022), greater information accuracy is

[11] This line of research has been developed particularly in settings with heterogeneous horizontal preferences, using models of history-based price discrimination (see, e.g., Gehrig et al., 2011, 2012, Shaffer and Zhang, 2002) and behavior-based price discrimination (see, e.g., Fudenberg and Tirole, 2000, Fudenberg and Villas-Boas, 2007).

interpreted as a broader completeness of the information available to firms. Although their analysis allows for the possibility of poaching on a rival's turf, they focus exclusively on the most profitable collusive strategy, without examining which strategy is the most sustainable. Moreover, they do not consider the possibility that a market-sharing rule could be more pro-competitive than fair competition across both sides of the market as emerged in our model. Finally, none of the models discussed above incorporates consumers' vertical preference for the product offered by the closest firm, as assumed, for example, in Shaffer and Zhang (2002). In our model, we focus on the interplay between such a preference and the optimal collusive strategy.

The rest of the paper proceeds as follows. In Section 2 we introduce the model. In Section 3 we characterize the colluding pricing scheme that maximizes the joint profits of the firms. In Section 4 we discuss the non-cooperative equilibrium. In Section 5 and 6 we discuss collusion sustainability under a grim-trigger strategy and a hasher punishment code, respectively. Section 7 concludes.

2. The model

Players. Consider two firms ($j = A, B$) playing an infinitely repeated price-setting game. Each firm sells a differentiated product that is produced at a constant marginal cost c, which is normalized to zero, while fixed costs are disregarded. Firms are located at the endpoints of a Hotelling-type market of length 1, where $x_A = 0$ and $x_B = 1$ represent the locations of Firm A and Firm B respectively. In every period, there is a unit mass of short-lived consumers distributed uniformly along the market.[12] We denote by $x \in [0, 1]$ the location of

[12] This implies that a new generation of consumers emerge in every period *t*, so substituting the previous one in *t-1*. Hence, the information collected in *t-1* is useless in *t*. This assumption is reminiscent of the model described by Shaffer and Zhang (2000), in which consumers have limited foresight, and also draws parallels with the those of Villas-Boas (1999) and Gehrig et al. (2011), who introduced the concept of a new wave of consumers.

each consumer in the product space, so representing the preferred variety of a given good: the closer the consumer is to 0 (1), the higher the willingness to pay for the product sold by the firm located at the left (right) endpoint. Consumers are willing to purchase at most one unit of product and their outside option is normalized to zero without loss of generality.

Information technology. Suppose that each firm owns an information technology that allows it to distinguish between the closer and the further consumers (Shaffer and Zhang, 2002, Gehrig et al., 2011 and 2012). In other words, firms partition consumers in two groups, defined as "turfs", which are denoted as follows: T_A represents the consumers located at $x \leq 1/2$, that is $T_A = \{x: x \leq 1/2\}$, whereas T_B represents the consumers located at $x \geq 1/2$, that is $T_B = \{x: x \geq 1/2\}$. Based on this information, each firm can price discriminate between its own turf and the rival's one.[13] We denote with $\mathrm{p_j}$ and $\mathrm{\tilde{p}_j}$ the price charged by firm *j* to former and the latter group respectively.

Consumers' preferences. We might interpret the consumers preferences in two equivalent ways. First, consumers have a brand loyalty to the closest firm (vertical interpretation). If transportation costs were nil and prices were the same, they would buy from Firm A if they are located at $x < 1/2$ or Firm B if they are located at $x > 1/2$.[14] This brand loyalty results from the combined effect of two non-negative parameters, Δ and τ, which represent the degree of vertical differentiation and the weight of vertical differentiation on the consumer utility, respectively. Alternatively, we might refer to consumers and firms as being located in two distinct countries (geographical interpretation). There are two

[13] This pricing strategy follows that described by Liu and Serfes (2007). In their model, consumers are classified into several sub-segments and firms charge a targeted price for each group of consumers. This model simplifies their setup through a simple partition of consumers, but it provides some general conclusions, and the results would be qualitatively the same with a larger number of sub-segments.
[14] Consumers are indifferent between the two firms if they are located at $x = 1/2$.

distinct countries: one includes locations from 0 to $1/2$, the other from $1/2$ to 1. The two countries are separated by a distance Δ (see Figure 1). The per-unit transportation cost within the countries is denoted by t, while the per-unit transportation cost in the "cross-border" area is denoted by τ.

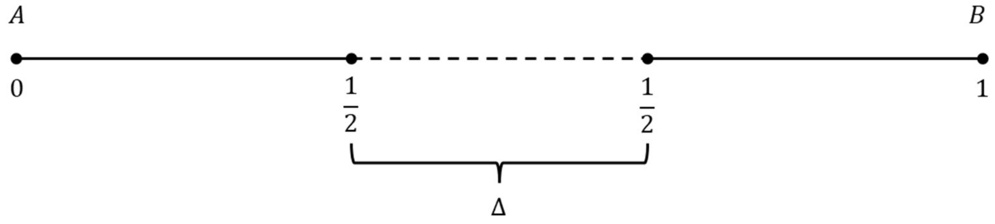

Figure 1: Geographical interpretation of the model.

