

# How Effective is European Merger Control?\*

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## **Abstract**

This paper applies a novel and intuitive approach based on stock market data to a unique dataset of large concentrations during the period 1990-2002 to assess the effectiveness of European merger control. We analyze the economic effects of the European Commission's merger control decisions and distinguish between prohibitions, clearances with commitments (either behavioral or structural), and outright clearances. We run an event study on merging and rival firms' stock prices to quantify the profitability effects of mergers and merger control decisions. The basic idea is to relate announcement and decision abnormal returns: merger control is effective if anticompetitive rents observed around the merger announcement are reversed by the antitrust decision, i.e. if there is a negative relation between announcement and decision abnormal returns. Our findings suggest that only outright prohibitions completely solve the competitive problems generated by the merger. Remedies are on average not effective in solving anticompetitive concerns, yet, we can qualify this finding. Remedies are more effective when they are applied during the first rather than the second investigation phase. Moreover, the European Commission appears to learn over time, since remedies are on average more effective in industries where they have been intensively applied before.

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

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## 1. Introduction

This paper aims to provide robust econometric evidence on the effectiveness of merger control decisions in the European Union (EU). This seems to be both necessary and timely. From the academic perspective, there is a lively on-going discussion among antitrust scholars on whether there is any need for a competition policy as witnessed by the discussion spurred by Crandall and Winston (2003) and Baker (2003). In particular, merger control institutions are repeatedly under criticism: they are ineffective and do not deter anticompetitive conduct (Crandall and Winston, 2003), destroy synergistic efficiencies by unnecessarily intervening in the market place (Aktas, de Bodt, and Roll, 2004), are protectionist (Aktas, de Bodt, and Roll, ADR, 2007), are relatively open to capture (Evans and Salinger, 2002), might not be the best instrument to prompt technological progress (Carlton and Gertner, 2003) or are too lenient and let anticompetitive mergers go through. From the policy standpoint, throughout the last decade there has been a clear shift in merger control to consider remedies as a superior policy instrument if compared to outright prohibitions. Remedies are supposed to function as a surgery treatment in that they effectively tackle the anticompetitive concerns potentially raised by mergers without destroying efficiency enhancing synergies.<sup>1</sup>

In this instance, the European experience is enlightening. The European Commission cleared outright most of the over 3,500 notified mergers since 1990 without commitments (around 90%), as they presumably do not pose a threat to competition. Nonetheless, few major mergers have been completed without some conditions and obligations being offered by the parties and implemented by the agency, such as divestitures, provision of access, termination of agreements, or other behavioral requirements. More than 75% of phase 2 decisions were compatible only with commitments; yet only 21 mergers were blocked between 1990 and 2007.<sup>2</sup> Moreover, significantly fewer proposed mergers have been blocked in recent years, following the overruling of three of the Commission's prohibitions by the European Court of Justice (Airtours/First Choice; Schneider/Legrand; and Tetra Laval/Sidel), which were under the media spotlight and triggered major institutional changes in European antitrust.<sup>3</sup> A similar evolution of merger policy is reflected in the American experience. The Federal Trade Commission (FTC) and Department of Justice (DOJ) have also been increasingly making use of remedies in merger

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<sup>1</sup> This tendency in the policy arena is witnessed by the publishing of several reports on remedies by the world's major antitrust jurisdictions (FTC, 1999; OFT, 2005; DG COMP, 2005) and international organizations (OECD, 2004), as well as the issuing of remedy guidelines (FTC, 1999; EC, 2001; DOJ, 2003).

<sup>2</sup> See <http://www.europa.eu.int/comm/competition/mergers/cases/stats.html> for constantly updated statistics on EU merger control.

<sup>3</sup> These events made it very difficult for the Commission to block further mergers. Indeed, no merger was blocked in 2002, 2003, 2005 and 2006, and only one was blocked in 2004 and 2007, respectively.

control decisions over the past decade (see figure 1).<sup>4</sup> However, differently from the European Commission, prohibitions have been intensively employed in the U.S., especially during the last two or three years.

**[figure 1 about here]**

Despite the economic importance and intense policy debate, there is almost no systematic econometric evidence on whether merger policy achieves what it is supposed to achieve, namely to “protect and restore effective competition”, nor on whether remedies are indeed the most appropriate instrument. We analyze the effects of merger control decisions using a sample of 151 mergers scrutinized by the European Commission between 1990 and 2002. We use evidence from the stock markets as an independent and ex-ante assessment of the competitive consequences of the mergers, against which the EU Commission’s decision can be evaluated. In the first step, we use a standard event study methodology to compute the cumulative average abnormal returns (CAAR) around relevant events for both merging firms and for their rivals, which have been identified by the Commission itself and retrieved from its published files. The CAAR around the merger announcement should capture the merger’s competitive impact, while the CAAR around the announcement of the Commission’s decision should measure the merger policy’s effects.

The next step constitutes the major novelty of our approach and lies in *relating* these stock market reactions using regression analysis to assess the effectiveness of merger control. The intuitive basic idea is that anticompetitive rents generated by the merger and measured around its *announcement* should be dissipated by the antitrust authority *decision*, *if* this is effective. Hence, we expect a *negative* relation between decision CAARs and announcement CAARs. Additionally, the design of our test gives us an absolute benchmark for a remedies’ effectiveness and, simultaneously, a robustness check for our approach: *we know* that outright prohibitions are effective in restoring competition by re-establishing the pre-merger situation. Thus, we expect a coefficient of minus *one* in this case: all rents that would have been generated by the merger are dissipated by the antitrust authority’s decision to block it. Reassuringly, in all regressions and specifications, we get a negative coefficient in the case of prohibitions, which is not significantly different from minus one. Our findings also suggest that remedies are on average not effective in solving anticompetitive concerns. Yet, we can qualify this result:

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<sup>4</sup> We thank Joe Clougherty and Jo Seldeslachts for providing us with the U.S. data. While it seems that frequency of an action is higher in the EU than the U.S., this is surely due to the kinds of mergers under scrutiny in the two jurisdictions. In the EU, only large mergers are notified to the Commission, 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 U.S..

remedies are fairly effective when the anticompetitive concerns are not too severe and when applied during the first rather than the second investigation phase. Moreover, the European Commission appears to learn over time, since remedies are effective when applied in “remedy-intensive” industries, i.e. industries where many remedies have been applied before.

A second novelty of our paper is that we account for the market expectations regarding the antitrust inquiry’s outcome. If we did not correct for market expectations, some of our results could be explained by the market updating its beliefs about a particular antitrust decision, once the uncertainty about the merger investigation is resolved. We propose to use observable merger characteristics to estimate the probability of a particular decision and correct our profitability measures (i.e. CAARs) accordingly. We must rely on the assumption that the market does not *perfectly* foresee the Commission’s decisions. There must be *some* surprise element, otherwise there would be no reaction around the relevant dates and we would only measure white noise.

Several arguments justify our approach. First, there *must* be some surprise element in the decision process of the Commission, otherwise the market would not significantly react to such news, which it however does. This surprise element can come from surprises in the decision making process itself (e.g. “horizontal merger guidelines” were not yet issued during our estimation period) but also from asymmetric and/or incomplete information (e.g. the Commission probably has better information than the market had at announcement after making an in-depth investigation). Second, the fact that some announced mergers were later blocked by the Commission is indirect evidence that the decision process is not completely determined; otherwise managers would probably not have announced these mergers in the first place.

The approach based on stock market data, despite its difficulties which we will discuss throughout the paper, has several major advantages if compared to the use of accounting data coupled with a difference-in-difference methodology. First and most notably, it allows us to disentangle the merger from the decision effects, whereas looking at the effects on firms accounting profits just allows one to measure the net effect. Second, it does not require us to define the time span along which the merger effects should be observed. Finally, it allows us to analyse blocking decisions and avoid a potential censoring problem due to the fact that the impact of a merger is only observed if the merger takes place.

The paper proceeds as follows. Section 2 briefly presents the institutional background of EU merger control. In section 3, we give a short description of 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 decision. In section 5, we introduce the data and some summary statistics, and section 6 presents our main results as well as a first set of robustness checks. Section 7 sums up and concludes. In the appendix, 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 following Gugler et al. (2003).

## 2. Institutional Features

Merger control in the EU began with the European Communities Merger Regulation (ECMR), which came into force on September 21, 1990.<sup>5</sup> Since then about 3,500 mergers have been scrutinized by the European Commission. According to the ECMR, a merger has community dimension, hence it is under the 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). The DT constitutes an important difference to the SLC (Substantial lessening of competition) test, which is used 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 most 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), and which provide important dates for our event study. After receiving notification of the concentration, the Commission has 25 working days to assess whether the concentration is compatible with the common market (the phase 1).

**[figure 2 about here]**

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<sup>5</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.

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, 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: block the merger (Art. 8.3), let it through unconditionally, or clear it 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's 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 discuss in section 4.

### **3. Literature**

Earlier studies tried to evaluate the ex-post effectiveness of merger control decisions and, in particular, 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 (1986) increases to four out of ten.

