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## How Effective is European Merger Control?

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## **Abstract**

This paper applies a novel methodology to a unique dataset of large concentrations during the period 1990-2002 to assess merger control's effectiveness. By using data gathered from several sources and employing different evaluation techniques, we analyze the economic effects of the European Commission's (EC) merger control decisions and distinguish between blockings, clearances with commitments (either behavioral or structural), and outright clearances. We run an event study on merging and rival firms' stocks to quantify the profitability effects of mergers and merger control decisions. We back up our results and methodology by using alternative measures for the merger's profitability effects based on balance sheet data and obtain consistent results. Our findings suggest that outright blockings solve the competitive problems generated by the merger. Remedies are not always effective in solving the market power concerns, at least not on average. Nevertheless, both structural (divestitures) and behavioral remedies do help restore effective competition when correctly applied to anticompetitive mergers during the first investigation phase. Yet, they are on the whole ineffective or even detrimental when applied after the second investigation phase. Finally, remedies - especially behavioral ones - seem to constitute a rent transfer from merging firms to rivals when mistakenly applied to pro-competitive mergers.

*Keywords:* Mergers, Merger Control, Remedies, European Commission, Event Studies, Ex-post Evaluation

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## 1. Introduction

The evaluation of the economic effects of bureaucratic or legal institutions' decisions is both one of the most important but also one of the most difficult tasks in economics. When analyzing merger control decisions, for example, there is uncertainty about the merger effects per se, the impact of the antitrust authority's decision, and the perennial problem of the proper counterfactual: what would have happened had the two firms not merged, what would have happened had the authority (not) blocked the merger or (not) ordered a particular remedy? Merger control institutions are often criticized: they are protectionist (Aktas et al., 2006), are relatively open to capture (Evans and Salinger, 2002), hinder "globalization" and hence technological progress (GE/Honeywell), destroy synergistic efficiencies by unnecessarily intervening in the market place (Aktas et al., 2004) or, on the contrary, let anticompetitive mergers go through.

This paper applies a novel methodology to a unique dataset of large concentrations scrutinized by the European Commission (EC) during the period 1990-2002. By using data gathered from several sources and by employing different evaluation techniques, we avoid many of the ambiguities of previous studies on the effects of institutional decisions. In particular, we distinguish between blockings, clearances with commitments (i.e. behavioral or structural remedies), and outright clearances. We run an event study on merging and rival firms' stocks to measure the profitability effects of mergers and merger control decisions. We back up our results and methodology by using alternative measures for the merger's profitability effects based on balance sheet data and we obtain consistent results. Our findings suggest that outright blockings solve the competitive problems generated by the merger. Yet, remedies are not always effective in solving the market power concerns, at least not on average. Nevertheless, both structural (divestitures) and behavioral remedies do help restore effective competition when correctly applied to anticompetitive mergers during the first investigation phase. Yet, they are on the whole ineffective or even detrimental when applied in the second investigation phase. Furthermore, remedies - especially behavioral ones - seem to constitute a rent transfer from merging to rival firms when mistakenly applied to pro-competitive mergers.

We think that an evaluation of different policy instruments' effectiveness in merger control is particularly timely and necessary. While the European Commission cleared most of the over 3,000 notified mergers since 1990 without commitments (around 95%) as they presumably do not impose a threat to competition, few major mergers are completed without

some conditions and obligations being imposed such as divestitures, provision of access, termination of agreements, or other behavioral requirements. More than *half* of phase 2 decisions (i.e. decisions after an in depth analysis: 75 out of 126 or 59%) are compatible only with commitments, yet only 19 mergers have been blocked since 1990. Moreover, there are significantly fewer proposed mergers blocked in recent years, following the overruling of three of the Commission’s blocking decisions by the European Court of Justice in recent years (Airtours/First Choice; Schneider/Legrand; and Tetra Laval/Sidel), which were under the media spotlight and triggered major institutional changes.<sup>1</sup> These events made it essentially politically unfeasible for the Commission to block further mergers. Indeed, no merger was blocked in 2002, 2003 and 2005, and only one was blocked in 2004.

The situation is partially comparable to the USA, where remedies have been heavily used in merger control decisions. In its 1998 and 1999 fiscal years, the Federal Trade Commission (FTC) challenged 63 mergers; of these 41 (65%) involved negotiated restructurings, 18 (29%) were abandoned, and only four (6%) were litigated. Looking at the overall activity of the two jurisdictions, however, one observes some notable differences.<sup>2</sup> The European Commission was surely more “activist” between 1993 and 2002 than their American counterparts, with an average ratio between actions and notifications of 6.4%, while in the US in only 2.1 % of the notified mergers antitrust intervention was applied.<sup>3</sup> Nevertheless, the American authorities appear to have been much tougher than the EC when intervening in the last years (see figure 1). While the ratio between blocking decisions and notifications is on average almost equal in the two jurisdictions over the entire sample, in the last sample year it diverged significantly with much more blockings per notifications in the US than in Europe.

**[figure 1 about here]**

Despite its economic importance, there is almost no systematic econometric evidence on whether merger control achieves what it is supposed to achieve, namely to “protect and restore effective competition.” This paper is the first study to accomplish this. We analyze the

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<sup>1</sup> See <http://www.europa.eu.int/comm/competition/mergers/cases/stats.html> for statistics on EU merger control.

<sup>2</sup> We thank Joe Clougherty and Jo Seldeslachts for providing us with this data (see Seldeslachts, Clougherty, and Barros, 2006). While our approach looks at the effectiveness of particular policy decisions in restoring competition, they focus on possible deterrence effects that some of the antitrust decisions might have. They find that only outright blockings have a deterrence effect on future notifications.

<sup>3</sup> Note, however, that this might also be due to the kinds of mergers under scrutiny by the EC. They are all big mergers, the smaller ones being under the jurisdiction of the national authorities. The DOJ and FTC, instead, are in charge of all mergers happening in the US. If one believes that big mergers are on average more likely to be anticompetitive than smaller ones, then one should observe more intervention by the EC than by the DOJ and FTC.

effects of merger control decisions using a sample of 167 mergers scrutinized by the European Commission between 1990 and 2002. In a first step we use standard event study methodology to compute the cumulative average abnormal returns (CAAR) around relevant events for both merging firms as well as for rival firms, which have been identified by the Commission itself and retrieved from its published files. According to our approach, the CAAR around the merger's announcement capture the merger competitive impact, while the CAAR around the announcement of the Commission decision measures the merger control's effects.

The novelty of our approach lies in relating these stock market reactions using regression analysis to measure the effectiveness of merger control. The general idea is that anticompetitive rents generated by the merger either for merging firms or - and in particular - for their rivals at the *announcement* of the merger should be dissipated by the final antitrust authority *decision*, if this decision is effective in preserving competition. Consequently, in this case, we expect a *negative* relationship between decision CAARs and announcement CAARs. Moreover, the design of our tests gives us an absolute benchmark of the remedies' effectiveness and, simultaneously, a robustness check for our method: we *know* whether outright blockings are effective in restoring competition by whether they re-establish the pre-merger situation. Thus, we expect a coefficient of minus *one* in this case: all rents that would be generated by this anticompetitive merger are dissipated by the antitrust authority's final decision to block the merger.

Reassuringly, we get a significant negative coefficient in case of blocking decisions and it is not significantly different from minus one. However, we do not always get negative coefficients when other remedies have been applied, casting doubts on their general effectiveness. Sometimes we even get significantly positive coefficients in the rivals' regressions and, for the same cases, significantly negative coefficients for the merging firms. This finding points to substantial rent transfers from merging firms to their rivals when remedies are ordered without solving the anticompetitive problem.

A second novelty of our paper is to propose a way to account for the market expectation about the antitrust inquiry's outcome. In fact, some of our results could be explained by the market updating its beliefs about a particular antitrust action, once the uncertainty about the merger investigation is resolved. We use observable mergers' characteristics to estimate the probability of a particular decision and correct our profitability measures accordingly. Our main results about the effectiveness of blocking and the relative ineffectiveness of remedies are not only confirmed but even reinforced.

Finally, to underline the robustness of our approach and results, we apply a second methodology based on (balance sheet) profitability effects two years after the merger to estimate the merger's effects following Gugler et al. (2003), and show that the results are consistent.

The paper proceeds as follows. In section 2 we present the institutional background of the EU merger control. In section 3 we shortly describe the related literature on the assessment of antitrust decisions. Section 4 discusses our main methodology and hypotheses and highlights our approach to correct the profitability measures for the market expectation about the antitrust investigation. In section 5, we introduce the data, present the results of the event studies, and discuss some measurement issues. Section 6 highlights our main results and presents a first set of robustness checks. In section 7 we discuss the methodology based on balance sheet data and present a second set of robustness checks. Finally, section 8 sums up and concludes with some remarks.

## **2. Institutional Details**

Merger control in the EU began with the European Communities Merger Regulation (ECMR), which came into force on September 21, 1990.<sup>4</sup> Since then more than 4,000 mergers were scrutinized by the European Commission. According to the ECMR, a merger has community dimension, hence it is under jurisdiction of the Commission, if “it takes place between firms with a combined worldwide turnover of at least 5 billion Euros and a turnover within the European Economic Area of more than 250 million Euros for each of at least two of the undertakings unless each undertaking achieves more than 2/3 of its aggregate Community turnover within one and the same member state.” This definition also includes mergers between firms that produce outside of Europe and sell into Europe. If necessary, a merger can be referred back to the member states for review.

Art. 2(3) of the ECMR states that “A concentration, which creates or strengthens a dominant position as a result of which effective competition would be significantly impeded in the common market or in a substantial part of it, shall be declared incompatible with the common market.” This is commonly referred to as the dominance test (DT). DT constitutes an important difference to the SLC (Substantial lessening of competition) test, which is used

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<sup>4</sup> Council Regulation (EEC) No. 4064/89 was amended by Council Regulation (EC) No. 139/2004 on the control of concentrations between undertakings that entered into force on January 20, 2004. Commission Regulation (EC) No.802/2004 implements the Council Regulation (EC) No. 139/2004. See <http://europa.eu.int/comm/competition/mergers/review/> for a description of the review process.

by US competition authorities. Some observers (e.g., Lyons, 2004) argue that the DT puts unnecessary weight on the concept of dominance in cases where the more important issue concerns the *significant impediment of effective competition*. The new merger regulation, which is applicable from May 1, 2004, focuses on a merger's impact on competition.

These regulations define the legal steps, which serve to control concentrations between undertakings (see figure 2). Merging parties are obliged to notify their intentions to merge to the Commission when the deal has a community dimension. After receiving notification of the concentration, the Commission has 25 working days to assess whether the concentration is compatible with the common market (the so called phase 1).

**[figure 2 about here]**

After this short period of time, the Commission can either clear the proposed concentration unconditionally (Art 6.1.b), it can decide to let it go through after verifying that the commitments and obligations proposed by the undertakings can effectively restore competition (Art. 6.2.), or it can decide that the proposed concentrations raise serious doubts as to their compatibility with the common market (Art. 6.1c) and, therefore, a more in depth analysis is needed. Notice that the Commission cannot outright block a merger after the phase 1 investigation. In this case, the Commission opens the so-called phase 2, which consists of 90 working days, and during which an in depth investigation is carried out. Generally, the Commission makes use of the entire available time, given the problematic nature of these cases, after which it has to come to a final decision: either to block the merger (Art. 8.3) or to let it through unconditionally or with commitments and obligations (Art. 8.2.).

Looking at figure 2, there are three events, which are important for our empirical analysis. The first is the merger announcement, which we define as the first rumor appearing in the press about the proposed merger, and which should help us identify the market assessment of the merger's competitive effects. The other two relevant events are the phase 1 and the phase 2 decision dates, which should help us identify the effect of remedial action, as we will discuss in section 4.

### **3. Literature**

Despite the large interest attracted by antitrust issues in the literature, the study of the effectiveness of merger control decisions, which is the aim of our paper, has been very

limited.<sup>5</sup> The most recent analyses of this question are two reports commissioned by the world's leading antitrust authorities: US and EU. The study commissioned by the FTC (1999) reviews 35 divestiture orders from 1990 through 1994.<sup>6</sup> Based on interviews, the authors argue that most divestitures appear to have created viable competitors in the concerned market (28 out of 37), whereas a higher percentage (19 out of 22) of divestitures were successful when they involved the sale of an entire ongoing business. Similarly, at the end of 2005 the Directorate General for Competition of the European Commission published an in-house study on merger remedies (DG Comp, 2005). It reviews the design and implementation of 85 different remedies adopted in 40 decisions of the European Commission between 1996 and 2000. Also in this case, the analysis is done by means of interviews with the committing parties or sellers, licensors and grantors, the purchasers or buyers, licensees and grantees and the trustees. More than half (57% ) of the analyzed remedies were considered to have been effective, 24% were only partially effective since they raised design or implementation issues that were not resolved during implementation, only 7% were clearly "ineffective", and 12% have been categorized as "unclear" remedies. While certainly informative, the fact that these divestiture studies only use qualitative information (interviews) for a small number of cases limits their validity for a more comprehensive sample.