Therefore, the utility function of a consumer located at $x < 1/2$ is $u_A = v + \tau\Delta - p_A - tx$ if she buys from Firm A and $u_B = v - \tilde{p}_B - t(1-x)$ if she buys from Firm B.[15] The utility functions are symmetric for the consumers located at $x > 1/2$. The parameter v, which is assumed to be sufficiently large such that consumers have always incentive to buy a product in equilibrium – i.e., $v \geq t - \frac{\tau\Delta}{2}$–, represents the intrinsic value of the product, while the parameter $t \geq 0$ is the disutility from buying a product of a variety that does not correspond to the preferred one or, from a geographical point of view, the transportation cost. To deal with interior solutions, through the analysis we assume that $\tau\Delta \leq t$ and, for the sake of simplicity, from now onward, we normalize τ to one.

Dynamic strategy. Consider long-lived firms that maximize the discounted sum of their future profits over an infinite horizon, using a common discount factor $\delta \in [0,1]$. In every period ($\rho = 1,2 \ldots, \infty$), firms set their prices simultaneously. Under perfect monitoring, firms know all the rival's past decisions before choosing the prices. We assume that firms adopt a grim trigger strategy

[15] This formulation is based on the vertical differentiation interpretation of the model. When considering the spatial interpretation, the more natural formulation of the utility function of a consumer located at $x < 1/2$ would be $u_A = v - p_A - tx$ if she buys from Firm A and $u_B = v - \tau\Delta - \tilde{p}_B - t(1-x)$ if she buys from Firm B. Obviously, the two formulations yield identical results.

(Friedman, 1971): collusion is maintained through an infinite Nash reversion – i.e., if one firm breaks the cooperative agreement, the rival will respond by playing the competitive equilibrium of the stage game in all the subsequent periods. The equilibrium concept is the Subgame Perfect Nash Equilibrium (SPNE).

It is well known that collusion is sustainable if and only if $\frac{\pi_j^C}{1-\delta} \geq \pi_j^D + \frac{\delta}{1-\delta}\pi_j^P$ where π_j^C, π_j^D and π_j^P are the one-shot collusive, deviation and punishment profits of Firm j. Firms sustain a cooperative agreement if and only if the long-term profits overwhelm the short-terms gains from cheating. In other words, firms cooperate if and only if they are sufficiently patient, that is the discount factor δ is larger than the following critical value

$$\delta^* \equiv \frac{\pi_j^D - \pi_j^C}{\pi_j^D - \pi_j^P} \quad (1)$$

which measures the degree of collusion sustainability: firms are less (more) likely to collude the higher is δ^*, as the set discount factors supporting collusion decreases (increases).

In the following, we first investigate the impact of the brand loyalty (or spatial separation) Δ on the collusive strategies, and then we study how it affects the sustainability of a tacit agreement.

3. Joint profit maximization

In this section, we characterize the colluding pricing scheme that maximizes the firms' joint profits. In practice, firms might enforce two alternative colluding strategies, which we denote as "market sharing" and "poaching in collusion". Let us explain this taxonomy that we use throughout the paper. If firms adopt a market sharing strategy, they agree not to compete on their rival's turf, so sharing the market equally. They do so by charging a unique price and serving only the closest consumers. Instead, if firms poach in collusion, they quote a couple of discriminatory prices to serve both their own and the rival's turf. In the following, we derive the firms' profits by adopting the two collusive strategies and then we compare them to identify which is the most profitable.

Let us start by considering the market sharing strategy. Each firm sets a price to fully extract the most distant consumer's surplus. Therefore, the collusive prices are

$$p_A^{ms} = p_B^{ms} = v + \Delta - \frac{t}{2} \tag{2}$$

where the superscript "ms" stands for "market sharing". Hence, the symmetric collusive profits are

$$\pi_A^{ms} = \pi_B^{ms} = \pi^{ms} \equiv \frac{2v+2\Delta-t}{4} \tag{3}$$

which are increasing in Δ. The intuition is straightforward: an increase in the degree of brand loyalty raises the consumers' willingness to pay and, consequently, the monopoly price in each share of the market.

Instead, if firms adopt a poaching in collusion strategy, they charge two different prices, one for their own turf and another one to the rival's turf. Consider first the group of consumers located at $x \leq 1/2$ and compare the utility functions if they buy from Firm A or from Firm B. The segment $[0, x_A]$ where $x_A = \frac{\Delta+\tilde{p}_B-p_A+t}{2t}$ represents the group of consumers belonging to the turf of Firm A who prefer buying from Firm A. The segment $\left[x_A, \frac{1}{2}\right]$, instead, represents the group of consumers belonging to the turf of Firm A who prefer buying from Firm B. Now, let us consider the group of consumers located at $x \geq 1/2$. By symmetry, we can identify two segments $\left[\frac{1}{2}, x_B\right]$ and $[x_B, 1]$, with $x_B = \frac{p_B-\tilde{p}_A-\Delta+t}{2t}$, representing the groups of consumers belonging to the turf of Firm B who prefer buying from