More recent analyses are two reports commissioned by antitrust authorities of the U.S. and EU. The study commissioned by the FTC (1999) reviews 35 divestiture orders from 1990 through 1994. Based on interviews, the study finds that most divestitures appear to have created viable competitors in the concerned market (28 out of 37). A higher percentage of divestitures (19 out of 22) were successful when they involved the sale of an entire ongoing business. The Directorate General for Competition of the European Commission also recently 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. The analysis is also 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, 7% were clearly “ineffective”, and 12% have been categorized as “unclear” remedies. Interestingly, phase 1 remedies were considered more effective than phase 2 remedies. This may be due to the generally higher complexity of second phase cases and the fact that, on average, these decisions include a greater number of remedies. Phase 2 investigations differ from phase 1 investigations in view of the drastically different timeframes involved (six weeks vs. four month) and that remedies proposed in phase 1 need to be clear-cut and straightforward. While certainly informative, the fact that these divestiture studies only use qualitative information (interviews) for a small number of cases limits their generality.

Ellert (1976) is the first study that looks at the valuation effects of anti-merger complaints. He does not, however, consider the impact on rival firms’ stock returns. Eckbo (1983), Stillman (1983), and Eckbo and Wier (1985) are the first papers that use event studies to analyze rival stock price reactions to antitrust decisions. 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 makes them (or the market) aware of real profit opportunities that were so far unknown. However, they do not - as we do - relate announcement and decision abnormal returns to make inferences about the effectiveness of remedies.

The papers most directly related to the present one are Duso, Neven, and Röller (DNR, 2007), and ADR (2004, 2007). Using the same sample of EU mergers as utilized in this paper, DNR (2007) show that for at least half of the mergers rival firms benefit after the merger is announced, i.e. they can be considered to be anticompetitive. By contrasting the markets’ reactions with the actual Commission’s decisions, they define type I errors (i.e. procompetitive mergers blocked or modified by the authority) and type II errors (anticompetitive mergers unconditionally cleared). Using probit regressions, they show that procedural issues, market definition, as well as the merging firms’ country and industry of origin play crucial roles in predicting both kinds of errors, while lobbying activities by firms do not. The fact that the Commission made mistakes is the first hint about the potential “non-effectiveness” of its policy. However, this study did not look at the effects of the decision.

ADR (2004) look at 602 EU Commission decisions involving 1,070 firms and document significant abnormal returns for the target firms and smaller and less significant bidder abnormal

returns. As does this paper, they also estimate abnormal stock price reactions 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. However, they do not look to the effects for rival firms and do not make inference about the quality of antitrust. In a follow-up paper, ADR (2007) look instead at the issue of whether the Commission decisions conform to the objective of increasing consumers' surplus. Although some of their results seem consistent with this objective, some others 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 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. However, none of the papers cited above relate announcement and decision abnormal returns to make inferences about the effectiveness of merger control. Studies of remedies on a case-by-case approach point to the superiority of structural over behavioral remedies, and possibly phase 1 over phase 2 remedies (DG Comp, 2005), but leave doubt about their general effectiveness. Theoretical arguments underline this conclusion.<sup>6</sup> In what follows, we try to resolve these ambiguities by systematically relating announcement and decision abnormal returns.

#### **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"). In both standard IO models of imperfect competition, Cournot and Bertrand with differentiated products, market output declines and prices rise absent efficiency gains (see Salant, Switzer, and Reynolds (1983) and Farrell and

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<sup>6</sup> Motta, Polo, and Vasconcelos (2003) enumerate the pros and cons of the different kinds of remedies (i.e. structural and behavioral) used by the European Commission. While they favor, in principle, 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. Davies and Lyons (2007), based on their empirical study using simulations, suggest that, for global mergers, behavioral remedies might be preferred in national markets especially when a national authority can monitor their application. 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) instead supports the superiority of structural remedies.



Shapiro, 1990).<sup>7</sup> Rival firms gain since they need not bear the quantity reduction of insiders and nevertheless benefit from the higher prices. The second effect, higher efficiency, leads to lower prices, benefits insiders and consumers, while rival firms lose from fiercer competition. It is likely that in most mergers both effects are simultaneously present, and we therefore look at the net effects.

An effective merger control policy should be able to maintain the benefits to consumers generated by increased efficiency and, at the same time, reduce the market power effects of the merger.<sup>8</sup> The central idea of this paper is that an effective merger control, whose effects are measured around the decision announcement, should dissipate the anticompetitive rents generated by the merger, which are measured around the merger announcement. Therefore, merger control effectiveness can be assessed in two steps: (i) quantify the rents generated by mergers and merger control decisions, (ii) systematically relate these measures by means of regression analysis. Next, we describe these two steps.

#### 4.1. Measuring Announcement and Decision Effects

##### 4.1.1. The Event Study Methodology

Following a long tradition in merger analysis, we use event study methodology.<sup>9</sup> Under the assumptions of efficient markets and rational expectations, the market model predicts that firm  $f$ 's stock return at day  $t$  ( $R_{f,t}$ ) is proportional to a daily market return ( $R_{m,t}$ ):

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

We estimate the market model over 240 trading days, starting 50 days prior to the announcement day and using the Scholes-Williams (1977) method. Using the model's parameters  $\alpha$  and  $\beta$ , we predict what firm  $f$ 's stock price would have been, had the event under consideration (merger announcement or antitrust decision) not occurred, i.e. the abnormal returns are:

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

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<sup>7</sup> See Gugler and Siebert (2007) for an application to mergers and RJVs in the semiconductor industry.

<sup>8</sup> Notice that we focus solely on the *direct* effect of merger policy, i.e. the effect of a particular decision on the market and the firms involved in that decision either as merging parties or as rivals. As pointed out by Sørsgard (2008), an optimal merger policy also entails *deterrence*, i.e. the effect a decision has on future firms' behavior. These deterrence effects seem to play a role in merger control as showed by Seldeslachts et al. (2007) who, by using a panel of jurisdictions over the period 1992-2003, empirically show that prohibitions strongly deter future merger activity while remedies do not.

<sup>9</sup> A thorough discussion about the literature using event study can be found in Duso, Gugler, and Yurtoglu (2006). In the appendix we introduce an alternative approach based on accounting data (see Gugler et al. 2003), which will be used to test the robustness of the approach developed here.

With efficient markets abnormal returns have zero mean and a variance equal to:

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

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. We then calculate the cumulative abnormal return over an event window  $(\tau_1, \tau_2)$ :

$$CAR_{f,\tau_1,\tau_2} = \sum_{\tau=\tau_1}^{\tau=\tau_2} AR_{f\tau}.$$

To obtain the aggregate effects of the merger  $j$  on merging firms ( $i=M$ ) and on rivals ( $i=R$ ) around the events of interest,  $\Pi_{ij}^e$ , ( $e = A, D$ ; announcement and decision), we take the weighted average of the cumulative abnormal returns of all firms in each of the two groups, the weight being firm  $f$ 's market value:

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

where  $N_{ij}$  is the number of firms in class  $i$  involved in merger  $j$ .

#### 4.1.2. Accounting for Market Expectations

If markets are efficient, they should account for the future antitrust decision when reacting to a merger announcement. We assume that the market builds expectations about the effect of the Commission's decision  $D$  (clearance or action, which includes blockings and any kind of remedies), given the *public* information available in the market around the merger announcement ( $I_A$ ). When expectations are rational, the expected value of the Commission's decision can be written as:

$$E[\Pi_{ij}^D | I_A] = \sum_D \Pi_{ij}^D \Pr[D_j | I_A] \quad D = \text{clear, action},$$

where  $\Pr[D_j | I_A]$  is the probability assigned by the market to decision  $D$  given the information available around the merger's announcement.

The observed abnormal return for firms  $i$  around the announcement day ( $\Pi_{ij}^A$ ) is then equal to the real effect of merger  $j$  for firms  $i$  ( $\Pi_{ij}^{A*}$ ) minus the expected value of the effect of

the Commission's decision. Assuming that any effective action (remedies or blockings) destroys all anticompetitive profits accruing from the merger, i.e.  $\Pi_{ij}^{D_a} = -\Pi_{ij}^{A^*}$ , and a clearance does not have any profitability effect, i.e.  $\Pi_{ij}^{D_c} = 0$ , we can then write the following:

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

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

$$\Pi_{ij}^{A^*} = \Pi_{ij}^A / \Pr(1 - [\text{action}_j | I_A]), \quad (1)$$

i.e. the measured announcement CAAR divided by the ex-ante probability that the merger will be cleared without conditions. The market can build a prior of this probability by using past information, which is what the econometrician can do by running a logit regression to assess the probability of clearance given the merger observables.

Similarly, at the time of the Commission's decision some new information hits the market. The first important date is the phase 1 decision. The phase 1 decision's effect ( $\Pi_{ij}^{P1}$ ) is the difference between the antitrust decision's *real effect* on firm  $i$  ( $\Pi_{ij}^{D^*}$ ) and the market expectation about it. Likewise, if anticompetitive concerns are substantial and the Commission decides to open a phase 2 investigation, the market updates its beliefs about remedies.<sup>10</sup> Therefore, the abnormal returns around phase 1 decision ( $\Pi_{ij}^{P1}$ ) 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>11</sup>

Summarizing, the phase 1 effect is the following:

<sup>10</sup> Indeed, when a case goes into phase 2, the probability of an antitrust intervention increases sharply. According to European Commission's statistics, the incidence of remedies in phase 1 is ca. 5%, while it increases to over 75% in phase 2. Moreover, a merger can be prohibited only after phase 2.

