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**European Merger Control: Is there an actual enhancement
of efficiency considerations under the current common
regulatory framework?**

Master dissertation

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Introduction

Since the birth of economics as science, the researchers have argued about the best way to control economic and social variables so as to measure their effects on target variables. In natural sciences, such a challenge is pretty easy because of the chance of controlling the most of variables in laboratory. However, in social sciences (including, obviously, economy) confining the actors of the social phenomenon in a laboratory to make experiments might be costly and unethical. In particular cases, social sciences researchers can figure these difficulties out through quasi-experiment, i.e. taking an event occurring within the social or economic environment and measuring the consequent changes on the target variables.

Such a methodology is really useful to assess the impact of statutory and policy changes on institutions. To some extent every institution can suddenly change the way whereby they interact with the agents, also called users. The institutions are frequently ruled by laws and guidelines whose modifications may affect their actual behavior in different degrees. Therefore, particular changes in legislation are excellent opportunities to find out whether it may alter an agency's behavior and to measure their impact on the decisions issued by these agencies. An adequate example is the enforcement of a legislation ruling the interaction of an agency with their environment, especially its users. For this particular case, the researcher may collect data before and after the enforcement so as to carry out quasi-experimental studies that yield results unknown before the occurrence of legislation modification. However, the results of every enforcement can be properly assessed only after a considerable period.

Moreover, we understand Competition Policy, in a practical sense, as the set of laws and rules that enhances the competition environment towards efficiency in allocation of goods and services and, consequently, controls any action that harms the current level of competition. Beyond its regulation tasks, the competition policy seeks to optimize the total welfare of the society. The optimal welfare is normally related with the reduction of the prices in the market. Such a sight is derived from the perfect competition benchmark where the price equals the marginal cost (Lipczynski, et al., 2005). Obviously, the most of industries are closer to the imperfect competition rather than perfect, then their prices are above the marginal costs. Although it is potentially harmful to achieve a perfect

competition price in every market, competition authorities must avoid a fall of the welfare either through anticompetitive behavior or through a rise of prices brought about by an expansion of market power.

As a part of the responsibilities of every Competition Authority, mergers control presents two faces which must be considered by these agencies. Since, unlike other cases such as Monopolistic and Anti-competitive behavior, a merger does not necessarily inflict harm on the welfare.

The European Merger Control had been accused of mismanaging the efficiency gains within its analysis. If a proposed merger leads to efficiency gains, applicants should claim them as these efficiencies may offset the potential harmful effects brought about by a merger on the market. However, the efficiency defense was indeed not specifically established in the European Legislation before 2004. The inclusion of clear rules and applications forms, as a part of an overall evolution of the European Competition Policy towards an emphasis of the role of economic analysis within its procedures (Röller, 2005), provides an excellent opportunity to assess the effect on applicants' behavior.

This document attempts to reveal how the Commission have been applying the new concerns of the ECMR 2004; specifically, the influence of efficiency gains on the Commission assessment, either as an independent factor or as a factor that offsets the importance of other factors. The theoretical and the statutory perspective make us previously expect a significant influence of efficiency consideration on the decision process, but such expectations should be assessed. For this purpose, the document is organized as follows. Section 1 explains the main issues of the economic theory with respect to the effects of merger on welfare. Section 2 describes the evolution of the European common regulatory merger framework. Section 3 refers the quantitative methodology used to reach our aim. Section 4 is devoted to present and to analyze the outcome of our quantitative approach. Finally conclusive section is drawn.

I. Mergers: An economic approach

The concern of the economic theory is the effects caused by merged firms on the welfare. The extent of such effects relies on the assumptions about the behavior of the participants (also called insiders) and non-participants (also called outsiders) of the concentration, and the structure of the market wherein these firms operate.

Firms are often willing to merge due to the increasing profits brought about by higher prices and lower costs as a result of the merger process. This is justified from both an empirical and theoretical approaches. The former suggests that the wave of merger activity occurred at the beginning of the 20th century suddenly stopped because of anti-trust law enforcement, rather than a lack of new profitable mergers (Perry & Porter, 1985). In other words, if different governments not had enacted an anti-trust legislation, firms would have found new profitable ways to merge. On the other hand, the theoretical approach is linked to the specific firms' motivations to set up a merger (Meder, 2009), i.e. (i) the possibility to increase profits through unilateral actions, (ii) the possibility of coordinated decisions, and (iii) the reduction of costs (also called efficiency gains).

One can observe the implications of both the unilateral and coordinated actions using the Game Theory to analyze the unilateral and pro-collusive effects. The unilateral effect is analyzed after assuming that there is non-cooperative behavior among the firms within the market. On the other hand, the pro-collusive effects arises when the merger enhances favorable conditions for coordinated behavior.

1.1. Unilateral Effects

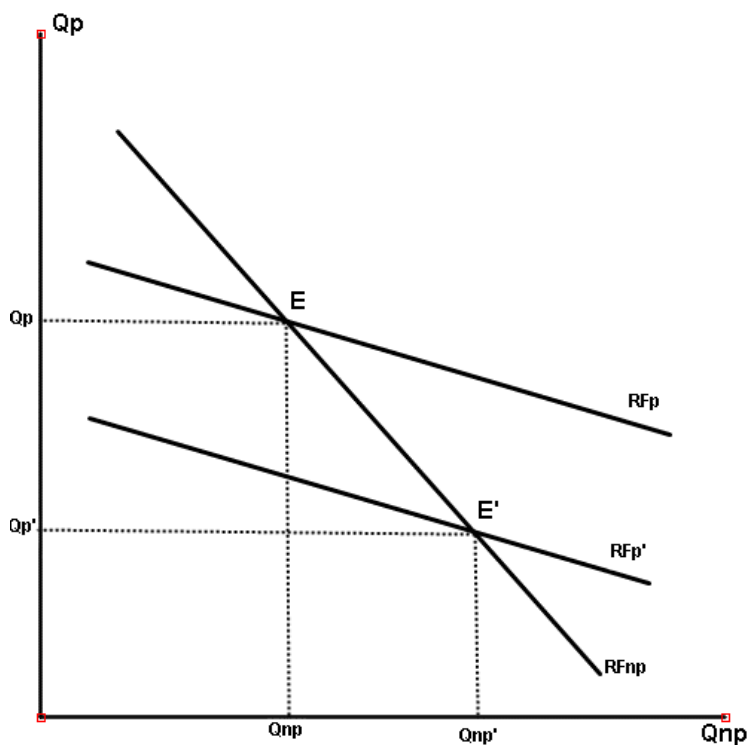
Also called "*non-cooperative effects*" (because of the assumptions under non-cooperative game), the unilateral effects are in rough terms: the effects brought about if the firms (either insider or outsider of a merger) take their decisions independently (without taking into account the simultaneous competitors' actions).

