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Competitors In Merger Control: Shall They Be Merely Heard Or Also Listened To?[1]

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Abstract

There are legal grounds to hear competitors in merger control proceedings, and competitor involvement has gained significance. To what extent this is economically sensible is our question. The competition authority applies some welfare standard while the competitor cares about its own profit. In general, but not always, this implies a conflict of interest. We formally model this setting with cheap talk signaling games, where hearing the competitor might convey valuable information to the authority, but also serve the competitor's own interests. We find that the authority will mostly have to ignore the competitor but, depending on the authority's own prior information, strictly following the competitor's selfish recommendation will improve the authority's decision. Complementary to our analysis, we provide empirical data of competitor involvement in EU merger cases and give an overview of the legal discussion in the EU and US.

Keywords: merger control, antitrust, European Commission, signaling, efficiency, competitors, rivals
JEL classification: G34, K21, L4, C73, L2.

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1. Introduction

Both in the European Union (EU) and the U.S., competitors have gained significance in merger control proceedings. EU merger law presently entitles competitors to submit their views on the notified merger in writing and in a formal hearing before the European Commission (Commission) makes a final decision. Additionally, competitors have been increasingly involved in the Commission's fact-finding and market investigation process. In the U.S., competitors' claims were traditionally treated restrictively but both the Department of Justice and the Federal Trade Commission have recently started to widen the extent of competitor participation in merger proceedings by conducting an 'open door' policy.

These recent procedural developments in merger control have motivated us to explore potential policy deficiencies which might arise out of a conflict between legal due process and economic efficiency aspects: while, on the one hand, we have regulatory, procedural and practical reasons to take into account the competitors' opinions such as their legal right to be heard or the authority's past heavy reliance on third-party input resulting from its information deficit due to limited resources; on the other hand, from an efficiency standpoint, there is reason to believe that a certain degree of temptation exists on the part of the competitors to manipulate the authority so as to achieve a decision maximizing their own profits rather than total welfare.

Our goal in this paper is twofold. First, we document the growing significance and the legal discussion of competitor involvement in merger proceedings in the EU and the U.S. This is complemented by empirical data of EU merger cases. Second, we introduce and analyze two tractable game-theoretical models for the strategic interaction between competitors and the competition authority.

We employ cheap talk signaling games in which the competitor communicates with the authority. This communication is costless and non-binding and its content is not verifiable. It has no direct consequences but, depending on how it affects the authority's beliefs about the merger implications, it might reveal valuable information or it might be used to deceive the authority. The authority decides to either clear or block the merger based on its own information and the competitor's message. This includes the option to ignore the competitor's communication.

Our two signaling models differ by the richness of the signaling language: In the first case the language is rich enough to communicate the full welfare and profit implications of clearing the notified merger. In the second, the language is just rich enough to recommend to either block or clear the merger.

We determine all perfect Bayesian pure- and mixed-strategy equilibria of the two signaling institutions. These turn out to be not substantially different between the two games. They can be partitioned into equilibria where the authority ignores the competitor's message and takes a decision based on its own information only, and equilibria where it implements the competitor's preferred decision. In the latter case, the authority's decision is always superior, by the welfare standard applied, as compared to a decision under ignorance of the competitor's message. The situations in which the authority should 'listen' rather than 'hear' are characterized by a sufficient expected alignment of interest. They can easily be identified from the authority's own information.

Relevant legal and economic literature is mentioned throughout the paper. Section 2 discusses the legal background and the procedural aspects of hearing competitors' views; Section 3 describes the model and the games; Sections 4 and 5 present the pure- and mixed-strategy equilibria of the first signaling game, respectively. Section 6 contains the results for the second signaling game. Section 7 provides a discussion of the results as well as our policy recommendation. Section 8 concludes. The appendix contains contain all lemmas and proofs, and empirical data on EU merger cases.

2. Competitor Involvement in Merger Control

2.1. European Union

Competitor involvement in EU merger control is explicitly set forth in the European merger law provisions: Within 7–10 days after receiving a merger notification the Commission sends out Article 11[2] letters to the filing parties and 'interested third parties'. The law defines the latter usually as being competitors, suppliers and customers.[3] The so-called Article 11 letters' main purpose is to gather information on the market in Phase 1. The Best Practice Guidelines further set forth that the Commission may consult third parties on methodological issues regarding data and information

[2]Merger Regulation 139/2004.

[3]Art. 11(c) of the Regulation 802/2004 (Implementing Regulation) implementing the Merger Regulation 139/2004, i.e., setting forth details on notifications, time limits, and hearings.

gathering in the relevant economic sector.[4] Third parties showing sufficient interest may request in Phase 1 to be heard orally.

In Phase 2, the Commission sends to the involved third parties a non-confidential version of the Statement of Objections[5] after which the third parties have the right to express their view in writing or orally in a formal hearing.[6]

Finally, the Commission states in its Best Practice Guidelines that it welcomes any individual submission apart from direct replies from questionnaires where third parties provide ‘information and comments’ considered relevant for the merger assessment. It may also invite those parties for meetings to discuss or clarify such issues further.[7]

The prevailing view among scholars and practitioners is that in most cases, the Commission will lack the internal market expertise upon receiving a notification, thereby granting a ‘considerable scope’ of comment to and relying heavily on the information provided by the third parties.[8] Hearing Officers Durande and Williams of the Cabinet of the Commissioner agree that although the right for a formal hearing may in principle be denied by the Commission, the rights of the ‘other involved third parties’ which includes competitors must be considered as being much closer to those of a defendant in terms of procedural guarantees.[9]

2.2. U.S.

The U.S. have been traditionally more reserved in granting rights to competitors in merger proceedings. The responsible authorities, the U.S. Department of Justice (DoJ) and the Federal Trade Commission (FTC), took the view that competitors were more likely to complain about mergers which would render the market more competitive post merger.[10] To competitors who tried to challenge a merger by way of an injunction[11] or sue for dam-

[4] Best Practices on the conduct of EC merger control proceedings 2004, para 28.

[5] Art. 16(1) Implementing Regulation.

[6] Art. 16 and 18 Implementing Regulation.

[7] para. 35.

[8] Van Bael & Bellis (2005, p. 861); Cleary Gottlieb Steen & Hamilton (2004, p. 4).

[9] as compared to rights of a complainant in antitrust matters. See Durande and Williams (2005, p. 22).

[10] Diesenhaus (1987, p. 2059); Van Arsdall and Piehl (2014).

[11] Sec. 16 Clayton Act, 15 U.S.C. § 26.

ages, the Supreme Court usually denied standing to the competitors.[12]

However, while the DoJ and FTC were once resistant to hear competitors in pending merger proceedings, the practice has markedly changed in recent years. The most prominent case was AT&T Inc.'s contemplated acquisition of T-Mobile USA, Inc. in 2011.[13] Competitors Sprint Nextel and Cellular South opposed the merger and the agencies supported their efforts in gaining access to the documents relating to the merger.[14] After their strong objections which were also supported by the U.S. and several states, AT&T ultimately abandoned its efforts to acquire T-Mobile USA.

Given the recent shift in the agencies' stance towards competitors, practitioners in the U.S. have become conscious about the 'right strategy' competitors could take in merger proceedings, stating that the bigger role in merger review 'necessitates an additional layer of planning and strategy'.[15]

2.3. Legal and Strategic Considerations in Competitor Involvement

Apart from information-gathering purposes, the involvement of competitors as set forth by EU laws is partly motivated by the legal principle of granting anyone the right to be heard before an individual measure which would affect such person adversely is taken[16] and partly by due process considerations. Legislators and legal scholars might have taken the view upon drafting the rules that the competitors would always report truthfully to the deciding agency. A competitor raising serious doubts about a merger would thus be a reason to view the merger more critically.

While the competitors' right to be heard can be seen as a *softer version* of the usual rights of defense,[17] practice shows that their participation is crucial if not essential in merger proceedings, as their involvement in Phase 2 proceedings shows:

[12] Cargill v. Monfort of Colorado, Inc., 107 S.Ct. 484 (1986).

[13] AT&T Inc., Description of Transaction, Public Interest Showing and Related Demonstrations, WT Docket No. 11-65 at 1, FCC filed April 21, 2011.

[14] See detailed case discussion in Hundt (2011); Stucke and Grunes (2012, p. 196).

[15] Van Arsdall and Piehl (2014, p. 2).

[16] Art. 41 Charter of Fundamental Rights of the European Union.

[17] Durande and Williams (2005, p. 23).

We have looked into all Phase 2 proceedings between 1990 and 2013 and identified those cases where competitors were given the opportunity to voice their opinions.[18] As can be seen in Figure 1 which plots the ratio between competitor participation and Phase 2 cases, competitor involvement has radically increased since the reform and the ratio has stayed continuously at 1. One can assume presently that all Phase 2 proceedings will entail the involvement of competitors, whereas in the past that was not necessarily the case.

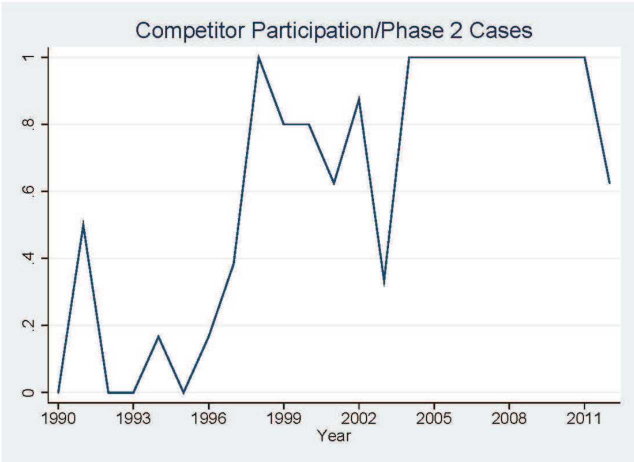

Figure 1: Competitor participation as a share of Phase 2 cases, EU, 1990–2013

We have further plotted the ratio of competitor objections to only those Phase 2 cases where competitors have been involved for the years from 1997 until 2013, see Figure 2. In other words, only those instances were captured where competitors had a negative opinion on the merger proposed. As can be seen, competitors have been increasingly voicing concerns in the past years. Could it be because competitors have realized the strategic potential in merger proceedings or because more competition-enhancing mergers have been notified in the past years which did not find the competitors' approval? In any case, scholars and practitioners now agree that competitors' opinions in merger proceedings shall be viewed with skepticism (see, e.g., Motta, 2004, p. 240). The Commission has recently proceeded to add in its decisions a footnote saying that information furnished by third parties will not

[18] See Appendix B for additional empirical data.

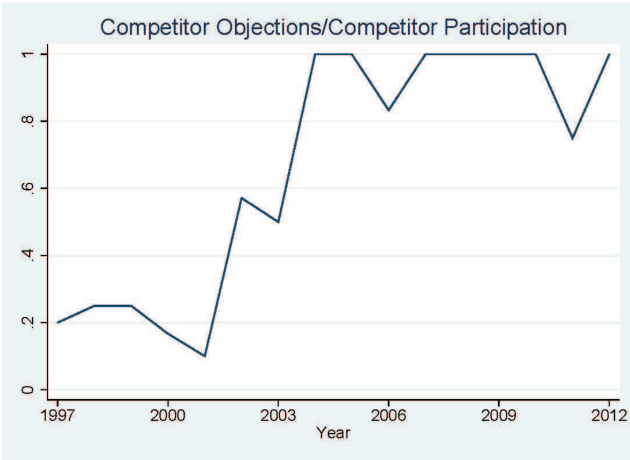

Figure 2: Competitor objections as a share of Phase 2 cases with competitor involvement, EU, 1997–2013

be taken at face value since 'the opinion provided might be biased to influence [its] decision-making process.' The footnote further states that the Commission will thus analyze competitors' opinions very carefully as they 'might have an interest in making the transaction of their competitors [...] more difficult[...]'.[19]

The FTC stated already 25 years ago in an amicus brief that competitors 'stand to benefit from, and have no incentive to challenge, acquisitions that may lead to supracompetitive pricing. [They] have a substantial incentive to challenge acquisitions that will make their rivals more efficient, make their industry more competitive, and reduce the prices they can charge their customers. [...] [Competitors must be] prevented from using the antitrust laws for anticompetitive purposes.'[20]

At the same time, the authorities are by definition market outsiders and must to some extent rely on the information provided by market insiders. They further face time and cost constraints which make it even more difficult to assess the state of a market or to anticipate the implication of a

[19]See for example the decision in Ryanair/Aer Lingus III, M.6663, Feb. 27, 2013, para 28, footnote 18.

[20]Brief for the United States and the Federal Trade Commission as Amici Curiae, Cargill v. Monfort.

proposed merger on the market. Once competitors are playing a role in the market assessment, however, there is a potential risk for strategic abuse of the legal possibility to express their opinions by sending distorted signals to the authorities in order to promote their own interests (Motta, 2004, p. 240).

