

International Competition Policy: Information Sharing Between National Competition Authorities

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Work in progress, comments are welcome

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Abstract

Using a common agency relationship where the agent has private information about its costs, I study the impact of the introduction of an information system that obliges each national competition authority to give information about the firms it has prosecuted when requested by another competition authority. I identify the conditions under which an "information-sharing system" is beneficial for each country that participates in it and how the behaviour of the multinational changes with the introduction of such an agreement.

1 Introduction

“Most officials believe that the issue of confidentiality is the chief limitation of enforcement cooperation agreements and hence it is submitted that the majority of effort should be concentrated on overcoming this particular obstruction to effective cooperation between antitrust agencies.”

Marsden and Whelan (2005), p.24

With globalisation, competition has an increasingly significant international dimension. A clear example is the existence of international cartels, such as the vitamins cartel which took place between January 1990 and February 1999. Another

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example is the increasing role played by multinationals, who operate at supranational level and who sometimes seem to be more powerful than national governments. Both these examples suggest the need for collective action to create an international competition institution; however, a true attempt to introduce international competition law has not been made. One of the reasons why such an attempt has not occurred is that most developed countries do not see the benefits of such an initiative. For instance, because many multinational companies have their headquarters in developed countries, they think that the flow of information will go always in the same direction, i.e. from developed to less developed countries.

There has been however, a proliferation of multilateral platforms where various policy issues are discussed such as the ICN (International Competition Network) or the OECD. These policy forums produce useful instruments, such as those introduced by the OECD to deal with hard-core cartels. Nonetheless, their usefulness is constrained by their non-binding aspect. Similarly, many bilateral agreements have emerged (see the next section). As pointed out by the quotation above, one of the main limitations of these agreements is the impossibility to exchange confidential information between competition authorities.

This paper studies the impact of the introduction of an information system that obliges each national competition authority to give information (confidential and non-confidential) about the firms it has prosecuted or analysed when requested by another competition authority. There are two competition authorities (the principals) from two different countries that are dealing with a multinational firm (the common agent). The multinational has the same cost in both countries, i.e., the technical costs of production that are specific to the firm and do not depend on the location. The information about its cost is private to the firm. In one country that we call North, the competition authority is prosecuting the firm for collusive behaviour. The multinational has incentives to present its costs as being high. In another country (South) the multinational wants to carry out an FDI through a merger or an acquisition and the competition authority is analysing the competitiveness of this merger. The multinational has incentives to show that its costs are low and that there will be a high enough synergy justifying the decrease in competition.

In the North, if the competition authority believes that the costs are low, i.e., that the firms have indeed colluded, it imposes a fine on the industry and enforces the competition that results if firms are low cost. If it believes that the costs are high there is no fine and firms continue to compete as before. In the South if the competition authority believes that the costs are low, it allows the merger, otherwise, it blocks it. The competition authorities have to rely on the report of the multinational as they do not have any means to check it. Thus, in the absence of coordination

between them, the firm reports high costs in the North and low costs in the South whatever its true costs. Any firm therefore reports its true costs in one country and misrepresents them in the other one.

Once the competition authorities share information about the firm, that is, its reports, the multinational has to make the same report in the two countries. In other words, if the competition authorities share firm's reports, there are information externalities. If the firm reports its true costs, the information sharing is obviously a success, but if it ends up misrepresenting its costs, it is a failure. The expected effect may depend on the distribution of firm's costs as firms with different costs may act differently.

The main findings of the paper are the following. Given the demand and cost functions, the crucial parameter that determines the behaviour of the multinational is the fine imposed in the North. If it is sufficiently large, then the firm with any costs pretends that its costs are high to escape from the punishment. The information-sharing agreement outperforms the no-agreement situation if the probability that the costs are indeed high is large enough. Symmetrically, if the fine is sufficiently small, the firm with any costs pretends that its costs are low to be allowed to merge in the South. The information-sharing agreement outperforms the no-agreement situation if the probability that the costs are indeed low is large enough. Finally, there is an intermediate range for the fine such that either the firm always reports its true costs, in which case the information-sharing is good whatever the cost distribution, or the firm always misrepresents its costs, in which case the information-sharing is unambiguously bad.

From policy perspective these results imply that there are cases in which the information-sharing agreement has to be combined with a coordinated antitrust policy to succeed.

We also provide the conditions under which there exists this intermediate range in which the firm always reports its true costs. A sufficient condition is that the firm's profits in each country are supermodular in its costs and report. Supermodularity in one country is the necessary condition. We find that for a class of cost functions the profit function is supermodular in the North.

The situation modelled in this paper in which the multinational has different incentives to report its private information (and de facto does make contradicting reports) actually arises in practice. To illustrate this point, consider the example where the cooperation between the South African and European competition authorities made possible a better information extraction from the firm under investigation. This cooperation took place in a global merger frame where Unilever and Robertsons

Foods¹ wanted to merge in both markets.