In this paper, we propose to use an event study methodology to directly assess merger control's effectiveness. Eckbo (1983), Stillman (1983), and Eckbo and Wier (1985) are the first papers that use event studies to analyze antitrust decisions.<sup>7</sup> Rather than looking at stock reactions to a particular antitrust decision as a way of identifying its effectiveness, they use this event to identify the competitive nature of the merger, i.e. whether market power or efficiencies are the drivers of post-merger firms' profitability. Eckbo and Wier (1985) look at 259 horizontal and vertical mergers in mining and manufacturing industries of which 76 were challenged. Although they find significantly positive abnormal returns for rival firms, they argue that this positive valuation effect may be due to positive information released by the merger: the merger announcement is good news from the rival firms' perspective, because it

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<sup>5</sup> See Duso, Gugler, and Yurtoglu (2006) for an in depth analysis of the literature.

<sup>6</sup> Earlier studies tried to evaluate the ex post effectiveness of ordered remedies in the USA using a case-by-case approach. Elzinga (1969), Pfunder, Plaine and Whittemore (1972) and Rogowsky (1986) use a methodology that is based on classifying ordered remedies as successful, sufficient, deficient, or unsuccessful depending on whether they fulfill certain criteria. While Elzinga (1969) argues that only one out of ten cases can be classified as successful or sufficient, the success rate in Rogowsky's (1986) sample increases to four out of ten.

<sup>7</sup> Ellert (1976) is the first study that looks at valuation effects of anti-merger complaints. He does not, however, consider the impact on rival firms' stock returns. There are also a number of studies that use event study methodology to evaluate the effects of mergers but do not analyze antitrust authority decisions, such as Banerjee and Eckard (1998), McGuckin et al. (1992), Mullin et al. (1995), Shahrur (2005), Simpson (2001), Singal (1996), Slovin et al. (1991), and Song and Walkling (2000).



makes them (or the market) aware of real profit opportunities that were so far unknown. To separate the market power effect from the information effect, they also estimate abnormal returns to rival firms around the time of an antitrust challenge, however, do not find statistically significant abnormal decreases in the stock prices of rival firms. Thus, they claim that the mergers in their sample do not raise market power on average. Several follow-up studies tackle the same issue. Schumann (1993) conducts an event study analysis of 37 acquisitions that were challenged by the FTC over the period 1981-1987 and comes up with the same pattern of abnormal returns as in Eckbo (1983) and Eckbo and Wier (1985). He reports positive abnormal returns to rivals around the antitrust complaint, which are positive and larger for smaller rivals.<sup>8</sup>

Fee and Shaw (2004) also find only little evidence consistent with collusion. They look at the upstream and downstream product market effects of horizontal mergers and identify the customers, suppliers, and rivals of the merging firms. In their sample of 554 US mergers, the net effect of a merger on a particular supplier depends largely on the supplier's ability to retain its product market relationship with the merged entity. They report positive abnormal returns to rivals of merging firms around announcements, which range from 0.67% to 2.61%. The antitrust challenge of such mergers, however, does not lead to negative abnormal returns for rivals. The evidence provided by Bittlingmayer and Hazlett (2000) on the antitrust action against Microsoft also rejects the joint hypothesis that (a) Microsoft's conduct was anticompetitive and (b) antitrust policy enforcement produced net efficiency gains.<sup>9</sup>

In contrast to this fairly long list of event studies on mergers in the US, there are only a few very recent studies of mergers that were analyzed by the European Commission.<sup>10</sup> Using the same sample of EU mergers utilized in this paper, Duso, Neven, and Röller (2006) find evidence in favor of the market power hypothesis. Yet, they only look at whether the Commission made errors and their determinants, without further exploring the issue of whether the Commission's decisions were on the whole effective. Aktas *et al.* (2004) look at 602 EU Commission's decisions involving 1070 firms, and document significant abnormal returns for the target firms and smaller and less significant bidder abnormal returns. Similarly

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<sup>8</sup> For a criticism of this methodology, see McAfee and Williams (1988).

<sup>9</sup> Carstensen (1999) offers a less favorable conclusion on the Microsoft case. See also Comanor (2001), who discusses the problem of remedy in the specific Microsoft case.

<sup>10</sup> Brady and Feinberg (2000) use event studies to evaluate the impact of the EU merger regulation's introduction and the effects of particular news with respect to the development of EU procedures in specific cases (like the decision to open a phase 2 investigation). They focus on merging firms and do not consider the effect on competitors.

to our results, they also estimate the abnormal stock price reaction to phase 1 and phase 2 decisions and find that outright prohibitions are associated with negative abnormal returns and approvals subject to conditions are relatively good news. In another paper, Aktas *et al.* (2006) suggest that European merger control is protectionist. They reach this conclusion by showing that the likelihood of an intervention by the EU Commission is higher, whenever the merger is proposed by a bidder from outside the EU and has a negative effect on European rivals.

Summing up, the evidence on mergers and merger control decisions is rather mixed. While most studies find positive effects of the merger for rivals, the interpretation differs. Some authors interpret this as being consistent with the information revelation hypothesis (e.g. Eckbo, 1983; and Eckbo and Wier, 1985), while other authors interpret it as consistent with market power (e.g. Singal, 1996). There is no event study explicitly analyzing the effectiveness of ordered remedies. Studies of remedies on a case-by-case approach point to the superiority of structural over behavioral remedies, but leave doubt about their general effectiveness. Theoretical arguments underline this.<sup>11</sup> In what follows, we try to resolve these ambiguities by (1) relating announcement and decision abnormal returns and (2) conducting an ex post study of merger effects.

#### **4. Hypotheses and Methods**

When firms decide to merge, they potentially generate two externalities on rival firms: A positive externality due to the merger's market power effect and a negative externality due to the potential efficiency gains generated by the merger. The first effect arises since, post-merger, there is one less firm in the market and, *ceteris paribus*, pricing will be less aggressive leading to higher prices and profits ("price umbrella").<sup>12</sup> Merging firms internalize their former negative pricing externality on each other and set higher prices, *ceteris paribus*. In both Cournot and Bertrand with differentiated products type of models, market output declines and prices rise absent efficiency gains (see Salant *et al.*, 1983; Farrell and Shapiro, 1990; or Gugler and Siebert, 2004). Particularly, rival firms gain since they need not bear the quantity reduction of insiders and nevertheless benefit from the higher prices: the merger paradox. The

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<sup>11</sup> Motta *et al.* (2003) enumerate the most important pros and cons of the different kinds of remedies (i.e. structural and behavioral) used by the European Commission. While they in principle favor the use of structural remedies to clear problematic mergers, they also point to information asymmetries and incentive problems, as well as to the increased possibility of pro-collusive effects of divestitures. Farrell (2003) argues that the effectiveness of structural remedies may suffer from inadequate buyers, "over" (or miss-) fixing and the discounting of merger efficiencies. Cabral (2003) also qualifies for the superiority of structural remedies.

<sup>12</sup> This is the sum of the anticompetitive effects of a merger that are called in the antitrust jargon "unilateral effects" – price increases due to imperfectly competitive markets – and "coordinated effects" – price increases due to the post-merger increased likelihood of collusive agreements.

second effect, higher efficiency, leads to lower prices and benefits only insiders. Rival firms lose from fiercer competition.

An effective merger control policy should target only anticompetitive mergers: where the market power problems are severe and strong enough to overcome any positive welfare effects due to efficiency gains. Moreover, in such mergers, the antitrust authority should be able to reduce the rents stemming from increased market power without destroying rents stemming from increased efficiency. Therefore, to measure merger control effectiveness we need three steps: (i) classify anticompetitive mergers, (ii) measure the rents generated by mergers and antitrust decisions, and (iii) relate these measures by means of regression analysis. We next discuss these three steps.

#### 4.1 Merger Taxonomy: Anticompetitive Mergers

For a large class of static oligopoly models, a merger generates unilateral incentives to increase prices for both merging firms and rivals at costs of consumers. Hence, there exists a clear correspondence between increase in rivals' profits and the decrease in consumers' surplus after the merger if efficiency gains are absent (Farrell and Shapiro, 1990).<sup>13</sup> This will be one of our main identifying assumptions: a merger is anticompetitive (i.e. reduces consumers' surplus) if it increases competitors' profits.<sup>14</sup>

In principle, a merger might have four possible effects on the merging and rival firms' profits. Table 1 lists these four possibilities as well as the optimal incidence of an antitrust action. If the merger generates positive profits for both the merging and the rival firms ( $\Delta\Pi_M > 0$  and  $\Delta\Pi_R > 0$ ),<sup>15</sup> the market power effect following from the merger outweighs any efficiency gains. In this case, the authority should act by imposing the appropriate remedies or by blocking the merger.

[table 1 about here]

If the merger generates positive profits for the merging firms but has a negative effect on rival firms' profits ( $\Delta\Pi_M > 0$  and  $\Delta\Pi_R < 0$ ), the efficiency effect of the merger outweighs

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<sup>13</sup> Duso, Neven, and Röller (2006) present a formal derivation of this result. They show that it holds for Cournot and Bertrand with differentiated goods.

<sup>14</sup> Implicitly, we assume that the antitrust agency follows a consumer surplus standard, which indeed is the welfare standard adopted by the US and EU authorities.

<sup>15</sup>  $\Delta\Pi_i$  ( $i = M, R$ ) represent changes in profits following the merger for merging firms (M) and rivals (R) respectively.

the market power effect, since only merging firms enjoy increased efficiency. There should be no remedies in this case, at least none that (also) reduce the efficiency gains from the merger.<sup>16</sup>

The fact that mergers, which reduce the efficiency and profits of merging firms, happen cannot be well explained by standard industrial organization models.<sup>17</sup> Nevertheless, there is overwhelming evidence that many of such mergers do take place. For example, Gugler *et al.* (2003) find several of these mergers taking place around the world and attribute them to managerial motives, such as growth and size maximization. Within this category, two cases can be distinguished: mergers that reduce the profits of the merging firms but increase the profits of the rival firms and mergers that reduce profitability of both parties. In the first case, if industry profits go up ( $\Delta\Pi_I > 0$ ), the merger may be considered as being predominantly anticompetitive since rival firms react to the reduced efficiency of the merging firms by increasing their prices. Here remedies may be considered, although the source of the problem is not one of competition policy but one of inadequate corporate governance. If industry profits go down, nothing can be said about the anticompetitive effects and necessary remedies. The same holds true in the last case, where both merging and rival firms' profits decrease ( $\Delta\Pi_M < 0$  and  $\Delta\Pi_R < 0$ ).

#### 4.2. Measuring Firms' Profitability: The Event Study Methodology

In the first step of our analysis, we use event study methodology to measure firms' profit increases.<sup>18</sup> Under the assumptions of efficient markets and rational expectations, the market model predicts that firm  $i$ 's stock return at day  $t$  ( $R_{i,t}$ ) is proportional to a daily market return ( $R_{m,t}$ ):

$$R_{i,t} = \alpha + \beta R_{m,t} + \varepsilon_{i,t}.$$

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<sup>16</sup> Remember that, according to the merger regulation, efficiencies should be "merger specific" and should "benefit consumers". See Röller *et al.* (2001) on considerations about the role of efficiency gains in merger control.

<sup>17</sup> One exception is the literature on pre-emptive mergers (see Fridolfsson and Stennek, 2005). In these models, profit maximizing firms rationally do unprofitable mergers in order to pre-empt rivals, in those cases where being an insider is more profitable than being an outsider. Alternatively, Banal-Estañol and Seldeslachts (2005) propose a theory of merger failures based on private information about synergy gains, costly integration efforts, and strategic uncertainty. Of course, another simple explanation is that unprofitable mergers happen just because managers make evaluation mistakes in a world with imperfect information.

<sup>18</sup> In section 7 we will introduce an alternative approach for measuring firms' profitability based on accounting data (see Gugler *et al.* 2003), which will be used to test the robustness of the approach developed here.

To study the stock price reaction to the mergers' announcement, we estimate the market model over 240 trading days, starting 50 days prior to the announcement day and using the Scholes–Williams (1977) method. We obtain estimated values for the model's parameters  $\alpha$  and  $\beta$ , which we can use to predict what firm  $i$ 's stock price would have been, had the event under consideration (merger or antitrust decision) not occurred. For firm  $i$ , we calculate then the abnormal return around the mergers' announcement day  $t$  ( $AR_{i,t}$ ) as:

$$AR_{i,t} = R_{i,t} - \hat{R}_{i,t} = R_{i,t} - \hat{\alpha} - \hat{\beta} R_{m,t}.$$

Under the null hypothesis of efficient markets, abnormal returns have zero mean and a variance equal to:

$$Var(AR_{i,t}) = \sigma^2_{\varepsilon_{j,t}} + \frac{1}{L} \left[ 1 + \frac{R_{mt} - \bar{R}_m}{\sigma^2_m} \right],$$

where  $L$  is the estimation period length and  $\bar{R}_m$  and  $\sigma^2_m$  are respectively the mean and variance of the market portfolio.

For merging firms and all rivals, we then calculate a cumulative abnormal return over an event window of  $x+y+1$  days ( $x, y = 0, 1, 2$ , etc.):

$$CAR_{i,t,x,y} = \sum_{\tau=t-x}^{\tau=t+y} AR_{j,\tau}.$$

In order to obtain the aggregate effects of merger  $j$  on merging firms ( $i=M$ ) and on rivals ( $i=R$ ) around the events of interest ( $\Delta\Pi_{ij}^a$ , where  $a = A, D$  denotes the event: merger's announcement,  $A$ , and antitrust decision's announcement,  $D$ ), we take the weighted average of the cumulative abnormal returns of all firms in each of the two groups ( $i=M, R$ ), the weight being firm  $j$ 's market value ( $MV_j^a$ ):<sup>19</sup>

$$\Delta\Pi_{ij}^a = \frac{\sum_{f=1}^{N_{ij}} CAR_f^a MV_f^a}{\sum_{f=1}^{N_{ij}} MV_f^a} \quad f = 1, \dots, N_{ij}, \quad i = M, R, \quad a = A, D.$$

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<sup>19</sup> With a slight abuse of notation, due to nature of our data where the unit of observation is not the firm but rather the merger, we drop the time index  $t$  and the window indexes  $x$  and  $y$ . We introduce instead the index  $a = A$  (announcement),  $D$  (decision). Moreover, from now on, the index  $i$  will not indicate a particular firm but rather a group of firms  $i=M$  (merging firms),  $R$  (rivals).  $N_{ij}$  represents the maximum number of firms in each of the two groups for merger  $j$ .

