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COMMON FACTORS OF WITHDRAWN AND PROHIBITED MERGER CASES IN THE EUROPEAN UNION

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Common factors of withdrawn and prohibited mergers in the European Union

Lea Bernhardt

Zusammenfassung / Abstract

In this paper, we analyse the final decisions for merger cases prepared by the European Commission (EC) since 1990 and build a unique subsample for all non-cleared cases. These incorporate all merger notifications which were either withdrawn by the notifying parties or have been prohibited by the European Commission. We find a sudden decline in prohibitions and withdrawals of cases since 2002 and explore three judicial defeats of the European Commission as determining factors behind these developments. We also find a higher likelihood of withdrawal or prohibition if cases are registered in sectors which incorporate firms in the business of information and communication or transportation and storage. When classifying the documents with a supervised machine learning algorithm, we are able to automatically identify the cleared versus the non-cleared cases with over 90% accuracy. Finally, we find that network effects, high market shares and the risk of collusion are the main competitive concerns which contribute to prohibition decisions in the information and communications sector.

Schlagworte / Keywords: mergers, competition policy, EU Commission, classification, network effects

JEL-Klassifikation / JEL-Classification: K21, L40, G34

1. Introduction

30 years ago, on 21 September 1990, the first Merger Regulation in the European Union (EU) came into force (ECMR, 1989). Since then, more than 6.000 decisions on merger proposals have been decided by the European Commission (EC). In a recent speech about future challenges of the EU's merger control, Margrethe Vestager, in her capacity as the current Commissioner in charge of competition, stressed the importance of the merger rules:

“Thanks to merger control, consumers and businesses can count on lower prices, wider choice, more innovative products. That means a better life for everyone; it also helps businesses to keep down costs, and successfully compete in global markets. And the merger rules also make Europe more competitive, by giving the best and most innovative companies plenty of room to grow.” (Vestager, 2020)

In this paper, we analyse all merger cases in the European Union (EU) from 1990 up to the end of 2019 and build a subsample of all withdrawn or prohibited mergers. Our aim is to identify possible common characteristics of these cases and apply classification methods in order to automatically identify if a merger was either cleared or prohibited. Is there a higher chance to get clearance in a specific sector? Are some commissioners more likely to veto mergers than others? Are there any structural characteristics in the deal which make a prohibition more likely?

We approach these questions by a thorough exploration of our dataset regarding all of the retrievable information. Firstly, we look into the distribution of the final outcomes and review the relevant legal framework within the merger assessment. We distinguish between withdrawn and prohibited cases in the descriptive analysis and review some of the crucial cases which led to a reform of the merger regulation. In addition, we apply established text-mining methods to form a corpus of all documents and then analyse their tonality, keywords and the underlying structure. By implementing a simple supervised classification algorithm, we are able to automatically distinguish between cleared and non-cleared cases. Finally, we conduct a

regression analysis in order to estimate the impact of our determining variables to explain variations in the outcome variable, which is the final decision of the merger review process.

In retrospect, over 95% of notified merger cases have been cleared by the EC since 1990.

Moreover, we observe a clear negative tendency regarding prohibitions and withdrawals of merger notifications in recent years. Also, mergers of companies registered in certain sectors such as communication and information, are less likely to get clearance than in other industries.

We identify entry barriers, dominance of merging parties in their operating market and an increase in the likelihood of collusion as major competition concerns which result in a veto against a merger. Furthermore, in the context of rising merger notifications in platform industries, the occurrence of network effects is gaining importance in the assessment.

The paper is structured as follows: In the next section, we explain the ground rules in merger control in the EU, focusing on unilateral and pro-collusive effects. Then, we explore our dataset and examine the composition of the decisions, the economic sectors, the duration of the review process and the commissioner of competition in charge at the time. In the fourth section, we conduct an automated text analysis, obtain the most relevant terms for the cleared versus the non-cleared cases and show differences in the tonality. Additionally, we implement an individual supervised classification task to identify the different outcomes. In the fifth section, we conduct a regression analysis to explain the decision variable with the given determining variables. Section six concludes.

2. Merger Control

In general, an effective merger control is required to prevent anti-competitive effects as a result of a merger (Motta et al., 2007). In situations where mergers decrease welfare, for example by lowering the number of firms in a market and therefore creating a dominant position of a single agent, a merger can be prohibited by a competition authority in order to ensure economic freedom for all market participants (Motta, 2009). These welfare effects can affect consumer surplus with regards to price effects, total surplus regarding also producers' surplus and other factors such as a high level of competitiveness of national firms on global markets or, in the case of the EU, a promotion of European integration (Röller et al., 2000). As Röller et al. (2000) state, the "common view is that mergers tend to increase prices". In absence of efficiency gains, mergers are therefore expected to lead to higher prices. In cases where mergers contribute to lower prices, however, substantial amounts of economies of scale and learning effects are observed (Farrell and Shapiro, 1990). According to Farrell and Shapiro (1990), these factors only achieve lower prices in a market with small market shares for the merging parties and low demand elasticity in the industry.

2.1. Regulation

In the EC Merger Regulation, that is the Council Regulation No 139/2004, the ground rules are set for controlling notified concentrations. The overall goal is to prevent anti-competitive outcomes, as stated in (5): "[...] it should be ensured that the process of reorganisation does not result in lasting damage to competition [...]" (ECMR, 2004). The Merger Regulation does not distinguish between the differences in concepts of mergers and acquisitions as it defines concentration as the result of either one of them in article 3(1)a and 3(1)b, respectively. Only if a concentration has a "community dimension" with specific thresholds regarding turnover worldwide and community-wide, the Merger Regulation is applied (European Union, 2010). In

this framework, a merger can be cleared instantly, prohibited or allowed under certain conditions or remedies. The latter are applied if DG Comp identifies serious competitive concerns in its economic assessment. In order to get clearance, these remedies must be adopted by the merging firms. They can be twofold: Structural remedies include divestitures of assets to new firms or existing competitors, whereas behavioural remedies consist of contractual obligations such as access to licences or patents (Duso et al., 2006). The latter requires continuous monitoring by the authorities and is therefore very resource-intensive. This could be a reason why structural remedies are preferred by the EC (Motta et al., 2007). Also, as merger control focuses on the prevention of anti-competitive market structures - in contrast to preventing anti-competitive behaviour as in antitrust regulation - structural remedies are the preferred choice in merger cases (Ritter, 2016).

2.2. Assessment

For horizontal mergers, that is mergers between competitors, two main aspects are under consideration: Firstly, unilateral effects, which occur when the merged firms are raising prices due to their higher market power, and secondly, an increased probability of collusion in the industry (Motta, 2009, p.231).

One detrimental result of a merger could be a higher degree of market power for the merging parties, which is likely to lead to a decreasing consumer surplus and therefore also total welfare (Motta, 2009, p.231-234). This is because the merged firms gain more market power unilaterally by eliminating competitors in their market. As a result, consumers are left with fewer choices and fewer alternatives when prices are increased. In different models, when firms decide on quantity instead of prices, these prices are stable post-merger but the firms' output is significantly lower (Motta, 2009 and references therein). Factors which influence the emergence of unilateral effects include, among others, the number of competitors in the market

post-merger as a measure of concentration, the likelihood of new market entries and existing market shares of the merging parties (Motta, 2009, p. 235-238).

Pro-collusive, or coordinated effects, increase the likelihood of collusion in the industry (Röller et al., 2000). This is due to the decrease of competitors after a merger, facilitating implicit cartel agreements. As described by Röller et al. (2000), the joint market power of the firms in that industry is likely to increase. Previously independent market participants are then, post-merger, able to increase prices to a higher level. In addition, the distribution of assets might shift to a more symmetric allocation, also increasing the chances for a collusive equilibrium (Motta, 2009, p. 251).

In assessing these cases, however, it is crucial to take efficiency gains into account as well. As Motta (2009) points out, the net effect of a merger could be ambiguous, depending on whether efficiency gains outweigh higher prices or not. This is because mergers can also create synergies between the merging companies, leading to lower production costs and higher overall efficiency. If these benefits compensate the higher levels of market power, then consumer surplus is stabilised by lower prices due to these efficiency gains. On the other hand, if a merger does not create any synergy effects, it will instead contribute to higher prices (Farrell and Shapiro, 1990).

In the next sections, we will investigate these effects and their relevance with regards to their actual occurrence in our decision documents.

3. Data

We create a comprehensive dataset of all merger cases in the EU since 1990 and construct a subsample of the withdrawn and prohibited cases.