There is a consensus about the oligopolistic models suitable to explain merger's unilateral effects: The Cournot Duopolistic Model (competition by quantities) and Bertrand Duopolistic Model (competition by prices). Beyond the decision instrument of maximization (prices or output), each model is adequate for different markets and

purposes. For instance, the Cournot Model is suitable for markets with goods rather homogenous, whereas the Bertand Model, for differentiated goods (Budzinski & Ruhmer, 2009).

The Cournot approach is also adequate to analyze a merger in which the joint post-merger profits are smaller than the sum of former independent firms (Salant, et al., 1983). The following illustration depicts how a merger brings about this outcome.

FIGURE 1: COURNOT MODEL EQUILIBRIUM FOR MERGERS



Denote by R_{np} the reaction function of non-participants firms. As outsiders do not collude with insiders (a Cournot Model assumption), this schedule remains even if a merger is introduced in the market. Denote R_p the reaction function of participants prior to merger and $R_{p'}$ its post-merger reaction function. Before the merger, the Nash Equilibrium occurs at E (where both participants and non-participants' reaction function intersect). The equilibrium output of each firm respectively reaches Q_{np} and Q_p . On the other hand, the post-merger equilibrium occurs at E' (with Q_p and Q_{np} as output for participants and non-participants, respectively).

To the extent that, the insiders and outsiders' post-merger outputs changes in opposite directions with respect to their former outputs, the joint post-merger profit must be lower than the joint profit before the merger.

On the other hand, things are quite particular if one considers a market for differentiated products. In such a case, the Bertrand Model allows to assess the markets wherein firms competes with prices each other. Under this approach, a merger softs the competition conditions though reducing the number of parties within the market. A market with fewer parties lead to a rise in market power and, therefore, a rise in prices (Motta, 2004).

1.2. Collusive Effects

Applying Game Theory, the effects of mergers can be classified as pro-collusive when the assumption of non-cooperative behavior is lift. These effects appears if the merger enhances favorable conditions for anticompetitive behavior such as collusive agreements.¹ Merger regulation authorities separately treat the pro-collusive effects since its implications are especially particular. In order to distinguish these effects, the merger regulators carry out the analysis of dominance, which plays a fundamental role for the determination of pro-collusive effects.

1.3. Efficiency gains

As being explained above, the non-participants firms may enhance their profits after a merger process. Such a situation may arise if the production of merged firm is lower than the joint production of both former firms, since the non-participants could fill the production gap leaved by the merger, and profit from a higher price and an outcome expansion. Therefore, under some conditions, mergers do not only yield benefits for their participants (Stigler, 1950).

If both the participants and non-participants can simultaneously obtain profits, there is not necessarily a negative relationship between market concentration and welfare. An increasing market concentration can indeed boost the welfare, since mergers can shift the

¹ See Motta (2004, p. 233)

production away from firms with high marginal costs towards those with small marginal costs (Farrell & Shapiro, 1990).

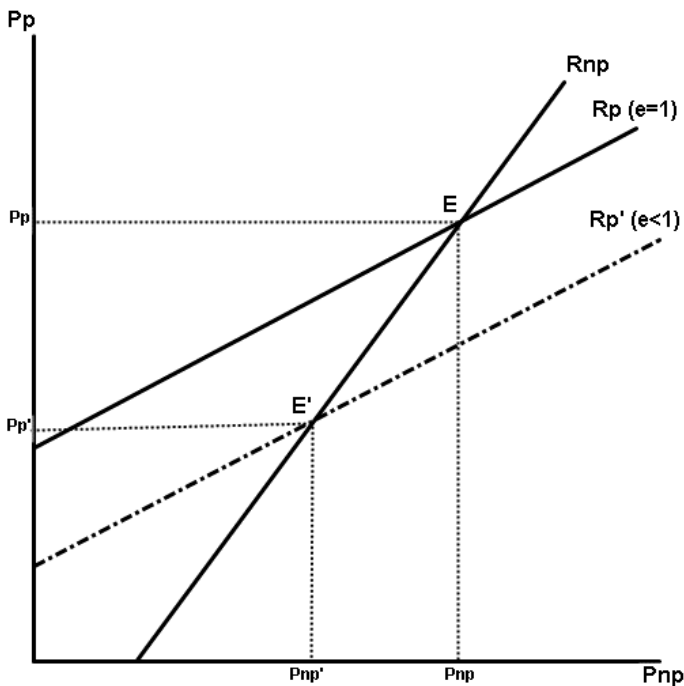
Mergers may to some extent achieve cost savings through operating at a larger scale and scope, synergies in research and development, rationalization of distribution and marketing activities, and savings in administration tasks². Moreover, a successful merger may lead to choose between two possible decisions. The first one is to optimize the profit through the rise of prices, whereas the second one is to boost the profit through decreasing the prices but increasing the outcome. Of course, the second choice provoke a fall in prices that enhances the consumer surplus. Thus, this way is more likely to occur if there are efficiency gains (Motta, 2004).

However, not every cost savings have to make the consumers increase their surplus. Only the variable cost savings can lead to consumer's surplus increase, whereas the fixed cost savings just generate profits rises (Motta, 2004). Denote e and c the cost savings and the marginal cost. A merger allows the new firm to produce at a post-merger marginal cost $e \cdot c$, where the parameter e is less than one and represents the efficiency gains resulting from the merger.

As Figure 1 depicts, the existence of efficiency gains shifts rightwards the reaction function of the insiders, leading to a new equilibrium point (from E to E') in which both the price of the participants and the price of the outsiders are lower than the equilibrium before the merge. Hence, in the presence of efficiency gains (and the consequently reduction of e) the prices fall, then the merger increase consumer's surplus.

² Also called X-efficiency, see Akhavein et al. (1997).