These weighted average abnormal returns give us a measure of the merger and decision profitability effects. We can now define merger  $j$  to be anticompetitive if  $\Delta\Pi_{Rj}^A > 0$ .

### 4.3. Hypotheses Testing

We can now turn to the measurement of merger control's effectiveness. After the merger, insider firms' profitability should rise due to both effects highlighted before: higher market power and efficiency. Hence, their cumulative average abnormal returns (CAAR) around the announcement of the merger should be positive (i.e.  $\Delta\Pi_{Mj}^A > 0$ ). Rival firms' profitability – hence their CAARs around the merger announcement - should rise only if the merger increases product market prices (i.e. the market power effect is larger than the efficiency effect), and should diminish if the reverse is true.

The decisions of antitrust authorities can also have two major effects. Either the antitrust action - i.e. clearance (no action), remedies, or blocking - is effective or not. A clearance decision should not impact firms' profitability, since it corresponds to the absence of an antitrust action. Remedies, instead, should have different effects depending on the merger's competitive nature and their effectiveness. If, for instance, remedies are applied to the right mergers - i.e. those that would otherwise increase product prices and are hence anticompetitive - and they are effective, the decision-day abnormal returns of both, merging ( $\Delta\Pi_{Mj}^D$ ) and rival firms ( $\Delta\Pi_{Rj}^D$ ), should be negative. Yet, only the fraction of merging firms' positive profitability increase due to the market power effect should be dissipated by effective remedies, since the antitrust action should not destroy the merger induced efficiency gains. If remedies are applied to the wrong (pro-competitive) mergers, the decision day abnormal returns of merging firms should be negative ( $\Delta\Pi_{Mj}^D < 0$ ) and the CAARs of rival firms should be positive ( $\Delta\Pi_{Rj}^D > 0$ ). If remedies are not effective, stock markets should not react. The extreme action taken by the Commission, i.e. blockings, should of course be "effective" in the sense that it should revert to the pre-merger situation.

This reasoning is true only if the market does not have expectations about the effect of the antitrust action, otherwise many of the observed effects could simply be due to information revelation and represent an update of the market's priors about the Commission's decision. We will pick up on this point in the next section, where we develop an approach to account for this problem.

According to the discussion above, we propose to measure the "degree of effectiveness" of an antitrust action by running the following basic regression:

$$\Delta\Pi_{ij}^D = a + b_C \cdot C_j \cdot \Delta\Pi_{ij}^A + b_O \cdot O_j \cdot \Delta\Pi_{ij}^A + b_D \cdot D_j \cdot \Delta\Pi_{ij}^A + b_B \cdot B_j \cdot \Delta\Pi_{ij}^A + gX_j + \eta_{ij} \quad (1)$$

where subscript  $i$  denotes either merging or rival firms and subscript  $j$  denotes the merger, which is our unit of observation. The dummy  $C_j$  takes on the value of one, if merger  $j$  is cleared without commitments and zero otherwise. The dummy  $O_j$  takes on the value of one and zero otherwise, if merger  $j$  is cleared with mainly behavioural commitments, such as terminating existing exclusive agreements, granting access to a necessary infrastructure, or licensing agreements, i.e. all those remedies that are not divestitures and which are mentioned in the Commission Notice on remedies (2001) under "Other remedies". The dummy  $D_j$  takes on the value of one and zero otherwise, if merger  $j$  is only cleared under the commitment that parts of the combined company are divested (structural remedies). The dummy  $B_j$  takes on the value of one and zero otherwise, if merger  $j$  is blocked after an in depth analysis of the case. The variables contained in  $X$  are exogenous controls.

It is important to notice that the direction of causality must run from announcement day abnormal returns to decision period abnormal returns: the EU Commission should impose stricter remedies in cases where potential market power concerns are more severe. That is, announcement day abnormal returns *determine* the Commission's action, which in turn determines decision period abnormal returns.

The  $b$ -coefficients measure the degree of market power (profit) reversion due to the final decision of the EU Commission. That is, if remedies are effective, then profits due to market power at the announcement day should be (at least partially) dissipated by the final decision and  $b$  should be negative. The higher these profits (or abnormal returns) are around the announcement day, the larger should be the decline in profits (abnormal returns) due to the decision. If remedies are perfectly effective in restoring competition, the hypothesis  $b = -1$  should not be rejected for rivals: all anticompetitive rents generated by the merger are reversed by the final decision. This is not necessarily true for the merging firms, as we noted before, if part of the merger's profitability effect is generated by efficiency gains.

It should be noted that  $b_B$ , i.e. the coefficient for blockings, *must* have a coefficient of minus one if our methodology is correct. We *know* that blocking is an effective remedy for an anticompetitive concern. This provides an additional test not only for our methodology, but more generally for using the event study methodology to assess anticompetitive effects of

mergers. Essentially, this complete profit reversion for both merging and rival firms is due to the fact that blocking restores the pre-merger situation.<sup>20</sup>

If remedies are not effective, this should show up in zero or positive  $b$ -coefficients for rival firms. Anticompetitive rents that the market foresaw at the merger announcement are reinforced (or at least not reduced) by the Commission's decision. This could happen since the market expected tougher remedies and did not increase rivals' share price adequately at the announcement day and now simply updated. Otherwise, it could happen since a behavioral remedy or a divestiture are considered as rent transfers from merging firms to rivals without remedying the anticompetitive concern.<sup>21</sup>

If the Commission wrongly imposed remedies - i.e. it imposed remedies to mergers that would increase efficiency - merging (rival) firms would lose (win) from such a decision, since the efficiency gains are not longer attainable. Therefore, we expect negative (positive)  $b$ 's for merging (rival) firms.

#### 4.4. Accounting for Market Expectations

Until now we have not considered that an efficient market should also account for the future antitrust decision when reacting to a merger announcement. Yet this seems to be a too strong assumption. We will now assume that the market can build expectation about the effect of the Commission's action  $a$  ( $a=clear, action$ ) on firms  $i$  for merger  $j$  ( $\Delta\Pi_{ij}^{D_a}$ ), given the *public* information available in the market around the merger's announcement day ( $I_A$ ). When expectations are rational, the expected value of the Commission's decision can be written as:

$$E[\Delta\Pi_{ij}^D | I_A] = \sum_a \Delta\Pi_{ij}^{D_a} Pr[a_j | I_A], \quad a = clear, action,$$

where  $Pr[a_j | I_A]$  is the probability of action  $a$  - i.e. clearance, remedies or blockings.

The observed abnormal return for firms  $i$  ( $i=M, R$ ) around the announcement day ( $\Delta\Pi_{ij}^A$ ) is then equal to the real effect of merger  $j$  for firms  $i$  ( $\Delta\Pi_{ij}^{A*}$ ) minus the expected value of the effect of the Commission's action, given the information available in the market at that time about remedies ( $I_A$ ). Assuming that any effective action (remedies or blockings)

<sup>20</sup> However, one can expect even a coefficient smaller than minus one for merging firms, if the opportunity costs of going through the antitrust investigation are judged to be very high.

<sup>21</sup> See for example the merger between SIEMENS AG and VA TECH AG. In this case, the commission cleared the merger under the condition that Siemens divests one part of VA TECH, VA TECH Hydro, operating in the relevant market in Austria. Once the acquirer of this divested asset, Andritz AG - a direct competitor of Siemens in the Austrian market - was announced, its stock price jumped up by almost 10%.



destroys all anticompetitive profits accruing from the merger – i.e.  $\Delta\Pi_{ij}^{D_a} = \Delta\Pi_{ij}^{A^*}$  – and a clearance does not have any profitability effect– i.e.  $\Delta\Pi_{ij}^{D_c} = 0$  –, we can then write the following:

$$\begin{aligned}\Delta\Pi_{ij}^A &= \Delta\Pi_{ij}^{A^*} - E\left[\Delta\Pi_{ij}^{D^*} \mid I_A\right] \\ &= \Delta\Pi_{ij}^{A^*} - \Delta\Pi_{ij}^{D_c} \Pr[\text{clear}_j \mid I_A] - \Delta\Pi_{ij}^{D_a} \Pr[\text{action}_j \mid I_A] \\ &= \Delta\Pi_{ij}^{A^*} (1 - \Pr[\text{action}_j \mid I_A]) = \Delta\Pi_{ij}^{A^*} \Pr[\text{clear}_j \mid I_A]\end{aligned}$$

Therefore, the real effect of merger  $j$  on firms  $i$  is:

$$\Delta\Pi_{ij}^{A^*} = \Delta\Pi_{ij}^A / \Pr[\text{clear}_j \mid I_A], \quad (2)$$

i.e. the measured announcement CAAR divided by the ex-ante probability that the merger will be cleared.<sup>22</sup> The market can build a prior of this probability by using past information, which is exactly what the econometrician can do by running a logit regression to assess the probability of clearance given the merger's observables. Once one has such a measure, one can build a proxy for the merger  $j$ 's real effect on firms  $i$ 's profitability ( $\Delta\Pi_{ij}^{A^*}$ ) according to equation (2) and use this in regression (1) instead of  $\Delta\Pi_{ij}^A$ .

Similarly, at the time of the Commission's decision some new information hits the market, which updates its beliefs about the effects of a particular decision. The first important date is the phase 1 decision. The phase 1 decision's effect ( $\Delta\Pi_{ij}^{P1}$ ) is the difference between the antitrust action's *real effect* on firms  $i$  ( $\Delta\Pi_{ij}^{D^*}$ ) and the market expectation about this action for merger  $j$ . Of course, if all information is public, then there should be no surprise for the market and, hence, we should not observe any abnormal return around the decision day. Yet, it seems reasonable to assume that some *private* information generated during the bargaining process between the Commission and the merging parties is unknown to the market. If market power concerns are substantial and the Commission decides to open a phase 2 investigation,

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<sup>22</sup> This is true for competitors but not necessarily for the merging firms, since a part of the merger's profitability effect does not come from an increase in market power but rather from increased efficiency, which should not be dissipated by the antitrust decision. Hence, it must not necessarily hold that  $\Delta\Pi_{Mj}^{D_a} = \Delta\Pi_{Mj}^{A^*}$ .

the market updates its beliefs about remedies.<sup>23</sup> Therefore, the abnormal returns around phase 1 decision ( $\Delta\Pi_{ij}^{P1}$ ) for mergers that go into a phase 2 investigation should simply be the update of the market expectation about remedies, given the newer information set available at this point in time ( $I_{P1}$ ).<sup>24</sup>

Summarizing, the phase 1 effect is the following:

$$\Delta\Pi_{ij}^{P1} = \begin{cases} \Delta\Pi_{ij}^{D*} - E[\Delta\Pi_{ij}^{D*} | I_A] = \Delta\Pi_{ij}^{D*} (1 - \Pr[\text{action}_j | I_A]) & \text{if } \text{phase 1} \\ E[\Delta\Pi_{ij}^{D*} | I_{P1}] - E[\Delta\Pi_{ij}^{D*} | I_A] & \text{if } \text{phase 2} \end{cases}.$$

Therefore, the real impact of the Commission's decision for a case that does not go into phase 2 is:

$$\Delta\Pi_{ij}^{D*} = \frac{\Delta\Pi_{ij}^{P1}}{(1 - \Pr[\text{action}_j | I_A])}. \quad (3)$$

Again, the market can have a prior about the probability of an action in phase 2 at the merger announcement. To control for that, we will use logit analysis to predict this probability as a function of the merger's observables.

Similarly, around the day of the phase 2 decision, the abnormal return ( $\Delta\Pi_{ij}^{P2}$ ) should measure the difference between the real value of an action in phase 2 (remedies or prohibitions) and the expectation that the market built given the information available on the phase 1 decision  $\Delta\Pi_{ij}^{P2} = \Delta\Pi_{ij}^{D*} - E[\Delta\Pi_{ij}^{D*} | I_{P1}] = \Delta\Pi_{ij}^{D*} - \Delta\Pi_{ij}^{P1} - E[\Delta\Pi_{ij}^{D*} | I_A]$ ,  $i=M, R$ . Hence, at the end of a phase 2 investigation the impact of the Commission's decision is:

$$\Delta\Pi_{ij}^{D*} = (\Delta\Pi_{ij}^{P2} + \Delta\Pi_{ij}^{P1}) / (1 - \Pr[\text{action}_j | I_A]). \quad (4)$$

Again, we can compute the probability of an action by running a logit regression and correcting our profitability measure to account for it. We then run regression (1) by using  $\Delta\Pi_{ij}^{A*}$  and  $\Delta\Pi_{ij}^{D*}$  instead of  $\Delta\Pi_{ij}^A$  and  $\Delta\Pi_{ij}^D$ .