It has long been recognized that mergers generally exhibit a tradeoff between market power effects that tend to reduce welfare, and synergy effects that might increase welfare. For the competitors, the market power effect is supposed to be profit-increasing, as they can free-ride on the merging firms' output reduction, while synergy effects tend to reduce prices and therefore hurt the competitors' profits (see, e.g., Stigler, 1950, Williamson, 1968, Perry and Porter, 1985).
For a given notified merger, it is difficult to say to what extent the competitors' and the authority's interests are aligned because both, the market power effect and some synergy effects, can be expected to be present in most mergers (Duso et al., 2011, p. 985).
Moreover, there is a large theoretical and empirical literature on mergers reporting very diverse effects with respect to welfare as well as insider and outsider profits depending on which aspects are relevant for a given merger. Examples of such aspects are collusion (Miller and Weinberg, 2014), quantity vs. price competition (Salant et al., 1983, Deneckere and Davidson, 1985), synergies (Banerjee and Eckard, 1998, Farrell and Shapiro, 2001), integration cost (Huck et al., 2004), internal capital-allocation (Mialon, 2008), strategic market power (Huck et al., 2001), internal conflict (Banal-Estañol et al., 2008), managerial incentives (Faulí-Oller and Motta, 1996, Kräkel and Müller, 2014), managerial synergies (Matsusaka, 1993), entry and exit (Davidson and Mukherjee, 2007), managerial hubris (Roll, 1986), technology (Lahiri and Ono, 1988), firm-internal competition (Creane and Davidson, 2004), multi-market presence (Werden et al., 1991), learning (Vermeulen and Barkema, 2001), union organization (Lommerud et al., 2001) or uncertainty (Amir et al., 2009). See Datta et al. (1992) for a meta-analysis.
Neven and Röller (2002) recall that, based on standard oligopoly models, just by varying the degree of cost efficiencies we can get very diverse merger implications with respect to outsider profits, consumer surplus and total welfare. Banerjee and Eckard (1998) and Clougherty and Duso (2009) present empirical evidence for both a post-merger increase as well as a decrease of outsider profits. Mergers might be unprofitable for both insiders and outsiders. This might happen in declining industries, when preemption

is the motivation for mergers (Fridolfsson and Stennek, 2005). Heubeck et al. (2006, p. 38) demonstrate how a merger can be desirable for both the competitor and the authority: Suppose the more efficient firm in a market is an outside firm and the merging firms do not realize any cost efficiencies. Then average marginal costs in the market might fall because the less efficient merged firm produces less than before, whereas the more efficient outsider will produce a larger share of the smaller total output. In spite of rising prices, total welfare might then rise.

3. Model

In this section, we start with discussing the modeling of merger types. Then we motivate the use of signaling games before formally introducing them.

3.1. Merger Types

The starting point of our model is the fact that *clearing* a proposed merger has implications for the competitor's profits (Π) and for welfare (W), as measured by the welfare standard applied. We shall neglect the impact on the merging firms' profits because merging firms will not strategically interact with competitors or the authority in our games.[21][22]

We assume that the authorities posit a welfare standard for their merger decisions and that competitor firms operate as profit-maximizers. For our analysis, it does not matter whether the authority, say, applies a total or a consumer welfare standard.

Denote by Π and W the *change* in the competitor's profit, resp. welfare, due to *clearing* a given merger, while blocking the merger preserves the status quo which is associated with 'no change'. Ignoring the possibility that a merger has no implications whatsoever, the authority's decision to clear a merger will either imply a welfare increase ($W > 0$) or decrease ($W < 0$),

[21]We do not include the merging firms as strategic players in the model as we study the institution of 'hearing the competitor' and we assume that insiders, by notifying the merger, have expressed a clear interest in getting the merger cleared. In this sense, any signals they might send to the authority will be unequivocally directed towards a clearing decision.

[22]Most of the merger literature focusses on the merging firms' profits and neglects the competitor. Event studies emphasize the different implications for the acquirer and the target. There are some exceptions, see, e.g. the taxonomy of mergers, proposed by Clougherty and Duso (2011, p.314). They distinguish between four merger types, depending on the merging firms' as well as the competitors' post merger profits.

as compared to the status quo, while the competitor's profit will either increase ($\Pi > 0$) or decrease ($\Pi < 0$). Combining the above, we can assign each merger to one of four types. Obviously, this covers all *conceivable* merger types regardless of their practical relevance.

This case distinction allows us to separate the merger types where the authority's and the competitor's interests are aligned (both welfare and profit change in the same direction, up or down) from those that involve a conflict of interest, while observing the direction of the individual changes in each case. In our model, each of the four merger types has a prior probability derived from the authority's own information on the given notified merger. The practical relevance of a given merger type is immaterial for our formal analysis, as we solve our games for *all* distributions of prior probabilities that the authority might attach to the merger at hand. Moreover, it is irrelevant what the reasons for the welfare and profit changes are (see the discussion in the subsection 2.3).

For simplicity, we represent each merger type by a combination of $\Pi, W \in \{-1, 1\}$, modeling the *direction* in which a clearance decision would alter welfare and the competitor's profit. This is, naturally, a very simplifying assumption. However, it allows us to keep the analysis straightforward and get clear results while still tackling the relevant strategic issues and preserving the basic interplay between conflict of interest and interest alignment. Apart from that, it might already be a challenging task in practice to place a given merger correctly within our four-type model. From a policy perspective, it might also not be practicable to analyze a more general model where Π and W are distributed on a finer grid, as this would require the authority to attach probabilities to each of the many types.

3.2. Signaling Game

We set out to capture the characteristic interaction between the competitor(s) and the competition authority, taking into account the information available to each side and each party's interests. We want to study the economic implications of an existing (legal) institution, rather than design an (optimal) institution.[23]

[23] Lagerlöf and Heidhues (2005) study the interaction between the authority and merger insiders. They derive optimal merger control institutions in order to induce merger insiders to invest into the production of hard evidence about efficiency gains. Milgrom and Roberts (1986) discuss on a general level the problem of a decision maker who has to rely on the information of (and competition between) better-informed parties. Any information revealed is assumed to be verifiable.

Our games start after a merger has been notified.[24] Therefore, the profit and welfare implications of clearing this particular merger are given. The competitor, as a market insider, is assumed to know the merger type. The authority does not know the merger type, but it independently gathers information and tries to predict the consequences of the notified merger before making a decision.[25] In the model, this information is represented by the distribution of prior probabilities of merger types. We further assume that the competitor, before making its statement, has an idea of the authority's prior information, through press releases, communication with the authority and, especially in the EU, the *Statement of Objections*. Therefore, we treat the authority's prior information as common knowledge.

Combining its prior information with the information inferred from the competitor's statement, the authority either prohibits (blocks) or clears the notified merger. For simplicity, we leave out the option of a clearance decision with remedies.[26]

We have found cheap talk signaling games to be the most appealing approach to capture the procedural and informational features of merger review.[27] The information submitted by the competitor is itself costless and has no direct consequences. It can only indirectly affect payoffs if it succeeds in altering the authority's perception (i.e., beliefs) of the situation sufficiently to affect the decision. In particular, the competitor can neither commit to tell the truth nor can lying be detected or has any cost. The difficulty for the authority in responding to the competitor's communication

[24]This might be any type of merger. The set of notified mergers can be seen as endogenous to the merger policy, see, e.g., Sørgard (2009) or Nocke and Whinston (2010).

[25]In practice, also the competitor faces some uncertainty about merger implications. Therefore, we can understand the payoffs in our games as (discounted) expected values. See, e.g., Cunha et al. (2014) for an explicit treatment of uncertain efficiency gains.

[26]Vasconcelos (2010) provides a theoretical treatment of remedies in an oligopoly model. We also leave out potential litigation following a decision. Gürtler and Kräkel (2009a) analyze litigation incentives depending on the type of takeover. Litigation cost are a separate source of inefficiencies which are typically neglected in the welfare analysis of takeovers, see Gürtler and Kräkel (2009b).

[27]The basic distinction in signaling games is between costly signals that directly affect payoffs (as, e.g., in the famous job market signaling of Spence, 1973) and signaling where the signal itself is 'cheap', i.e., costless, but might affect beliefs and, therefore, indirectly, payoffs (e.g., Farrell and Rabin, 1996, Krishna and Morgan, 2008). Signaling games have been successfully applied to many contexts, see, e.g., Riley (2001) and Connelly et al. (2011). Crawford (1998) surveys experimental evidence on the working of cheap talk communication.

therefore lies in the fact that it is not verifiable. Therefore, the authority must try to gauge the informational content of the competitor's statement, taking into account its own information and the fact that the competitor's interest need not, but can, coincide with the authority's.

We now formally set up a signaling game, i.e., a sequential game with players S (also referred to as sender or competitor) and R (also referred to as receiver or authority), and a non-strategic player *nature*. The timing, actions and information in this game are as follows:

1. Nature draws the merger type $t_i \in T = \{t_1, t_2, t_3, t_4\}$ with corresponding prior probabilities $p_i := \Pr\{t_i\} > 0$ where $\sum_{t_i \in T} p_i = 1$.[28]
2. S observes t_i and chooses a message $m_j \in M = \{m_A, m_B, m_C, m_D\}$. We refer to S's actions synonymously as reports or recommendations. The message set contains as many elements as there are merger types. Therefore, in principle (though not necessarily in equilibrium), the merger type can perfectly be communicated.
3. R observes m_j but does not observe t_i, and chooses a decision $d_k \in D = \{d_P, d_C\}$, i.e. the decision either prohibits or clears the merger.
4. Payoffs $U^R(t_i, d_k)$ and $U^S(t_i, d_k)$ are realized, where

$$U^R(t_i, d_k) = \begin{cases} W_i & \text{if } d_k = d_C \\ 0 & \text{if } d_k = d_P \end{cases}, \quad U^S(t_i, d_k) = \begin{cases} \Pi_i & \text{if } d_k = d_C \\ 0 & \text{if } d_k = d_P \end{cases}, \tag{1}$$
$$t_i \in T, \ (W_1, W_2, W_3, W_4) = (-1, 1, 1, -1),$$
$$(\Pi_1, \Pi_2, \Pi_3, \Pi_4) = (1, 1, -1, -1).$$

Hence, there is a conflict of interest for types 1 and 3, whereas for types 2 and 4 both the competitor and the authority prefer the same decision (clearance for type 2 and blocking for type 4).

In order to simplify the presentation of mixed-strategy equilibria, we exclude certain non-generic constellations of the four prior probabilities of merger types. This rules out that indifference between actions is caused by the configuration of the priors rather than strategic decisions. Moreover, these assumptions imply a unique default decision (see next subsection).

[28] We assume strictly positive prior probabilities for each type in order to simplify the analysis. This is not a restrictive assumption as these probabilities can be arbitrarily small.

In words, we assume that no two prior probabilities are equal, nor are there sums of two (resp. three) prior probabilities that are equal to the sum of the other two prior probabilities (resp. the remaining prior probability). These assumptions are not restrictive. Prior probabilities can be arbitrarily close to the excluded values. Formally,

Assumption 1. *For any pair of merger types t_i and t_j, we assume that $p_i \neq p_j$, $p_i \neq 1/2$ and $p_i + p_j \neq 1/2$.*

3.3. Default Decision

We define d^{default} as the authority's optimal decision under complete ignorance of S's reports, for a given prior probability distribution of merger types. Absent any signals by S, it is optimal for R to implement the decision that implies a higher expected welfare, based on R's priors. In particular, the notified merger should be cleared (d_C) if the merger is more likely to be welfare-improving rather than welfare-decreasing, i.e., $p_2 + p_3 > p_1 + p_4$, and prohibited (d_P) otherwise.

Therefore, the default decision is

$$d^{\text{default}} = \begin{cases} d_C & \text{if } p_2 + p_3 > p_1 + p_4, \\ d_P & \text{otherwise.} \end{cases} \tag{2}$$

The corresponding expected welfare (change) is

$$\begin{aligned} E[W|d^{\text{default}}] &= \begin{cases} \sum_{t_i \in T} p_i W_i & \text{if } d^{\text{default}} = d_C, \\ 0 & \text{otherwise,} \end{cases} \\ &= \begin{cases} -p_1 + p_2 + p_3 - p_4 > 0 & \text{if } p_2 + p_3 > p_1 + p_4, \\ 0 & \text{otherwise.} \end{cases} \end{aligned} \tag{3}$$

4. Pure-Strategy Equilibria

A pure strategy of S is a function $m(t_i)$, $t_i \in T$, a pure strategy of R is a function $d(m_j)$, $m_j \in M$. Conditional on observing message $m_j \in M$, R's belief about the merger type is denoted by the probability distribution $\mu_i^j := \Pr\{t_i|m_j\} \geq 0$, $t_i \in T$. Denote by $T_x \subset T$ the set of merger types for which S sends the message $m_x \in M$ in any given equilibrium (candidate). Thus, T_A, T_B, T_C and T_D together are a partitioning of the type set.

