Determinants of the success of remedy offers: Evidence from European Community mergers*

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Abstract: This article proposes an empirical method for finding the determinants of the size of remedy offers relative to the level required by the European Commission in individual cases. Evidence is presented that merger characteristics, such as the size of the transaction, or the number of horizontal overlaps do not affect the probability of a remedy offer being successful. It is also shown that pre-merger expectations about merger-generated efficiencies increase the likelihood of successful offers. These findings are very important features of EC merger control, and a novelty in the existing literature. If parties are delay-averse, then the complexity of the case matters very little, as merging parties appear to be able to offer something outright acceptable for the Commission. This may lead to a counter-productive situation where less delay-averse mergers become more prone to offering too much, which can result in over-fixing the competition problem for those mergers where savings would be more likely.

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1. Introduction

Merger remedies have attracted much interest from academics and practitioners in the past few years, partly because of the increasing role they play in merger control.[1] Since the first merger regulation took effect in 1990, out of roughly 4000 European merger cases there have been around 300 in which intervention was necessary to prevent the anticompetitive effects of the merger. In over 270 of these cases the merger was approved subject to certain conditions (merger remedies), whereas in the remaining cases the merger was prohibited. This paper focuses on the mergers that were approved subject to merger remedies.

The idea behind merger remedies is that they alter the market structure, or the behaviour of market agents in a way that eliminates the competitive concerns caused by the proposed merger. In the absence of efficiency improvements, merger remedies are the only means of acquiring regulatory approval for otherwise anti-competitive mergers. In the European Union, mergers with community dimension[2] are subject to the approval of the European Commission[3] but if a merger is found to be anticompetitive and thus remedies are needed, the scale and scope of the remedies proposed is at the discretion of the merging parties. The Commission's only role is to decide whether to accept the offered remedy or not.

When merging parties come to deciding on the size of the offered remedy they have to weigh up the gain from offering a smaller remedy against the loss from a potential delay caused by the bargaining over the remedy (and the

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1 The focus of this paper is not on substantive issues regarding merger remedies. For these issues the following works provide a comprehensive analysis. Parker, et al. (2000), Motta, et al. (2002), and Rey (2003) are a good source for a discussion on the taxonomy of merger remedies. Neylan (2002) and Werden, et al. (2005) attempt to extend the conventional dichotomy of remedies (structural and behavioural remedies) by introducing new types of remedies. Balto, et al. (2001), Cadman, et al. (2006), Shelanski, et al. (2001), and Lévêque (2006) are various attempts to identify industries (e.g. network industries) where a special treatment of remedies might be justified. Lyons, et al. (2007) and Farrell (2003) focus on the negotiation process on remedies between the regulator and the merging parties. Lévêque, et al. (2003), and Davies, et al. (2007) provide a more thorough and comprehensive analysis of numerous aspects of merger remedies.

2 See Article 2 of Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings (hereinafter ECMR)

3 Hereinafter referred to as Commission.

potential rejection of the offered remedy). Therefore if a delay is more costly than the gain of getting away with a smaller remedy, then they will want the bargaining to stop as quickly as possible, by offering something at or above the level, which they think is necessary to pass the Commission's test. The results presented in this paper will provide evidence to this type of behaviour. The main policy implication of this is that it may potentially lead to type I errors in the Commission's decision making process. Although the welfare effects are unclear, there is at least the possibility that the excessive offer lowers welfare if efficiencies are muted.

I will test a set of factors to see how they affect the probability of a remedy offer being accepted. Evidence will be presented that merger characteristics, such as the size of the transaction, or the complexity of the case (measured by the number of horizontal overlaps) do not affect the probability of a remedy offer being accepted, whereas the expected level of merger-generated cost savings and more experience has a positive effect. This implies that the complexity of the merger matters a lot less than intuitively expected, as the merging parties can always find a suitable remedy if it is in their interest to do so in order to avoid delay.

This finding is a very important – but yet rather unexplored – feature of EC merger control. It shows that if parties are delay-averse, then the complexity of the case matters very little, as the parties will be able to offer something outright acceptable for the Commission.

Although this paper is not the first attempt to research the merger control practice of the European Commission empirically,[4] there has been no empirical work on estimating the probability of successful remedy offers. For the purposes of this paper, probably the most relevant theoretical articles are Chopard, et al. (2008) and Lyons and Medvedev (2007). The Chopard et al. paper proposes a theoretical framework to assess the probability of a successful remedy settlement between the competition authority and the

[4] For example Bougette, et al. (2006) analyse the determinants of the choice of merger remedy, Davies, et al. (2008) investigate the effect of EC merger remedies in collective dominance cases, Duso, et al. (2006) use an event study methodology to identify if a merger was potentially anticompetitive and then look at what remedy was applied, and Seldeslachts, et al. (2007) investigate the deterrence effect of merger remedies.

merging parties. They find that – with an increase in the consumer pass-on-rate of merger-generated cost savings – the probability of successful settlement also increases. In this paper I will empirically analyse the effect of the expected level of merger generated cost savings on the probability of 'reaching settlement' about the offered remedies.

The paper is structured as follows: firstly the remedy offer-acceptance practice of the Commission is introduced. This is followed by the formulation of the model to determine the probability of a successful offer using the assumption that a remedy can only be accepted (and thus the merger is approved) if a remedy was offered by the merging parties and this offered remedy is above the reservation level of the Commission. Following that, the parameters of the distribution of remedy offers and remedy acceptance are estimated. Using the functional form of these two distributions, the probability of a remedy offer being successful at any given time during a merger procedure is calculated. Finally the effect of delay-averseness, experience, the value of the merger transaction, and the complexity of the case on the probability of successful offers is estimated.

2. Remedy offers and acceptance

A merger remedy (or commitment) is purported to eliminate the competition problem caused by the merger.[5] This can be achieved by either rearranging the structure of the industry (structural remedy) or by directly changing the behaviour of market players by requiring them to engage in a given type of behaviour (behaviour or conduct remedy).[6] The conventional approach to remedies by the Commission is that structural remedies should always be the preferred choice for its simplicity and for the relative ease of implementation.[7]

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5 Although in certain market environments there are arguments in favour of a more interventionist approach, see for example Lévêque (2006)

6 Although this seems like an obvious dichotomy to organise merger remedies around – and is done by many related authors – it has to be mentioned that many authors propose a different taxonomy of merger remedies.

7 However Rey (2003) for example questions whether behavioural remedies are more difficult to implement in certain environments.

The Commission's notice on remedies provides detailed rules about the procedural aspects of remedies.[8]

There is one distinguishing feature of the EC merger control regime, which deserves special attention as it provides the theoretical basis for the model proposed in this paper. According to the rules governing the application of merger remedies, in mergers notified to the Commission the remedy offer shall always come from the merging parties, the Commission can only decide whether to accept it or not by examining if the offered remedy is proportionate to the competition problem and entirely eliminates it.[9] This is a crucial characteristic of European merger control as it means that the remedy is not imposed on the parties by a regulator but it is the parties who have to initiate the remedy offer if they want to have their merger approved. Therefore, it is at the merging parties' discretion if a remedy is offered, when it is offered, and what the content of that offer will be.

If the Commission turns down the offered remedy,[10] then the merging parties have to find an alternative remedy that they can include in their subsequent offer. If the offer is accepted, the case is closed with the Commission's final decision. This paper assumes that in every case the Commission reaches its decision on the offered remedies based on a reservation level of remedy that is at least needed in order to fix the competition problem caused by the merger. Remedy offers that fall above this reservation level are accepted, otherwise they are rejected. Although the Commission does not communicate

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8 Commission Notice on remedies acceptable under Council Regulation (EEC) No 4064/89 and under Commission Regulation (EC) No 447/98 ('old Notice'), and Commission Notice on remedies acceptable under Council Regulation (EEC) No 139/2004 and under Commission Regulation (EC) No 802/2004 ('new Notice').

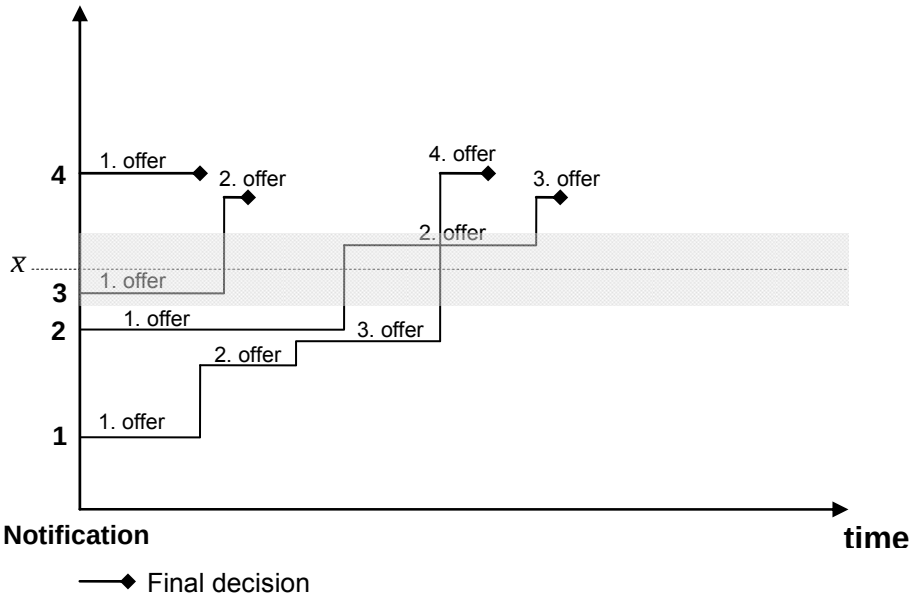
9 See Judgment of the CFI in Case T-210/01 General Electric v Commission [2005] ECR II-0000, paragraph 52; or in Case T-87/05 EDP v Commission [2005] ECR II-0000, paragraph 105

10 According to the ECMR, an anticompetitive merger can be granted authorisation if the merging parties offer a commitment "with a view to rendering the concentration compatible with the common market", provided that the Commission declares this commitment to be able to entirely eliminate the competition problem cause by the merger. If the Commission finds that a remedy offer does not eliminate the competition concerns then the offer is rejected and the merger is not approved until an appropriate remedy is subsequently offered. See recital 30 of the new ECMR.

this reservation level, I also assume that the merging parties have a good idea what it is if they carefully follow the Commission's practice.[11]

Figure 1 helps in visualising the remedy offer-acceptance process in EC merger procedures (the vertical axis represents the level (size) of the remedy offer, the horizontal axis measures time elapsed from the start of the procedure). The graph shows four distinct hypothetical merger cases, each of which are characterised by different numbers of remedy offers.