Firm A and from Firm B respectively. Based on the pricing scheme and the consumers' allocation described above, the firms' profit functions can be written as follows

$$\pi_A = p_A x_A + \tilde{p}_A \left(x_B - \frac{1}{2}\right) \tag{4}$$

$$\pi_B = p_B(1 - x_B) + \tilde{p}_B \left(\frac{1}{2} - x_A\right) \tag{5}$$

By maximizing the joint profits, the collusive prices are

$$p_A^{pc} = p_B^{pc} = \frac{8v+6\Delta-3t}{8} \tag{6}$$

$$\tilde{p}_A^{pc} = \tilde{p}_B^{pc} = \frac{8v+2\Delta-5t}{8} \tag{7}$$

where the superscript "pc" denotes "poaching in collusion" strategy. Clearly, the highest prices are charged to the consumers closer to the firms, while those located in the middle of the Hotelling segment receive a price discount to switch. Poaching the rival's consumers occurs only if the market conditions are verified – i.e., $x_A \in \left[0, \frac{1}{2}\right]$ and $x_B \in \left[\frac{1}{2}, 1\right]$. By substituting (6) and (7) into x_A and x_B, it can be easily shown that the above collusive prices are consistent with the market conditions only if $\Delta \leq \frac{t}{2}$. This implies that poaching in collusion is viable only if the degree of brand loyalty is sufficiently small. In other words, firms can serve some of the rival's consumers only if consumers do not stick too much to a firm's product.

By poaching in collusion, the firms' profits are equal to

$$\pi_A^{pc} = \pi_B^{pc} = \pi^{pc} \equiv \frac{4\Delta^2+12t\Delta+16tv-7t^2}{32t} \tag{8}$$

Since the above pricing strategy is not feasible if $\Delta > \frac{t}{2}$, let us focus on the region of parameters in which firms can adopt both the collusive strategies – i.e., $\Delta \leq \frac{t}{2}$.[16] Now, the relevant question is the following: which collusive pricing strategy maximizes the firms' joint profits? To answer this question, we need to compare (3) with (8) as follows

$$\pi^{ms} - \pi^{pc} = -\frac{(t-2\Delta)^2}{32t} < 0$$

This implies that the poaching in collusion strategy is always the most profitable strategy in the region of parameters under analysis. Hence, we can state the following result.

Proposition 1. If $\Delta \leq \frac{t}{2}$, firms maximize their joint profits by poaching in collusion. Otherwise, they maximize their joint profits by means of a market sharing rule such that each firm serves only its own turf.

The above result shows that poaching in collusion is always the most profitable strategy for two colluding firms when the consumers' brand loyalty for a firm's product is small enough (or the two markets are close enough). In other words, when each firm's advantage in serving its own turf is not especially pronounced, joint profit maximization leads firms to serve both sides of the market. Clearly, this ceases to hold if a firm cannot serve a group of consumers, even by offering a price discount, because they have a strong preference for the rival product (or the two markets are too distant). In that case, firms collude on the market shares, and they prevent from serving the rival's turf.

This proves that exclusive territories clauses, no-competition agreements and market sharing rules are not always the most profitable strategies for colluding

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[16] If this condition is not met, firms adopt the market sharing strategy.

firms, shedding some doubts on the actual policy attitude of antitrust authorities against this market practices. Indeed, if firms aim at maximizing their joint profits, they should charge discriminatory prices and serve more than one single territory when consumers have not a strong preference for a product. This also demonstrates that imposing tariffs that strengthen consumer preference for domestic goods can restore the profitability of territorial clauses for colluding firms.

4 Non-cooperative equilibrium

Now, let us suppose that firms do not cooperate. Building on the approach of Fudenberg and Tirole (2000), we examine a potential equilibrium characterized by "poaching", where, within each turf, some consumers switch to the most distant firm. Therefore, firms set a pair of discriminatory prices which, unlike the poaching in collusion strategy, result from the maximization of individual rather than joint profits. We denote this strategy as "poaching in competition" to highlight the difference from the "poaching in collusion" strategy.

If firms adopt a poaching in competition strategy, they aim at serving both sides of the market. Substituting x_A and x_B in (4) and (5), and maximizing them with respect to the price pairs $(p_A, \tilde{p}_A)$ and $(p_B, \tilde{p}_B)$ respectively yield the following equilibrium prices

$$p_A^* = p_B^* = \frac{\Delta+2t}{3} \qquad (9)$$

$$\tilde{p}_A^* = \tilde{p}_B^* = \frac{t-\Delta}{3} \qquad (10)$$

where the superscript "*" denotes the equilibrium of the stage game.[17] It is worth noting that, in the limit case $\Delta = t$, both firms charge the most competitive price $\tilde{p}_A^* = \tilde{p}_B^* = 0$ to the rival's turf, while in the own turf the prices are $p_A^* = p_B^* = t$ as in the standard Hotelling game. Instead, if Δ decreases and goes to zero, the brand loyalty of each turf decreases so affecting the prices (4) positively and the prices (5) negatively. Therefore, in the stage game, the firms gain the following symmetric equilibrium profits