FIGURE 2: EFFECTS OF MERGERS ASSUMING COST SAVINGS ON THE MARKET PRICES



Although one can focus the external effect of a merger on the non-participants and on consumers welfare (Farrell & Shapiro, 1990), we think the approach explained above allow to distinguish harmless mergers ³. Indeed, efficiency gains might overcome the anticompetitive effects brought about by a merger. Thus, the analysis of efficiency gains brought about by mergers is fundamental because of without them there will surely be a reduction of economic welfare. Therefore, ignoring cost savings during either merger control procedure might yield a welfare fall.

II. Evolution of European Merger Regulation

Mergers regulation frequently focuses on the consequences brought about after an enhanced market power in favor to the insiders (Lipczynski, et al., 2005). In addition, the authorities around the world tend to treat independently both the unilateral effect and the collusive effects. For the first merger regulatory frameworks, the analysis of dominance is a useful tool for the assessment of such effects.

³ It is quite easy for a typical merger control procedures to use the efficiency gains as key factor for their assessment.

2.1. The former common merger regulatory framework

The first legal basis regarding the merger control in the European Union was the articles 85 and 86 in the Treaty of Rome, afterwards the articles 81 and 82 of the Treaty of Amsterdam (1997)⁴. Formerly, each member controlled the implications of merger agreements using its national competition legislation.

The progress of the European Economic Integration process and its consequent increase in cross-border activities pushed the enforcement of a common merger regulatory framework (Fernández, et al., 2008). The final result was the enactment of the European Council Merger Regulation of 1989 (hereinafter ECRM1989), amended in 1997⁵.

Beyond the jurisdictional⁶ and procedural issues, there was an economic core within the ECRM1989, i.e. the Market Dominance Test (hereinafter MD Test). As being explained above, a high market concentration may lead to increase prices of goods and services. Either unilateral or coordinated, such rise harms the welfare and it must be limited by Competition Authorities. Hence, by using this first legal framework, the Commission focused its assessment on the factors that may reveal an increasing post-merger market dominance.

Nevertheless, the economic theory foresees that there may be situations brought about by a merger which provokes a decreasing welfare without the presence of a higher post-

⁴ The article 81 of the EC Treaty (ex Article 85) states:

*"1. The following shall be prohibited as incompatible with the common market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as **their object or effect the prevention, restriction or distortion of competition within the common market**, [...]"*(emphasis added)

The article 82 of the EC Treaty (ex Article 86) states:

*"Any abuse by one or more undertakings of **a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market** insofar as it may affect trade between Member States."* (emphasis added)

⁵ Council Regulation (EC) No 1310/97 of 30 June 1997 amending Regulation (EEC) No 4064/89 on the control of concentrations between undertakings.

⁶ Potential conflicts between national and European jurisdiction.

merger market dominance. Such fact may lead a biased assessment because some proposed merger that do not increase the market dominance might be cleared, even if they bring about a fall in welfare.

In addition to these economic implications, the former ECMR faced other three troubles that forced its reform (Berg, 2004):

- The expansion of European Union
- The Reform of the articles 81 and 82 of the Treaty
- The nullification of three decisions by the Court of first Instance of the European Union

During the discussion concerning the new ECMR, The discussion about the choice of the new regulation framework blocked the first stages of negotiations. The challenge was to find an equilibrium point between the MD Test and the “Substantial Lessening of Competition Test”⁷ (hereinafter SLC Test), each test had an important number of supporters within the Council of Ministers (Berg, 2004).

2.2. The enforcement of the Significant Impediment to Effective Competition Test (SIEC Test)

Nowadays the European Commission focuses its assessment on the effects on competition conditions rather than the significant changes on the structure of the market. Under the current merger regulation framework, the Commission must prohibit mergers that “*significantly impede effective competition*”. Actually, this is literally stated in the article 2(3) of ECRM 2004:

“A concentration which would significantly impede effective competition, in the common market or in a substantial part of it, in particular as a result of the creation or strengthening of a dominant position, shall be declared incompatible with the common market.”

Such a mandate significantly differs from the former legislation (ECMR 1989) that emphasized the role of dominant position analysis as the origin of any potential impediment of effective competition. This modification on the regulation thereby makes

⁷ About 2002 – 2004, this test was applied by the American, Australian and British Merger Regulatory Authority. The SLC Test assesses the effects on the market brought about by a merger and on competition among firms rather than the thresholds such as market shares (OECD, 2009).

the dominant position brought about a merger be a particular case of significantly impeding competition.

The SIEC Test thereby extended the scope of the assessment to cases which the post-merger market structure is not likely to yield collusive or coordinated behavior. In other words, the Commission do not need to find profits of pro-collusive effects brought about by a proposed merger.

This framework is able to produce resolution more consistent with the whole scope of decreasing-welfare cases predicted by the economic theory. Therefore, the determination resulting from the SIEC should be quite economic consistent.

In addition to the implications of the current test, there were two others improvements within the ECRM 2004. The first one was the creation of a special unit called Merger Task Force. This unit is responsible to assess every notification that yields a concentration surpassing the threshold determined in the ECRM 2004⁸.

The second improvement was the enforcement of the role of efficiency gains as a factor to take into account to decide whether a merger is allowed or not.

2.3. The Role of Efficiency gains

Concerning the role of efficiency gains within the European Merger Regulation, The Commission was always able to take into account efficiencies under the figure of *“the development of technical and economic progress provided that it is to consumers’*

⁸ The article 1(2 and 3) states:

“2. A concentration has a Community dimension where:

*(a) the combined aggregate worldwide turnover of all the undertakings concerned is **more than EUR 5 000 million**;*
and

*(b) the aggregate Community-wide turnover of each of at least two of the undertakings concerned is **more than EUR 250 million**, unless each of the undertakings concerned achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State.*

3. A concentration that does not meet the thresholds laid down in paragraph 2 has a Community dimension where:

*a) 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**, unless each of the undertakings concerned achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State.” (emphasis added)*

*advantage*⁹. However, as being discussed by Pitofsky (2006), the same article of the same European Regulation indicates that such efficiencies should “*not form an obstacle to competition*”¹⁰, provoking confusion about the way this authority should have addressed them.