“... (I)t was found that certain arguments used by the merging parties in that particular transaction in South Africa were contradictory to arguments by the same parties used in the EU. Pursuant to the cooperation and technical assistance from the EU, the South African Competition authorities were able to obtain certain concessions from the parties which may not have been possible had such cooperation not been received. The South African authorities found that the merging parties were not convincing in certain arguments which were advanced and could not show why South African firms were not likely to behave similarly to EU firms. Accordingly, the South African Competition Authority imposed certain condition on the merger having the benefit of cooperation and technical assistance received from the EU. It must be noted, however, that all information shared between the respective authorities was information which was in the public domain and did not constitute “confidential information”.”

Chetty (2005), p.12

Before proceeding with our analysis, we briefly contrast it with related work in the literature although to the best of my knowledge, there is no attempt in the economic literature to study this issue.

The model builds on contract theory and the economic theory of incentives under asymmetric information. In particular, it uses the framework of the principal agent relationship when there are two principals that deal at the same time with a unique agent, who possesses some private information. The seminal work on multiple principals offering optimal incentive contracts subject to adverse selection is due to Stole (1991) and Martimort (1992).² These and other papers compare the first best with the second best under cooperation of the principals and non-cooperation. We do the same in this paper. The crucial difference is that in our model the agent wants to make different reports to the two principals while in the multiprincipal literature the agent wants to pretend being high cost to both principals. For simplicity, we assume that the payoffs from the contracting with the two principals are independent of each other in agent’s utility function since the marginal costs of production are constant. In existing multiprincipal models the independence of the two payoffs renders the problem trivial since in this case the coordination outcome is identical to

¹Unilever Plc and Robertsons Foods (Pty) Ltd 55/Lm/Sep01.

²See Martimort (1996) for a more recent version.

the non-coordination one. The direct comparison of the results is therefore difficult as in these models it is the substitutability or complementarity of the two payoffs that matters which is absent in our model.

In the multiprincipal model of Mezzetti (1997) the setup is somewhat different from the standard one. In his paper the agent should report his relative efficiency in performing tasks for the two principals if they cooperate. Thus, the agent cannot claim to be inefficient in both tasks. If they do not cooperate, the agent reports his type as usual. However, the externalities of the two tasks arising in the agent's utility function are still necessary to make the cooperation game different from the non-cooperation one.

We can draw some analogy with the countervailing incentives introduced by Lewis and Sappington (1989). According to them, countervailing incentives "exist when the agent has an incentive to understate his private information for some of its realisations, and to overstate it for others" (p. 294). They study a single-agent single-principal model where countervailing incentives arise because the agent's fixed cost of production is inversely related to his privately known marginal cost. Then, the incentive-compatibility constraint of any type can bind and the distortion can go either way. Sometimes incentive compatibility constraints do not bind and the first-best is achieved. In our model the firm wants to misrepresent its type differently in the two countries. Playing on this, the cooperating principals can sometimes induce the first-best, in other cases, any type can lie in the equilibrium.

The rest of this paper is organised as follows. Next Section makes a short overview of the existent antitrust agreements between countries. Section 3 introduces the model, and Section 4 presents the full information benchmark. Sections 5 and 6 analyse the results without and with cooperation. Section 7 analyses when the profit function is supermodular. Section 8 presents the main finding of when the information-sharing agreement is successful. Section 9 considers a particular example. Section 10 concludes.

2 Existent cooperation agreements between national competition authorities

We will start by giving a brief overview of the cooperation agreements between countries on antitrust policy issues that exist up to the moment. We can group those agreements according to whether or not they allow for the exchange of confidential information.

The first group of agreements is characterised by the impossibility of exchang-

ing confidential information between the parties involved in the agreement. Within this group we find trade agreements that include competition policy provisions and agreements that only focus on antitrust issues.

The most prominent example of the agreements that only focus on antitrust issues is the competition cooperation arrangement established between the EU and the US in 1991.³ Other examples are the agreements between Canada and the US in 1984 and 1995⁴ and the agreement between Canada and the EU in 1999.⁵

The second subgroup of agreements refers to those that take place within a free trade agreement (FTA) between countries. The main objective of those provisions is to promote conditions of fair competition in the free trade area. Examples of this type of agreements are the Canada-Costa Rica Free Trade Agreement (CCRFTA),⁶ the Canada-Chile Free Trade Agreement (CCFTA),⁷ the EU-Mexico Free Trade Agreement (EMFTA)⁸ and the EU-South Africa Trade, Development and Cooperation Agreement (TDCA)⁹.

In general the main difference between both subgroups of agreements is that in the FTA there is no separate agency-to-agency agreement¹⁰ although the competition authorities are the principal enforcement agencies responsible for the operation of the competition sections of the free trade agreement.¹¹ Usually, both types of

³In fact, there are two EU-US Cooperation Agreements, one signed in 1991 and the other in 1998. See Agreement between the Government of the USA and the Commission of the European Communities Regarding the Application of their Competition Laws, 23 Sept. 1991, (1991), 4 CMLR 823, 30 ILM 1487; EU-US Positive Comity Agreement, 4th June 1998, (1998) OJ L173/28, (1999) 4 CMLR 502.

