Efficiency of
EU Merger Control in the
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Abstract:

The main goal of this paper is to provide an analysis of key regulatory changes in the European merger control and to evaluate their real impact on the efficiency of merger regulation. Our main contribution is an empirical analysis of a unique representative sample of 161 horizontal mergers covering the final regulatory assessments during the period from 1990 to 2008. We use stock market data to identify those cases where there are discrepancies between the Commission and market evaluation of the merger. The PROBIT model is then used to further investigate the sources of these discrepancies. Our results suggest that the Commission's decisions are not purely explained by the motive of protecting consumer welfare and that other political and institutional factors do play a role in setting policy. We did not find evidence that the Commission protects competitors at the expense of consumers and foreign firms. Moreover, we conclude that the regulatory reform introduced in 2004 has significantly enhanced efficiency of the European merger control. To the authors' best knowledge, this paper is the first study using stock market data to evaluate an impact of the recent EU merger control.

Keywords: merger control, European Union, political economy, regulatory reform, PROBIT model

JEL: L4, K21, C25, D78

Contents

1. Introduction

European merger regulation has been operating for almost two decades, promoting the idea of fair competition at the Common European market and protecting consumers from negative effects of anti-competitive mergers. Since 1990, the merger regulation has undergone significant change. During the early years of merger control, the European Commission yearly evaluated only few merger cases annually, while the number of evaluated cases exceeded 400 in 2007. With a rising number of evaluated cases also increased the confidence of the Commission in the adequacy of its own decisions. The number of merger cases charged with some form of remedy rose significantly and the number of prohibited mergers reached its maximum in 2001, when five mergers were blocked. A major shock came in 2002, when the Court of First Instance reversed three of those controversial decisions, raising serious concerns about the appropriateness of Commission's evaluation methods.

The Court's decisions only fostered an already recognized need for a reform of the merger regulation that would bring a 'more economic approach' into Commission's appraisal procedures. The reform process culminated in 2004 when new guidelines for the assessment of horizontal mergers were introduced. The key task of new legislation was to provide a more transparent, efficient and economic oriented framework for the merger appraisal in the European Union.

The main goal of this paper is to empirically test the functioning of EU merger control, focusing on the overall efficiency of regulation and on the real impacts of 2004 regulatory reform. Our approach is consistent with recent empirical studies, which use stock market data and information provided by the European regulator examining various aspects of the merger proceedings in the EU. Bergman et al. (2003) use the insights of Coate and McChesney (1992) analyzing EU merger cases and trying to account for decisions to open a Phase II investigation and the decisions to prohibit the merger in terms of factors listed in the final documentation. They test whether the Commission gives appropriate weight to the factors regarded as important ex-ante (for instance published in merger guidelines) and to factors regarded as important by economic theory (market shares, barriers to entry etc.). Duso, Gugler and Yortuglu (2005) analyze the stock market ability to identify the potential anticompetitive effects and remedial provisions on transactions assessed by the Commission. They found that the market seems able to predict effectiveness of the remedies applied in Phase I and to produce good prior to Phase II's clearances and prohibitions, but not to remedies. Last but not least, Aktas, de Bodt, and Roll (2007) use an event study approach to evaluate the hypothesis that the EU merger regulation is protectionist. They analyze whether the market considers the prospect for regulatory intervention in its initial assessment of the proposed mergers and test whether the Commission is biased against mergers involving non-EU firms.

In our research, we closely follow method of Duso, Neven and Röller (2007) in order to assess the efficiency of merger control mechanism in the EU. We collect a unique representative sample of 161 horizontal mergers evaluated by the Commission from 1990 to

2008. Note that none of the previous studies worked with merger cases evaluated after 2002. Thus, our sample offers exclusive opportunity for assessment of the recent EU regulatory reform.

We collect information about 348 relevant competitors and used stock market data to identify mergers that the stock market anticipated as anti-competitive. From this we identify cases where the Commission had prohibited mergers that the stock market regarded as pro-competitive as well as the instances where the Commission had failed to prevent anti-competitive mergers. Using the PROBIT model, we further investigate sources of these discrepancies with a particular focus on the relevant factors that might potentially influence quality of the Commission's decisions. In particular, we test 8 hypotheses covering various efficiency aspects of the EU merger regulation. The paper is structured as follows: the next section discusses the methodology and data used. Section 3 presents our simple econometric model and the 8 hypotheses that are consequently tested. Section 4 offers the econometric results of our empirical analysis and finally and Section 5 concludes.

2. Methodology and Data

2.1. Merger Assessment using an Event Study Approach

In order to identify the discrepancies in the decisions of the antitrust authority, we need to compare those with a market opinion on the merger's competitive effects. We employ external effects of merger announcement on competitors' stock prices to assess aggregate welfare changes instead of the direct measurement of changes in consumer surplus. This method relies on the theoretical framework developed by Farell and Shapiro (1990), which shows that under some general assumptions there is a clear correspondence between the effect of a merger on consumers and competitors. However, it should be noted that this correspondence is lost in cases of vertical mergers where firms involved in the merger are at the different level of supply chain. Therefore, we restrict our empirical analysis only to the cases where the merger is of a horizontal nature.[1]

We apply an event study approach where we use stock market data as an independent competitive assessment of M&A transactions that is necessary for our further analysis. Note that in contrast to US antitrust procedure, EU merger regulation does not offer any alternative competitive assessment as the Commission is solely responsible for the whole appraisal process. Therefore, by using the stock market reaction we do not rely solely on the information provided by the Commission decisions, which is possibly incomplete and endogenous.[2]

Moreover, without the independent ex-ante assessment provided by the stock market data we would be entirely dependent on the ex-post performance of merging parties and their competitors in assessment of merger's anti-competitive effects. However, that would be possible only for mergers that were cleared by the Commission, thus creating a censoring problem. As we observe stock market reactions on the day of the announcement in all cases where relevant competitors are publicly listed companies, we are able to identify the impact of the merger on competitors' stocks even when the merger is blocked and to avoid the censoring problem in our data sample.[3]

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[1] For the mergers between firms involved in totally unrelated business activities (conglomerate mergers) a correspondence between consumer welfare and competitor's profits may also break down. As conglomerate effects played role in several horizontal merger cases in our sample, we control for those effects in our analysis.

[2] Main advantages and disadvantages of event study method in the assessment of merger competitive effects are discussed in the original paper from Duso, Neven and Röller, 2007. For a more general critique of event study methodology, see for instance Cox and Porter, 1998.

[3] However, the censoring is not fully eliminated as there is no documentation available for the several cases that were voluntary withdrawn by the merging parties. Thus, we were not able to identify the competitors and we could not include those cases in our sample.