Figure 1: Process of remedy offer and acceptance



Looking at the four hypothetical procedures one by one, the graph reveals some additional information about the remedy offer-acceptance process. The horizontal line $\bar{x}$ shows the Commission's reservation level. The grey shaded area around $\bar{x}$ is intended to suggest that the reservation level of the remedy is not one clearly distinguishable level of remedy size.[12] The Commission cannot tell for certain whether the offers that fall in this grey area eliminate the competition problem. These offers are therefore prone to type I or type II

[11] At least they know what the 'true remedy' – the remedy that eliminates the competition problem – is, and for a well functioning competition authority the reservation remedy should converge to the true remedy. The concept of the true remedy was introduced by Lyons, et al. (2007)

[12] Similarly, the level of the remedy offer should be imagined as the effect of the offer, which is also a stochastic variable.

errors,[13] and the decision about these remedy offers depend on which type of error the Commission is trying to avoid.

For example, case 1 shows a merger where the parties start the sequence of offers at a very low level and frequently increase it by a small amount until they reach the desired level. In case 2 the first offer is closer to the reservation level and therefore it takes more time to assess by the Commission. Once it is rejected, the follow-up offer is above $\bar{x}$ but only marginally, and therefore it falls in the grey area. Assuming that the Commission has a preference for avoiding a type II error, this offer will be rejected and therefore merging parties have to increase their offer. In case 3 the offer falls just under $\bar{x}$ and as such would be rejected[14] but anticipating this, the merging parties immediately increase their offer to a higher level, which is subsequently approved by the Commission. Case 4 illustrates a merger where the parties can fully anticipate the Commission's concerns and thus make a sufficiently large offer early in the procedure.[15]

The main message of Figure 1 is that as soon as offers reach the reservation level $\bar{x}$, the remedy is accepted. If an offer is accepted, the merger procedure is finished and the merger can be approved subject to that offer.[16] This implies that there are remedy offers that are not accepted and thus need to be followed by another (or more) remedy offer(s) until the Commission accepts them. Therefore typically longer procedures are associated with more remedy offers, although this is not necessarily the case for every merger. Knowing how various circumstances affect the probability of remedy offers being

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13 When assessing mergers, competition authorities can make two types of errors. They can end up prohibiting a merger when it is in fact not harmful to competition (type I error) or authorising an anticompetitive merger transaction (type II error). In the context of remedy offers a type I error could be caused by requiring a remedy even where there is no competitive harm, whereas a type II error would result from a forgone remedy, which would have been needed to eliminate a competition problem.

14 Assuming again that the Commission has a preference for minimising type II errors.

15 Although not shown in Figure 1, there are also cases where the parties withdraw from their notification. As information about these cases is very scarce, they were not included in the analysis.

16 Hereinafter by final decision we always mean the acceptance of a remedy offer (as for this purpose prohibition cases are excluded from the analysis; for further details see below).

accepted would be a very important achievement in understanding merging parties' litigation behaviour, which primarily motivated this paper.

3. A method for calculating the probability of remedy offers being accepted

Although the distribution of the size of remedy offers in merger cases is difficult to model, there are strong theoretical assumptions about the properties of this distribution. For example divestiture remedies can be looked at as a proportion of the total amount of assets that changes ownership as a result of the merger.[17] This way the distribution of potential divestitures would range from a minimum (zero when no divestiture is needed) to a maximum value (1 if all the assets that changed ownership as a result of the merger have to be divested). If we think about the size of remedy offers (x) as being stochastic, where the probability of any size offer is described by a density curve $r(x)$, then the area under this density curve to the right of a given level ($\bar{x}$) of remedy offer is the probability that a remedy offered will be larger than $\bar{x}$.

Based on the framework provided by the ECMR, a remedy offer is assumed to be accepted if the offer had been made and the size of the offer exceeds the reservation level of the Commission. Therefore, the probability of a remedy offer being above the reservation level $\bar{x}$ is assumed to equal the probability of a final decision (i.e. a remedy offer being accepted)[18] subject to the condition that an offer had been made by 10 days preceding the final decision. The choice of using $t-10$ for remedy offers comes from the observation that the mean number of days between the final offer and the final decision for the 198 cases in the sample of analysed cases is 10.404 days.

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[17] As is introduced by Lyons, et al. (2007).

[18] As a final authorising decision can only be attained if a suitable remedy had been offered before.

Let *O* denote the event that a remedy has been offered by time $t-10$,[19] and let *A* denote the event that a remedy is accepted by time *t*:

$$O:\{\text{remedy offered by time } t-10\}$$
$$A:\{\text{remedy accepted by time } t\}$$

By definition $A \subset O$ at any time *t*, i.e. the remedies accepted constitute a subset of the remedies offered. We are looking for the probability of *A* (acceptance) conditional to *O* (offer), which is given by:

$$P(A \mid O) = \frac{P(A \cap O)}{P(O)}$$

Assuming that the size of remedy offers follows some distribution *R*(*x*), the probability of remedies offered by time *t* – 10 being above some reservation level $\bar{x}$ is given by its complement $1-R(\bar{x})$, therefore:

$$1-R(\bar{x}) = \frac{P(A \cap O)}{P(O)}$$

i.e. the probability of a remedy offer being above the reservation level equals the conditional probability of a remedy offer being accepted provided that it had been offered at least 10 days earlier.

Denote the probability distribution of remedy acceptance over time by $F(t,X)$.[20] The arrival of remedy offers[21] also follows a continuous distribution over time: $G(t,X)$.[22] $G(t,X)$ tells us the probability of a remedy having been offered by time *t*, and $F(t,X)$ shows us the probability of a remedy being accepted by time *t*, and therefore:

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19 Where *t* is time elapsed from the notification of the merger, measured in working days, $t \in [10, t_{\max}]$, where $t_{\max}$ is the regulatory maximum length of a merger case. As Ormosi (2009a) showed this can vary very significantly due to the fact that the ECMR does not define the maximum length of the suspension of an investigation.

20 Where *t* is time elapsed, *X* is a vector of merger and case specific covariates affecting the shape of the distribution functions.

21 Important to emphasise again that here the emphasis is on how offers are distributed over time (only their timing and not their content matters here).

22 Where the bimodally distributed remedy offer variable can be defined as A (Phase I) with probability α or B (Phase II) with probability 1-α.

$F(t, X) = P(A)$, and $G(t-10, X) = P(O)$, hence

$$(1) \qquad 1 - R(\bar{x}, t) = R^{C}(\bar{x}, t) = \frac{F(t, X)}{G(t-10, X)} \qquad \begin{array}{l} t \geq 10 \\ 0 \leq F(t, X) \leq 1, \\ 0 \leq G(t-10, X) \leq 1, \end{array}$$

Where $\bar{x}$ is the reservation level of merger remedies in the given case. Equation (1) implies that the probability of a remedy offer being above the reservation level is given by the ratio of the probability of a remedy offer having been accepted by time *t*, and the probability of a remedy offer having been made by time $t-10$.[23]

The probability of remedy offers being successful can be thought of as a measure of how willing the parties are to engage in a bargaining process with the Commission on the size of the remedy. If we can identify a group of cases where remedies are more likely to be accepted it means that the parties are avoiding small offers and they make sure that their first offer is such that it is accepted by the Commission. On the other hand if we find that given a different environment the probability of remedy offers being successful is smaller, it would imply that in those cases there were more rejected offers, i.e. the parties were more willing to 'bargain' with the Commission by offering something small first and then gradually increasing their offer until the merger is approved.

The estimated parameters have to satisfy the first axiom of probability for Equation (1). Knowing that the ratio of $F(t, X)$ and $G(t-10, X)$ is by definition always positive, we have:

$\frac{F(t, X)}{G(t-10, X)} \leq 1$, and thus, $F(t, X) \leq G(t-10, X)$, for any $t \in [0, t_{\max}]$

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An appealing characteristic of (2) is that we can estimate the ratio $\frac{F(t,X)}{G(t-10,X)}$ if we know the parametric shape of the two distribution functions. Ormosi (2009a) tests how the timing of remedy offers and final decisions fits various theoretical distribution functions and provides evidence that both variables follow a bimodal process, which can be decomposed into two log-logistically distributed parts. Therefore $F(t,X)$ and $G(t,X)$ are assumed to be given by:

$$F(t,X)=(1-\rho)\frac{1}{1+(t/\alpha_{F1})^{-\beta_{F1}}}+\rho\frac{1}{1+(t/\alpha_{F2})^{-\beta_{F2}}}\text{, and}$$

(2)

$$G(t,X)=(1-\rho)\frac{1}{1+[(t-10)/\alpha_{G1}]^{-\beta_{G1}}}+\rho\frac{1}{1+[(t-10)/\alpha_{G2}]^{-\beta_{G2}}}$$ [24]

Where ρ is the probability of an investigation ending in a phase II procedure, α_i ($i=F1,F2,G1,G2$) are the scale parameters for the distribution of remedy offers and for the distribution of remedy acceptance, for phase I and phase II respectively, and β_i (with $i=F1,F2,G1,G2$) are the shape parameters with similar meaning for the indices. From these functions we can compute the ratio in equation (1) for all *t*, which gives the probability of remedy offers, offered by time *t* – 10, being above the reservation level $\bar{x}$. The corresponding density functions $f(t,X)$ and $g(t-10,X)$ are given by:

$$f(t,X)=(1-\rho)\frac{(\alpha_{f1}/\beta_{f1})(t/\beta_{f1})^{\alpha_{f1}-1}}{\left[1+(t/\beta_{f1})^{\alpha_{f1}}\right]^2}+\rho\frac{(\alpha_{f2}/\beta_{f2})(t/\beta_{f2})^{\alpha_{f2}-1}}{\left[1+(t/\beta_{f2})^{\alpha_{f2}}\right]^2}\text{, and}$$

$$g(t-10,X)=(1-\rho)\frac{(\alpha_{g1}/\beta_{g1})(t-10/\beta_{g1})^{\alpha_{g1}-1}}{\left[1+((t-10)/\beta_{g1})^{\alpha_{g1}}\right]^2}+\rho\frac{(\alpha_{g2}/\beta_{g2})(t-10/\beta_{g2})^{\alpha_{g2}-1}}{\left[1+((t-10)/\beta_{g2})^{\alpha_{g2}}\right]^2}$$

From the two density functions the log-likelihood functions are calculated, which are then used for conducting a maximum-likelihood estimation for the parameters. An MLE programme was written for this purpose. The programme had to ensure that in the same model we can control for

[24] A remedy offered in a phase II case but before the start of the second phase investigation was considered as a remedy offered in phase I. This happens in those situations where an unsuitable remedy is offered in phase I, which the Commission rejects and the cases therefore carries on to phase II.

covariates that can affect the scale parameters and also parameter *ρ* that gives the probability of phase II procedures. Therefore for each density function, five parameters had to be estimated ($\rho, \alpha_1, \alpha_2, \beta_1, \beta_2$), three of which (ρ, β_1, β_2) could have been affected by a number of covariates.[25]

The estimations are then plugged into the bimodal distribution functions in equation (2), from which the ratio in equation (1) can be calculated for any time *t*. This ratio gives a curve representing how the probability of a remedy offer being successful changes over the procedure. The probability of successful remedy offers by time *t* ($R^C(x,t)$) will then be calculated for different case types, and they will be compared graphically and formally[26] using a one-tailed Mann-Whitney U test.[27] The test results will show us if different case characteristics result in different probabilities of successful remedy offers.