It was not until 2004 that The Commission enforced the efficiency gains considerations, detailing them in its *Horizontal Merger Control Guidelines*¹¹. From paragraphs 76 through 77 of these guidelines, the Commission recognizes that the efficiency gains might counteract the potential harm to consumers brought about by a merger. Nevertheless, the Commission only accepts efficiency gains that are compatible with the common market objectives, beneficial for consumers, merger-specific and verifiable.

2.4. Which factors should influence Commission’s decision?

As being seen above, the economic theory explains the mechanisms how a merger may harm the welfare. The Regulatory Authorities must identify some indicators so that they assess the information provided by participants and other Parties. Some indicators may be linked with the economic theory, but other ones may be taken into account by the Commission because of subjective considerations according to the opinion of the Commissioner.

Both market power and the probability of anticompetitive behavior may rise when two firms combines their operations, as the oligopoly models foresees harmful effect on welfare if the number of firms reduces (Motta, 2004). The anticompetitive effects of mergers in homogeneous Cournot oligopolies predominantly depend on current (in contrast to future) market features, with market shares representing a meaningful indicator (Budzinski & Ruhmer, 2009). Therefore, if one focuses on the results derived from oligopolistic model analysis, it is clear why a competition authority would avoid every important increase of concentration brought about by mergers.

⁹ See Article 2(1)(b) of Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings. This article is exactly correlated with the previous regulation “*Council Regulation (EEC) No 4064/89*” that had been in force since 1989.

¹⁰ *Id*

¹¹ See Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004/C 31/03)

Although the economic theory explains that the mergers are potentially harmful since they may rise their market power as consequence of higher post-merger market shares, the presence of efficiency gains as result of a merger might induce positive impacts on the welfare, offsetting the damage brought about the rising market power.

Farrell & Sharprio (1950) show that the effect of a rising market power is likely more harmful when the former market share of each participant is pretty high and when the merger largely increase their post-merger market share.

Moreover, a regulatory authority can independently evaluate the risk of collusive behavior among the remaining firms within the post-merger market. So, the authority must analyze the transparence of information to determine whether the firms would be able to coordinate their decisions.

On the other hand, the rising market share could be temporary. That is why some authorities assess the market access conditions. If the entry barriers are few and weak, one can expect the arrival of new firms. These new firms should neutralize the theoretical effects of a reduction in the number of firms within the market.

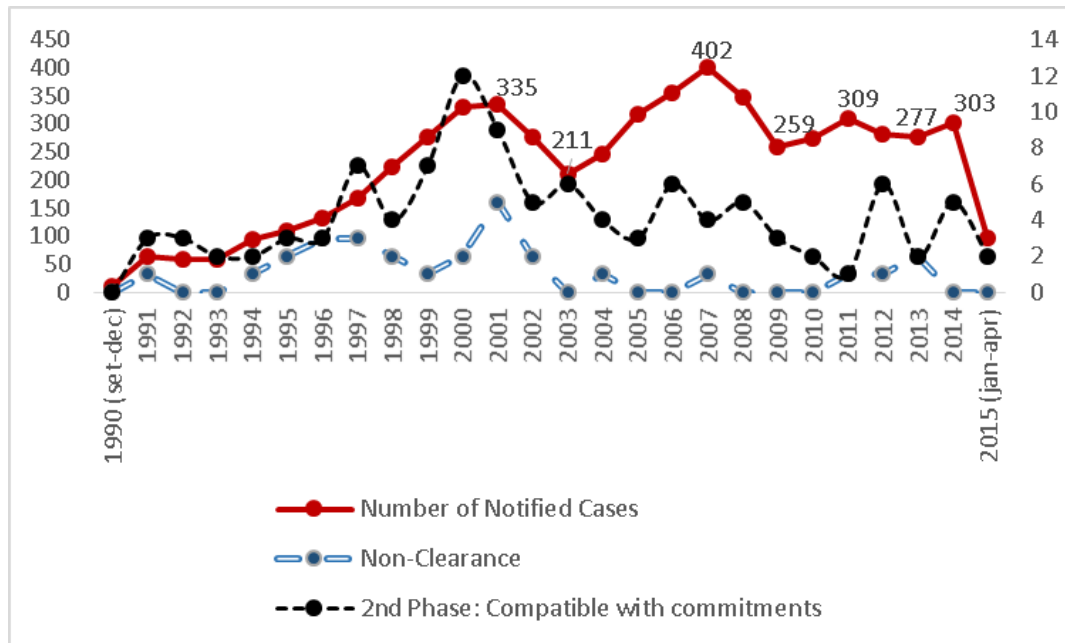
Beyond the assessment of the factors underpinned by the economic theory, several researchers have analyzed another factors to try to find out whether there are political or institutional criteria that influence authorities' decisions. These authors assume that non-economic factors such as the origin of the participants firms or the existence of a huge firm owning an important market position at the worldwide level. Besides, if the agency carries out any internal reorganization because of, for instance, an enforcement of a new legal framework, one should expect a change on the way this institution assesses the cases.

III. Data & Methodology

The beginning of the merger regulation under the common framework dates back to September 1990. Since such a period, the Commission has received 5 822 notifications whose frequency has increased at an average of 6% per year (from 1991 until 2014). Regarding the Legislation applied by the Commission, 2 438 proposed mergers were ruled under the EC Merger Regulation 1989, while 3 457 under the ECMR 2004.

Figure 3 depicts the year-on-year evolution of proposed concentrations (left Y-axis). We also see the evolution of prohibit concentrations and clearances with undertaking (right Y-axis). Until 2003, the number of both the prohibited and the clearance with commitments followed the pace of notifications. However, these three series have exhibited an unclear trend since such a year.

FIGURE 3: EVOLUTION OF PROPOSED MERGER BY TYPE OF FINAL DECISION



Source: European Commission’s website

The correlation among these three series broke off in 2004 when the Commission enforced its merger’s legislation. Besides, the statistics of merger regulation show that the probabilities of both clearance with undertakings and non-clearance decisions have diminished since 2004.