<sup>11</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 go into a phase 2 investigation might also reflect the high costs these firms are expected to pay.

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

The total impact of the Commission's decision for a case that does not go into phase 2 is thus:

$$\Pi_{ij}^{D*} = \frac{\Pi_{ij}^{P1}}{(1 - \Pr[\text{action}_j | I_A])} . \quad (2)$$

Similarly for cases going into phase 2, around the phase 2 decision, the abnormal return ( $\Pi_{ij}^{P2}$ ) should measure the difference between the real value of a remedy in phase 2 and the expectation that the market built given the information available on the phase 1 decision  $\Pi_{ij}^{P2} = \Pi_{ij}^{D*} - E[\Pi_{ij}^{D*} | I_{P1}] = \Pi_{ij}^{D*} - \Pi_{ij}^{P1} - E[\Pi_{ij}^{D*} | I_A]$ ,  $i=M, R$ . Hence, the overall impact of the Commission's decision for cases that go into phase 2 is the sum of phase 1 and phase 2 effects weighted by one minus the probability of an action:

$$\Pi_{ij}^{D*} = (\Pi_{ij}^{P2} + \Pi_{ij}^{P1}) / (1 - \Pr[\text{action}_j | I_A]) . \quad (3)$$

As we mentioned in the introduction, we must rely on the assumption that the market does not perfectly foresee the Commission's decisions to separately identify the effects of the merger and the decision itself. That is, there must be some surprise element, otherwise there would be no reaction at relevant dates and we would only measure white noise. The fact that the market significantly reacts to such news is evidence that the decision process is not completely determined.

#### 4.2. Effectiveness Assessment

The anticompetitive effect of a merger implies positive profits for both merging and rival firms, while the efficiency effect of a merger implies positive profits for the merging but negative profits for rival firms. Thus, if the action of the antitrust authority is effective, the decision-day abnormal returns of both, merging and rival firms ( $\Pi_{ij}^{D*}$ ) should be negative, since an effective decision takes away the anticompetitive profits for both types of firms. Moreover, they should be systematically *negatively* related to announcement period abnormal returns. The larger the anticompetitive effect of the merger and thus the larger the announcement period abnormal returns ( $\Pi_{ij}^{A*}$ ) of both types of firms, the more rent reversion should there be, if the antitrust

action is effective. We therefore propose to assess the "degree of effectiveness" of an antitrust action by running the following basic regression separately for merging firms and rivals:

$$\Pi_{ij}^D = a_{iC}C_j + a_{iO}O_j + a_{iS}S_j + a_{iB}B_j + b_{iC}C_j \cdot \Pi_{ij}^A + b_{iO}O_j \cdot \Pi_{ij}^A + b_{iS}S_j \cdot \Pi_{ij}^A + b_{iB}B_j \cdot \Pi_{ij}^A + g_i X_j + \eta_{ij} \quad (4)$$

where subscript  $i$  denotes either merging ( $M$ ) or rival ( $R$ ) 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, if merger  $j$  is cleared with those remedies that are not divestitures and which are mentioned in the Commission Notice on remedies (2001) under "Other remedies", and zero otherwise.<sup>12</sup> The dummy  $S_j$  takes on the value of one, if merger  $j$  is cleared under structural remedies (the commitment that parts of the combined company are divested), and zero otherwise. The dummy  $B_j$  takes on the value of one, if merger  $j$  is blocked, and zero otherwise. We interact these four dummies with the announcement period abnormal returns of both types of firms, respectively. Thus, we estimate different intercepts as well as slope coefficients for the four types of decision. The  $b$ -coefficients measure the degree of market power (rent) reversion due to the EU Commission's decision. The variables contained in  $X$  are exogenous controls such as year and industry dummies. Table 1 presents our hypotheses on the intercepts and slope coefficients, if merger control is effective.

**[table 1 about here]**

The most extreme action taken by the Commission, i.e. *to block* the merger, brings back the pre-merger situation and thus dissipates all rents, i.e. both the anticompetitive and the pro-competitive ones. Therefore, the null hypothesis  $b_{iB} = -1$  should not be rejected for both rivals ( $i=R$ ) and merging firms ( $i=M$ ): all rents generated by the merger are reversed by the final decision. Moreover, if the merger is blocked, both market power and efficiency effects disappear and the regression line should pass through the origin: if there are no net rents generated by the merger, no rents are taken away by the decision, thus  $a_{iB} = 0$ . It could of course be that the decision to block the merger has some other effects on the companies' market values different from those specifically related to the deal. For example, it could constitute a negative signal on the future possibilities to merge in this industry and thus depresses share prices over and above the rents generated at the announcement. In this case, we could expect a negative coefficient  $a_{iB}$ .

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<sup>12</sup> These are mainly behavioral commitments, e.g. terminating existing exclusive agreements, granting access to a necessary infrastructure, or licensing agreements.

If the merger is cleared without commitments, we do not expect decision effects that are systematically related to announcement returns, thus  $a_{iC}, b_{iC} = 0$  for merging firms and rivals.

The situation is more complex in case of *remedies* (both structural and other remedies). Only anticompetitive rents measured around the merger announcement should be entirely dissipated by the antitrust decision if it is effective. Hence, each remedial action will entail a negative decision effect for merging firms and rivals. However, this effect will be differently captured in our regression for merging firms and rivals.

For the rivals, we expect a negative intercept ( $a_{RO} < 0, a_{RS} < 0$ ) as well as a negative slope ( $b_{RO} < 0, b_{RS} < 0$ ). The former captures the shift due to the elimination of the anticompetitive rents, while the latter indicates that rent reversion should be larger, the larger the size of the anticompetitive rents generated by the merger. For the merging firms, since both market power and efficiency effects are positive, we only expect a negative slope ( $b_{MO} < 0, b_{MS} < 0$ ), while we expect a zero slope ( $a_{MO} = 0, a_{MS} = 0$ ). Figure 3 should help to clarify our predictions in diagrams representing the announcement rents on the x-coordinate and the decision rents on the y-coordinate.

In part a) we describe the prediction for rivals. Consider a merger 1, where efficiency and market power effects on rivals exactly cancel out (i.e.  $\Pi^{anticomp} = -\Pi^{efficiencies}$ )<sup>13</sup>, so that measured returns around the merger announcement are zero (point A<sup>1</sup>). If this merger is blocked, the decision's effect on rivals should also be zero, since there is no net rent to be reversed. On the contrary, for this merger an effective remedy would rip out only the anticompetitive rents ( $-\Pi^{anticomp}$ ), leading to a negative shift (i.e. intercept) due to the decision (movement to R<sup>1</sup>). Consider now the clearly anticompetitive merger 2. The market power effect is larger than the efficiency effect, so the starting point is A<sup>2</sup>. If this merger is blocked, both the anticompetitive and the efficiency rents are reversed: we move down to B<sup>2</sup>, by the amount of the net effect  $-(\Pi^{anticomp} + \Pi^{efficiencies})$ . In the case of remedies, an effective decision takes away the market power effect still maintaining the efficiency effect. So we move further down to point R<sup>2</sup>. By tracing out all possible mergers, we get the predicted regression lines for the case of prohibitions and effective remedies. In the former, the slope is equal to -1; in the latter, it is still negative but less steep than -1.<sup>14</sup>

**[figure 3 about here]**

<sup>13</sup> Remember that, for rivals, the anticompetitive effect is always positive while the efficiency effect is negative.

<sup>14</sup> The negative slope hinges on the assumption that the anticompetitive effect monotonically increases with the net-effect, i.e. that anticompetitive and efficiency effects are not perfectly negatively correlated.

In part b) we describe the situation for the merging firms. First, notice that here the origin represents a merger that has neither an anticompetitive nor an efficiency effect on merging firms' profitability. Furthermore, in this case, an effective action should not take away any rent since the merger does not create any. Therefore, both regression lines for remedies and prohibitions should run through the origin. We now consider again merger 1, which has a positive announcement effect consisting of the sum of the positive anticompetitive rents ( $\Pi^{anticomp}$ ) and the positive rents due to increased efficiency ( $\Pi^{efficiencies}$ ). The starting point is therefore  $A^1$ . If this merger is blocked, both kinds of rents are destroyed and we move down to point  $B^1$ . On the other hand, if effective remedies are imposed, only the anticompetitive rents are ripped out by the antitrust action and we move down to point  $R^1$ . The same mechanism applies to merger 2. As with rivals, we observe for the merging firms, too, that in the case of blocking the slope of the regression line should be -1, while in case of remedies it should be negative yet, in absolute terms, smaller than -1.<sup>15</sup>

### **4.3. Further Considerations**

#### **4.3.1. Phase 1 vs. Phase 2**

Mergers that are cleared with or without commitments in phase 1 and mergers that go into phase 2 might be quite different. For example, the ex-post evaluation study conducted by DG Comp (2005), finds that remedies are mostly effective in phase 1. Some reasons might be that these cases are simpler to fix, remedies in this investigation phase must be clear-cut and easy to implement, and the Commission has a stronger bargaining power vis-à-vis the merging firms through the credible threat of opening a costly phase 2 investigation. We shall test for differences in the remedies' effectiveness depending on whether the case was decided in phase 1 or phase 2.