2.2.   Merger Cases Selection and Competitors Identification

The first step in our analysis was a selection of suitable merger cases. We use publicly available information from the Commission's website.[4] We select all Phase II cases from the beginning of 1990 until October 2008. We have to exclude some most recent cases because of unavailability of Commission reports.[5]

A second step is identification of relevant competitors. One option, widely used in older studies, is to identify competitors according to the industry classification codes (i.e. SIC, NACE) and include all firms that belong to the same industry as merging parties.[6] Such a method assures sufficient number of observations; but it also increases the risk of including the firms irrelevant for the competitive effects of the merger - as industry classification codes provide only a rough estimate of the real competitive setup of particular markets. Some firms with the same classification code might be customers or suppliers of the merging parties. Therefore, empirical results from such a sample might be significantly biased.[7]

In order to avoid the shortcomings of this approach, we follow the method applied in more recent studies that deal with the EU merger regulation and we work only with the competitors identified by the Commission's economic team. The biggest advantage of this approach is that Commission's experts have made a careful market definition – every merger case report includes a clear definition of relevant product and geographical markets as well as a list of competitors present at those markets.[8] For those cases with relevant documentation, we analyze the Commission's reports and exclude all transactions where the Commission evaluated a nature of merger as mainly vertical, for the reasons mentioned previously. We also exclude all '2 to 1' cases – situations where merging parties are the only two firms present in the relevant market and there is no competitor left after the merger. For the similar reasons, we exclude all cases where competitors (or their parent companies) are not publicly listed.

Finally, we ended up with 72 Phase II cases suitable for our analysis. In order to obtain a representative sample and to avoid sample selection problems we follow the approach used in

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[4] http://europa.eu.int/comm/competition/mergers/cases

[5] Another censoring problem may arise due to sample selectivity of EU merger data. Note that we cannot collect relevant information for withdrawn cases, cases with no documentation and for the cases that were resolved in the "simplified procedure" under the New ECMR. However, this potential censoring issue has not been tackled in any of the previous studies.

[6] See Aktas, Bodt and Roll, 2007 for an overview of relevant studies.

[7] As pointed out by Clougherty and Duso (2008), in case that we treat customer-firms as competitors, the abnormal returns would be biased upwards – synergies generated by merger will lead to lower prices for customer firms. Including the firms with no relation to the merging parties in our sample would generate bias of competitors' abnormal returns toward zero – because such firms would be unaffected by the merger.

[8] On the other hand, a precise definition of geographic markets is a key determinant of the merger's competitive effects. Therefore, we recognize a potential inconsistency in our approach, as we measure the "rightness" of Commission's decision based on the change in market value of competitors, which were identified by the Commission in the first place. However, we are aware that fully unbiased identification of competitors is unfeasible and we consider our approach as a lesser of two evils.

previous studies and we randomly selected a sub-sample of 89 Phase I merger cases.[9] For our sample of total 161 merger cases we then collect all relevant information from the Commission reports: name and location of merging firms, name of all relevant competitors, product and geographical market definitions and the final decisions.

For each case we determine the first day the merger announcement appeared in the financial press.[10] We collect data on stock prices[11] (P_{it}) as well as on the number of shares (S_{it}) for all firms in our sample on the announcement date, 260 before this date as well as 3 days after to construct the abnormal returns around the announcement date. We also collect 'market data' for the same period, in particular we used a country relevant industry index provided by Datastream (I_{it}).

2.3. Construction of Competitor Gains

In order to estimate abnormal returns at the announcement date, we use market model approach (Brealey and Myers, 1995):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

Note that Duso, Neven and Röller (2007) apply an 'index model' in their empirical analysis – a specific form of the market model where parameter α is set equal to zero and β equal to one. However, this method is considered more suitable for the analysis of IPOs, where no historical data are available. In our case, we avoid this unnecessary simplification and we estimate parameters α, β using historical information. In particular, we employ stock returns over the 200-day trading period ending 60 days prior the announcement date. We exclude the 60 days period in order to minimize the potential 'pre-announcement rumors' effect - information about prospective merger usually appears at public before the official merger announcement and including this period might have biased our estimates. Using the standard OLS approach we estimate model parameters, which we then use to predict firm *i's* normal return at the announcement date – i.e. we estimate the stock price return for the hypothetical event where the merger would not have been announced ($\hat{R}_{it}$).

Consequently, we calculate the abnormal return around the merger's announcement date *t* (AR_{it}). Given the possibility of information leakages – which influence firm *i's* return before (or after) the merger announcement and the fact that the market might not be able to absorb the announcement information promptly, we define the total effect as a cumulative abnormal return (CAR) - a sum of the daily abnormal returns within the event window of particular

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[9] We realize overrepresentation of Phase II cases in our analysis compared to their real occurrence. However, we follow the Duso, Neven and Röller approach and do not consider this as a significant measurement problem.

[10] The announcement date was obtained from "Dow Jones Factiva" (customizable business news and research product that integrates content from newspapers, newswires, journals, research reports, and web sites).

[11] Stock market data were obtained from "Thomson Datastream" (world largest statistical and financial database). All prices have been transformed in constant 2000 USD thousands.

length. We compute CAR for the event windows of different lengths (τ_1 before and τ_2 after announcement date), in particular 1, 2 and 3 days around the announcement date:

$$CAR_{i,\tau_1,\tau_2} = \sum_{t=\tau_1}^{\tau_2} AR_{it} = \sum_{t=\tau_1}^{\tau_2}(R_{it} - (\hat{\alpha} - \hat{\beta}R_{mt}))$$

Based on this data we construct the *competitor's gain from merger* variable that we use for the assessment of merger's competitive effects. In order to estimate an average competitive effect at the relevant markets, we include only *main competitors* in our analysis - the firms that are present at all relevant markets and are thus most likely to be influenced by the merger. In those cases, where main competitors are absent, we use major rivals from each relevant market and control for those cases in our further analysis.[12] Competitor *i's* gains (Π_i^{CG}) are then calculated as follows:

$$\Pi_i^{CG} = \sum_{t=\tau_1}^{\tau_2}(AR_{it} \cdot P_{it} \cdot S_{it})$$

For each merger case *J* in our sample, we then calculate an 'average' competitors' gain from a merger (Π_J^{CG}) as a weighted average of the above defined competitors' gains, where the average market capitalization for a given 200-day trading period is used as a weight.

$$\Pi_J^{CG} = \frac{\sum_{i \in J} \Pi_i^{CG} \cdot \overline{P}_{it} \cdot \overline{S}_{it}}{\sum_{i \in J} \overline{P}_{it} \cdot \overline{S}_{it}}$$

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[12] Right treatment of competitors raises a rather complex question. The method suggested by Duso, Neven and Röller (2007) is to use all competitors available for one specific merger irrespectively of the relevant market. Another approach is to use each single relevant market as one separate observation and then correct for the correlation among these observation with a clustering procedure at the merger level. Our approach might be considered as a compromise between these two methods.

3. Econometric Model

3.1.　　Model Specification

In our empirical analysis, we compare average competitor gains for each merger case with the Commission's decision to identify discrepancies between the actual decision and competitive assessment of the merger by the stock market.