Our equilibrium concept is pure-strategy perfect Bayesian equilibrium. Therefore, in addition to the above belief system, we require that R's decision $d_k \in D$ is payoff-maximizing, i.e, the optimal decision $d^*(m_j)$ conditional on observing message m_j satisfies

$$d^*(m_j) \in \arg\max_{d_k \in D} \sum_{t_i \in T} \mu_i^j U^R(t_i, d_k). \tag{4}$$

Similarly, S's message $m_j \in M$ must be optimal, given the observed type t_i and $R's$ optimal choice $d^*(m_j)$, i.e., the optimal message $m^*(t_i)$ satisfies

$$m^*(t_i) \in \arg\max_{m_j \in M} U^S(t_i, d^*(m_j)). \tag{5}$$

Finally, for each message $m_j \in M$ that is played by S on the equilibrium path, R's beliefs on the information set corresponding to m_j must follow from Bayes' rule and S's strategy. Formally, for each message $m_j \in M$ for which there is a type $t_i \in T$ with $m^*(t_i) = m_j$ (or, equivalently, $T_j \neq \emptyset$),

$$\mu_i^j = \frac{p_i}{\sum_{t_s \in T_j} p_s}. \tag{6}$$

An equilibrium is denoted by the players' complete strategies and R's consistent belief system.

$$\Big\{\{m^*(t_i)\ \forall t_i \in T\}, \{d^*(m_j)\ \forall m_j \in M\}, \{\mu_i^j\ \forall t_i \in T, m_j \in M\}\Big\} \tag{7}$$

We constructively derive *all* pure-strategy equilibria. Equilibrium candidates can be distinguished by S's strategy (m_i, m_j, m_k, m_l), where the first entry is the message sent if the merger type is t_1, the second for merger type t_2 etc. and $m_i, m_j, m_k, m_l \in M$.

The analysis of equilibria can be simplified substantially as follows.[29] The informational content of each pure strategy of S corresponds to a partitioning of the type set. For instance, the pure strategy (m_A, m_B, m_A, m_A) partitions the type set into $T_A \in \{t_1, t_3, t_4\}$ and $T_B = \{t_2\}$. In words, the merger type 2 is fully revealed in this candidate whereas the other three types are *bunched* together by sending the same message for all of them. As a consequence, the pure strategy (m_A, m_B, m_A, m_A) has the same

[29] As there are four messages available for each merger type, we have $4^4 = 256$ pure-strategy equilibrium candidates.

informational content as (m_D, m_B, m_D, m_D) and will implement the same equilibrium decision.[30]

By the above, the pure-strategy equilibrium candidates can conveniently be distinguished by their informational content, i.e., the form of the partitioning of the type set T they induce. This results in five classes of equilibrium candidates which we formally analyze in Lemmas 1 to 5 in the appendix.

Using m_w, m_x, m_y, $m_z \in M$ (resp. $t_i, t_j, t_k, t_l \in T$) to denote arbitrary and different messages (resp. merger types) these classes of equilibrium candidates are

(A) Exactly one message is played on the equilibrium path, i.e., S's strategies have the form $T_x = T$, $T_w = T_y = T_z = \emptyset$. (Lemma 1)

(B) Exactly two messages are played on the equilibrium path, whereby one of the messages is sent for three types, i.e., S's strategies are described by $T_x = \{t_i, t_j, t_k\}$, $T_y = \{t_l\}$ and $T_w = T_z = \emptyset$. (Lemma 2)

(C) Exactly two messages are played on the equilibrium path, whereby each message is sent for two types, respectively. These strategies have the form $T_x = \{t_i, t_j\}$, $T_y = \{t_k, t_l\}$ and $T_w = T_z = \emptyset$. (Lemma 3)

(D) Exactly three messages are played on the equilibrium path. These strategies have the form $T_x = \{t_i, t_j\}$, $T_y = \{t_k\}$, $T_z = \{t_l\}$ and $T_w = \emptyset$. (Lemma 4)

(E) Exactly four messages are played on the equilibrium path. These strategies have the form $T_w = \{t_i\}$, $T_x = \{t_j\}$, $T_y = \{t_k\}$ and $T_z = \{t_l\}$. (Lemma 5)

Applying this classification, we describe and explain our findings in the following, while the Appendix contains the lemmas and proofs. These proofs constructively derive all equilibria in pure strategies.

(A) There are uninformative equilibria (Lemma 1) in which S always sends the same message, not revealing any information, and therefore R optimally implements the default decision. This equilibrium is supported by R's beliefs such that after any (other) message the default is the

[30]In the signaling literature, this is referred to as *inessential* multiplicity of signaling languages, see, e.g., Crawford (1998). We distinguish only the *essentially* different equilibrium candidates.

correct decision. Given this, S is indifferent and therefore cannot do better than always send the same message.

(B) There are equilibria (Lemma 2), in which S reveals one of the types 'truthfully' by sending a certain message exclusively for that type. S sends a second message for all other types, so these types cannot be distinguished from each other by the message. In these equilibria, the default decision is implemented.

In principle, the authority has two options. First, R might ignore the messages and implement the default. This is indeed the best response and constitutes an equilibrium for certain constellations of R's prior information. More precisely, R always implements the welfare-optimal decision for the single revealed type. Therefore, ignoring S's message can only be an equilibrium, if R's optimal decision is the same for that single type and for the group of three mergers represented by the second message. If, however, the optimal decisions corresponding to the two messages are different, then there is no equilibrium where the authority ignores S's message.

Second, the authority might block the merger after one of the messages and clear it after observing the other message. Then S can manipulate the decision whenever this increases S's profit. As three of the types carry the same message and therefore the same decision, for one of those three types S must have an incentive to deceive the authority. This is because, intuitively, for every decision of the authority, there are exactly two types for which S likes the decision, whereas for the other two types, S prefers the opposite decision. Thus, no equilibrium exists in which R's decision is conditional on S's message.

(C) There are equilibria (Lemma 3) in which S reveals a pair of types one of which is the true type. There are two classes of equilibria here.

First, R's optimal decision might be the same for each pair of types. This happens if each of the pairs contains a type with positive and with negative welfare change due to clearance, and within each pair, the expected welfare change must has the same sign. Given this, S cannot do better than send messages in this way, and R implements the default decision.

Second, R's optimal decisions after each message might be different. But then, S can pick the preferred decision by sending the appropriate message. This is indeed an equilibrium, provided that R's and S's interests are aligned in a certain way: R's best response must coincide with S's preferred decision. We call this the 'selfish' equilibrium.

(D) There is no equilibrium in which S sends exactly three messages. The intuition is as follows. If S sends three messages, then two types are revealed perfectly. For these two types, R's best response can either be the same or different. Suppose it is the same, e.g., d_C. Then for one of those types (e.g. t_2 and t_3), there is a conflict of interest, so S deviates to the third message, because there R's best response must be the other decision, d_P. Now suppose R's decision is different after for the two revealed types. This only works if S reveals the two types for which there is no conflict of interest (i.e. t_2 and t_4; otherwise S or R have an incentive to deviate). But for the remaining two types (i.e. t_1 and t_3), R is supposed to implement the same decision (following the third message), while S prefers different decisions for them, so S can profitably deviate to another message for one of the remaining types.

(E) The game does not have equilibria in which all four messages are played. The intuition is simple: If each type is associated with a unique message, then all types are perfectly revealed and R's best response is to implement the first-best decision in each case. But for two of the types there is a conflict of interest, so S would deviate to a message that implements the opposite decision.

We discuss these results in section 7.

5. Mixed-Strategy Equilibria

In this section, we discuss the game's perfect Bayesian equilibria in mixed strategies. A mixed strategy means any strategy where S randomizes (i.e. mixes) between at least two messages for at least one type, or a strategy where R mixes between decisions after at least one message on the equilibrium path.

We constructively derive *all* mixed-strategy equilibria in a series of lemmas in the appendix. While the model and game remain the same as before, we introduce new notation for mixed strategies. Denote the probability that S

sends message m_x for type t_i by[31]

$$\tilde{p}_i^x = \Pr\{m_x|t_i\} \in [0,1],\ t_i \in T,\ m_x \in M,\ \sum_{m_x \in M} \tilde{p}_i^x = 1. \tag{8}$$

A complete strategy of S is therefore given by 16 probabilities $\tilde{p}_i^x$ for all type–message combinations. Similarly, denote the probability that R *clears* the merger (d_C) after observing message m_x by $\tilde{p}_x^C$:[32]

$$\tilde{p}_x^C = \Pr\{d_C|m_x\} \in [0,1],\ \forall m_x \in M. \tag{9}$$

As there are only two decisions, a complete strategy of R can be represented by four clearance probabilities $\tilde{p}_x^C$, corresponding to the four messages $m_x \in M$. Therefore, a mixed-strategy equilibrium is formally characterized by

$$\Big\{\{\tilde{p}_i^x, \forall m_x \in M, t_i \in T\}, \{\tilde{p}_x^C, \forall m_x \in M\}, \{\mu_i^x, \forall t_i \in T, m_x \in M\}\Big\}. \tag{10}$$

We partition the mixed-strategy equilibrium candidates as follows.

(I) S plays a pure strategy and R a mixed strategy (Lemma 6).

(II) S plays a mixed strategy and R a pure strategy, always implementing the same decision regardless of the message (Lemma 7).

(III) S plays a mixed strategy and R a pure strategy, implementing different decisions depending on the message (Lemma 8).

(IV) Both S and R play a mixed strategy (Lemma 9).

The lemmas and proofs are in the appendix. The proofs constructively derive all mixed-strategy equilibria. Our findings can be described as follows.

(I) There is no mixed-strategy equilibrium in which S plays a pure strategy. This is because given any pure strategy of S, R's best response is entirely based on prior probabilities and the corresponding expected welfare. So R cannot be indifferent, by Assumption 1.

(II) There are mixed-strategy equilibria in which R implements the default decision independent of the message. This makes S indifferent between messages, so S is willing to mix (using two, three or four messages). In turn, as long as S's mixed strategy is such that the default decision remains a best response (given updated beliefs), we have an equilibrium.

[31] In this notation, the pure strategy $m(t_i) = m_A$ is now denoted as $\tilde{p}_i^A = 1$.
[32] In this notation, the pure strategy $d(m_A) = d_P$ is now denoted as $\tilde{p}_A^C = 0$.

(III) There are mixed-strategy equilibria in which R implements a message-dependent decision. The equilibrium decisions are always S's preferred decisions because otherwise S would deviate to a message that implements the preferred decision. As several messages implement the same decision, S is indifferent between these messages, respectively, and is therefore willing to mix. In equilibrium, we only require that R's best response remains to implement S's selfish decisions.

(IV) There are no equilibria in which both S and R play a mixed strategy. The intuition for this result is not obvious.

Based on prior probabilities, R always favors one decision over the other, say d_C because the merger is more likely to be welfare-increasing. So in order to make R indifferent between decisions after *all* messages, S must send *each* message less often for welfare-increasing types and *each* message more often for welfare-decreasing types.[33] But this is impossible, because mixing probabilities for a given type must add up to one across all messages. The total mixing probability mass for welfare-increasing types is the same as that for welfare-decreasing types.

Having established that R will not mix after *all* messages, R must necessarily play a pure decision after at least one message. But this decision is preferred by S for two types (one of them welfare-increasing, the other welfare-decreasing), so S will not mix for these types, but send the message that gives the certain and preferred decision. As S is supposed to play mixed, this can be done only for the remaining two types. But now the same argument as above applies: For the remaining types, R favors one decision, by the prior probabilities, and one type must necessarily be welfare-increasing and the other welfare-decreasing. Again, S cannot make R indifferent after all messages because the total mixing probability mass is the same for welfare-increasing and welfare-decreasing types, but in order to make R indifferent S would need to put more weight *in total* on one of the types, which is impossible.

We discuss these results in section 7.

[33] In order to see this, suppose S sends each of the four messages with equal probability. Then R does not learn anything and d_C remains strictly optimal.

6. A Two-Message Institution

In the previous sections, we have studied a signaling institution where the authority's hearing of the competitor permits four messages, i.e, in principle, communication of the merger type.

Based on the results we have derived so far, we can study a second institution, where the authority restricts the message space to two messages only, $M = \{m_A, m_B\}$. Intuitively, this can be understood as simply asking for the competitor's recommendation to either clear or block the merger. Apart from the message set, the model and game are otherwise unchanged, as is the default decision. In the following, we explain how our results for pure- and mixed-strategy equilibria of the four-message game apply to the two-message game.

6.1. Pure-Strategy Equilibria of the Two-Message Game

Obviously, as there are now two available messages, only cases (A) to (C) of our case distinction apply. The results of Lemmas 1 to 3 apply directly. The only changes concern off-equilibrium messages: In Lemma 1, there is now only one instead of three off-equilibrium messages. In Lemmas 2 and 3, there is no off-equilibrium message, so we do not need supporting beliefs. Therefore, in the two-message game, we still have either the default decision in equilibrium, or the 'selfish' equilibrium that implements S's preferred decision. Existence conditions are unchanged.