#### **4.3.2. Pro vs. Anticompetitive Mergers**

Until now we have supposed that the antitrust agency does not make mistakes and always take the appropriate decision. Yet, the agency could wrongly intervene against pro-competitive mergers (type I errors) or approve anticompetitive mergers without remedying them (type II errors). We follow DNR (2007), and use rivals' merger announcement effects to measure anticompetitiveness. Under a consumer welfare standard, we can then define a merger to be

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<sup>15</sup> In figure 3b, we blanked out the possibility of non-profitable mergers. The fact that mergers happen, which reduce the efficiency and profits of merging firms, cannot be well explained by standard industrial organization models (for an exception, see Fridolfsson and Stennek, 2005). Nevertheless, there is overwhelming evidence that these managerial mergers do take place (see e.g. Gugler et al., 2003). Predictions for an effective merger control in this case are difficult to spell out.

anticompetitive (i.e. reduces consumer's surplus) if it increases competitors' profits, i.e. if  $\Pi_{Rj}^A > 0$ . In the empirical section, we shall run regressions testing for the robustness of our results and discriminate between pro and anticompetitive mergers.

#### **4.3.3. Non-Horizontal Mergers**

Not all mergers have only pure horizontal effects; some also have important vertical, e.g. exclusionary, or conglomerate effects. If so, anticompetitive rents cannot be measured by positive CAARs for rivals around the merger announcement as the nature of the anticompetitive concerns is very different than previously discussed. As an example, the main antitrust concern in anticompetitive vertical mergers is the possible foreclosure of rivals. In this case, their CAARs around the merger announcement should be *negative*.

Nonetheless, we do not think that this should be a large problem for the present study, as most of the mergers in our sample have predominantly horizontal effects (and would now fall under the "Horizontal Merger Guidelines"). Moreover, we control in all regressions for this problem by adding a dummy that takes on the value of one in all those mergers for which the Commission identified "vertical", "foreclosure", or "conglomerate" concerns. Finally, in the robustness section, we propose one specification where we exclude all mergers that were not purely horizontal according to the Commission's decision and find consistent results.

#### **4.3.4. Information Revelation and Merger Waves**

Positive stock market reactions for rivals after a merger announcement may not measure anticompetitive rents, but rather convey other kinds of positive news. For instance, they might signal that the industry is "at play", e.g. that a merger wave will subsequently happen with commensurate increases in share prices (Salinger and Schumann, 1988). Furthermore, they might signal that some industry-specific efficiencies can be reached through a merger, as first suggested by Eckbo and Wier (1985). We tackle this issue twofold empirically. First, we divide the sample into two time periods: pre-1996 and 1996-2002, during which a merger wave took place (see Gugler, Mueller, and Yurtoglu, 2006). Second, in the appendix, we estimate ex-post profit effects not relying on stock market data but on balance sheet data.

#### **4.3.5. Industry and Learning Effects**

Industries may differ in how the Commission treats them in merger control. That is, the Commission may define problematic industries, because concentration is already high, e.g. telecommunication, or industries of "national interest", e.g. energy. The Commission's past



decisions may convey important information on how this industry is treated. Also, the Commission may learn how to implement effective remedies in specific industries. Thus we define remedy-intensive and un-intensive industries in the robustness section, and test for differential effectiveness of remedies.

## **5. The Data and the Estimated Abnormal Returns**

Our sample consists of 151 concentrations that have been analyzed by the European Commission in the period 1990-2002. Our starting database was developed in DNR (2007). 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 71 phase 2 cases and 80 phase 1 cases for which we have complete information. We identify 544 different firms involved in the mergers either as merging parties or as rivals.

Merging firms and competitors are identified from the publicly available Commission's decisions.<sup>16</sup> This is one of the big advantages of our data set, since we can rely on the Commission's analysis concerning the market definition (i.e. the relevant competitors).<sup>17</sup> Furthermore, the Commission's reports also provide in-depth information about the characteristics of the mergers and decisions, such as the kind of concentration (e.g. full versus partial merger), the nature of the merger (pure horizontal vs. horizontal with conglomerate/vertical effects), the involved product and geographical markets, the kind of remedies imposed, the provenience of the involved firms, etc.

The merger announcement dates are 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. Finally, we collect data on firms' stock prices and market value as well as market indexes, as defined by each firm's country-industry sector, by using Thomson Financial's Datastream.<sup>18</sup>

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<sup>16</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/>.

<sup>17</sup> In the existing literature (see for instance Eckbo, 1983), in fact, rivals are defined as all other firms in the industry, however, antitrust markets are generally fairly different from an industry. Therefore, we can significantly reduce the measurement error due to a too broad market definition, which would bias the competitors' abnormal return towards zero.

<sup>18</sup> For the robustness check presented in the appendix, we use the Standard & Poor's Global Vantage and Compustat databases for information on firms' accounting profits and total assets.

Table 2 presents a short description of the relevant variables. The market value of the combined firms (rivals) is on average 45 (7.5) billion U.S. 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 market definition was not relevant for the decision.

Remedies have been imposed in 35.1% of the mergers (12.2% of phase 1 and 78% of phase 2 mergers), and 7.7% were blocked. Hence, we have 42.8% of the cases in our sample where the Commission took an action, i.e. intervened to modify or block the merger in order to restore effective competition. 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 11.8% it imposed other kinds of remedies.

**[table 2 about here]**

Table 3 reports statistics on the cumulative average abnormal returns (CAARs) around various events and using different event windows for merging firms and competitors. We consider a short window from 5 days before to 5 days after the relevant event, and a long window that goes back 50 days before the event to 5 days after.

**[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>19</sup> The cumulative abnormal returns for the rivals around the announcement date are, instead, not statistically significantly different from zero and, on average, very small in size.<sup>20</sup> Looking at phase 1 decisions, we observe negative CAARs for the merging firms as well as for the rivals. The negative effect stems mainly from those cases where a phase 2 investigation was opened: The negative CAARs for the merging firms in that case are on average -1.7% in the short window and -1.4% in the

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<sup>19</sup> See for instance Andrade et al. (2001). 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 ADR (2004) using a comparable sample of mergers.

<sup>20</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(s) under consideration and are, therefore, only partially affected by the merger.

long window. Similarly, rivals lose from the opening of a phase 2 investigation (in the long window up to -1.1%). For phase 2 decisions, almost all CAARs are statistically insignificant.

## 6. Results

### 6.1. The probability of an Action

As previously discussed, our first step is to estimate the probability that the Commission takes an action. The dependent variable is a dummy (ACTION) equal to 0 in the case of outright clearance and equal to 1 in the case of remedies or prohibitions. Table 4 reports the estimation results. The probability of an action is explained by several observable merger characteristics proxying for the merger's likely (anti) competitive effects, firms' lobbying, and/or protectionist tendencies of the antitrust agency: whether one or both of the merging firms stem from the USA (*us*), whether one or both of the merging firms stem from a major EU country (*bigeu*; France, Germany, Italy, Spain, or UK), whether conglomerate or vertical concerns have been identified (*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 is a full merger (*full*; as opposed to partial acquisitions), the size of merging and rival firms measured by the logarithm of their market values (*lnvm* and *lnvr* respectively), industry indicators (*d* for manufacturing and *i* for communications) and time variables (time trend and a dummy for the late years 1995-2002<sup>21</sup>).

[table 4 about here]

The probability of an action is significantly lower if one or both of the merging firms stem from the USA<sup>22</sup> or if markets are defined as EU-wide. It significantly increases with the presence of conglomerate or vertical concerns<sup>23</sup>, the size of rival firms, if the firms operate in manufacturing, and during the last years of the sample (1995-2002). We correctly classify around 70% of the observations. From the reported estimates, we predict for each merger the probability of an action ( $\Pr[action|I_A]$ ), and correct the estimated CAARs around the merger and decision announcements by the predicted probabilities according to the discussion highlighted above. We run regression (4) using the probability corrected CAARs.

### 6.2. Main Results

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<sup>21</sup> This dummy captures the years during which Mario Monti was the Competition Commissioner and several changes in merger control enforcement happened.

<sup>22</sup> Note that this result seems to contrast with the findings of ADR (2007), who claim that EU merger control is protectionist and favors European firms.

<sup>23</sup> A merger is defined to also have conglomerate or vertical (foreclosure) effects if the Commission stated so in its reports.

Table 5 presents our main regression results. We choose the long window (-50, +5) to measure the merger's effect around its announcement, the short window (-5, +5) around phase 1 decision, and again the long window (-50, +5) around phase 2 decision. These strike us to be the best choices to account for information leakages. Information leakages before merger announcements are well documented in the literature. Before the phase 1 decision, one should not expect much outflow of information as this investigation phase spans over a quite short time period, which is mostly used for administrative and procedural issues. Instead, information leakages might be an issue during phase 2, since this in-depth investigation lasts several months and attracts more public attention than phase 1. Moreover, the Commission might provide some information to the market by applying the so-called "market test", which asks competitors and customers to evaluate the proposed conditions.<sup>24</sup>

In all specifications we control for time as well as industry effects (manufacturing and communications). We also add a dummy equal to one for those cases where conglomerate and/or foreclosure aspects were identified by the Commission (i.e. not purely horizontal mergers).