$$\pi_A^* = \pi_B^* = \pi^* \equiv \frac{2t\Delta + 2\Delta^2 + 5t^2}{18t} \tag{11}$$

which are increasing in Δ. Indeed, a higher degree of brand loyalty softens competition and allows firms to charge a higher price to the closer consumers. While it is crystal clear that poaching in competition yields lower profits compared to poaching in collusion, whenever they are both viable – i.e., $\Delta \leq \frac{t}{2}$ –, the same cannot be said when poaching in competition is compared with a market sharing agreement, according to which firms decide not to compete with the rival's turf. Indeed, in the latter case, the two strategies differ not only in the quoted prices but also in the market structures, that is how consumers are shared between the two firms.

This leads to the following research questions: can a collusive market sharing rule be suboptimal compared to the outcome of natural competition on prices? Under what conditions do firms prefer to compete on prices rather than to collude by serving their own territory, for instance, through territorial exclusivity clauses? To answer these questions, we need to compare (3) with (11) as follows

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[17] By substituting (9) and (10) into x_A and x_B, it is easy to verify that $x_A \in \left[0, \frac{1}{2}\right]$ and $x_B \in \left[\frac{1}{2}, 1\right]$ for any $\Delta \leq t$.

$$\pi^{ms} - \pi^* = \frac{18vt - 4\Delta^2 + 14t\Delta - 19t^2}{36t}$$

which is strictly positive only if $v > v^*(t, \Delta) \equiv \frac{19t^2 - 14t\Delta + 4\Delta^2}{18t}$. Then we can state the following result.

Proposition 2. There exists a threshold $v^*(t, \Delta)$ such that market sharing is more profitable than poaching in competition if and only if $v > v^*(t, \Delta)$ with $v^*(t, \Delta)$ decreasing in Δ.

The Proposition above provides an interesting result. Colluding by sharing the market equally, such that firms serve only their own turf, is more profitable than fairly competing on prices only under certain circumstances. Specifically, firms find profitable to cooperate through a market sharing agreement only if the reservation price is larger than a determined threshold, which is decreasing in the degree of brand loyalty or markets distance. If this is not the case, in contrast with the conventional wisdom, firms maximize their profits by competing on both sides of the market without fixing any tacit or explicit agreement. The above result can be explained as follows. If Δ is small, consumers perceive the products on sale as almost perfect substitutes. Therefore, firms are more likely to attract further consumers by slightly undercutting the rival's price and they charge a higher price to the closer consumers so that only a share of their turf is served. By contrast, if Δ is large, firms need to offer a large price discount in order to attract consumers belonging to the rival's turf, which makes this strategy less appealing. In this case, firms would prefer to cooperate and divide the market equally without interfering in the rival's turf.

The relevance of this result is twofold. First, it provides some insights about the most profitable strategy when firms cannot collude on prices but only on the market shares. This is a realistic case for several reasons. For instance, colluding on prices is not always feasible, either due to a lack of information—whose exchange is often prohibited by antitrust authorities—or because of the increased risk of incurring fines. In this case, colluding only on the market shares by simply splitting the market in two is not always the right answer to maximize firms' profits. Indeed, market sharing is more profitable than competing on prices only if consumers have a sufficient high brand loyalty for one of the products on sale or the two markets are sufficiently distant. Otherwise, it is even detrimental to the firms' profits. Second, Proposition 2 is crucial for studying the sustainability of a tacit cartel. Indeed, the firms' profit when they do not cooperate – which coincides with the poaching in competition strategy – is the equilibrium output of the stage game. Hence, (11) defines the competitive equilibrium that characterizes the punishment phase following any deviation from the collusive agreement. Yet, Proposition 2 shows that firms can use a more severe punishment code to sustain collusion by sharing the market equally and avoiding competition for the same turf when Δ is sufficiently small. This simple but effective strategy allows firms reduce profits in the punishment phase, makes deviation less appealing and facilitates the collusion sustainability. Following this argument, in the next sections, we first study the collusion sustainability by means of Nash reversion and then by means of a harsher punishment code involving a market sharing agreement.

5. Collusion sustainability

In this section, we characterize the optimal deviation strategies from market sharing and poaching in collusion. This allows us to characterize the self-enforcing conditions required to sustain a cooperation between firms.

Let us start by considering the first case, when firms share the market equally by serving only their own turf. The optimal deviation strategy for a firm, say firm

A, consists in keeping the same price for its own turf and charging a lower price to the rival's turf. As a result, there exists a threshold $\hat{v}(t) = \frac{5}{2}t$ such that the optimal deviation price charged to the rival's turf is

$$p^{dms} = \begin{cases} \frac{v}{2} - \frac{t}{4}, \ v < \hat{v}(t) \\ v - \frac{3t}{2}, \ v \geq \hat{v}(t) \end{cases} \tag{12}$$

where the superscript "dms" denotes the deviation price when the colluding scheme consists of market sharing. It is worth noting that, if the reservation price is sufficiently large ($v \geq \hat{v}(t)$), firm A can serve the entire market by slightly undercutting the rival's collusive price. Note that the above pair of prices do not depend on Δ. The reason is because firm B charges a collusive price that fully extracts such brand loyalty.