6.2. Mixed-Strategy Equilibria of the Two-Message Game

Given that there are only two available messages now, both messages necessarily have to be played on the equilibrium path in any mixed-strategy equilibrium. In the following we refer to the case distinction (I) - (IV) of the four-message game.

(I) Lemma 6 shows that there are no mixed-strategy equilibria where S plays a pure strategy. The proof is based on the fact that R is never indifferent after S's pure play. This also applies here.

(II) Lemma 7 shows that there are equilibria that implement the default decision. The proof explicitly includes the case of two messages played in equilibrium. We only need to leave out the discussion of off-equilibrium messages (there are none).

(III) The proof of Lemma 8 explicitly shows (in case a)) that there is no equilibrium for the case of two equilibrium messages. The argument applies directly.

(IV) Lemma 9 shows that there is no equilibrium where both S and R play a mixed strategy. The case a) of the proof explicitly covers the case of two messages.

Summarizing, the two-message game has a continuum of mixed-strategy equilibria, but they always implement the default decision. In particular, there are no 'selfish' equilibria here, similar to those shown for the four-message game in Lemma 8. These equilibria require the use of four messages on the equilibrium path.
We discuss these results in the following section.

7. Discussion and Policy Recommendation

Combining the results for the four- and the two-message games, we distinguish two classes of equilibria (including pure- and mixed-strategy equilibria): *All equilibria implement either the default decision or the competitor's preferred decision, with certainty, respectively.* There is no equilibrium in which the authority plays a mixed-strategy. Only the competitor ever mixes between messages. In any mixed equilibrium, S's strategies are 'close to' the pure strategies of a corresponding pure-strategy equilibrium, such that R's pure best response is the same as in the corresponding pure-strategy equilibrium.
The basic intuition for pure-strategy equilibria is as follows. The authority has two options. First, it might just ignore the competitor's message. Then the default decision is taken, and any message by S is a best response. Second, it might act on the message. This is equivalent to saying that the authority makes its decision conditional on the message observed. Thus, it takes a specific decision after observing a certain (subset of the) feasible message(s), while taking the opposite decision conditional on observing the remaining message(s). But given this reaction of the authority, the competitor can basically control the authority's decision by sending (one of) the message(s) after which the authority implements S's preferred decision. Therefore, a message-contingent decision can only occur in equilibrium if the authority intends to directly implement the competitor's preferred decision anyway. We conclude that either the authority must ignore the message, or it must implement the competitor's preferred decision in equilibrium.

The intuition for the selfish mixed-strategy equilibria is similar to that for the selfish pure-strategy equilibria. The (insubstantial) difference is that the competitor mixes between pairs of messages, but the messages within a pair have the same meaning in equilibrium, i.e., two messages recommend to block the merger, while the other two recommend a clearance decision. In this sense, two of the messages are redundant. This explains why there is no selfish mixed-strategy equilibrium in the two-message game: This equilibrium requires four messages.

All other mixed-strategy equilibria implement the default decision. The intuition here is that, given that R implements the default, S is indifferent between messages and there is a range of (pure and mixed) strategies that leave R's best response unchanged. The range of mixed strategies is larger the more certain R's default decision goes in one or the other direction.

We have shown that the four-message game does not have pure-strategy equilibria in which more than two messages are played. Moreover, whenever more than two messages are used in mixed-strategy equilibria, then several messages have the same meaning, making the additional messages inconsequential and redundant. Thus, *the competitor strategically conceals information by choosing a 'crude' language.*[34] Intuitively, using more than two (essentially different) messages reveals too much information to the authority, from the point of view of the competitor. Then the conflict of interest becomes payoff-relevant too often. In order to prevent this, S either does not reveal any information (or only so much that the default decision remains R's best response), or if interests are sufficiently aligned, S reveals carefully tailored information to R. In the selfish equilibrium, the information revealed ensures that S's preferred decision is taken, while preventing R from finding out the actual merger type.

In general terms, our results are in line with the theoretical literature on cheap talk signaling (e.g., Crawford and Sobel (1982)) as follows. Although we assume that the competitor knows the merger type, there is, given the authority's uncertainty, neither a pure conflict of interest, nor are interests completely opposed. Because of this, we can expect to find equilibria in which the competitor's information is partially revealed. However, this only happens if interests are sufficiently aligned, which is the case whenever the selfish equilibrium exists. Due to the potential conflict of interest, there cannot be full information revelation. Similarly, alignment of interest is

[34]The nature of this result is well-known in the cheap talk literature, see Crawford and Sobel (1982).

insufficient for many prior distributions, which results in the default decision in equilibrium. In some of these equilibria that implement the default, there is some information transmission. However, the competitor carefully reveals only so much information that the default decision remains a best response. In this sense, the information revealed is inconsequential and its revelation does not hurt the competitor.

In order to prepare a policy recommendation, we establish the payoff superiority of the selfish equilibria.

Proposition 1. *Suppose the selfish equilibria exist, i.e., $p_1 < p_2$ and $p_3 < p_4$. In these equilibria, the authority's expected welfare and the competitor's expected profit are larger than in any other equilibrium. This applies to the selfish equilibria in pure strategies of the four- and two-message games as well as the selfish equilibria in mixed strategies of the four-message game.*

By Proposition 1, whenever they exist, the selfish equilibria can be considered to be the natural solution of the signaling games, as they are strictly 'preferred' by both the competitor and the authority.

Whenever a selfish equilibrium does not exist, we have shown that any equilibrium implements the default decision. Therefore, in these cases, the authority need not listen to the content of the competitor's communication and optimally and straightforwardly implements the default decision, based on its own information.

Let us now look in detail at the implications of the selfish equilibria where S communicates its preferred decision and R implements it. By Lemmas 3 and 8, the formal condition for this equilibrium is

$$p_1 < p_2, \quad p_3 < p_4. \tag{11}$$

This constellation of prior information is compatible with d_P or d_C being the default decision. It means that if the competitor, through its communication, reveals that the merger type is profit-increasing (type 1 or 2), then the authority, based on its own information, must expect that the competitor's preferred (clearing) decision is more likely to be welfare-increasing than decreasing. Simultaneously, it must hold that blocking the merger is optimal by the authority's prior information should the competitor reveal that the merger type is profit-decreasing (3 or 4).

Why is the selfish equilibrium welfare-superior to the default decision (Proposition 1)? Clearly, it reveals valuable information to the authority: The competitor, through the selfish recommendation, *truthfully* reveals whether the actual merger type is profit-increasing (1 or 2) or profit-decreasing (3 or 4), thereby truthfully excluding the two remaining types. Combining this truthful information with the authority's own prior information should intuitively improve the quality of the authority's decision. The price the authority pays for this information is to implement the competitor's preferred decision. Nevertheless, the existence condition of the selfish equilibrium, (11), ensures that the authority follows the competitor's recommendation only if that increases expected welfare as compared to ignoring the competitor. Intuitively, in any equilibrium, the authority plays a best response based on all available information, and it always has the option to implement the default. Therefore, a decision different from the default will only be taken if it is superior.

As mentioned above, the competitor intentionally sends a crude signal by only revealing a pair of merger types rather than the actual merger type. For instance, if the competitor reveals that the merger type is profit-increasing (types 1 or 2), the authority will clear the merger if it thinks, by (11), that welfare is more likely to increase than decrease given this information. If the actual merger type is 2, then the authority's decision will be ex post welfare-maximizing, whereas, if it is type 1, the decision will be wrong. In expectation, however, clearance is the right decision. If, instead, the competitor revealed the actual type, then nothing would change if the merger were 2, but in case of type 1, the authority would block the merger, hurting the competitor. Given this, it is better for the competitor to conceal the actual type.

Policy Recommendation. Based on its own information about the likely merger implications, the authority should check if condition (11) holds or not. In plain words, this condition is: *Conditional on the merger being profit-increasing for the competitor, welfare must be expected to increase after clearance, and, conditional on the merger being profit-decreasing, welfare must be expected to decrease after clearance.* If this condition holds, the authority should ask the competitor directly whether the merger will increase or decrease the competitor's profit, while asking for welfare implications is not sensible by our analysis. Then the authority should implement the competitor's preferred decision. It can take for granted that the information is truthful as lying is not in the competitor's interest. Equivalently, one might ask for a recommendation to either clear or block the merger, but should understand that the response will follow the competitor's selfish interest. If (11) does not hold, implement the default decision, i.e., the optimal decision

under ignorance of the competitor's communication.
Derived from this recommendation, we emphasize that the quality of the authority's own information-gathering effort is crucial. This prior information decides whether hearing or listening is the optimal policy, and it is the basis for the default decision.

8. Conclusion

Our paper is the first to set up a formal game-theoretical model for the strategic interactions between competitor and authority in merger proceedings. This effort follows the spirit of information economics, which understands information asymmetries as a major driving force of economic decision making and should therefore be in the focus of policy making.[35]
The goal of this paper was to outline the extent of usefulness and abuse of hearing competitors in order to derive a recommendation as to how to distinguish between cases where competitors should only be heard, and those where they should be listened to.
We have analyzed two cheap talk signaling games which differ by the richness of the signaling language. In equilibrium, the competitor will always use a 'crude' language, strategically concealing information.
Our main result is that the authority should generally ignore the competitor's recommendation, with one exception: If the interests of both parties are statistically aligned in a certain way, the authority should straightforwardly implement the competitor's recommendation. This is a price worth paying as it removes uncertainty and thus enables a decision that is better in expectation.
The decision of whether to hear or to listen is based entirely on the authority's own information. Even if it is optimal to ignore the competitor's communication, the authority's decision is based on its own information. Because of this, the competition authorities should focus on the quality of their own information gathering effort.[36]
In our analysis we made simplifying assumptions regarding merger types and the information structure in order to obtain a tractable model. In particular, competitors in practice are likely to be uncertain about the merger implications. Of course, we can always interpret payoffs in our games as

[35] See, e.g., Stiglitz (2002).
[36] See, e.g., Duso et al. (2010) for a discussion of the event study methodology, and the recent Miller (2014) on simulations of merger effects.

(discounted) expected values. Apart from that, we think that as long as there is relevant information on the side of the competitor that is not available to the authorities, and is not verifiable, the basic logic of our results applies: There are situations in which it is in both sides' interest to communicate some of that information and act on it, understanding that this information will not be complete and it will necessarily have to be profitable for both sides.

Appendix A. Formal Results

Appendix A.1. Pure-strategy equilibria of the four-message signaling game

We formally derive all pure-strategy equilibria of the four-message signaling game. As part of these proofs, we will show that R is never indifferent between decisions on the equilibrium path given that S plays a pure strategy. This is used in the proof of Lemma 6.

We denote the set of equilibrium messages by $\tilde{M}$. Thus, an off-equilibrium message m_y is denoted by $m_y \notin \tilde{M}$. Arbitrary (and different) types are denoted by t_i, t_j, t_k, $t_l \in T$, and arbitrary (and different) messages by m_w, m_x, m_y, $m_z \in M$.

Lemma 1. *The game has "uninformative" pure-strategy equilibria in which S always sends the same message $m_x \in M$, while R implements the default decision. Formally, for all $t_i \in T$ and all $m_y \notin \tilde{M}$, these equilibria are*

1. *(implementing $d^{default} = d_C$)*

$$\begin{aligned} &m^*(t_i) = m_x, \quad d^*(m_x) = d^*(m_y) = d^{default} = d_C, \\ &\mu_i^x = p_i, \quad \mu_2^y + \mu_3^y \geq \mu_1^y + \mu_4^y. \end{aligned} \tag{A.1}$$

   existence condition: $p_2 + p_3 > p_1 + p_4$.

2. *(implementing $d^{default} = d_P$)*

$$\begin{aligned} &m^*(t_i) = m_x, \quad d^*(m_x) = d^*(m_y) = d^{default} = d_P, \\ &\mu_i^x = p_i, \quad \mu_2^y + \mu_3^y \leq \mu_1^y + \mu_4^y. \end{aligned} \tag{A.2}$$

   existence condition: $p_2 + p_3 < p_1 + p_4$.

