



KU LEUVEN

LAW FACULTY

Academic year 2019 - 2020

# **Predicting fines under EU antitrust law: the quest for a magic formula**

**An analysis of fining practices by the EU Commission between 2006  
and 2020 in antitrust cases**

Promotor: Prof. Phd. **W. Devroe**

Corrector: Prof. Phd. **T. Incalza**

Master thesis submitted by

**Bruno Van den Bosch** for final exam  
to obtain the degree “MASTER IN DE  
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# Abstract

*This master-thesis analyses the fining practices by the EU Commission in antitrust cases between 2006 and 2020. More specifically, I applied a multiple linear regression model to tackle both the protectionist hypothesis, the allegation the EU Commission treats US undertakings unfairly, and the more broad "black box"-problem in antitrust enforcement, the fact we do not know how the Commission arrives at specific figures in its fining decisions. The paper argues for a "fining formula thesis". Meaning, the EU Commission is suspected to use some form of coherent methodology beyond what is said in the fining guidelines to arrive at specific figures to set the fine. Secondly, this paper suggests that at least in respect to US undertakings, apparent bias disappears once controls by other relevant factors are added such as turnover. Lastly, the "fork" for potential fines is narrowed given the empirical data.*

# Acknowledgments

The presented master-thesis is the result of a good collaboration between my promotor and supervisor, and me. I acknowledge the help of Friso Bostoen, who patiently answered my many emails about methodological questions and professor Devroe, who (as he also put it himself) was the first to appreciate me as a (student-)academic and was personally involved in this project. As the reader will notice, this master-thesis to obtain the degree of "master of law", heavily relies on a mathematical toolbox. I thank both promotor and supervisor to give me the chance to do this methodological experiment. Professor Van Cayseele was very kind to check my research proposal for flaws in the model, and his comments were of great assistance for the development of the project.

A professor once said after reading an early draft of one of my projects: "He is crazy but he is really good at hiding it." I thus would like to thank Jasmien Baeyens, Louise Van Damme, and Annemie Van de Vliet who helped me to develop my ideas and helped me communicate them better. I hope if any craziness remained in this project, it is made explicit in the "limitations". The many discussions I had with Fien Apers and Alex De Klerck about mathematics (and physics) kept the skills I needed for this research up to date, and were a reminder to develop them further.

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Gillis Waelkens also deserves special mention in that respect. He helped me to get started as a (student)researcher since my bachelor-thesis and has discussed every subsequent research project I have presented to him clearly and thoroughly with me.

This master thesis was partly written while abroad in New-Zealand. When I arrived at Auckland international airport, I "knew no one for thousand of kilometers". Thank you, Caitlin Hemminga, Alissa Woodley, Luke Chew, Gabi and numerous others for making sure there will not be a location left where there is not at least *one* friendly face within a few thousand kilometers.

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# Part I

## Introduction

### 1 Introduction to EU antitrust enforcement

#### 1.1 Problem statement

Two American presidents in row have accused the European Commission (hereafter “Commission”) of acting in a biased way against their home companies in competition cases. President Obama did so in 2015 saying Europe was acting in a protectionist way in regard to technology,<sup>1</sup> and Donald Trump lashed out in June 2019 citing antitrust cases against Facebook and Google, on the day the Commission acted against Broadcom.<sup>2</sup> American media picked up on this narrative. When Commissioner Vestager gave an interview to CNBC on the day of the Google Shopping decision, she was asked directly about why she was treating American companies so unfairly, if it was because European competitors could not keep up.<sup>3</sup>

This political bias allegation is long-running and got a boost by the GE/Honeywell case and the Boeing/McDonnell Douglas merger in 1997.<sup>4</sup> In academic literature,<sup>5</sup> the accusation became known as the “*protectionist hypothesis*”: both in merger and antitrust cases US firms are treated unfairly by the Commission because of political bias.

The issue has been studied mostly in merger cases, as will be clear from the literature review. Methodologically this seems a good place to start since it is more straightforward than cartel (art. 101 TFEU) or abuse of dominance (art. 102 TFEU) cases. Either a merger is blocked or not, compared to a dependent variable which is a continuous figure (the fine). The binary set-up in merger cases enables research to analyze the Commission’s track record towards a clear conclusion using probit or logit regressions. If the fact a firm is US strongly predicts a blocked merger, the hypothesis can be suggested to be proven. However, the more complex antitrust cases can hide bias in plain

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<sup>1</sup>Murad Ahmed, Duncan Robinson and Richard Waters, “Obama attacks Europe over technology protectionism”, *Financial Times* 17 februari 2015.

<sup>2</sup>Kiran Stacy, Rochelle Toplensky and Demetri Sevastopulo, “Donald Trump attacks EU action against US tech groups”, *Financial Times* 27 juni 2019.

<sup>3</sup>As retold in: Thomas Hebsgaard, “Dit is de Eurocommissaris die Google miljarden boetes oplegt (en ze is nog lang niet klaar)”, *de Correspondent*, 19 juli 2018.

<sup>4</sup>Roberto, S. “Boeing/McDonnell Douglas merger review: A serious stretch of European competition powers.” *Brooklyn Journal of International Law*, 24 (1998), 593–616; Priest, G., and F. Romani. “The GE/Honeywell precedent.” *The Wall Street Journal*, (June 20 2001), p. A-18.; Aktas, N.; E. de Bodd; M. Levasseur; and A. Schmitt. “The emerging role of the European Commission in merger and acquisition monitoring: The Boeing/McDonnell Douglas case.” *European Financial Management*, 7 (2001), 447–480.

<sup>5</sup>See each of the studies mentioned in the state of the art overview



sight. It is difficult to assess whether a fine was "higher than it should have been" or "lower than it should have been", at least there is more gray area in pinning a specific continuous figure down as a result of bias, compared to the binary set up. Therefore, it might be useful to dig deeper into these complex cases to support or oppose previous literature, which mostly exonerated the Commission.

Trying to address the factor of political bias in antitrust enforcement directly and in isolation is useless. Firstly, because it was not even known if there was any inherent structure in fining practices. There are many discretionary points laid out in the fining guidelines, non of which are said to result in specific factors. At most a minimum and maximum are given.<sup>6</sup> It is not only a question of "is there political bias?", but even for purely European companies there is much uncertainty about how their case is being assessed. As a EU General Court judge who reportedly asked in the *Graphite carbon* case where these "magical numbers" came from, we are left to guess how the specific figure of a fine is determined.<sup>7</sup> The fining practices of the Commission are a "black box".

These considerations, both about the protectionist hypothesis and the black box, led to the following literature review. Section 1.2 will give the state of the art of the protectionist hypothesis and EU competition enforcement more broadly. I also looked at American literature about competition enforcement because of their long history of reviewing the US Department of Justices (hereafter, DoJ) track records.

## 1.2 The state of the art

### Literature review methodology

the literature review aimed to find studies about authority's conduct in competition cases. A topical divide was kept between conduct in merger and in antitrust cases. I searched for studies with an empirical or econometric methodology which focused on the decision making process or which advised certain practices in antitrust enforcement decision-making. Those studies also needed to be peer reviewed or referenced by peer reviewed studies.

Once literature was selected, each paper was coded in excel using the following categories: "title, author, journal, year, keywords, type of article, 101/102 or example (mergers), research question, method, model, main finding, note and, the reference".

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<sup>6</sup>This will be clear in the discussion under Subsection 3.1 Transparently communicated factors.

<sup>7</sup>Patrick Van Cayseele, Peter Camesasca and Kristian Hugmark, 'The EC Commission 2006 fining guidelines reviewed from an economic perspective: risking overdeterrence' (2008) 53 *The Antitrust Bulletin* 1083.

Specific articles were selected accordingly: a non-systematic search yielded starting articles on the topic. Secondly, references were checked of those peer reviewed articles. Database Limo was searched using the following keywords: “merger decisions, decision Commission, fining guidelines, cartel fines, econometric Commission.” The same keywords were used in SSRN. However, most results were found by looking up references in recent articles provided to me and snowballing backwards.

In total 18 studies formed the core of this literature review (footnotes: 5-33). They will be discussed in the next paragraphs, divided between literature: (i) on US antitrust literature, (ii) on EU merger control, (iii) on EU antitrust enforcement. The last topic is further divided between the topical questions: (iiia) ”What should the fine be?” and (iiib) ”How does the Commission decide fines now?”.

### **Literature on US antitrust, specifically the Sherman act**

As Carrée, Günster and Schinkel (whose numeration of authors and structure will be used as a starting point for this literature review) point out: in the US there is a longer history of analysing decisions of competition authorities because the Sherman act dates back to 1890.<sup>8</sup> They list a series of articles. Keeping in mind the chronology of publication the story unfolds as such: Early studies include, firstly, Posner’s 1970 article “A statistical study of antitrust enforcement”, that statistically analyses the decisions and conclusions of cases. As the introduction puts it, Posner’s paper aims more to serve as an example and tries to close some methodological gaps;<sup>9</sup> Secondly, several articles by Gallo et al. who in their first article<sup>10</sup> updated the original article by Posner, focusing on length, number of cases and outcome. They continued to analyze the behaviour of the antitrust authorities in a more macro way (meaning, not looking at how specific cases are decided), for example by testing the Posners Plausible Hypothesis (is there a significant relation between economic activity and the Department of Justice (DoJ) actions?);<sup>11</sup>. More recent publications by

<sup>8</sup>Carrée, Martin, Günster, Andrea and Schinkel, Maarten, “European Antitrust Policy 1957–2004: An Analysis of Commission Decisions”, *Review of Industrial Organization*, (2010), Vol.36(2), pp.97-131.

<sup>9</sup>Richard A. Posner, ”A Statistical Study of Antitrust Enforcement,” *Journal of Law & Economics* 13, no. 2 (October 1970): 365-420.

<sup>10</sup>Josepu Gallo, Joseph Craycraft and Steven Bush, “Guess who came to dinner”, *Review of Industrial Organization*. (Summer 1985), Vol. 2 Issue 2, p106-130. 25p.

<sup>11</sup>or example: Vivek Ghosal and Joseph Gallo, “The cyclical behavior of the Department of Justice’s antitrust enforcement activity”, *International Journal of Industrial Organization*, 19 (2001) 27–54; Joseph Gallo, Kenneth Dau – Schmidt, Joseph Craycraft and Charles Parker, “Department of Justice Antitrust Enforcement, 1955–1997: An Empirical Study.”, *Review of Industrial Organization*, (August 2000), Vol.17(1), p.75(59); Joseph C. Gallo, Jos L. Craycraft and Shantanu Dutta, “Incarceration and fines: An empirical study of antitrust sanctions”, *Review of Industrial Organization*, (June 1986), Volume 3, Issue 2, pp 38–66.

Ghosal and Stennek<sup>12</sup> which also include articles on EU competition law approached in an economic way rather than the strictly legal analysis of a situation, mainly looking at how to approach antitrust infringements and why; Recently Baker also provided evidence for the benefits of antitrust enforcement;<sup>13</sup> Lastly, Kovacic and Shapiro map how thinking about competition law changed from the enactment of the Sherman act in 1890 up until 2000.<sup>14</sup>

One aspect of the Sherman act that has been discussed by Page, concerns damages that can be awarded for antitrust infringements.<sup>15</sup> Page argues that damages should not be awarded in case the result of the cartel was not inefficient. He makes this legal claim based on an economic analysis of cartels and damage. Another aspect of the Sherman act that has been discussed is the international effect of the act. Connor researched the question to what extent the act needed to apply to non-US companies and concluded that in order to be efficient and effective, it did need to apply to non-US companies.<sup>16</sup>

This so called “efficiency defence” could be reference to two possible situations: a cartel that was beneficial for the consumer or a case where a cartel did not work and thus could not create negative effects. Both American and European authorities make some allowances, however, a general efficiency defence is not recognized.<sup>17</sup>

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<sup>12</sup>Vivek Ghosal, V., and Johan Stennek, *The political economy of antitrust*. Amsterdam, Science Direct, (2007), 1-489.