Let us suppose, instead, that firms collude on prices and they both serve their own and the rival's turf. In this case, firm A has two candidate deviation strategies. It can keep the collusive price for consumers on its own turf, while setting a deviation price that maximizes the expected profit from consumers on firm B's turf. Given the threshold $\tilde{v}(\Delta, t) = \frac{19t+2\Delta}{8}$, this leads to the following deviation prices

$$\tilde{p}^{dpc} = \begin{cases} \frac{v}{2} - \frac{3t+2\Delta}{16}, \ v < \tilde{v}(\Delta, t) \\ v - \frac{11t+\ \Delta}{8}, \ v \geq \tilde{v}(\Delta, t) \end{cases} \tag{13}$$

where the superscript "dpc" denotes the deviation price for the rival's turf when the colluding scheme consists of poaching in collusion. Similarly to what we have noticed above, firm A can attract all the consumers belonging to the rival's turf when v is sufficiently large ($v \geq \tilde{v}(\Delta, t)$). However, in contrast to what we observed so far, the deviation prices hinge crucially on the degree of brand loyalty or geographical distance. Indeed, if Δ is high, attracting further consumers is more difficult and less profitable for the cheating firm.[18]

Alternatively, firm A can deviate by changing the prices charged on both its own turf and the rival's one. Clearly, while the deviation prices for the rival's turf are those characterized in (13), the optimal deviation price for consumers in firm A's turf is the one that allows firm A to attract a larger share of consumers, given the rival's collusive price. This implies that, if firm A deviates in its own turf, it sets a price that is lower than the collusive price. Given the threshold $\breve{v}(\Delta, t) = \frac{13t-10\Delta}{8}$ (with $\breve{v}(\Delta, t) < \tilde{v}(\Delta, t)$), the deviation prices are

$$\breve{p}^{dpc} = \begin{cases} \frac{v}{2} + \frac{3t+10\Delta}{16}, & v < \breve{v}(\Delta, t) \\ v - \frac{5t-10\Delta}{8}, & v \geq \breve{v}(\Delta, t) \end{cases} \tag{14}$$

As intuition suggests, even in this case, firm A can attract all consumers belonging to its own turf when v is sufficiently large, i.e., if $v \geq \breve{v}(\Delta, t)$. Moreover, since $\breve{v}(\Delta, t) < \tilde{v}(\Delta, t)$, firm A deviates on both sides of the market and serves all consumers only if $v > \tilde{v}(\Delta, t)$. It is worth noting that the rationale according to which a higher Δ makes it more difficult and less profitable to attract further consumers does not apply to nearby consumers. Indeed, if Δ is high, consumers exhibit a stronger preference for the closer product, making it easier and more profitable for a deviating firm to attract them.

What is the most profitable deviation strategy? To answer this question, we need to compare the gains from colluding and deviating on each turf separately. There exists a threshold $\bar{v}(\Delta, t) = \frac{9t-2\Delta}{8}$ such that firm A deviates on both sides of

[18] Note that $\tilde{v}(\Delta, t)$ is increasing in Δ. Therefore, the higher the degree of brand loyalty, the more difficult it is to attract all the consumers belonging to the rival's turf. Yet, in the region of parameters under analysis $\tilde{v}(\Delta, t) \leq \hat{v}(t)$.

the market only if $v > \bar{v}(\Delta, t)$. Otherwise, firm A keeps the collusive price on its own turf and deviates on the rival's one.

Summing up, the optimal deviation strategy, as a function of increasing values of v, unfolds as follows: (i) firm A maintains the collusive price on its own turf while poaching part of the rival's turf when v is sufficiently small; (ii) firm A undercuts the collusive price on both turfs, serving a subset (but not all) of consumers on each side for slightly higher values of v; (iii) firm A undercuts on both turfs to capture the entire demand on its own side and a larger share of the rival's when v is intermediate; (iv) firm A deviates on both turfs to capture the entire market when v is sufficiently large.

Given the above deviation prices, we can summarize the deviation profits in Table 1 a,b.

(a)	π^{dms}
$v < \hat{v}(t)$	$\frac{4v^2 + 16t\Delta + 12tv - 7t^2}{32t}$
$v \geq \hat{v}(t)$	$v - t + \frac{\Delta}{2}$

(b)	π^{dpc}
$v < \bar{v}(\Delta, t)$	$\frac{64v^2 + 144tv + 108t\Delta + 96v\Delta + 100\Delta^2 - 63t^2}{512t}$
$v \in [\bar{v}(\Delta, t), \check{v}(\Delta, t))$	$\frac{64v^2 + 36t\Delta + 64v\Delta + 52\Delta^2 + 9t^2}{256t}$
$v \in [\check{v}(\Delta, t), \tilde{v}(\Delta, t))$	$\frac{64v^2 + 332t\Delta + 32v\Delta + 4\Delta^2 + 208tv - 151t^2}{512t}$
$v \geq \tilde{v}(\Delta, t)$	$v - t + \frac{\Delta}{2}$

Table 1: Deviation profits from market sharing (a) and poaching in collusion (b).