4. The dataset

A sample of 10 years of EC merger control cases (1999–2008) was chosen. Only those cases were included in the sample where remedies were offered by the merging parties in order to restore the pre-merger level of competition.[28] The data was collected from three major sources: (a) the Commission's case reports, (b) merging parties' annual reports, (c) online news resources and business press services (business newspapers, industry magazines, business-and-law search engines such as Lexis-Nexis). The sampling process used for this research was – in a sense – purposive sampling as it aimed at collecting all of those European Commission cases

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25 For simplicity α_1 and α_2 are treated as constants but it should not imply an assumption of heterogeneity, therefore robust standard errors are calculated in the estimation process.

26 This reveals a shortcoming of this method, i.e. it only allows the pairwise comparison of cases.

27 The Mann-Whitney test is a non-parametric test and it does not require a normality assumption about the distribution of the examined samples. For more information see Sprent (1997)

28 Remedies are offered in cases that result in the prohibition of the merger (i.e. where the remedy offer was rejected by the Commission) according to Article 8.3 of the ECMR, or in the conditional approval of the merger, see Articles 6.1 (b) (in conjunction with Article 6.2) and 8.2 of the ECMR.

within the analysed timeframe which involved some sort of intervention from the Commission's part.

The data collection was subject to various limitations. The most obvious constraint was the availability of the required data in the text of the decision. In general it can be said that for older case reports, the range of available information becomes more and more limited, which explains why the paper only looks at the past 10 years of EC merger cases. There was also a reporting bias from the Commission's part, which was only discovered at a later stage of the research and which also resulted in significant changes to this paper. This bias was due to the fact that phase I documents do not contain the same amount and level of information as phase II documents. This meant that some of the structural variables (entry characteristics, market shares outside of the relevant markets, etc) had to be dropped, as this information was typically not reported in the phase I documents. This is also true with regards the comparison between older and more recent documents. Some information that was only reported in, say, post-2004 documents cannot be used for an unbiased analysis when it is obvious that the lack of information for pre-2004 documents is due to the fact that the Commission followed different reporting policies. Another constraint affecting the collected sample was that only English and French texts were included. Therefore from the 223 cases in the examined period,[29] 9 had not been published by the time of finalising this article, 11 were in German, 3 in Italian, and 2 in Spanish, leaving 198 cases to be analysed.

4.1 The analysed covariates[30]

The dependent variables used are the number of working days between the notification of the merger and the final decision (*NLENGTH*), and the number of working days between the notification and the remedy offer (*NREM*).[31] The

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29 See EC merger control statistics between 1 January 1999 to 31 December 2008, downloaded from: http://ec.europa.eu/competition/mergers/statistics.pdf

30 The table in Appendix I contains the summary statistics of all the analysed variables.

31 Remedy offers in cases that led to prohibition were included in the analysis, but *NLENGTH* observations for the same prohibition cases were excluded from the sample as there was no acceptance of remedy offers in these cases.

NLENGTH variable represents the timing of the remedy acceptance as we know that on average 10 days following acceptable remedy offers the merger is approved. $F(t, X)$ is the cumulative distribution function of *NLENGTH*, and $G(t, X)$ is the *cdf* of *NREM*.[32]

This paper attempts to look at the determinants of the relative size of remedy offers (i.e. the probability of a remedy offer being accepted by the Commission). To ensure the robustness of the results, a model had to be chosen that controls the relevant circumstances surrounding merger cases. As mentioned above, the characteristics of the market (entry characteristics, market shares outside of the relevant markets, etc) are not included in the analysis due to the reporting bias on this data. Instead, the models control for merger characteristics, such as the complexity of the merger, which is measured by the number of market overlaps, vertical and coordinated effects, and the size of the transaction. I will also try to measure the effect of merging firms' pre-merger saving expectations and the fact whether parties revealed these saving expectations to the Commission. Experience about the Commission's practice was also expected to play a role.

4.1.1 The complexity of the merger

The word complexity in the way it is measured for the purposes of this article, is somewhat synonymous to how problematic the merger is, as it is assumed that the more complex a case is, the more problematic it becomes from a competition point of view (for example, more market overlaps with competition concerns, or vertical concerns on top of horizontal problems). For this reason complexity can affect how easy it is to design an appropriate remedy to eliminate all competitive concerns, and also, how easy it is for the Commission to adequately assess whether the proposed remedy is capable of eliminating the identified problems. For more complex mergers, typically a

[32] The procedural deadlines were different under the two ECMR. This means that if the analysis includes cases from both under the old and the new ECMR, then the results can only be meaningfully interpreted if some sort of weighting is used for the event-spell variables. In comparison with the old ECMR, phase I merger procedures can be 1.666 times, whereas phase II investigations can be 1.356 times longer under the new ECMR. These multipliers were used as weights accordingly

more extensive remedy is needed, which may have an influence on the probability of a remedy offer meeting the Commission's requirement.

The complexity of the case is controlled for by the number of horizontal market overlaps (*COVL*), where the Commission identified competition concerns. *COVL* measures the number of horizontal overlaps, created by the merger, where the Commission found that intervention was necessary. Both the geographic and the product dimensions of market definition were taken into account, therefore each geographic market was counted for each of the product markets where competition was restricted.

Vertical[33] and coordinated effects[34] were also included in the model, firstly the binary variables *VERT* and *COOR* refer to cases where vertical or coordinated effects without horizontal effects were identified. The interaction variables *VERTHOR* and *COORHOR* are aimed at distinguishing the effect of cases where horizontal and vertical or coordinated effects were jointly identified by the Commission. Information on *COVL*, *VERT* and *COOR* were collected from the Commission's case reports.

4.1.2 Pre-merger saving expectations

The data on cost saving expectations (*VAL*) constitute a central part of this paper. The use of this type of information is a novelty in merger related research, and has never been collected systematically in the same way, probably due to the scepticism that surrounds the efficiency expectations of merging parties pre-merger.[35] However, if one interprets this piece of

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33 Vertical mergers are mergers between firms that operate on different levels of the production or distribution chain. When looking at vertical mergers the Commission is primarily trying to detect if the merger would result in foreclosure: when the firm created by the merger allows no more access to a given asset, thereby driving competitors out of the market or making entry difficult.

34 In these cases the Commission focuses on market structure and is trying to assess whether it is such (oligopolistic) that is capable of facilitating "tacit collusion" between the market players, which would then lead to the consequence of prices being raised, output being reduced or other harmful effects on competition. Apart from looking at the market structure, the Commission also examines the past practice of market players to be able to assess whether the market is susceptible to collusion.

35 Although synergy expectations were collected from the above listed sources, there has been academic attempts to measure these synergies from other available data. Chang (1988) for example proposes a method for calculating these anticipated synergies using three variables: the acquisition premium paid by the buying firm, the market value, and the replacement costs of the target firm.

information carefully (e.g. not using it as a measure of actual efficiency gains), then it can reveal some very important information about the way merging parties act in merger cases.

When announcing merger plans, companies often signal to the public that their merger would create cost savings. In many instances these expectations are published in a quantified manner. I will assume that the magnitude of these published expectations is directly proportional to how urgent the approval procedure becomes for the merging parties (i.e. delay becomes more costly when more savings are expected). An intuitive explanation to this assumption could be that a delay in realising these synergies not only affects their present value but also jeopardises their realisation given that delays can increase the likelihood of a third party pre-emptive takeover. Parties are very keen on avoiding this as third party takeovers can lead to the larger (indirect) losses through the strengthening of a competitor. This provides a very strong incentive to merging parties to avoid delay as much as possible.

The *VAL* variable is a continuous variable, and it measures the amount of saving expectations pre-merger. For the purposes of this research I assumed that if parties had not published synergy expectations pre-merger then they were not expecting such savings to occur. The value of the cost saving expectations in these cases is zero. Whenever saving expectations are communicated, they are usually accompanied by calculations about the timing of the realisation of these savings.

The calculation of the *VAL* variable was done in the following way. First, I calculated the present value (*PV*) of the deflated annual cost savings (*CS*). This is basically an annuity to be realised in *YRS* years and I assumed that this annuity would last for five years in every case, therefore the present value of the annuity in *YRS* years time is: $PV_{YRS} = \frac{CS}{0.1} - \left(\frac{CS}{0.1}\right)\left(\frac{1}{1.1^5}\right)$, and the present value now is: $PV = \frac{PV_{YRS}}{1.1^{YRS}}$. As larger mergers are more likely to realise larger cost savings, the calculated present value of savings was divided by the size

of the transaction (*PA*), to get: $VAL = \frac{PV}{PA}$. The corresponding summary statistics are presented in Table 1.