⁴See: Memorandum of Understanding between the Government of the United States of America and the Government of Canada as to Notification, Consultation and Cooperation with Respect to the Application of National Antitrust Laws, March 9, 1984, United States-Canada, reprinted in 4 Trade Reg. Rep. (CCH) 13,503A. The US and Canada also entered into a cooperation agreement in 1995, available at <http://cb-bc.gc.ca/epic/internet/incb-bc.nsf/en/ct02007e.html>

⁵See the Agreement between the European Communities and the Government of Canada regarding the applications of the competition laws OJ L 175, 10.7.1999, p.50.

⁶The CCRFTA is available at http://dfait-maeci.gc.ca/tna-nac/Costa_Rica_toc-en.asp

⁷See Chapter J of the CCFTA available at <http://www.dfait-maeci.gc.ca/tna-nac/bilateral-en.asp>

⁸It is available at http://europa.eu.int/comm/external_relations/mexico/doc/a4_dec_02-2000_en.pdf for goods and at http://europa.eu.int/comm/external_relations/mexico/doc/a5_dec_02-2001_en.pdf for services.

⁹See http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/1_311/1_31119991204en00030297.pdf

¹⁰Usually, a section or an annex to the main agreement establishes provisions relating to competition policy issues.

¹¹An exception to this is the Memorandum of Understanding signed between the Canadian and Chilean competition authorities in 2001, available at <http://strategis.ic.gc.ca/epic/internet/incb-bc.nsf/en/ct02320e.html>

agreements establish provisions relating to notifications of enforcement activities or other measures that have an impact on the other party's interests, coordination of enforcement activities with respect to specific cases, consultations with the other party's authority when their investigations or proceedings have an impact on the first party's important interests, avoidance of conflict, assistance¹² and exchange of information. In most of the cases these provisions can be regarded as a form of "soft law" because the obligations concerning the cooperation mechanism are not enforceable.

With respect the exchange of information, competition authorities are allowed to exchange without restrictions the text on legal theory, case-law or market studies in the public domain, information related to the application of competition legislation provided that it does not adversely affect the person providing such information, information concerning any known anticompetitive activities and any innovations introduced in the respective legal systems in order to improve the application of their respective competition laws.

However, they are not allowed to exchange any information that violates the confidentiality laws of both parties. In particular, the competition authority must maintain the confidentiality of any information it has received in confidence unless it has the express consent of the source of the information exchanged.

Sometimes it is vaguely established that competition authorities should help each other "to collect other types of information in their respective territories",¹³ however, this information should not violate either party's confidential national laws.

Finally, there is a second group of more proactive competition policy agreements that expressly provide for the exchange of confidential information between competition authorities. Within this group we find the bilateral agreement between the US and Australia¹⁴ and the trilateral agreement between Iceland, Norway and Denmark.¹⁵

In both examples all the parties are subject to commitment that they will use the confidential information only for the purposes stipulated in the agreement and in all these countries national legislation allowing for the exchange of confidential

¹²The EU-US agreement is an exception.

¹³Article 4.2 of the Annex of the Check, Agreement between the United Mexican States and the EEC, July 15, 1975, 1975 OJ (L247). The third Generation Agreement, Mexico-EEC, April 26 1991, "Cooperation Scheme Agreement", available at <http://www.europa.eu.int>.

¹⁴See the Agreement between the Government of the United States of America and the Government of Australia on Mutual Antitrust Enforcement Assistance, available at www.apec.org.tw/doc/USA/Cooperation/usaus7.htm

¹⁵Agreement between Denmark, Iceland and Norway on Co-operation in Competition Cases: www.globalcompetitionforum.org/regions/europe/Denmark/Agreemen1.pdf

information was passed before the establishment of the agreements.

Another example of this type of agreements is provided by the competition authorities of the European Member States. EC Regulation 1/2003, referred to as the Modernisation Regulation, took effect on 1 May 2004 and it reinforces, among other measures, the cooperation between the competition authorities of the member states. This more active cooperation framework provides for the exchange of confidential information.

“For the purpose of applying Articles 81 and 82 of the Treaty the Commission and the competition authorities of the Member States shall have the power to provide one another with and use in evidence any matter of fact or of law, including confidential information.”

EC (2003), L 1/11.

3 The model

Consider two competition authorities (the principals, P^S and P^N) from two different countries (the South and the North) that are dealing with a multinational firm (the common agent). The multinational produces a homogeneous product and has the same cost in the two countries. We can think about this cost as the technical cost of production (excluding wages, land rent and other costs that may vary from one country to another), which is specific to the firm and particularly difficult for the antitrust authority to discover. The cost function is $C(q, c)$ increasing in both arguments where q is the quantity produced and c is a parameter (type) which is private information of the agent. This private information is a random variable drawn from a known cumulative distribution $F(c)$ on $[c_L, c_H]$.