<sup>23</sup> Indeed, when a case goes into phase 2, the probability of an antitrust intervention increases sharply. According to the statistics produced by the European Commission, the incidence of remedies in phase 1 is 4%, while it increases to over 60% in phase 2. Moreover, a merger can be prohibited only after a phase 2 investigation.

<sup>24</sup> Actually at the beginning of a phase 2 investigation, the market could also value the cost of such a procedure. Therefore, the abnormal return around the phase 1 decision for those mergers that went into a phase 2 investigation might also reflect the high costs these firms are expected to pay.

## 5. The Data and the Estimated Abnormal Returns

Our sample consists of 167 concentrations that have been analyzed by the European Commission in the period 1990-2002. Our starting database was developed in Duso, Neven, and Röller (2006). Our sample includes almost all phase 2 mergers scrutinized by the EC till the end of 2001, and a randomly drawn sample of phase 1 cases, which run up to June 2002. Because of difficulties in identifying competitors or their stock, we end up with 78 phase 2 cases and 89 phase 1 cases for which we have complete information. We identify 544 different firms involved in several mergers either as merging parties or as rivals.

Merging firms and competitors are identified from the publicly available Commission's decisions.<sup>25</sup> This is a big advantage of our data set, since we can rely on the Commission's analysis concerning the market definition (the relevant competitors). Furthermore, the Commission's reports also provide in-depth information about the mergers' and decisions' characteristics, such as the kind of concentration (e.g. full versus partial merger), the nature of the merger (horizontal vs. conglomerate/vertical), the involved product and geographical markets, the kind of remedies imposed, the provenience of the involved firms, etc.

The mergers' announcement date is collected from the financial press by using the Dow Jones Interactive database. This is a customizable business news and research product that integrates contents from newspapers, newswires, journals, research reports, and web sites. We look at the first rumors about the merger, i.e. the first time a discussion of the merger appears in the international press, and not necessarily the official merger's announcement by the involved parties. This has the advantage of reducing the noise in identifying the "right" event. On the other hand, our measure of abnormal returns might be downward biased since there might still be uncertainty on whether the merger will take place or not.

Finally, once firms have been identified, we collect information about their characteristics from two sources. For the first part of the analysis, where we measure profitability by means of event studies, we collect data on firms' stock prices and market value as well as market indexes by using Thomson Financial's Datastream. This database provides financial information and computation services to the securities industry worldwide. For the second part of the analysis, we use the Standard & Poor's Global Vantage and Compustat databases to retrieve information about firms' accounting profits and total assets from their balance sheets.

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<sup>25</sup> The reports for each of the Commission's decisions can be downloaded from the Commission's webpage: <http://europa.eu.int/comm/competition/mergers/cases/>.

Table 2 presents a short description of the relevant variables. The market value of the combined firm (rivals) is on average 45 (7.5) billion US dollars. On average, the Commission reports 7.6 rival firms, and we could find stock market information for 62.5% of them. The majority of the concentrations in our sample (57.1%) were full mergers, 24% joint ventures, 13.1% partial acquisitions, 11.3% tender offers, and only 6% consisted of asset acquisitions. In 41.1% of the cases the geographical market definition is the European Economic Area, in 35.1% it was defined to be national, in 21% it was worldwide, and in a few cases it was left open because the geographical definition was not relevant for the decision.

Remedies have been imposed in 35.1% of the mergers (6.6% in phase 1 and 28.7% in phase 2), and 7.7% were blocked. Considering these prohibitions as an extreme type of remedy, we have 43.1% of the cases in our sample where the Commission intervened to modify the merger in order to restore effective competition.

**[table 2 about here]**

Remedies are categorized as structural or behavioral using the information contained in the Commission's decision. In 23.5% of the cases the Commission ordered a divestiture, while in 10.8% it imposed other kinds of remedies. For the purpose of this study we will consider these two categories - which happen to be those used in the merger remedies guidelines - and blockings. The selling of shares was imposed in 10.3% of cases, licensing agreements in 11.5%, the access to essential technologies or facilities in 9.7%, the dismissing of exclusive agreements in 7.3%, and the dissolution of interlocking directorates only in 3.6% of the mergers in our sample.

Table 3 reports statistics on cumulative average abnormal returns for merging firms and competitors around various events and using different event windows. We consider a short window from 5 days before to 5 days after the merger, and a long window that goes back 50 days before the event. For each event, we look at how abnormal returns differ according to the future Commission's decision.

**[table 3 about here]**

The mergers in our sample were on average "profitable" since the CAARs for the merging firms around the announcement date are positive and statistically significant at the 5% level for all used windows. The size of the effects ranges from 1.05% in the short window

to 1.8% in the long window. This result seems to be in line with the literature.<sup>26</sup> The cumulative abnormal returns for the rivals around the announcement date are, instead, not statistically significant different from zero and very small in size.<sup>27</sup> On average, these mergers seem to be welfare-neutral, in the sense that they neither increase nor decrease the average rivals' profitability. The breakdown across later decisions reveals significant effects for those mergers that are either cleared with no remedies in phase 1 (efficiency-enhancing mergers?) or that were cleared with remedies in phase 2 (market power mergers?).

Looking at phase 1 decisions, we observe negative CAARs for the merging firms as well as for the rivals.<sup>28</sup> These are, however, statistically significant only for the merging firms using the short window. The negative effect stems mainly from those cases where a phase 2 investigation was started: The negative CAARs for the merging firms in that case are on average -1.7% in the short window and -1.4% in the long window. Similarly, rivals lose from the opening of a phase 2 investigation (in the long window up to -1.1%). Interestingly, decisions that either clear mergers in phase 1 (with or without remedies) in the short window and those decisions that lead to later blockings (long window) decrease rival firms' market value by a rather large and significant 3.5%. If (presumably) efficiency enhancing mergers are cleared without - or with ineffective - remedies, or if (presumably) market power enhancing mergers are blocked, rival firms lose, which is exactly the pattern we predict and observe.

For phase 2 decisions, almost all measures of abnormal returns are statistically insignificant. Nevertheless, looking at the long run CAARs, we observe strong negative, though not significant, effects for the rivals in those mergers that were cleared with remedies (-1.8%) or blocked (-5.5%). Moreover, merging firms have large and significant positive long-run abnormal returns (+6.6%) in those mergers that were cleared without conditions. The market expected some negative effects at the phase 1 decision day for merging firms, but was surprised that the Commission did not impose remedies.

The next question is what is the “right” profitability measure to be used in the regressions? If there is no information leakage, the right measure would be the abnormal

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<sup>26</sup> See for instance Andrade et al. (2002). In fact, the merging firms' CAAR is the weighted sum of the acquiring and of the target firms' abnormal returns. Depending on the event window, we estimate average abnormal returns for acquirers in the range between -0.54% and 0.12% (not statistically significantly different from zero) and for the targets in the range between 3.4% and 6.2% (statistically significantly greater than zero at the 1% level). These results are quite similar to those reported by Aktas et al. (2004) using a comparable sample of mergers. Note, however, that in their sample the phase 2 cases are more underrepresented than in ours.

<sup>27</sup> The abnormal returns for rivals are measured with errors, since we lost part of them due to the fact that they are small - not quoted - firms. Because we have mostly the biggest competitors in our sample, we possibly have another bias towards “no significance”: big firms derive probably only a small fraction of their revenues from the market under consideration and are, therefore, only partially affected by the merger.

<sup>28</sup> Note that we use a shorter window for the long term CAARs around the phase 1 decision, since the period of time between the notification and the phase 1 decision is only one month.

return at the event day. However, if we think that some relevant information was present in the market already before this event, then a larger window should more carefully capture the real effects. Looking at figure 3, which shows time plots of daily cumulative abnormal returns averaged over merging firms and rivals, respectively, for the period from 50 days prior until 5 days after major events, we can get a feeling of how much of a surprise the event under consideration was. For both types of firms, we see an upward drift of abnormal returns beginning some 50 days before the announcement of the merger for merging firms and some 30 days for rivals. Hence, we decide to use the long-run window (-50, +5) to measure the merger's effect.

For the CAARs around the Commission's decisions, we breakdown the figure according to the kind of decision: clear, remedies, or opening of a phase 2 investigation for the phase 1 decisions; and clear, remedies, block for the phase 2 decisions. Phase 1 decisions – specifically, remedies in phase 1 - seem to come as a relative surprise. We therefore decide to take the short-run window (-5, +5) to measure the rents generated by this event.<sup>29</sup>

Differently, for the phase 2 decisions, we observe quite a bit of movement in the long run CAARs for all kinds of decisions suggesting that information leaks out to stock markets in the course of the second investigation's phase. This makes sense, since phase 2 is much longer and attracts much more public attention than phase 1. Moreover, the Commission might provide some information to the market by applying the so-called "market test", where it asks competitors and customers to evaluate the proposed conditions. Thus, we think that the long-run window should better capture the market assessment of the Commission's decision.

For mergers cleared in phase 1, the Commission's *decision effect* is simply defined as the abnormal return around the phase 1 decision date. For cases that go to phase 2, instead, we define the decision's effect as the sum of the phase 1 and phase 2 decision date abnormal returns, since around the phase 1 decision the market updates its beliefs about the final outcome. In fact, the probability that the merger will be blocked or cleared with remedies sharply increases when a merger goes into a phase 2 investigation.

## 6. Results

In this section we present the main results and several robustness checks. We start by using the CAARs not corrected for the probability of antitrust action as a benchmark case. We then look at several sub-samples to qualify our findings. We finally show that the main results hold

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<sup>29</sup> We however run all tests also using the longer window. Our results remain mostly unchanged.

true also correcting for the market's expectation about the Commission's decision. Yet, differences emerge, which helps to explain some of the previous findings.

## 6.1. Main Regressions

Table 4 presents our main regression results. Regressions are run separately for merging firms and rivals. According to equation (1), the dependent variable is the decision CAAR of merging firms or rivals, while the main independent variable is the corresponding announcement CAAR of merging or rival firms respectively. In the different specifications, we interact this independent variable with several sets of dummies for the Commission's decision, as well as for the merger competitive effect as discussed in section 4.3. Finally, in all specifications we control for time as well as industry effects (manufacturing and communications) and for those cases where conglomerate and/or foreclosure aspects play a role (i.e. not purely horizontal mergers) by adding a dummy.<sup>30</sup>

Panel A presents the results for the entire sample. Neither for insiders nor for rivals is there a significant relation between announcement and decision CAARs. There is also no significant difference in effects for those mergers that were cleared with remedies or blocked (ACTION) or cleared outright (CLEAR). As we will see, however, this masks important differences across sub-samples.

[table 4 about here]

When we interact announcement CAARs not only with action/clearance dummies but simultaneously with indicators for anticompetitive - rival announcement CAARs =  $\Delta\Pi_{Rj}^A > 0$  - vs. pro-competitive - rival announcement CAARs =  $\Delta\Pi_{Rj}^A < 0$  - mergers, an interesting difference arises for merging firms. Merging firms lose a part of the efficiency gains from a merger, if remedies are wrongly applied in pro-competitive mergers: the coefficient's point estimate is equal to -0.29 and statistically significant different from zero.

When we breakup actions into outright blockings (BLOCK), divestitures (DIVESTITURE), and other remedies (OTHERREM), it becomes evident that the blocking decisions generate a rent reversion for rivals. We estimate a significant coefficient  $b_B$  of -0.69, significantly different from zero but not significantly different from minus one at

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<sup>30</sup> A merger has been defined to have conglomerate or vertical (foreclosure) effects if the Commission stated so in its report.

conventional significance levels. This is our first important finding: blocking is effective in restoring the pre-merger situation.

The rents earned by rivals around the announcement of the merger are actually *exacerbated* by the Commission's decision to impose divestitures ( $b_D = 0.46$ , significant at the 1% level). The coefficient for other remedies is also positive ( $b_O = 0.34$ ) but not significant. This could be the case if divestitures or other remedies were imposed in the wrong mergers, i.e. efficiency enhancing mergers, and/or these remedies were not effective in solving the anticompetitive problems identified by the Commission but rather resulted in a rent transfer to rivals. For example, rival firms could buy the divested assets at below market value prices. There are a number of reasons why this could be the case: deadlines for sale, buyer approval by the Commission, etc.

The last regression in panel A of table 4 combines the interaction terms of the above two panels. It is evident that the rent reversion of rival profits is due to the blocking of anticompetitive mergers by the EU Commission. The coefficient rises to a significantly negative 0.79, again not significantly different from minus one. Essentially all rents of the rivals from an anticompetitive merger are dissipated by the blocking decision of the EU Commission. In contrast, by the forced divestiture of assets in anticompetitive mergers, rivals' rents are additionally increased, and effective competition is not restored. Interestingly, there appears to exist a rent transfer from the merging firms to the rivals when pro-competitive mergers are levied with other remedies: the coefficient for rivals is positive and significant ( $b_O = 1.41$ ) while the estimated coefficient for merging firms is negative though not significant ( $b_O = -0.39$ ).

Merging firms' abnormal returns around the decision day do not correlate significantly with their announcement day counterparts, with the startling exception of outright blockings. In this case, merging firms lose either a significant share of their market power rents ( $b_B = -0.52$ ) or their returns from investing in efficiency mergers (-0.80). Interestingly, it seems to be worse for merging firms if a pro-competitive rather than an anticompetitive merger is blocked.