3.1. Composition

Our dataset consists of all merger decision documents prepared by the EU's Directorate General for Competition (DG Comp). We collect all final decisions which were available in English from 1990 up to the end of 2019. Our focus lies on the English-language cases as the English language is one of the three official working languages of the Commission, besides German and French. The automation of language processing is simplified when the corpus of documents consists of only one language. For setting up our dataset, we retrieve all files from the official website of DG Comp (European Commission, 2020a). In total, we end up with a collection of 6215 documents and extract the following basic information about every case: case number, parties involved, notification date of the merger, final decision date by the DG, word lengths in every document, associated economic sector and finally, and articles of the decision. The latter are used for identifying whether a merger was approved directly, only under certain conditions, or completely prohibited.

As a next step, we create a subsample of these merger cases, including all available documents for cases which are either withdrawn by the notifying parties themselves, or prohibited by the Commission. To the best of our knowledge, there exists no dataset for these withdrawn or prohibited EU merger cases up to today. In total, we collect 239 cases for this subsample. Many cases were withdrawn absent any decision document because the merging firms were likely to perceive a negative decision by the Commission and therefore did not proceed to the final stage of the process. In these situations, the EC releases a short statement, declaring the withdrawal without further information. In about 75% of the cases, no final decision document was released. We therefore also extract information of press releases by the EC regarding these specific cases. For some of these announcements, a more detailed public statement was released at the EC's press corner, especially for broadly discussed merger notifications.

Next, we turn to the different types of decisions in the merger review process and explain those most relevant for our purpose in more detail.

3.2. Analysis

In order to explore our dataset, we focus on the following characteristics: legal decisions for clearance or prohibition of a merger case in the EU, duration of the review process, economic sector, and commissioner in office at DG Comp.

Decision

We identify the most relevant articles for merger decisions according to the EU Competition Law Rules (European Union, 2010). These include articles 6(1)b and 8(1) which provide the basis for approval in the first or second phase, respectively. In cases where commitments are not fulfilled or agreements cannot be reached, a merger can eventually be prohibited or withdrawn by the notifying parties. Article 8(3) refers to a prohibition in Phase II, as shown in Tab. 1.

Tab. 1 Relevant articles in EU Competition Law

Phase	Article	Decision
I	6(1)a	Case not within the scope of the Merger Regulation
	6(1)b	Approval: No serious doubts
	6(1)c	Serious doubts: Redirection to Phase II
II	8(1)	Approval
	8(2)	Approval with conditions and obligations
	8(3)	Prohibition

In our sample, the vast majority of decisions follow article 6(1)b, which clears the merger without any conditions or obligations. In total, over 85% of the cases are approved in that way. This is in line with findings by Affeldt et al., (2020), in which the authors found that over 90% of all their analysed cases were cleared within Phase I, albeit they did not include withdrawn cases.

With regards to the minority of cases which are finally not cleared, less than 0.5% of all cases are rejected in Phase II. Some authors, like Haucap and Schmidt (2013), suggest that the EC is rather willing to set up remedies than to impose a prohibition. As they state, this procedure avoids a possible review in court (Haucap and Schmidt, 2013 , p. 261). We define a prohibition as a case decided according to article 8(3), such that we only include cases in Phase II which were finally not cleared for merger. In line with Bergman et al. (2005), we consider withdrawn cases as the ones likely to be rejected. We therefor merge withdrawn and prohibited cases into one category. These are the cases which we explore in more detail.

In our dataset, we have a total of 239 cases which were either withdrawn or vetoed against by the EC, corresponding to 3,8% of all merger cases. Interestingly, the relative number of withdrawn or prohibited cases reaches a much lower level after 2002. As depicted in Fig. 1, before 2002, 7.28% of cases were withdrawn or rejected on average, while after 2002, these figures decreased to a mean of only 2.83%.

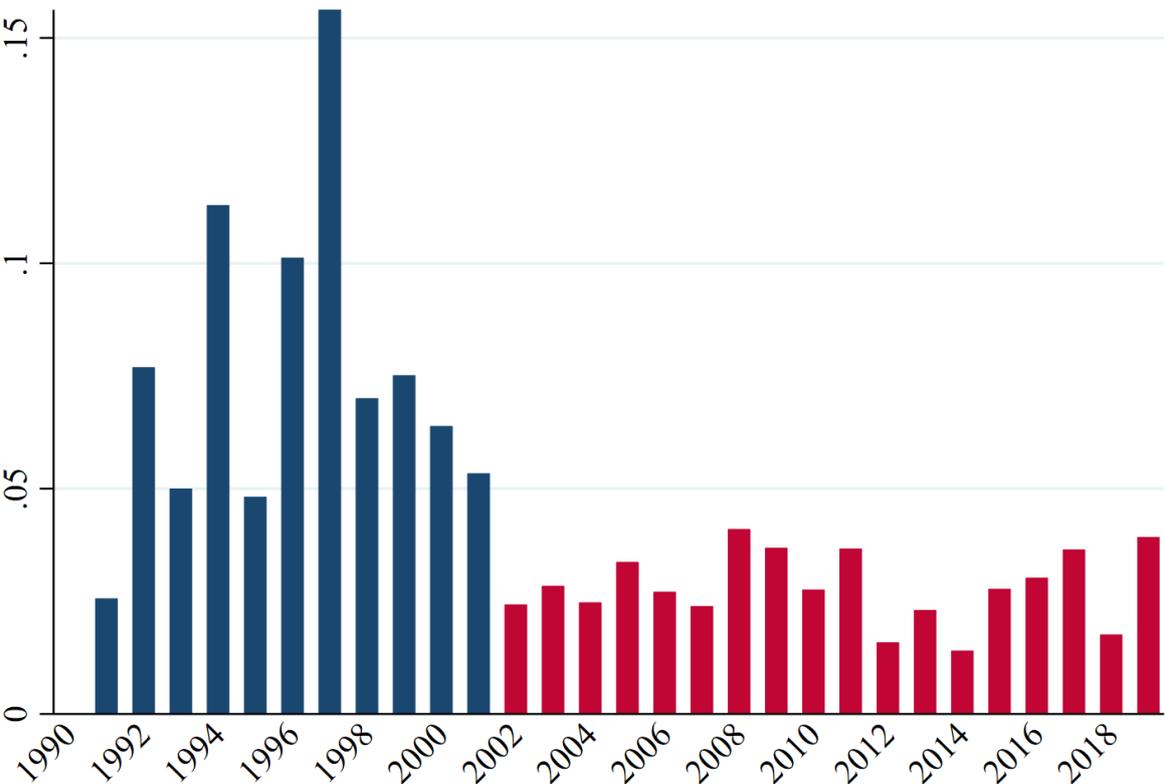


Fig. 1 Amount of withdrawn/prohibited cases up to 2002 (blue) and after 2002 (red).

One reason for this sudden decline can be found in judicial defeats against the Commission in 2002. In that year, three final merger decisions of DG Comp were overruled by the Court of First Instance (CFI). In the first case, the British company Airtours challenged the prohibition of its merger with one of its competitors, First Choice, set by the Commission in April 1999. The CFI mostly criticised the lack of economic evidence which was supposed to prove a collective dominant position created by this merger in the market for tour operators. It therefore annulled the decision in June 2002 (Court of First Instance, 2002a). Two other cases were both overruled by the CFI in October 2002: The merger of the French manufacturers Schneider/Legrand in the market for electrical equipment and the merger of the companies Tetra Laval BV and Sidel (European Commission, 2003). The CFI annulled the prohibition decision in the Schneider/Legrand case based on “errors, omissions and inconsistencies [...] of undoubted gravity” (Court of First Instance, 2002b). In the second case, the merger between the then world-leader of packaging products for cartons Tetra Laval and the French manufacturer of PET plastic bottles, Sidel, the CFI rejected the Commission’s veto even without a detailed examination (Court of First Instance, 2002c). In line with the previous annulments, the CFI strongly condemned the conducted economic analysis of the anticipated anti-competitive effects. Some researchers regard this ruling as one of the driving forces for the development of a revised merger review afterwards in order to avoid future setbacks (Bradford et al., 2018). Also, as explained by Duso et al. (2013), these events finally led to the implementation of the new Council Regulation 139/2004, which is still in place today (Duso et al., 2013). Others, such as Lyons (2004), disagree with this conclusion. He argues that long before these reverses in the CFI were made, a reform process was already taking place, following a formal consultation document which was published in December 2001. Lyons identifies three other main forces: “maturity in merger regulation; increasing use of economic analysis; and expanding membership of the EU” (Lyons, 2004, p. 249). In any case, the sharp

decline of the withdrawn and prohibited cases after 2002 has led to a stable low level of these cases which has not changed since then.