Proof of Lemma 1. Clearly, as S always sends the same message m_x (for every type), R's updated beliefs on the equilibrium path are equal to the prior beliefs. This implies that the default decision is implemented. The default decision is based on expected welfare only. Thus, it might be d_P or d_C. Depending on the type, S's preferred choice might coincide with the default or not. If not, then S would have an incentive to deviate if there is an off-equilibrium message $m_y \notin \tilde{M}$ for which R does not implement the default decision. Therefore, R's off-equilibrium beliefs must be such that R implements the default whenever an off-equilibrium message m_y is observed. More precisely:

1. For types $t_i \in \{t_1, t_2\}$, S prefers d_C. If $d^{\text{default}} = d_C$, there is no incentive to deviate. If, however, $d^{\text{default}} = d_P$, then S has an incentive to deviate to an off-equilibrium message m_y if that leads to d_C. Therefore, if $p_2 + p_3 < p_1 + p_4$ (when $d^{\text{default}} = d_P$), then the supporting beliefs must satisfy
$$\sum_{t_i \in T} \mu_i^y W_i \leq 0 \;\Leftrightarrow\; \mu_2^y + \mu_3^y \leq \mu_1^y + \mu_4^y. \tag{A.3}$$
It can be seen that this corresponds to the relation of priors that implements $d^{\text{default}} = d_P$.
2. For types $t_i \in \{t_3, t_4\}$, S prefers d_P. If $d^{\text{default}} = d_P$, there is no incentive to deviate. If, however, $d^{\text{default}} = d_C$, then S has an incentive to deviate to an off-equilibrium message m_y if that leads to d_P. By symmetry, we obtain results similar to the above, with reversed inequalities.

Note that, by Assumption 1, R is never indifferent between decisions, as the equilibrium (default) decision is exclusively based on expected welfare and prior probabilities. □

Lemma 2. *The game has pure-strategy equilibria in which S plays two messages in equilibrium, $\tilde{M} = \{m_x, m_y\}$, such that one type is revealed through message m_y, i.e., $T_y = \{t_l\}$, while the other message m_x is sent for the remaining types, $t_s \in T_x = \{t_i, t_j, t_k\}$. In these equilibria, R ignores S's message and implements the default decision. These equilibria are (denoting off-equilibrium messages by $m_z \notin \tilde{M}$)*

1. *(implementing $d^{default} = d_P$)*
$$\begin{aligned} &m^*(t_s) = m_x,\; m^*(t_l) = m_y,\; t_l \in \{t_1, t_4\},\\ &d^*(m_x) = d^*(m_y) = d^*(m_z) = d^{default} = d_P,\\ &\mu_s^x = \frac{p_s}{\sum_{t_r \in T_x} p_r},\; \mu_l^x = 0,\; \mu_s^y = 0,\; \mu_l^y = 1,\\ &\mu_2^z + \mu_3^z \leq \mu_1^z + \mu_4^z, \end{aligned} \tag{A.4}$$

existence condition: $\sum_{t_s \in T_x} p_s W_s \leq 0$, $W_l < 0$.

2. *(implementing $d^{default} = d_C$)*

$$\begin{aligned}
&m^*(t_s) = m_x,\ m^*(t_l) = m_y,\ t_l \in \{t_2, t_3\}, \\
&d^*(m_x) = d^*(m_y) = d^*(m_z) = d^{default} = d_C, \\
&\mu_s^x = \frac{p_s}{\sum_{t_r \in T_x} p_r},\ \mu_l^x = 0,\ \mu_s^y = 0,\ \mu_l^y = 1, \\
&\mu_2^z + \mu_3^z \geq \mu_1^z + \mu_4^z,
\end{aligned} \tag{A.5}$$

existence condition: $\sum_{t_s \in T_x} p_s W_s \geq 0$, $W_l > 0$.

Proof of Lemma 2. Consider S's candidate strategy which is represented by $T_x = \{t_i, t_j, t_k\}$ and $T_y = \{t_l\}$. Two messages are therefore played on the equilibrium path. As message m_y is sent for type t_l only, we have $\mu_l^y = 1$ and $\mu_l^x = 0$, and R's best response is

$$d^*(m_y) = \begin{cases} d_P & \text{if } W_l < 0, \text{i.e., } t_l \in \{t_1, t_4\}, \\ d_C & \text{if } W_l > 0, \text{i.e., } t_l \in \{t_2, t_3\},. \end{cases} \tag{A.6}$$

Message m_x is sent for all other types, which gives the updated beliefs stated in (A.4) and (A.5). R's best response is found as follows. Decision d_P implies $U^R = 0$ whereas d_C has an expected payoff of

$$\sum_{t_s \in T_x} \mu_s^x U^R(t_s, d_C) = \sum_{t_s \in T_x} \frac{p_s}{\sum_{t_r \in T_x} p_r} W_s. \tag{A.7}$$

Therefore, d_C is optimal if

$$\sum_{t_s \in T_x} \frac{p_s}{\sum_{t_r \in T_x} p_r} W_s \geq 0 \ \Leftrightarrow \ \sum_{t_s \in T_x} p_s W_s \geq 0. \tag{A.8}$$

It follows that

$$d^*(m_x) = \begin{cases} d_P & \text{if } \sum_{t_s \in T_x} p_s W_s \leq 0, \\ d_C & \text{if } \sum_{t_s \in T_x} p_s W_s \geq 0. \end{cases} \tag{A.9}$$

Combining (A.6) and (A.9), we distinguish four cases:

1. $\sum_{t_s \in T_x} p_s W_s \leq 0$ and $W_l < 0$:
These conditions imply $\sum_{t_i \in T} p_i W_i < 0$, i.e., $d^{\text{default}} = d_P$. Here, the optimal decision after each message is $d^*(m_y) = d^*(m_x) = d_P = d^{\text{default}}$. Deviating to the other message (m_x, resp. m_y) does not

affect the decision and is thus never profitable. We need supporting beliefs such that after observing an off-equilibrium message m_z, R implements the same decision, i.e., we need $\mu_2^z + \mu_3^z \leq \mu_1^z + \mu_4^z$ which implies $d^*(m_z) = d_P$.

2. $\sum_{t_s \in T_x} p_s W_s \leq 0$ and $W_l > 0$:
   Here, $d^*(m_y) = d_C$ and $d^*(m_x) = d_P$. S sends m_x for three types and has a payoff of 0 in these cases. There is no equilibrium here, because for one of those three types, S's payoff can be improved from 0 to 1 by reporting m_y instead, which leads to decision d_C.
3. $\sum_{t_s \in T_x} p_s W_s \geq 0$ and $W_l < 0$:
   Here, $d^*(m_y) = d_P$ and $d^*(m_x) = d_C$. S sends m_x for three types and must have a negative payoff for at least one of those types. There is no equilibrium here, because S can avoid a negative payoff by reporting m_y instead, which leads to decision d_P with a payoff of 0.
4. $\sum_{t_s \in T_x} p_s W_s \geq 0$ and $W_l > 0$:
   These conditions imply $\sum_{t_i \in T} p(t_i) W_i \geq 0$, i.e., $d^{\text{default}} = d_C$. Here, $d^*(m_y) = d^*(m_x) = d_C = d^{\text{default}}$. Deviating to the other message (m_x, resp. m_y) does not affect the decision and is thus not profitable. We need supporting beliefs such that after observing an off-equilibrium message m_z, R implements the same decision. Thus, we need $\mu_2^z + \mu_3^z \geq \mu_1^z + \mu_4^z$ which implies $d^*(m_z) = d_C$.

Note that in the above four cases, $\sum_{t_s \in T_x} p_s W_s \geq 0$ (resp. ≤ 0) can never hold with equality, by Assumption 1. Therefore, R is never indifferent between decisions after message m_x (and, obviously, neither after message m_y). □

Lemma 3. *The game has pure-strategy equilibria in which pairs of types are associated with the same message, $T_x = \{t_i, t_j\}$ and $T_y = \{t_k, t_l\}$, while R either implements the default decision or S's preferred decision. Denoting $t_s \in T_x$, $t_u \in T_y$ and $m_z \notin \tilde{M}$, the set of these equilibria can be partitioned as follows.*

1. *(implementing $d^{default} = d_P$)*

$$\begin{aligned} & m^*(t_s) = m_x, \ m^*(t_u) = m_y, \\ & d^*(m_x) = d^*(m_y) = d^*(m_z) = d^{default} = d_P, \\ & \mu_s^x = \frac{p_s}{p_i + p_j}, \ \mu_s^y = 0, \ \mu_u^y = \frac{p_u}{p_k + p_l}, \ \mu_u^x = 0, \\ & \mu_2^z + \mu_3^z < \mu_1^z + \mu_4^z. \end{aligned} \tag{A.10}$$

existence condition: $\left(\sum_{t_s \in T_x} p_s W_s \le 0, \sum_{t_u \in T_y} p_u W_u \le 0\right)$.

2. *(implementing $d^{default} = d_C$)*

$$\begin{aligned}
&m^*(t_s) = m_x,\ m^*(t_u) = m_y, \\
&d^*(m_x) = d^*(m_y) = d^*(m_z) = d^{default} = d_C, \\
&\mu_s^x = \frac{p_s}{p_i + p_j},\ \mu_s^y = 0,\ \mu_u^y = \frac{p_u}{p_k + p_l},\ \mu_u^x = 0, \\
&\mu_2^z + \mu_3^z \ge \mu_1^z + \mu_4^z.
\end{aligned} \tag{A.11}$$

existence condition: $\left(\sum_{t_s \in T_x} p_s W_s \ge 0, \sum_{t_u \in T_y} p_u W_u \ge 0\right)$.

3. *(implementing S's preferred decision)*

$$\begin{aligned}
&T_x = \{t_1, t_2\},\ T_y = \{t_3, t_4\}, \\
&m^*(t_s) = m_x,\ m^*(t_u) = m_y, \\
&d^*(m_x) = d_C,\ d^*(m_y) = d_P, d^*(m_z) \in \{d_P, d_C\}, \\
&\mu_s^x = \frac{p_s}{p_1 + p_2},\ \mu_s^y = 0,\ \mu_u^y = \frac{p_u}{p_3 + p_4},\ \mu_u^x = 0, \\
&\mu_i^z \ge 0.
\end{aligned} \tag{A.12}$$

existence condition: $p_3 < p_4, p_1 < p_2$.

Proof of Lemma 3. We consider all candidates where $T_x = \{t_i, t_j\}$ and $T_y = \{t_k, t_l\}$, i.e. the messages m_x and m_y are played on the equilibrium path, each message for exactly two types. The corresponding updated beliefs conditional on message m_x, resp. m_y, therefore have the form stated in Lemma 3. Consider R's decision conditional on observing message m_x. Decision d_P implies $U^R = 0$, whereas d_C has an expected payoff of

$$\sum_{t_s \in T_x} \mu_s^x U^R(t_s, d_C) = \sum_{t_s \in T_x} \frac{p_s}{\sum_{t_r \in T_x} p_r} W_s. \tag{A.13}$$

Therefore, d_C is optimal if

$$\sum_{t_s \in T_x} \frac{p_s}{\sum_{t_r \in T_x} p_r} W_s \ge 0 \ \Leftrightarrow \ \sum_{t_s \in T_x} p_s W_s \ge 0. \tag{A.14}$$

Summarizing, the optimal decision is

$$d^*(m_x) = \begin{cases} d_P & \text{if } \sum_{t_s \in T_x} p_s W_s \le 0, \\ d_C & \text{if } \sum_{t_s \in T_x} p_s W_s \ge 0. \end{cases} \tag{A.15}$$

By symmetry, the optimal decision conditional on observing message $m_y \neq m_x$ is

$$d^*(m_y) = \begin{cases} d_P & \text{if } \sum_{t_u \in T_y} p_u W_u \leq 0, \\ d_C & \text{if } \sum_{t_u \in T_y} p_u W_u \geq 0. \end{cases} \tag{A.16}$$

Combining (A.15) and (A.16), we distinguish four cases:

1. $\sum_{t_s \in T_x} p_s W_s \leq 0$ and $\sum_{t_u \in T_y} p_u W_u \leq 0$:
   This constellation implies $\sum_{t_i \in T} p(t_i) W_i \leq 0$ and, therefore, $d^{\text{default}} = d_P$. Here, $d^*(m_y) = d^*(m_x) = d_P = d^{\text{default}}$. S has no incentive to deviate between messages m_x and m_y as both imply the same decision. We need supporting beliefs such that after off-equilibrium messages m_z, R implements d_P as well: $\mu_2^z + \mu_3^z \leq \mu_1^z + \mu_4^z$.
2. $\sum_{t_s \in T_x} p_s W_s \geq 0$ and $\sum_{t_u \in T_y} p_u W_u \geq 0$:
   This implies $\sum_{t_i \in T} p_i W_i \geq 0$ and, therefore, $d^{\text{default}} = d_C$. Here, $d^*(m_y) = d^*(m_x) = d_C = d^{\text{default}}$. S has no incentive to deviate between messages m_x and m_y as both imply the same decision. We need supporting beliefs such that after off-equilibrium messages m_z, R implements d_C as well: $\mu_2^z + \mu_3^z \geq \mu_1^z + \mu_4^z$.
3. $\sum_{t_s \in T_x} p_s W_s \leq 0$ and $\sum_{t_u \in T_y} p_u W_u \geq 0$:
   Here, $d^*(m_x) = d_P$ and $d^*(m_y) = d_C$. Therefore, S is able to 'choose' R's decision in its favor by sending the appropriate message. This implies that there is no equilibrium here unless R's decisions coincide with S's preferred decisions for every type. This is equivalent to requiring that $T_x = \{t_3, t_4\}$ (i.e. blocking of types 3 and 4) and $T_y = \{t_1, t_2\}$ (i.e. clearing of types 1 and 2). Given that $T_x = \{t_3, t_4\}$ and $T_y = \{t_1, t_2\}$, the condition ($\sum_{t_s \in T_x} p_s W_s \leq 0$ and $\sum_{t_u \in T_y} p_u W_u \geq 0$) simplifies to

   $$\begin{aligned} & p_3 W_3 + p_4 W_4 \leq 0 \text{ and } p_1 W_1 + p_2 W_2 \geq 0 \\ \Leftrightarrow\ & p_3 < p_4 \text{ and } p_1 < p_2. \end{aligned} \tag{A.17}$$

4. $\sum_{t_s \in T_x} p_s W_s \geq 0$ and $\sum_{t_u \in T_y} p_u W_u \leq 0$:
   As m_x and m_y are arbitrary (but different and feasible) messages, the analysis of this case is already covered by case 3. above.