We evaluate Commission decision as a 'type I error'[13] in case that a merger was prohibited by Commission (Article 8.3) while market consider this merger as pro-competitive ($\Pi_J^{CG} < 0$). Furthermore, we define 'type II error' only for those cases cleared by the Commission with no objections (Article 6.1.b or Article 8.1) where stock market reaction was positive ($\Pi_J^{CG} > 0$) – thus indicating anti-competitive nature of the merger.

The next step in our empirical analysis is to identify factors that influence the occurrence of discrepancies in the Commission's decisions. Our model is based on the theoretical framework of Neven and Röller (2005) according to which an antitrust agency maximizes its own utility and where third parties (firms, governments etc.) can affect its utility. According to their model, a benevolent antitrust agency blocks a merger if and only if consumer surplus is reduced. Decision dummy for the benevolent agency (*D*) is then defined as follows:

D=1 (clear)　if　　*ΔCS>0*

D=0 (block)　　*otherwise*

Let *P* be the actual decision taken by the agency, which is equal to one when the merger is cleared and zero otherwise. Discrepancies in the agency decisions are than defined as follows:

E1=1 iff *P=0* and *D=1*　　　(*Type I error*)
E2=1 iff *P=1* and *D=0*　　　(*Type II error*)

Thus, the functional form of our theoretical model can be represented by following two equations:

$$E1 = \sum_{i=1}^{k} \alpha_i X_i + \varepsilon_i \qquad (1)$$

$$E2 = \sum_{i=1}^{k} \beta_i X_i + \varepsilon_i \qquad (2)$$

We thus assume that there is a linear relationship between occurrence of both type of errors (*type 1 errors - E1, type 2 errors - E2*) and various explanatory variables (*X*). We then

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[13] We use the "error" term merely for the explanatory reasons. A discrepancy is in fact more suitable expression, as it does not automatically imply that the Commission view is necessarily wrong compared to the market opinion. However, in order to be consistent with terminology in previous studies, we will further use error terms.

identify potential factors that may influence occurrence of both types of errors. We use several previous studies in order to name factors that might play significant role in the decision making of the European antitrust agency. We will provide a short discussion regarding the potential influence factors and use relevant factors for a specification of parameters in the equations *(1)* and *(2).*

Power of Competitors

In fact, the Commission is often criticized for giving excessive attention to the welfare of competing firms.[14] During the merger evaluation procedure, the Commission usually takes into account also the concerns of competitors and their view on the competitive effects of proposed merger. This apparent willingness to listen to the competitors rise justified concerns about the potential influence of competitors on the final agency decisions. For this reason we include a proxy for a competitors' incentive to influence the Commissions' decision in our econometric model (see below).

Institutional Factors

Moreover, there are a number of institutional and political economy variables that may influence the anti-trust agency. As suggested in previous studies, the size of the country in which the merging firms originate does play a role in the Commission's decisions – large countries might for instance exercise significant political pressure to have an anti-competitive transaction cleared if it benefits their national champions, thus increasing the occurrence of type II errors. The pattern of errors may also vary across the sectors in which the mergers are taking place, as some industrial sectors have more political cloud than others, mostly at the level of member states. Therefore we included industry specifics in our model.

Procedural Issues

Regarding the procedural issues, some critics pointed out the inadequacy of Phase I proceedings as the Commission might not have enough time and resources to evaluate the complex merger cases properly. Therefore, we should test whether occurrence of type II errors is positively correlated with Phase I proceedings (strong type I errors are in this case irrelevant as merger cannot be blocked in Phase I proceeding).

Another question arises with respect to rapidly increasing workload of the Commission's expert team. While the average number of evaluated transactions in the period 1990-1999 was only 124 cases per year, the amount of workload almost tripled in the last decade, reaching 321 cases annually between 2000 and 2008. We should thus control for this potential effect on the frequency of both type of errors.

The issue of concern is also market definition applied in Commission's analyses. Neven et al., 1994 claimed that the EU merger guidelines are biased towards excessively narrow market definitions, both in terms of the wording of the guidelines and in an actual practice. As a result, the narrow market definition may be associated with a higher frequency of type I errors – i.e. too narrow market definition might result in exaggerating merger's anti-competitive effects at particular submarkets, neglecting the overall competitive dynamics of the market concerned.

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[14] See Neven and Röller (2002) for further details.

Preference for Domestic Firms

A disagreement of the EU and US regulators in the cases that fall under both legislations (in particular in the *GE/Honeywell* and *Boeing/McDouglass* mergers and in the *Microsoft* antitrust case) uncover another important issue – the potential protectionism from the European antitrust authority. The American financial press often raised suspicion that the EU focuses more on protection of domestic competitors rather than consumers. Aktas et al. (2006) find that the more harm suffered by European rival firms when the acquirer is coming from outside the European Community, the greater the likelihood of European regulatory intervention against the proposed combination. Such evidence cannot support an unambiguous conclusion of protectionism but it certainly raises some doubts. We therefore distinguish the type of the mergers in our sample (intra-European, extra-European and Cross-euro-border) to control for this possible effect.

Effect of the 2004 Reform

Last but not least, we also include the variable that reflects the recent legislative changes in the EU merger regulation. More consumer-oriented approach in the evaluation process, clear specification of countervailing factors and prolonged investigation periods might have a positive effect on the Commission's accuracy – we thus expect lower occurrence of both type I and type II errors since the introduction of new legislation.

With respect to the arguments stated above we specify the equations *(1)* and *(2)* as follows:

$$E1 = \alpha_0 + \alpha_1\widetilde{\Pi}^{CG} + \alpha_2 BIG + \alpha_3 PH\_II + \alpha_4 T + \alpha_5 NAT + \alpha_6 CROSS + \alpha_7 EXTRA + \alpha_8 ECMR + \alpha_x X + \varepsilon_1 \qquad (3)$$

$$E2 = \beta_0 + \beta_1\widetilde{\Pi}^{CG} + \beta_2 BIG + \beta_3 PH\_II + \beta_4 T + \beta_5 NAT + \beta_6 CROSS + \beta_7 EXTRA + \beta_8 ECMR + \beta_x X + \varepsilon_2 \qquad (4)$$

In light of the above discussion, the right side of both equations consists of key factors that could potentially determine the occurrence of both types of errors. The vector *X* contains other important controlling variables. For the detailed description of variables see Table 2.

3.2.   Model Estimation

PROBIT Regression

Following the methodology applied in previous studies, we use PROBIT regression to estimate the equations *(3)* and *(4).* The PROBIT model can be derived from the assumption that there exist a latent (unobservable) variable *P** - in our case the Commission's view on merger's anti-competitive effects. If the latent variable takes a value above some critical level, then merger is prohibited (*P=0*), otherwise merger is approved (*P=1*). Thus, for each subsample (pro-competitive and anti-competitive mergers) we estimate the parameters of the model using the PROBIT regression - assuming that the latent variable is generated by the model:

$$P^* = \beta'X + \varepsilon$$

where β is a vector of parameters (weights), X is a vector of explanatory variables and $\varepsilon \sim N(0,1)$ is a random shock. It is then easy to show that:

$$\Pr(P = 1) = \Phi(\beta'X)$$

This gives us the likelihood for both cases *P=0* and *P=1*. Assuming the observations are i.i.d., it is easy to construct the sample log-likelihood. This can be maximized using standard nonlinear maximization algorithms.