Recent events could possibly bring some similar disruptions. In May 2020, the General Court overruled a judgement made four years earlier by the EC. Back then, the EC vetoed on the acquisition of Hutchison over Telefonica UK. In the published prohibition decision, the EC argued that this deal would create a new, powerful market leader in the British mobile communications industry with detrimental effects on the network infrastructure and customer services (European Commission, 2016). In the assessment, a test concerning a “significant impediment to effective competition” (SIEC) was conducted, as referred to in the Merger Regulation in Article 2(3), where a merger is to be declared incompatible with the common market if it creates or strengthens a dominant position (ECMR, 2004). The Court however, ruled that the EC did not provide enough evidence for an establishment of a SIEC. In particular, it criticised the inconsistency in the application of the SIEC test and the economic analysis which was conducted to show the impact on prices as a result of the merger (General Court, 2020). The Court stated that the quantitative analysis regarding the upward pricing pressure insufficiently verified a reasonable probability that prices are going to rise post-merger. This judgement, unless overturned by the European Court of Justice, could change the EC’s merger control in relation to high standards of proof and therefore intensify and prolong review processes (Riedel et al., 2020). In this regard, it is expected that more critical cases, which are likely to be prohibited, have a higher duration from notification until the final decision is set, as shown in the following section.

Duration

The average merger review in the EU takes 77.5 days from notification until a decision has been made,, as shown in Fig. 2. In 2013, the previously discussed case Tetra Laval / Sidel (M.2416) was finally decided on 13 January 2013 and took 605 days (European Commission,

2003). Only two other cases lasted longer: The merger between Schneider/Legrand with 653 days (European Commission, 2002) and the merger between the Greek gas transmission operator DESFA and the State Oil Company of Azerbaijan Republic (SOCAR) with 855 days. (European Commission, 2014). The latter was withdrawn in 2017, after two years of suspension, due to a lack of acceptable solutions for the EC. In general, cleared mergers are processed much faster than withdrawn/prohibited ones: On average, it takes 55 days for the EC to finally clear the merger, whereas withdrawn or prohibited cases take almost 94 days.

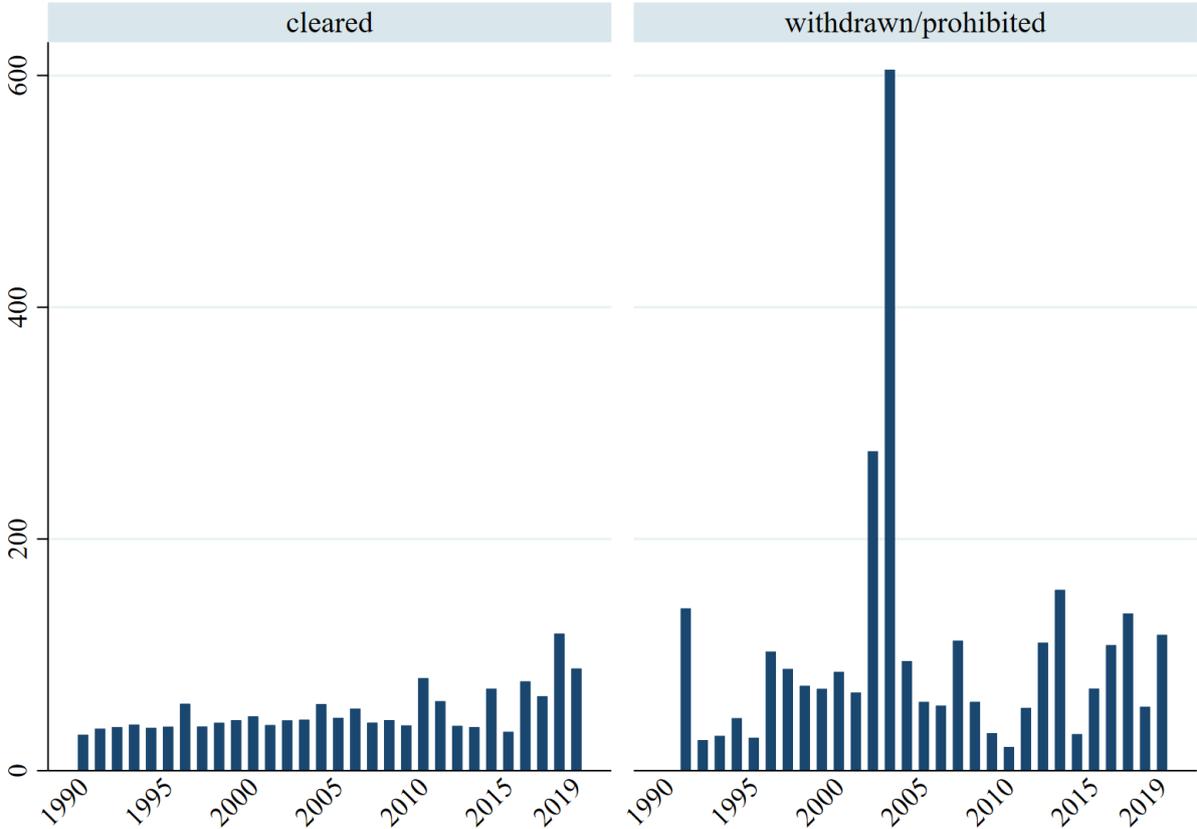


Fig. 2 Average duration of review processes per year for withdrawn/prohibited cases vs. cleared cases in days.

With regards to differences in the duration in different economic sectors, we also examine the average processing time in our W/P (withdrawn/prohibited) subsample by the corresponding sector. We identify the longest cases in sectors C, F, H and J and compare them to their counterparts for the cleared cases. See Tab. 9 and Fig. 10 in the appendix for the result and

explanations for the abbreviations. In the following section, we take a closer look at these sectors and identify variability for specific industries.

Sector

The official “Statistical Classification of Economic Activities in the European Community” provides the framework for our analysis of the distribution of economic sectors in our dataset (European Commission, 2020b). An overview of the classification and notation of the codes is given Tab. 9. In our complete sample of all merger cases, sector C, the manufacturing sector, incorporates the most cases (42%). Sector G (Wholesale and retail trade) includes 12% of all cases, and sector K (Financial and insurance activities) includes 9,8%. This distribution changes slightly when we focus solely on the withdrawn/aborted cases: Now, we observe that over 45% of all cases belong to sector C (Fig. 3).

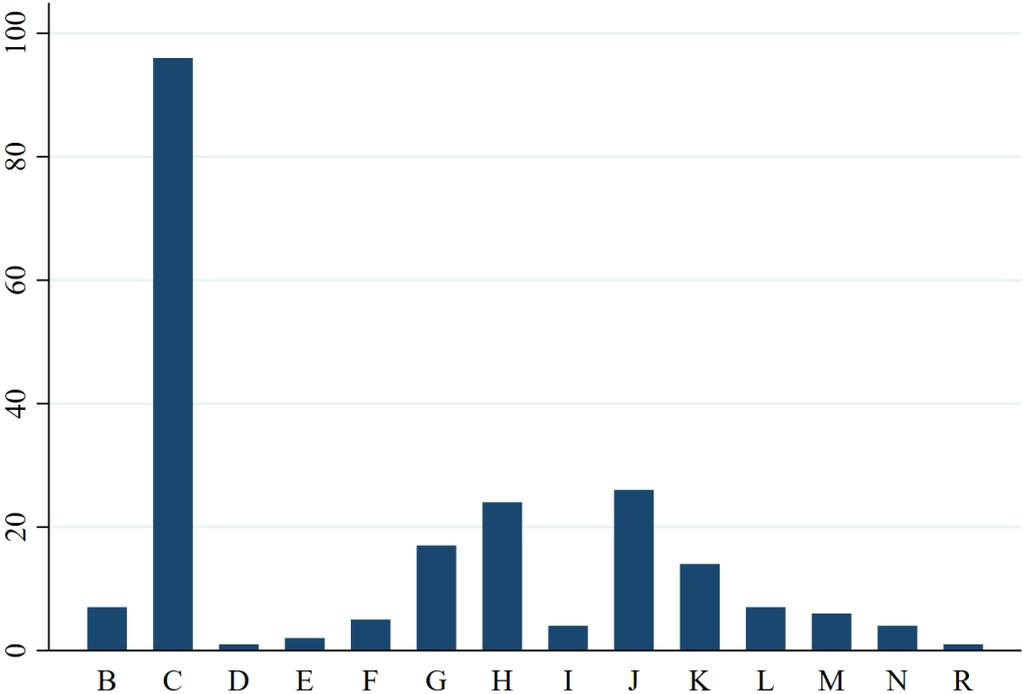


Fig. 3 Number of withdrawn/prohibited cases per sector.