Table 1: Summary statistics for saving expectations (VAL)

variable	description	N	mean	std.dev.	min	max	p5*	p50*	p95*
PV	Present value of the cost saving expectations (deflated, million GBP)	198	595	1470	0	11914	0	69	2718
CSdum	1 if there are published cost saving expectations	198	0.53	0.50	0	1	0	1	1
	phase I	*136*	*0.581*	*0.495*	*0*	*1*	*0*	*1*	*1*
	phase II	*62*	*0.403*	*0.495*	*0*	*1*	*0*	*0*	*1*
VAL	PV/PA	168	0.10	0.23	0	2.09	0.00	0.01	0.40
	phase I	*115*	*0.115*	*0.256*	*0*	*2.092*	*0*	*0.044*	*0.40*
	phase II	*53*	*0.074*	*0.151*	*0*	*0.875*	*0*	*0*	*0.40*
VALg	VAL without outliers	161	0.07	0.096	0	0.423	0	0	0.28

* 5th, 50th (median), and 95th percentiles

Mergers often communicate their synergy expectations to shareholders pre-merger. Although it has been shown that some of these saving expectations fall short[36], they are still well-suited for the purposes of this paper as they are used for measuring merging parties' pre-merger expectations, which primarily determine the strategy that parties chose during litigation. I will also assume that the communicated saving expectations are genuine expectations. Box 1 contains an example for how such saving expectations are communicated to public.

Box 1: The Air France / KLM merger

The *Air France*/*KLM* merger in 2004 created the largest European airline company, the world's largest airline by sales income and the fourth largest by traffic volumes.[37] Air France and KLM expected cost savings of $450 million to

[36] See for example: Gugler, et al. (2003), or Booz Allen & Hamilton (2004)

[37] Air France – KLM (2004): Annual Report (available at: http://www.airfranceklm-finance.com/sysmodules/RBS_fichier/admin/forcedownload.php?id=329).

$550 million after five years as a result combining purchasing, sales and information technology.[38] As the deal was valued at around 850 million Euros, the calculated value of the *VAL* variable is 1.466. The merger was approved in a phase I procedure after the parties offered a comprehensive package of remedies to eliminate the competition problems caused with regards some of the airport slots and routes. These remedies were accepted without modifications.

Four major sources were used for collecting information on saving expectations: (1) merging parties' annual reports: the information I was looking for (pre-merger expectations) were found in that year's report when the merger was announced.[39] These reports are typically written for shareholders and contain a description of the expectations related to the proposed merger project. (2) Company press releases: these short informational articles are a brief and prompt signalling means. They are normally available on the merging parties' websites or in their online archives. (3) Business-and-law search engines such as Lexis-Nexis. (4) Google news archives were used to double-check the information acquired through the first two steps, or if the annual reports were not detailed enough or simply because there were no annual reports available. The data on synergy expectations was only used if there were at least 3 different news sources reporting the same expectation, roughly at the same time.

4.1.3 Efficiency defence

It has been mentioned above that merging parties decide whether to offer remedies, when to make the remedy offer and how much the offered remedy should be.[40] With efficiency claims the situation is similar. Parties have to decide whether to bring forward their efficiency expectations to the Commission or not. Although the Commission can *'ex officio'* investigate the

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38 Post-merger it was showed that these saving expectations were realised.

39 For example for a merger that was announced in 2003, with the EU procedure starting in 2004, I used the 2003 report, which is the one that reflects the pre-merger expectations.

40 However if the remedy offer is insufficient to restore the pre-merger level of competition then the Commission prohibits the notified merger.

efficiency effects of a merger, given the information asymmetry in this question, there is very little the Commission can do if the parties remain silent about evidence on efficiency gains, and offer a remedy instead. As anticompetitive mergers can only be approved if a suitable remedy is offered, or if efficiency gains outweigh the anticompetitive effects, merging parties have to decide which solution to opt for (remedy offer or efficiency claims, or some combination of the two).

Two groups of cases where efficiency arguments were discussed can be distinguished. In the first group it is clear from the Commission's case report that the efficiency claims came from the merging parties. There have been nine such cases since 1999. Only these are used as efficiency defence cases in this article. There were also a number of cases where the Commission discussed efficiency arguments but either the efficiency related information came from sources other than the merging parties (competitors, consumer groups, etc.), or it was not clear from the case report where it came from (13 such cases since 1999).[41]

4.1.4 Other factors

The model will also control the experience of the merging parties and the Commission, using the case number as a proxy variable (*CNo*). This variable is the four-digit part of the Commission's case numbers. Merger cases are numbered in the following manner: Case No COMP/M.XXXX, where the XXXX part is a four-digit number. Cases are numbered in a chronological order following their notification to the Commission; therefore between two merger cases the one with a higher number is the one that was notified to the Commission at a later date. Assuming that merging parties design their remedy offer based on how they perceive the Commission's case law, this variable should have an effect on the relative size of remedies offered. With a growing number of cases the Commission's practice becomes clearer and

[41] Thus altogether there were 22 cases where the Commission discussed efficiency arguments in their case reports.

parties will have more information to adjust their strategies accordingly to achieve an early approval of their merger.

Finally, the size of the merger (*PA*) was also controlled for. Since 1990 there have been over 4000 thousand cases notified at the European Commission. These mergers significantly vary both in the size of the merging parties and the size of the transaction itself, with one common constraint for all the mergers in the sample: their relevant turnover figures have to be above the Community notification threshold,[42] except when they achieve two-thirds of their aggregate Community-wide turnover within one and the same Member State.[43] As the world-wide turnover and the turnover of the merging companies are reported in the Commission's decision, it has been used in various empirical works in order to see its effect on various factors. For example Bougette, et al. (2006) claims that mergers with larger worldwide turnover figures are more likely to divest some of their assets (as opposed to other types of remedies) as an attempt to remedy the anticompetitive effects of the merger. Although the effect of the annual turnover of the post-merger entity may have some interesting policy implications, one has to be very careful in interpreting these results. In nearly half of the cases this data is not reported by the Commission (as the parties chose to treat this information as confidential) and there is a very strong suspicion of the missing data not missing at random. For this reason, information on the value of the transaction was collected to analyse the effect of merger size on the probability of successful remedy offers. The data on the size of the transaction is not reported in the text of the Commission's decisions, and therefore it was collected from the same sources as the data on saving expectations.

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42 With the exception of cases that were referred to the Commission from a Member State competition authority.

43 The combined aggregate worldwide turnover of all the undertakings concerned is more than EUR 5 000 million; and the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than EUR 250 million; or (a) if the combined aggregate worldwide turnover of all the undertakings concerned is more than EUR 2 500 million; (b) in each of at least three Member States, the combined aggregate turnover of all the undertakings concerned is more than EUR 100 million; (c) in each of at least three Member States included for the purpose of point (b), the aggregate turnover of each of at least two of the undertakings concerned is more than EUR 25 million; and (d) the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than EUR 100 million (Article 1 (2)-(3), ECMR).

Table 2: Summary statistics for the value of the transaction (PA)

variable	description	N	mean	std.dev	min	max	p5*	p50*	p95*
PA	Price of the acquired assets (deflated, million GBP)	178	9350	21420	112	159132	240	2027	46580
Old ECMR	*phase I*	*70*	*11414*	*24886*	*191*	*159132*	*277*	*2135*	*47657*
ECMR	*phase II*	*32*	*14222*	*31125*	*219*	*152432*	*339*	*2802*	*64337*
New ECMR	*phase I*	*62*	*5080*	*8719*	*112*	*48534*	*233*	*1940*	*19363*
	phase II	*14*	*7250*	*13199*	*244*	*46580*	*244*	*1335*	*46580*

* 5^{th}, 50^{th} (median), and 95^{th} percentiles

This variable (summarised in Table 2) is the amount of money the acquiring company paid for the acquisition (*PA*). The value of the transaction is a continuous variable, and it measures the amount of money paid for the merger transaction. As *PA* directly measures the money paid for the merger transaction it is a better measure of the size of transaction than the total turnover of companies, which includes the entire portfolio of assets of a typically large, international, diversified company.

5. Estimation results and their interpretation

5.1 The distribution curves of remedy offers and remedy acceptance

As a first step, the parameters of the distribution curves given in Equation (2), not controlling for any of the covariates (i.e. taking all the parameters to be constant), are estimated and presented in Table 3:

Table 3: Sample parameter estimates when parameters are held constant

		$F(t,X)$				$G(t,X)$			
		phase1		phase2		phase1		phase2	
	ρ	scale	shape	scale	shape	scale	shape	scale	shape
Parameter estimates	0.29	38.64	8.16	152.08	9.45	25.98	2.93	103.61	2.68
(std.dev)		(0.66)	(0.64)	(3.68)	(1.09)	(1.06)	(0.19)	(6.00)	(0.22)

As the distribution is assumed to be a mix of two log-logistic distributions (where ρ gives the probability of an observation being in the second sub-sample) we know that the scale parameter shifts the distribution up and down

along the horizontal axis, and the shape parameters signifies the dispersion of the distribution (with larger shape variables representing smaller dispersion). Table 3 shows that the dispersion of remedy offers is much larger than the dispersion of remedy acceptance. This should not come as a surprise as remedy offers can be made at any time during the procedure,[44] whereas remedy acceptance and the final decision is more concentrated (but still stochastic) around the regulatory deadlines.

Figure 2 plots the 3 functions from equation (2): $R^C(\bar{x}) = \frac{F(t, X)}{G(t-10, X)}$. We can see that $F(t, X)$ remains larger than $G(t-10, X)$ throughout the whole of the domain, therefore our initial assumption of their ratio remaining not bigger than 1 holds. The probability of remedy offers being successful increases gradually until around day 70 then decreases until around day 125, where it starts increasing again. The pattern is explained as follows: at the beginning of the procedure more remedies are offered than accepted, the probability curve remains zero until around day 28, which is when the first remedies are accepted.[45] After a sharp increase in the proportion of remedy offers being accepted, after day 70 (already in phase II) more remedies are suddenly offered and the proportion of rejected remedy offers increases, therefore the $R^C(\bar{x})$ curve declines again.