However, we should note that an announcement of a merger states an intention of merging parties and it is usually subject to review by both the merging companies and government antitrust agencies. Therefore, the stock market reaction at the particular event of interest does not reflect only the estimate of change in future performance of merging parties, but also the likelihood that the deal will be cleared. The change in value of the stock at the time of announcement is equal to the probability of clearance times the value that will be generated by the transaction. Therefore, anticipated profits cannot be seen as exogenous as market takes into account the antitrust procedure (Aktas, Bodt and Roll, 2007). In our analysis, we only need the sign of the expected stock price change in order to identify anti-competitive deals which corresponds fully with the real change in value given the merger takes place (as the probability is always non-negative). In order to overcome the potential endogeneity of the observed competitors' gains, we use the approach from Duso, Neven and Röller (2007). Firstly, we estimate the PROBIT model, regressing the probability of the merger clearance on the subset of the relevant exogenous variables. For each merger case in our sample, we divide observable competitors' gains by the predicted probability of merger being cleared, i.e. we are able to reconstruct the real effects of the merger on competitors' profits and use them in the estimation of equations *(3)* and *(4)*.[15]

Estimation of Marginal Effects

The equation coefficients estimated by the PROBIT regression do not provide a straightforward illustration of partial effects of a change in the particular explanatory variable on the dependent variable, as in case of linear regression models. A default method to overcome this difficulty, offered by most of statistical software, is the computation of marginal effects (partial derivatives) at the values of independent variables fixed at their sample means. However, this formula is limited by two problems. Firstly, the formula is not very intuitive in the presence of dummy variables – the sample means used during the calculation of marginal effects refer to nonexistent observations (as dummy variable never takes a value of its sample

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[15] Let *V* be the abnormal change in the value of competitor's stock on the day of announcement of the merger. Let the *p* be the probability that the market assigns to the event that merger is cleared. Then $V=p\Pi^{CG}$ can be interpreted as expected change in competitor's value conditional on the event that merger is cleared by antitrust authority. Since *p* must be non-negative, *V* and Π^{CG} have a same sign - enabling us to identify the anti-competitive (pro-competitive) cases using only observed reaction of competitors' stocks.

mean). Secondly, this method might generate estimation bias in the presence of observations where continuous variable takes extremely high (low) values.[16]

To remove these limitations, we follow the method suggested by Bartus (2005), and define average marginal effects (AME) as the average amount of change in the expected value of a dependent variable:

$$AME_i = \beta_i \frac{1}{n} \sum_{k=1}^{n} f(\beta x^k)$$

where βx^k denotes the value of the linear combination of parameters and variables for the kth observation.

In order to estimate marginal effects for dummy variables we use following formula:

$$AME_i^D = \frac{1}{n} \sum_{k=1}^{n} \left\{ F(\beta x^k \mid x_i^k = 1) - F(\beta x^k \mid x_i^k = 0) \right\}$$

Using the formulas above, we avoid the problem of setting dummy variables at their means, as well as potential negative effect of extreme values of continuous variables in our sample.[17] Therefore we use 'marginal effects' only for explanatory reasons while in fact we always refer to AME.

3.3.   Definition of Hypotheses

Assuming that we can measure the variables and estimate both equations consistently, we construct the following hypothesis in line with the previous discussion:

H1 (Benevolence): $\alpha's = 0, \ \beta's = 0$, *no systematic errors of type I or II.*

That is the decision process produces only errors that can be characterized by the white noise through the error terms.

H2 (Influence): $\alpha_1 = 0, \ \beta_1 = 0$, *no systematic influence of competitors on the agency.*

H2 tests whether there is significant effect of competitors on the occurrence of both types of errors.

H3 (Preference): $\alpha_2 = 0, \ \beta_2 = 0$, *no preference for big countries.*

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[16] This is exactly case of our sample. PCgains takes extremely high values for observations, where gigantic corporations are indentified as competitors (such as AT&T with market capitalization of almost USD 30 billion). Those observations increases sample mean of PCgains extremely, and most of the observations in the sample have PCgain lower than the mean. Computing marginal effects at the fixed means results in underestimation of dummy variables effect, making variable PCGain a perfect predictor. Instead of excluding observation with extremely high PCgains, we applied method suggested by Bartus (2005) that overcomes this problem.

[17] For more details on statistical properities of AME see (Bartus, 2005).

That is the decision process of the Commission does not depend on the country of origin of merging parties and there is no discrimination of firms from other then large EU member states.

H4 (Inadequacy): $\alpha_3 = 0, \beta_3 = 0$, *no systemic bias in Phase I (Phase II) proceedings.*

In other words, we test whether there is any significant change in the occurrences of errors if final decision was made after the Phase II investigation (compared to decisions in the Phase I proceedings).

H5 (Workload): $\alpha_4 = 0, \beta_4 = 0$, *increased number of cases does not affect the occurrence of errors.*

A number of cases investigated by the Commission increased exponentially in the last two decades. Hypothesis H5 centers around possible negative impact of increased workload on the frequency of both type of errors.

H6 (Market Definition): $\alpha_5 = 0, \beta_5 = 0$, *no effect of a narrow market definition.*

In this case, we test whether narrowly defined markets significantly influence the error occurrence. We use all cases where the Commission identified relevant geographical market as "national" as a proxy for a narrow market definition.

H7 (Protectionism): $\begin{array}{l} \alpha_6 = \alpha_7 = 0, \\ \beta_6 = \beta_7 = 0 \end{array}$, *no discrimination of outsiders.*

If we cannot reject H7 that means that there is no significant effect of cross-euro-borders mergers (extra-European mergers) on the frequency of errors made by the Commission, compared to the intra-European mergers.

H8 (2004 Reform): $\alpha_7 = 0, \beta_7 = 0$, *no effect of the new merger regulation.*

Last hypothesis remains of main importance - we test whether the 2004 reform has any significant impact on the occurrence of both types of errors.

4. Empirical Results

The estimation of equations *(3)* and *(4)* proceeds by splitting our dataset into anti- and pro-competitive subsamples. In particular, we estimate *(3)* on the sample of pro-competitive deals ($\Pi_J^{CG} < 0$). We use the weak definition of type I errors for construction of our dependant variable – we set *E1=1* when a pro-competitive merger was blocked or cleared with remedies. Equation *(4)* was estimated on the sample of anti-competitive deals ($\Pi_J^{CG} > 0$) and we set *E2=1* if an anti-competitive deal was cleared without conditions.[18]

The explanatory variables that are available for each merger case are described in Table 2 (see Appendix for all Tables). Summary statistics are provided in Table 3. The results are presented in Table 4 and Table 5.