Note that, when v is high enough – i.e., $v \geq \hat{v}(t)$ –, the deviating firm posts a couple of prices to attract all the consumers in the market regardless the adopted collusive strategy. Consequently, the deviation profits are the same whether firms sustain collusion by equally splitting the market or by poaching in collusion.

Interestingly, the deviation profits are always increasing in Δ. This occurs although the deviation prices do not depend on the degree of brand loyalty or geographical distance when firms do not poach in collusion, while they are strictly decreasing in Δ for the rival's turf when firms poach in collusion. Nevertheless, the higher the degree of brand loyalty or geographical distance the higher is the willingness to pay for the closer consumers. Therefore, the positive impact of Δ on the surplus extracted by the closer consumers dominates the impact on the profits deriving from the rival's turf.

Now, we can study the stability of each collusive strategy – i.e., the critical discount factor above which collusion is sustainable. If collusion is not sustainable, because one firm can profitably deviate from the cooperative agreement, both firms play the competitive equilibrium of the stage game, that is poaching in competition.[19]

Let us assume that firms collude by adopting a market sharing agreement. Substituting (3), (11) and the profit functions in the first column of Table 1 into (1) yields the following critical discount factors

$$\delta^{ms} \equiv \begin{cases} \frac{9(2v-t)^2}{112t\Delta-32\Delta^2+108tv-143t^2+36\ {}^2}, & v < \hat{v}(t) \\ \frac{9t(2v-3t)}{2(7t\Delta-2\Delta^2+18tv-23t^2)}, & v \geq \hat{v}(t) \end{cases} \tag{15}$$

Clearly, if $v < v^*(t,\Delta)$ profits from a market sharing rule are lower than those with poaching in competition. This means that the collusive profit is not worth the punishment profit. Hence, δ^{ms} becomes larger than 1 and, by definition, collusion is not sustainable.

Instead, if firms collude through a poaching in collusion strategy, the critical discount factors are immediately obtained by substituting (8), (11) and the profit

[19] This is because we are assuming that collusion is sustained by means of infinite Nash reversion. In the following section, we study how collusion can be sustained through a harsher punishment code.

functions in the second column of Table 1 into (1). This leads to the following result

$$\delta^{pc} \equiv \begin{cases} \frac{9(8v+6\Delta-7t)^2}{1847\ ^2-4t(324v+115\Delta)-4(216v\Delta+144v^2+9\ \ \Delta^2)}, & v < \bar{v}(\Delta,t) \\ \frac{9\left(65\ ^2+64v^2+64v\Delta+20\Delta^2-4t(32v+1\ \ \Delta)\right)}{559t^2-68t\Delta-4(144v^2+144v\Delta+5\ \ \Delta^2)}, & v \in \left[\bar{v}(\Delta,t), \check{v}(\Delta,t)\right) \\ \frac{9(39t^2+48tv-64v^2-140t\Delta+32v\Delta+60\Delta^2)}{2639\ ^2-576v^2+288v\Delta+476\Delta^2-4t(468v+619\Delta)}, & v \in \left[\check{v}(\Delta,t), \tilde{v}(\Delta,t)\right) \\ \frac{9\left(25t^2+4\Delta^2-4t(4v+\Delta)\right)}{16(23\ ^2-18tv-7t\Delta+2\Delta^2)}, & v \geq \tilde{v}(\Delta,t) \end{cases} \quad (16)$$

We have already proved that poaching in collusion is the optimal stationary collusive scheme if $\Delta \leq \frac{t}{2}$, otherwise a market sharing rule maximizes the joint profits. What about stability? Which collusive scheme is more likely to be sustained? To answer these questions, we compare (15) and (16): if the former is greater than the latter, poaching in collusion is more sustainable than market sharing, and vice versa. By combining this comparison with the results on the most profitable strategy (see Proposition 1), we can identify the optimal strategy for two firms that collude in order to obtain supra-competitive profits.

Proposition 3. Poaching in collusion is both the most profitable and sustainable collusive strategy whenever it is viable (i.e., $\Delta \leq \frac{t}{2}$). Firms collude through a market sharing agreement only if $\Delta > \frac{t}{2}$.

The above Proposition shows that sustainability and profitability are perfectly aligned, with no trade-off between the two. Consequently, whenever a cooperative agreement is sustainable, the optimal collusive strategy also yields the highest joint profits. In other words, the decision to poach or not the rival's turf in collusion is not pursued merely because it maximizes the total industry profits, but also because it is easier to sustain. Naturally, when the discount factor is small enough, tacit collusion is not enforceable, and the outcome of the repeated game corresponds to a non-cooperative equilibrium.

This shows that the fact that two firms do not share the market equally is not evidence that they are not colluding. On the contrary, firms are extracting a larger share of consumer surplus and they are also using such a collusive strategy as a facilitating practice to sustain a cooperative agreement.