In total, most withdrawn or aborted cases are in sector C (45%), followed by sector J (12%), H (11%) and G (8 %). No withdrawn or prohibited case is registered in sectors A, O, P, Q, S, T or U.

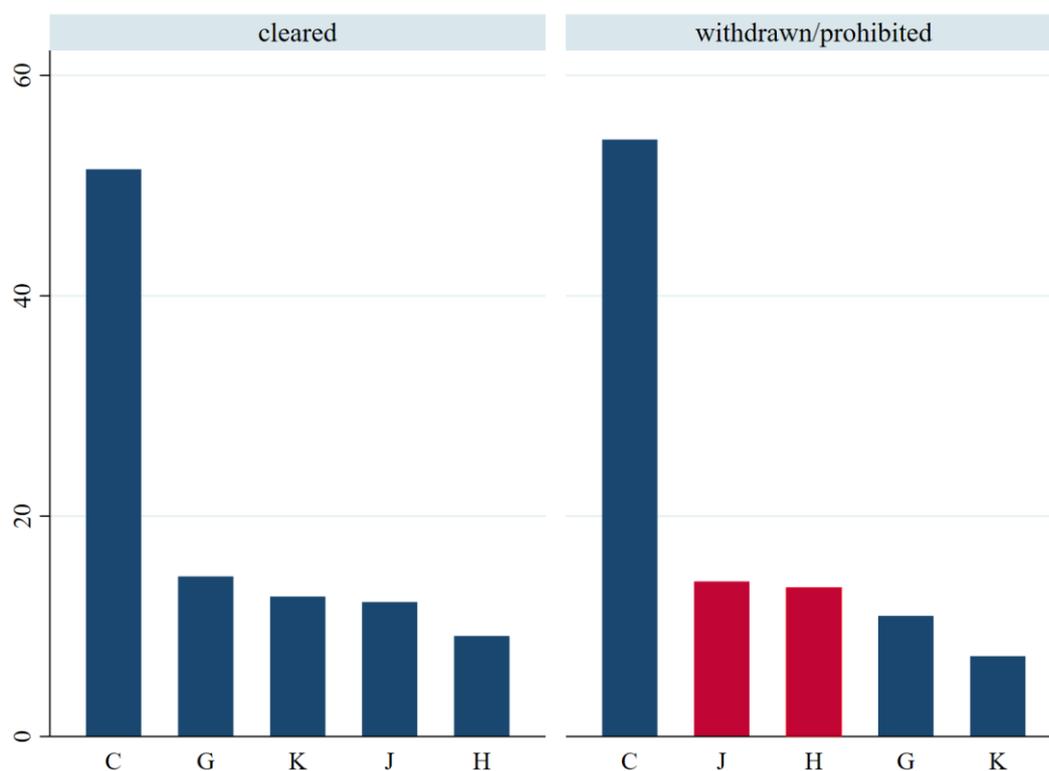


Fig. 4 Number of cleared and withdrawn/prohibited cases per sector for the five most common sectors in our data.

A comparison between the full sample and our subsample reveals a different distribution regarding the economic sectors. Fig. 4 displays the five most frequent sectors for both full sample and subsample. For the withdrawn/prohibited cases, sector J (Information and communication) and sector H (Transporting and storage) are more frequently represented in our data. This result shows that mergers in these two sectors are less likely to get clearance than in other sectors. Now, that we have seen differences regarding the duration and the industry, we focus on the EC's leading representative in charge for competition policy in order to find possible deviations in assessing their associated merger cases.

Commissioner

As shown in the following timetable Tab. 2, there has been a total of six different commissioner for DG Comp from 1990 until today. The duration of their terms in office varies substantially,

ranging from only 730 days in the case of Mario Monti, up to over 2000 days for Margrethe Vestager.

Tab. 2 Timetable

Commissioner	Term		Duration (Days)	Country
	Start	End		
Leon Brittan	06.01.1989	05.01.1993	1460	UK
Karel Van Miert	06.01.1993	13.09.1999	2440	BE
Mario Monti	15.09.1999	30.10.2004	730	IT
Neelie Kroes	22.11.2004	09.02.2010	1904	NL
Joaquín Almunia	09.02.2010	01.11.2014	1725	ES
Margrethe Vestager	01.11.2014		>2000	DK

With regards to vetoes against some high-profile merger notifications, Mario Monti had one of the most publicly debated cases in his term. After he had taken office in September 1999, his Directorate decided to block the Airtours/First Choice merger, as discussed above. It was only the second time that a prohibition decision had been made on the grounds of oligopolistic market structures with the fear of collective dominance.

Overall, the commissioner with the most prohibited or withdrawn cases is Karel Van Miert who had a total of 623 final decisions, of which 8% were not cleared (see Fig. 5) One of these cases was the prohibited merger between the German media companies Bertelsmann, Premiere and Kirch in 1998. The Commission identified a near-monopoly for pay-TV suppliers as a likely result of this concentration and was therefore declared incompatible with the common market, as described in the final decision document (European Commission, 1998). Another highly discussed case was the merger between the US aircraft manufacturers Boeing and McDonnell Douglas Corporation (European Commission, 1997a). It was cleared unconditionally by the Federal Trade Commission (FTC) in the US but challenged under van Miert by the European authorities. The main competitive concerns included the existing dominance of Boeing with a

high market share, high barriers to entry and exclusive supply deals on a long-term basis (European Commission, 1997b). Although the EU Commission could not have prohibited the merger technically, it could have imposed heavy fines for the companies' operations in Europe. In the end, this merger was only cleared after Boeing had agreed to concessions regarding exclusive contracts with other US airlines, the licensing of patents to competitors and other commitments (European Commission, 1997b). Some European researchers viewed this result as a success for the European Commission (Haid and Hornschild, 1997). In fact, it was only the second merger of two US firms, following Kimberly-Clark/Scott Paper in 1995, which was first challenged and then accepted by the EC (European Commission, 1995).

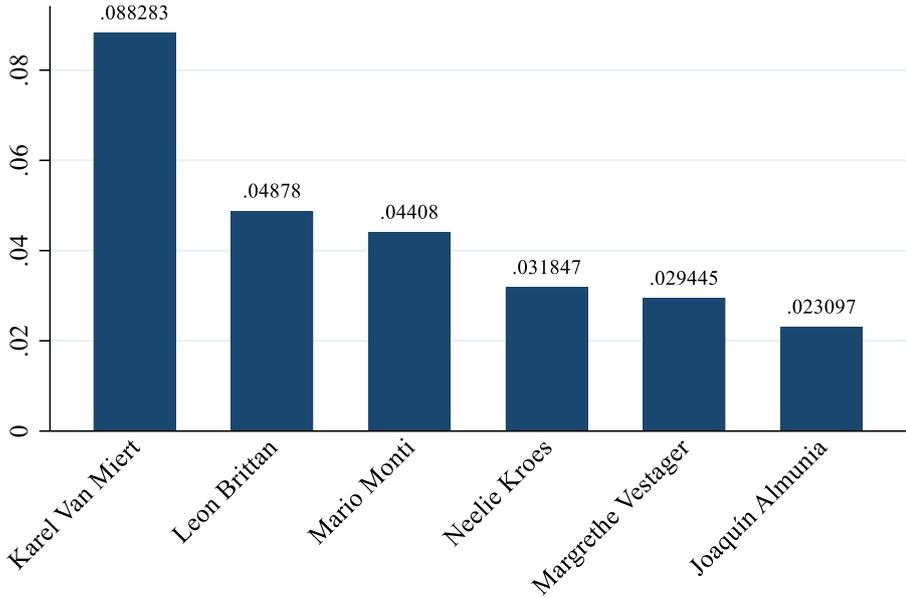


Fig. 5 Withdrawn/prohibited cases per commissioner.

In the next section, we are going to refrain from the descriptive analysis of the merger cases we have examined so far and apply some established text-mining methods on our data in order to find certain characteristics of our merger decisions.