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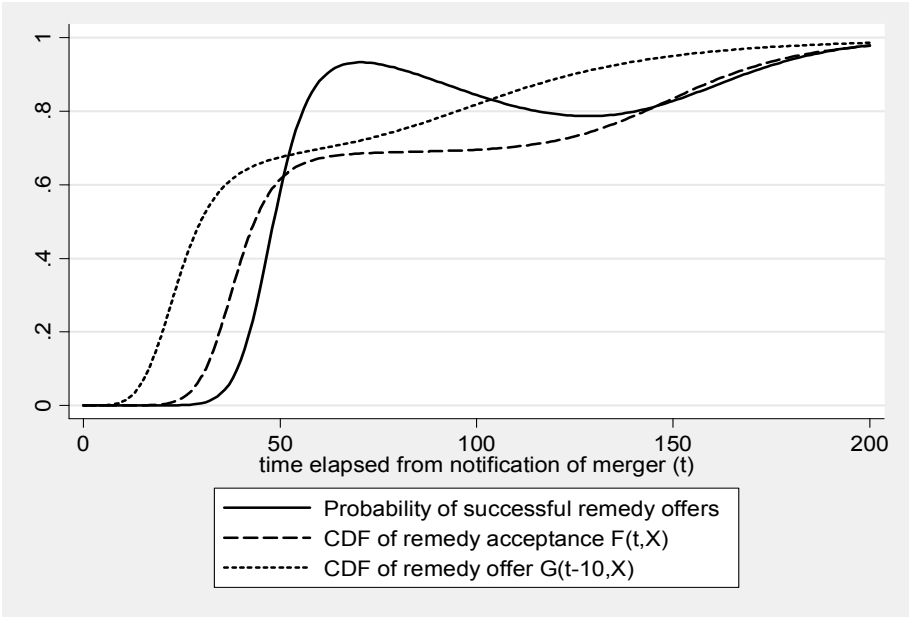
44 With the constraint that they have to be offered before day 20 in phase I procedures, and by day 65 following the start of a phase II procedure otherwise. These deadlines however can be extended, and a suspension of the case also stops the procedural clock.

45 Day 35 is the deadline for a phase I decision if remedies had been offered.

Figure 2: The empirical CDF's and the calculated probability of successful remedy offers



The primary purpose of this paper was to derive some information on how the probability of a successful remedy offer (the solid curve on Figure 2) changes between various different types of cases. The two subsamples are compared using a Mann-Whitney U-test for pairwise comparison. The interpretation of the results raises a central question that has to be clarified before moving on to presenting them. If two groups of cases are compared and the probability of successful remedy offers is shown to be larger in group A than in group B, one may come up with two different explanations:

(1) mergers in A cause less competitive harm, therefore a smaller remedy is sufficient in order to eliminate the anticompetitive effects, which means that it is more likely that any offer will be above the reservation level set by the Commission;

(2) mergers in A are more urgent for the merging parties, therefore they are not willing to engage in lengthy bargaining by offering something small at first and then continuously increasing their offer; instead they make sure that their first offer is large enough to be accepted.

The estimated effects of the covariates below will help us decide which of these stories is more credible. If the complexity and the size of the merger has a strong effect on the probability of successful remedies it supports

interpretation (1), if the saving expectations of the merging parties has a significant effect that would support scenario (2).

Before looking at the ratio of $F(t, X)$ and $G(t-10, X)$, it is worth spending some time interpreting the coefficient estimates in Table 4. The *ρ* rows show how each of the covariates affect the probability of either the remedy offer or the remedy acceptance being in phase II. The *α* rows contain the estimated shape parameters, which implies how disperse the distribution is. The *β* rows contain information about how the covariates that we controlled affect the scale parameter (the horizontal position) of the two distributions. Whilst the *ρ* parameter tells us how the cases are distributed *between* phase I and phase II, the *α* and *β* parameters show how the analysed distributions change *within* phase I or phase II. Table 4 only contains the estimation for the covariates where evidence was found that they significantly affected whether one of the parameters. Appendix II contains the estimation results when other covariates were controlled for. Some of the variables were dropped based on a likelihood ratio test, but the table in Appendix II shows that the estimation results remain approximately the same irrespective of the model chosen, which supports the robustness of these results.[46]

[46] Robustness was also checked and confirmed by comparing estimations for sub-samples of cases under the old and under the new ECMR.

Table 4: Parameter estimates where the shape parameters are constant

		$F(t, X)$		$G(t, X)$	
Parameter	variable	coef.	(std.err)	coef	(std.err)
	VAL	**-3.3497*** **	(1.2393)	**-3.2264*** **	(0.9434)
	ED	**1.7403** **	(0.6979)	**2.2928*** **	(0.6104)
	CNo	**-0.0002*** **	(0.0001)	**-0.0003*** **	(0.0001)
ρ	*COVL*	0.0091	(0.0089)	**0.0148** **	(0.0058)
	VERT	0.0680	(0.3167)	-0.0124	(0.2991)
	VERTHOR	0.0508	(0.0331)	**0.1675** **	(0.0717)
	_cons	0.1473	(0.3141)	**0.3777** **	(0.2879)
α_1		**8.6386*** **	(1.3760)	**3.1476*** **	(0.3588)
	VAL	**-9.6068** **	(4.6917)	**-14.0486** *	(8.3094)
	ED	**-3.2633*** **	(0.6578)	-13.2531	(28.1197)
	CNo	**-0.0015*** **	(0.0006)	-0.0001	(0.0009)
β_1	*COVL*	0.0474	(0.0591)	0.0973	(0.1248)
	VERT	3.2060	(2.3454)	5.6557	(4.3297)
	VERTHOR	**-0.4419** **	(0.1925)	-0.2487	(1.5263)
	_cons	**44.0108*** **	(2.4534)	26.3193	(3.8207)
α_2		**10.1985*** **	(1.7042)	**2.8735*** **	(0.5175)
	VAL	0.2665	(34.8993)	-62.7618	(83.4798)
	ED	**-18.7279*** **	(6.2645)	-8.9896	(16.8038)
	CNo	**-0.0062** **	(0.0028)	**-0.0123*** **	(0.0042)
β_2	*COVL*	0.0247	(0.1043)	0.0535	(1.2145)
	VERT	2.6868	(9.4273)	24.7534	(16.4417)
	VERTHOR	-0.0024	(0.4154)	-0.4720	(2.3263)
	_cons	**169.5413*** **	(7.9553)	**141.2216*** **	(19.8852)

Asterisks show significance levels at 0.1 (*), 0.05 (**), and 0.01 (***)
The parameters follow the same denotation as introduced in equation (3).

The probability of phase II procedures: The co-efficiency of saving expectations is significant and negative for both distribution functions. This provides evidence that mergers with higher saving expectations are less likely to offer remedies in phase II (as opposed to offering them in phase I) and that these remedies are more likely to be accepted in phase I. Efficiency defence applications from the merging parties significantly increase the probability that remedies are only going to be offered (by around 62 per cent) and accepted (by around 60 per cent) in phase II. The probability of the remedy being offered and accepted in phase II decreases with experience (as the case number increases by 1000 cases, the probability of phase II investigation decreases by around 6.5 per cent[47] at a decreasing rate for both remedy offers and acceptance). Finally, there is evidence that the number of

[47] Taking all the other variables as constant at their mean value.

concerned horizontal overlaps increase – although very weakly – the probability of phase II remedy offers (every additional concerned overlap increases the probability of phase II by around 0.5 per cent[48]), but does not affect the probability of remedy acceptance being either in phase I or II. Vertical effects alone do not affect the probability of phase II procedures but there is evidence that when vertical and horizontal effects are jointly present, the probability of phase II procedures and phase II remedy offers increases.

The shape parameters: The shape parameters show a similar pattern as in Table 3, i.e. the distribution of remedy offers is more disperse than that of remedy acceptance, which is not surprising as remedies can be offered at any time during the procedure, whereas the final decision is always brought near the legal deadline.

The scale parameters: There is evidence that saving expectations affect the phase I scale parameters negatively. This means that *within* phase I cases more efficient mergers are characterised by earlier remedy offers and remedy acceptance. Similar effects were not found for phase II cases. This suggests that phase mergers with saving expectations try not to delay phase I investigations and to avoid a phase to procedure but once the phase II procedure has started, delay (which becomes inevitable anyway) does not matter for them. Evidence shows that efficiency defence delays the closure of the case, but does not affect the timing of remedy offers. The case number variable has a negative and significant (except in phase I remedy offers) effect, providing evidence that the more experienced the parties and the Commission become, the earlier they offer (and accept) remedies.[49]

To sum it up, there is evidence that saving expectations and the fact whether merging parties apply for efficiency defence significantly affect the timing of remedy offers and remedy acceptance (final decision). The experience of the merging parties and that of the Commission also seems to have an effect on

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48 Taking all the other variables as constant at their mean value.

49 For a merger with efficiency expectations VAL=0.06, with 7 horizontal concerned overlaps, and no vertical effects, with every 1000 case number increase, phase I cases will be accepted by 2 days earlier, and the same case number increase induces the length of phase II procedures to decrease by 8 days on average. For the same merger, an increase of 1000 in case number, results in earlier remedy offers by 15 days on average.

both distributions. On the other hand there is no evidence that the size of the transaction (measured by *PA*) affects whether remedies are offered and accepted in phase I or phase II, or that it has an effect on the timing of these two events within each of the procedural phases. Finally the number of concerned overlaps in horizontal cases was only found to have a weak effect on the probability of remedies being offered in phase II. The next section will look at the ratio of $F(t, X)$ and $G(t-10, X)$ to see how the estimated probability of remedy offers being successful changes for mergers with different characteristics.

5.2 The probability of remedy offers being successful

The probability of remedy offers being successful is computed from Equation (1), $R^C(x,t) = \frac{F(t, X)}{G(t-10, X)}$, using the parameters acquired above. By changing the values of the independent variables the parameter estimates change as well. By plugging the estimates into the distribution functions the ratio in Equation (1) can be computed. This allows the comparison of the probability of remedy offers being successful for different values of the independent variables. By holding all other variables constant, the focus will be on the effect of changing the values for one variable at a time. The resulting probability curves will be compared visually (by plotting them against time), and formally (using a pairwise Mann-Whitney U test).[50]

5.2.1 Saving expectations

Evidence was presented above that with saving expectations the probability of phase I remedy offers increases, and even within phase I, companies that expect more savings are more likely to make their offers earlier. I also showed that more cost saving expectations result in a higher probability of, and earlier

[50] The Mann-Whitney U test – unlike the parametric t-test – makes no assumptions about the distribution of the data. This means that it is often used as an alternative to the t-test, when the assumption of normality or equality of variance is not met.

phase I approvals. As a first step Figure 3 plots $\frac{F(t,X)}{G(t-10,X)}$ against time *t* for four merger cases with different levels of pre-merger cost saving expectations. *VAL* = 0 refers to mergers without saving expectations, and *VAL* = 0.6 is a merger with high saving expectations.[51] All the other covariates were set to their average values.