4.1.   Weak Type I Errors

Let us first concentrate on weak type I errors. As we can see from the Table 4, the Chi-squared statistics is 53.26, indicating that $\alpha's \neq 0$ with over 99% probability. This implies that the Commission decisions are not consistent with the benevolent agency procedures (making only random errors) and therefore we reject *H1*.[19] Regarding the influence of competitors, we see that the variable PCGAIN is strongly insignificant. Thus, we cannot reject the hypothesis *H2* that competitors have no influence over the Commission decisions, as far as pro-competitive mergers are concerned.

With respect to preferential conditions for the large EU countries, we found it significant at the 5% level of significance. We thus can reject the *H3*. In terms of extent of the BIG_EU variable, presents the marginal effects. According to our estimates, the large EU countries have about 20% lower chance of getting a pro-competitive deal curtailed by the Commission.

Concerning the procedural issues, we see that variable PHASE_II is highly significant (at 1% significance level) implying that the weak type I errors are more likely in the Phase II. Therefore, *H4* can be rejected. As can be seen from the Table 5 marginal effect of PHASE_II variable is estimated at 0.50 – the probability of the weak type I error is about 50 % higher in the Phase II.

The steadily increasing number of cases that are appraised by the Commission every year does not seem to have any significant effect on the occurrence of the weak type I errors. We therefore cannot reject *H5*.

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[18] Estimations were carried out using STATA 9.2 software. We controlled for co-linearity and potential outliers. All standard errors are heteroskedasticity robust.

[19] Due to the limited size of our data sample, we follow the approach from the earlier studies by setting a 10% significance level as the upper bound for the hypotheses testing, i.e. maximum significance level at which a hypothesis can be rejected.

The effect of the NATIONAL variable is not statistically significant at 10% level. Thus we cannot reject *H6*. In other words, narrowly defined markets do not lead to an unnecessary burden imposed on pro-competitive deals by the Commission.[20]

Our estimates suggest that there is no evidence of protectionist behavior of the EU antitrust agency (*H7*). While variable EXTRA_EU is statistically insignificant, the effect of the CROSS_EU is significant at the 5% level. Considering the marginal effect of -0.23, we see that probability of unnecessary remedies (or a prohibition) is about 23% lower in case that acquirer comes from outside the EU. One possible explanation is that these mergers usually get under the scope of several antitrust agencies. Therefore, existence of another independent assessment of the proposed transaction might generate a disciplinary effect on the EU regulator.

With respect to the effects of the EU regulatory reform, we see that variable ECMR_2004 is not significant at the 10% level. We thus cannot reject *H8* that the reform has no sizeable effect on the occurrence of weak type I errors at this level of significance.

Concerning the other controlling variables, we did not find any effect of network industries, neither the existence of the vertical effects showed any significant impact. The variable SAME_COUNTRY is also insignificant. The only significant controlling variable is the NO_MAIN_COMPETITOR - probability of weak type I errors is about 17 % higher for the cases where several product market were identified, but none of the relevant competitors was present at all of the markets.[21]

We also control for potential bias that might be associated with presence of foreclosure effects. As already mentioned in previous sections, negative competitor gains might be induced by expected foreclosure of the competitors, rather than with increased competition at the relevant markets that will benefit consumers – those mergers would thus be wrongly classified as pro-competitive. Therefore, we exclude those cases from our sample where the Commission raised concerns about foreclosure effects of the merger and re-estimate the equation *(3)* on this restricted sample. As we can see from the Table 4, parameter estimates do not change considerably. We observe significant change in two parameters only.

Firstly, variable NATIONAL becomes significant at the 10% level. If the Commission identifies at least one of the concerned markets as national, the probability of weak type I error increases by approximately 13%. Secondly, vertical effects of the proposed transaction seem to play a significant role. Probability that unnecessary remedies will be imposed on the pro-competitive deal decreases by 17% in the presence of vertical effects generated by the proposed horizontal

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[20] Note again that we assumed that remedies increase consumer welfare even further. Therefore, from the definition of weak type I errors, imposing conditions and obligations at the particular product markets only increases overall positive effect of the pro-competitive mergers.

[21] Interpretation of this result is rather ambiguous. One possible explanation is to connect those errors with too narrow product market definition. However, there is also potential measurement error resulting from the inability to capture the overall competitive effect of a merger. Note that we aggregated the gains of the main competitors from all identified markets. In about 55% of cases the stock reaction of individual competitors had the same sign as the aggregate competitors gain.

merger. Interpretation of this is rather ambiguous. One possible explanation is that our restricted sample does not cover any mergers where vertical (conglomerate) effects could potentially lead to foreclosure of competitors. Vertical mergers that do not lead to marginalization of competitors are usually considered beneficial for consumers. The incentive of the Commission to impose remedies might therefore be lower for those merger cases, where positive vertical effects are observed.[22]

4.2.   Type II Errors

Turning to the analysis of type II errors, we again find evidence that the decisions by the Commission are not consistent with those that would have been taken by a benevolent agency making only random errors (the Chi-squared statistic is 34.12) – we reject the hypothesis *H1* with over 99% probability. Regarding the influence of competitors, we reject hypothesis *H2* at the 1% significance level.

Interestingly, the coefficient of the PCGAIN variable has a negative sign. In other words, the more positive expected increase in competitors' equity value around the announcement date, the less probable is that an anti-competitive merger will be cleared. However, as we can see from Table 5, the marginal effect of PCGAIN is neglectable, even with respect to the magnitude of the PCGAIN variable. For illustration, increase in the equity value of about USD 240 million (what equals to a median gain in our anti-competitive sample), would result in an approximately 5% lower probability of the type II error.[23] We thus consider competitors influence of a minor importance.

Variable BIG_EU is not significant at the 10% level and we cannot reject hypothesis *H3*. Our results suggest that large EU countries cannot extract their political power in order to get the Commission to clear an anti-competitive deal, in which the 'national champions' are involved.

Regarding the procedural issues, we see that variable PHASE_II is highly significant and large in magnitude (at 1% significance level) implying that we can reject hypothesis *H4*. Moreover, marginal effects show that the probability of waving an anti-competitive merger through is some 48 % larger in the Phase I. This observation is further supported by the significance of the TREND variable representing the increased workload coupled with a relatively higher proportion of cases decided in Phase I proceedings. The probability that an anti-competitive

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[23] The "marginal" effects provided in table represent an average change in probability resulting from the unit of measurement change in the relevant explanatory variable.

merger will be cleared increases slightly (on average 2% p.a.) in the last decade and as a result we reject hypothesis *H5*. [24]

The significance of the NATIONAL variable is around a 10% level - we reject hypothesis *H6*. In other words, the narrow market definition increases chances that the anti-competitive effects of proposed merger will be recognized. If the Commission identifies at least one of the concerned markets as national, the probability of anti-competitive merger being cleared decreases by 13%. Note that, according to our data, the positive effect of national market definition (lower frequency of type II errors) is of a comparable magnitude as the negative effect arising from an unduly narrow geographic market definition (higher occurrence of weak type I errors in 'foreclosure corrected sample'). However, given the significantly higher number of mergers cleared by the Commission and the potential effects of anti-competitive mergers, higher frequency of weak type I errors might be seen as a reasonable price to pay for higher probability of identification of the anti-competitive mergers.