<sup>13</sup>Jonathan Baker, “The Case for Antitrust Enforcement.” *Journal of Economic Perspectives*, (2003) 17 (4): 27-50.

<sup>14</sup>William Kovacic and Carl Shapiro “Antitrust Policy: A Century of Economic and Legal Thinking.” *Journal of Economic Perspectives*, (2000), 14 (1): 43-60.

<sup>15</sup>William Page, “Antitrust damages and economic efficiency: an approach to antitrust injury”, *The University of Chicago Law Review*, (Spring 1980), Vol.47(3), p.467.

<sup>16</sup>John Connor, “Extraterritoriality of the Sherman Act and Deterrence of Private International Cartels”, *IDEAS working paper*, (2005).

<sup>17</sup>This this goes beyond the scope of the research. I will briefly address the way American and European antitrust enforcement deal with the defence. In the first situation both the OECD, the EU and the FTC recognize that in some limited cases cartels could benefit the consumer. These instances relate mostly to instances of collaboration in research and development, marketing and production, which would reduce costs and as a result reduce the price for the consumer. In EU law this would generally fall under the defence of article 101 (3) TFEU. The EU for example issued in this regard a block exemption which applies to certain R&D agreements between competitors. The FTC, when applying the rule of reason, also in some cases takes into account the potential benefits. However, this possible exemption or relief is very narrowly defined and will not be applied de facto: for example, the FTC specifically says it will not look at possible benefits in per se illegal situations. In the used example of R&D cooperation, the EU also excludes the limited exemption they give in case of hardcore restrictions. On this first situation it seems that the “not inefficient cartel” theory is only considered in EU and US antitrust in a very restrictive way.

The second possible situation: cartels that did not enter into force, a brief answer can be given: the anti-cartel provision in the TFEU (art 101 TFEU) clearly states: “all agreements (...) which may affect (...)”. This seems to indicate that it is not necessary that it in fact “did” affect trade, thus not necessary the agreement was in effect at the time the Commission stepped in. A brief search for cases where this defence was raised and was effective did not yield results. It therefore seems that the Commission interprets the provision as illustrated

American literature does not seem concerned with political bias in DoJ cases and the hypothesis seems not even to be put forward in the same way the EU is accused of. American literature also seems more concerned with what the DoJ “has been up to” in relationship with social and economic situations than looking at what factors influence the DoJ in its decisions. This is in contrast with the literature on European antitrust, as will be shown in the following paragraphs.

### Literature on EU merger control

Multiple studies tried to find factors which influence merger decisions. I will list and discuss a selection in chronological order.

In 2003, Lindsay, Lecchi and Williams looked in an econometric way at merger decisions taken since 2000.<sup>18</sup> The study tested seven hypotheses, related to certain factors possibly influencing the Commission decision to act against the merger or not. They included entry barriers and the protectionist hypothesis. The study, which has a very extensive methodology and used a Logit regression approach, did, most noticeably, not find any political bias in the EU Commission’s decision in merger decisions.

Bergman and Roza also used a logarithmic regression to try and find what factors predict EU Commission merger decision outcomes.<sup>19</sup> The study did not find any effect of political factors, such as the nationality of the merging firms to influence the decisions. There was no evidence found for the protectionist hypothesis.<sup>20</sup>

Özden, who studied the same protectionist hypothesis in the same year as Bergman and Roza, did find influences of political factors.<sup>21</sup> Özden claims influence of: “(1) the nationality of the acquired firm, (2) the market presence of merging firms in Europe and (3) the market presence of other American

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above. (OECD: briefly on their site: <http://www.oecd.org/competition/cartels/>; EU as shown in article 101 (3) TFEU; FTC as shown in Antitrust Guidelines for Collaborations Among Competitors of April 2000; Methodology of brief search: databases used: google scholar, Eurlax. Search terms: “failing cartel (EU)”, “efficiency defence cartel (EU)”, “cartel did not work EU” (used in google)).

<sup>18</sup>Alistair Lindsay, Emanuela Lecchi And Geoffrey Williams, “Econometrics study into European Commission merger decisions since 2000”, *European Competition Law Review*, Dec, (2003), Vol.24(12), p.673-682.

<sup>19</sup>Mats Bergman, Marie Jakobsson and Carlos Razo, “An Econometric Analysis of the European Commission’s Merger Decisions”, *International Journal of Industrial Organization*, (2005), vol. 23(9), pp. 717-737.

<sup>20</sup>This study has been cited by other selected articles such as: Duso, Gugler and Szücs (2013), Melnik, Shy and Stenbacka (2008), and Davies, Olczak and Coles (2011), (the last one will be discussed later on), footnotes 20, 21, and 22 for full references.

<sup>21</sup>Çaglar Özden, “International Dimensions of Competition Policies: European Responses to American Mergers”, *Revue économique*, (1 November 2005), Vol.56(6), pp.1413-1442.

*firms in Europe in that industry.*"<sup>22</sup> This seems surprising because on the first point Bergman and Roza explicitly did not find any proof. Özden first shows a theoretical importance of the political variables before diving into a logit regression, similar to the Bergman and Roza study. The number of mergers was larger for the Özden study (209 versus 96 mergers) but the methodology both followed the same built up, although the formulas used to predict the Commissions decisions were different. This raises the question why the studies concluded the opposite with regards to the protectionist hypotheses. A detailed comparison of both studies is therefore explained the difference. The built up of this comparison is as follows: First, a comparison will be made with regards to the "hypothesis 0", meaning the hypothesis that was tested, in each study. How the question delineates the problem might result in different methodologies and thus different results. Secondly, the proxies used for the relevant factors (in this case home-bias of the Commission), will be compared. Thirdly, the regression formulas will be compared. And lastly the data itself will be checked based on exclusion and inclusion criteria used. On this last point it is important to note that the Özden study used more than double the amount of decisions Bergman and Roza did.

Right from the start both studies have a different goal: Özden is out to proof political factors matter, while Bergman and Roza are more interested in a more global overview of factors that might matter. This is why Özden first sets out theoretically why those political factors would matter before starting to look into the data. This also results in different proxies used for the protectionist hypothesis. Where Özden defines five factors approaching whether there is a protectionist tendency (including whether the acquired firm is European and the market share of the US firm in Europe), Bergman and Roza's only factor to test this effect is a binary question whether the company is US based or not. Both mostly operate on the assumption that a company other than European would be a US based company, which is in line with the origin of the protectionist hypothesis. The regression used is both a Logit regression and although the built up is different both models approximate logistic functions.

The data scope is different. Bergman and Roza took into account every decision up until 2002 and excluded doubles and decisions not readily available or mergers that were withdrawn, and they ended up with 96 decisions. However, Özden looked at a time frame from 1995 till 1999, which does overlap the decisions in the Bergman and Roza study but did not mention any data cleaning (such as excluding doubles) and ended up with a larger sample.

Given all of the above the following conclusion can be drawn. Even if Bergman and Roza did not use extended proxies to test the hypothesis (since it was not their main goal), the pure criterion "is this a US firm", sufficiently addresses the protectionist hypothesis. The purest form of the hypothesis is that the mere fact an undertaking is US results in unfair treatment and would be enough to

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<sup>22</sup>Çaglar Özden, "International Dimensions of Competition Policies: European Responses to American Mergers", *Revue économique*, (1 November 2005), Vol.56(6), in abstract.

tilt the decision. Since it is not clear if doubles were filtered out in the Özden study, potentially tainting the result significantly, the Bergman and Roza study seems more trustworthy.

In a similar time-frame, Aktas, De Bodt, Delanghe and Roll looked at EU Commission decisions with regards to mergers during the 1990s.<sup>23</sup> The approach and aim of the study was, however, completely different. The study sets out to prove that merger control is not about going against monopoly power but is instead about protectionist power. Subsequently, the European jurisdiction was chosen because the jurisdiction was not free of accusations of being protectionist. Instead of just looking whether the nationality of the merging firms were a factor, this study looked at what impact the merger would have on competing EU firms, by looking at what a merger within the market would mean for the bottom line of those firms. The study also took into account what the impact of the merger would be on competition within the market. The study did account for the risks of endogenous factors mudding the statistics. The conclusion was that most mergers that got reviewed and were discussed by the Commission did not amount to a risk of monopoly but actually heightened competition. Secondly, that there was a certain relation between mergers of non-EU firms risking to hurt EU based firms and an intervention of the EU Commission. In conclusion this study clearly suggests a protectionist tendency of the EU Commission. This seems to support Özden's conclusion. However, because Özden did not define protectionist the same way, the studies' methodologies do not line up, meaning one study cannot support the other. Aktas, De Bodt, Delanghe and Roll defined a protectionist tendency as protecting against actual impact against "home" firms, and quantified that impact, while Özden assumed bias against firms just based on nationality, without taking into account market share in different jurisdictions. It would be a mistake to think Aktas, De Bodt, Delanghe and Roll concluded a general bias against foreign firms. Bergman and Roza looked at this exact factor, the plain fact that the firm was US based, and did not find a general bias. The Aktas et al. study described in this paragraph does not negate that conclusion.

In 2011 the same authors as in last paragraph looked at the protectionist hypothesis again.<sup>24</sup> Aktas, de Bodt, Delanghe and Roll noticed a change in behaviour in 2002 and concluded that, after 2002, the Commission was less biased against foreign mergers. Important factors they put forward included the deal size, the acquirer's size and the value creation of the deal. The study also aimed to find a relation between the stock market reaction and merger decisions by the Commission. The conclusions reached in their 2011 study were, acknowledged by the authors, contrary to the conclusions reached in their

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<sup>23</sup>Nihat Aktas, Eric de Bodt, and Richard Roll, 2007. "Is European M&A regulation protectionist?" *Economic Journal* 117, (2007), 1096–1121.

<sup>24</sup>Nihat Aktas, Eric de Bodt, Marieke Delanghe and Richard Roll, "Market Reactions to European Merger Regulation: A Reexamination of the Protectionism Hypothesis," *Working Paper, AFFI Conference*, (2012).

2007 study. his supposed change in behaviour does not explain the different conclusion reached by Özden versus Bergman and Roza, since Bergman and Roza only looked at mergers up until 2002 in an overlapping time frame and the same consideration as at the end of last paragraph applies.

Davies, Olczak and Coles, also in 2011, tried to close some methodological gaps concerning the previous studies that tried to find the implicit model for merger decisions, most importantly that mergers may have an effect on several other mergers and this should be addressed in the models.<sup>25</sup> Secondly, they distinguished unilateral and coordinated effects. And lastly, the study criticizes the approach to the X variables in the analysis of previous studies. They argue that the use of categorical variables is not necessary and not methodologically sound because the Commission will justify its own decision. Therefore, analysing the decision in search of answers on these variables will not yield fair results. The study argues isolating factors is better done by empirical methods and careful sample selection. The previously mentioned Bergman and Roza study, is pointed out as using the criticized method. However, no political factors were reported on.