3.1. Dataset construction

As being suggested by Bergman et al. (2006), we will use a choice based sampling which is a nonrandom method suitable for our purpose, as it is suitable when one deals with scarce explained variable. We will thereby ensure an important number of target observations belonging a rare group. Hence, by choosing cases issued as prohibition and clearance with

commitments deliberately¹², there will be enough information to measure the effects of the explanatory variables on each type of Commission’s decision

The sample was built with data available till April 2015. Firstly, we chose a subsample of 16 prohibitions out of its subpopulation of 28 cases. We then drew a second target subsample of 15 conditional clearances out of a total of 109 cases. Afterwards, we included 16 of the 234 phase-2 cases and 22 out of the total population of decisions. In the case of both the prohibitions and conditional clearances decisions, we merely chose two random subsamples from their subpopulation. We applied the same process to obtain the subsample of phase-2 decisions. Finally, we used the method suggested by Bergman et al (2006), drawing 30 random numbers from 1 through 7624 (the highest number assigned to a merger case until April 2015). According to the Commission’s statistics, there are roughly 1802 numbers with non-correspondence to any of the 5822 notified mergers. Finally, we obtained 22 out of 30 numbers corresponding to an actual concentration notification.

We must now take into account the overlapping among the subpopulations used to construct the initial sample. As being showed by the Figure 3, both the population of prohibitions and the population of conditional clearance are a subpopulation of the phases-2 population and this latter, in turn, is a subpopulation of all notified mergers.

TABLE 1: SAMPLING OUTCOME

	Non-clearance	Clearance with commitments	2nd phase	1st phase	Total
Population	28	109	97	5359	5822
Initial sample	16	15	16	22	69
Double sampling			-2		
Reclassification	-1	3	-2		
Gross sample	15	18	12	22	67
Withdrawn, aborted or referred			-3	-3	
Lack of Information	-2	-1	-1	-10	
Net Sample	13	17	8	9	47

¹² As a result, the rare target choice may be over-represented in our sample.

Both Non-clearance and Clearance with commitments are subpopulations of second-phase cases. The samples of Non-clearance and Clearance with commitments were selected before choosing the random sample of cases assessed in the second phase. Therefore, one should expect to deal with a problem of duplication in the number of cases after joining these subsamples. To avoid this problem, we filtered the duplicated cases from the joined sample. Besides, using information from the Commission's Reports¹³, we reclassified three cases previously tagged as Non-clearance and others 2nd phase in Clearance with commitments. Before obtaining a net sample, we must clean withdrawn cases and those which have scarce information for our purpose. The net sample is finally made up by 13 Non-clearance cases, 17 clearance with commitments, 8 others second phase cases and 9 first phases cases; adding up 47 cases that make up the final dataset with which we analyze the factors for merger clearance.

The most of information taken into account by the Commission to assess each proposed concentration is available in its website. We can find in this source the resolutions of the Commission whose extend may differ as the complexity of each case. Such resolutions hold the potential variables to be analyzed using an econometrical model. However, we must deal with both quantitative and qualitative information. Concerning the quantitative information, we expect to be able to take it directly from the resolution. For instance, the market share and the differentiated market share (the current market share with respect to the expected market share after concentration) should be reported as a quotient.

Finally, taking into account that subjective criteria characterize the qualitative variables, we can transform them in dummy variables depending on the way how the Commission described such factors in its resolutions.

3.2. The Ranked Ordered Logit Model

As being mentioned previously, our aim is not to build a model that describes Commission's decision procedure. Our purpose lies in finding a statistical evidence of a hypothetical shift on the weight of the factors taken into account by the Commission, from those that have previously explained how it takes a decision, towards other factors formerly relegated, such as the efficiency gains. We expect that the importance of the

¹³ http://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id=2

factors formerly prioritized by the Commission had lost weight to explain Commission's decisions, due to the encouragement of the ECMR 2004, which favored others factors highlighted on the Significant Impediment of Effective Competition Test (SIEC).

Regarding the Merger Regulation in Europe, the literature refers the weight of factors influencing the probability of allowing a proposed merger. However, the Commission actually allows several cases if they includes some commitments in the merger operation that ensure the competitive conditions compatible with the single market. Hence, we consider the approach used by Avalos & De Hoyos (2008), according to which the authority is able to take several choices (clearance, conditional clearance or prohibition), since this approach are more suitable to the European Commission procedure.

Given the features of Merger Regulation procedures, this 3-choice outcome is properly carried out through a model with limited dependent variable. We thereby expect to determine the decisive factors for the merger regulation procedure. This method is also suitable because the authorities' assessment is not completely observable as it is inherently subjective. On the other hand, one is able to observe the consequence of this assessment, i.e. the final decision.

We define a scalar latent dependent variable y_i (unobservable) as the subjective assessment which determines whether a notified merger will obtain one of the possible final decisions. Let y_i^* be the observable Commission's decision that takes values $k \in \{0, 1, 2\}$, where 0: Clearance, 1: Conditional clearance and 2: Prohibition. And let x_i be the set of criteria or factors taken into account by the Commission.

For N observations and M independent variables, we assume that the scalar latent dependent vector (Y_n) and the independent variables matrix $(X_{n \times m})$ the following linear relationship:

$$Y = X\beta + \epsilon, \quad (1)$$

where β is the constant parameters matrix and ϵ is the random term.

Besides, under the rank ordered model, there are two constants (a_1, a_2) that delimit the thresholds whereby the observable dependent variable reaches each value, as follows:

$$-\infty < y_i^* \leq a_1 \leftrightarrow y_i^* = 0$$

$$\begin{aligned}
a_1 < y_i^* \leq a_2 &\leftrightarrow y_i^* = 1 \\
a_2 < y_i^* < \infty &\leftrightarrow y_i^* = 2
\end{aligned}
\tag{2}$$

For our purpose, we assume that the random term follows a logistic distribution. Therefore, the probability distribution of the observable variable (y_i) is defined by the following equations:

$$\begin{aligned}
\text{Prob}(y_i = 0) &= \frac{1}{1 + e^{\frac{\beta \cdot x_i - a_1}{\mu}}} \\
\text{Prob}(y_i = 1) &= \frac{1}{1 + e^{\frac{\beta \cdot x_i - a_2}{\mu}}} - \frac{1}{1 + e^{\frac{\beta \cdot x_i - a_1}{\mu}}} \\
\text{Prob}(y_i = 2) &= 1 - \frac{1}{1 + e^{\frac{\beta \cdot x_i - a_2}{\mu}}},
\end{aligned}
\tag{3}$$

where μ is the mean of this distribution.