That said, the collusive use of exclusive territories clauses, no-competition agreements and market sharing rules should not be dismissed, either as a means to extract greater surplus from consumers or to achieve a non-competitive outcome that would otherwise be unsustainable. What should guide an antitrust authority in identifying potential collusive strategies is neither the division of market shares, which may even benefit consumers (see Proposition 2), nor the use of uniform versus discriminatory pricing. Instead, an antitrust authority should combine these observations with the degree of consumer loyalty to one of the products on sale or the geographical distance between the markets.

6. Harsher punishment code

In our model, firms punish any deviation from the collusive path by reverting to the Nash equilibrium of the stage game in all the subsequent periods. This implies that both firms poach in competition. However, one may wonder whether market sharing can emerge during the punishment phase as an alternative (and harsher) punishment code.[20]

We have shown that firms adopt a market sharing agreement when $\Delta > \frac{t}{2}$, since poaching in collusion is not viable. Therefore, in this region of parameters, each firm serving its own turf is a clear indicator of collusion, regardless of whether firms revert to a Nash equilibrium or follow an alternative punishment strategy that still involves a market sharing agreement. Indeed, firms have no incentive

[20] It is well known that Nash reversion does not coincide with the optimal punishment à la Abreu (1986, 1988) when consumers have heterogeneous preferences, as in the Hotelling model, because the punishment phase does not nullify the one-shot competitive profits.

to poach from the rival's turf, but during a competitive phase. Hence, if we observe a market sharing agreement, it is because firms are colluding.

By contrast, poaching in collusion is the most profitable and sustainable strategy whenever it is viable (i.e., $\Delta \leq \frac{t}{2}$). If firms revert to a Nash equilibrium during the punishment phase, we observe both firms serving their own and the rival's turfs during the collusive and the punishment phase. Therefore, if firms adopt a grim trigger strategy, a market sharing agreement should not emerge. For this reason, it is interesting to investigate whether an alternative and harsher punishment code, such that each firm serves its own turf, can be used to make collusion easier to sustain. If this is the case, a market sharing agreement can be used by the firms as a strategic tool to sustain a cooperative agreement and it can be interpreted by Antitrust Authorities as a facilitating practice that confers stability to tacit agreements.

To this end, we focus on $\Delta \leq \frac{t}{2}$ and we adapt the punishment codes described by Abreu (1986, 1988) to our framework by constraining prices to be non-negative.[21] This penal code requires that prices equal the marginal cost, such that each firm serves its own turf and profits equal to zero in each period of the punishment phase. Based on a *stick and carrot* strategy, collusion is sustained by the following penal code:

i. if a firm deviates from the collusive agreement in period ρ, then in period $\rho + 1$ all firms trigger the punishment phase. Provided that all firms comply with the punishment strategy, collusion is resumed from period $\rho + 2$ onwards;
ii. if a firm deviates during the punishment phase in period ρ, a new round of punishment is initiated in period $\rho + 1$. If all firms adhere to the punishment

[21] Note that imposing non-negative prices implies that firms cannot set prices below their marginal cost, which is normalized to zero, such that profits cannot be negative in each period.

strategy in that period, collusion resumes in period $\rho + 2$ and continues thereafter. Otherwise, the punishment phase is prolonged.

The punishment code described above is harsher than simple Nash reversion if and only if the following condition is satisfied

$$\delta\pi^h + \frac{\delta^2}{1-\delta}\pi^{pc} < \frac{\delta}{1-\delta}\pi^* \tag{17}$$

where π^h is the one-shot profit during the harsher punishment phase, which is equal to zero. The condition above ensures that the net present values of profits during the punishment phase are lower with this alternative code than with simple Nash reversion.[22] If it holds, the alternative punishment code is harsher than the grim trigger strategy considered in the baseline model. As a result, firms have less incentive to deviate from the collusive path and the following condition, which denotes the incentive constraint during the collusive phase, is more likely to be satisfied

$$\frac{\pi^{pc}}{1-\delta} \geq \pi^{dpc} + \delta\pi^h + \frac{\delta^2}{1-\delta}\pi^{pc} \tag{18}$$

However, this is not enough to state that there is an alternative punishment code that makes collusion more sustainable. The punishment must be credible such that firms must not have incentive to deviate also from the punishment path. Hence, we first need to characterize the optimal deviation strategy during the punishment phase. Given the price equal to zero charged by the rival, a

[22] Note that, as shown by Madio and Pignataro (2023), when such a condition does not hold, this alternative punishment code becomes less severe than simple Nash reversion. As a result, the punishment phase must last more than one period for the alternative code to be harsher than the grim trigger strategy. However, firms must also have no incentive to deviate from the punishment path. As originally argued by Motta (2004), a harsher punishment code reduces the incentive to deviate from the collusive path, but it makes firms more eager to deviate from the punishment path. Therefore, firms face a trade-off in designing the punishment code, which may result in a milder punishment phase to make it credible.