A very recent study (2018) on the protectionist hypothesis by Bradford, Jackson and Zytneck, also used a logistic regression including more recent data (decisions up until 2014).<sup>26</sup> The study researched the question whether the Commission was more severe to non-EU companies. The data set included 5000 cases over 25 years found in 6 sources (eg. SDC, factset financial services database, factiva, Zephyr, etc.). They determined a range of 6 dependent variables in order to capture different decision outcomes. However, it is important to notice this is an endogenous analysis, which called for robustness checks. The study did not find any proof for the protectionist hypothesis, moreover the study suggested the EU commission was, given the used data, less likely to challenge transactions by non-EU-acquirers. Given the extent of the data set, and given the nuance brought about by differentiating outcomes, and given the robustness checks did not call the conclusion into question, it seems this study can be assessed as convincing. Their conclusion that the burden of proof had now shifted towards those who claim the hypothesis can be supported.

**Conclusion for merger control** Most of the mentioned literature, when critically appraised, tends to conclude that, to date, there is no proof for the protectionist hypothesis. This denial of the hypothesis tends to be stronger in later studies, some earlier studies disagree with this denial. It is also important to note that every before mentioned study used a logarithmic regression in its

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<sup>25</sup>Stephen Davies, Matthew Olczak and Heather Coles, “Tacit collusion, firm asymmetries and numbers: Evidence from EC merger cases”, *International Journal of Industrial Organization*, Volume 29, Issue 2, (March 2011), Pages 221-231.

<sup>26</sup>Anu Bradford, Robert J. Jackson, Jr. and Jonathon Zytneck, “Is E.U. Merger Control Used for Protectionism? An Empirical Analysis”, *Journal of Empirical Legal Studies*, Volume 15, (2018), Issue 1, 165-191.

analysis and used similar data sets. They may in some extent (as the limits are explained in the text) be considered as for each other's control studies.

However, merger decisions are, to a larger extent, more straightforward than cartel and abuse of power fines: mergers go through (with conditions or not) or do not, as I also explained in the introduction. Fines can vary in size. Potential bias can thus not only hide in the fact that there is fine but also influence how high the fine is. Moreover, art 101 and 102 TFEU cases touch upon more non-binary assessments of situations. It therefore seems useful to apply the methodology used in the before mentioned studies to the fining practices of the Commission. In the next paragraphs I will first give an overview of law and economics literature concerning art. 101 and 102 TFEU.

### **Literature on EU antitrust enforcement**

In order to understand how authorities should react to cartels (e.g. the study by Page, see before and later on), it is important to understand how and when cartels do take place and what the impact of a cartel is.<sup>27</sup> Hylton 2009 points out why cartels are not desirable in a free market, this reasoning will be taken into account further in the study to find out what factors are relevant to a fining decision. The main conclusion of the Hylton study is the fact that companies, who operate in a market that is more to the oligopolic end of competition do benefit from forming a cartel. Therefore, it seems sensible to assume there will always be an incentive for such companies to do so, if it is not discouraged by the state. He also supports the theory that cartels *do* result in consumer and welfare loss. Therefore, in principle, it seems the state should act against cartels.

The introduction to cartels put forward in the last paragraph, needs to be nuanced to some degree.<sup>28</sup> As I mentioned in the introduction on the American literature, a study by Page concluded that, regarding damages, it does not make economic sense to impose fines on cartels that did not result in inefficiency. I mentioned, this inefficiency defence does not have a big impact on the existing legal framework: cartels that actually benefit the consumer can apply for an exemption under art 101 (3) TFEU under strict conditions and failing cartel defence does not seem to be an effective defence. In any case, this nuanced take, does not negate the basic idea put forward in Hylton's guiding study: a counter reaction is advised against the negative effects of cartels. The most important negative effect is inefficiency, thus, where there is no inefficiency, no damages nor fine are needed.

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<sup>27</sup>Keith N. Hylton, "Cartels", in Keith N. Hylton, *Antitrust law- Economic theory and common law evolution*, Cambridge university press, (2009) online, pages: 68-89.

<sup>28</sup>William Page, "antitrust damages and economic efficiency: an approach to antitrust injury", *The University of Chicago Law Review*, Spring (1980), Vol.47(3), p.467.



Getting back to Literature on European legislation and actions, the literature looked at can be split up in two ways: (a) what should be the result of the fine? and (b) how does the Commission decide fines?

***What should the result of the fine be?*** A first article about what the result of the fine should be, is a study by Camilli.<sup>29</sup> He researched what the optimal fine is in cartel cases and how the European guidelines for fines match up to this ideal. Although, the article goes into detail about to what fines for cartel infringements should address, it does not go towards a fining formula. Camilli concludes that the 2006 fining guidelines are more in line with economic principles than previous versions. However, the author acknowledges the fact that further research will have to prove this assessment in practice. Since the article came out the same year as the guidelines did, no test cases were available yet.

This optimism towards the fining guidelines is not shared in a study by Van Cayseele, Camesasca and Hugmark two years later.<sup>30</sup> Just as in the article by Page (see above), the study points out that it is possible that there are some effects to cartels that could be, to some degree, beneficial. Secondly, a fine should be used to deter the negative effects of a cartel. However, the study concludes that the 2006 guidelines go too far and risk over-deterrence, that is not supported by economics.

Veljankovski, who published the year before the Van Cayseele et al. article, also put forward the fact that fines calculated according to the 2006 guidelines are higher than before.<sup>31</sup> However, Veljankovski points out that the leniency programme significantly lowers fines, so much so that he concludes that they do not match up with consumer loss and, contrary to Van Cayseele et al, concludes that the actual fines did not deter price fixing.

***How does the Commission actually decide fines?*** An early study into what factors the Commission uses in order to fine, based on the guidelines before 2006, is a study by Geradin and Henry.<sup>32</sup> The study first looks at what factors decide the fine and the extent of the fine, and in a second part, looks at the appeals process (what factors result in a mitigating appeal decision). The study did list a great number of factors but did not focus on political factors.

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<sup>29</sup>Enrico Leonardo Camilli, "Optimal Fines in Cartel Cases and the Actual EC Fining Policy", *World Competition*, (December 2006), Vol.29(4), pp.575-605.

<sup>30</sup>Patrick Van Cayseele, Peter D. Camesasca and Kristian Hugmark, "The EC commissions 2006 fining guidelines reviewed from an economic perspective: risking overdeterrence", *The antitrust Bulletin*, volume 53, no 4, (2008), 1083.

<sup>31</sup>Cento Veljankovski, "Cartel fines in Europe, Law, practice and deterrence", *World Competition*, (March 2007), Vol.30(1), pp.65-86.

<sup>32</sup>Damien Geradin and David Henry, "The EC Fining Policy for Violations of Competition Law: An Empirical Review of the Commission Decisional Practice and the Community Courts' Judgments", *European Competition Journal*, 01 October 2005, Vol.1(2), p.401-473.

Nonetheless, the study did find some predicting factors for the extent of the fine. However, the study is based on decisions before the new fining guidelines came into effect and its conclusions might therefore be outdated.

A study by Carree, Günster and Schinkel looked at the same time period (start of the legislation till 2004) and provided a statistical analysis of the decisions of the Commission.<sup>33</sup> They categorised the decisions based on “*report route, investigation duration, length of the decision, decision type, imposed fines, number of parties, sector classification, nationality, and Commissioner and Director General responsible.*”<sup>34</sup> The article largely limits itself to presenting data, but does draw the conclusion that, given the extent of the Commissions reach, the Commission does not use its antitrust law to “frustrate non-EU-competitors”.

Lastly, Gual and Mas also aimed to find out what factors the Commission used in its assessment.<sup>35</sup> More specifically, they were interested in seeing to what extent and economic analysis is used by the Commission. They were not interested in political factors and tested factors on the industry level. The study reached its conclusions based on a probit regression, similar to those used in the merger decisions. However, the study is done based on decisions from before 2004, therefore the conclusions might also be outdated.

Lastly, no literature review about EU antitrust enforcement would be complete without mentioning Wils. He published numerous articles about antitrust enforcement and the application of specific variables, using a law and economics approach.<sup>36</sup> His research makes the ‘black box’ a little less opaque but still no answer has been given to how exactly specific values are quantified.

**Conclusion for Antitrust enforcement** There is precedent for studies trying to find the implicit model for fines. However, most studies focus on older data, mostly because of availability issues at the time of the study. As acknowledged in the literature, there has been a focus on merger decisions in recent years with regards to the bias question. A new study therefore seems possible including following the two following aims: (1) check the factors that were significant in old data set, against decisions taken after 2006 (when the new fining guidelines entered into force), to check whether any new conclusions

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<sup>33</sup>Martin Carree, Andrea Günster, Maarten Pieter Schinkel, “European antitrust policy 1957-2004: an analysis of commission decisions”, *Review of Industrial Organization*, (2010), Vol.36(2), pp.97-131.

<sup>34</sup>Numeration directly taken from abstract.

<sup>35</sup>Jordi Gual and Nuria Mas, “Industry characteristics and anti-competitive behaviour: Evidence from the EU”, *IDEAS Working Paper Series from RePEc*; St. Louis, 2007.

<sup>36</sup>Wouter Wils ‘Optimal Antitrust Fines: Theory and Practice’, (2006), 29 *World Competition*, 183; Wouter Wils ‘The European Commission’s 2006 Guidelines on Antitrust Fines: A Legal and Economic Analysis’ (2007), 30, *World Competition*, 197; Wouter Wils, ‘Discretion and Prioritization in Public Antitrust Enforcement, in Particular EU Antitrust Enforcement’, (2011), 34 *World Competition*, 353.

regarding potential bias may be reached (2) try to find the implicit formula for competition related fines, that predict the fine in a useful and significant way. An important factor that needs to be considered when looking at fines, is the leniency program. This became clear in the first part of the 101 and 102 literature. However, the same research hints at the leniency aspect to be largely independent from the "regular" fining process. Secondly, when trying to find factors on the basis of which fines are decided, it is important to have proxy factors for a supposed inefficiency in the market, as this is seen in the literature as a reason for governments to act. This factor would need to tell something about the actual market impact of an antitrust violation.

## 2 Methodology

### 2.1 Aims and objectives

The literature laid bare some gaps in the current state of the art: Firstly, there seems to be a real gap concerning the protectionist hypothesis in fining decisions, a gap that is absent in merger decisions. Secondly, the literature that I found on art 101 and 102 TFEU uses older data and I have been unable to find updated studies. Even studies published after the 2006 guidelines use data from before the enactment of the guidelines. This could be due to the need for data in order to do a linear, logit or probit regression. However, at this point in time, almost 14 years have passed since the introduction of the new guidelines.

The research in this master thesis aims to fill in parts of these gaps. The study took place over the course of one year, limiting the potential for too extensive data. However, since the new fining guidelines are only enacted 14 years ago, my research could still be exhaustive. My master thesis is partly an exploratory study, which updated the older studies with new data, while simultaneously testing the protectionist hypothesis.

The study's aim goes beyond modestly filling in the gap of the state of the art. In the introduction I explained that we did not even know if there was any structural approach to the Commission's fining practices. Besides testing (i) how variables influenced fining decisions in the past, and (ii) if the Commission has protectionist tendencies, my master-thesis assessed (iii) whether there was any structural approach to be uncovered.