Our results on the entire sample provide strong evidence that: (1) blockings restore effective competition in mergers that the market has identified as anticompetitive. (2) Remedies, be they behavioral or structural like divestitures, are on average not successful in restoring effective competition. In some cases, especially if wrongly applied to pro-competitive mergers, they merely result in rent transfers from merging firms to their rivals. Yet, this does not preclude effective remedies in some mergers that are well designed, as it is



evidenced by the high standard errors around our estimated remedies' coefficients in some sub-samples. (3) Our results also indicate that the event study methodology can be applied in antitrust analysis and in particular in the analysis of the effects of mergers. Here, we do not stress the importance of looking at absolute CAARs at the announcement or decision dates, but rather the need of analyzing the relation between announcement and decision CAARs, which gives us a much more powerful test of the effects of the antitrust authority's decision. The fact that we get a coefficient *not statistically* different from minus one for the sub-sample of blocking decisions is a robustness check in itself and a benchmark for the effectiveness of other types of remedies.

We now go into further detail by analyzing phase 1 and phase 2 decisions (sub-samples) separately in panel B and panel C of table 4 respectively. This analysis provides very useful new insights. For the 81 final phase 1 decisions, rivals lose if anticompetitive mergers are not cleared outright, which is consistent with the notion that the Commission's action is effective.<sup>31</sup> Rivals win if pro-competitive mergers are levied with an action, and in this case merging firms experience a profit loss. This is exactly what we expect by the design of our regressions if remedies present a rent transfer between merging and rival firms. Distinguishing between divestitures and other remedies, does not unearth significant differences. Instead, splitting by the dichotomy anti- versus pro-competitive mergers yields particularly interesting and reassuring results: if remedies are imposed on anticompetitive mergers in phase 1, they are effective. The *b*-coefficients are between -0.5 (divestitures, not significant) and -0.6 (other remedies, significant) and both coefficients are not statistically significantly different from -1 at the 10% level. Again, wrongly imposing remedies in pro-competitive mergers constitutes a rent transfer from merging firms to the rivals but only for behavioral remedies. The only puzzling result in panel B of table 4 is the positive and significant coefficient for rival firms in the sub-sample of pro-competitive mergers that were cleared without remedies. Maybe these mergers and decisions signal good future prospects for M&A activity in this industry without interference by antitrust authorities (i.e. the information revelation hypothesis proposed by Eckbo and Wier, 1985).

Panel C in table 4 estimates all regressions for the sub-sample of mergers that were decided upon in phase 2 (76). Here, as expected, the most striking feature is the negative and significant coefficient on blockings. This is again not statistically different from minus one for both merger's insider and rival firms: both firms lose on average their rents due to this

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<sup>31</sup> Notice that the only action that the authority can take in phase 1 is to impose remedies. No blocking decisions can be made at this stage before an in depth (phase 2) investigation.

decision. Divestitures do not solve the anticompetitive problem. On the contrary, they increase rivals' profitability when imposed in anticompetitive mergers, hence constituting a rent transfer from merging firms to competitors. Also behavioral (other) remedies show on average this "perverse" effect significantly increasing rivals' profitability, yet only when applied to pro-competitive mergers.

To summarize, remedies seem to work in phase 1 when correctly applied, while they seem to be ineffective in phase 2.<sup>32</sup> Particularly, remedies in phase 2 represent on average a rent transfer to the rivals. Finally, behavioral remedies that are wrongly applied, i.e. used in pro-competitive mergers, constitute a rent transfer from insiders to competitors both in phase 1 and phase 2.

## **6.2. Robustness**

### **6.2.1. Different Sub-samples**

We have already mentioned that one "robustness test" for the validity of our methodology is the coefficient of minus one on announcement CAARs for blocked mergers, which we actually obtain. Panel A of Table 5 presents additional robustness checks by splitting the sample into profitable (i.e. insider announcement CAARs are positive) versus unprofitable (i.e. insider announcement CAARs are negative) mergers. We would expect that our tests are most appropriate for profitable mergers, since motives behind unprofitable mergers may differ (e.g. they may be undertaken for managerial discretion reasons, see Gugler *et al.*, 2003). All our results carry over. The coefficient on blocked anticompetitive mergers is negative and significant in the rivals' regression and not significantly different from minus one. Other remedies still do not solve the anticompetitive problems on average.

**[table 5 about here]**

While no predictions are possible if merging firms' announcement CAARs are negative using standard IO models assuming profit maximization, it is an empirical fact that unprofitable mergers happen. If merging firms should not have merged from a corporate

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<sup>32</sup> This apparently anomalous result is however in line with the findings by the DG Comp (2005) study on remedies. Indeed, the Commission's practice is to require that remedies proposed in phase 1 be clear-cut and straightforward. Hence, they tend to be more far-reaching and effective than remedies applied in phase 2. In fact, one of the main findings of the Commission's study is that "more phase 1 remedies have been effective as opposed to phase 2 remedies[...] [and] more phase 2 remedies have been "partially effective" when compared to phase 1 remedies."

governance perspective, a side effect of an antitrust action - in particular a blocking - by the Commission may be to increase the merging firms' abnormal returns for the benefit of shareholders. This is what we observe for blocked unprofitable mergers: the market welcomes these blocking decisions with a share price rally.

Panel B of table 5 splits the sample into mergers with conglomerate/vertical effects and those with pure horizontal effects.<sup>33</sup> Our tests should suit pure horizontal mergers best: rents due to market power are best achieved by horizontal effects. Moreover, our sign predictions change for e.g. vertical foreclosure mergers: the rents gained by merging firms due to e.g. excluding rivals stem from the rival firms, thus while merging firms win rival firms lose. Due to the small number of observations in the sub-sample conglomerate/vertical mergers, we concentrate on pure horizontal mergers. For this sub-sample, all our results carry over with comparable significance levels.

Some of our sub-samples suffer from a rather small number of observations, thus Panel C estimates by robust regression techniques using STATA command *rreg*, which essentially weights down extreme observations. Using robust regression techniques, however, leaves our main results unaltered.

### **6.2.2. Correcting for Market Expectations**

In this section we shall present the two steps of the regression where we correct for market expectation about the authority's action. In the first step we estimate the probability of a particular action (clearance and remedies) and in the second stage we correct our measures for the mergers' and decisions' profitability effects as highlighted in section 4.4.

In table 6 we report the results of the logit estimation for clearance and actions. Clearances (dummy equal to 0 in the case of blocking and equal to 1 in the case of clearance) and action (dummy equal to 0 in the case of outright clearance and equal to 1 in the case of remedies or blocking decisions) are explained by the following observables proxying for the likely (anti-) competitive effects of the mergers, lobbying and/or protectionist tendencies: whether one or both of the merging firms stem from the USA (*us*), whether one or both of the merging firms stem from a big EU country (*bigeu*; France, Germany, Italy, Spain, or UK), whether conglomerate or vertical effects are also present (*conglom*), whether the merger is a cross border deal (*crossbord*), whether the EU Commission defines the relevant geographic market as worldwide (*world*), EU wide (*eu*) or national (reference group), whether the merger

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<sup>33</sup> It should be noted that all analyzed mergers have horizontal effects, but some have in addition conglomerate or vertical effects

is a full merger (*full*; as opposed to partial acquisitions), the size of merging and rival firms measured by the logarithm of market values (*lnvm* and *lnvr*), industry indicators (*d* for manufacturing as opposed to services; and *i* for communications) and time variables (time trend and a dummy for the late years 1995-2002). Notice that all these variables are also observable to the market when assessing the merger's and decision's effects.

**[table 6 about here]**

The probability of clearing a merger is significantly higher if one or both of the merging firms stem from the USA, and it is lower if besides horizontal also conglomerate or vertical concerns are identified by the Commission. All other variables are not significant, although some of them have the expected sign, like the negative coefficients on cross border deals or the wider than national market definitions. The probability of an action is significantly lower if one or both of the merging firms stem from the USA<sup>34</sup> or if markets are defined as either world or EU-wide; this probability increases when also conglomerate or vertical concerns are present, if rival firms are larger on average, and in the last years of the sample.

From the reported estimation, we predict for each merger the probability of a clearance and an action, which measure the ex-ante market's expectation about these Commission's decisions  $Pr[clear_j|I_A]$  and  $Pr[action_j|I_A]$  respectively. We next correct the estimated CAARs around the merger's and decision's announcement by the predicted probabilities according to the discussion highlighted above. Finally, we run the same set of regressions as in table 4 but using the probability corrected measures ( $\Delta\Pi_{ij}^{A*}$  and  $\Delta\Pi_{ij}^{D*}$ ) instead of the original ones ( $\Delta\Pi_{ij}^A$  and  $\Delta\Pi_{ij}^D$  respectively).

Panel A of table 7 presents the regression results using these corrected CAARs and the entire sample. Results are qualitatively very similar and in most cases even stronger than using the "uncorrected" values. Remedies, also including blockings, have significant effects: they reduce rivals' profitability in anticompetitive mergers while increasing it if wrongly applied to pro-competitive mergers. In the latter case, insiders lose. Hence remedies can again be seen as a rent transfer from merging firms to competitors. When we look more in detail at the different decisions, it becomes evident that blockings are responsible for the profit-

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<sup>34</sup> Note that this result differs from what is found by Atkas et al. (2004), who claim that EU merger control is protectionist and favours European firms.

reversion effect, as we previously saw. Again, we cannot reject the hypothesis that the coefficient  $b_B$  is significantly different from minus one for rivals, whereas it is even significantly smaller than minus one for merging firms. This means that a blocking decision imposes some extra costs to the insiders in addition to the lost rents from market power or the efficiency gains. While divestiture does not seem to have any significant effect on both merging and rival firms independently of the merger's competitive effect, behavioral remedies continue to merely constitute a rent transfer from merging to rival firms if wrongly applied to pro-competitive mergers.

[table 7 about here]

In panels B and C we again split the sample into phase 1 and 2 decisions. Most of the previous results are qualitatively confirmed, some are even reinforced. Concerning phase 1 decisions, both divestitures and other remedies reduce rivals' profitability when appropriately applied to anticompetitive mergers. They instead have the opposite (OTHERREM) or no (DIVESTITURE) effect when mistakenly adopted.

Looking at phase 2 decisions (panel C), results are again quite similar to those presented in table 4. However, the coefficients are less precisely estimated and, therefore, they lose significance. Nevertheless, the two main findings obtained before are confirmed: the blockings of anticompetitive mergers completely dissipate rival firms' rents (the coefficient is not significantly different from minus one), while remedies increase it, even though not significantly. Again, we notice that blocking decisions impose extra costs to merging firms by reducing their rents well below the pre-merger situation (the  $b_B$  coefficient is -2.3).

## 7. An Ex-Post Evaluation of Mergers

In this section, we present additional robustness checks on the results obtained so far using the methodology of Gugler et al. (2003) to predict the profit effects of the merger. This method compares actual post merger (e.g. two years as we do here) balance sheet profit levels with predicted profit levels in the *absence* of the merger. Our counterfactual is the development of profits and total assets in the same 3-digit industry as the merging firms or their rivals operate. We used a number of other counterfactuals, such as similar size or geographical regions but none changed our results significantly. We define  $\Pi_{Gt+n}$  as the (balance sheet) profits of the acquiring company in year  $t+n$ ,  $\Pi_{Dt}$  as the profits of the acquired company in the year  $t$ ,

$\Pi_{Mt+n}^{predicted}$  as the predicted profits of the merged company in year  $t+n$ ,  $\Pi_{IGt+n}$  as the profits of the median firm in the same 3-digit industry of the acquiring company in year  $t+n$ ,  $\Pi_{IDt+n}$  as the profits of the median firm in the same 3-digit industry of the acquired company in year  $t+n$ ,  $K_{Gt+n}$  as the assets of the acquiring company in year  $t+n$ ,  $K_{Dt}$  as the assets of the acquired company in year  $t$ ,  $K_{IGt+n}$  as the assets of the median firm in the same 3-digit industry of the acquiring company in year  $t+n$ , and  $K_{IDt+n}$  as the assets of median firm in the same 3-digit industry of the acquired company in year  $t+n$ .

We can now compute the projected change ( $\Delta_{IG\ t-1,t+n}$ ) in the returns on the acquirer's assets from year  $t-1$  to  $t+n$  using again the changes observed for the median (in terms of profitability) company in its industry:

$$\Delta_{IG,t-1,t+n} = \frac{\Pi_{IGt+n}}{K_{IGt+n}} - \frac{\Pi_{IGt-1}}{K_{IGt-1}}.$$

If the median firm in the acquirer's industry earned a 0.10 return on assets in  $t-1$ , and a 0.11 return in  $t+n$ , then we would predict that the acquiring firm's returns on assets would increase by 0.01 in the absence of the merger.

Defining  $\Delta_{ID\ t,t+n}$  for the acquired firm's industry analogously to  $\Delta_{IG\ t-1,t+n}$  gives us the following formula for predicting the profits of the combined company in the year  $t+n$ .

$$\Pi_{Mt+n}^{predicted} = \Pi_{Gt-1} + \frac{K_{IG\ t+n}}{K_{IG\ t-1}} K_{Gt-1} \Delta_{IG\ t-1,t+n} + \Pi_{Dt} + \frac{K_{ID\ t+n}}{K_{ID\ t}} K_{Dt} \Delta_{ID\ t,t+n}. \quad (5)$$

The profits of the merged company in year  $t+n$  are predicted to be the profits of the acquirer in  $t-1$ , plus the predicted growth in its profits from  $t-1$  to  $t+n$ , plus the profits of the acquired firm in  $t$ , plus the predicted growth in its profits from  $t$  to  $t+n$  in the absence of the merger. Analogously we can compute predicted profits for rival firms in the absence of the merger.