In both markets, North and South, there are local competitors. In the South they are always inefficient, that is, their type is c_H . In the North, the multinational has the same cost as its competitors. One possible justification for this assumption is that the multinational is originally from the North. In the North, the firms always collude to produce as if they had the highest possible costs.¹⁶

The multinational wants to undertake a merger in the South and the competition authority P^S should decide whether to approve the merger or not. It has a merger control institution that allows for "an efficiency defense", therefore, it will clear the merger whenever there is enough evidence of large efficiency gains. In the North, the competition authority P^N is prosecuting the industry for an alleged anticompetitive

¹⁶This obviously imposes some condition on c_H and c_L , that is, they are not too far apart.

conduct of collusive behaviour. If it finally decides that there is enough evidence of collusion it will impose a fine F on the firm.

The firm reports its type \tilde{c} to each competition authority. It can make different reports in the two countries. In the North, all the firms collude to report the same type. Based on these reports, the competition authorities will decide which policy to apply. Given the policy the firm decides on its production. The profits of the firm excluding the fine, given the optimal production, when its type is c and it reported \tilde{c} are $\pi^i(\tilde{c}, c)$ for $i = S, N$.

We consider two regimes, the no-agreement and the information-sharing agreement. Under the no-agreement regime, the multinational reports independently to each competition authority. Under the information-sharing regime, the principals will communicate to each other the reports that the firm has given individually to them, therefore the firm will make the same report to both principals. There is a well-known conflict between competition authorities wanting to have as much information as possible in order to enforce the antitrust law effectively, and businesses wanting to protect their business secrets away from competitors. I assume that both competition authorities commit to keep such information confidential vis-à-vis third parties and to use it only for the purpose for which it was provided.

4 Full information benchmark

Consider the benchmark case when the principals know the agent's cost c . If the principals have full information about the firm's type, the information sharing is irrelevant and they always implement the first-best policy. Therefore, if the firm's cost is low enough to make the merger desirable, P^S will clear the merger. Similarly, if the cost is low enough to believe that there has been collusion, P^N will fine the firm.

5 No agreement

Under the no information-sharing regime the firm reports to each principal separately. The decision rule of each principal is the following. P^S will consider that a merger is desirable, and thus clear it, whenever the cost is below the threshold c_S . Similarly, P^N will believe that there has been collusion if c is below the threshold c_N and therefore impose the fine F on the firm.

Consider first the case where $c_L \leq c_S \leq c_N \leq c_H$ and denote by \underline{c} any $c \in [c_L, c_S]$ and by \bar{c} any $c \in [c_N, c_H]$ as in Figure 1.

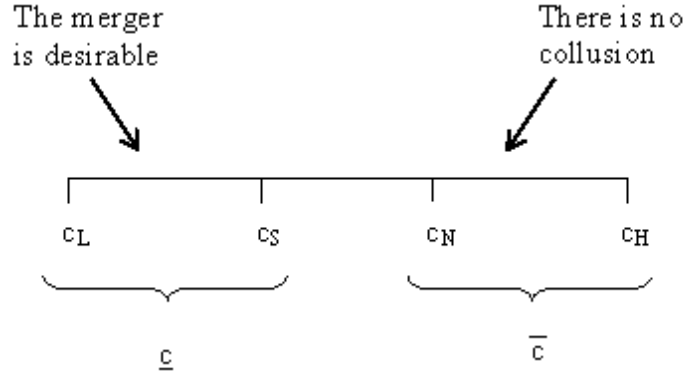


Figure 1:

Under this regime, whenever the firm's cost would belong to the interval $[c_L, c_S]$, the firm will report the true cost to P^S but will misrepresent its cost to P^N (i.e. the firm would say to P^N that its cost is \bar{c}). If the firm's costs are between c_N and c_H , the firm will report the true costs to P^N but will misrepresent its cost to P^S (i.e. the firm would say to P^S that its cost is \underline{c}). Finally, if the firm's cost ranges between c_S and c_N , the firm will misrepresent its cost to both P^N and P^S (i.e. the firm would say to P^N that its cost is \bar{c} and to P^S that its cost is \underline{c}).

Consider now the case where $c_L \leq c_N \leq c_S \leq c_H$. Then, the firm will report the true cost to P^S but will misrepresent its cost to P^N whenever the firm's cost belong to the interval $[c_L, c_N]$. Similarly, if the firm's cost are in between c_S and c_H , the firm will report the true cost to P^N but will misrepresent its cost to P^S . Finally, if the firm's cost range between c_N and c_S , the firm will report its true cost to both P^N and P^S .

Proposition 1 *If $c_S \leq c_N$, the firm whose cost are in $[c_L, c_S]$ reports the true cost to P^S but will misrepresent its cost to P^N , the firm whose cost are in $[c_S, c_N]$ misrepresent its cost to both principals, and the firm whose cost are in $[c_N, c_H]$ reports the true cost to P^N but will misrepresent its cost to P^S .*

If $c_N \leq c_S$, the firm whose cost are in $[c_L, c_N]$ reports the true cost to P^S but will misrepresent its cost to P^N , the firm whose cost are in $[c_N, c_S]$ reports the truth to both principals, and the firm whose cost are in $[c_S, c_H]$ reports the true cost to P^N but will misrepresent its cost to P^S .