As in the case of weak type I errors, our estimates suggest that there is no clear evidence of a protectionist behavior of the EU antitrust authority (*H7*). While the variable EXTRA_EU is statistically insignificant, the effect of the CROSS_EU is significant at the 5% level. The negative marginal effect implies that the anti-competitive mergers involving EU firms (both target and acquirer) have about 21% higher probability of being cleared. Again, this might be explained by a more careful examination of the cross-euro-border cases by the Commission, rather than by the systematic discrimination of foreign acquirers.

The frequency of type II errors decreases by 22% as a result of the 2004 regulatory reform and we can reject hypothesis *H8* at the 10% significance level. Prolonged periods of both investigation phases and the more economically oriented merger assessment under the new ECMR show significant effect regarding the identification of anti-competitive mergers. Considering the control variables, none of them have proved significant. Table 1 further summarizes results of the hypotheses tested.

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[24] Average number of cases evaluated yearly is about 314 in the period 1998-2008. Using a crude estimate of the 'average' marginal effect, we can simply multiply average number of cases by the estimated marginal effect to get the change in probability of type II error occurrence.

5. Conclusion

We collected a unique representative sample of 161 merger cases evaluated by the Commission in the period from 1990 to 2008 in order to provide an empirical assessment of the efficiency of EU merger control. It is worthwhile to note that none of the previous studies analyzing the EU merger control have worked with merger cases evaluated after the year 2002. Thus, our sample offers a unique opportunity to assess the impact of the recent regulatory reform. We collected information about 348 relevant competitors and used stock market data to identify mergers that stock market anticipated as anti-competitive. From this we identified instances where the Commission had prohibited mergers that the stock market regarded as pro-competitive as well as the instances where the Commission had failed to prevent anti-competitive mergers. Using the PROBIT model, we further investigated the sources of these decision errors with particular focus on the potential influences that can be brought to bear on the decision making process. In particular, we tested 8 hypotheses covering various efficiency aspects of the EU merger regulation.

In line with previous studies, our results suggest that the Commission's decisions are not purely explained by the motive of protecting consumer welfare. We also reject the claim that the Commission listens too much to competitors at the expense of consumer interest. Instead, the evidence suggests that other political and institutional factors do play a role. In particular, mergers involving firms from large EU countries have a significantly lower probability to bear unnecessary remedies imposed by the Commission. However, we did not find any evidence that the Commission is willing to clear anti-competitive deals involving firms from the large Member States. We neither find any evidence supporting the allegation of protectionist behavior by the Commission. Our results suggest only that mergers involving a foreign acquirer are examined under closer scrutiny.

The procedural issues still play a significant role. The probability that an anti-competitive merger will be cleared is significantly higher if the final decision is made in the Phase I proceeding. This is further accompanied with the significant effect of the increasing workload of the Commission staff on the occurrence of this type of error. On the other hand, Phase II proceedings often result in the imposition of unnecessary remedies on pro-competitive mergers. Nevertheless, given the significantly larger proportion of transactions decided in Phase I, the unnecessary remedies can be considered as a reasonable price to pay for a higher probability of identification of anti-competitive mergers. Last but not least, our data suggest a positive effect of the 2004 reform. We found that for mergers appraised under the new regulation, the probability of anti-competitive deal being cleared decreases significantly. We conclude that prolonged Phase I proceedings, increased transparency and more efficient analytical evaluation under the new guidelines result in the lower occurrence of unidentified anti-competitive mergers.

However, our results do not show that the occurrence of unnecessary remedies have significantly decreased as the result of the new merger control. One possible explanation is that firms still believe it to be difficult to defend claimed efficiencies in front of the Commission. Therefore, firms might prefer to offer remedies in the Phase I rather than risk a costly Phase II investigation in the hope of a successful efficiency defense.

Nevertheless, we recognize a need for a further research in this area, with more data that would confirm robustness of our results and fully capture the real effects of the recent regulatory reform of the EU merger control. Moreover, regarding the political economy of the merger control, we examined only the potential influence of competitors while ignoring the possibility of lobbying of merging parties. Although none of the previous studies found significant evidence confirming the ability of the merging parties to influence the antitrust authority, our model could be extended in order to control for these effects.

6. References

Andrade, G., Mitchell M. and E. Stafford (2001): "New Evidence and Perspectives on Mergers." *Journal of Economic Perspectives*, 15, pp. 103-120.

Aktas, N., de Bodt, E. and R. Roll (2007): "Is European M&A Regulation Protectionist?", *The Economic Journal*, 117, pp. 1096-1121.

Ball, R. and PP. Brown (1968): "An Empirical Evaluation of Accounting Income Numbers", *Journal of Accounting Research*, pp. 159-178.

Bergman, M., Jakobsson, M. and C. Razo (2003): "An Econometric Analysis of the European Commission's Merger Decisions", *International Journal of Industrial Organization*, 23(9-10), pp. 717-737.

Brady, U. and R. Feinberg (2000): "An examination of stock-price effects of EU merger control policy", *International Journal of Industrial Organization*, 18(6), 885-900.

Brealey, R. A. and S. C. Myers (1995): "Fundamentals of Corporate Finance*", McGraw Hill*Campbell, J. Y., Andrew, W. Lo. And C. MacKinlay (1997): "The Econometrics of Financial Markets", *Princeton University Press*

Coate, M. B. and F. S. McChesney, (1992): "Empirical Evidence on FTC Enforcement of the Merger Guidelines", *Economic Inquiry*, 30, pp. 277-293.

Cox, A. and J. Portes (1998): "Mergers in Regulated Industries: The Uses and Abuses of Event Studies", *Journal of Regulatory Economics*, Vol. 14, No. 3, pp. 281-285.

Dolley, J. (1933): "*Characteristics and Procedure of Common Stock Split-Ups*", *Harvard Business Review*, 11,pp. 316-326.

Duso, T. and J. A. Clougherty (2008): "The Impact of Horizontal Mergers on Rivals: Gains to Being Left Outside a Merger," *CEPR Discussion Papers 6867*, C.E.P.R. Discussion Papers.

Duso, T., Gugler, K. and B. Yortuglu (2005): "EU Merger Remedies: A Preliminary Empirical Assessment", *Discussion Papers 81, SFB/TR 15 Governance and the Efficiency of Economic Systems*, Free University of Berlin, Humboldt University of Berlin, University of Bonn, University of Mannheim, University of Munich.

Duso, T., Neven, D.J. and L-H. Röller (2007): "The Political Economy of European Merger Control: Evidence using Stock Market Data, " *The Journal of Law and Economics*, vol. 50,pp. 455-489.

Eckbo, E. (1983): "Horizontal Mergers, Collusion, and Stockholder Wealth", *Journal of Financial Economics*; 11 (1-4),pp. 241-273.

Fama, E., Fisher, L., Jensen, M. and R. Roll (1969): "The Adjustment of Stock Prices to New Information", *International Economic Review*, 10,pp. 1-21.