4. Automated Text Analysis

We apply text-mining methods on our dataset in order to find common characteristics of merger decisions. Firstly, we process the collection of merger decision documents into one dataset of all combined files for further analysis. Then we extract the relevant terms and build a corpus for textual analysis. This is done using standard text mining tools with the tidy text package by Silge and Robinson (2017). We take advantage of the specific structure of tidy data with each variable in a column, each observation in a row and each type of observational unit as a table, as described in Wickham (2014). The idea of setting a token for every document in every row (“one-token-per-document-per-row”) eases the analysis of textual data. In most cases, the token is a single word but it can also contain whole sentences. Therefore, we split (tokenize) our entire text in order to find meaningful units (Silge and Robinson, 2016). We then identify the most relevant terms in our documents, indicating the focus of the merger review process.

4.1. Relevant terms

The most frequent terms in our sample are all connected to the standard vocabulary of the merger procedure in the EU: The description of the relevant markets, the merging parties, their businesses, customers and products. Additionally, words which characterise the standard approach taken for these decision document are common: the articles of the decisions, the corresponding regulation and the commission itself (Tab. 3). The comparison of the most common words in our subsample versus the whole sample, containing all documents, reveals some interesting observations. Terms which occur more frequently in the subsample than in the whole sample, are coloured in red. Firstly, terms regarding customers and services are more common in the withdrawn/prohibited cases. Secondly, the competitors of the merging parties, as well as information about prices and commitments, are described in more detail.

Tab. 3 Term Frequency - Whole sample vs. Subsample

Whole sample		Subsample	
Term	Frequency	Term	Frequency
market	267838	market	19849
commission	130387	commission	12701
parties	79901	parties	10499
notifying	58644	customers	7805
article	55673	notifying	5949
customers	52656	services	5805
business	51907	route	5175
merger	51639	competitors	4872
share	50126	question	4567
case	50037	competition	4510
regulation	46741	competitive	4240
product	44958	party	4126
services	44373	response	4077
transaction	43724	business	3997
products	42771	transaction	3904
markets	40317	questionnaire	3868
question	38905	price	3843
competition	38276	information	3779
european	37938	routes	3693
competitors	37229	network	3652

In order to avoid over- or underestimating single terms and their relevance, we also take the relative occurrence into account, as the number of words per decision document increases dramatically over time, as shown in Fig. 6. Before 1998, the cases have on average a total of 2'777 words per document. During this period, the most extensive case has 25'030 words: The previously mentioned merger between the two US companies Kimberly-Clark Corporation of Dallas and Scott Paper Company of Philadelphia of 16 January 1996 (European Commission, 1995). In the years between 1999 and 2010, the average number of words varies around 4'000. One extreme outlier here is the merger between the airlines Ryanair / Aer Lingus which was prohibited under article 8(3) of the Merger Regulation (European Commission, 2007). This decision took almost a year until it was finalised in 2007, resulting in a very detailed and extensive decision document with more than 20'000 words. After 2010, the figures fluctuate sharply around 6'000 words with a high variance. This is due to some extraordinarily large and

complex cases in recent years. The longest case overall is the merger between the chemical companies Dow and DuPont, cleared in March 2017. Its final decision document spans 915 pages and contains nearly 405'000 words (European Commission, 2017).

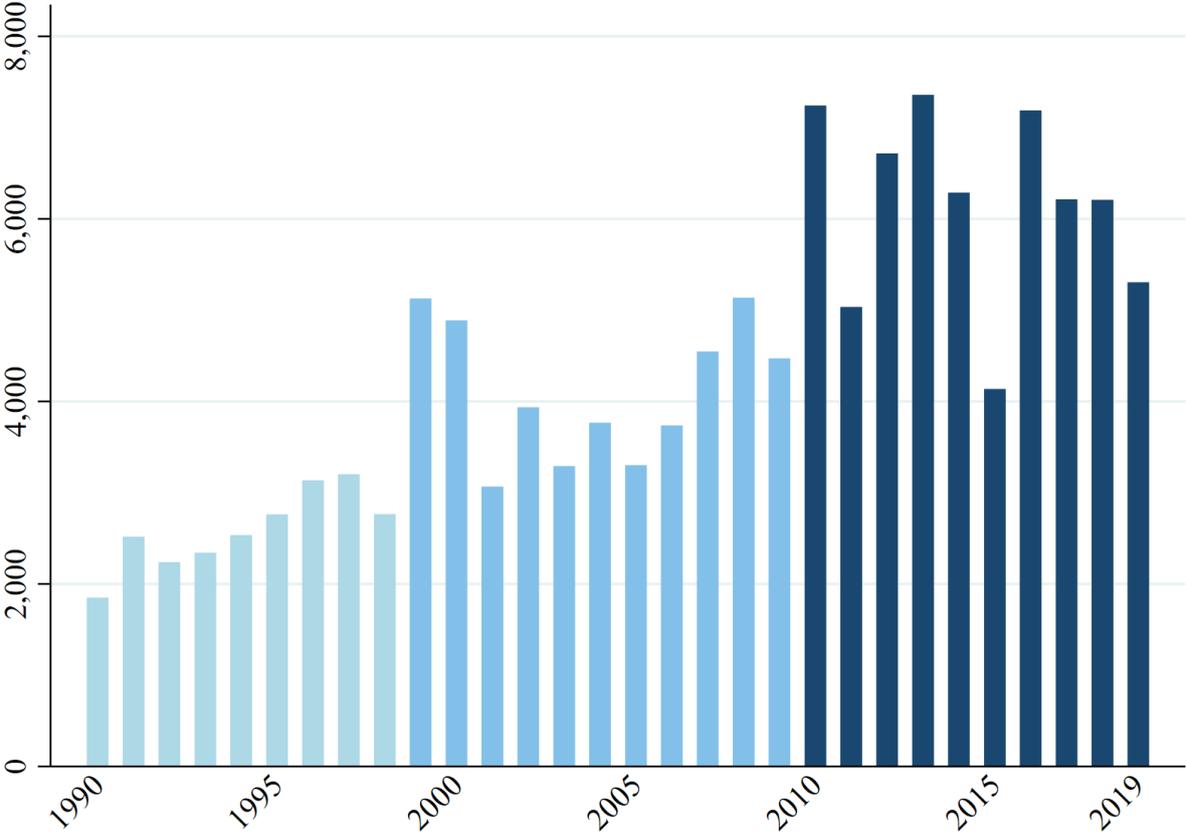


Fig. 6 Yearly averages of the number of words in the decision documents of merger decisions.

Against that background, not only does the number of notified mergers at DG Comp substantially increased over the course of the last years, the final decision documents also became much more extensive and detailed. These findings call for a careful approach towards exploring the relevance of certain competition terms. As explained in section 2.2, an important factor for the assessment of mergers is the unilateral market power exercised by the newly merged firms. This is determined by the degree of concentration on the market and the dominance of single players, the likelihood of collusion and entry barriers. Moreover, for concentrations in some sectors such as communication and information, network effects are an important factor in the merger review process. As shown in the graph below, when we compare

the relative occurrences, which take the absolute word length of the documents into account, these critical terms are clearly over-represented for the non-cleared cases. The greatest discrepancy can be found for the mentioning of entry barriers which are perceived as problematic in the context of merger control. In that sense, these expressions can have a negative connotation which we are going to evaluate in the next section.