6 Information-sharing agreement

Under the information-sharing agreement, the principals receive a single report from the firm and their decision rule is the same as under the no agreement regime, that is, the participation in this agreement does not imply a change in the national competition policy.

Consider the case where $c_S = c_N$. Any high cost firm, whose cost lie in the interval $[c_N, c_H]$, will report its true type whenever the profits from reporting \bar{c} will be higher than those of reporting \underline{c} , i.e.

$$\pi^N(\tilde{c}, \bar{c}) + \pi^S(\tilde{c}, \bar{c}) \geq \pi^N(\underline{c}, \bar{c}) - F + \pi^S(\underline{c}, \bar{c}). \quad (1)$$

Similarly, the incentive compatibility constraint for a low cost firm will be

$$\pi^N(\underline{c}, \underline{c}) - F + \pi^S(\underline{c}, \underline{c}) \geq \pi^N(\tilde{c}, \underline{c}) + \pi^S(\tilde{c}, \underline{c}). \quad (2)$$

Rearranging (1) and (2), F is bound from above and below

$$\begin{aligned} \pi^S(\underline{c}, \underline{c}) - \pi^S(\tilde{c}, \underline{c}) + \pi^N(\underline{c}, \underline{c}) - \pi^N(\tilde{c}, \underline{c}) &\geq F \\ &\geq \pi^S(\underline{c}, \bar{c}) - \pi^S(\tilde{c}, \bar{c}) + \pi^N(\underline{c}, \bar{c}) - \pi^N(\tilde{c}, \bar{c}). \end{aligned} \quad (3)$$

We say the fine is *optimal* if it satisfies (3) whenever possible. A sufficient condition for an optimal F to exist is

$$\pi^N(\tilde{c}, \bar{c}) - \pi^N(\underline{c}, \bar{c}) \geq \pi^N(\tilde{c}, \underline{c}) - \pi^N(\underline{c}, \underline{c}) \quad (4)$$

and

$$\pi^S(\tilde{c}, \bar{c}) - \pi^S(\underline{c}, \bar{c}) \geq \pi^S(\tilde{c}, \underline{c}) - \pi^S(\underline{c}, \underline{c}). \quad (5)$$

Note that (4) and (5) are definitions of the profit function being supermodular in its report and cost in the North and in the South, respectively. We obtain Proposition 2.

Proposition 2 *A sufficient condition for the information-sharing agreement together with an optimal coordination (i.e. F is set optimally) to induce truth-telling in both countries is that the profit function is supermodular in \tilde{c} and c in both countries. A necessary condition is that it is supermodular in at least one country.*

Therefore, even in the simplest model where the competition authority is forced to believe any report from the firm (i.e. there is no instrument available to neither the competition authority to verify the information nor to the firm to produce any

evidence of its costs), the coordination of authorities may induce truth-telling for some values of F .

Supermodularity is a sufficient condition to obtain truth-telling under the information sharing agreement. It is not necessary, however, as (4) and (5) are stronger than (3). It is easy to see how we can find situations where (5) is not satisfied but (3) still may hold for some parameter values (for instance, when the South market is not very important for the firm).

Now consider the case where $c_N \leq c_S$. In this case, the firm will always report the true cost whenever the firm's cost would belong to the interval $[c_N, c_S]$. If the firm's cost are in between c_L and c_N , the firm will report the true cost if

$$\pi^N(\underline{c}, \underline{c}) - F + \pi^S(\underline{c}, \underline{c}) \geq \pi^N(\bar{c}, \underline{c}) + \pi^S(\bar{c}, \underline{c}).$$

Finally, if the firm's cost are in between c_S and c_H , the firm will report the true cost if

$$\pi^N(\bar{c}, \bar{c}) + \pi^S(\bar{c}, \bar{c}) \geq \pi^N(\underline{c}, \bar{c}) - F + \pi^S(\underline{c}, \bar{c}).$$

Thus, for this case, Proposition 2 still holds.

Finally, consider the case where $c_S \leq c_N$. Proposition 2 will apply only to the firm which costs lie in the interval $[c_L, c_S]$ or $[c_N, c_H]$ but optimal information sharing will not achieve truth-telling in both countries at the same time for any firm with cost c in the interval $[c_S, c_N]$. When the costs belong to this interval, a firm reporting its true costs will face the merger blocked in the South and the fine imposed in the North. Any lie will do better. However, the information sharing regime will be strictly better than no-agreement regime as it allows to one of the two countries to implement the optimal policy. In particular, the firm will report \bar{c} if

$$\pi^N(\bar{c}, c) + \pi^S(\bar{c}, c) \geq \pi^N(\underline{c}, c) - F + \pi^S(\underline{c}, c)$$

and thus P^S will optimally block the merger. Similarly, the firm will report \underline{c} if

$$\pi^N(\underline{c}, c) - F + \pi^S(\underline{c}, c) \geq \pi^N(\bar{c}, c) + \pi^S(\bar{c}, c).$$

As a result, P^N will correctly fine the firm for collusion charges.