Figure 3: The probability of remedy offers being successful (by VAL)

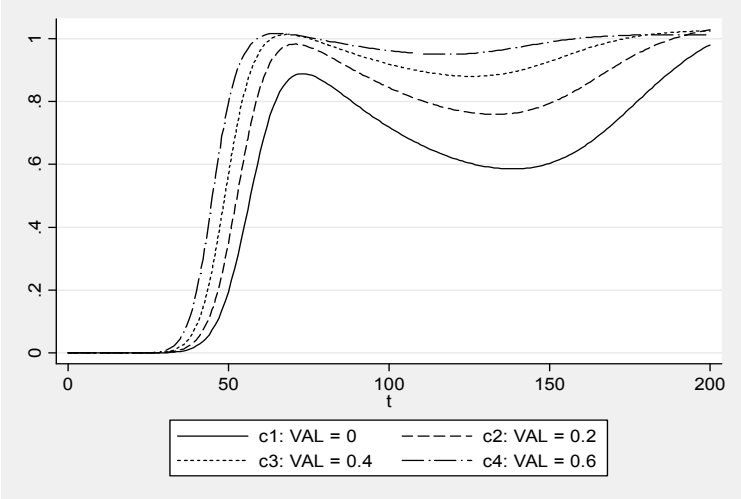

Figure 3 visually confirms the expectation that pre-merger saving expectations increase the likelihood of remedy offers being successful. To test the difference, a Mann-Whitney U test was used (as the normality assumption was rejected). As the test only allows a pairwise comparison, the test compares mergers without saving expectations with mergers where $VAL = 0.2$, then moves on to comparing $VAL = 0.2$ with $VAL = 0.4$, and so on.[52]

Null hypothesis	$H_1: c2 > c1$	$H_1: c3 > c2$	$H_1: c4 > c3$
Mann-Whitney U test (*z*-score)	5.708	4.791	3.498
Critical value at 0.05 level is 1.64[53]			

The test results provide formal evidence that as we increase the value of *VAL*, the calculated probabilities also significantly increase. This is a very important finding as it shows that whenever saving expectations are high, merging

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51 Excluding outliers (VAL_{max} = 0.82).

52 Logically, if we find evidence that $c1 \geq c0$, and $c2 \geq c1$, then we do not need to test if $c2 \geq c0$.

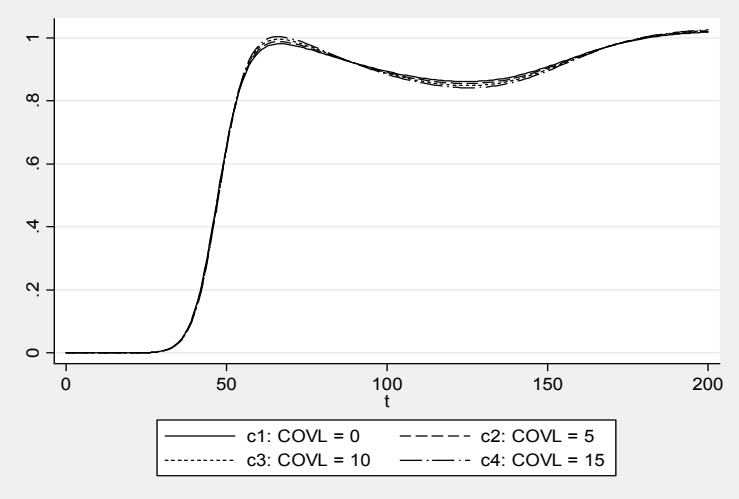
53 For a one-tail test.

parties are more likely to go for a larger remedy offer (at least relatively larger) that has a higher chance of passing the reservation level, as opposed to offering something small at the outset and gradually increasing their offer.

5.2.2 The number of concerned overlaps

The number of horizontal overlaps was shown to have only a weak effect on the estimated distribution curves, which means that the effect on the ratio of these distribution curves (i.e. the effect on the probability of remedy offers being successful) is also expected to be weak. Figure 4 plots the probability of successful remedy offers for four merger cases with different numbers of concerned horizontal overlaps (0, 5, 10, and 15 overlaps[54]).[55]

Figure 4: The probability of remedy offers being successful (by COVL)



The plot reveals that the difference between the compared samples is rather small, which is confirmed by formal testing below:

Null hypothesis	$H_1: c1 \neq c2$	$H_1: c1 \neq c3$	$H_1: c1 \neq c4$
Mann-Whitney U test (*z*-score)	0.206	0.305	0.367
Critical value at 0.05 level is 1.96			

The results show that even a merger with 15 concerned overlaps is not significantly less likely to make a successful remedy offer (the difference

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54 The values were chosen knowing that the mean number of overlaps, after removing the outlier observations (based on a Grubbs outlier test), is 4.5 markets.

55 All the other covariates were set as constant at their average values.

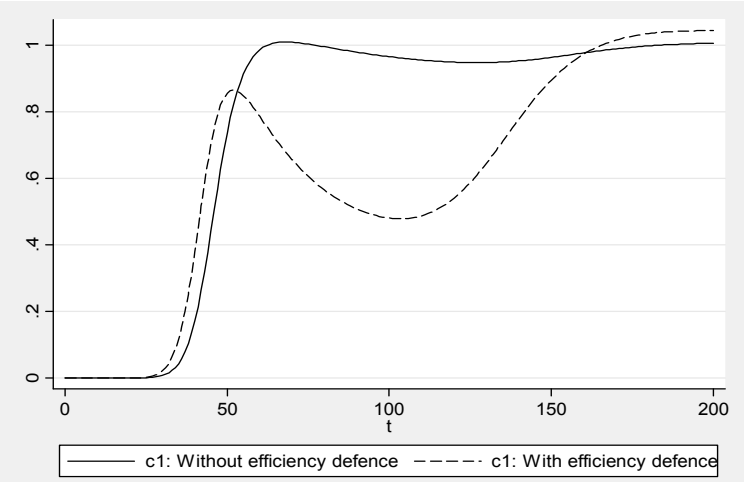
would only be significant at the 0.1 level) than a merger with no concerned overlaps. This is a very important finding as it means that once we control for factors such as saving expectations, the size of the transaction, or the parties' experience, there is no evidence that the number of horizontal overlaps would affect the probability of the success of remedy offers.

5.2.3 Efficiency defence

Merging parties can decide whether they reveal their efficiency expectations to the Commission. Evidence was provided above that the higher the expectations about merger-generated savings, the more likely it becomes that they offer a remedy that will be accepted by the Commission. This section looks at the probability of successful remedy offers once the merging parties decided to reveal their efficiency related evidence to the Commission.

Figure 5 plots[56] the probability of successful remedy offers for cases with and without efficiency defence applications.[57]

Figure 5: The probability of remedy offers being successful (by ED)



[56] Keeping the other covariates as constant at their mean value.

[57] The reason for the probability curves at some places entering the region above 1 is related to the fact that they happen around the two peaks, i.e. where the underlying two distribution curves have their tails in both modes. Estimating the exact shape of the tails is very difficult as only a few observations are available in these regions. This inaccuracy may result in the estimated ratio of the two distribution curves exceeding 1.

The curves show that once merging parties reveal their efficiency expectations to the Commission, they are less likely to make successful remedy offers. Further evidence is provided from a formal test:

Null hypothesis	$H_1 : c1 > c2$
Mann-Whitney U test (*z*-score)	6.661
Critical value at 0.05 level is 1.64	

Assuming that parties follow the Commission's practice[58] they must be aware of the fact the efficiency defence is likely to result in phase II investigations. Once they decide to engage in efficiency defence, they are in no hurry to offer an early remedy unless they want the Commission to ignore the efficiency claims and approve the merger solely based on the remedy offers.[59]

5.2.3.1 Learning curve or reporting bias?

By monitoring the patterns that the Commission follows, firms (and their legal advisors) become more and more experienced in how to behave during EC merger investigations. In the context of remedy offers it means that as companies become more familiar with the concept of offering commitments, the likelihood of successful remedy offers might change. Therefore, by controlling the numbering of the case I was expecting the model to pick up the learning process over time.

The estimated parameters in Table 4 have provided evidence that with an increase in the case number,[60] remedies are offered earlier and they are accepted earlier as well.

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58 See for example: paragraph 62, Case No IV/M.4057 - Korsne/Assidomd Cartonboard

59 Ormosi (2009b) discusses this phenomenon in more details.

60 All the other covariates were set to their average values, with *VAL* = 0.06, *COVL* = 7, *VERT* = 0, *COOR* = 0, *PA* = 7800

Figure 6: The probability of remedy offers being successful (by case number)

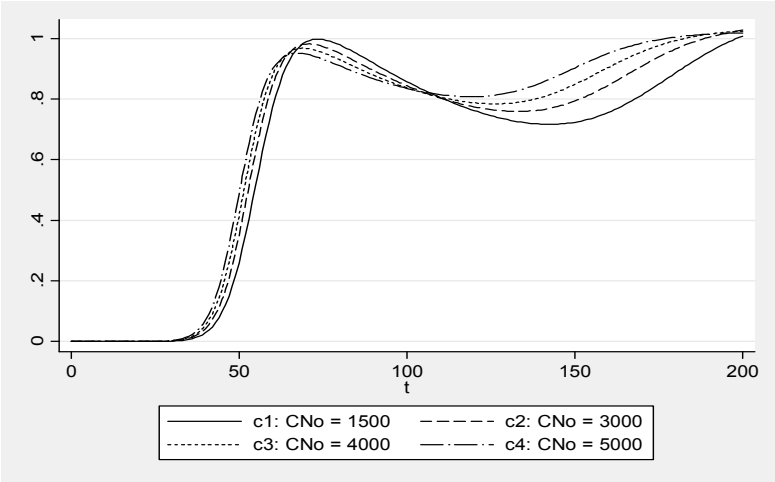

Figure 6 plots the examined probability curves for four cases with different case numbers, increasing from 1500 to 5000.[61] The plots do not clearly reveal what happens with the increase in case number so a formal test is needed before any sort of conclusions can be drawn. The probability curves corresponding to an increasing case number are compared to the curve corresponding to one of the first cases in the sample (*CNo* = 1500).