Our measure to evaluate the effects of the merger is then the difference between actual (observed) profits in year  $t+n$  and the predicted profits:

$$\Delta \Pi_{Mt+n}^{effect} = \Pi_{Mt+n}^{(actual)} - \Pi_{Mt+n}^{predicted}. \quad (6)$$

Exactly the same logic can be applied for the rivals. In fact, antitrust markets are different than industries based on SIC codes. The advantage of our database is that we have information on the *real* rivals to the merging firms. These firms are not a good counterfactual

to the merging firms, since they are also influenced by the merger as the merging firms. However, the rest of the industry should not be affected so strongly by the merger and this makes the 3-digit SIC code a good counterfactual for the merger. We can hence get a measure of the merger induced profit effect for rivals, which is something novel in the literature.

**[table 8 about here]**

Table 8 relates the ex post profit effects from (6) for  $n = 2$  years (and divided by the sum of the total assets of merging and rival firms, respectively, in year  $t-1$  relative to the merger) to the announcement CAARs and the total CAARs of the merger, which is the sum of CAARs around announcement and decision. For both measures the relation is significantly positive. This assures us that (1) stock markets - at least partially - foresee the eventual profit effects of the merger and (2) both methodologies measure the true merger's effects.

**[table 9 about here]**

Table 9 relates the profit effect for the rivals ( $\Delta\Pi_{Rt+n}^{effect}$ ) to the merging firms' profit effect ( $\Delta\Pi_{Mt+n}^{effect}$ ) and interacts the former with our dummies for outright clearance, other remedies, divestitures, and blockings. If the merger induces both the profits of the merging firms and the profits of their rivals to increase, then market power is at work, since the profits stem from consumer surplus. While we do not find a significant relation between the two profit effects for cleared mergers without commitments and blockings, there is a statistically and economically significantly positive relation for those mergers that were cleared with commitments. This is additional evidence for our earlier findings using an event study methodology that remedies do not solve the anticompetitive problems on average.

## **8. Conclusions**

This is the first paper to econometrically analyze the effects of merger control decisions of one of the world's most important antitrust agencies, the EU Commission. While this is a formidable task and wrecked with several difficulties, we are very cautious in isolating the true effects of the antitrust decisions: we do not only employ standard event study techniques but also conduct an ex post analysis using balance sheet data on firms' profits and assets. We take great care in accounting for information leakage prior to major events, and we adjust for possible priors the market already had priced in at the event day. We apply a novel

methodology relating abnormal returns at the two major event dates, the merger's announcement and antitrust decision, and obtain several testable hypotheses. By means of regression analysis, we test these predictions. Moreover, our dataset is as "clean" as possible in identifying major rivals of merging firms, since our source of information are the decisions of the European Commission itself. Thus we believe that our results are robust.

We find that only the outright blockings of supposedly anticompetitive mergers completely solve the anticompetitive concerns raised by the EU Commission. Only in this case, do we statistically get the complete dissipation of anticompetitive rents that the market believes will result from the merger between its announcement and the final antitrust decision. Other remedies, such as behavioral remedies but also divestitures, do not achieve this, on average. This is particularly true when remedies are applied after the Commission's in-depth investigation, while they seem to be effective when applied to the "right", anticompetitive, mergers during phase 1. Remedies, either because wrongly applied or wrongly designed, often merely result in wealth transfers from merging firms to their rivals, without solving the anticompetitive concerns. Our findings are thus consistent with potential problems of remedies such as information asymmetry and incentive problems, and the increased possibility of pro-collusive effects as pointed out in the theoretical literature.

In recent years the EU Commission - in contrast to the US antitrust authorities - increasingly hesitates to block mergers after the European Court of Justice overruled several blocking decisions. Our results imply that this may lead to the clearance of too many anticompetitive mergers with ineffective remedies.



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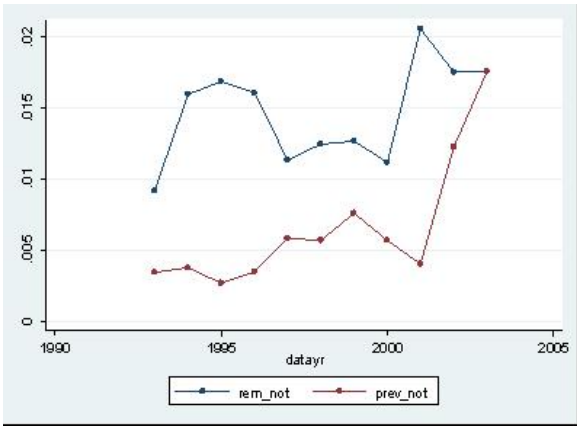
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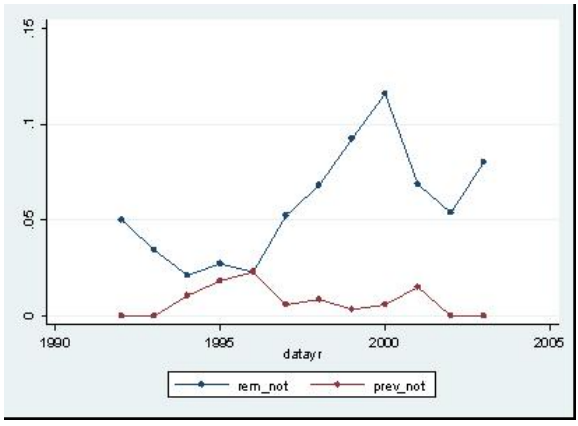
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Tables and Figures

Figure 1: Merger Control Interventions in Different Jurisdictions: USA and EU



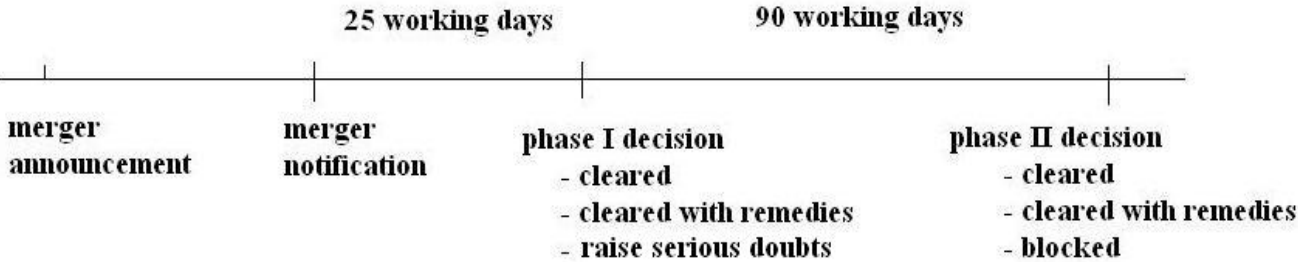
USA



EU

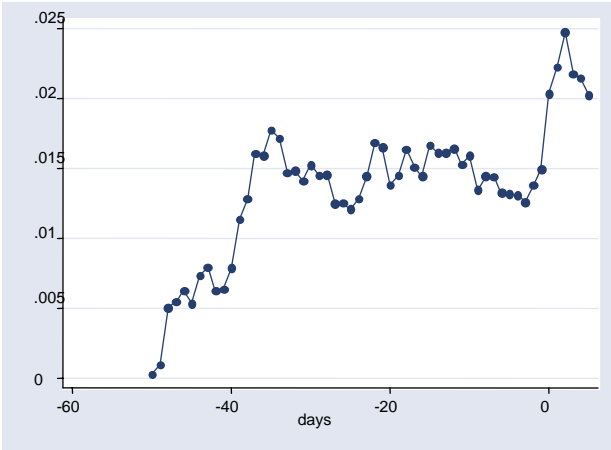
Note: rem\_not = remedies divided by notifications; prev\_not = preventions divided by notifications

Figure 2: The EU Merger Control Process

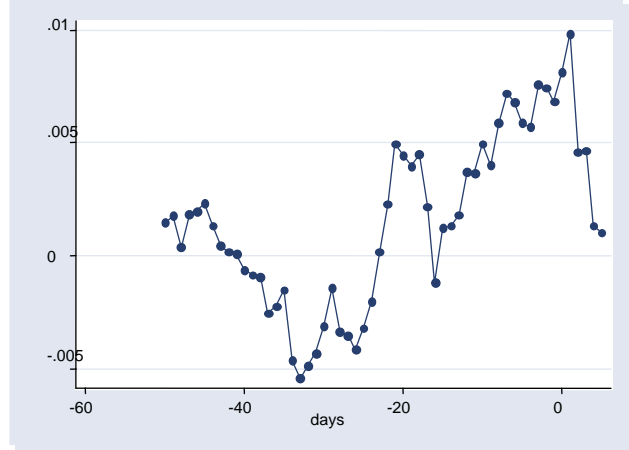


**Figure 3. Cumulative Abnormal Returns Around Different Events**

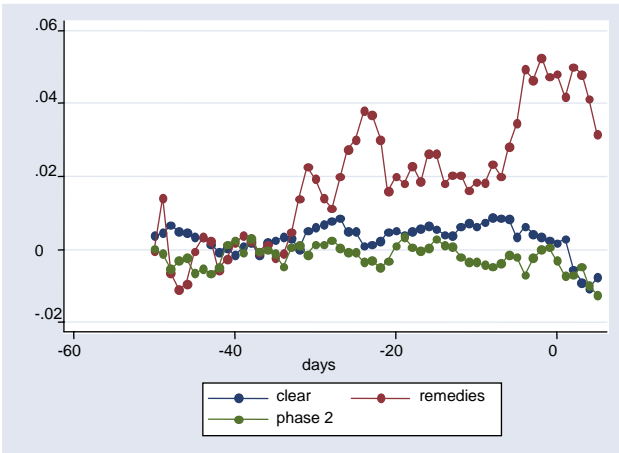
**MERGING FIRMS**  
Announcement day



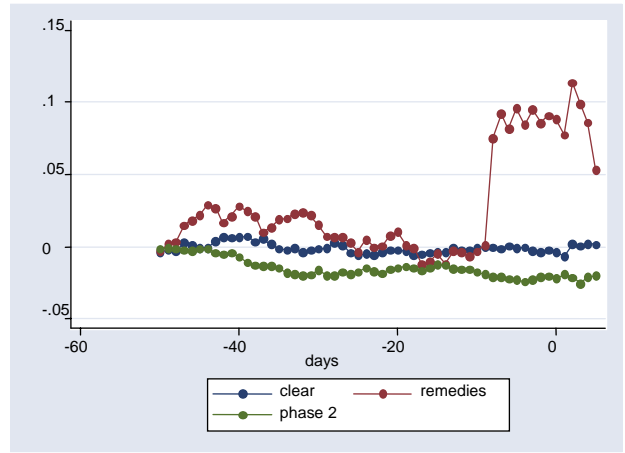
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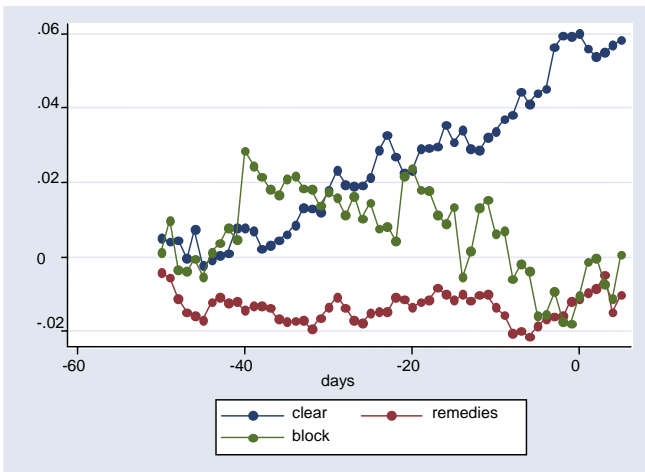
**Phase 1 decision**



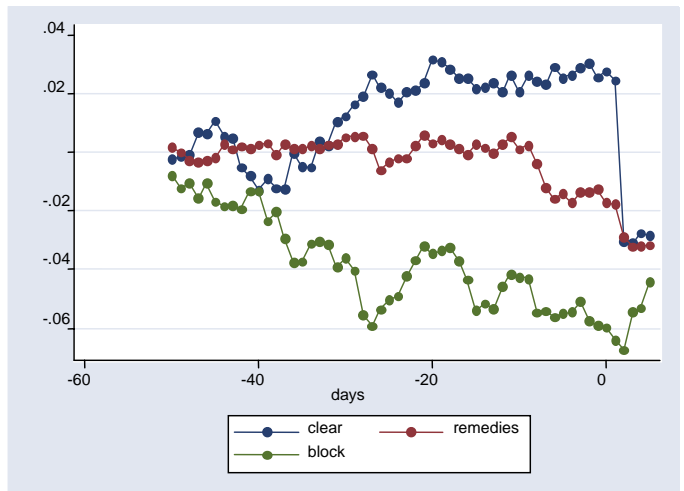
**Phase 1 decision**



**Phase 2 decision**



**Phase 2 decision**



**Table 1: Possible Effects of Mergers on Merging (M) and Rival (R) Firms' Profits and the Optimal Incidence of Remedies**

	$\Delta\Pi_M > 0$	$\Delta\Pi_M < 0$
$\Delta\Pi_R > 0$	Market Power Increase; <b>Action</b>	Efficiency Reduction; <b>Possibly Action (if <math>\Delta\Pi_I &gt; 0</math>)</b>
$\Delta\Pi_R < 0$	Efficiency Increase; <b>No Action</b>	Efficiency Reduction; <b>No Action</b>