**[table 5 about here]**

Our first important findings are the negative coefficients  $b_{iB}$  for outright blockings (-0.88 for rivals and -0.72 for merging firms), which are not statistically significantly different from -1. As we previously acknowledged, this is *the* test for the appropriateness of our entire approach: prohibitions fully restore the pre-merger situation and are, therefore, an effective merger tool. The significantly negative intercept term for merging firms when the merger is blocked can be explained by additional costs (in addition to the lost anticompetitive and efficiency rents) of a blocked merger. These involve the direct costs of the lost merger proceedings and, probably more importantly, the indirect costs of the need to establish a new merger or business strategy.

Clearances do not have, per se, a positive effect on both rivals and merging firms as witnessed by the zero intercepts. However, the positive and significant estimate of the slope for rivals ( $b_{RC}$ ) implies that their gains increase the more anticompetitive the outright cleared deal is. Possibly, the absence of an action by the antitrust authority conveys positive news to the market that future mergers are possible in this industry without provoking prolonged merger proceedings.

The effect of remedies is only partly in line with the predictions for an effective merger control. In particular, the predicted negative shift for rivals, i.e. the elimination of anticompetitive rents, is not observed, since the estimated intercepts are not significantly

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<sup>24</sup> For further evidence supporting our choices, see Duso, Gugler, and Yurtoglu (2006, 2007). Moreover, we run our main regressions also using other windows and our qualitative results are not altered.

different from zero.<sup>25</sup> Yet, the coefficient estimates for the slopes are negative for both rivals and merging firms, and for the latter they are significantly different from zero. For rivals, we can neither reject the hypothesis that they are negative nor that they are positive. The negative slopes imply a partial rent reversion (i.e. effectiveness of remedies), which is increasing with the anticompetitiveness of the merger.

### 6.3. Additional Results and robustness checks

We first analyze phase 1 and phase 2 decisions (sub-samples) separately in table 6. For cases closed after a phase 1 investigation, we observe significant rent reversion in case of remedies only for rival firms ( $b_R = -0.19$ ). However, the intercept is not significantly different from zero.<sup>26</sup> This is again consistent with remedies being, though only partially, effective when they are applied in phase 1, which is in line with the findings by the Commission's in-house study (DG Comp, 2005).

[table 6 about here]

The large and significantly positive intercept and slope coefficients for rivals in mergers that were outright cleared might be a signal of 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).<sup>27</sup>

The regressions run in the phase 2 sub-sample almost entirely replicate the results observed in the full sample. Again, the consistency check for our procedure is successful, as the estimates for the slopes ( $b_{iB}$ ) are not significantly different from -1, and the intercepts ( $a_{iB}$ ) are not significantly different from zero for both merging firms and rivals. Furthermore, the hypotheses for outright cleared mergers are also met for both merging firms and rivals, as the slopes as well as the intercepts are not significantly different from zero. The major discrepancy is on the remedies' effectiveness. Now, the slope coefficient for STRUCTURAL REMEDIES is estimated to be significantly *positive* for rivals yet negative, though not significant, for merging firms. Thus, we cannot rule out the possibility that these remedies, on average, merely resulted in rent transfers from merging firms to their rivals without correcting the anticompetitive nature of the merger. This result implies that remedies in phase 2 are less of an effective merger tool, on average.

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<sup>25</sup> Yet, given the small coefficient estimates and the relatively large standard errors, we can neither reject the hypothesis of these coefficients being smaller than zero nor the hypothesis of these coefficients being larger than zero.

<sup>26</sup> Notice that, due to the limited number of observations, we do not discriminate between OTHER REMEDIES and STRUCTURAL REMEDIES.

<sup>27</sup> Alternatively, they might signal that the market was surprised by a particularly favorable decision. We will come back to this when we discuss the difference between pro and anticompetitive mergers.

We next interact announcement returns with the decision categories CLEAR and REMEDIES, and additionally with indicators for anticompetitive (rival announcement CAARs =  $\Pi_{Rj}^A > 0$ ) vs. procompetitive (rival announcement CAARs =  $\Pi_{Rj}^A < 0$ ) mergers (see table 7).<sup>28</sup>

**[table 7 about here]**

Our main results carry over in that outright prohibitions restore the pre-merger situation (i.e.  $b_{iB}$  is not significantly different from -1)<sup>29</sup> and remedies are only partially effective. In particular, remedies in anticompetitive mergers have a strong and significantly negative effect on rivals, while, in the case of merging firms, the negative and significant effect is observed when remedies are applied to pro-competitive mergers. This points to costs for merging firms when a type I error occurs because the authority intervenes in a pro-competitive merger. Finally, a clearance of an anticompetitive merger exacerbates the positive rents earned by rivals while not significantly influencing the merging firms: A type II error seems to benefit the competitors without hurting the merging firms. Most likely consumers pay for it.

Table 8 presents the estimates for our main regressions using only *purely horizontal mergers* (85% of the sample), which are mergers where the EU Commission did not identify any conglomerate or vertical effects. Our tests should suit these kinds of mergers best. For this sub-sample, most of our main results carry over with comparable significance levels. The coefficients on blocked mergers are again not significantly different from minus one for merging firms and rivals. The effectiveness of remedies is only partially corroborated. In particular, different from the full sample, we observe that other (behavioral) remedies seem to be a rent transfer from the merging firms - which show a significantly negative slope coefficient - to the rivals, for which the estimated slope is significantly positive.

**[table 8 about here]**

Our sample period, 1990-2002, saw huge speculative stock price appreciations with a commensurate merger wave in the second half of the 1990ies (see Gugler, Mueller, and Yurtoglu, 2006, for an analysis of this merger wave). One may be concerned that stock market reactions during this period were somewhat special and possibly unrelated to antitrust issues. For example, following the announcement of a merger, the whole industry, and especially the rivals, may be put “at play” and speculation about forthcoming bids may drive up their share prices. This could be the case for some specific industries (e.g. telecommunications) and/or for the whole market during particular periods of time (e.g. end of the 1990s bubble). We therefore

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<sup>28</sup> Data limitations do not allow us to separately estimate the effect of prohibitions (BLOCK) for pro and anticompetitive mergers.

<sup>29</sup> In this specification, the negative effect of prohibitions on merging firms is even stronger, since the intercept  $a_{MB}$  is also negative and significant, pointing to some extra costs of prohibitions for the merging parties.

split the sample into a pre-1996 period (1990-1995) and a post-1996 (1996-2002) period, for which we present the results in table 9.

**[table 9 about here]**

Our results are robust to merger wave arguments. We still cannot reject the hypothesis  $b_{iB} = -1$  ( $i=M,R$ ). On remedy effectiveness, we obtain the same results as in the full sample: remedies are only partially effective. However, we observe that structural remedies seem to constitute a rent transfer to rivals, for which the slope coefficient is positive and significant.

The Commission's past decisions are important for a number of reasons. First, besides intrinsic characteristics such as merger intensity or growth, industries may differ in how the antitrust authority treats them. For instance, the Commission may define problematic industries, because they are highly concentrated, e.g. telecommunication, or of "national interest", e.g. energy, and treat them more severely, by using more effective remedies more often, than in other industries. Likewise, the Commission's past decisions may convey important information to the market with respect to future decisions. Hence, the signal-to-noise ratios of our measured abnormal returns may vary across industries. Finally, the Commission may learn how to implement effective remedies in specific industries. To analyze these issues, we define remedies-intensive industries defined at the two digit NACE codes. In *remedies-intensive industries* the Commission imposed remedies including prohibitions in more than 10% of the notified cases, which is the median. We use the whole population of notified mergers (more than 3,500) to make this classification.

**[table 10 about here]**

Table 10 presents our findings for this sub-sample. Results are again quite reassuring and reinforce our previous conclusions. Both for merging firms and rivals, prohibitions work as expected by reversing all rents generated around the merger announcement. The remedies' effectiveness is substantially increased in remedies-intensive industries: All four slope coefficients have a negative sign, three of them are significant, and the size of the coefficients is much larger than in the full sample. This indicates substantial rent reversion and suggests that the Commission has learnt over time and in certain industries to implement effective remedies.

## **7. Conclusions**

To the best of our knowledge, this is the first paper that tries to econometrically assess the effectiveness of merger control decisions. We do this by using a simple, intuitive, and novel approach based on stock market data: By looking at the relation between firms' abnormal returns around the two major event dates, the merger and antitrust decision announcements, we

obtain several testable hypotheses. We are cautious in isolating the true effects of the antitrust decisions. First, we account for information leakages prior to major events. Second, we adjust our profitability measures for the market prior to the merger control procedure by using a probability correction method. Third, our dataset is as “clean” as possible in identifying major rivals of merging firms, hence the merger’s true competitive effect, as our sources for market definition are the decisions of the European Commission itself. Fourth, several robustness checks based on different types of mergers, industries, and time periods confirm the robustness of our results. Finally, 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 (see the appendix). Therefore, we believe that our results are robust.