Farrell, J. and C. Shapiro (1990): "Horizontal mergers: An equilibrium analysis", *American Economic Review*, Vol. 80, No. 1. (Mar., 1990),pp. 107-126.

Fridolfsson S-O. and J. Stennek (2005): "Why Mergers Reduce Profits And Raise Share Prices - A Theory Of Preemptive Mergers" *Journal of the European Economic Association*, Vol. 3, No. 5, pp. 1083-1104

Kaplan, S. N. and M. S. Weisbach (1992): " The Success of Acquisitions: Evidence from Divestitures", *Journal of Finance*, American Finance Association, vol. 47(1), pages 107-38, March.

Molnar, J. (2007): "Pre-Emptive Horizontal Mergers: Theory and Evidence", *Bank of Finland Research Discussion Paper No. 17/2007*

Motta, M. (*2004*): "Competition Policy: Theory and Practice", *Cambridge University Press*

Motta M. and M. Ruta (2008): "A political economy model of merger policy in international markets", *CEPR Discussion Paper No. 6894*. London.

Neven. D and L. Röller (2002): "Discrepancies between Markets and Regulators: an Analysis of the First ten Years of EU Merger Control", *HEI Working Papers 10-2002*, Economics Section, The Graduate Institute of International Studies.

Neven D. and L. Röller L.-H. (2005): "Consumer surplus vs. welfare standard in a political economy model of merger control", *International Journal of Industrial Organization 23*, 829-848.

Ravenscraft, D. and F.M. Scherer (1987): "Life After Takeovers", *Journal of Industrial Economics*, 41, pp. 153-192.

Salinger, M-A., and L. Schumann (1988): "Horizontal Mergers and the Market Value of Rivals: The 'In Play' Effect", *Columbia First Boston Series in Money, Economics and Finance Working Paper*: FB-88-03.

Schwert, W. (1996): "Markup pricing in mergers and acquisitions", *Journal of Financial Economics*, 36, pp. 147-156.

Stillman, R. (1983), "Examining Antitrust Policy towards Horizontal Mergers", *Journal of Financial Economics,* 11, (1-4),pp. 225-240.

Tirole, J. (1988): "The theory of industrial organization", *The MIT Press, Cambridge*

Wooldridge, J. M. (2001): "Econometric Analysis of Cross Section and Panel Data", *MIT Press*

EU Regulation

Council Regulation (EC) No. 139/2004 of January 20, 2004 on the control of concentrations between undertakings, *O.J. 2004 No. L 24/1*

Green Paper on the Review of Council Regulation (EEC) No 4064/89, COM (2001) 745/6 final, 11/12/2001

Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, *O.J. 2004 No. C 31/5*

Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings, *O.J. 2008 No. C265/07*

Internet Sources

http://ec.europa.eu/competition/mergers/cases/
http://www.mergermarket.com
https://www.thomsonone.com
http://factiva.com

7. Appendix 1: Results and Statistics

Table 1: Hypotheses Test Results

Hypothesis	Parameters	Description of H0	Result	Details		Conclusion
				Pro-competitive mergers	*Anti-competitive mergers*	
H1 (Benevolence)	$\alpha's = 0,\ \beta's = 0$	The Commission act as a benevolent agency, protecting solely interest of consumers and making only random errors.	**REJECT**	Commission decisions are not consistent with benevolent agency.	Commission decisions are not consistent with benevolent agency.	Commission's decisions are not purely explained by the motive of protecting consumer welfare.
H2 (Influence)	$\alpha_1 = 0,\ \beta_1 = 0$	Competitors do not have an influence on the Commission decisions.	**CANNOT REJECT**	NO SIGNIFICANT EFFECT	NO SIGNIFICANT EFFECT**	We reject the claim that the Commission listens too much to competitors at the expense of consumer interest.
H3 (Preference)	$\alpha_2 = 0,\ \beta_2 = 0$	Firms from large EU countries do not receive 'special treatment' from the Commission.	**REJECT**	Large EU countries have about **20% lower chance** of getting a pro-competitive deal curtailed by the Commission.	NO SIGNIFICANT EFFECT	Large EU countries can protect their firms from bearing unnecessary remedies. No evidence that the Commission is willing to clear anti-competitive deals involving firms from the large Member States.
H4 (Inadequacy)	$\alpha_3 = 0,\ \beta_3 = 0$	Type of proceeding does not influence the frequency of errors.	**REJECT**	Probability of an unnecessary remedies is about **50% higher** in Phase II proceedings.	Probability of waving an anti-competitive merger through is some **48% larger** in Phase I.	Phase I proceedings are too short and unadequate - anti-competitive mergers being cleared more often. Phase II proceedings usually result in unnecessary remedies.
H5 (Workload)	$\alpha_4 = 0,\ \beta_4 = 0$	Increased workload in recent years does not affect occurrence of errors.	**REJECT**	NO SIGNIFICANT EFFECT	Probability that anti-competitive merger will be cleared **increases slightly (on average 2% p.a.)** in the last decade.	Increased workload means more mergers evaluated in Phase I proceedings - thus increasing the frequency of cleared anti-competitive mergers.
H6 (Market Definition)	$\alpha_5 = 0, \beta_5 = 0$	Narrow market definition does not lead to higher/lower number of error decisions.	**REJECT**	If the Commission identifies at least one of the concerned markets as national, the probability of weak type I error **increases by approximately 13%**.*	The probability of anticompetitive merger being cleared **decreases by 13%.**	Narrow market definition induces higher occurrence of both type of errors by approximately equal magnitude - unnecessary remedies as a reasonable price to pay for higher probability of identification of the anti-competitive merger effects.
H7 (Protectionism)	$\alpha_6 = \alpha_7 = 0,$ $\beta_6 = \beta_7 = 0$	No 'special treatment' for mergers involving foreign firms.	**REJECT**	Probability of unnecessary remedies (or a prohibition) is about **23% lower** in case that acquirer comes from outside the EU.	Anti-competitive mergers involving foreign acquirer have about **21% lower probability** of being cleared, compared to Intra-European mergers.	More careful examination of cross-euro-border cases by the Commission, rather than systematic discrimination of foreign acquirers.
H8 (2004 Reform)	$\alpha_7 = 0,\ \beta_7 = 0$	Reform process did not affect the efficiency of decision making.	**REJECT**	NO SIGNIFICANT EFFECT	Frequency of type II errors **decreases by 22%** as a result of the merger regulation reform	Prolonged Phase I proceedings, increased transparency and more efficient analytical evaluation result in lower occurrence of unidentified anti-competitive mergers.