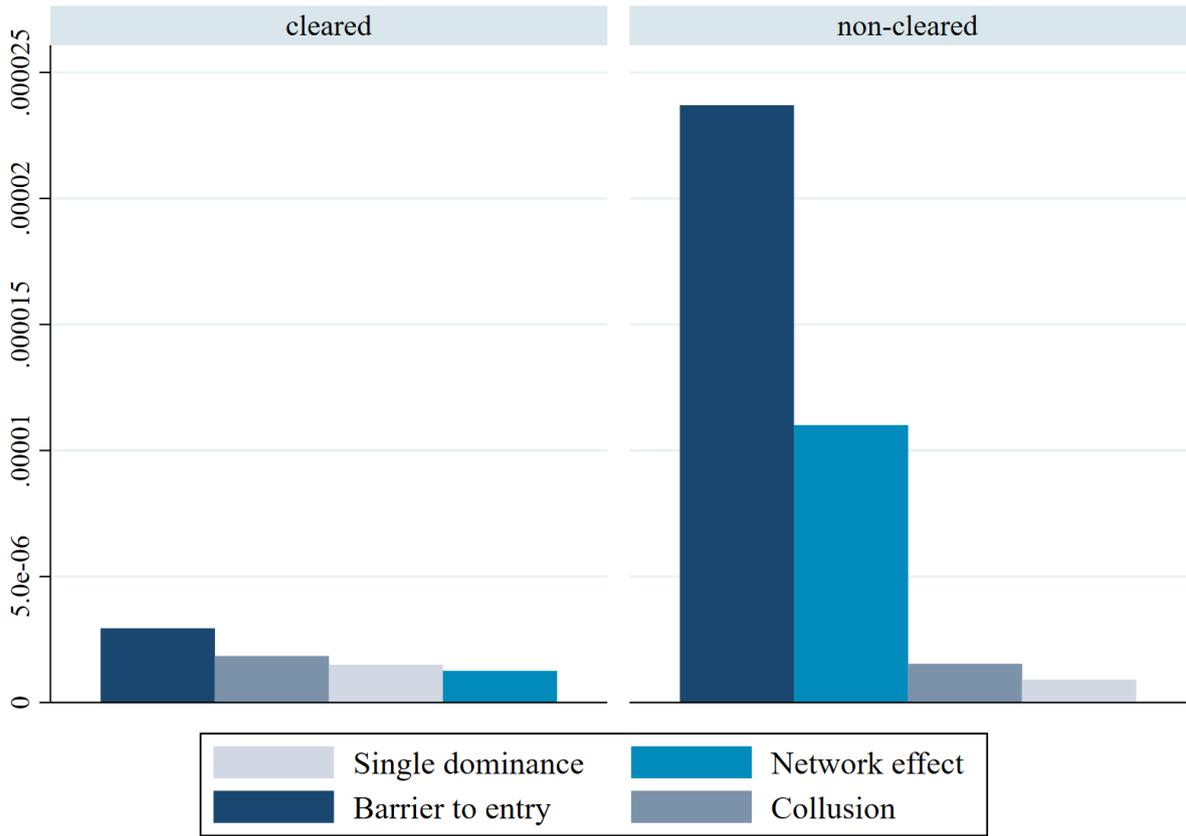


Fig. 7 Relative occurrence of terms describing competitive concerns: cleared vs. non-cleared cases.

4.2. Tonality

Firstly, we explore our textual data by obtaining values for positive or negative words in the documents. That is, we measure the tonality by applying a standardised dictionary on our data. In a second step, we adapt this dictionary by adding a few terms relevant to competition policy specifically. For example, we include the words “barrier” or “dominance” as negative terms in order to refine the method for our specific needs. One of the most basic and established

approaches is the lexical source SentiWordNet 3.0 (Baccianella et al., 2010). We apply this dictionary to our whole sample as well as the subsample for comparison (Fig. 8).

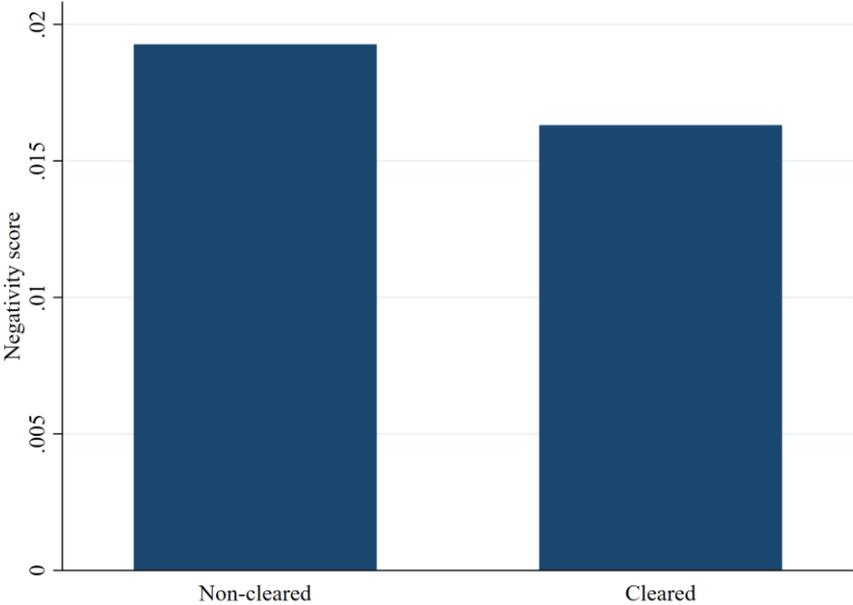


Fig. 8 Tonality of cleared cases vs. non-cleared ones as measured by the negativity score.

As we expect, the overall tonality of the withdrawn or prohibited cases is less positive than for the cleared ones. We also use another approach, the sentiment lexicon created by Liu (2012)), in order to check the results. In line with our previous findings, the subsample also shows a less positive tonality than the whole sample. Interestingly, the tonality of the document for the cleared cases becomes less negative over time, as depicted in Fig. 9, where the tonality is aggregated per decade. Moreover, in the 1990s, the cleared cases were even more negative in tonality than the non-cleared cases.

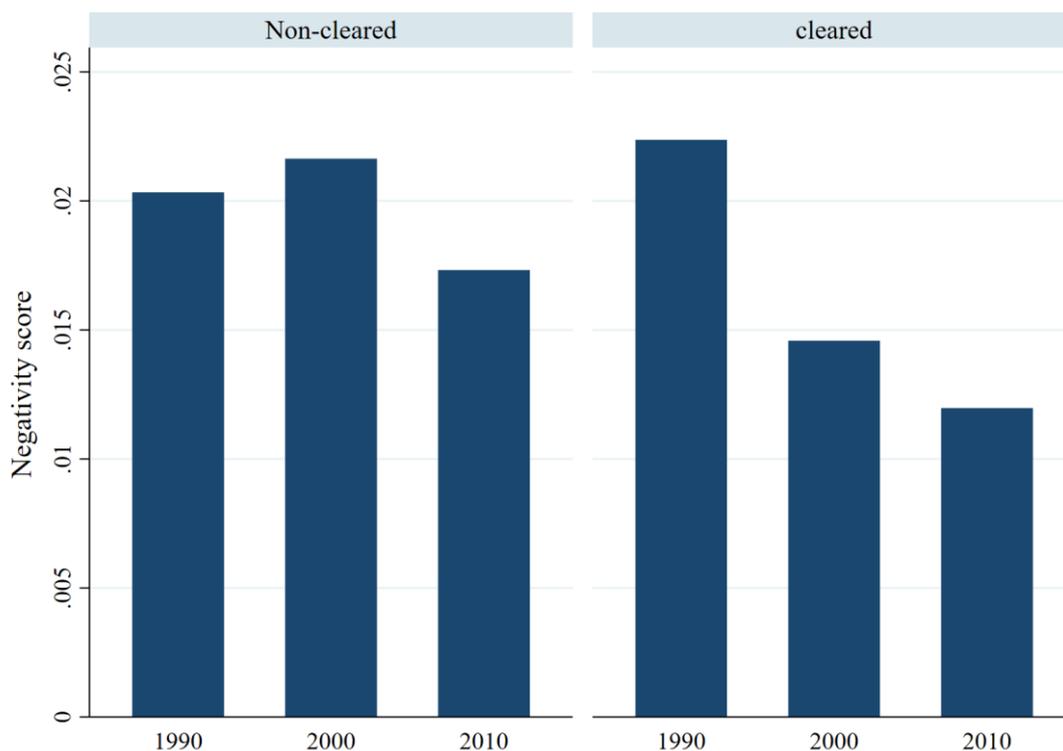


Fig. 9 Tonality per decade, cleared vs. non-cleared cases

Consequently, the tonality per commissioner is also more negative for those who were in office in the 1990s than later on. Tab. 4 summarises the tonality scores for every commissioner and lists them in decreasing order: Leon Brittan has the most negatively connoted cases whereas Margrethe Vestager has the least negative cases. These findings are also broadly in line with the percentages of prohibitions and withdrawals per commissioner (see Fig. 5 for comparison). As a result, a commissioner with a higher rate of prohibitions has a more negative tonality and vice versa.

Tab. 4 Tonality per Commissioner in order of decreasing negativity score.