Modestly, this last aim was defined as finding the "implicit" formula, which could predict fining decisions to a reasonable degree, meaning within a confidence interval exceeding 90%, or at least provide a prove of concept of a formula acceding to this threshold. However, this aim proved to be too modest during the course of the research and was changed to proposing a "fining formula thesis". The content of this proposition is that there *is* a structural, formula-like approach the Commission uses to quantify the fines.

In short: the study aims to determine (i) what factors and to what extent, influenced fining decision in the last 14 years, (ii) if any factors were of a political nature, (iii) and whether the Commission uses a structural approach to quantify fines. Therefore, the main research question is: “*How does the Commission decide fines regarding infringements of art 101 and 102 TFEU?*”

## 2.2 Research questions and approach

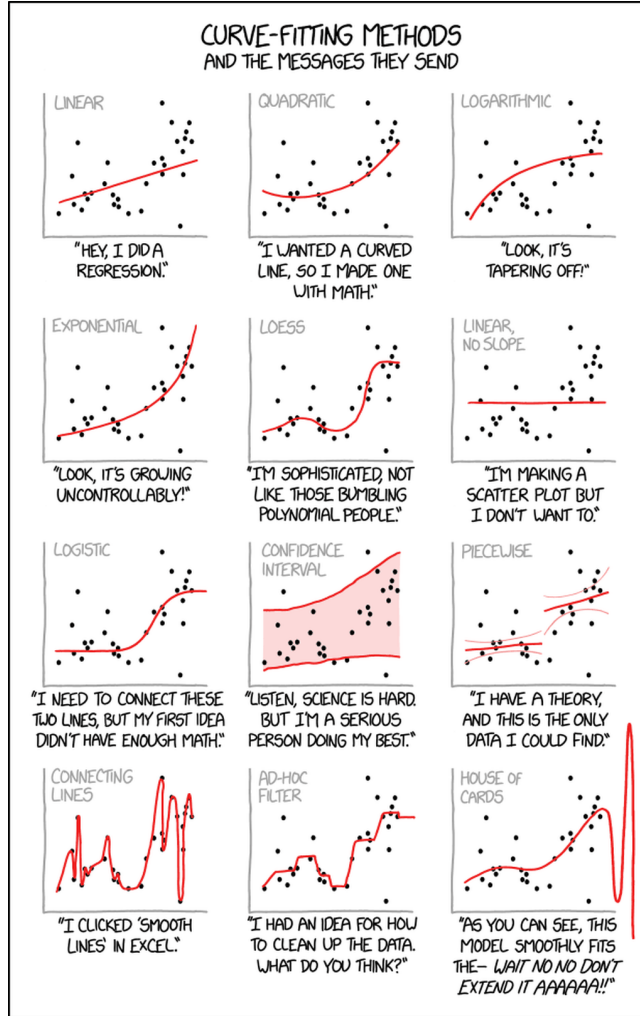
The main research question cannot be answered in one go. There are two possible methodological approaches to answer this question.

The first would be to do qualitative interviews with civil servants of the EU antitrust enforcement department. This is not feasible: firstly, because it is uncertain if those civil servants would have been present in the decision room the entire time-frame of the study (from 2006 till 2020), which is necessary to be able to tell if the approach is consistent. Secondly, it is very unlikely those civil servants would suddenly release this information (they did not do so in the past) nor give accurate information (it is logical they would just deny any allegation of bias.)

The second approach, and the one used here, is to *reverse engineer* how decisions were made. Just as merger control was assessed using regression techniques, the same can be done in this context. However, since in this context the dependent variable to approximate is a continuous figure, I cannot use a logit nor probit regression. And opted for a multivariate linear regression.

The choice for this type of regression needs to be seen in context. There is an inherent judgment call in choosing what type of regression is applied. This is best illustrated by this popular (among statisticians) cartoon (figure 1).

Figure 1: Curve fitting methods and the message they send



Cartoon by Randall Munroe out of the series "This xkcd comic"<sup>37</sup>. The data-points are the same in each figure, yet deciding what the baseline formula is changes the perception of the data.

The following considerations were taken into account in choosing for a multivariate linear regression:

Firstly, the variables I used are dichotomous, meaning a factor is either present or not (coded as 1 or 0). Putting these independent variables in more complex formulas would not mean fitting the data better.  $\exp 0$  is just 1 and  $\exp 1$  is just  $\exp$ . For one dichotomous variable this "exponential functions" could be approximated as  $f(\text{variable}) = (e - 1) * \text{variable} + 1$ , meaning a linear formula

with constant  $(e - 1)$ . Therefore, I do not believe it is necessary to use more convoluted regressions to achieve useful predictive and accurate regression formulas.

Secondly, at the starting point of this research there was not any specific information available how fines were quantified. Therefore, the most important characteristic for the regression is that it shows if a variable pushes the fine's level up or down and roughly by how much. Approximating set constants do just that, without over-fitting the data nor dramatizing the data. I did consider a logarithmic regression with an upper-limit being the legal maximum, but ultimately decided against it since this would imply such dramatization of the data and imply the Commission would be quicky to accelerate the fine towards the legal maximum, of which I had no reason to assume they did.

A (linear) regression methodology implies five steps. The first three steps ("Variable selection" (Section 3), "Data collection" (Section 4), and "Model technicalities and data cleaning" (Section 5)) are defined here as "Groundwork" (part II). The next step is analyzing the data and reporting the results ("Extended result report" (part III)). This will be done at some length and for this master-thesis also intermediate analysis results will be reported on. Lastly, the findings are discussed ("Discussion and findings" (part IV)). The last part of this master-thesis concludes the research.

## Methodology for groundwork

### Variable selection

Before looking at empirical data, it is important to collect the relevant factors that will be part of the model in step two. There are 3 sub-research questions to be considered:

(1) *"What factors does the Commission explicitly use in their fining decisions?"*

This question was answered by looking at the 2006 fining guidelines and extracting every factor put forward in these guidelines. A selection of actual fining decisions were then scrutinized, in order to extract factors the Commission puts forward themselves in line with these guidelines. This step was supplemented with court cases of the appeals against fining decisions. This data collection stage is also important for the next question.

(2) *"What objective data is used for the factors found in sub-research question 1?"*

This question aimed to link objective data to the more vague factors. For example: what is considered to be a "legislative excuse" needs to be determined. The goal was thus to find either (a) yes or no instances of factors being present or not or (b) create a semi-quantitative scale on which to score those vague

factors. Ultimately, the amount of data-points which needed to be determined limited the possibility to determine the value (1 or 0, present or not) of each data-point on the basis of this external definitions. The research was included, as it is useful for future research but the used criteria was: "Factor is in the fining decision mentioned to possibly be present and not presented as being mentioned *ex absurdo*".

The third sub-research question: (3) "*What are the objective factors to the situation?*" needs to be split up into 3 sub-sub-research questions. These objective factors need to be different from factors decided on in the previous two steps. This research question aims to uncover possible variables the Commission is not explicit about. The three sub-sub-research questions are:

- (a) "*What are the objective factors to each party in a fining decision?*"<sup>38</sup>
- (b) "*What are the objective factors to each infringement in a fining decision?*"<sup>39</sup>
- (c) "*What are the objective factors to the context in a fining decision?*"<sup>40</sup>

It is in this third research question the variable to test the protectionist hypothesis will come forward. Under question (3a) it was envisioned and later implemented to include a dummy for which Commissioner decided on the case. Up unto this point, the Commission was always seen as a continuum, I tried to falsify this claim and negated it (see "findings and discussion" (part IV)).

Under feasibility concerns, the question put forward in the literature to assess real impact of a cartel is difficult to apprise. I included a proxy instead under question (3b): "real market impact", which was coded under the same criteria as the others (mentioned in the decision but not *ex absurdo*).

At least for the explicit factors, I tried to be as exhaustive as possible under feasibility concerns. Certain factors proved irrelevant but this could not be assessed at the start of this research. It is, however, not possible to catch all variables in, therefore it is important to keep in mind the error term. If the error term is too big, this means either the regression model needs to be changed in future research or, more likely, I did not include the actually relevant variables.

### **Data collection**

I scrapped All fining decisions in cartel and abuse of dominance cases since 2006 till 2020, which were readily available from the Commission's website. As much as possible I included the complete "prohibition decisions", if this document was not available I included the Summary decision, if this was also not available the case was excluded.

Secondly, an application was specifically created for this research which enabled

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<sup>38</sup>E.g. Nationality of the party, public or private company, etc.

<sup>39</sup>E.g. Novelty of the infringement, impact on the market of the infringement, etc.

<sup>40</sup>E.g. Political alignment of Commissioner, economic situation, etc.

me to code the variables systematically and smoothly.<sup>41</sup> The Program showed keyword search hit simultaneously with the parties from the document which enabled the data collector to select for which party the hit was relevant or if the hit was a false hit. Thus, the human was kept in the loop. In case a hit gave rise to selecting a party, the sentence from the hit was collected as evidence that the variable was present. The keyword used for each variable is also shown in annex.

The methodology for the data collection is explained more thoroughly at the beginning of the relevant section ("Data collection" (section 4)).

## **Model technicalities**

### *Development of the model*

Before diving into the mathematics, it is important to lay out what specifications the model needs to abide by. What will be laid out next is: (1) what end goal the model had, (2) what data needed to be accessible from looking at the model, (3) what framework the model needed to be built from, and lastly (4) what basic assumption the model had to be built upon.

#### *(1) What end result the model needs to give*

The aim of the study is to find a formula that predicts the fine the Commission gives, based on objective variables. Since the fine is decided as a percentage upon worldwide return, the end result should be given as a percentage. Since literature points out the importance of the leniency program towards the final fine and since I did not aim to approximate the leniency program, these steps were kept distinct. The formula's resulting percentage will be based on the initial fine calculation, and secondly, an approximation of the fine in combination with the leniency program will be shown.

What will be outside the result of the model is how the choice is made which year's turnover or sales are used as a base to calculate the ultimate fine. This choice between years, could be modeled as well, but would be modeled differently, since the output would not be encapsulated as a percentage.

#### *(2) What information needs to be accessible by looking at the model*

Firstly, By looking at the model, it should be clear which factors have an influence on the decision and what the importance of each factor is. The latter meaning the weight given to each factor should be easy to read. As is mentioned above, I opted for a linear relationship which would make it easier to compare total influence of all the factors with an individual factor.

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<sup>41</sup>I am grateful to Joren Dumoulin, Engineering student at KU Leuven, who ultimately ended up programming the application.



Secondly, the end formula should be easy to adapt in order to enable future research to expand upon the model or to correct mistakes made. Therefore, the end formula should be easy to understand and leave room to add or remove factors, as future research sees fit.

*(3) What framework does the model need to be built on*

The starting point of the model are the fining guidelines. I explained in the variable selection section how variables would be selected on the basis of a selection of both fining decisions and court cases. Therefore, the framework of the model are publicly available information.

I assumed the Commission to use a logical set up. There was also no reason to doubt the Commission to be following to some extent the guidance of the fining guidelines.

*(4) Basic assumptions*

There are two basic assumptions underlying this research. Firstly, The basic assumption is that the Commission decides at least indirectly on objective data that can be traced back. Secondly, although the decision by the Commission might be to some degree random, the model starts from the assumption that they are not. This assumption was easily tested by applying the ultimate predictive formula to a set of control cases. Both assumptions proved to be sufficiently correct for the model to be useful.