Note that the expected-welfare conditions in (A.15) and (A.16) cannot hold with equality, by Assumption 1. Therefore, R is never indifferent between decisions. □

Lemma 4. *The game does not have a pure-strategy equilibrium where exactly three different messages are used on the equilibrium path.*

Proof of Lemma 4. Suppose that exactly three different messages are played in equilibrium, $T_x = \{t_i, t_j\}$, $T_y = \{t_k\}$, $T_z = \{t_l\}$. This implies that S sends a unique message for two of the four types (t_k and t_l) respectively, so these two types are identified. For these two types, R optimally responds by implementing the first-best decision. We distinguish two cases.

a) Suppose for the two identified types, i.e., after messages m_y and m_z, R's first-best decision is the same. Therefore, one of the two types involves a conflict of interest, and, moreover, R optimally implements the opposite decision after message m_x. Therefore, S has an incentive to deviate from either m_y or m_z and can improve profit by sending m_x instead.

b) Suppose for the two identified types the first-best decision is different. In this case, S can 'control' R's decision by sending the appropriate message, either m_y or m_z. Therefore, in an equilibrium the two identified types must be t_2 and t_4 which do not involve a conflict of interest. However, for the two remaining types t_1 and t_3 and message m_x, R's decision must be the same, but S prefers different decisions for each of them, and can get the preferred decision by deviating to either m_y or m_z.

Note that in each situation above, R's best response is entirely based on prior probabilities and the corresponding expected welfare, so R is never indifferent between decisions, by Assumption 1. □

Lemma 5. *The game does not have a pure-strategy equilibrium where four different messages are used on the equilibrium path.*

Proof of Lemma 5. Suppose S sends a different message for each type, thereby fully revealing all types. Then R's best response is to implement the first-best decision for each type (d_c for t_2 and t_3, d_p for t_1 and t_4). However, for types t_1 and t_3, there is a conflict of interest. Therefore, S has an incentive to deviate to a message that implements $S's$ preferred decision. This profitable deviation is always feasible. Note that after each message in this candidate, R's best response is unique. □

Appendix A.2. Proof of Proposition 1

Proof of Proposition 1. The existence condition for the selfish pure- and mixed-strategy equilibria of the four-message game (Lemmas 2 and 8) and, by the discussion in subsection 6, the selfish pure-strategy equilibria of the two-message game, was shown to be

$$p_3 < p_4,\ p_1 < p_2. \tag{A.18}$$

By Lemmas 1 to 9, and the discussion in subsection 6, all pure- and mixed-strategy equilibria of the four- and two-message games implement either S's preferred (selfish) decision or the default decision. Therefore, it suffices to show that the selfish equilibria are payoff-superior for both players to the corresponding default decision.

Given the above existence condition for the selfish equilibrium and the fact that there always exists an equilibrium that implements the default decision (see, e.g., the uninformative equilibrium described in Lemma 1), the two can only be compared in case both exist simultaneously, i.e., whenever (A.18) holds. We assume this in the following.

We start with considering the authority's payoff, U^R. First, suppose d_P is the default decision (and (A.18) holds). Then taking the default implies $U^R = 0$. The selfish equilibrium implements d_P as well if the merger type is either type 3 or type 4, with $U^R = 0$. If, however, the merger is of type 1, we get $U^R = -1$ and for type 2 we get $U^R = 1$ where, by (A.18), the latter is more likely. In expectation the selfish equilibrium implements $E[U^R] = p_1W_1 + p_2W_2 = -p_1 + p_2 > 0$ (the latter by (A.18)) which is better than the default $U^R = 0$.

Second, suppose d_C is the default decision (and (A.18) holds). Taking the default implies $E[U^R] = \sum_{t_i \in T} p_iW_i = -p_1 + p_2 + p_3 - p_4 > 0$ (the latter by (A.18)). The selfish equilibrium implements d_P for types 3 and 4, with $U^R = 0$, and it implements d_C for types 1 (with $U^R = -1$) and 2 (with $U^R = 1$), where, again, welfare is conditionally more likely to be positive. In expectation, the selfish equilibrium implements $E[U^R] = p_1W_1 + p_2W_2 = -p_1 + p_2 > -p_1 + p_2 + p_3 - p_4$, because $p_3 < p_4$ by (A.18).

Combining these results, we conclude that the *selfish* equilibrium implements strictly higher expected welfare (U^R) than the default, regardless of what the default decision is.

Finally, consider the competitor's payoff, U^S. As the selfish equilibrium always implements S's preferred decision, whereas the default decision maximizes expected welfare, the selfish equilibrium is intuitively superior. We show this formally in the following.
Suppose d_P is the default decision. Then $U^S = 0$ ex post, whereas the selfish equilibrium has $U^S = 1$ for types 1 and 2 and $U^S = 0$ for types 3 and 4. In expectation, the selfish equilibrium gives $E[U^S] = p_1 + p_2 > 0$, which is strictly better. Now suppose d_C is the default decision. Then $E[U^S] = p_1 + p_2 - p_3 - p_4$, whereas the selfish equilibrium, again, has $U^S = 1$ for types 1 and 2 and $U^S = 0$ for types 3 and 4. In expectation, the selfish equilibrium gives $E[U^S] = p_1 + p_2 > 0$, which obviously strictly better than $p_1 + p_2 - p_3 - p_4$. □

Appendix A.3. Mixed-strategy equilibria of the four-message signaling game

In the proofs below we use m_w, m_x, m_y, $m_z \in M$ (resp. $t_i, t_j, t_k, t_l \in T$) to denote *arbitrary and different* messages (resp. merger types). Moreover, $\tilde{M}$ denotes the set of messages that are played on the equilibrium path. Thus, $m \notin \tilde{M}$ denotes off-equilibrium messages. In order to simplify the formal statements of equilibria, we make the following omissions in the lemmas below. We omit the statements of $p_i^m = 0$ for off-equilibrium messages $m \notin \tilde{M}$, i.e., we state S's mixing probabilities only for the equilibrium messages. Furthermore, we simplify the statement of R's off-equilibrium decisions and off-equilibrium beliefs in equilibria where these beliefs are unrestricted because there is no potential deviation incentive for S. In these cases we write $p_w^C \in [0,1]$ and $\mu_i^w \in [0,1]$ without stating the precise relationship between beliefs and corresponding decisions:

$$\mu_i^w \in [0,1], \sum_{t_i \in T} \mu_i^w = 1, \ \forall t_i \in T, \ \forall m_w \notin \tilde{M}, \tag{A.19}$$

$$p_w^C = \begin{cases} 1 & \text{if } \sum_{t_i \in T} \mu_i^w W_i \geq 0 \\ 0 & \text{if } \sum_{t_i \in T} \mu_i^w W_i \leq 0, \end{cases} \quad \forall m_w \notin \tilde{M}. \tag{A.20}$$

Lemma 6. *The game does not have mixed-strategy equilibria in which S plays a pure strategy.*

Proof of Lemma 6. By Assumption 1 and as analyzed in the proofs of Lemmas 1 to 5, R has a unique and pure-strategy best response to any pure strategy of S. □

Lemma 7. *The game has mixed-strategy equilibria in which R plays a pure strategy. In these equilibria, R implements the default decision ($d = d^{default}$) regardless of the message(s). S plays a mixed strategy and plays either two, three or four messages on the equilibrium path ($|\tilde{M}| \in \{2, 3, 4\}$). The equilibria can be partitioned into*

1. *(implementing $d^{default} = d_C$)*

$$\begin{aligned}
&p_2^k p_2 + p_3^k p_3 \geq p_1^k p_1 + p_4^k p_4, \ \forall m_k \in \tilde{M}, \quad p_x^C = 1, \ \forall m_x \in M, \\
&\mu_i^k = \frac{p_i^k p_i}{\sum_{t_s \in T} p_s^k p_s}, \ \forall t_i \in T, \forall m_k \in \tilde{M}, \\
&\mu_2^r + \mu_3^r \geq \mu_1^r + \mu_4^r \ \forall m_r \notin \tilde{M}.
\end{aligned} \tag{A.21}$$

existence condition: $d^{default} = d_C$.

2. *(implementing $d^{default} = d_P$)*

$$\begin{aligned}
&p_2^k p_2 + p_3^k p_3 \leq p_1^k p_1 + p_4^k p_4, \ \forall m_k \in \tilde{M}, \quad p_x^C = 0, \ \forall m_x \in M, \\
&\mu_i^k = \frac{p_i^k p_i}{\sum_{t_s \in T} p_s^k p_s}, \ \forall t_i \in T, \forall m_k \in \tilde{M}, \\
&\mu_2^r + \mu_3^r \leq \mu_1^r + \mu_4^r \ \forall m_r \notin \tilde{M}.
\end{aligned} \tag{A.22}$$

existence condition: $d^{default} = d_P$.

Proof of Lemma 7. Given that R always implements the same decision, S is always indifferent between messages, and therefore willing to play mixed. This requires, of course, that R implements that decision also off the equilibrium path. For an equilibrium, we need that R's decision is a best response to S's strategy. After each message $m_k \in \tilde{M}$ (i.e., on the equilibrium path), R's best response is d_C if

$$\begin{aligned}
&\sum_{t_i \in T} \mu_i^k W_i \geq 0 \ \Leftrightarrow \ \sum_{t_i \in T} \frac{p_i^k p_i}{\sum_{t_s \in T} p_s^k p_s} W_i \geq 0 \ \Leftrightarrow \ \sum_{t_i \in T} p_i^k p_i W_i \geq 0 \\
&\Leftrightarrow \ p_2^k p_2 + p_3^k p_3 \geq p_1^k p_1 + p_4^k p_4.
\end{aligned} \tag{A.23}$$

For all off-equilibrium messages $m_r \notin \tilde{M}$ (if there are any), we need beliefs that lead to the same optimal decision,

$$\mu_2^r + \mu_3^r \geq \mu_1^r + \mu_4^r, \ \forall m_r \notin \tilde{M}. \tag{A.24}$$

If the reverse inequalities hold in the above, then d_P is the best response on and off the equilibrium path.
Finally, note that if we add up the conditions (A.23) over all messages, making use of the identity $\sum_{m\in\tilde{M}} p_i^m \equiv 1$, then we get $p_2+p_3 > p_1+p_4$, i.e., the condition that makes d_C the default decision. Thus, the above described equilibrium implies the default decision (again, with $d^{\text{default}} = d_P$ for the reverse inequalities. □

Lemma 8. *The game has mixed-strategy equilibria in which R plays a pure strategy including both decisions on the equilibrium path. In these equilibria, R implements S's preferred decision, and they exist only if $p_2 > p_1$ and $p_3 < p_4$. They can be partitioned by the number of messages $|\tilde{M}|$ played by S on the equilibrium path:*

1. *(S plays messages $\tilde{M} = \{m_x, m_y, m_z\}$ in equilibrium)*

   1.1 *(Implementing d_C after m_x and m_y, and d_P after m_z.)*
   For $m_k \in \{m_x, m_y\}$, $t_i \in \{t_1, t_2\}$, $t_j \in \{t_3, t_4\}$:

$$\begin{aligned} &p_2^k p_2 \geq p_1^k p_1, \quad p_3^k = p_4^k = 0,\ p_k^C = 1, \\ &p_1^z = p_2^z = 0, \quad p_3^z = p_4^z = 1,\ p_z^C = 0, \\ &\mu_i^k = \frac{p_i^k p_i}{p_1^k p_1 + p_2^k p_2},\ \mu_j^k = 0,\ \mu_i^z = 0,\ \mu_j^z = \frac{p_j}{p_3+p_4}, \\ &p_w^C \in [0,1],\ \mu_l^w \in [0,1],\ \forall t_l \in T,\ m_w \notin \tilde{M}. \end{aligned} \tag{A.25}$$