Commissioner	positive	negative
Leon Brittan	0.0131	0.0241
Karel Van Miert	0.0110	0.0204
Mario Monti	0.0069	0.0157
Neelie Kroes	0.0062	0.0140
Joaquín Almunia	0.0068	0.0128
Margrethe Vestager	0.0065	0.0113

4.3. Classification

In this section, we build a linear classification model which in order to identify the non-cleared cases from the cleared cases. A support vector machine (SVM) model developed by Vapnik and Cortes (1995) categorises our data based on a given training dataset. In the categorisation of machine learning algorithms, the SVM is an individual supervised classification task, alongside generative naïve bayes approaches and other discriminative algorithms like decision trees. The basic idea of SVMs, as described in detail by Baharudin et al. (2010), is to optimise the separation between differently categorised data points in a n-dimensional space. Therefore, SVM maximises the margin between the two distinct categories. This so-called hyper-plane distinguishes which document belongs to a certain category and declares the points which are close to it as the support vectors. According to Baharudin et al. (2010), the main advantage of SVMs over other techniques is the general classification effectiveness and ability of handling high-dimensionalities in the input space whereas a major drawback is the complexity of the algorithm which requires a lot of calculating time and memory capacity. For an overview over different classification methods and their practical implementations, see also Wiedemann (2016).

We implement a SVM for our dataset implemented in the statistics software R (R Core Team, 2020). First, we label our training dataset according to the associated categories. We select a sample of 300 cases with 48 non-cleared cases and 252 cleared cases. We label each of them as cleared or non-cleared, according to their known status. We implement the SVM in R with the Liblinear package created by Helleputte (2017). For this purpose, we reduce the dimensionality of our Document-Term Matrix (DTM) in order to create a sparse matrix with only 26'492 features, compared to 163'019 single terms in the original matrix.

Tab. 5 SVM prediction versus test labels

		Test Labels	
		No	Yes
Predicted Labels	No	6	1
	Yes	3	51

As summarized in Tab. 5, the share of true positive predictions, also called type I error, gives a precision of over 94%. The share of true positives which are correctly identified as such, referring to type II errors, lies at 98% and is commonly expressed as recall (Fritsche, 2019).

The accuracy, that is the share of correctly estimated labels, achieved by our model is more than 90%, indicating that this method is very well suited for our task. The true negative rate specificity is 0.67 and the F-value 0.96. Tab. 6 summarises all these results.

This outcome is also in line with findings described by Wiedemann (2016), who summarizes different studies for simple categorizations which achieve a high accuracy level with automatic classifications. These methods for classifying documents are able to predict the correct proportions of the categories very well.

Tab. 6 Evaluation SVM

Precision	Recall	Specificity	F-Value	Accuracy	Pos.
0.9434	0.9803	0.6667	0.9615	0.9333	51.00

5. Estimation

In order to complement our analysis of the withdrawn and prohibited merger cases, we estimate the impact of our obtained determinants on the decision of the merger review. If we obtain significant effects of the previously discussed determinants, we are able to explain the outcome of the merger review, at least up to a certain extent (for more information about the interpretation of the models, see the discussion in section 5.2).

5.1. Model set up

As our variable of interest is the final decision of the merger review process, we distinguish between two possible outcomes: First, the merger is eventually cleared or, second, it is not cleared and therefore either prohibited or withdrawn from further consideration. These two unrelated groups form our dichotomous dependant variable *clearance*. Therefore, we first set up a basic binomial logistic regression model to explain the final decision as the dependent variable. In particular, we set *clearance* equal to 1 if a merger is cleared and 0 otherwise:

$$clearance = \begin{cases} 1 & \text{if cleared} \\ 0 & \text{if not cleared} \end{cases} \quad (1)$$

Firstly, we resample our data in a random manner and subsequently test smaller subsamples repeatedly for normality. As a result, the Shapiro-Wilk test statistic shows a p-value < 0.05 and so we can reject the null hypothesis of a normal distribution (Shapiro and Wilk, 1965).

Now, we continue with a binomial logistic regression model to estimate the probability p of the occurrence of a clearance which is defined as:

$$p = \frac{1}{1 + e^{-z}} \quad (2)$$

In our case, the following equation defines the logits z :

$$z_c = \beta_0 + \sum_{j=1}^J \beta_j \cdot x_{j,c} + u_c \quad (3)$$

with c as every individual case, j as the number of independent variables, $x_{j,c}$ as the corresponding characteristics of the variables j for case c and u_c as the error term. Our logit regression is then the following:

$$\begin{aligned} \text{logit}(p) = \beta_0 + \beta_1 \text{EntryBarriers} \\ + \beta_2 \text{Dominance} + \beta_3 \text{MarketShare} + \beta_4 \text{Collusion} + \beta_5 \text{NetworkEffect} \end{aligned} \quad (4)$$

where we use the full sample with the different competitive concerns as explanatory variables such as market share, dominance, collusion, entry barriers and network effects.

We now continue to improve our models by adding year and sector fixed effects. As we have seen in section 3.2, time seems to have an important influence on the final decisions. Although the number of merger notifications rises every year, the ratio of prohibited cases is declining constantly. Moreover, merger cases which were submitted before 2002 have a higher likelihood of prohibition than in the years afterwards. In this context, the Commissioners in charge in the 1990s have higher ratios of prohibitions than their successors in office in recent years. Thus, we also include time fixed effects in our regression model to capture variations regarding seasonal effects. Moreover, we also include the various economic sectors as independent variables. When we test for an overall effect of these sectors, we find the effect statistically significant at the 10% level. Our model is therefore expanded to the following:

$$\begin{aligned} \text{logit}(p) = & \alpha_i + T_t + \beta_0 + \beta_1 \text{EntryBarriers}_t \\ & + \beta_2 \text{Dominance}_t + \beta_3 \text{MarketShare}_t + \beta_4 \text{Collusion}_t + \beta_5 \text{NetworkEffect}_t \end{aligned} \quad (5)$$

where T_t are the time fixed effects and α_i the corresponding sector effects.

5.2. Results and discussion

These regression results for our sample are summarized in Tab. 7. For the first specification, we turn to Model I. In terms of coefficients, all of our competitive concerns are highly significant at the 1% level. As expected, all of our coefficients have a negative sign, indicating a lower probability of getting clearance if these competitive concerns are mentioned. These results are line with our findings from section 3.2. The explanatory power of this first model is expressed in terms of the pseudo R^2 at 16,92% which provides an adequate value, given the limited amount of information available. Further, we apply the Receiver Operating Characteristic analysis (ROC) as described by Fawcett (2006). The area under the ROC curve of 0.77 confirms the findings from the R^2 as it is greater than 0.5, at which point the model would have no predictive power.

Our results indicate the overall importance of competitive concerns in the cleared versus the prohibited cases. We test these independent variables and their degree of correlation in order to identify possible issues with multi-collinearity. The highest correlation is found between *dominance* and *market share* but at an acceptable level (0.23). For Model II, we also incorporate year fixed effects. As a result, the coefficients become more negative, except for *collusion*, which stays nearly constant. In Model III, which further takes sector fixed effects into account, we still obtain highly significant and negative coefficients and our explanatory power increases to 20%.

Tab. 7 Regression results for different model specifications.

Dependent variable:	(1) Model I - Full sample	(2) Model II - Full sample	(3) Model III - Full sample	(4) Model IV - Sector J	(5) Model V - Sector J
Clearance					
Entry Barriers	-1.165*** (0.181)	-1.225*** (0.188)	-1.269*** (0.192)	-0.944 (0.654)	-1.138 (0.747)
Dominance	-1.010*** (0.143)	-1.283*** (0.155)	-1.246*** (0.157)	-0.764* (0.417)	-0.759 (0.466)
Market Share	-1.882*** (0.115)	-2.041*** (0.120)	-1.952*** (0.122)	-1.082*** (0.300)	-1.320*** (0.333)
Collusion	-1.336*** (0.263)	-1.325*** (0.267)	-1.292*** (0.270)	-1.415* (0.757)	-2.137** (0.862)
Network Effect	-1.796*** (0.384)	-1.689*** (0.394)	-1.833*** (0.412)	-2.221*** (0.719)	-2.046** (0.810)
Constant	3.467*** (0.101)	3.252*** (1.257)	2.211* (1.220)	2.659*** (0.238)	2.221*** (0.659)
Observations	5,921	5,921	5,887	541	535
Year FE	No	Yes	Yes	No	Yes
Sector FE	No	No	Yes	No	No
Pseudo R2	0.164	0.182	0.200	0.111	0.174

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

As shown in the last two specifications, Models IV and V, we then focus only on the sector with a relatively high number of prohibitions: sector J, consisting of companies in the information and communications industry. In this sector, the occurrence of high market shares, network effects or collusion seems to clearly lower the chances of clearance. On the contrary, entry barriers and the occurrence of dominance are not significant. These findings are compared

with a recent study conducted by Argentesi et al. (2019), in which the authors analyse some broadly discussed merger cases in the digital sector. They find network effects as one of the main determinants, amongst others, of the theories of harm in the European merger review process. As they state, the occurrence of network effects does not automatically and in every case result in competitive concerns but these concerns can arise when network effects contribute to entry barriers or limits of expansion. Therefore, network effects can have an indirect influence on other competitive features in digital markets.