Therefore, as long as inequality (3) holds and regardless of how the rest of the national competition policies are related (i.e. the relation between c_S and c_N), the information-sharing regime is strictly more beneficial than the no-agreement regime.

When inequality (3) cannot hold, that is, the RHS is lower than the LHS, then this result is no longer true. See Section 8 for more detail.

7 Supermodularity of the profit function

In proposition 2 we argue that supermodularity of the profit function is a sufficient condition to induce truth-telling under the information sharing agreement, for an optimal F . Therefore, a natural question is: when is the profit function supermodular in the firm's cost and report?

From now on, we consider that there are just two types c_L and $c_H > c_L$. Denote γ the probability the firm has high costs c_H .

In this section we show that the profit function is supermodular in the North for a general demand function and for a fairly general cost function.

Proposition 3 *If the cost function is of the form $C(q, c) = cq(q)$, then the profit function is supermodular in the North for any demand function.*

Proof. For simplicity, we will omit all the superscripts that refer to the North. First, consider the case when the firm's type is c_L . The profit of reporting its true type is

$$\pi(\tilde{c}_L, c_L) = P(Q_L)q_L - c_L g(q_L) - F,$$

where Q_L is the total quantity and q_L is the firm's quantity produced in the equilibrium of the industry with the costs c_L . If the firm reports c_H , then the firm (and the industry) behaves as if they were of this type, obtaining an extra margin of $(c_H - c_L)g(q_H)$, and they do not face the fine. Hence, the firm's profit is

$$\pi(\tilde{c}_H, c_L) = P(Q_H)q_H - c_H g(q_H) + (c_H - c_L)g(q_H),$$

where Q_H is the total quantity and q_H is the quantity produced in the equilibrium of the industry with the costs c_H . Similarly, when the firm's type is c_H , its profit according to the different reports are

$$\pi(\tilde{c}_H, c_H) = P(Q_H)q_H - c_H g(q_H)$$

and

$$\pi(\tilde{c}_L, c_H) = P(Q_L)q_L - c_L g(q_L) + (c_L - c_H)g(q_L).$$

Therefore, the differences in profits holding the reports constant are

$$\pi(\tilde{c}_H, c_H) - \pi(\tilde{c}_H, c_L) = -(c_H - c_L)g(q_H) \tag{6}$$

and

$$\pi(\tilde{c}_L, c_H) - \pi(\tilde{c}_L, c_L) = -(c_H - c_L)g(q_L). \tag{7}$$

As $c_H > c_L$, $q_H < q_L$ and $g(q)$ is an increasing function. The LHS of (6) is higher than the LHS of (7), which gives us condition (4). ■

Thus, for a class of cost functions the necessary condition for the information-sharing agreement to induce truth-telling is satisfied. Unfortunately, we could not come up with a general result on when the profit function is supermodular in the South. However, it can be easily satisfied in particular examples. See Section 9 for one of them.

8 When is the information-sharing agreement beneficial?

Define

$$A = \pi^S(\tilde{c}_L, c_L) - \pi^S(\tilde{c}_H, c_L) + \pi^N(\tilde{c}_L, c_L) - \pi^N(\tilde{c}_H, c_L)$$

and

$$B = \pi^S(\tilde{c}_L, c_H) - \pi^S(\tilde{c}_H, c_H) + \pi^N(\tilde{c}_L, c_H) - \pi^N(\tilde{c}_H, c_H).$$

Note that A is positive. The incentive compatibility constraints of the two types (2) and (1) are

$$A \geq F \tag{8}$$

and

$$F \geq B. \tag{9}$$

A and B can be related in two possible ways: $A > B$ and $B \geq A$ (this last constraint would be true if, for instance, the profit function in the South is not supermodular and the market in the North is not very important for the multinational). We determine the optimal F , and what happens if the competition authority of the North does not set this policy variable at the appropriate level. We adopt a consumer surplus standard, that is, competition authorities care only about consumer surplus and not about the welfare (i.e., the sum of consumer surplus and firms profits). Not to include the firm's profits in the competition authority objective function is the most plausible assumption because of the international nature of the multinational. We say that the information-sharing agreement is *beneficial* if it results in a higher total consumer surplus than the one without the agreement. Denote CS_{NA}^i and CS_A^i , $i = N, S$, the consumer surplus under no information-sharing agreement and with agreement, respectively.

Proposition 4 *If $F < \min\{A, B\}$ there exists the threshold $\underline{\gamma}$ such that information-sharing agreement is beneficial if and only if the probability that the firm is inefficient is lower than this threshold, $\gamma < \underline{\gamma}$.*

If $A < F < B$ the information-sharing agreement is never beneficial.

If $B < F < A$ the information-sharing agreement is always beneficial.