Null hypothesis	$H_1 : c2 > c1$	$H_1 : c3 > c1$	$H_1 : c4 > c1$
Mann-Whitney U test (*z*-score)	1.936	2.853	3.656
Critical value at 0.05 level is 1.64			

The test results suggest that the difference in the probability curves becomes more significant as case number increases. This means that for more recent cases there is a larger proportion of remedy offers that are above the reservation level, i.e. all else being equal, the area to the left of $\bar{x}$ under the density curve of potential remedy offers is larger under less recent cases. This may be caused by the fact that the merging parties are becoming better at assessing what the Commission's reservation level of the remedy is.[62]

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61 The smallest case number in the sample is 1313, the largest is 5384.

62 This result about experience is only a preliminary approximation. In future work to actually measure experience I am planning to introduce dummy variables to measure the effect of the publication of landmark decisions, or other events.

5.3 Interpretation of the results

The evidence presented above showed that remedy offers are more likely to be accepted in cases where the merging parties expect their mergers to generate cost savings. This may happen because the Commission is more lenient with efficiency enhancing mergers.[63] However looking at the Commission's case reports, we cannot find evidence to support this theory. Ormosi (2009b) examines the Commission's practice with regards the relationship between efficiency defence and remedy offers, and finds no evidence that remedies are tailored against the scope of efficiency gains (even when parties reveal their efficiency related evidence). This explanation is therefore rejected.

Another – and probably more feasible – explanation would be that mergers, which generate significant cost savings can lose more with a delayed integration,[64] partly because the expected savings can only be materialised at a later stage, and also because a delay always jeopardises the success of the merger and the resulting savings. For this reason mergers with more saving expectations will be more delay-averse and thus will be inclined to offer larger remedies to improve their chances in the approval process. The Lufthansa/Swiss merger in Box 2 provides a fine example for mergers of this type.

Box 2 The Lufthansa/Swiss merger

The parties to the *Lufthansa*/*Swiss* merger[65] had been expecting a large amount of savings to be realised through the integration of the two companies. Synergies were expected for example from cooperation in network management, from the optimisation of neighbour traffic and mini-hubs, from harmonising flight schedules, from the merging of check-ins and lounges at airports, from the synchronisation of IT systems, and from the joint selling.[66]

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63 See Chopard, et al. (2008)

64 Chanmugam, et al. (2005)

65 Case No COMP/M.3770 – Lufthansa / Swiss

66 Lufthansa, Annual Report 2006, available at: http://konzern.lufthansa.com/en/downloads/presse/downloads/publikationen/lh_gb_2006.pdf.

67 But post-merger turned out to be a lot higher.

The total annual value of these synergies was expected to be over EUR 160 million.[67] Lufthansa notified the transaction within 8 weeks of its announcement. Remedies were offered at an early stage and they were sufficient to eliminate the competition problems caused by the merger, therefore the remedy was accepted and the merger approved in phase I. Absent the remedies the merger would have raised serious doubts concerning 12 intra-European routes, and 7 inter-continental routes.

This signals an important message to policymakers. To avoid delay, more urgent mergers (mergers with higher saving expectations) are more likely to offer remedies that are overly large, causing a type I error in the Commission's work. There are many reasons why a company might decide to engage in seemingly excessive commitments – even if their merger would create significant efficiencies – in order to obtain authorisation to a merger. Current literature suggests that this entrepreneurial decision stems from the profit-maximising goals of market agents, and companies are able to come up with a rational decision in order to fulfil this ultimate goal. Merging parties are therefore rationally acting market agents opting for a decision that maximises their profits. Based on this logic, an extensive remedy will always have a rational motivation, such as avoiding the costs of a lengthy litigation, avoiding delays from a prolonged procedure, or even to eliminate some industry capacity.[68]

We can also see why this would also be supported by competitors. An efficiency enhancing merger will give a comparative advantage to merging parties against their competitors. Remedies on the other hand are – by their nature of reorganising industry structure – capable of decreasing the level of competition in a given market,[69] which can benefit the merging parties and

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68 The prospect of eliminating some capacity can also be an incentive for the merging companies to offer divestitures – even if adverse to efficiencies. An interesting model from Farrell (2003) suggests that during the divestiture process the divested assets can be crippled and in most cases the buying company will be perfectly happy with it, for the simple fact that they also have an interest in internalising a merger's anticompetitive effect.

The other effect of the capacity reduction is a consequent increase in the price of capacities in the given market, as discussed by Gale, et al. (2001). Is it good or bad? If the merger was a pre-emptive one then it gives the merging companies a little comparative advantage given that other capacities in the market will be more expensive to take over

69 See for example: Farrell (2003).

their competitors likewise. It is not difficult to guess which solution competitors would prefer when the Commission runs the so called market testing of a remedy commitment.

For a long time, regulatory attitude towards overly harsh remedies was that if the merging parties are willing to offer larger remedies then the regulator should not worry about it. There are three dangers with this approach:

1. Experience where remedies are weighed against efficiencies shows that the former can easily impede the latter.[70] This results in type I errors (by giving up some of the efficiency gains) to the advantage of avoiding type II errors. The real threat of this approach is that due to type I errors, efficiencies will be lost through the remedy (mostly as an effect of divestitures). There is also evidence that in the case of over-fixing divestitures will increase rival firms' profitability as well.[71]

2. Efficiencies and potential efficiency gains are very important in industries that had previously been regulated state monopolies, often operating in a very inefficient way. Dynamic efficiencies play a central role in this as technological progress, as a result of innovation, can sweep out regulation from industries that are currently characterised as natural monopolies. One of the most important factors in liberalised markets is enhancing efficiency (both at endogenous and consumer level). Foregoing potential efficiency gains in these markets by sub-optimally designed merger remedies can have a very harmful effect in the long-run.

3. Such an approach can create disincentives against revealing efficiency gains – if any. This will question the whole meaning of the merger and that of merger control. Companies merge to boost their profits by increasing market power or by achieving synergies. If they do not reveal

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70 See the *Group 4* merger cited below.

71 Duso, et al. (2006, p.25)

the latter then the competition regulator might ask the question – what legitimate reason does the merger serve?[72]

Another finding of this paper was that if the parties decide to reveal their efficiency expectations to the Commission, then the probability of less successful remedy offers increases. Probably the most intuitive explanation would be that once the parties decide to reveal efficiency related evidence to the Commission, they will want to design their remedy offers accordingly, taking these efficiency gains into account. This results in smaller remedy offers. However, the Commission's practice shows that remedies are not weighted against efficiency gains, therefore the smaller remedy offers will be rejected, and thus the parties will have to make larger subsequent offers.

It was also shown that once other factors are controlled for, the number of horizontal overlaps does not have an effect on the same probability. This evidence confirms that the success of remedy offers is to a large extent at the merging parties' discretion. Even in mergers that result in a large number of overlaps with competition concerns, merging parties can offer a successful remedy early in the procedure, if other factors (such as delay-averseness, or more experience) inspire them do so.

Assuming that the chronological numbering of merger decisions is a good proxy of the familiarity of firms with the way the Commission decides in the individual cases, then the presented evidence suggests that experience helps in offering more successful remedies. It is fair to assume that firms and their legal advisors carefully examine the Commission's case law before they notify their merger. The more extensive the case law, the more information the parties will possess about how to design their remedy offer in order to gain approval without any delay.

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[72] Although not illegitimate, but other merger motifs, such as pre-emptive motivations, or enlarging the product portfolio are very dubiously good for the society.

6. Conclusion

The size (and the corresponding probability of success) of remedies offered by the merging parties has not been subject to much academic work, let alone empirical research. In this paper I examined various factors, such as the size of the merger, the complexity of the case, and pre-merger saving expectations in order to identify the determinants of the relative size of merger remedy offers.

Evidence was found that the more efficient the parties believe their merger will be, the higher the likelihood of a remedy offer that is accepted by the Commission, whereas efficiency claims revealed to the Commission reduce the probability of successful remedy offers. The finding on the effect of experience suggested that companies are becoming better at assessing what the Commission's reservation level of remedy is. Circumstances such as the complexity of the case have little effect on the probability of remedy offers being accepted by the Commission.

By showing how efficiency expectations (and the resulting delay-averseness) increase the level of remedy offers we have drawn attention to two potential policy problems:

1. Parties, where delay matters more, are more prone to offering too much, which – if the Commission accepts it – can result in over-fixing the problem. This should be kept in mind for authorities that are keen on avoiding type I errors in merger control.

2. If remedy offers and efficiency defence are looked at as two means of reaching regulatory approval, then it might be the case that for more efficient mergers – that offer larger remedies – will be less prone to reveal their efficiency expectations if a satisfactory remedy is offered anyway.

Appendix I

Summary statistics of the analysed variables

variable	description	N	mean	std.dev.	min	max	p5	p50	p95
Event spell variables									
NLENGTH	Number of working days between notification and final decision	198	79.21	59.46	25	337	34	40.5	178
NREM	Number of working days between notification and remedy offer	302	59.50	52.66	0	325	14	34	155
PHASE	1 if merger was investigated in a phase II procedure	198	0.31	0.46	0	1	0	0	1
Efficiency in the case report and pre-merger expextations		**N**	**mean**	**std.dev.**	**min**	**max**	**p5**	**p50**	**p95**
ED	1 if the efficiency claim came from the parties	198	0.05	0.21	0	1			
PV	Present value of the cost saving expectations (deflated)	198	595	1470	0	11914	0	69	2718
CSdum	1 if there are published cost saving expectations	198	0.53	0.50	0	1	0	1	1
VAL	PV/PA	168	0.10	0.23	0	2.09	0.00	0.01	0.40
Date of decision		**N**	**mean**	**std.dev.**	**min**	**max**	**p5**	**p50**	**p95**
ECMR	1 if the case was under the new ECMR	198	0.41	0.49	0	1			
CNo	4-digit number in EC case number	198	3095	1204	1221	5384	1430	2975	5020
Complexity of case		**N**	**mean**	**std.dev.**	**min**	**max**	**p5**	**p50**	**p95**
COVL	Number of horizontal overlaps with competition concerns	198	6.68	11.73	0	117	0	3	32
COOR	1 if merger has anticompetitive coordinated effects	198	0.15	0.35	0	1	0	0	1
VERT	1 if merger has anticompetitive vertical effects	198	0.21	0.41	0	1	0	0	1
VERTHOR	Interaction term: VERT*COVL (mergers with vertical and horizontal effects)	198	1.17	4.30	0	41	0	0	6.68
COORHOR	Interaction term: COOR*COVL (mergers with coordinated and horizontal effects)	198	0.99	4.40	0	32	0	0	6
Size of the merger		**N**	**mean**	**std.dev.**	**min**	**max**	**p5**	**p50**	**p95**
TOVER	Aggregate world-wide turnover (deflated)	108	35293	48475.4	2503	308875	3994	19586	111100
PA	Price of the acquired assets (deflated)	178	9350	21420	112	159132	240	2027	46580