***Mathematical model***

The core of the model is inspired by Daniel McFadden’s work.<sup>42</sup> However, slightly adapted to the needs laid out in the introduction of this paragraph. The model starts out by looking at the 2006 fining guidelines. The Commission puts forward a 2-step methodology: first a basic amount is calculated, secondly this basic amount is corrected upwards or downwards. Van Cayseele et al. put forward the following mathematical formula to incapsulate this methodology:<sup>43</sup>

Formula 1: Basic amount formula

$$\text{Basic amount} = (\text{relevant base} * \text{entry fee}[\text{between 15\% and 25\%}]) + (\text{relevant base} * \text{gravity}[\text{between 1 and 30\%}] * \text{duration}[0, 5 \text{ and upwards}])$$

Formula 2: Fine before leniency

$$\text{Fine before leniency} = (\text{basic amount} * \text{aggravating circumstances}) - (\text{basic amount} * \text{mitagating circumstances}) * \text{deterrence factor}$$

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<sup>42</sup>Models by this author were looked at as an example. Eg. Daniel McFadden, “The Revealed Preferences of a Government Bureaucracy: Empirical Evidence”, *The Bell Journal of Economics*, Vol. 7, No. 1 (Spring, 1976), pp. 55-72.

<sup>43</sup>Patrick Van Cayseele, Peter D. Camesasca and Kristian Hugmark, “The EC commissions 2006 fining guidelines reviewed from an economic perspective: risking overdeterrence”, *The antitrust Bullitin*, volume 53, no 4, (2008), 1083

Formula 3: Ultimate fine

*Ultimate fine = Fine before leniency \* leniency reduction*

putting those formulas in one complete formula we get:

Formula 4: Complete fine formula

$$F = [(B\alpha) + (B\beta t)\gamma] - [(B\alpha) + (B\beta)]\mu\delta\theta$$

*with F being total fine, B being the relevant base (either turnover or sales),  
alfa ( $\alpha$ ) being the entry fee value, beta ( $\beta$ ) being gravity value, t being  
duration, gamma ( $\gamma$ ) being the aggravating circumstances value, Mu ( $\mu$ ) being  
the mitigating circumstances value, delta ( $\delta$ ) being the deterrence factor and  
theta ( $\theta$ ) being the leniency reduction.*

Greek letters ( $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\mu$ ,  $\theta$ ) are values the Commission is free to decide. Therefore, we bundle these discretionary values together, Thus the formula becomes:

Formula 5: Fine in percentage (formula to approximate)

$$F/B = (\alpha + \beta t)(\gamma - \mu)\delta\theta$$

*with F being total fine, B being the relevant base (either turnover or sales),  
alpha ( $\alpha$ ) being the entry fee value, beta ( $\beta$ ) being gravity value, t being  
duration, gamma ( $\gamma$ ) being the aggravating circumstances value, Mu ( $\mu$ ) being  
the mitigating circumstances value, delta ( $\delta$ ) being the deterrence factor and  
theta ( $\theta$ ) being the leniency reduction.*

There are two parts to the analysis. Firstly, each discretionary point will be approximated using a regression. This means regression formulas will be calculated for each variable in the formula (the Greek letters). Secondly, the main aim of this study concerns the fine as such, and not just parts. Therefore, I also approximated the fine, before and after leniency application, directly. in the next paragraphs I will explain firstly, the regression of each "discretionary point", which are called the building blocks within this thesis, and secondly, the regression of the final fine.

*(1)Predicting the building blocks*

Each Greek letter represents a percentage, which is our dependent variable. We approximate this dependent variable using the following formula.

Formula 6: Linear regression formula

$$\hat{Y} = b_0 + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

*With,  $\hat{Y}$  being the dependent variable to approximate,  $b_0$  the intercept, and,  $b$ ,  
the regression coefficient for each factor X.*

The aim is to find this regression coefficient for each factor. Based on this coefficient, it will be possible to say to what extent each objective factor, attributes towards the total fine. I, more precisely the statistical program R,<sup>44</sup> uses to calculate these b-values is:

Formula 7: formula to calculate estimates  
 $estimatedb = (X'X)^{-1}X'y$

*With, b being the matrix of all the regression coefficients, X being the matrix of all factors and y being the matrix of all output values.*

*(2) Prediction of complete fine*

The final regression will aim to approximate the fine without looking at the build up of the fine. The idea is that, if every objective factor is considered, a regression would result in the same outcome as if each variable was calculated separately. Thus, the model will have dichotomous (and some continuous) independent variables (dichotomous meaning: 1 or 0, present or not). These variables will be the objective factors identified in the previous step of the methodology. Meaning, factors concerning (a) the party, (b) the infringement and (c) the context. These variables will be used to predict the one continuous dependant variable (the fine). What we are interested in is to what extent each variable attributes towards the dependent variable (the fine). Meaning, we are interested in the regression coefficient (b) in the regression. As will be clear from below, the "b" in the regression formula is the regression coefficient, expressing to what extent a certain independent variable attributes towards the final result. Where other studies use a logit regression, I am unable to use it because logit regression have a dependent variable that is dichotomous (0 or 1). It is possible to rewrite the situation in dichotomous outcomes, however, there is no reason to believe a multiple regression would not yield the right result. I will discuss the prerequisites for multiple regression down below. The regression formula base used will be the same as the one used for the building blocks of the fine. This means, the standard linear regression model.

*Assumptions underlining linear regression models*

Linear regression models, like the one described above, need to fulfill the following conditions.

- a. There should be a linear relationship between the independent and dependant variables;
- b. The independent variables cannot be too highly correlated;
- c. There cannot be significant outliers.

This first condition is explained in the justification to use a linear model. The second assumption will be tested before the multivariate regression is run.

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<sup>44</sup>Open source statistical program used in this thesis for each analysis. <https://www.r-project.org/>

And lastly, I did not exclude outliers because I expected statistical outliers to be explained by the application of exceptional circumstances, which are captured under variables only applied in such exceptional cases.

### **Analyzing data and reporting results**

My research has been conducted in light of obtaining the degree of "Master of Law". Therefore, this Master thesis will report on the results more extensively than is done in the publication version of the same research. Results will be explained and contextualized: the emphasis will be on explaining mathematical results are the result of a set of judgment calls and a "significant" estimate, does not always mean something is relevant. I will not potential co-morbid hidden factors or explain how the way variables are coded can result in those variables being proxies for other hidden variables.

The aim of this extensive explanation is to be transparent in reasoning and assessment for the last part: the discussion of findings ("Discussion and findings" (part IV)). The method of reporting should make it easier for the assessors of this master thesis to spot oversights or be convinced of the soundness of the discussion and findings of my research.<sup>45</sup>

### **Discussion and findings**

On the basis of the extended reporting of findings, the aims, which can be thought of as hypothesis to test, can be assessed. Before collecting the data, I set thresholds for each aim that needed to be fulfilled for an aim to be reached. These thresholds are explained in the next paragraph.

#### *about quantifying variables:*

I considered variables influences to be quantified both as descriptive observations, and the estimates linked to each variable. The conclusions will always need to be interpreted while keeping the error of the prediction model in mind.

#### *For the protectionist hypothesis:*

The protectionist hypothesis would have been answered positively if the factor for US or non-EU undertaking showed a positive estimate in one of the multivariate regressions (negative for mitigating and leniency amount), meaning party nationality statistically affects the fine against the party's interest. I set  $\alpha$  at 5% (95% confidence interval).

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<sup>45</sup>I acknowledge the invaluable help of my promotor professor Wouter Devroe and supervisor Friso Bostoën. However, Any mistakes or oversights are my own.

*About the supposed structural approach:*

If I were able to construe a formula which predicts to a reasonable degree the level of the fine on a small number of test cases when excluding those test-cases from the regression, I considered to have uncovered the Commission to use a structural approach. I was not satisfied with a high adjusted R-squared and a small standard error of the regression, since this could just be the result of fitting the data-set with no real application.

After this last step in the methodology, I conclude my master thesis. The thesis is structured in order of methodology, starting with the groundwork (the following part), moving towards the extended result reporting, to the discussion and findings, and ending in the conclusion.

## Part II

# Groundwork

### 3 Variable selection

As was set out above in the methodology this section aims to identify factors that will ultimately be tested whether they have influence on the fining decision. This step will be done in 3 phases (as set out above). The first one is to look at what the Commission puts forward themselves as factors they consider. This will be done by going through the 2006 fining guidelines and identifying criteria that the Commission says has influence on their decision. More specifically, the focus will be on chapter VI of the guidelines. The recitals will also be looked at thoroughly. However, these fining guidelines are concise and content wise very broad. Therefore, as part of identifying the (what I will call) “transparently communicated factors”, I will also look at actual fining decisions in combination with doctrine discussing these fining decisions. Selected decisions came from the data-set which first decisions are from after 2006 (after the introduction of the guidelines). Articles supporting the analysis of those decisions will have to be published articles and peer reviewed, as a proxy for having a certain degree of quality and support among the doctrine. This step in the research does not aim to dig up controversy and only aims to identify possible factors that might be used.

In total 23 cases were chosen blindly from the data-set.<sup>46</sup> These cases span from earliest 2004, which was included because it concerned issues not changed by the 2006 guidelines, till latest June 2019. Nine cases had to be excluded during the process because the Commission did not release the full prohibition decision or the link to those documents was corrupted.<sup>47</sup>

How the fine is calculated in broad terms, will not be discussed in this section since this is already done under formula 1 through 3. I also excluded the

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<sup>46</sup> Case COMP/37.956 — Reinforcing bars; Case COMP/38.238 — Raw Tobacco — Spain; Case AT.39258 — Airfreight; Case AT.39740 — Google Search (Shopping); Case AT.39780 — Envelopes; Case AT.39813 — Baltic Rail; 39816 - Upstream gas supplies in Central and Eastern Europe; Case 39849 - BEH gas; AT.39881 — Occupant Safety Systems supplied to Japanese Car Manufacturers; Case AT.39920 — Braking Systems; Case AT.39960 — Thermal Systems; Case AT.40009 — Maritime Car Carriers; Case AT.40013 — Lighting Systems; Case AT.40018 — Car battery recycling; Case AT.40023 — Cross-border access to pay-TV; Case AT.40113 — Spark Plugs; Case 40135 - FOREX; Case AT.40153 — E-Book MFNS and related matters; Case AT.40208 — International Skating Union’s Eligibility Rules; Case AT.40220 — Qualcomm (Exclusivity Payments); Case 40461 - DE/DK Interconnector; Case AT.40481 — Occupants Safety Systems (II) supplied to the Volkswagen Group and the BMW Group.

<sup>47</sup> Excluded cases: Case AT.39258 — Airfreight; 39816 - Upstream gas supplies in Central and Eastern Europe; Case 39849 - BEH gas; Case AT.40023 — Cross-border access to pay-TV; Case AT.40153 — E-Book MFNS and related matters; Case AT.40208 — International Skating Union’s Eligibility Rules; Case AT.40220 — Qualcomm (Exclusivity Payments); Case 40461 - DE/DK Interconnector.

leniency notice from consideration, since the application is done by assessing the cooperation, which merits a separate analysis what it means to "cooperate".

### 3.1 Transparently communicated factors

At the 2003 council regulation<sup>48</sup> eight broad factors that should influence the decision were determined: (i) the maximum fine is set at 10% turnover(art. 23), (ii) the case of insolvency issues within a group is discussed (art. 23, subsection 4). The other factors can be expressed in the following key words: the party (iii) gave incorrect, misleading, or incomplete information (art. 23, 1 (a,b, and c)), or (iv) did not rectifying such information in time (art. 23, 1, d), (v) either failed or refused to give information (art. 23, 1, d), or (vi) broke fixed seals (art. 23, 1, e). Lastly,both (vii) the duration and (viii) gravity of the infringement needs to be taken into account (art. 23, 3).