We find that outright prohibitions completely solve the anticompetitive concerns raised by the European Commission. Only in this case, we cannot reject the hypothesis that the Commission decision fully dissipates all those rents that the market believed would result from the merger. This is also a strong consistency check for the reliability of our approach, as prohibitions restore the pre-merger situation. Remedies, instead, do not seem to achieve this full rent reversion on average. Yet, our methodology allows us to qualify this result in several directions. Remedies appear to be more effective if ordered during the first investigation phase. This result, at first sight controversial, is in line with the empirical evidence provided by the ex-post evaluation study conducted by DG Comp (2005), which is based on a very different evaluation method. Remedies are mostly effective in phase 1, because these cases are simpler, remedies must be clear cut and easily implementable, and the Commission has a stronger bargaining power with respect to the merging firms through the credible threat of opening a costly phase 2 investigation. We also offer insights about the evolution of European merger policy effectiveness over time. Apparently, the Commission was able to learn over the years and from its past experience and improved the effectiveness of its remedial action.

In recent years the EU Commission - in contrast to the U.S. antitrust authorities - increasingly hesitates to block mergers, especially after the European Court of Justice overruled several of its blocking decisions. Our results imply that this may be problematic: remedies might be a good policy tool, when the anticompetitive concerns brought by the merger are not too serious. In complex mergers, which create serious worries about the post-merger industry’s competitiveness, prohibitions might be the only tool capable of restoring effective competition.



## Appendix: An Ex-Post Evaluation of Mergers

In this section, we present additional robustness checks on the results obtained so far using the methodology proposed by 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 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  $t+n$ .

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

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 applies for rivals. In fact, antitrust markets are different to 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 a 3-digit SIC industry a possible 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 11 about here]**

Table 11 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 stock markets - at least partially - foresee the eventual profit effects of the merger.

**[table 12 about here]**

Table 12 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 fully solve the anticompetitive problems on average.

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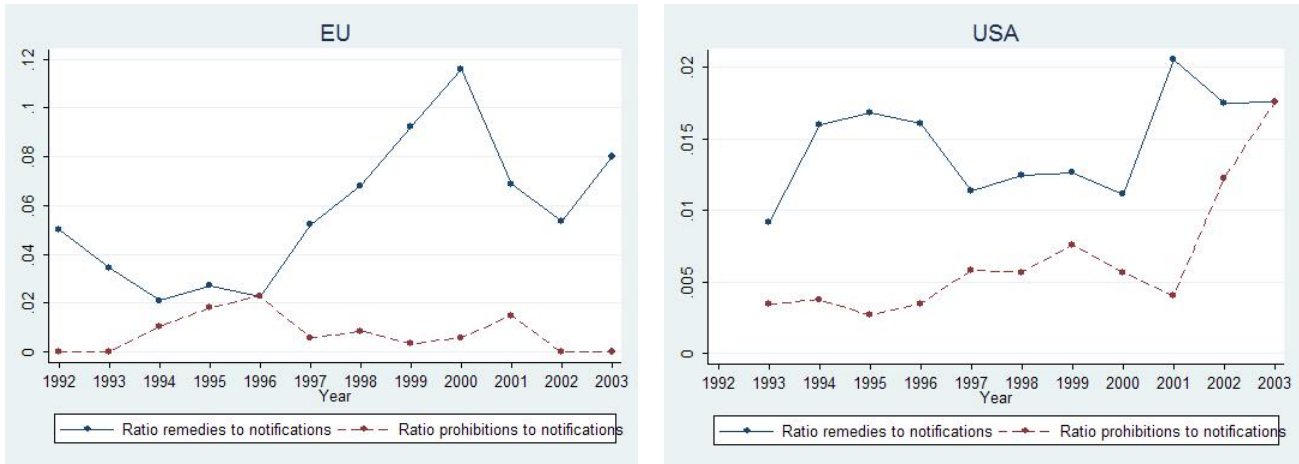
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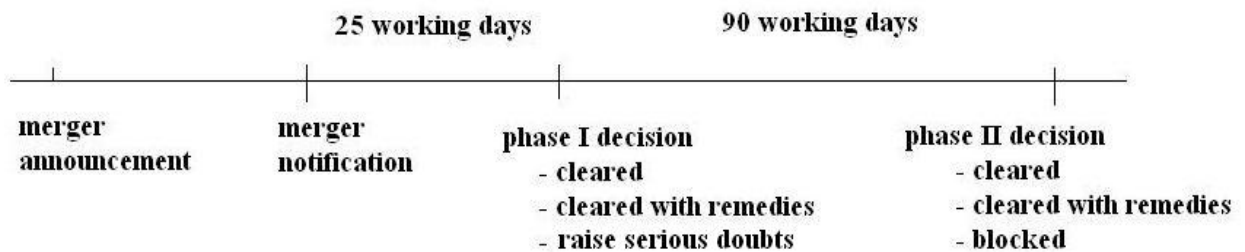
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## Tables and Figures

**Figure 1: Frequency of Merger Control Interventions: EU and USA**

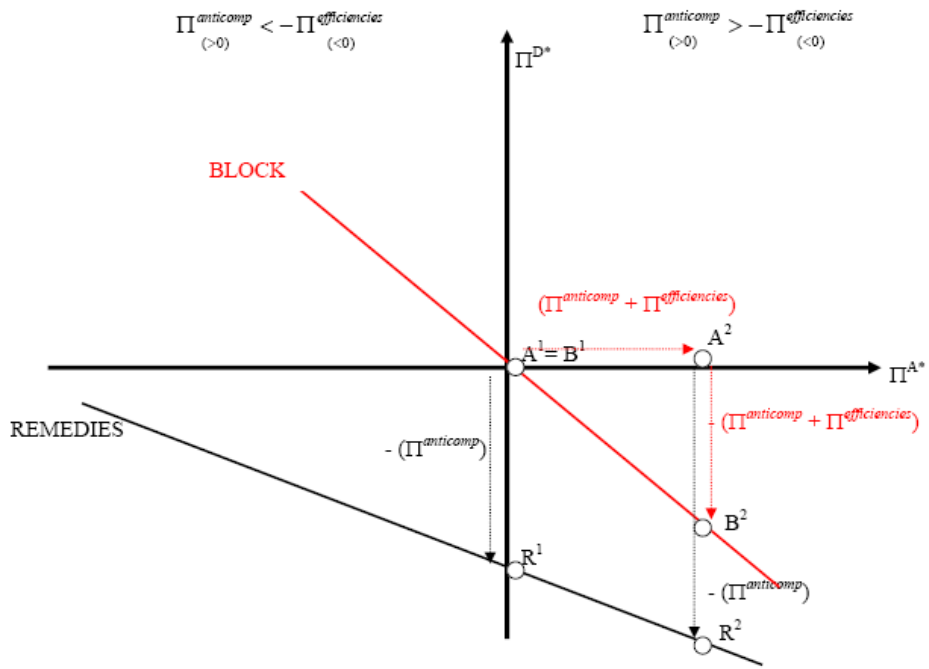


**Figure 2: The EU Merger Control Process**

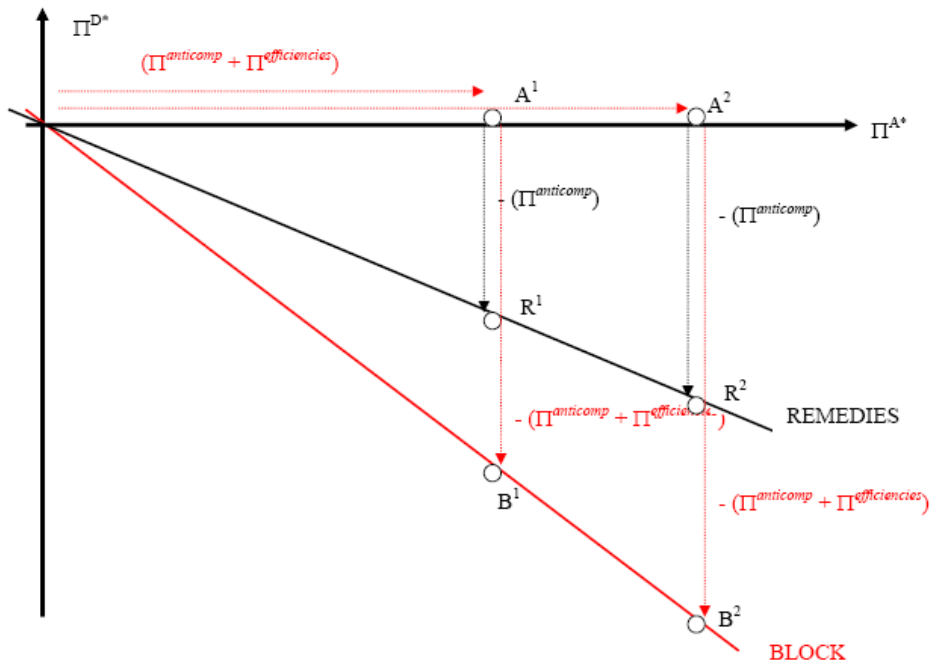


**Figure 3: Effective merger control**

**a) Rivals**



**b) Merging firms**



**Table 1. Effective Merger Control**

	Predictions	
	Rivals	Merging firms
<b>Blocking</b>	$a_{RB} = 0, b_{RB} = -1$	$a_{MB} = 0, b_{MB} = -1$
<b>Remedies</b>	$a_{RO} < 0, a_{RS} < 0$	$a_{MO} = 0, a_{MS} = 0$
	$b_{RS} < 0, b_{RS} < 0$	$b_{MO} < 0, b_{MS} < 0$
<b>Clearance</b>	$a_{RC} = 0, b_{RC} = 0$	$a_{MC} = 0, b_{MC} = 0$

Note: a denotes the intercepts and b the slope coefficients. First subscript: M for merging firms and R for rivals. Second subscripts: B for Blocking; O for Other remedies; S for Structural remedies; C for outright Clearance.