   1.2 *(Implementing d_P after m_x and m_y, and d_C after m_z.)*
   For $m_k \in \{m_x, m_y\}$, $t_i \in \{t_3, t_4\}$, $t_j \in \{t_1, t_2\}$:

$$\begin{aligned} &p_3^k p_3 \leq p_4^k p_4, \quad p_1^k = p_2^k = 0,\ p_k^C = 0, \\ &p_3^z = p_4^z = 0, \quad p_1^z = p_2^z = 1,\ p_z^C = 1, \\ &\mu_i^k = \frac{p_i^k p_i}{p_3^k p_3 + p_4^k p_4},\ \mu_j^k = 0,\ \mu_i^z = 0,\ \mu_j^z = \frac{p_j}{p_1+p_2}, \\ &p_w^C \in [0,1],\ \mu_l^w \in [0,1],\ t_l \in T,\ m_w \notin \tilde{M}. \end{aligned} \tag{A.26}$$

2. *(S plays all four messages in equilibrium, R plays S' preferred decision after two messages respectively.)*

For $m_k \in \{m_x, m_y\}$, $m_l \in \{m_w, m_z\}$, $t_i \in \{t_1, t_2\}$, $t_j \in \{t_3, t_4\}$:

$$\begin{aligned} & p_2^k p_2 \geq p_1^k p_1,\ p_3^k = p_4^k = 0,\ p_k^C = 1, \\ & p_3^l p_3 \leq p_4^l p_4,\ p_1^l = p_2^l = 0,\ p_l^C = 0, \\ & \mu_i^k = \frac{p_i^k p_i}{p_1^k p_1 + p_2^k p_2},\ \mu_j^k = 0,\ \mu_i^l = 0,\ \mu_j^l = \frac{p_j^l p_j}{p_3^l p_3 + p_4^l p_4}. \end{aligned} \tag{A.27}$$

3. *(S plays all four messages in equilibrium, R plays one of the decisions after three messages, the other decision after the remaining message.)*

   3.1 (Implementing d_C after m_x, m_y, m_z and d_P after m_w.)
   For $m_k \in \{m_x, m_y, m_z\}$, $t_i \in \{t_1, t_2\}$, $t_j \in \{t_3, t_4\}$:

$$\begin{aligned} & p_2^k p_2 \geq p_1^k p_1,\ p_3^k = p_4^k = 0,\ p_k^C = 1, \\ & p_1^w = p_2^w = 0,\ p_3^w = p_4^w = 1,\ p_w^C = 0, \\ & \mu_i^k = \frac{p_i^k p_i}{p_1^k p_1 + p_2^k p_2},\ \mu_j^k = 0,\ \mu_i^w = 0,\ \mu_j^w = \frac{p_j}{p_3 + p_4}. \end{aligned} \tag{A.28}$$

   3.2 (Implementing d_P after m_x, m_y, m_z and d_C after m_w.)
   For $m_k \in \{m_x, m_y, m_z\}$, $t_i \in \{t_3, t_4\}$, $t_j \in \{t_1, t_2\}$:

$$\begin{aligned} & p_3^k p_3 \leq p_4^k p_4,\ p_1^k = p_2^k = 0,\ p_k^C = 0, \\ & p_3^w = p_3^w = 0,\ p_1^w = p_2^w = 1,\ p_w^C = 1, \\ & \mu_i^k = \frac{p_i^k p_i}{p_3^k p_3 + p_4^k p_4},\ \mu_j^k = 0,\ \mu_i^w = 0,\ \mu_j^w = \frac{p_j}{p_1 + p_2}. \end{aligned} \tag{A.29}$$

Proof of Lemma 8. We cover all equilibrium candidates where S mixes, while R plays a pure strategy but does not always play the same decision.[37] These candidates are

(a) $|\tilde{M}| = 2$, R plays d_C after message m_x and d_P after message m_y,
(b.1) $|\tilde{M}| = 3$, R plays d_C after m_x, m_y and d_P after m_z,
(b.2) $|\tilde{M}| = 3$, R plays d_P after m_x, m_y and d_C after m_z,
(c) $|\tilde{M}| = 4$, R plays d_C after m_x, m_y and d_P after m_w, m_z,
(d.1) $|\tilde{M}| = 4$, R plays d_C after m_x, m_y, m_z and d_P after m_w,
(d.2) $|\tilde{M}| = 4$, R plays d_P after m_x, m_y, m_z and d_C after m_w.

[37] The candidates where R always plays the same decision are covered in Lemma 7.

In the following, we analyze these candidates.

(a) $|\tilde{M}| = 2$, R plays d_C after message m_x and d_P after message $m_y \neq m_x$. The unique best response of S is obviously m_x for t_1 and t_2 and m_y for t_3 and t_4. This is a pure stragegy. Therefore, there are no (mixed) equilibria for a).

(b.1) $|\tilde{M}| = 3$, R plays d_C after m_x, m_y and d_P after m_z, Consider S's best response. Message m_z is the unique (and pure) best response for t_3 and t_4. Optimality of d_P requires the existence condition $p_3 < p_4$. For t_1 and t_2, S is indifferent between messages m_x and m_y (but would never play m_z) and therefore is prepared to mix. However, in order to correspond to R's strategies, S mixed strategies must make d_C the optimal decision, i.e.,

$$\mu_1^k W_1 + \mu_2^k W_2 \geq 0 \;\Leftrightarrow\; \frac{p_1^k p_1}{p_1^k p_1 + p_2^k p_2} W_1 + \frac{p_2^k p_2}{p_1^k p_1 + p_2^k p_2} W_2 \geq 0 \qquad \text{(A.30)}$$
$$\Leftrightarrow\; p_2^k p_2 \geq p_1^k p_1,\; m_k \in \{m_x, m_y\}$$

Adding the two conditions in (A.30), using $p_i^x + p_i^y \equiv 1$ for $i \in \{1, 2\}$, we get the existence condition $p_2 \geq p_1$ which, by Assumption 1 implies $p_2 > p_1$. In this equilibrium, S's preferred decision is always implemented. Therefore, S cannot have an incentive to deviate to the off-equilibrium message, implying unrestricted off-equilibrium beliefs.

(b.2) $|\tilde{M}| = 3$, R plays d_P after m_x, m_y and d_C after m_z. The proof is omitted because, by symmetry, it is similar to the analysis of (b.1). The types who send m_z resp. m_x and m_y are interchanged and we have reversed inequalities for the optimality of d_P after m_x and m_y. The existence conditions are the same.

(c) $|\tilde{M}| = 4$, R plays d_C after m_x, m_y and d_P after m_w, m_z. Consider S's best response. Messages m_x and m_y (resp. m_w and m_z) will only be sent for t_1 and t_2 (resp. t_3 and t_4). However, S is indifferent between m_x and m_y (resp. m_w and m_z), so is prepared to mix in any way. For an equilibrium, we therefore only require that the above stated decisions are optimal given S's mixed strategies. Therefore, we need (derived similar to (A.30))

$$p_2^k p_2 \geq p_1^k p_1,\; p_3^l p_3 \leq p_4^l p_4,\; \forall m_k \in \{m_x, m_y\},\; m_l \in \{m_w, m_z\}. \qquad \text{(A.31)}$$

Adding up the two conditions for each message pair (using $p_2^x + p_2^y \equiv 1$ etc.), we get the existence conditions $p_2 > p_1$ and $p_3 < p_4$ (strict inequalities by Assumption 1).

(d.1) $|\tilde{M}| = 4$, R plays d_C after m_x, m_y, m_z and d_P after m_w. Consider S's best response. Message m_w is the unique (and pure) best response for t_3 and t_4. Then optimality of d_P requires the existence condition $p_4 > p_3$.
As for types t_1 and t_2, S is indifferent between the remaining three messages but would never send m_w. Therefore S is willing to mix these messages in any way. However, we need d_C to be optimal, which is equivalent to (derived similar to (A.30))

$$p_2^k p_2 \geq p_1^k p_1, \;\; m_k \in \{m_x, m_y, m_z\}. \tag{A.32}$$

Adding up these three conditions (using $p_2^x + p_2^y + p_2^z \equiv 1$ etc.), we get the existence condition $p_2 > p_1$ (strict inequality by Assumption 1).

(d.2) $|\tilde{M}| = 4$, R plays d_P after m_x, m_y, m_z and d_C after m_w. The proof is omitted because of similarity to that of (d.1), by symmetry.

□

Lemma 9. *The game does not have equilibria where both S and R play mixed strategies.*

Proof of Lemma 9. Before classifying equilibrium candidates, we establish the result that R will never mix between decisions after *all* messages, i.e., R will play pure after at least one of the messages on the equilibrium path. Mixing after all messages requires indifference for each message $m_w \in \tilde{M}$ on the equilibrium path, i.e.

$$\begin{aligned} &\sum_{t_i \in T} \mu_i^w W_i = 0 \Leftrightarrow \sum_{t_i \in T} \frac{p_i^w p_i}{\sum_{t_s \in T} p_s^w p_s} W_i = 0 \\ \Leftrightarrow &\sum_{t_i \in T} p_i^w p_i W_i = 0 \;\Leftrightarrow\; p_2^w p_2 + p_3^w p_3 = p_1^w p_1 + p_4^w p_4. \end{aligned} \tag{A.33}$$

Now add up these equalities over all messages, making use of the identity $\sum_{m_w \in \tilde{M}} p_i^w \equiv 1$ for all $t_i \in T$. This results in $p_2 + p_3 = p_1 + p_4$ which is ruled out by Assumption 1. Therefore, R cannot be indifferent after *all* messages, so we ignore the respective equilibrium candidates in the following. In order to play a mixed strategy, S must play at least two messages in equilibrium. The remaining candidates can be partitioned into the following cases (by the set $\tilde{M}$ of messages played in equilibrium):

a) $\tilde{M} = \{m_x, m_y\}$. R mixes after m_x and plays pure after m_y.

b) $\tilde{M} = \{m_x, m_y, m_z\}$. R mixes after m_x and plays pure after m_y, m_z.

c) $\tilde{M} = \{m_x, m_y, m_z\}$. R mixes after m_x, m_y and plays pure after m_z.

d) $\tilde{M} = M$. R mixes after m_w and plays pure after m_x, m_y, m_z.

e) $\tilde{M} = M$. R mixes after m_w, m_x and plays pure after m_y, m_z.

f) $\tilde{M} = M$. R mixes after m_w, m_x, m_y and plays pure after m_z.

In the following, we analyze these cases one by one.

a) $\tilde{M} = \{m_x, m_y\}$. R mixes after m_x and plays pure after m_y. Suppose R plays d_C after m_y (pure). Then for t_1 and t_2, S's unique best response is to send m_y. Similarly, for t_3 and t_4, S's unique best response is to send m_x, regardless of R's mixing probabilities. But this is a pure strategy, contradicting the assumption of a mixed strategy of S. By symmetry, a similar argument applies if R plays d_P after m_y.

b) $\tilde{M} = \{m_x, m_y, m_z\}$. R mixes after m_x and plays pure after m_y, m_z.

   b.1) Suppose R plays decision d_C after m_y and m_z. Then for types t_3 and t_4 the unique best response is to send m_x in order to get d_P at least sometimes, while S will never play m_x for t_1 and t_2 Given this, mixing over decisions after m_x is optimal only if R is indifferent,

$$\mu_3^x W_3 + \mu_4^x W_4 = 0 \;\Leftrightarrow\; \frac{p_3}{p_3 + p_4} W_3 + \frac{p_4}{p_3 + p_4} W_4 = 0 \;\Leftrightarrow\; p_3 = p_4, \tag{A.34}$$

   which is ruled out by Assumption 1.

   b.2) Suppose R plays decision d_P after m_y and m_z. By symmetry, the conclusion is similar to that for b.1).

   b.3) Suppose R plays decision d_C after m_y and d_P after m_z. Then S's unique best response is for each type to always send either m_y or m_z. This implements S's preferred decision, so S will never play m_x (after which R plays mixed), contradicting the candiate.

c) $\tilde{M} = \{m_x, m_y, m_z\}$. R mixes after m_x, m_y and plays pure after m_z. Suppose R plays d_C after m_z. Then for types t_1 and t_2, S's unique best response is to send m_z (pure play). Message m_z will never be sent for

t_3 and t_4 because S's preferred decision d_P is only played after m_x and m_y (as part of the mixing). As m_x and m_y are only sent for t_3 and t_4 (according to some p_3^x, p_3^y, p_4^x, p_4^y, possibly including pure components), R's indifference condition (to make mixing optimal) is again $p_3 = p_4$ (derived similarly to (A.34)), which is ruled out by Assumption 1. Therefore, R will not mix for both m_y and m_x, contradicting the candidate. By symmetry, the same conclusion obtains if we assume that R plays d_P after m_z.

d) $\tilde{M} = M$. R mixes after m_w and plays pure after m_x, m_y, m_z.