The 2006 fining guidelines, which implement this regulation at the Commissions level, set out the steps to apply each factor and adds some specificity.<sup>49</sup> There are seven steps in the fine setting methodology according to the guidelines: (i) determining the relevant sales(Recital 13 to 18), (ii) determining the infringement's gravity to decide which portion of those sales are the *basic amount* of the fine (Recital 19 to 26), (iii) scaling the fine up by taking aggravating circumstances into account (Recital 28), (iv) scaling the fine down by taking mitigating circumstances into account (Recital 29), (v) if needed, increase the fine to achieve a deterrent effect (Recital 30 and 31), (vi) lastly, in exceptional cases, the ability to pay the fine is taken into account (Recital 35). However, beyond the standard methodology, the additional application of (vii) leniency instruments can bring the fine further down (Recital 34). The legal maxim is also mentioned in the guidelines (the 10% turnover limit). Again, since leniency depends on very nuanced situational circumstances, this research limited itself to only determining whether the "leniency notice"-itself was applied, not what specific factors might have given rise to such application. Other post-"standard" (such as duration of proceedings) and leniency reductions were added to the "post-lenieny subtraction" and were not under review.

The ability to pay, was addressed in a few from the sample but only granted in the case 40018.<sup>50</sup> According to the guidelines, the factual situation giving rise to granting this should be of the nature that there is objective evidence that the fine would jeopardize the economic viability of the undertaking and cause its assets to lose all their value.<sup>51</sup> In the decision from the sample, the circumstances were such that the undertaking would be forced into liquidation if

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<sup>48</sup>Council regulation (EC) No 1/2003, "On the implementation of the rules on competition laid down in Article 81 and 82 of the treaty".

<sup>49</sup>Guidelines on the method of setting fines imposed pursuant to Article 23(2)(a) of Regulation No 1/2003.

<sup>50</sup>Case AT.40018 – Car battery recycling, decision from 8/2/2017

<sup>51</sup>Recital 35 of the fining guidelines 2006.

this pressure relief was not granted.<sup>52</sup> In the same case another undertaking was not granted the same relief, showing, as in the other cases, only in exceptional circumstances this relief is granted.<sup>53</sup> In ideal circumstances the variable “Fine would force undertaking in liquidation” would have been used similarly to the variable “legal maximum exceeded”. In the section “Data Collection” (section 4) it will become clear I was unable to do so, since the Commission censures which party the circumstance was applied to.

From this point forward variables will be listed in order of occurrence in the fining methodology, according to the guidelines. starting with determining the value of sales,<sup>54</sup> up to applying a deterrence amount.

## The value of sales

### Object of sales

A first important issue is the fact that, according to the guidelines, only the “sales of goods or services to which the infringement directly or indirectly relates”, can be taken into account to determine the fine.<sup>55</sup> Case law from the CJEU specify that this amount does not need to be corrected for upstream nor downstream cartels, which might have affected those sales or turnover.<sup>56</sup> In a significant portion of selected cases the Commission uses the “invoicing criterion”, meaning what was invoiced for the relevant product or service is used as the relevant sales.<sup>57</sup> Defining those “relevant sales” can be difficult in certain instances where there is a bundling of products or if there are overlapping markets on which the infringement has an effect. In general, the Commission tends to take a wholesale approach to determining the relevant sales. For example, in case AT.39740, the Google shopping case, the Commission took into account the fact that the infringement could have had anti-competitive effects in the national markets for comparison shopping services. Thus, even though it was not proven as such, took into account the total revenue generated in each of the 13 markets in which the conduct takes place.<sup>58</sup>

This approach is supported by CJEU case-law.<sup>59</sup> In some case this is even more clear: the court held that if a service is part of a package, the whole package

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<sup>52</sup>Case AT.40018 – Car battery recycling, at para 419.

<sup>53</sup>Case AT.40018 – Car battery recycling, at para 418 and 419.

<sup>54</sup>Included for exhaustiveness and to pick up on factors that might be relevant in quantifying the percentages of this amount.

<sup>55</sup>Recital 13 of the fining guidelines 2006.

<sup>56</sup>Case T-270/12 Panalpina World Transport and Others v Commission, para 147 to 151; Case T-265/12 Schenker v Commission, para 274, 278 and 284.

<sup>57</sup>Eg. Case AT.40136 — Capacitors, para 17. Other cases see footnote 46.

<sup>58</sup>Case AT.39740 - Google Search (Shopping), at para 737 and 738.

<sup>59</sup>Case T-254/12 Kühne + Nagel International and Others v Commission, para 226–228; Case T-265/12 Schenker v Commission, para 265–267; Case T-762/14 Koninklijke Philips and Other v Commission, para 297; Case C-101/15 Pilkington Group v Commission, para 19–23.



is contaminated by the infringement and thus, the sales of the whole package needs to be taken into account.<sup>60</sup>

Another issue was highlighted in the case AT.40013: in case the infringement affected different categories customers, the Commission resolves this by applying distinct multipliers for each category.<sup>61</sup> This means it is not the product that defines the relevant sales, but the customers to whom the goods or services are sold. If the same product is sold to distinct groups, there are different relevant sales.

This is similarly done in the case AT.40018, where the infringement concerns the scrap lead-acid automotive batteries. The Commission explicitly excludes scrap lead-acid industrial batteries from the calculation as they are not seen as part of “relevant sales”.<sup>62</sup> This is similar and supported in earlier CJEU case law: the Commission needs to consider excluding sales which do not directly or indirectly relate to the infringement.<sup>63</sup> A clear example of this, is the court drawing a distinction in a case where transportation cost are past on or not, thus being affected or not.<sup>64</sup>

Since the substance of the previous analysis only relates to setting the base amount, this does not directly affects how a percentage is calculated. I have taken, “sales” directly from the decision, but as will become clear in section 4.2, heavy censoring of this information rendered it unusable for analysis.

### **Geographical aspect of the sales**

They guidelines also specifically state that only the sales of the relevant geographical area affected by the infringement are to be taken into account.<sup>65</sup> This geographical restraint poses a problem in situations where the infringement went beyond the EEA. The guidelines state that in such a case it is important for the fine to reflect the aggregate of relevant sales and the relevant weight of each offender in the infringement. Thus, the guidelines put forward the method of taking the worldwide market share of the offenders, and applying that share to the total relevant sales within the EEA.<sup>66</sup> The following situations occurred in the selected cases and were addressed as follows.

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<sup>60</sup>Case T-270/12 Panalpina World Transport and Others v Commission, para 115–117; Case T-254/12, Kühne + Nagel International and Others v Commission, para. 229; Case T-264/12, UTI Worldwide v Commission, para 259 to 260.

<sup>61</sup>Case AT.40013 — Lighting Systems, at para 21.

<sup>62</sup>Case AT.40018 – Car battery recycling, at para 304.

<sup>63</sup>Case T-216/13 Telefónica v Commission, para 296 and 308 to 309; Case T-208/13 Portugal Telecom v Commission, para 242–243.

<sup>64</sup>Joined Cases T-389/10 and T-419/10 SLM and Other v Commission, paras 163–180.

<sup>65</sup>Recital 13 fining guidelines 2006.

<sup>66</sup>Recital 18 fining guidelines 2006.

In case AT.39881 there were no sales in the EEA since the distributor of the offender was active in Japan only. The Commission put forward the use of a proxy. In this case, an important fact was the fact the offender, Marutaka, was also the facilitator of the cartel.<sup>67</sup> Since they contributed in this way to the infringement, the proxy was determined with reference to the other parties value of the relevant sales. A consideration is also given to the fact the offenders role was only as facilitator in the EEA. The calculation was:

*“the Commission has calculated the proxy for MARUTAKA’s value of sales by applying to its global turnover the average ratio between (i) the other Parties’ value of sales in the EEA of seatbelts destined for Toyota vehicles and (ii) their global turnover. The result is then divided by four, to take into account the number of participants in the infringement, and is further reduced by 1/3, in consideration of MARUTAKA’s more limited role as a facilitator.”*<sup>68</sup>

On the same issue, in the case AT.39960, Panasonic did not have any direct sales either within the EEA. In this case the relevant offender did not act as a facilitator. The Commission did not apply the same formula as in the previous case, but used the method as described in the fining guidelines: the worldwide market share for the relevant product in combination with the relevant sales of another party who did have sales in the EEA.<sup>69</sup> In the same case other parties did not have any relevant sales either in regards to an infringement. The Commission applied equal shares of value to the sales of the party with relevant sales, and scaled this to the extent those other parties participated.<sup>70</sup>

The approach in the previous case is supported in case law of the CJEU: in the Toshiba case, the court held that in some instances it was better to use worldwide sales as a proxy to determine the fine.<sup>71</sup> Eric Barbier de La Serre and Eileen Lagathu note that the provision used in this case, the same as used in the previous case, is not applied commonly but are by this case approved as legitimate.<sup>72</sup> This might explain the deviation in the first case, and in the next case: the Commission does not adhere to the recital very strictly.

In case AT.40009 a correction was also made for the fact some services were performed outside the EEA, thus a part of the harm fell outside of the EEA. The Commission applied a 50% reduction on the basic amount for each party in this situation.<sup>73</sup> This does not seem a strategy inspired by the fining guidelines, as set out above.

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<sup>67</sup>Case AT.39881 - Occupant Safety Systems Supplied to Japanese Car Manufacturers, at para 112.

<sup>68</sup>Case AT.39881 - Occupant Safety Systems Supplied to Japanese Car Manufacturers, at para 112.

<sup>69</sup>Case AT.39960 — Thermal Systems, at para 25.

<sup>70</sup>Case AT.39960 — Thermal Systems, at para 26.

<sup>71</sup>Case C-373/14 P Toshiba Corporation v Commission, para 87–88.

<sup>72</sup>Eric Barbier de La Serre and Eileen Lagathu, “The Law on Fines Imposed in EU Competition Proceedings: Time for a Refresh of the Fining Guidelines?”, *Journal of European Competition Law & Practice*, (2017), Vol. 8, No. 6, 413.

<sup>73</sup>Case AT.40009 — Maritime Car Carriers, at para 18.

This passage makes it clear that facilitators with no specific sales are difficult to assess in this first step. However, again, this issue is about the base amount and this research focuses on the percentage. I took the "relevant sales" as is reported on in the prohibition decision (which was mostly censored thus not reported on). A factor which is relevant for the regression is the "global effect" of the infringement, meaning whether (as put in the last case) harm fell entirely within or partly outside the EEA.

A last point concerning the geographical aspect of determining the relevant sales, is the fact that the Commission is quick to determine the relevant geographical area to be the whole of the EEA, even though as shown before, the principle is to strictly include those areas affected by the infringement.<sup>74</sup> This is supported in the Lundbeck judgement by the CJEU: if the infringement is of a scale that it affected the whole of the EU the court will not try to limit it even if the impact in certain territories is very unlikely.<sup>75</sup> However, the Commission uses the fact that the infringement concerns the entire EEA as a reason for, what they claim, is a higher multiplier.<sup>76</sup>

This analysis can be summarized as: there are two factors selected for regression in this section. Firstly, the global aspect of the infringement and secondly, whether or not the infringement covered the entire EEA.