**Table 2. Preliminary Statistics**

	Description	Obs	Mean	Min	Max
mvm	Market value of merging firms in million US \$	151	44165	10.8	607975
mvr	Market value of rivals (average) in million US \$	151	7492	3.6	227604
ncomp	Number of competitors mentioned in the Commission report	151	7.59	1	34
ncomp_list	Percentage of mentioned competitors listed in the stock market	151	0.63	0	1
full	Full acquisition	151	0.57	0	1
partial	Partial acquisition	151	0.13	0	1
JV	Joint Venture	151	0.24	0	1
asset	Asset acquisition	151	0.06	0	1
tender	Tender offer	151	0.11	0	1
conglom	Conglomerate or vertical concerns have been identified	151	0.15	0	1
crossbord	Cross border deal	151	0.69	0	1
us	One or both of the merging firms stem from the USA	151	0.33	0	1
bigeu	One or both of the merging firms stem from a major EU country (France, Germany, Italy, Spain, or UK)	151	0.68	0	1
phase1	The merger was cleared in phase 1	151	0.54	0	1
phase2	The geographical market is national	151	0.46	0	1
EU	The geographical market is the European Economic Area	151	0.41	0	1
World	The geographical market is worldwide	151	0.21	0	1
ACTION	An action (remedies or blocking) have been taken	151	0.43	0	1
BLOCK	The merger was prohibited	151	0.08	0	1
STRUCTURAL	The remedy consisted in a divestiture	151	0.23	0	1
OTHER	Other kinds of remedies	151	0.12	0	1



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

	Merging firms					Rivals				
	Nobs	Short run		Long run		Nobs	Short run		Long run	
		CAAR (5,5)	S.E.	CAAR (50,5)	S.E.		CAAR (5,5)	St.E.	CAAR (50,5)	St.E.
<b>At announcement of the merger:</b>	151	<b>0.010**</b>	0.005	<b>0.018**</b>	0.010	151	-0.003	0.003	0.004	0.008
<b>At phase 1 decision of the merger:<sup>a</sup></b>										
Cleared in phase 1	71	-0.002	0.007	0.003	0.010	71	-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	70	<b>-0.017***</b>	0.006	<b>-0.014**</b>	0.008	70	-0.0001	0.005	-0.011	0.009
All	151	<b>-0.008**</b>	0.004	-0.005	0.006	151	-0.003	0.003	0.000	0.007
<b>At phase 2 decision of the merger:</b>										
Cleared in phase 2	16	0.018	0.019	<b>0.066**</b>	0.037	16	0.001	0.010	0.001	0.022
Cleared with remedies in phase 2	41	0.003	0.012	-0.015	0.015	41	-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	70	0.007	0.008	0.005	0.015	70	0.001	0.007	-0.019	0.348

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

<sup>a</sup> For the phase 1 decisions the long-run window is (25,5).

**Table 4: The Probability of Action**

	<b>Coef.</b>	<b>Std. Err</b>
<i>us</i>	<b>-1.314**</b>	0.540
<i>bigeu</i>	-0.419	0.480
<i>conglom</i>	<b>0.955*</b>	0.568
<i>crossbord</i>	-0.476	0.459
<i>world</i>	-0.418	0.519
<i>eu</i>	<b>-0.844*</b>	0.482
<i>full</i>	<b>0.781*</b>	0.421
<i>lmvm</i>	0.121	0.165
<i>lmvr</i>	<b>0.183**</b>	0.151
<i>d</i>	<b>1.034**</b>	0.508
<i>i</i>	0.673	0.637
<i>trend</i>	-0.949	0.611
<i>d95_02</i>	<b>1.729*</b>	0.921
<i>constant</i>	-2.452	1.688
Nobs		151
Pseudo R <sup>2</sup>		0.156
Correctly classified		69.48%
Log-likelihood		-88.80

Note: The Dependent variables is ACTION equal to 1 if the merger was cleared with remedies or blocked. *us* is 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; *crossbord* 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; *lmvm* and *lmvr* 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 5: Regression Results for Equation (4)**

Dependent variable: Probability Corrected Decision CAAR, $\Pi^{D*}$	Rivals			Merging Firms		
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
CLEAR	0.042	0.061	$H_0: a_C=0$ 0.494	-0.020	0.093	$H_0: a_C=0$ 0.832
OTHER REMEDIES	0.013	0.037	$H_0: a_O \leq 0$ 0.420	-0.095	0.056	$H_0: a_O \leq 0$ 0.826
STRUCTURAL REMEDIES	0.049	0.028	$H_0: a_S \leq 0$ 0.233	-0.033	0.045	$H_0: a_S \leq 0$ 0.626
BLOCK	-0.061	0.041	$H_0: a_B=0$ 0.410	<b>-0.213</b>	0.063	$H_0: a_B=0$ 0.062
CLEAR * $\Pi^{A*}$	<b>0.274</b>	0.076	$H_0: b_C=0$ 0.000	0.007	0.090	$H_0: b_C=0$ 0.940
OTHER REMEDIES* $\Pi^{A*}$	-0.116	0.093	$H_0: b_O \leq 0$ 0.893	<b>-0.341</b>	0.172	$H_0: b_O \leq 0$ 0.975
STRUCTURAL REMEDIES* $\Pi^{A*}$	-0.105	0.091	$H_0: b_S \leq 0$ 0.874	<b>-0.165</b>	0.077	$H_0: b_S \leq 0$ 0.983
BLOCK* $\Pi^{A*}$	<b>-0.875</b>	0.100	$H_0: b_B=-1$ 0.211	<b>-0.718</b>	0.136	$H_0: b_B=-1$ 0.040
Nobs		151			151	
R <sup>2</sup>		0.539			0.325	

Note: We perform robust regressions using the *rreg* command in STATA. We control for industry effects, for conglomerate/foreclosure aspects, and we control for the proportion of rivals that we lost due to data limitation. CLEAR: the merger is cleared without remedies; OTHER REMEDIES: the merger is cleared with remedies other than divestitures (mainly behavioral remedies); STRUCTURAL REMEDIES: the merger is cleared with a divestiture; BLOCK the merger is blocked. We report the p-value for the tested hypotheses.

**Table 6: Phase 1 vs. Phase 2**

Dependent variable: Probability Corrected Decision CAAR, $\Pi^{D*}$	Rivals			Merging Firms		
	Phase 1					
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
CLEAR	<b>0.075</b>	0.031	$H_0: a_C=0$ 0.018	-0.025	0.055	$H_0: a_C=0$ 0.659
REMEDIES	0.020	0.023	$H_0: a_R \leq 0$ 0.305	-0.018	0.040	$H_0: a_R \leq 0$ 0.602
CLEAR * $\Pi^{A*}$	<b>0.232</b>	0.033	$H_0: b_C=0$ 0.000	0.029	0.046	$H_0: b_C=0$ 0.525
REMEDIES* $\Pi^{A*}$	<b>-0.190</b>	0.054	$H_0: b_R \leq 0$ 0.999	0.010	0.080	$H_0: b_R \leq 0$ 0.450
Nobs		80			80	
R <sup>2</sup>		0.650			0.249	
Phase 2						
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
CLEAR	-0.035	0.246	$H_0: a_C=0$ 0.889	0.272	0.319	$H_0: a_C=0$ 0.397
OTHER REMEDIES	-0.050	0.103	$H_0: a_O \leq 0$ 0.588	0.069	0.159	$H_0: a_O \leq 0$ 0.401
STRUCTURAL REMEDIES	0.090	0.089	$H_0: a_S \leq 0$ 0.353	0.207	0.132	$H_0: a_S \leq 0$ 0.255
BLOCK	-0.020	0.105	$H_0: a_B=0$ 0.934	0.205	0.151	$H_0: a_B=0$ 0.526
CLEAR * $\Pi^{A*}$	0.199	0.462	$H_0: b_C=0$ 0.668	0.158	0.708	$H_0: b_C=0$ 0.825
OTHER REMEDIES* $\Pi^{A*}$	0.042	0.503	$H_0: b_O \leq 0$ 0.467	-0.823	0.545	$H_0: b_O \leq 0$ 0.931
STRUCTURAL REMEDIES* $\Pi^{A*}$	<b>0.531</b>	0.177	$H_0: b_S \leq 0$ 0.002	-0.217	0.149	$H_0: b_S \leq 0$ 0.924
BLOCK* $\Pi^{A*}$	<b>-0.714</b>	0.196	$H_0: b_B=-1$ 0.151	<b>-0.782</b>	0.244	$H_0: b_B=-1$ 0.377
Nobs		71			71	
R <sup>2</sup>		0.570			0.474	

Note: REMEDIES includes both OTHER REMEDIES and STRUCTURAL REMEDIES.