d.1) Suppose R always plays the same decision, say d_C, after m_x, m_y, m_z. Then S will send these messages exclusively for t_1 and t_2, while m_w is sent exclusively for t_3 and t_4. But then, similar to the derivation of (A.34), R must be indifferent between decisions, knowing that the type is either t_3 or t_4. Indifference requires $p_3 = p_4$ which is ruled out by Assumption 1. By symmetry, we get the same conclusion if we assume that d_P is played after m_x, m_y, m_z.

d.2) Suppose R plays different 'pure' decisions, i.e., d_C after one or two of m_x, m_y, m_z, and d_P after the remaining message(s). Then S's best response is obviously a pure strategy, avoiding R's mixed play and therefore contradicting the candidate.

e) $\tilde{M} = M$. R mixes after m_w, m_x and plays pure after m_y, m_z.

e.1) Suppose R always plays the same decision, say d_C, after m_y and m_z. Then S will send these messages exclusively for t_1 and t_2 (in some possibly mixed way), while m_w, m_x are sent exclusively for t_3 and t_4. But then, similar to the derivation of (A.34), R must be indifferent between decisions after both m_w and m_x, knowing that the type is either t_3 or t_4. Indifference requires $p_3 = p_4$ which is ruled out by Assumption 1. By symmetry, we get the same conclusion if we assume that d_P is played after m_x and m_y.

e.2) Suppose R plays different decisions after m_y and m_z. Then S's best response is obviously a pure strategy, avoiding R's mixed play and therefore contradicting the candidate.

f) $\tilde{M} = M$. R mixes after m_w, m_x, m_y and plays pure after m_z. Suppose R plays d_C after m_z. Then for types t_1 and t_2, S's unique best response is to send m_z (pure play). Message m_z will never be sent for t_3 and t_4 because S's preferred decision d_P is only played after m_w, m_x and m_y (as part of the mixing). As m_w, m_x and m_y are only sent for t_3 and t_4 (according to some pure/mixed play), R's indifference condition (to make mixing optimal) is again $p_3 = p_4$ (derived similarly to (A.34)), which is ruled out by Assumption 1. Therefore, R will not mix for all three messages, contradicting the candidate. By symmetry, the same conclusion obtains if we assume that R plays d_P after m_z.

□

Appendix B. Data

Table B.1: Cases with Competitor participation in Phase 2 EU

Type of Decision	Case no.	Year Notification	Rivals Heard
Art. 8(2) with conditions & obligations	M.42	1990	0
Art. 8(2) with conditions & obligations	M.43	1990	0
Art. 8(2) with conditions & obligations	M.126	1991	1
Art. 8(2) with conditions & obligations	M.12	1991	1
Art. 8(3)	M.53	1991	0
Art. 8(2)	M.68	1991	0
Art. 8(2)	M.222	1992	0
Art. 8(2) with conditions & obligations	M.214	1992	0
Art. 8(2) with conditions & obligations	M.190	1992	0
Art. 8(2) with conditions & obligations	M.291	1992	0
Art. 8(2)	M.358	1993	0
Art. 8(2)	M.315	1993	0
Art. 8(2) with conditions & obligations	M.308	1993	0
Art. 8(2) with conditions & obligations	M.468	1994	0
Art. 8(3)	M.469	1994	0
Art. 8(2)	M.269	1994	0
Art. 8(2)	M.477	1994	1
Art. 8(2)	M.484	1994	0
Art. 8(2) with conditions & obligations	M.430	1994	0
Art. 8(2) with conditions & obligations	M.582	1995	0
Art. 8(2) with conditions & obligations	M.623	1995	0
Art. 8(2) with conditions & obligations	M.553	1995	0
Art. 8(2) with conditions & obligations	M.580	1995	0
Art. 8(3)	M.490	1995	0
Art. 8(2) with conditions & obligations	M.603	1995	0
Art. 8(3)	M.619	1995	0
Art. 8(2) with conditions & obligations	M.856	1996	0
Art. 8(3), Art. 8(4)	M.784	1996	0
Art. 8(2) with conditions & obligations	M.754	1996	0
Art. 8(2) with conditions & obligations	M.737	1996	0
Art. 8(3)	M.774	1996	0
Art. 8(2)	M.794	1996	1
Art. 8(2)	M.970	1997	0
Art. 8(3), Art. 8(4)	M.890	1997	1
Art. 8(2) with conditions & obligations	M.1069	1997	1
Art. 8(2)	M.1016	1997	1
Art. 8(2) with conditions & obligations	M.950	1997	1
Art. 8(2) with conditions & obligations	M.938	1997	1
Art. 8(3)	M.993	1997	0
Art. 8(2) with conditions & obligations	M.986	1997	0

Table B.1 (continued)

Type of Decision	Case no.	Year Notification	Rivals Heard
Art. 8(2) with conditions & obligations	M.942	1997	0
Art. 8(2) with conditions & obligations	M.833	1997	0
Art. 8(2) with conditions & obligations	M.877	1997	0
Art. 8(2) with conditions & obligations	M.913	1997	0
Art. 8(3)	M.1027	1997	0
Art. 8(2) with conditions & obligations	M.1313	1998	1
Art. 8(2) with conditions & obligations	M.1221	1998	1
Art. 8(2) with conditions & obligations	M.1225	1998	1
Art. 8(2) with conditions & obligations	M.1157	1998	1
Art. 8(2) with conditions & obligations	M.1673	1999	1
Art. 8(2) with conditions & obligations	M.1636	1999	1
Art. 8(2) with conditions & obligations	M.1663	1999	0
Art. 8(2) with conditions & obligations	M.1601	1999	1
Art. 8(2) with conditions & obligations	M.1693	1999	1
Art. 8(2) with conditions & obligations	M.1630	1999	1
Art. 8(2) with conditions & obligations	M.1383	1999	1
Art. 8(2) with conditions & obligations	M.1641	1999	0
Art. 8(3)	M.1524	1999	1
Art. 8(2) with conditions & obligations	M.1532	1999	0
Art. 8(2) with conditions & obligations	M.1628	1999	1
Art. 8(2) with conditions & obligations	M.1671	1999	1
Art. 8(2) with conditions & obligations	M.1578	1999	1
Art. 8(2) with conditions & obligations	M.1439	1999	1
Art. 8(3)	M.1672	1999	1
Art. 8(2) with conditions & obligations	M.1915	2000	0
Art. 8(2) with conditions & obligations	M.1845	2000	0
Art. 8(3)	M.1741	2000	1
Art. 8(2) with conditions & obligations	M.1813	2000	1
Art. 8(2)	M.1940	2000	1
Art. 8(2) with conditions & obligations	M.1853	2000	1
Art. 8(2) with conditions & obligations	M.2060	2000	1
Art. 8(2)	M.2499	2000	1
Art. 8(2) with conditions & obligations	M.2033	2000	1
Art. 8(2)	M.1879	2000	1
Art. 8(2)	M.2498	2000	1
Art. 8(2) with conditions & obligations	M.1806	2000	1
Art. 8(3)	M.2097	2000	0
Art. 8(2)	M.1882	2000	1
Art. 8(2) with conditions & obligations	M.2139	2000	1
Art. 8(4)	M.2416	2001	0
Art. 8(2)	M.2333	2001	1
Art. 8(2) with conditions & obligations	M.2533	2001	1
Art. 8(2) with conditions & obligations	M.2434	2001	0

Table B.1 (continued)

Type of Decision	Case no.	Year Notification	Rivals Heard
Art. 8(2) with conditions & obligations	M.2530	2001	1
Art. 8(2) with conditions & obligations	M.2547	2001	1
Art. 8(2)	M.2621	2001	0
Art. 8(2)	M.2495	2001	0
Art. 8(3)	M.2220	2001	1
Art. 8(2) with conditions & obligations	M.2568	2001	1
Art. 8(4)	M.2283	2001	0
Art. 8(2) with conditions & obligations	M.2420	2001	0
Art. 8(2) with conditions & obligations	M.2389	2001	1
Art. 8(3)	M.2187	2001	1
Art. 8(2)	M.2314	2001	1
Art. 8(2)	M.2201	2001	1
Art. 8(2) with conditions & obligations	M.2947	2002	1
Art. 8(2) with conditions & obligations	M.2903	2002	0
Art. 8(2)	M.2706	2002	1
Art. 8(2) with conditions & obligations	M.2876	2002	1
Art. 8(2) with conditions & obligations	M.2698	2002	1
Art. 8(2) with conditions & obligations	M.2650	2002	1
Art. 8(2) with conditions & obligations	M.2861	2002	1
Art. 8(2) with conditions & obligations	M.2822	2002	1
Art. 8(2)	M.3056	2003	0
Art. 8(2)	M.3216	2003	0
Art. 8(2) with conditions & obligations	M.2978	2003	0
Art. 8(2) with conditions & obligations	M.3083	2003	1
Art. 8(2) with conditions & obligations	M.2972	2003	0
Art. 8(2) with conditions & obligations	M.3099	2003	1
Art. 8(2) with conditions & obligations	M.3431	2004	1
Art. 8(2) with conditions & obligations	M.3436	2004	1
Art. 8(3)	M.3440	2004	1
Art. 8(2) with conditions & obligations	M.3916	2005	1
Art. 8(2) with conditions & obligations	M.3868	2005	1
Art. 8(2) with conditions & obligations	M.3796	2005	1
Art. 8(2) with conditions & obligations	M.3653	2005	1
Art. 8(2) with conditions & obligations	M.3687	2005	1
Art. 8(2) with conditions & obligations	M.3696	2005	1
Art. 8(2) with conditions & obligations	M.4187	2006	1
Art. 8(2) with conditions & obligations	M.4000	2006	1
Art. 8(2) with conditions & obligations	M.4404	2006	1
Art. 8(2) with conditions & obligations	M.4180	2006	1
Art. 8(3)	M.4439	2006	1
Art. 8(2) with conditions & obligations	M.4381	2006	1
Art. 8(2) with conditions & obligations	M.4525	2007	1
Art. 8(2) with conditions & obligations	M.4504	2007	1

Table B.1 (continued)

Type of Decision	Case no.	Year Notification	Rivals Heard
Art. 8(2)	M.3333	2007	1
Art. 8(2) with conditions & obligations	M.4726	2007	1
Art. 8(2) with conditions & obligations	M.4513	2007	1
Art. 8(2) with conditions & obligations	M.5153	2008	1
Art. 8(2) with conditions & obligations	M.4980	2008	1
Art. 8(2) with conditions & obligations	M.4919	2008	1
Art. 8(2) with conditions & obligations	M.5046	2008	1
Art. 8(2) with conditions & obligations	M.5335	2008	1
Art. 8(2) with conditions & obligations	M.5440	2009	1
Art. 8(3)	M.5830	2010	1
Art. 8(2) with conditions & obligations	M.5658	2010	1
Art. 8(2) with conditions & obligations	M.5675	2010	1
Art. 8(2) with conditions & obligations	M.6266	2011	1
Art. 8(2) with conditions & obligations	M.6203	2011	1
Art. 8(3)	M.6166	2011	1
Art. 8(2) with conditions & obligations	M.6286	2011	1
Art. 8(2) with conditions & obligations	M.6497	2012	1
Art. 8(2) with conditions & obligations	M.6576	2012	0
Art. 8(2) with conditions & obligations	M.6471	2012	0
Art. 8(2) with conditions & obligations	M.6690	2012	1
Art. 8(3)	M.6663	2012	1
Art. 8(2) with conditions & obligations	M.6410	2012	1
Art. 8(2) with conditions & obligations	M.6458	2012	1
Art. 8(3)	M.6570	2012	0

Table B.2: Competitor Participation as a share of Phase 2 cases EU (Figure 1)

Year Notification	Sum Participation	Sum Phase 2	Sum Participation/ Sum Phase 2
1990	0	2	0
1991	2	4	.5
1992	0	4	0
1993	0	3	0
1994	1	6	.167
1995	0	7	0
1996	1	6	.167
1997	5	13	.385
1998	4	4	1
1999	12	15	.8
2000	12	15	.8
2001	10	16	.625

2002	7	8	.875
2003	2	6	.333
2004	3	3	1
2005	6	6	1
2006	6	6	1
2007	5	5	1
2008	5	5	1
2009	1	1	1
2010	3	3	1
2011	4	4	1
2012	5	8	.625

Table B.3: Competitor objections as a share of Phase 2 cases with competitor involvement EU (Figure 2)

Year Notification	Sum Participation	Sum Objections	Sum Objections/ Sum Participation
1997	5	1	.2
1998	4	1	.25
1999	12	3	.25
2000	12	2	.167
2001	10	1	.1
2002	7	4	.571
2003	2	1	.5
2004	3	3	1
2005	6	6	1
2006	6	5	.833
2007	5	5	1
2008	5	5	1
2009	1	1	1
2010	3	3	1
2011	4	3	.75
2012	5	5	1

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