If $F > \max\{A, B\}$ there exists the threshold $\bar{\gamma}$ such that information-sharing agreement is beneficial if and only if the probability that the firm is inefficient is higher than this threshold, $\gamma > \bar{\gamma}$.

Proof. If $F < \min\{A, B\}$ under information-sharing agreement both types report that they are efficient, that is, the efficient type report the truth and the inefficient type lies. Under no agreement both types say the truth in one market and lie in the other one. If the firm is efficient, $\gamma = 0$, $CS_A - CS_{NA} > 0$ while if it is inefficient, $\gamma = 1$, $CS_A - CS_{NA} < 0$. Noting that $CS_A - CS_{NA}$ is linear in γ completes the proof for this case.

If $A < F < B$ both types lie under the information-sharing agreement. It is always worse than no agreement.

If $B < F < A$ both types report the truth under the information-sharing agreement. It is always better than no agreement.

For $F > \max\{A, B\}$ the proof is analogous to the first case. ■

Therefore, in general, when the fine does not satisfy the inequality (3), the fact that the principals share the information imposes externalities on each other.

Note that the information sharing agreement between antitrust authorities limits the possibilities for the multinational to misrepresent its cost and that therefore, the multinational always prefers, in this particular setup, a no agreement regime.¹⁷

When $A > B$, the optimal F is the "middle range F" (i.e. $A \geq F \geq B$) as it will always induce the multinational to report its true type. Therefore, the information-sharing agreement would be beneficial for both competition authorities.

Conversely, when $B \geq A$ there is no F that achieves truth-telling by both types at the same time. The best outcome that can be obtained in this situation is that only one of the types reports the truth. The optimal F depends on how probable each of the types are, that is, on γ . In particular, if γ is low, it will be optimal to set F low (i.e., $F < \min\{A, B\}$). Such an F would violate the incentive compatibility constraint of c_H (1) but this would not be very costly as the probability of finding this type is low. Both types will report c_L , thus, a low range F will make P^S indifferent

¹⁷There are situations where the multinational may benefit from the existence of an information-sharing agreement between two competition authorities, for instance, in order to facilitate a timely merger approval.

between the agreement and the no agreement regime. However, the consumers in the North will benefit from the agreement if γ is low enough to make the loss in consumer surplus resulting from having the high cost firms to acting as if they were efficient as compared to the benefit of having c_L reporting its true type. If γ is high, it will be optimal to set F high (i.e., $F > \max\{A, B\}$). Such an F would violate the incentive compatibility constraint of c_L (2) but this would not be very costly as the probability of finding this type is low. Both types will report c_H , thus, a high range F will make P^N indifferent between the agreement and the no agreement regime. However, the consumers in the South will benefit from the agreement if γ is high enough to make the loss in consumer surplus resulting from the absence of the efficient merger as compared to the benefit of blocking the inefficient merger. This is summarized in next Proposition.

Proposition 5 *If $A > B$ the optimal $F \in (A, B)$. If $B > A$ there exists a threshold $\hat{\gamma}$ such that the optimal $F < A$ if $\gamma < \hat{\gamma}$ and the optimal $F > B$ if $\gamma > \hat{\gamma}$.*

9 An example: Cournot duopoly with linear demand

In this section we compare the no-agreement regime with the information-sharing agreement outcome for a particular application. In both markets the multinational competes à la Cournot with another firm. The duopoly faces a linear demand of the form: $p^i(Q) = a^i - b^i Q$ for $i = S, N$, where Q is the total quantity sold in the market. The firm has constant marginal costs c_H or c_L .

As in the general model of Section 3, in the North if the firm has low cost, the competitor has low cost as well and they both collude to set quantities as if they had high costs. If the firm has high cost, then the competitor has also high cost and they both choose quantities according to this cost. In the South, the competitor always has high cost. If the merger is allowed, then the industry will end up being a monopoly. The merger involves the reallocation of output across the two firms so that:

$$c_{merged}(Q) = \min_{q_H, q_i} (c_H q_H + c_i q_i)$$

subject to $q_H + q_i = Q$ and where $i = H, L$. Moreover, the merger creates a synergy¹⁸ of ϵ to the merged firm regardless of the cost of the multinational. Therefore, if the

¹⁸It is necessary to assume the existence of a synergy in order for the merger to increase consumer surplus. See Farrel and Shapiro (1990).

multinational have a marginal cost of c_H , the marginal cost of the merged firm will be $c_H - \epsilon$ and if the multinational have a marginal cost of c_L , the marginal cost of the merged firm will be $c_L - \epsilon$.

In order to avoid the low cost multinational being indifferent between merging or not merging in the South, we will assume that the high cost competitor of the no-merger situation produces a positive quantity.

Assumption 1 $c_H < \frac{a^S + c_L}{2}$.

We will assume as well that the merger increases consumer surplus (and thus is efficient) only when the multinational's cost is c_L .

Assumption 2 $\frac{a^S + c_L - 2c_H}{3} < \epsilon < \min\{\frac{a^S - c_H}{3}, c_L\}$.