**Table 7: Pro- vs. Anticompetitive mergers**

Dependent variable: Probability Corrected Decision CAAR, $\Pi^{D^*}$	Rivals			Merging Firms		
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
	Full Sample					
CLEAR*ANTICOMP	0.015	0.040	$H_0: a_C=0$ 0.834	0.031	0.041	$H_0: a_C=0$ 0.721
CLEAR*PROCOMP	0.035	0.064	$H_0: a_C=0$ 0.590	0.018	0.081	$H_0: a_C=0$ 0.825
REMEDIES*ANTICOMP	0.081	0.052	$H_0: a_R \leq 0$ 0.150	-0.043	0.047	$H_0: a_R \leq 0$ 0.685
REMEDIES*PROCOMP	0.021	0.044	$H_0: a_R \leq 0$ 0.387	0.011	0.044	$H_0: a_R \leq 0$ 0.450
BLOCK	-0.066	0.048	$H_0: a_B=0$ 0.389	<b>-0.257</b>	0.058	$H_0: a_B=0$ 0.010
CLEAR*ANTICOMP* $\Pi^{A^*}$	<b>0.352</b>	0.172	$H_0: b_C=0$ 0.043	-0.226	0.123	$H_0: b_C=0$ 0.067
CLEAR*PROCOMP* $\Pi^{A^*}$	0.193	0.127	$H_0: b_C=0$ 0.129	0.020	0.105	$H_0: b_C=0$ 0.847
REMEDIES*ANTICOMP* $\Pi^{A^*}$	<b>-0.302</b>	0.166	$H_0: b_R \leq 0$ 0.964	-0.059	0.071	$H_0: b_R \leq 0$ 0.797
REMEDIES*PROCOMP* $\Pi^{A^*}$	-0.089	0.122	$H_0: b_R \leq 0$ 0.767	<b>-0.695</b>	0.119	$H_0: b_R \leq 0$ 0.999
BLOCK* $\Pi^{A^*}$	<b>-0.867</b>	0.104	$H_0: b_B=-1$ 0.201	<b>-0.763</b>	0.118	$H_0: b_B=-1$ 0.047
Nobs		151			151	
R <sup>2</sup>		0.497			0.469	

Note: ANTICOMP is equal to one if rivals' announcement CAARs  $> 0$  ( $\Pi_{Rj}^A > 0$ ); PROCOMP is equal to one if rivals' announcement CAARs  $< 0$  ( $\Pi_{Rj}^A < 0$ ); REMEDIES includes both OTHER REMEDIES and STRUCTURAL REMEDIES.

**Table 8: Robustness Checks: Pure Horizontal Mergers**

Dependent variable: Probability Corrected Decision CAAR, $\Pi^{D*}$	Rivals		Pure Horizontal			
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
CLEAR	-0.027	0.073	$H_0: a_C=0$ 0.715	0.023	0.087	$H_0: a_C=0$ 0.790
OTHER REMEDIES	<b>-0.119</b>	0.045	$H_0: a_O \leq 0$ 0.941	-0.097	0.054	$H_0: a_O \leq 0$ 0.854
STRUCTURAL REMEDIES	-0.001	0.033	$H_0: a_S \leq 0$ 0.506	0.031	0.042	$H_0: a_S \leq 0$ 0.372
BLOCK	<b>-0.102</b>	0.050	$H_0: a_B=0$ 0.251	<b>0.242</b>	0.059	$H_0: a_B=0$ 0.022
CLEAR * $\Pi^A$ *	<b>0.235</b>	0.095	$H_0: b_C=0$ 0.015	-0.096	0.089	$H_0: b_C=0$ 0.286
OTHER REMEDIES* $\Pi^A$ *	<b>0.886</b>	0.169	$H_0: b_O \leq 0$ 0.000	<b>-0.365</b>	0.175	$H_0: b_O \leq 0$ 0.980
STRUCTURAL REMEDIES* $\Pi^A$ *	-0.077	0.106	$H_0: b_S \leq 0$ 0.765	0.061	0.109	$H_0: b_S \leq 0$ 0.288
BLOCK* $\Pi^A$ *	<b>-0.865</b>	0.134	$H_0: b_B=-1$ 0.315	<b>-1.325</b>	0.136	$H_0: b_B=-1$ 0.018
Nobs		129			129	
R <sup>2</sup>		0.560			0.570	

Note: Pure horizontal mergers are those for which the Commission identified only horizontal effects and no conglomerate or vertical effects. We report the p-value for the tested hypotheses.

**Table 9: Robustness Checks: Post-1996**

Dependent variable: Probability Corrected Decision CAAR, $\Pi^{D*}$	Rivals			Merging Firms		
	Post 1996					
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
CLEAR	0.022	0.066	$H_0: a_C=0$ 0.743	0.072	0.081	$H_0: a_C=0$ 0.378
OTHER REMEDIES	-0.027	0.066	$H_0: a_O \leq 0$ 0.625	-0.042	0.079	$H_0: a_O \leq 0$ 0.661
STRUCTURAL REMEDIES	0.031	0.045	$H_0: a_S \leq 0$ 0.340	0.020	0.056	$H_0: a_S \leq 0$ 0.413
BLOCK	-0.066	0.069	$H_0: a_B \leq 0$ 0.464	<b>-0.481</b>	0.079	$H_0: a_B=0$ 0.000
CLEAR * $\Pi^A$ *	<b>0.252</b>	0.111	$H_0: b_C=0$ 0.026	-0.008	0.106	$H_0: b_C=0$ 0.942
OTHER REMEDIES* $\Pi^A$ *	-0.106	0.136	$H_0: b_O \leq 0$ 0.781	<b>-0.338</b>	0.192	$H_0: b_O \leq 0$ 0.959
STRUCTURAL REMEDIES* $\Pi^A$ *	<b>0.395</b>	0.132	$H_0: b_S \leq 0$ 0.002	<b>-0.185</b>	0.089	$H_0: b_S \leq 0$ 0.980
BLOCK* $\Pi^A$ *	<b>-0.843</b>	0.178	$H_0: b_B=-1$ 0.379	<b>-0.687</b>	0.152	$H_0: b_B=-1$ 0.042
Nobs		104			104	
R <sup>2</sup>		0.418			0.476	

Note: The **Post-1996** period includes the years 1996-2002.

**Table 10: Robustness Checks: Remedy-intensive industries**

Dependent variable: Probability Corrected Decision CAAR, $\Pi^D$ *	Rivals			Merging Firms		
Remedy-Intensive Industries						
	Coeff	S.E.	Single Tests $H_0$ (p-values)	Coeff	S.E.	Single Tests $H_0$ (p-values)
CLEAR	0.000	0.186	$H_0: a_C=0$ 0.998	0.100	0.126	$H_0: a_C=0$ 0.429
OTHER REMEDIES	-0.046	0.065	$H_0: a_O \leq 0$ 0.592	0.031	0.077	$H_0: a_O \leq 0$ 0.415
STRUCTURAL REMEDIES	0.011	0.051	$H_0: a_S \leq 0$ 0.477	0.084	0.062	$H_0: a_S \leq 0$ 0.250
BLOCK	-0.097	0.075	$H_0: a_B \leq 0$ 0.625	<b>0.276</b>	0.097	$H_0: a_B \leq 0$ 0.059
CLEAR * $\Pi^A$ *	<b>0.441</b>	0.170	$H_0: b_C=0$ 0.012	-0.148	0.143	$H_0: b_C=0$ 0.304
OTHER REMEDIES* $\Pi^A$ *	-0.193	0.133	$H_0: b_O \leq 0$ 0.924	<b>-0.564</b>	0.223	$H_0: b_O \leq 0$ 0.993
STRUCTURAL REMEDIES* $\Pi^A$ *	<b>-0.533</b>	0.162	$H_0: b_S \leq 0$ 0.999	<b>-0.193</b>	0.087	$H_0: b_S \leq 0$ 0.985
BLOCK* $\Pi^A$ *	<b>-0.837</b>	0.161	$H_0: b_B=-1$ 0.315	<b>-1.514</b>	0.302	$H_0: b_B=-1$ 0.094
Nobs	81			81		
$R^2$	0.590			0.587		

Note: In **remedy-intensive** industries, defined by the two digit NACE code, the Commission imposed remedies including prohibitions in more than 10% of the mergers (i.e. the median). We report the p-value for the tested hypotheses.



**Table 11. 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	0.118	<b>0.077***</b>	0.026	0.148	<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	0.196	0.169	0.148	0.196	<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 12. The Relationship between Merging Firms' and Rivals' Profit Effects**

Dependent Variable: Independent variables:	Merging firms' profit effect 2 years after merger	
	Coef.	Std. Err.
Rivals' profit effect 2 years after merger* CLEAR	0.089	0.108
Rivals' profit effect 2 years after merger* OTHER REMEDIES	<b>0.816***</b>	0.216
Rivals' profit effect 2 years after merger* STRUCTURAL REMEDIES	<b>1.849***</b>	0.089
Rivals' profit effect 2 years after merger* BLOCK	0.347	0.893
Nobs	87	
R <sup>2</sup>	0.194	

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 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 without remedies; OTHER REMEDIES: the merger is cleared with remedies other than divestiture (mainly behavioral remedies); STRUCTURAL REMEDIES: 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