3.3. Variables

As being explained above, the dependent variable takes 3 values (0=clearance, 1=conditional clearance and 2=prohibition). We view the Commission's decision process as an assessment using a set of variables to uncover potential harmful effects on the competition conditions if the merging process ends up. For this document, we choose the variables that showed a significant weight in former researches, including efficiency claim and the enforcement of the ECMR 2004 as dichotomous variables.

For our purpose, we have used the following variables:

Combined Market Shares (CMktShare): After collecting the proofs, the Commission reports the combined post-merger market share that can fluctuates between 0% and 100%.¹⁴ As being suggested by Bergman et al. (2006), we have split this variable into three groups, i.e. [31 – 50], [51 – 75] and [76 – 100]. So, there is three dummy variables that take the value of 1 if the market share lies within each group.¹⁵

¹⁴ For the most of cases, the post-merger market share is object of a confidential claim due to be considered business secret. Therefore, the Commission's publications hide such information using ranges. In these situations, we have taken the upper limit of the range.

¹⁵ Of course, if each dummy variable is zero, the post-merger market share is lower than 30%.

Increase in market share (Dmktshare): This is the difference between the combined post-merger market share and the largest pre-merger market share of the participants.¹⁶

Collusion or coordinated behavior (Collusion): a dummy variable that takes the value of 1 if the Commission finds enough proofs to determine that there is likely collusion or coordinate behavior against the competition conditions in the market.

Merger regulation enforcement in 2004 (ECMR2004): A dummy variable taking the value of 1 if the proposed merger was assessed under the European merger regulation of 2004.

Efficiency claim (Efficiency): this variable takes the value of 1 if the participant affirm that the efficiency gains overcome the negative effects brought about by the merger.

Specific and verifiable (CommissionEfficiency): a dummy variable taking the value of 1 if the Commission finds that the efficiency claim accomplish the requirements specificity and verifiability.

Entry barriers (Barriers): The value of this dummy variable is 1 if the Commission considers that the entry barriers for new entrants are high in the relevant market.

Belonging to the three big European Countries (BigEu): If, at least, one of the participants has its headquarters in one of the biggest European countries (Germany, France and United Kingdom), this dummy variable takes the value of 1.

Belonging to United States or Canada (US/Can): If, at least, one of the participants has its headquarters in either United States or Canada, this dummy variable takes the value of 1.

World leader (Leader): A dummy variable taking the value of 1 if one of the participants is a worldwide leader for the relevant product market.

In some cases, the Commission issues its decision without referring each variable mentioned above. For these variables, we have assumed that its value was quite low, close to zero.

IV. Results

¹⁶ When the Commission has not reported the pre-merger share of each participant, we assumed equal market share for each participant.

4.1. Singles Variables

Firstly, we have evaluated the weight of each variable previously identified using an ordered logit model. The Table 2 depicts the outcome of Model 1 that includes all the previously defined variables, but the variable ECRM 2004. We decided to exclude this variable because the number of non-clearance suddenly fell after 2003 (see Figure 3). This exclusion attempt to avoid biased conclusions, since the trend above mentioned might not be related with any factor to be taken into account by the Commission.

According to these results (Table 2), if a proposed merger bring about a higher market share after finishing the operation, there is a world leader within the merger operation, or there are considerable market barriers; the probability of being either conditioned or prohibited is significantly higher.

With this first model, the efficiencies (either just claimed by the insiders or recognized by the Commission) seems to be neither important nor significant. Nevertheless, the effect of the interaction between them and other variables on the Commission's decision could be significant. Therefore, we are to test such interactions in the following part of this section.

TABLE 2: MODEL 1 – ALL VARIABLES

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
Dmktshare	0.087	0.043	2.014	0.044	**
CMktShare31_50	-1.389	1.541	-0.901	0.367	
CMktShare51_75	0.275	1.664	0.165	0.869	
CMktShare76_100	3.206	1.981	1.618	0.106	
Leader	3.723	1.281	2.908	0.004	***
Collusion	-0.617	1.191	-0.518	0.604	
US_Canada	-0.748	1.123	-0.667	0.505	
BigEU	-0.006	0.794	-0.008	0.994	
Entry_Barriers	4.406	1.346	3.273	0.001	***
Efficiency	0.386	1.254	0.308	0.758	
CommissionEfficiency	-0.151	1.515	-0.01	0.921	
cut1	4.059	1.522	2.668	0.008	***
cut2	7.678	2.003	3.834	0.000	***
Log-likelihood	-24.3	Akaike criterion		74.6	
Schwarz criterion	98.652	Hannan-Quinn		83.651	

Notes: * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level. Number of cases 'correctly predicted' = 36 (76.6%).

The coefficients above estimated have no direct interpretation, since they only measure the effect of the explicative variable on the latent variable (see equation (1)). To find out

the impact of each variable on the probability of clearance with commitments or non-clearance, we estimate the marginal effects which are depicted in the following table:

TABLE 3: MODEL 1 – MARGINAL EFFECTS

	<i>Clearance</i>	<i>Conditioned</i>	<i>Prohibition</i>
Dmktshare	-0.014	0.007	0.007
CMktShare31_50	0.259	-0.16	-0.099
CMktShare51_75	-0.065	0.054	0.011
CMktShare76_100	-0.478	0.122	0.355
Leader	-0.106	-0.615	0.721
Collusion	0.002	0.062	-0.065
US_Canada	0.004	0.106	-0.11
BigEU	0.000	0.001	-0.001
Entry_Barriers	-0.096	-0.658	0.754
Efficiency	-0.000	-0.016	0.016
CommissionEfficiency	0.000	0.005	-0.006

For continuous variables (i.e. the increased post-merger market share), the marginal effect measures the change on the probability of observing an outcome given the infinitesimal change around the mean of each explicative continuous variable whilst the other variables hold fixed in their mean. For discrete variables, it is measured the impact on the probability given a change of the explicative dummy variable from 0 to 1.

For the three significant coefficients on *Dmktshare*, *Leader* and *Entry Barriers*; the marginal effect shows fluctuating values for each outcome. Holding everything else constant, a percentage increase in *Dmktshare* reduces more than 1 percentage points the probability of a merger being cleared, whilst it increases the probability of both being conditioned and being prohibited by less than 1 percentage point.