**Table 2. Preliminary Statistics**

Description	Obs	Mean	Min	Max
Market value merging firms in million US \$	159	44165	10.8	607975
Market value of rivals (average) in million US \$	156	7492	3.6	227604
Number of competitors listed in the Commission report	163	7.59	1	34
Percentage of Competitors listed	163	0.63	0	1
Full acquisition	168	0.57	0	1
Partial acquisition	168	0.13	0	1
Joint Venture	168	0.24	0	1
Asset acquisition	168	0.06	0	1
Tender offer	168	0.11	0	1
The merger was cleared in phase 1	168	0.53	0	1
The geographical market is national	168	0.35	0	1
The geographical market is the European Economic Area	168	0.41	0	1
The geographical market is worldwide	168	0.21	0	1
An action (remedies or blocking) have been taken	168	0.43	0	1
The merger was prohibited	168	0.08	0	1
The remedy consisted in a divestiture	166	0.23	0	1
Other kinds of remedies	166	0.11	0	1
The remedy consisted in selling shares	166	0.10	0	1
The remedy consisted in dissolving interlocking directorates	166	0.04	0	1
The remedy consisted in eliminating exclusive agreements	166	0.07	0	1
Merging firms must license some products / processes	166	0.11	0	1
Merging firms must guarantee access to an essential technology/ facility	166	0.10	0	1

**Table 3: Abnormal Returns to Merging Firms and Their Rivals for Various Events, Windows and Decisions**

	Merging firms					Rivals				
	Short run			Long run		Short run			Long run	
	Nobs	CAR5_5	S.E.	CAR50_5	S.E.	Nobs	CAR5_5	St.Err.	CAR50_5	St.Err.
<b>At announcement day of the merger:</b>										
(Later) cleared in phase 1	74	0.010	0.009	<b>0.021*</b>	0.016	77	0.001	0.004	-0.001	0.011
(Later) cleared with remedies in phase 1	10	-0.014	0.022	0.019	0.061	10	-0.010	0.015	-0.009	0.045
(Later) going to phase 2	73	<b>0.014**</b>	0.007	0.013	0.014	78	<b>-0.006*</b>	0.004	0.010	0.012
(Later) cleared in phase 2	16	0.010	0.010	0.014	0.021	17	-0.007	0.013	0.005	0.025
(Later) cleared with remedies in phase 2	44	<b>0.019**</b>	0.009	0.023	0.019	48	-0.005	0.004	0.004	0.014
(Later) blocked	13	0.001	0.018	-0.019	0.033	13	-0.009	0.011	0.035	0.040
All	157	<b>0.010**</b>	0.005	<b>0.018**</b>	0.010	165	-0.003	0.003	0.004	0.008
<b>At phase 1 decision day of the merger:</b>	<b>Nobs</b>	<b>CAR5_5</b>	<b>St.Err.</b>	<b>CAR25_5</b>	<b>St.Err.</b>	<b>Nobs</b>	<b>CAR5_5</b>	<b>St.Err.</b>	<b>CAR25_5</b>	<b>St.Err.</b>
Cleared in phase 1	74	-0.002	0.007	0.003	0.010	77	-0.002	0.005	0.008	0.009
Cleared with remedies in phase 1	10	0.013	0.024	-0.007	0.033	10	<b>-0.035*</b>	0.020	0.032	0.066
Going to phase 2	73	<b>-0.017***</b>	0.006	<b>-0.014**</b>	0.008	78	-0.0001	0.005	-0.011	0.009
(Later) cleared in phase 2	16	<b>-0.023**</b>	0.009	-0.017	0.020	17	0.003	0.010	-0.008	0.027
(Later) cleared with remedies in phase 2	44	<b>-0.011*</b>	0.007	-0.013	0.010	48	-0.003	0.008	-0.006	0.011
(Later) blocked	13	-0.029	0.027	-0.017	0.017	13	0.003	0.009	<b>-0.035*</b>	0.023
All	157	<b>-0.008**</b>	0.004	-0.005	0.006	165	-0.003	0.003	0.000	0.007
<b>At phase 2 decision day of the merger:</b>	<b>Nobs</b>	<b>CAR5_5</b>	<b>St.Err.</b>	<b>CAR50_5</b>	<b>St.Err.</b>	<b>Nobs</b>	<b>CAR5_5</b>	<b>St.Err.</b>	<b>CAR50_5</b>	<b>St.Err.</b>
Cleared in phase 2	16	0.018	0.019	<b>0.066**</b>	0.037	17	0.0001	0.010	0.001	0.022
Cleared with remedies in phase 2	44	0.003	0.012	-0.015	0.015	48	-0.004	0.008	-0.017	0.029
Blocked	13	0.008	0.009	0.008	0.049	13	0.025	0.025	-0.055	0.045
All	73	0.007	0.008	0.005	0.015	78	0.001	0.007	-0.019	0.348

Note: \*, \*\*, \*\*\* ... significant at 10%, 5%, 1%.



**Table 4. Regressions Results: Full Sample, Phase 1 and Phase 2**

Dependent variable: Decision CAAR of	Rivals				Merging firms			
Independent variable Rival/insider CAR at announcement interacted with:	Nobs	R <sup>2</sup>	Coeff	St.Err.	Nobs	R <sup>2</sup>	Coeff	St.Err.
<b>PANEL A – Full Sample</b>								
One	157	0.095	0.110	0.095	149	0.134	-0.006	0.068
CLEAR ACTION	157	0.098	0.176 0.051	0.142 0.135	149	0.149	0.084 -0.122	0.089 0.101
CLEAR *ANTICOMP CLEAR *PROCOMP ACTION*ANTICOMP ACTION*PROCOMP	155	0.121	0.282 0.091 -0.042 0.190	0.240 0.230 0.198 0.249	149	0.166	0.126 0.032 0.023 <b>-0.285**</b>	0.124 0.134 0.139 0.147
CLEAR OTHERREM DIVESTITURE BLOCK	155	0.216	0.190 0.339 <b>0.456***</b> <b>-0.687***</b>	0.132 0.298 0.174 0.223	147	0.196	0.089 -0.049 -0.006 <b>-0.639***</b>	0.087 0.241 0.124 0.246
CLEAR *ANTICOMP CLEAR *PROCOMP BLOCK*ANTICOMP BLOCK*PROCOMP DIVESTITURE*ANTICOMP DIVESTITURE*PROCOMP OTHERREM*ANTICOMP OTHERREM*PROCOMP	155	0.274	0.303 0.087 <b>-0.790***</b> -0.228 <b>0.818***</b> 0.097 -0.032 <b>1.407**</b>	0.218 0.206 0.252 0.509 0.268 0.257 0.353 0.592	147	0.217	0.122 0.048 <b>-0.523*</b> <b>-0.801**</b> 0.152 -0.160 0.148 -0.378	0.122 0.131 0.331 0.376 0.180 0.169 0.297 0.393
<b>PANEL B - Phase1</b>								
CLEAR ACTION	81	0.183	<b>0.219***</b> 0.070	0.075 0.175	78	0.152	0.058 -0.025	0.060 0.141
CLEAR *ANTICOMP CLEAR *PROCOMP ACTION*ANTICOMP ACTION*PROCOMP	81	0.310	0.062 <b>0.395***</b> <b>-0.455**</b> <b>0.859***</b>	0.122 0.124 0.226 0.289	78	0.200	0.081 0.032 0.063 <b>-0.626*</b>	0.080 0.091 0.148 0.361
CLEAR OTHERREM DIVESTITURE	81	0.185	<b>0.219***</b> 0.109 -0.029	0.076 0.200 0.301	78	0.153	0.057 0.022 -0.043	0.060 0.274 0.169
CLEAR *ANTICOMP CLEAR *PROCOMP DIVESTITURE*ANTICOMP DIVESTITURE*PROCOMP OTHERREM*ANTICOMP OTHERREM*PROCOMP	81	0.392	0.033 <b>0.409***</b> -0.522 -0.014 <b>-0.604**</b> <b>1.589***</b>	0.116 0.118 0.360 0.417 0.238 0.381	78	0.202	0.079 0.032 0.027 -0.640 0.156 -0.582	0.081 0.093 0.177 0.523 0.290 0.530

PANEL C - Phase II								
CLEAR	76	0.197	0.141	0.431	71	0.287	-0.293	0.439
ACTION			0.074	0.209			-0.200	0.158
CLEAR *ANTICOMP	74	0.222	0.546	0.824	71	0.291	0.038	0.829
CLEAR *PROCOMP			-0.089	0.600			-0.424	0.535
ACTION*ANTICOMP			0.187	0.334			-0.140	0.246
ACTION*PROCOMP			-0.089	0.428			-0.226	0.224
CLEAR	74	0.347	0.142	0.397	69	0.363	-0.309	0.427
OTHERREM			1.137	0.797			-0.177	0.441
DIVESTITURE			<b>0.561**</b>	0.258			-0.003	0.192
BLOCK			<b>-0.699**</b>	0.322			<b>-0.747**</b>	0.329
CLEAR *ANTICOMP	74	0.409	0.268	0.766	69	0.371	0.021	0.829
CLEAR *PROCOMP			0.062	0.550			-0.436	0.529
BLOCK*ANTICOMP			<b>-0.647*</b>	0.376			<b>-0.747*</b>	0.470
BLOCK*PROCOMP			-0.780	0.898			-0.718	0.516
DIVESTITURE*ANTICOMP			<b>1.112***</b>	0.416			0.151	0.324
DIVESTITURE*PROCOMP			0.022	0.406			-0.075	0.255
OTHERREM*ANTICOMP			0.366	1.048			-0.048	0.659
OTHERREM*PROCOMP			<b>2.456*</b>	1.421			-0.280	0.629

Note: We perform one-way-fixed effects regressions, where the absorbing categorical factor is the year of the decision. We also control for industry effects and for conglomerate/foreclosure aspects. Moreover we control for the proportion of rivals that we lost due to data limitation. The dependent variable is the decision abnormal returns for rivals and merging firms respectively. The decisions are defined as follows: CLEAR: the merger is cleared without remedies; ACTION: the merger is either cleared with remedies or blocked; OTHERREM: the merger is cleared with remedies other than divestitures (mainly behavioral remedies); DIVESTITURE: the merger is cleared with a divestiture; BLOCK the merger is blocked. The definition of anti-and pro-competitive merger is as follow: ANTICOMP is equal to one if rivals' announcement CAARs > 0; PROCOMP is equal to one if rivals' announcement CAARs < 0. The symbols \*, \*\*, \*\*\* represent significance at 10%, 5%, 1% respectively.

**Table 5: Robustness Checks: Profitable vs. Unprofitable Mergers, Conglomerate vs. Non-conglomerate, and Robust regressions**

Dependent variable: Decision CAAR of	Rivals				Merging firms			
Independent variable Rival/insider CAR at announcement interacted with:	Nobs	R <sup>2</sup>	Coeff	St.Err.	Nobs	R <sup>2</sup>	Coeff	St.Err.
<b>PANEL A</b>								
<b>Profitable</b>								
CLEAR *ANTICOMP	82	0.4562	<b>0.483**</b>	0.229	82	0.3182	0.481	0.425
CLEAR *PROCOMP			0.164	0.313			0.154	0.176
BLOCK*ANTICOMP			<b>-0.766***</b>	0.222			-0.322	0.793
BLOCK*PROCOMP			-0.262	0.573			<b>-0.909**</b>	0.416
DIVESTITURE*ANTICOMP			<b>0.711*</b>	0.372			0.240	0.256
DIVESTITURE*PROCOMP			-0.294	0.357			-0.071	0.211
OTHERREM*ANTICOMP			-0.040	0.295			0.302	0.429
OTHERREM*PROCOMP			<b>1.036*</b>	0.624			-0.805	0.744
<b>Unprofitable</b>								
CLEAR *ANTICOMP	73	0.4527	0.845	0.555	65	0.5166	-0.019	0.232
CLEAR *PROCOMP			-0.323	0.325			0.258	0.346
BLOCK*ANTICOMP			-1.063	0.727			-0.454	0.372
BLOCK*PROCOMP			-0.386	0.918			<b>3.079**</b>	1.318
DIVESTITURE*ANTICOMP			<b>0.996*</b>	0.397			0.310	0.313
DIVESTITURE*PROCOMP			-0.142	0.399			0.168	0.469
OTHERREM*ANTICOMP			0.575	2.071			0.570	0.482
OTHERREM*PROCOMP			1.817	1.203			0.221	0.488
<b>PANEL B</b>								
<b>Conglomerate</b>								
CLEAR *ANTICOMP	23	0.6631			21	0.9088		
CLEAR *PROCOMP			0.323	0.316			0.9175	0.325
BLOCK*ANTICOMP			-1.037	0.826			-0.452	0.587
BLOCK*PROCOMP			-0.677	0.763				
DIVESTITURE*ANTICOMP			<b>0.715**</b>	0.313			0.250	0.525
DIVESTITURE*PROCOMP			0.677	0.899			-1.597	1.216
OTHERREM*ANTICOMP			-0.299	0.473			-0.201	0.530
OTHERREM*PROCOMP			5.374	6.530			0.443	0.517
<b>Non Conglomerate</b>								
CLEAR *ANTICOMP	132	0.2379	0.212	0.234	126	0.2192	0.100	0.130
CLEAR *PROCOMP			0.105	0.273			-0.038	0.170
BLOCK*ANTICOMP			<b>-0.797***</b>	0.271			-0.514	0.416
BLOCK*PROCOMP			-0.119	0.619			<b>-0.779**</b>	0.391
DIVESTITURE*ANTICOMP			0.576	0.424			0.094	0.210
DIVESTITURE*PROCOMP			0.0967	0.275			-0.161	0.178
OTHERREM*ANTICOMP			0.066	0.578			0.041	0.497
OTHERREM*PROCOMP			<b>1.463**</b>	0.629			-0.343	0.413
<b>PANEL C</b>								
<b>Robust regressions</b>								
CLEAR *ANTICOMP	155		<b>0.395***</b>	0.129	146		0.105	0.107
CLEAR *PROCOMP			-0.046	0.121			0.069	0.116
BLOCK*ANTICOMP			<b>-0.980***</b>	0.149			-0.022	0.292
BLOCK*PROCOMP			-0.412	0.301			<b>2.016*</b>	1.081
DIVESTITURE*ANTICOMP			<b>1.380***</b>	0.158			0.129	0.158
DIVESTITURE*PROCOMP			<b>-0.322**</b>	0.152			<b>-0.616***</b>	0.149
OTHERREM*ANTICOMP			0.028	0.209			0.120	0.262
OTHERREM*PROCOMP			0.530	0.350			-0.339	0.346