In addition, we also test splitting the sample into two distinct time series. We are thus focussing only on the decisions before 2002, which was the turning point in the ratio of prohibitions in our sample (see section 3.2). As we have seen, the number of prohibitions and withdrawals decreased substantially after the year 2002. The obtained results are reported in Tab. 8. Interestingly, the occurrence of network effects is not significant in all three specifications, indicating no effect of network effects on the probability of clearance. This can be explained by the emergence of digital businesses models only in the last few years whereas before 2002, network effects did not play such a crucial role. The coefficients of market shares are also much less significant. In contrast, the effects of entry barriers, dominance and collusion is unchanged to the whole timespan. In this context, several studies from various researchers have analysed the impact of the 2004 reform on the relevance of certain concepts of competition policy. For instance, Affeldt et al. (2020) identify a shift towards more complex indicators such as barriers to entry a market after 2004. Contrary, Duso et al. (2013) also examine the merger reform empirically and find barriers to entry less frequent after 2004 whereas dominance of firms (defined as a market share higher than 50% before the merger for one party) is unchanged after the reform. These interesting findings are however restricted due to the time horizon of the dataset only until 2007. Our results are of course not completely comparable due to the different cut off year and also due to differences in the data and methodology. Still, we are able to confirm our results from the descriptive statistics and the text analysis.

Tab. 8 Regression results for the cases decided before 2002

Dependent variable: Clearance	(1) Model I	(2) Model II	(3) Model III
Entry Barriers	-0.960*** (0.362)	-1.114*** (0.376)	-1.105*** (0.381)
Dominance	-1.408*** (0.219)	-1.556*** (0.228)	-1.447*** (0.231)
Market Share	0.251 (0.208)	0.377* (0.216)	0.403* (0.222)
Collusion	-1.672*** (0.546)	-1.802*** (0.559)	-1.720*** (0.565)
Network Effect	-0.865 (1.018)	-0.811 (1.043)	-0.709 (1.079)
Constant	2.023*** (0.171)	1.144 (1.196)	0.991 (1.284)
Observations	1,215	1,215	1,170
Year FE	No	Yes	Yes
Sector FE	No	No	Yes
Pseudo R2	0.0728	0.102	0.115

For our results, albeit they are mostly coherent to our descriptive analysis, it should be noted that the explanatory power of the models is certainly limited due to the missing information about the exact number of competitors in the market, the arising market shares post- merger or the exact numbers for revenue streams and other, classified financial figures about the merging companies. These missing data are treated as confidential and are therefore not made available for the public. In the final decision documents, the actual numbers are mostly blackened. Against that background, we are well aware of possible issues regarding omitted variable bias. This could lead to biased coefficients in our regression results. Another important aspect is the small number of prohibitions and withdrawals in comparison to the vast amount of cleared cases. This also lowers the power of estimation. As the limitation of information is unfortunate, we are still able to confirm most of our results from the previous sections which provide us with a clear indication of the effects of our obtained variables.

6. Summary and Conclusion

In this paper, we have collected all EU merger cases from 1990 until the end of 2019 and constructed a subsample of all non-cleared decisions. These include cases which were either prohibited by the EC due to serious competitive concerns such as high barriers to entry for new competitors in the market, increasing market power for the merged entity or a higher risk for collusion post-merger or the merger notification was withdrawn by the companies themselves. Such withdrawals are less costly for the merging parties when the prospect for clearance is low and the case is transferred into an elaborate and time-consuming second phase of investigation. We observe a sudden decline in prohibitions after 2002 and identify three successive defeats before the Court of First Instance against the European Commission's decision as possible reasons for this development, which are in context of the reform of the Merger Regulation in 2004. Furthermore, we distinguish the decisions by the corresponding economic sectors and find a higher likelihood of prohibition in the sectors which incorporate companies operating in the communications and information sector, as well as the transport sector. When we employ an automated text analysis on our corpus of documents, we confirm our hypothesis that the merger decisions which were cleared have a more positive tone than the ones which were rejected. As we distinguish between a binary outcome, that is clearance or no clearance, we are able to perform a highly accurate automated classification task. Finally, when we estimate the effects of competitive concerns on the decision variable, we find significant influences of the occurrence of entry barriers and high market shares on the outcome. For mergers between companies operating on platforms, network effects play an increasing role and contribute to a higher rate of prohibitions, up to a certain extent. As the growth of digital businesses will further increase in the near future, these network effects will be examined more closely, as alluded to by Vestager (2020):

“Digitisation, for instance, can transform the way markets work. It can give the biggest companies more power than ever – thanks to the insights from huge collections of data, or the big networks that make a service attractive to users. So

we want to see if digitisation means we need to change some aspects of the way we assess how a merger affect competition.”

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Appendix

Code	Sector
C	Manufacturing
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
K	Financial and insurance activities
J	Information and communication
H	Transporting and storage
D	Electricity, gas, steam and air conditioning supply
N	Administrative and support service activities
L	Real estate activities
B	Mining and quarrying
F	Construction
M	Professional, scientific and technical activities
I	Accommodation and food service activities
E	Water supply; sewerage; waste management and remediation activities
Q	Human health and social work activities
R	Arts, entertainment and recreation
A	Agriculture, forestry and fishing
O	Public administration and defence; compulsory social security
S	Other services activities
P	Education
T	Activities of households as employers
U	Activities of extraterritorial organisations and bodies

Tab. 9 Classification of Economic Activities in the European Community, Rev. 2 (2008), sorted by frequency in our dataset

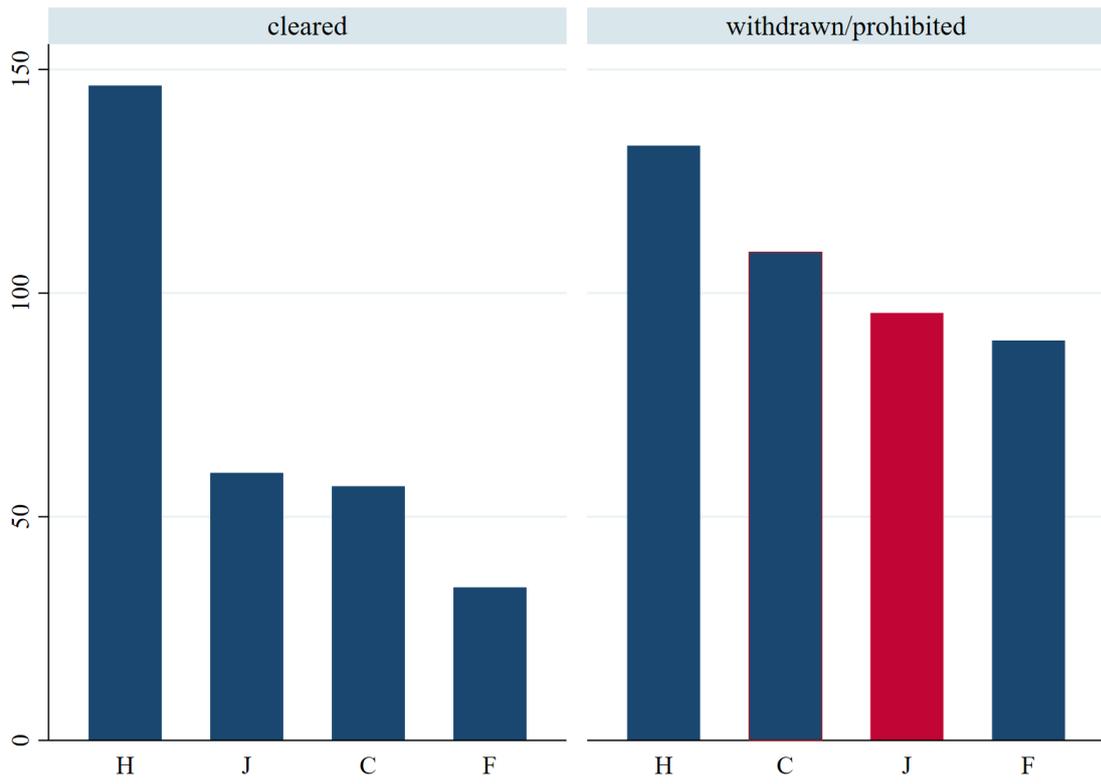


Fig. 10 Comparison of longest review processes (duration) per sector between cleared and non-cleared cases.

2020

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