cheating firm can serve only a share of its own turf by setting the following optimal deviation price

$$p^{dh} = \frac{\Delta + t}{2} \tag{19}$$

where the superscript "dh" denotes the deviation price from the punishment path when firms adopt a harsher punishment code. Therefore, the deviation profits are equal to

$$\pi^{dh} = \frac{(\Delta + t)^2}{8t} \tag{20}$$

Firms have no incentive to deviate from the punishment phase if the long-term profits from adhering to the punishment code are larger than the short-term gains from cheating. Substituting the above profits into the following condition, which denotes the incentive constraint during the punishment phase, the alternative penal code is credible if and only if

$$\pi^h + \frac{\delta}{1-\delta}\pi^{pc} \geq \pi^{dh} + \delta\pi^h + \frac{\delta^2}{1-\delta}\pi^{pc} \tag{21}$$

In sum, firms do not deviate from an alternative harsher punishment code only if (17), (18) and (21) are jointly satisfied. By combining these conditions, we can state the following.

Proposition 4. There exists a threshold $v^h(t, \Delta)$ with $v^h(t, \Delta) \in [\check{v}(\Delta, t), \tilde{v}(\Delta, t))$, such that, if $v \leq v^h(t, \Delta)$, poaching in collusion can be sustained by means of a harsher punishment code involving a market sharing agreement.

Proposition 4 shows that firms can use a harsher penal code to sustain collusion by adopting a market sharing agreement during the punishment phase. This allows firms to make poaching in collusion easier to sustain as the tacit agreement is stable in a wider range of discount factors relative to Nash reversion.

It is worth noting that, by adopting a harsher penal code, firms can use territorial exclusivity clauses as a facilitating practice to intensify competition during the punishment phase. This is in contrast with the conventional view of exclusive territories according to which firms use them to soften competition and extract a larger share of consumer surplus. Moreover, if an Antitrust Authority observes firms sharing the market equally when poaching in collusion is viable, it can be interpreted as an evidence of a harsh punishment phase, being part of a cooperative agreement. Indeed, the Nash equilibrium of the stage game features firms poaching the rival's turf. If they don't do it, it is likely because they are enforcing a harsh punishment. Although this can improve consumer welfare in the short term, because prices are lower than those in the Nash equilibrium, it can lead firms to return to collude in the long term. Hence, any policy allowing or fostering firms to share the market equally through territorial exclusivity clauses is likely to harm consumers not only in a static but also in a dynamic framework because it helps firms to sustain a cooperative agreement.

7. Conclusions

In this paper, we examine the conditions under which colluding firms optimally choose to serve each other's markets rather than strictly partitioning consumers through market sharing rules. In particular, by providing a simple theoretical model, we argue that poaching in collusion is the joint-profit maximizing strategy whenever the costs incurred by consumers to purchase a good from a more distant firm — whether due to geographic distance or horizontal differentiation — are not prohibitively high. This is because it allows firms to extract higher prices from their closer consumers while still profiting from attracting more distant ones. Thus, the lack of a formal market-sharing agreement does not necessarily imply the absence of collusive behavior; rather, it may reflect firms' efforts to capture a greater portion of the market surplus.

Moreover, we provide new insights on the sustainability of collusion. We show that poaching in collusion is also easier to sustain. This is a particularly relevant finding and has broader implications for antitrust policy. Traditional enforcement tends to treat market-sharing and no-poaching agreements as hard-core restrictions of competition, while being more cautious in establishing the existence of collusion when firms continue to compete in the same markets. Our findings suggest that such a sharp distinction may be misleading. Collusive poaching, though less obvious than market division, may be both more profitable and more sustainable. From an enforcement perspective, this raises a significant challenge: tacit collusion may take forms that are harder to detect because firms keep operating in the same markets and target the same customers, yet their pricing strategies reveal a coordinated pattern.

We also show that, when firms are unable to coordinate prices, a market sharing agreement can be even less profitable than fair competition on both sides of the market. Hence, because poaching in competition serves as the punishment strategy within a collusive framework, if it generates higher profits than a market-sharing arrangement, then collusion can be sustained even through harsher punishment codes. This implies that a market sharing rule can facilitate tacit collusion by strengthening competition during the punishment phase.

These findings also open several promising avenues for future research. One natural extension would be to consider asymmetric firms, either in terms of cost structures or in terms of consumers' brand loyalty, to explore how imbalances affect the choice of collusive strategy. Another interesting direction would be to extend the analysis to dynamic environments with learning, where firms gradually acquire information on consumers and refine price discrimination.

In conclusion, this paper shows that the conventional wisdom that collusion naturally takes the form of market sharing is incomplete. When consumer heterogeneity and additional costs are taken into account, poaching in collusion not only emerges as the profit-maximizing strategy but also proves to be more resilient. By combining theoretical insights with implications for enforcement, our analysis underscores the need to rethink how collusive practices are detected. This calls for a more nuanced approach by antitrust authorities, who should recognize that collusion may thrive even in the absence of explicit market division, and that poaching strategies may be both optimal for firms and detrimental to consumer welfare.

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