Note: We perform one-way-fixed effects regressions by means of the *areg* command in STATA, where the absorbing categorical factor is the year of the decision. We also control for industry effects and for conglomerate/foreclosure aspects. Moreover we control for the proportion of rivals that we lost due to data limitation. The dependent variable is the decision abnormal returns for rivals and merging firms respectively. The decisions are defined as follows: CLEAR: the merger is cleared without remedies; ACTION: the merger is either cleared with remedies or blocked; OTHERREM: the merger is cleared with remedies other than divestitures (mainly behavioral remedies); DIVESTITURE: the merger is cleared with a divestiture; BLOCK the merger is blocked. The definition of anti-and pro-competitive merger is as follow: ANTICOMP is equal to one if rivals' announcement CAARs > 0; PROCOMP is equal to one if rivals' announcement CAARs < 0. (Un)Profitable mergers are defined as mergers where the merging firms announcement CAAR > (<) 0; Conglomerate mergers are such when the Commission identified also conglomerate or vertical effects; in Non-conglomerate mergers the Commission identified only horizontal effects; Robust regressions uses STATA command *rreg*. The symbols \*, \*\*, \*\*\* represent significance at 10%, 5%, 1% respectively

**Table 6: The Probability of Clearance and Remedies: Logit regressions**

	Dep. Var: CLEAR		Dep. Var: ACTION	
	Coef.	Std. Err	Coef.	Std. Err
<i>us</i>	<b>3.078*</b>	1.609	<b>-1.314**</b>	0.540
<i>Bigeu</i>	0.486	1.009	-0.419	0.480
<i>conglom</i>	<b>-0.573**</b>	0.883	<b>0.955*</b>	0.568
<i>crossbord</i>	1.921	0.743	-0.476	0.459
<i>world</i>	-0.408	0.859	<b>-0.418*</b>	0.519
<i>eu</i>	-0.158	0.887	<b>-0.844*</b>	0.482
<i>full</i>	-0.136	0.790	0.781	0.421
<i>lnvm</i>	-0.262	0.297	0.121	0.165
<i>lnvr</i>	-0.055	0.254	<b>0.183**</b>	0.151
<i>d</i>	-0.296	0.974	1.034	0.508
<i>i</i>	-1.347	1.089	0.673	0.637
<i>trend</i>	0.870	1.122	-0.949	0.611
<i>d95_02</i>	-1.281	1.643	<b>1.729*</b>	0.921
<i>constant</i>	3.486	2.998	-2.452	1.688
Nobs	154		154	
Pseudo R <sup>2</sup>	0.197		0.156	
Log-likelihood	-35.79		-88.80	

Note: We perform probit regression given the categorical nature of the dependent variables. The Dependent variables are CLEAR equal to 1 if the merger was cleared with or without remedies and ACTION equal to 1 if the merger was cleared with remedies or blocked. The control variables are: *us* equal to 1 if one of the merging firms stems from the USA; *bigeu* equal to 1 if one of the merging firms stem from a big EU country (Germany, France, UK or Italy); *conglom* equal to 1 if conglomerate or vertical effects are also present; *cross* equal to 1 if the merger is a cross border deal; *world* equal to 1 if the EU Commission defines the relevant geographic market worldwide; *eu* equal to 1 if relevant market EU wide; *full* equal to 1 if the merger is a full merger; *lnvm* and *lnvr* are respectively the size of merging and rival firms measured by the logarithm of market values; *d* equal to 1 if manufacturing sector; *i* equal to 1 if communications sector; *trend* represents a time trend; *d95\_02* equal to 1 if the merger was scrutinized during 1995-2002. The symbols \*, \*\*, \*\*\* represent significance at 10%, 5%, 1% respectively

**Table 7: Regression Results: Correcting for the Probability of Clearance and Remedies.**

Dependent variable: Decision CAAR of	Rivals				Merging firms			
Independent variable Rival/insider effective CAAR at announcement interacted with:	Nobs	R <sup>2</sup>	Coeff	St.Err.	Nobs	R <sup>2</sup>	Coeff	St.Err.
<b>PANEL A – Full Sample</b>								
One	149	0.1029	0.034	0.176	149	0.1335	-0.229	0.153
CLEAR ACTION	149	0.1141	0.325 -0.155	0.285 0.229	149	0.1791	0.1532 <b>-0.640***</b>	0.206 0.214
CLEAR*ANTICOMP CLEAR*PROCOMP ACTION*ANTICOMP ACTION*PROCOMP	149	0.1855	-0.005 -0.290 <b>-0.918**</b> <b>0.859**</b>	0.287 0.280 0.319 0.373	149	0.1851	0.164 0.137 -0.428 <b>-0.849***</b>	0.301 0.293 0.306 0.302
CLEAR OTHERREM DIVESTITURE BLOCK	149	0.2644	0.328 <b>1.233***</b> 0.449 <b>-1.272***</b>	0.262 0.454 0.359 0.319	147	0.2792	0.1592 -0.542 -0.103 <b>-2.225***</b>	0.195 0.446 0.273 0.455
CLEAR *ANTICOMP CLEAR *PROCOMP BLOCK *ANTICOMP BLOCK *PROCOMP DIVESTITURE*ANTICOMP DIVESTITURE*PROCOMP OTHERREM*ANTICOMP OTHERREM*PROCOMP	149	0.3075	0.524 0.208 <b>-1.326***</b> -1.122 0.373 0.443 -0.116 <b>2.401***</b>	0.442 0.405 0.349 0.912 0.699 0.451 0.692 0.646	147	0.2917	0.138 0.178 <b>-2.003***</b> <b>-2.494***</b> 0.022 -0.244 0.021 <b>-1.086*</b>	0.287 0.279 0.647 0.661 0.401 0.369 0.620 0.610
<b>PANEL B – Phase1</b>								
CLEAR ACTION	78	0.4079	<b>0.427***</b> <b>1.336***</b>	0.162 0.279	78	0.1614	0.036 -0.324	0.128 0.277
CLEAR *ANTICOMP CLEAR *PROCOMP ACTION*ANTICOMP ACTION*PROCOMP	78	0.5696	0.120 <b>0.315**</b> <b>-0.702*</b> <b>2.414***</b>	0.134 0.137 0.490 0.324	78	0.2848	0.032 0.045 0.218 <b>-1.361***</b>	0.170 0.174 0.312 0.420
CLEAR OTHERREM DIVESTITURE	78	0.4203	<b>0.421**</b> <b>1.435***</b> 0.332	0.162 0.292 0.934	78	0.1710	0.038 -0.587 -0.111	0.128 0.423 0.379
CLEAR *ANTICOMP CLEAR *PROCOMP DIVESTITURE*ANTICOMP DIVESTITURE*PROCOMP OTHERREM*ANTICOMP OTHERREM*PROCOMP	78	0.6935	0.086 <b>0.805***</b> -1.640 -0.053 <b>-1.202***</b> <b>2.940***</b>	0.212 0.208 1.586 0.800 0.432 0.305	78	0.2909	0.027 0.047 0.083 -1.626 0.532 <b>-1.265*</b>	0.173 0.176 0.383 1.058 0.575 0.476

PANEL C – Phase 2								
CLEAR	71	0.2230	0.114	0.874	71	0.2832	-0.341	1.067
ACTION			-0.316	0.351			<b>-0.817**</b>	0.347
CLEAR *ANTICOMP	71	0.2436	-0.144	1.963	71		-0.025	2.060
CLEAR *PROCOMP			-0.009	1.246			-0.485	1.293
ACTION*ANTICOMP			-0.756	0.510			<b>-0.923*</b>	0.526
ACTION*PROCOMP			0.356	0.663			-0.701	0.502
CLEAR	71	0.3395	0.1345	0.829	71	0.4134	-0.372	1.004
OTHERREM			1.374	1.552			-0.800	0.952
DIVESTITURE			0.655	0.520			-0.078	0.426
BLOCK			<b>-1.142**</b>	0.465			<b>-2.351***</b>	0.622
CLEAR *ANTICOMP	71	0.3497	0.470	1.698	71	0.4146	-0.011	1.994
CLEAR *PROCOMP			0.023	1.232			-0.520	1.241
BLOCK*ANTICOMP			<b>-1.015*</b>	0.546			<b>-2.344**</b>	0.940
BLOCK*PROCOMP			-2.067	1.744			<b>-2.317**</b>	0.937
DIVESTITURE*ANTICOMP			0.984	1.139			-0.147	0.714
DIVESTITURE*PROCOMP			0.501	0.724			-0.016	0.574
OTHERREM*ANTICOMP			0.846	2.176			-0.674	1.323
OTHERREM*PROCOMP			2.591	3.063			-0.973	1.458

Note: We perform one-way-fixed effects regressions by means of the *areg* command in STATA, where the absorbing categorical factor is the year of the decision. We also control for industry effects and for conglomerate/foreclosure aspects. Moreover we control for the proportion of rivals that we lost due to data limitation. The dependent variable is the decision abnormal returns for rivals and merging firms respectively divided by the probability of clearance. The announcement CAARs are divided by one minus the probability of remedies. This variable is interacted with the decisions that are defined as follows: CLEAR: the merger is cleared without remedies; ACTION: the merger is either cleared with remedies or blocked; OTHERREM: the merger is cleared with remedies other than divestitures (mainly behavioral remedies); DIVESTITURE: the merger is cleared with a divestiture; BLOCK the merger is blocked. The definition of anti-and pro-competitive merger is as follow: ANTICOMP is equal to one if rivals' announcement CAARs > 0; PROCOMP is equal to one if rivals' announcement CAARs < 0. The symbols \*, \*\*, \*\*\* represent significance at 10%, 5%, 1% respectively.

**Table 8. Cumulative Average Abnormal Returns and Profit Effects**

Dependent Variable: Independent variables:	Rivals						
	Total Effect Announcement CAAR+Decision CAAR				Announcement CAAR		
	Nobs	R <sup>2</sup>	Coef.	Std. Err.	R <sup>2</sup>	Coef.	Std. Err.
Rivals' profit effect 2 years after the merger	105	0.1185	<b>0.077***</b>	0.026	0.1485	<b>0.067***</b>	0.018
Dependent Variable: Independent variables:	Merging Firms						
	Total Effect Announcement CAAR+Decision CAAR				Announcement CAAR		
	Nobs	R <sup>2</sup>	Coef.	Std. Err.	R <sup>2</sup>	Coef.	Std. Err.
Merging firms' profit effect 2 years after the merger	94	0.1959	0.169	0.148	0.1960	<b>0.218**</b>	0.116

Note: We perform robust regressions by means of the *rreg* command in STATA to account for the role of outliers. The dependent variables are the announcement CAARs and the sum of the announcement and the decision CAARs for the rivals and merging firms respectively. The main explanatory variable is the profit effect two years after the merger measured by means of balance sheet data. We control for time and industry dummies in all regressions. The symbols \*, \*\*, \*\*\* represent significance at 10%, 5%, 1% respectively

**Table 9. The Relationship between Merging Firms' and Rivals' Profit Effects**

Dependent Variable: Independent variables:	Merging firms' profit effect 2 years after the merger	
	Coef.	Std. Err.
Rivals' profit effect 2 years after the merger* CLEAR	0.089	0.108
Rivals' profit effect 2 years after the merger* OTHER REMEDIES	<b>0.816***</b>	0.216
Rivals' profit effect 2 years after the merger* DIVESTITURE	<b>1.849***</b>	0.089
Rivals' profit effect 2 years after the merger* BLOCK	0.347	0.893
Nobs	87	
R <sup>2</sup>	0.1938	

Note: We perform robust regressions by means of the *rreg* command in STATA to account for the role of outliers. The dependent variable is the profit effect two years after the merger measured by means of balance sheet data for the merging firm. The main explanatory variable is the same measure for the rivals that is interacted with the Commission's decision defined as follows: CLEAR: the merger is cleared; OTHERREM: the merger is cleared with remedies other than divestiture (mainly behavioral remedies); DIVESTITURE: the merger is cleared with a divestiture; BLOCK the merger is blocked. We control for time and industry dummies in all regressions. The symbols \*, \*\*, \*\*\* represent significance at 10%, 5%, 1% respectively