Effect of the narrow market is significant for restricted subsample, i.e. 'foreclosure effect' corrected sample
***Effect of competitors is statistically significant, but coefficient has a negative sign and only neglectable magnitude. Protection-of-competitors motive can thus be rejected.*
Source: Authors

Table 2: Definition of Variables

Variable	Definition
Dependant Variables	
Decision Errors	
E1	Dummy = 1 if the commission made a type I error, i.e. a pro-competitive merger was blocked.
E2	Dummy = 1 if the commission made a type II error, i.e. a anti-competitive merger was cleared without remedies. The assumption is that the remedies restore competition but the market did not anticipate the use of remedies.
Independent Variables	
Power of Competitors	
Π_{CG}	Expected gains from mergers for the competitors. Cumulative change in stock market value (relative to an index) for the competitors on the day around the first announcement date of the merger. The value is expressed in 2000 constant USD (thousands).
Geographic Factors	
Big_EU	Dummy = 1 if one of the merging part comes from one big EU country (France, Germany, Italy, Spain, UK)
Same_Country	Dummy = 1 if the both merging parties come from the same country
Extra_EU	Dummy = 1 if the both merging parties come from the countries outside of the EU
Cross_EU2	Dummy = 1 if the acquier comes from the country outside the EU and the merger target comes from the EU
Market Factors	
Network	Dummy = 1 if if the merger concerns telecom, transports, electricity or the financial industry
Foreclosure	Dummy = 1 if the Commission identified threat of the competitors foreclosure due to the merger
National	Dummy = 1 if the relevant geographic market is national
Vertical_Eff	Dummy = 1 if the Commission identified vertical or conglomerate effects
Procedural Issues	
Phase_II	Dummy = 1 if the merger was in phase II
Trend	Official number of the merger case - captures increasing number of evaluated cases more efficiently then the date (year) of the official merger announcenment.
ECMR_2004	Dummy=1 if the merger was evaluated after the reform of EU merger regulation
Other Variables	
No_Main_Competitor	Dummy=1 if there is not at least one competitor active at all merger-relevant product markets.

Source: Authors

Table 3: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Clear	161	0.6273	0.4850	0	1
Prohibition	161	0.0497	0.2180	0	1
Remedies	161	0.3230	0.4691	0	1
Phase_I	161	0.5528	0.4988	0	1
Phase_II	161	0.4472	0.4988	0	1
Anticompetitive	161	0.4783	0.5011	0	1
Foreclosure	161	0.0621	0.2421	0	1
Type_I	84	0.0476	0.2142	0	1
W_Type_I	84	0.4167	0.4960	0	1
Type_II	77	0.6753	0.4713	0	1
Cgains	161	63302	1704696	-8105858	11500000
Trend	161	2275	1489	12	5123
Big_EU	161	0.7019	0.4589	0	1
Same_Country	161	0.2609	0.4405	0	1
National	161	0.3665	0.4833	0	1
ECMR_2004	161	0.2857	0.4532	0	1
Network	161	0.1429	0.3510	0	1
Intra_EU	161	0.6087	0.4896	0	1
Extra_EU	161	0.1180	0.3236	0	1
Cross_EU2	161	0.1863	0.3906	0	1
Vertical_Eff	161	0.3230	0.4691	0	1
No_Main_Comp	161	0.2360	0.4260	0	1

Source: Authors' own computations

Table 4: Probit Results - Reference Case*

Dependent Variable	WTYPE I Errors		WTYPE I Errors		TYPE II Errors	
			Foreclosure Correction			
	Coef.	P-Values	Coef.	P-Values	Coef.	P-Values
PCgains	-1.74E-07	0.2310	-2.59E-07	0.2550	-1.63E-06	0.0000
Big_EU	-0.9480	0.0470	-1.0807	0.0350	-0.8586	0.1280
Phase_II	2.0985	0.0000	2.0629	0.0000	-2.7779	0.0000
Trend	0.0002	0.3120	0.0001	0.7560	0.0005	0.0880
National	0.5671	0.1240	0.6832	0.0970	-1.1176	0.0530
Cross_EU2	-1.1965	0.0340	-1.1272	0.0500	-1.6912	0.0120
Extra_EU	-0.2228	0.7710	-0.1091	0.8900	0.3541	0.6850
ECMR_2004	-1.0484	0.1370	-0.4232	0.5690	-1.7101	0.0930
Network	0.1995	0.7350	0.3486	0.5690	0.1978	0.7280
Same_Country	-0.1772	0.6760	-0.4050	0.3680	-0.7581	0.1590
Vertical_Eff	-0.7326	0.1240	-0.9050	0.0650	0.5698	0.2800
No_Main_Comp	0.8185	0.0160	0.8707	0.0100	0.0047	0.9940
_cons	-0.9263	0.1090	-0.7546	0.1910	3.6229	0.0000
Observations	84		78		77	
Log Likelihood	-30.738206		-28.687419		-16.832526	
Chi-Squared	53.26		44.85		34.12	
Significance level	0.0000		0.0000		0.0006	
Pseudo R2	0.4612		0.4527		0.6532	
Correct Predictions	0.8095		0.7949		0.8961	

The estimation of Weak Type I errors is on the sub-sample of pro-competitive mergers, while the estimation of Type II errors is on the sub-sample of anti-competitive mergers. The dependent variables are type1 and type2. The PCGain variable is corrected for p, the predicted probability of the case being cleared obtained from a probit estimation on the full sample, where dependent variable is Clear and the exogenous variables are a constant, Big_EU, Phase_II, Trend, National, Cross_EU2, Extra_EU, ECMR_2004, Network, Same_Country and Vertical_Eff.

Source: Computed from eq. (3) and (4)

Table 5: Marginal Effects – Reference Case*

Dependent Variable	WTYPE I Errors		WTYPE I Errors Foreclosure Correction		TYPE II Errors	
	Coef.	P-Values	Coef.	P-Values	Coef.	P-Values
PCgains	-3.48E-08	0.2280	-5.22E-08	0.2440	-1.95E-07	0.0000
Big_EU	-0.1976	0.0240	-0.2262	0.0120	-0.0981	0.1580
Phase_II	0.4977	0.0000	0.4747	0.0000	-0.4705	0.0000
Trend	0.0000	0.3000	0.0000	0.7550	0.0001	0.0600
National	0.1107	0.1470	0.1299	0.1320	-0.1354	0.0630
Cross_EU2	-0.2250	0.0050	-0.2104	0.0070	-0.2100	0.0090
Extra_EU	-0.0437	0.7650	-0.0217	0.8880	0.0411	0.6740
ECMR_2004	-0.2054	0.0850	-0.0845	0.5430	-0.2092	0.1090
Network	0.0407	0.7380	0.0730	0.5820	0.0233	0.7260
Same_Country	-0.0349	0.6710	-0.0784	0.3400	-0.0974	0.1820
Vertical_Eff	-0.1420	0.1030	-0.1720	0.0360	0.0736	0.2220
No_Main_Comp	0.1694	0.0270	0.1821	0.0200	0.0006	0.9940

Coefficients represent average effects of partial derivative of $E[y]=F[\beta X]$. For the binominal (dummy) variables, coefficients represent the effect of discrete change of dummy variable from 0 to 1.

Source: Computed from eq. (3) and (4)

*Reference case: abnormal change in equity of competitors (variable PCgains) for each merger is computed as a weighted average of abnormal equity change of each competitor on a 5-day event window, with market capitalization as a weight

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