#### **"During the last business year"-aspect**

The relevant sales, determined by the substantive and geographical aspect, are to be considered in the last full business year of the participation in the infringement.<sup>77</sup> However, what is notable in the phrasing of recital 13 fining guidelines 2006 is the word "normally". The concern behind the phrasing is the fact that this time period might not always be the most representable and thus most desirable to determine the basic amount. This concern is also addressed in the CJEU case law: in several instances the court held that if another year or time period is more representable of the infringement it is allowed that that time period is to be used.<sup>78</sup>

Several examples of the use of different time periods are shown in the sample. Most illuminating is a case where this argument was dismissed, in case AT.40018, the Commission referenced earlier case law and set out reasons for using different time periods:

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<sup>74</sup>Eg. Case AT.40113 - Spark Plugs at para 97, Case AT.40136 — Capacitors at para 18 and Case AT.39920 - Braking Systems at para 101. Counter where the Commission did limit: Case AT.40018 – Car battery recycling, at para 312.

<sup>75</sup>Case T-472/13 Lundbeck v Commission, para. 804.

<sup>76</sup>Case AT.40113 - Spark Plugs at para 97 and Case AT.40136 — Capacitors at para 18.

<sup>77</sup>Recital 13 fining guidelines.

<sup>78</sup>Case C-514/15 P HIT Groep v Commission, para 30–38 and Case T-471/13 Xellia Pharmaceuticals and Alpharma v Commission, para 448–460.

*“In certain previous cases, the Commission has indeed considered that a different period or other years could be used if the last year is not representative, due for instance to ‘the exponential growth of sales [...] for all the undertakings’, a significant decrease of the value of sales for all undertakings or in cases of significant variations in the territories of the cartel...”*<sup>79</sup>

In case AT.39920 there was no full business year to consider, thus the Commission took the average sales in the EEA as base amount.<sup>80</sup> However, in most cases in the sample the last full business year was used as the fining guidelines suggested.

Since these paragraphs concern the input, it would go beyond the scope of the research to find a formula deciding what input to use, since this would mean the formula obtained would contain functions pertaining an “IF” situation. Although relevant for the input aspect, no factors are obtained from this section.

#### **Technical issues relating to the discussion above**

Even though determining the base is outside the scope of this research, there are a few technical situation that are addressed in the fining guidelines and case law;

- i) A situation where multiple members of the same group participated in an infringement;
- ii) The issues with obtaining the useful information;
- iii) The VAT aspect of sales;
- And iv) a situation where the infringement happened through a joint venture.

The first situation is answered very clearly: the fining guidelines state that the sum of the value of its members is to be taken.<sup>81</sup> However, this provision was often used in combination with recital 37, the provision allowing the Commission to depart from the methodology, which resulted in a *de facto* competitive advantage for mono-organized undertakings.<sup>82</sup> The court limited this practice of deviating for this reason on two occasions.<sup>83</sup>

The second situation is also addressed in the fining guidelines: the Commission is permitted to “*determine the value of its sales on the basis of the partial figures it has obtained and/or any other information which it regards as*

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<sup>79</sup>Case AT.40018 – Car battery recycling at para 317.

<sup>80</sup>Case AT.39920 - Braking Systems at para 93.

<sup>81</sup>Recital 15 fining guidelines 2006.

<sup>82</sup>Eric Barbier de La Serre and Eileen Lagathu, “The Law on Fines Imposed in EU Competition Proceedings: Time for a Refresh of the Fining Guidelines?”, *Journal of European Competition Law & Practice*, (2017), Vol. 8, No. 6, 411.

<sup>83</sup>Case AT.39792 – Steel abrasives, para 228–229; Case C-101/15 P Pilkington Group v Commission, para 64 to 67.

*relevant and appropriate.*<sup>84</sup> No major case law is reported on this issue, since it makes sense the Commission is allowed to work with the information available to them. This Recital was not directly referred to in the cases from the sample.

The third situation, is answered clearly in the fining guidelines: the amount of sales will be determined before VAT (or any other taxes).<sup>85</sup> No major cases are reported on this recital, this provision was not prominent in the cases from the sample.

The last situation arose from case law. The issue is that if the infringement concerned the sales attributed to a joint venture, there were no sales within the undertakings themselves to be taken into account. There is a corporate veil issue since often the joint venture is separate from the parent undertakings. The Commission solved this issue and was supported in its approach by the CJEU. The joint venture's sales were counted as sales and attributed to each shareholder in reflection of their market share before the infringing activity was placed under a joint venture.<sup>86</sup>

### **Gravity of the infringement**

From the base, discussed in the last paragraphs, percentages are calculated: which is the ultimate fine to be paid. Those percentages will be the subject of the regression thus moving forward in the next section factors will be determined. The guidelines state that the percentage depends on the gravity of the infringement.<sup>87</sup> The upper limit is 30 percent.<sup>88</sup> However, the Commission still has much liberty in setting the fine. Eric Barbier de La Serre and Eileen Lagathu claim that for article 102 TFEU cases, the Commission sets the fines significantly lower.<sup>89</sup> This is later on confirmed by the descriptive statistics of the cartel data-set compared to the abuse of dominance set. His broad discretion is allowed according to the case law.<sup>90</sup> As the guidelines clearly state, this gravity percentage is to be determined on a case-by-case basis.<sup>91</sup> The guidelines go on to mention different factors that might be considered or need to be considered in this analysis.<sup>92</sup> Missing from these factors, the guidelines do not

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<sup>84</sup>Recital 16 fining guidelines 2006.

<sup>85</sup>Recital 17 fining guidelines 2006.

<sup>86</sup>Case T-409/12 Mitsubishi Electric Corp. v Commission, para 131–143 and Case T-404/12 Toshiba Corp. v Commission, para 113–125.

<sup>87</sup>Recital 20 fining guidelines 2006.

<sup>88</sup>Recital 21 fining guidelines 2006.

<sup>89</sup>Eric Barbier de La Serre and Eileen Lagathu, “The Law on Fines Imposed in EU Competition Proceedings: Time for a Refresh of the Fining Guidelines?”, *Journal of European Competition Law & Practice*, (2017), Vol. 8, No. 6, 413.

<sup>90</sup>Case AT.39759 – ARA Foreclosure; Eric Barbier de La Serre and Eileen Lagathu, “The Law on Fines Imposed in EU Competition Proceedings: Time for a Refresh of the Fining Guidelines?”, *Journal of European Competition Law & Practice*, 2017, Vol. 8, No. 6, 413.

<sup>91</sup>Recital 20 fining guidelines 2006.

<sup>92</sup>Recitals 20 through 26 fining guidelines 2006.

specifically require the Commission to take the actual economic effects of the infringement into account. This is in contrast with the literature where this circumstance was stressed.<sup>93</sup>

Nonetheless, This is supported by case law of the CJEU, who said that it is not required of the Commission to do so.<sup>94</sup> In one case from the sample, this was restated: the gravity of the infringement does not need to reflect the economic impact, only the economic importance of the infringement.<sup>95</sup> Thus, the gravity of the infringement needs only to reflect the magnitude of the potential effect of the infringement.

As stated in the referenced case law and by the fining guidelines itself, the gravity of the infringement needs to be interpreted as the value judgment of such behaviour, not the actual impact: there are 7 factors mentioned in the guidelines, three of which directly relate to policy considerations about certain behaviour. Those factors are: (i) the nature of the infringement,<sup>96</sup> (ii) the combined market share of the undertakings,<sup>97</sup> (iii) the geographical scope of the infringement,<sup>98</sup> (iv) whether or not the infringement has been implemented,<sup>99</sup> (v) if the infringement touches upon a policy consideration,<sup>100</sup> (vi) the duration of participation in the infringement,<sup>101</sup> (vii) extra consideration if the issue relates to horizontal price fixing, market sharing and output limitations.<sup>102</sup>

### Nature of the infringement

The nature of the infringement is heavily dependent on the market situation: although it is not required for the Commission to assess the *actual* impact of the infringement, the nature of the market can be determinant for the nature of the infringement. For instance in the "Google shopping"-case, the Commission did consider the fact that comparable shopping services have a high economic importance, thus the impact of the infringement on that market would be significant as well.<sup>103</sup> In another selected case a similar concern arose because the relevant market concerned a high percentage of the community's production.<sup>104</sup> I concluded that the first important factor is the nature of the market. In the next paragraphs strict parameters will be defined, such as

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<sup>93</sup>See section 1.2 "The state of the art".

<sup>94</sup>Case T-264/12 UTI Worldwide v Commission, para 282 and 287; Case T-216/13 Telefónica v Commission, para 271; Case T-471/13 Xellia Pharmaceuticals and Alpharma v Commission, para 412.

<sup>95</sup>Case AT.40018 – Car battery recycling, at para 329.

<sup>96</sup> Recital 22 fining guidelines 2006.

<sup>97</sup>Recital 22 fining guidelines 2006.

<sup>98</sup>Ibidem footnote 96.

<sup>99</sup>Ibidem footnote 96.

<sup>100</sup>Recital 23 fining guidelines 2006.

<sup>101</sup>Recital 24 fining guidelines 2006.

<sup>102</sup>Recital 25 fining guidelines 2006.

<sup>103</sup>Case AT.39740 - Google Search (Shopping), at para 743 (a).

<sup>104</sup>Case COMP/C 38238 - Raw Tobacco Spain, at para 409.

whether the market is a gateway market to other services, as was the case in the Google case, or whether the market is an important market for the community.

There are already factors mentioned in the fining guidelines which fall under this "market" consideration. Firstly, the commission can fine more heavily if they consider the market to be policy relevant<sup>105</sup> and secondly, specific behaviour is penalized more heavily.<sup>106</sup> This will be discussed later on.

### **Combined market share of the undertakings**

The most striking example from the sample of "market share of the undertaking" being an important factor, is in the "baltic rail"-case.<sup>107</sup> In this case the undertaking concerned was the only service provider in that particular market.<sup>108</sup> As a result the Commission claimed having considered a higher proportion of sales. A super dominant market position is thus certainly a factor the Commission is explicit about. Secondly, in another case from the sample the Commission made clear that it did fine different undertakings differently for the same infringement based on their different market share: "*Starting fines should however take into account the different size and the market shares of each processor involved.*"<sup>109</sup> This suggests that there is also an implicit factor of relative market size compared to the other parties involved.

This factor also makes sense when linked to the discussion on the nature of the market defining the nature of the infringement: if this is logic holds, then considering the market share seems to be a predictor of the impact the infringement had on the market.

From this analysis the following factors are distilled: a "super dominant" position in the market, the relative market share sizes amongst the parties, and lastly, the explicit "market share size" of the undertaking.

### **Geographical scope of the infringement**

The following analysis flows from the same cases as the one about "the market-share". Defining geography is after all part of defining the relevant market.

It seemed clear in those cases that the Commission claims to fine infringement covering the entire EEA, heavier than local infringements.<sup>110</sup> Of course, later

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<sup>105</sup>Recital 23 fining guidelines 2006.

<sup>106</sup>Recital 25 fining guidelines 2006.

<sup>107</sup>Case AT.39813 - Baltic Rail.

<sup>108</sup>Case AT.39813 - Baltic Rail, at para 378.

<sup>109</sup>Case COMP/C 38238 - Raw Tobacco Spain, at para 418.