It can be checked that given the Assumption (1), the synergy ϵ will never be negative.

Under the no-agreement regime the high cost firm reports its true cost to P^N but reports c_L to P^S . Similarly, the low cost firm reports its true cost to P^S but reports c_H to P^N .

Under the information-sharing regime, the truth-telling constraint for high cost firm (10) becomes

$$\underbrace{\frac{(a^S - c_H)^2}{9b^S}}_{\pi^S(\tilde{c}_H, c_H)} + \underbrace{\frac{(a^N - c_H)^2}{9b^N}}_{\pi^N(\tilde{c}_H, c_H)} \geq \underbrace{\frac{(a^S - c_H + \epsilon)^2}{4b^S}}_{\pi^S(\tilde{c}_L, c_H)} + \underbrace{\frac{(a^N - c_L)^2}{9b^N} - (c_H - c_L)\frac{a^N - c_L}{3b^N}}_{\pi^N(\tilde{c}_L, c_H)} - F. \quad (10)$$

When the firm is low cost, (11) is

$$\underbrace{\frac{(a^S - c_L + \epsilon)^2}{4b^S}}_{\pi^S(\tilde{c}_L, c_L)} + \underbrace{\frac{(a^N - c_L)^2}{9b^N}}_{\pi^N(\tilde{c}_L, c_L)} - F \geq \underbrace{\frac{(a^S - 2c_L + c_H)^2}{9b^S}}_{\pi^S(\tilde{c}_H, c_L)} + \underbrace{\frac{(a^N - c_H)^2}{9b^N} + (c_H - c_L)\frac{a^N - c_H}{3b^N}}_{\pi^N(\tilde{c}_H, c_L)}. \quad (11)$$

Rearranging (10) and (11), F is bound from above and below

$$\begin{aligned} & \frac{(a^S - c_L + \epsilon)^2}{4b^S} - \frac{(a^S - 2c_L + c_H)^2}{9b^S} + \frac{(a^N - c_L)^2}{9b^N} - \left(\frac{(a^N - c_H)^2}{9b^N} + (c_H - c_L) \frac{a^N - c_H}{3b^N} \right) \geq F \\ & \geq \frac{(a^S - c_H + \epsilon)^2}{4b^S} - \frac{(a^S - c_H)^2}{9b^S} + \frac{(a^N - c_L)^2}{9b^N} - (c_H - c_L) \frac{a^N - c_L}{3b^N} - \frac{(a^N - c_H)^2}{9b^N}. \end{aligned} \quad (12)$$

We say the fine is *optimal* if it satisfies (12) whenever possible. Following Proposition 2, a sufficient condition for such an optimal F to exist is the supermodularity of the profit function in both markets.

By Proposition 3, setting $g(q) = q$, the profit function is supermodular in the North. In the South, the profit function is supermodular if the following condition holds:

$$2a^S + 18\epsilon \geq 9c_H - 7c_L \quad (13)$$

For instance, if we assume that c_H equals its maximum possible value $\frac{a^S + c_L}{2}$, it can be shown that it is always supermodular when we take the maximum possible value for the synergy (i.e. $\epsilon = \frac{a^S - c_H}{3}$) and similarly, it is never supermodular when we take the minimum possible value for the synergy (i.e. $\epsilon = \frac{a^S + c_L - 2c_H}{3}$).

10 Conclusion

The objective of this paper has been to analyse the consequences of the introduction of an information system that obliges each national competition authority to give information (confidential and non-confidential) about the firms it has prosecuted or analysed when requested by another competition authority.

We have showed that consumers of both countries gain from the agreement whenever the profit function of the multinational is supermodular in its cost and report in both markets and the fine in the North is set optimally. An important finding is that the information sharing can be bad unless it is combined by a change in the policy, for example, in changing the fine in the North. This may provide a hint why in some cases the information-sharing agreement exists and works (for instance, in the European Union where the supranational European Commission has powers on the national competition policy variables) while in others it does not (for example, in the majority of trade agreements where there is not even an agency-to-agency agreement). These results shed new light on the view that cooperation agreements between competition authorities may not be worthwhile or may benefit only a particular type of countries. We find that in some cases it benefits both participating countries without any need to change further policy variables. However, if it is combined with an appropriate change in the antitrust policy it is much more likely to be beneficial.

While the countries may gain from the agreement, the multinational firm always prefers a no agreement regime as this limits its possibility to misrepresent its type.

One limitation of the model is the fact that neither the competition authority in the South, nor the one in the North can take any action to extract the truth in the no agreement regime. Similarly, there is nothing that the multinational can do to provide hard evidence of its type. Therefore, one possible direction of future work would be to enrich the model by introducing such instruments. For instance, we can enable the competition agencies to perform random audits (similar to the ones used in the income tax literature) that would verify the report offered by the firm at the social cost of the enforcement expenditures. Another possibility would be to allow the multinational to invest wastefully in hard evidence production of its type (for example, by employing consultants). This investment would create hard evidence with some probability that would depend on the amount invested.

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