On the other hand, if there is a world leader participant, the probability of a merger being cleared and conditioned falls more than 10 percentage points and more than 61

percentage points, respectively; whereas the same change in Leader increases the probability of it being prohibited by more than 72 percentage points. Likewise, the presence of important entry barriers reduces the probability of a merger being cleared and being conditioned by 10 and 66 percentage points, respectively. We expect the opposite effect on the probability of it being prohibited (an increase in 75 percentage points).

TABLE 4: MODEL 2 – REDUCED MODEL

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
Dmktshare	0.093	0.037	2.483	0.013	**
CMktShare31_50	-1.719	0.903	-1.904	0.057	*
CMktShare76_100	2.639	1.385	1.906	0.057	*
Leader	3.403	1.13	3.011	0.003	***
Entry_Barriers	4.407	1.17	3.766	0.000	***
cut1	4.01	1.266	3.168	0.002	***
cut2	7.639	1.807	4.228	0.000	***
Log-likelihood	-24.594		Akaike criterion		63.188
Schwarz criterion	76.139		Hannan-Quinn		68.062

Notes: * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level. Number of cases 'correctly predicted' = 37 (78.7%).

The Table 4 depicts the outcome including all significant variables at the 10% level at least. As being explained above, one cannot directly interpret the values of these coefficients (which are not considerable different with respect to those of the Model 1). The Table 5 depicts the marginal effects of this model.

TABLE 5: MODEL 2 – MARGINAL EFFECTS

	<i>Clearance</i>	<i>Conditioned</i>	<i>Prohibition</i>
Dmktshare	-0.015	0.007	0.008
CMktShare31_50	0.326	-0.207	-0.119
CMktShare76_100	-0.501	0.317	0.183
Leader	-0.204	-0.454	0.657
Entry_Barriers	-0.1	-0.66	0.761

For *Dmktshare* and *Entry Barriers*, the marginal effects estimated in Model 1 and Model 2 show similar values. This is not the case for *Leader* whose marginal effect differs in both models. Effectively, for the outcomes *Clearance* and *Prohibition*, the marginal effects on *Leader* are lower; whereas it is higher when the Commission allows the merger with

commitments. Holding everything else constant, if there is a world leader participant, the probability of a merger being cleared and conditioned fall more than 20 percentage points and more than 45 percentage points, respectively; whereas the same change in *Leader* (from 0 to 1) increases the probability of it being prohibited by 66 percentage points.

On the other hand, if the combined post-merger market share lies within the range [31 – 50], the probability of a merger being cleared increases 33 percentage points; whereas lying within [31 – 50] reduces the probability of being conditioned and prohibited by 21 and 12 percentage points, respectively.

4.2. Cross-Variables

Part of the purpose of this document is to measure the influence of efficiency considerations and the enforcement after 2004 on the Commission’s decision. Therefore, we make this variable interact with other variables in order to find out any potential cross effect among them. For instance, if such estimation reveals any significant coefficient, we should assume that the Commission assesses the efficiency considerations to offset the effect of other factors on its decision.

TABLE 6: MODEL 3 – FACTORS INTERACTING WITH EFFICIENCY CLAIMS

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
Dmktshare	0.128	0.036	3.544	0.000	***
Leader	1.771	1.305	1.357	0.175	
Collusion	1.332	1.552	0.858	0.391	
US_Canada	-0.76	1.255	-0.606	0.545	
BigEU	-0.886	0.97	-0.913	0.361	
Entry_Barriers	2.874	1.144	2.512	0.012	**
Dmktshare_eff	-0.012	0.052	-0.223	0.823	
Leader_eff	0.499	2.224	0.224	0.823	
Collusion_eff	-1.833	2.013	-0.911	0.362	
US_Canada_eff	0.936	2.228	0.420	0.674	
BigEU_eff	1.781	1.52	1.171	0.242	
Entry_Barriers~	0.219	1.606	0.137	0.891	
cut1	3.476	1.266	2.746	0.006	***
cut2	6.606	1.586	4.166	0.000	***
Log-likelihood	-27.525		Akaike criterion	83.05	
Schwarz criterion	108.952		Hannan-Quinn	92.797	

Notes: * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level. Number of cases 'correctly predicted' = 36 (76.6%).

According to the results depicted in the Table 6, efficiencies claims seem to have no significant interaction with any other variable. To the extent that there are no interacting variables significantly different than 0, it is not worth analyzing the marginal effects for this model.

TABLE 7: MODEL 4 – FACTORS INTERACTING WITH RECOGNIZED EFFICIENCIES

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
Dmktshare	0.137	0.035	3.909	0.00009	***
Leader	2.059	1.199	1.717	0.086	*
Collusion	1.055	0.995	1.06	0.289	
US_Canada	-0.365	1.064	-0.343	0.731	
BigEU	-0.155	0.838	-0.185	0.853	
Entry_Barriers	3.093	1.025	3.019	0.003	***
Dmktshare_comm	1.689	13.51	0.125	0.901	
Leader_comm	62.76	467.224	0.134	0.893	
Collusion_comm	-47.225	324.444	-0.146	0.884	
US_Canada_comm	-68.951	510.64	-0.135	0.893	
BigEU_comm	-33.864	270.179	-0.125	0.9	
cut1	3.822	1.27	3.009	0.003	***
cut2	7.361	1.717	4.286	0.000	***
Log-likelihood	-24.373		Akaike criterion	74.745	
Schwarz criterion	98.797		Hannan-Quinn	83.796	

Notes: * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level. Number of cases 'correctly predicted' = 35 (74.5%). Entry_Barriers_comm was omitted due to exact collinearity.

Likewise, the Table 7 depicts the interaction of the efficiencies recognized by the Commission with the other factors. According to this outcome, there is no significant interaction among these variables. Thus, neither the efficiency claims nor those recognized by the Commission shows a significant interaction with the other variables.

Nevertheless, there are other interactions potentially worthy to assess such as the effect of the change of regulatory framework or lying within any combined post-merger market share range interacting with the variables assessed in the Model 1 (i.e. *Dmktshare*, *Leader*, *Collusion*, *US_Canada*, *BigEU* and *Entry_Barriers*). Regarding the enactment of the ECMR 2004, the following table depicts that only the interaction between ECMR2004 and Collusion is significantly different than 0 at 10% level. Its marginal effect on the probability of a merger being cleared is too low, almost zero. However, if there is evidence of potential

collusive behavior under the current regulatory framework, the probability of a merger being conditioned and prohibited changes -17 and 17 percentage point, respectively.