Appendix II

Estimating the effects of the covariates on $F(t, X)$ and $G(t, X)$

		$F(t, X)$		$G(t, X)$	
parameter	variable	model1	model2	model1	model2
	VAL	**-3.8182*** **	**-3.3497*** **	**-3.3672*** **	**-3.2264*** **
		(1.2049)	(1.2393)	(0.9530)	(0.9434)
	ED	**1.7935** **	**1.7403** **	**2.3643*** **	**2.2928*** **
		(0.7216)	(0.6979)	(0.5993)	(0.6104)
	CNo	**-0.0002*** **	**-0.0002*** **	**-0.0003*** **	**-0.0003*** **
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
	COVL	**0.0134** **	0.0091	**0.0151** **	**0.0148** **
		(0.0084)	(0.0089)	(0.0060)	(0.0058)
	VERT	0.0935	0.0680	0.0085	-0.0124
ρ		(0.3193)	(0.3167)	(0.3006)	(0.2991)
	VERTHOR	**0.0544** *	0.0508	**0.1682** **	**0.1675** **
		(0.0304)	(0.0331)	(0.0729)	(0.0717)
	COOR	0.5129		0.2903	
		(0.3837)		(0.3833)	
	COORTHOR	-0.0443		-0.0050	
		(0.0393)		(0.0233)	
	PAf	0.0000		0.0000	
		(0.0000)		(0.0000)	
	_cons	0.1415	0.1473	0.3779	**0.3777** **
		(0.3448)	(0.3141)	(0.3051)	(0.2879)
α_1		**8.7843*** **	**8.6386*** **	**3.1793*** **	**3.1476*** **
		(1.4251)	(1.3760)	(0.3694)	(0.3588)
	VAL	**-7.7361** *	**-9.6068** **	-12.1486	**-14.0486** *
		(4.4581)	(4.6917)	(9.0521)	(8.3094)
	ED	**-4.3084** *	**-3.2633*** **	-9.5397	-13.2531
		(2.3634)	(0.6578)	(28.8320)	(28.1197)
	CNo	**-0.0015*** **	**-0.0015*** **	0.0000	-0.0001
		(0.0005)	(0.0006)	(0.0009)	(0.0009)
	COVL	-0.0250	0.0474	0.0684	0.0973
		(0.0728)	(0.0591)	(0.1316)	(0.1248)
	VERT	3.2788	3.2060	5.3968	5.6557
β_1		(2.3236)	(2.3454)	(4.2779)	(4.3297)
	VERTHOR	**-0.6330*** **	**-0.4419** **	-0.1062	-0.2487
		(0.2142)	(0.1925)	(1.4867)	(1.5263)
	COOR	**-3.1922*** **		-3.6333	
		(1.0279)		(2.9891)	
	COORTHOR	**0.4030*** **		0.4428	
		(0.1337)		(0.3288)	
	PA	0.0000		-0.0001	
		(0.0001)		(0.0001)	
	_cons	**44.1474*** **	**44.0108*** **	26.6988	**26.3193*** **
		(2.4809)	(2.4534)	(3.6180)	(3.8207)

		$F(t,X)$		$G(t,X)$	
parameter	variable	model1	model2	model1	model2
α_2		**10.3120*** **	**10.1985*** **	**2.8782*** **	**2.8735*** **
		(1.7511)	(1.7042)	(0.5248)	(0.5175)
	VAL	1.2655	0.2665	-59.5504	-62.7618
		(35.4917)	(34.8993)	(86.1487)	(83.4798)
	ED	**-17.8817*** **	**-18.7279*** **	-9.8278	-8.9896
		(6.9474)	**(6.2645)**	(15.9611)	(16.8038)
	CNo	**-0.0065** **	**-0.0062** **	**-0.0117*** **	**-0.0123*** **
		(0.0033)	(0.0028)	(0.0043)	(0.0042)
	COVL	0.0406	0.0247	-0.0648	0.0535
		(0.0955)	(0.1043)	(1.6550)	(1.2145)
	VERT	3.5015	2.6868	24.8769	24.7534
β_2		(9.7397)	(9.4273)	(16.7298)	(16.4417)
	VERTHOR	-0.1193	-0.0024	-0.4462	-0.4720
		(0.4397)	(0.4154)	(2.5682)	(2.3263)
	COOR	-5.4749		-17.0220	
		(10.7576)		(19.7763)	
	COORTHOR	-0.2912		0.9854	
		(0.3050)		(1.7803)	
	PAf	0.0001		0.0001	
		(0.0001)		(0.0002)	
	_cons	**170.4135*** **	**169.5413*** **	**140.1189*** **	**141.2216*** **
		(10.3195)	(7.9553)	(21.5216)	(19.8852)

7. References

BALTO, D., and J. MONGOVEN (2001): "Deregulation and Merger Enforcement in the Natural Gas Industry," *Antitrust Law Journal*, 69, 527-568.

BOOZ ALLEN & HAMILTON (2004): "Merger Integration: Delivering on the Promise," *A Series of Viewpoints on Mergers, Acquisitions, and Integration*(downloaded from: http://www.boozallen.com/media/file/76776.pdf).

BOUGETTE, P., and S. TUROLLA (2006): "Merger Remedies at the European Commission: A Multinomial Logit Analysis," *Available at: http://mpra.ub.uni-muenchen.de/2461/*.

CADMAN, R., and P. TWOMEY (2006): "The Regulation of Telecommunications Industries in Small Economies," Strategy and Policy Consultants Network Ltd, 1-38.

CHANG, P. C. (1988): "A Measure of the Synergy in Mergers under a Competitive Market for Corporate Control " *Atlantic Economic Journal*, 16 (2), 59-62.

CHANMUGAM, R., W. SHILL, D. MANN, K. FICERY, and B. PURSCHE (2005): "The Intelligent Clean Room: Ensuring Value Capture in Mergers and Acquisitions," *Journal of Business Strategy*, 26 (3), 43-49.

CHOPARD, B., T. CORTADE, and A. COSNITA (2008): "Settlement in Merger Cases: Remedies and Litigation," *Available at:*.

DAVIES, S., and B. LYONS (2007): *Mergers and Merger Remedies in the Eu: Assessing the Consequences for Competition*. Edward Elgar Publishing.

DAVIES, S. W., and M. OLCZAK (2008): "Assessing the Efficacy of Structural Merger Remedies: Choosing between Theories of Harm? ," *ESRC Centre for Competition Policy Working Paper No. 08-28. Available at SSRN: http://ssrn.com/abstract=1259853*.

DUSO, T., K. GUGLER, and B. YURTOGLU (2006): "How Effective Is European Merger Control," *GESY Discussion Paper*, 153.

FARRELL, J. (2003): "Negotiation and Merger Remedies: Some Problems," *Competition Policy Center, University of California, Working Paper No. CPC03-41*.

GALE, I., and DANIEL P. O'BRIEN (2001): "The Antitrust Implications of Capacity Reallocation by a Dominant Firm," *The Journal of Industrial Economics*, XLIX (2), 137-160.

GUGLER, K., D. C. MUELLER, B. B. YURTOGLU, and C. ZULEHNER (2003): "The Effects of Mergers: An International Comparison," *International Journal of Industrial Organization*, 21, 625-653.

LÉVÊQUE, F. (2006): "Antitrust Enforcement in the Electricity and Gas Industries: Problems and Solutions for the Eu," *The Electricity Journal*, 19 (5), 27-34.

LÉVÊQUE, F., and H. SHELANSKI (2003): *Merger Remedies in Us and Eu Competition Law*. Edward Elgar Publishers.

LYONS, B., and A. MEDVEDEV (2007): "Bargaining over Remedies in Merger Regulation," *CCP Working Paper Series, 07-03*.

MOTTA, M., M. POLO, and H. VASCONSELOS (2002): "Merger Remedies in the European Union: An Overview," (Paper presented at the Symposium on “Guidelines for Merger Remedies – Prospects and Principles”, Ecole des Mines, Paris, January 17-18, 2002).

NEYLAN, S. C. D. (2002): "Quantification and Design of Merger Remedies under the Competition Act," Ottawa, 3-4 October 3-4 2002

ORMOSI, P. L. (2009a): "Are All Mergers Equally Delay-Averse? An Empirical Analysis of Procedural Delay in European Commission Merger Cases (1999-2008)," *CCP Working Paper Series 09-10*, Available at: http://www.uea.ac.uk/polopoly_fs/1.136838!wp09-10_mergers_equally_delay_averse_po.pdf.

— (2009b): "Merger Remedies Versus Efficiency Defence: Does the Current Merger Remedy Practice Create a Disincentive to Reveal Efficiencies?," *CCP Working Paper Series*, Available at: ...

PARKER, R. G., and D. A. BALTO (2000): "The Evolving Approach to Merger Remedies," *Antitrust Report*, 22 (May 2000) (Available at: www.ftc.gov/speeches/other/remedies.shtm).

REY, P. (2003): "Economic Analysis and the Choice of Remedies," *Chapter.8 in Lévêque, F. and H. Shelanski (2003)*.

SELDESLACHTS, J., J. A. CLOUGHERTY, and P. P. BARROS (2007): "Remedy for Now but Prohibit for Tomorrow: The Deterrence Effects of Merger Policy Tools," *WZB, Markets and Political Economy Working Paper No. SPII 2007-02. Available at SSRN: http://ssrn.com/abstract=1009135*.

SHELANSKI, H. A., and J. G. SIDAK (2001): "Antitrust Divestiture in Network Industries," *The University of Chicago Law Review*, 68 (1).

SPRENT, P. (1997): *Data Driven Statistical Methods*. Chapman and Hall.

WERDEN, G. J., L. M. FROEB, and S. T. TSCHANTZ (2005): "Incentive Contracts as Merger Remedies," *Vanderbilt Law and Economics Research Paper* No. 05-27 (Available at SSRN: http://ssrn.com/abstract=824484).