TABLE 8: MODEL 5 – FACTORS INTERACTING WITH ECRM2004

	Coefficient	Std. Error	z	p-value	
Dmktshare	0.126	0.038	3.36	0.001	***
Leader	2.744	1.496	1.834	0.067	*
Collusion	-0.912	1.372	-0.665	0.506	
US_Canada	0.224	1.706	0.131	0.896	
BigEU	1.201	1.049	1.145	0.252	
Entry_Barriers	3.47	1.289	2.693	0.007	***
Dmktshare_2004	0.0414	0.057	0.733	0.463	
Leader_2004	0.738	2.31	0.32	0.749	
Collusion_2004	3.372	1.998	1.687	0.092	*
US_Canada_2004	-1.195	2.449	-0.488	0.626	
BigEU_2004	-2.683	1.671	-1.605	0.108	
cut1	4.614	1.383	3.336	0.000	***
cut2	7.949	1.815	4.379	0.000	***
Log-likelihood	-25.923		Akaike criterion	79.846	
Schwarz criterion	105.749		Hannan-Quinn	89.594	

Notes: * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level. Number of cases 'correctly predicted' = 35 (74.5%).

Concerning the cross variables built with *CMktShare* [31 – 50], the following table depicts the outcome of this estimation. In this case, several interactions are significantly different than 0, such as the interaction with *Dmktshare*, *Leader* and *Collusion*.

TABLE 9: MODEL 6 – FACTORS INTERACTING WITH LYING WITHIN [31 - 50]

	Coefficient	Std. Error	z	p-value	
Dmktshare	0.167	0.044	3.776	0.000	***
Leader	3.419	1.468	2.329	0.02	**
Collusion	1.74	1.337	1.302	0.193	
Entry_Barriers	4.609	1.444	3.192	0.001	***
Dmktshare31_50	-0.448	0.223	-2.013	0.044	**
Leader31_50	6.792	3.493	1.945	0.053	*
Collusion31_50	-7.739	4.021	-1.925	0.054	*
US_Canada31_50	-5.859	3.905	-1.5	0.134	
Entry_Barriers~	6.118	3.814	1.604	0.109	
cut1	4.69	1.523	3.08	0.002	***

cut2	9.727	2.414	4.03	0.000	***
Log-likelihood	-18.773		Akaike criterion	59.546	
Schwarz criterion	79.897		Hannan-Quinn	67.204	

Notes: * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level. Number of cases 'correctly predicted' = 80 (85.1%).

The marginal effects are showed in the following table:

TABLE 10: MODEL 6 – MARGINAL EFFECTS

	<i>Clearance</i>	<i>Conditioned</i>	<i>Prohibition</i>
Dmktshare31_50	0.0636	-0.05	-0.013
Leader31_50	-0.002	-0.201	0.203
Collusion31_50	0.003	0.283	-0.286

These results reveal fluctuating marginal effects according to the different type of decision. In effect, the probability of a merger being cleared is outstandingly higher only for the interaction with variation in post-merger market share. On the other hand, the probability of a merger being conditioned is lower if *DMktshare* and *Leader* increases while the combined post-merger market share lies within [31 – 50] (minus 5 and 20 percentage points, respectively); whereas this probability reduces if *Collusion* increases (from 0 to 1) while the combined post-merger market share lies within [31 – 50].

Although the Commission finds increasing post-merger market share or evidence of collusive behavior, the probability of a merger being prohibited reduces if the former occurs while the combined market share lies within [31 – 50]. Conversely, this probability is higher if there is a world leader insider, even if the combined market share lies within [31 – 50].

V. Limitations

As being explained above, some categories within a population could be scarce. Researchers can use the nonprobability sampling to figure out this trouble. Nevertheless this sampling method not allows the estimation of sampling errors. The nonprobability sampling could thereby present some problems in estimation. (Waldman, 2000).

Also related to the sampling method and the storage of information, we dealt with the lack of information for some cases. Effectively, some Commission's reports hide information because of confidential reasons, but some cases followed the simplified procedure without

publishing important information about the merger conditions. Beyond the reasons of the lack of information for some cases, some of them may be lifted assuming that the insignificant factors must be neglected.

Concluding Remarks

Using a created dataset with information collected from Commission's final Reports, we have estimated the weight of the factors that impacts on probability of a merger fall on any of three possible decisions taken by the Commission when it assesses a proposed merger, i.e. clearance, clearance with commitments, or non-clearance.

Given the nature of Merger Regulation procedures, a 3-choice ordered logit was estimated. The results of these estimations suggest that three variables formerly identified in Bergman, et al. (2006) and Fernández, et al. (2008), i.e. Increase in market share, Entry barriers and World leader, have a significant impact on Commission's decisions. A second model containing these three variables estimated alongside other three dummies variables representing the combined post-merger market share, can correctly predict 8 of every 10 decisions taken by the Commission.

With respect to the marginal effects of the second model, a merger increases its chance to be cleared only if the combined post-merger market share is lower than 50%. Regarding the mergers cleared with commitments, its probability increases if

Unfortunately, there is no significant evidence to believe that the efficiency considerations have an impact on the Commission's assessment. Likewise, the interactions among the efficiency considerations and other factors were not significant when they were tested in other models. Such results allow us to assume that the efficiency considerations play no practical role in Commission's decision process, neither as an independent variable nor as a variable offsetting the impact of other significant variables. These results may be related to the difficulties inherent in proving that an efficiency is specific and verifiable.

Besides, we tried to test the probable impact of the current common framework on the weight of the decisional factors. However, the results suggest that the theoretical change

on the way how the Commission assess a proposed merger should be either inexistent or insignificant.

On the other hand, the Commission seems to be more predictable with respect to the combined market share, In addition to the significant importance of reporting low post-merger market share, it seems that the Commission considers the merger with low combined market share as a factor which offsets the negative effects of Increase in market share, Entry barriers and World leader on the probability of a merger being cleared.

This document attempts to follow up new results regarding former researches, in order to understand the influence of the current common merger regulatory framework on the Commission's decision, in practice. This kind of research is important to find out how to perform a properly use of the tools provided in the framework aforementioned.

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