<sup>110</sup>Case AT.40113 - Spark Plugs, at para 97; Case AT.40136 — Capacitors, at para 18; Case AT.39920 - Braking Systems, at para 101.

in this master-thesis this assertion can be checked by looking at the quantified effects. Nonetheless, Since the Commission tries to reflect the gravity of the infringement in the fine, it seemed, in theory, defensible that infringements covering the entire EEA get fined more heavily. However, in the sample of cases there was a counter example. In case 39813, the Commission considered the fact that the infringement was very local but also stated that the fact that LG was a monopolist as proof of the fact the infringement still had a lot of impact.<sup>111</sup> As was said above, the Commission is not required by law to assess the actual impact of the infringement, thus these proxies do not go beyond claiming a certain relation between a factor and the impact.

It needs to be noted that the geographical aspect of an infringement is relevant twice in the calculation. Once to determine the relevant sales, secondly to determine what proportion of those sales are appropriate. From this discussion, the following factors are selected: if the infringement concerned the entire EEA, and secondly, the opposite, if the infringement was sufficiently local. This last factor functions as the anti-factor to the one obtained from the sample of cases. However, it is important to note that thresholds regarding community aspect in order for the jurisdiction of the Commission to apply, are still relevant.<sup>112</sup>

### **Infringement has been implemented**

In all cases from the sample, the infringement was implemented. No conclusion can thus be drawn for this factor. However, CJEU case law endorsed the fact that the infringement does not need to be implemented to be fined, it is enough that there was a potential to restrict competition.<sup>113</sup> This does not negate the fact that for non-implemented infringements the fine should be lower, since the fining guidelines explicitly say they will be fined at the lower end.<sup>114</sup> The factor retained for the regression is the one explicit in the fining guidelines: “was the infringement implemented or not.”<sup>115</sup>

### **Infringement touches upon a policy consideration**

The fining guidelines specify certain infringement as being considered especially harmful as a matter of policy.<sup>116</sup> The specific infringements are: horizontal price-fixing, market-sharing and output-limitation agreements. As mentioned above, these infringements are considered to be harmful by their nature.<sup>117</sup> It

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<sup>111</sup>Case AT.39813 - Baltic Rail, at para 381.

<sup>112</sup>Eg. Case AT.40018 – Car battery recycling, at para 28, where this discussion is set out if there was sufficient trade between the member states for the jurisdiction of the Commission to be engaged.

<sup>113</sup>Case T-264/12 UTI Worldwide v Commission, para 292 to 294.

<sup>114</sup>Recital 22 fining guidelines 2006.

<sup>115</sup>Ibid.

<sup>116</sup>Recital 23 fining guidelines 2006.

<sup>117</sup>Ibidem footnote 107.



is clear in the cases from the sample that the Commission uses this provision in practice: in four distinct cases the Commission explicitly states that the infringement (horizontal price fixing), is one of the most harmful to competition and thus fined more heavily.<sup>118</sup>

I identified the following factor to be tested in the regression: "infringement qualifies as either Horizontal price fixing, or market-sharing, or output-limitation agreement."

### **Duration of participation in the infringement**

This section relates to the paragraphs about "implementation" since the issue in the referenced case, was whether certain time frames should be included or not because of a lack of implementation in that time.<sup>119</sup> As mentioned: it is not necessary for the infringement to be implemented during a certain time, for that time to be counted in the duration of the infringement. In the cases from the sample the assumption put forward in the fining guidelines that long-term infringements need to be fined heavier seems to be put into practice. For example in case COMP/37956, the fact that the infringement spanned more than a decade for most of the parties, was considered to imply a more severe gravity of the infringement, resulting in a higher proportion of the relevant sales.<sup>120</sup> This is supported in another case where the threshold for a long-term infringement is set as being: "*longer than 5 years.*"<sup>121</sup>

The factor distilled from this discussion is thus: "for how long did the infringement last". This factor will be continuous since it will be difficult to tell the difference between an infringement of 5 and 10 years, as shown in the sample.

### **Extra consideration for specific behaviour**

This Factor includes the same instances as the "policy matter"-consideration. The fining guidelines are clear that an extra amount should be added in those instances.<sup>122</sup> The aim of this extra factor is to make sure such behaviour is deterred. This add-on serves thus the same purpose as discussed in paragraphs about deterrence. It is not clear why the Commission choose to include this fact into this section and not later on. The relevant cases in the sample are thus similar to those of the discussion on policy consideration. It seems the fining

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<sup>118</sup>Case AT.40113 - Spark Plugs, at para 97; Case AT.40018 - Car battery recycling, at para 322; Case AT.39920 - Braking Systems, at para 100; and Case AT.39881 - Occupant Safety Systems Supplied to Japanese Car Manufacturers, at para 118 (in this last case market sharing was also mentioned).

<sup>119</sup>Case T-264/12 UTI Worldwide v Commission, para 292 to 294.

<sup>120</sup>Case COMP/37956 - Reinforcing bars, re-adopted, at para 29.

<sup>121</sup>Case COMP/C 38238 - Raw Tobacco Spain, at para 433.

<sup>122</sup>Recital 25 fining guidelines 2006.

guidelines serve to specify those "policy considerations", but keep the door open for others by also stating the more broad provision.

Since the factors are the same as previously mentioned, no new factors are obtained under this subtitle.

### **Aggravating circumstances**

The Commission is allowed to set the fine higher if there are aggravating circumstances.<sup>123</sup> The circumstances relate to facts that go beyond the pure nature of the infringement (whose importance are already addressed under the gravity of the infringement") or facts relating to the relationship with the Commission. It needs to be noted that in the sample of case law, it is rare that the Commission takes aggravating or mitigating circumstances into account, except for those mentioned below. This is later more generally confirmed in the analysis of all cases.

Often this section of the fine just mentions the fact that they were not there.<sup>124</sup> The fining guidelines specifies 4 circumstances as aggravating: (i) recidivism or continuation of similar infringements,<sup>125</sup> (ii) refusal of cooperation,<sup>126</sup> (iii) role of the leader or instigator,<sup>127</sup> or (iv) the party took steps to coerce other parties.<sup>128</sup>

The last two circumstances feature in the same point in the recital, however, they will be treated separately in this paper since there is a distinct difference in leading willing participants, and coercing others. It is therefore interesting to see if the Commission treats those circumstances differently. It would have been interesting to see if coercing is been taken into account additionally, however, this is difficult to assess for each instance by keyword search since the Commission does not seem to draw this distinction. I could not assess with certainty the instances were there was a leader-role but no coercion. This question is thus up to future research.

### **Recidivism or continuation of similar infringements**

The aggravating circumstances most (but still rarely) mentioned and applied in the sample is recidivism.<sup>129</sup> In those cases the Commission mentions

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<sup>123</sup>Recital 28 fining guidelines 2006.

<sup>124</sup>Case 37980, at para 19; AT.39813 - Baltic Rail, at para 385; Case AT.39881 - Occupant Safety Systems Supplied to Japanese Car Manufacturers, at para 126; Case AT.40013 — Lighting Systems, at para 22; Case AT.40018 – Car battery recycling, at para 350; Case AT.40113 - Spark Plugs, at para 104; and Case AT.40481 — Occupants Safety Systems (II) supplied to the Volkswagen Group and the BMW Group, at para 21.

<sup>125</sup>Recital 28, first point fining guidelines 2006.

<sup>126</sup>Recital 28, second point fining guidelines 2006.

<sup>127</sup>Recital 28, third point fining guidelines 2006.

<sup>128</sup>Recital 28, third point fining guidelines 2006.

<sup>129</sup>Case COMP/37956 - Reinforcing bars, re-adopted, at para 30; Case AT.39920 - Braking Systems, at para 107; and Case AT.40136 — Capacitors , at para 21.

specific previous fining decisions. In one case AT.39920 the Commission took offence especially because it continued and repeated similar infringements often since the adoption of the first fining decision.<sup>130</sup> The Commission, given these facts, augmented the basic amount of the fine by 50 percent. It seems clear that recidivism is an important factor and the factual element to trigger this factor is the existence of a previous decision aimed at the same undertaking.

### **Refusal of cooperation**

No cases from the sample mention this factor nor did research yield specific CJEU cases on this issue. Later however, the opposite (good cooperation) seems to have a large factual application. For this reason, the factor for this circumstance will be the positive one instead of the negative one.

Above, the situation of refusing to give information or giving misleading or false information was already selected. The previous paragraph only pertains influence of "non-cooperation" other than those specific circumstances.

### **Role of the leader or instigator**

Eric Barbier de La Serre and Eileen Lagathu assert that the court had accepted the circumstance of instigator if: an undertaking represents another in cartel meetings and notifies the other of the results of the meeting, if they organise cartel meetings, Collects and distributes information within the cartel, lastly, suggesting proposals for the cartel.<sup>131</sup> This claim is based on a CJEU case, however in this case the CJEU rejected the application of the circumstance by the Commission in the fifth and sixth plea.<sup>132</sup>

In a case from the sample, where this circumstances were applied, the Commission cites specific facts such as the sending of faxes, testimony by other parties, and the market leader position of the undertaking, in its reasoning to apply this circumstance.<sup>133</sup> This seems to be in line with the assertions mentioned above.

Three factors were selected to be tested later on: firstly, the role of the instigator proven on the basis of meetings and internal documents, and secondly, if there is testimony of the party having the leader role by other parties. This factor aims to determine if the Commission relies on this kind of testimony.

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<sup>130</sup>Case AT.39920 - Braking Systems, at para 107.

<sup>131</sup>Eric Barbier de La Serre and Eileen Lagathu, "The Law on Fines Imposed in EU Competition Proceedings: Time for a Refresh of the Fining Guidelines?", *Journal of European Competition Law & Practice*, (2017), Vol. 8, No. 6, 414.

<sup>132</sup>Case T-146/09, Parker ITR Srl, Parker-Hannifin Corp. v. European Commission, para 139-140 and 145-146.

<sup>133</sup>Case COMP/C 38238 - Raw Tobacco Spain, at para 417 and 435.

Lastly, in case of a 102 TFEU infringement the question of “leader” will be adapted to the question whether the party was a “market leader”. This factor is mentioned here because in the methodological search towards the factor “leader”, this was ultimately be found simultaneously.

### Steps taken to coerce other parties

As is mentioned above, it would be interesting to test this variable independently from the leadership role. Given the constraints of my study, this was left for future research.

### Mitigating circumstances

The fining guidelines set out four mitigating circumstances: (i) when there is proof the infringement was immediately terminated as soon as the Commission intervened,<sup>134</sup> (ii) when the infringement was the result of negligence,<sup>135</sup> (iii) When the involvement of the infringement was limited and the undertaking tried to avoid the applying the infringing conduct by adopting competitive behaviour in the market,<sup>136</sup> (iv) when the undertaking cooperated with the Commission outside of the scope of the leniency notice,<sup>137</sup> (v) When the conduct was authorised by public authorities or legislation.<sup>138</sup> However, the court held that the Commission has a certain discretion to apply other mitigating circumstances.<sup>139</sup> In no case in the sample such different circumstances were applied.

It is also important to point out which facts are not allowed as mitigating circumstances, in the case law of the CJEU: Erring in the lawfulness of the behaviour needs to be differentiated of a situation of negligence. Mistaking in lawfulness cannot be applied as a mitigating circumstance.<sup>140</sup> The difference is that in this last circumstance, the fact that the undertaking is aware of the behaviour, but not of the fact that it was unlawful. The court held in the same case that it was possible that the fact that it was the first time competition law was applied in a certain sector could be taken into account as a mitigating circumstance. This was *obter dicta* since in this case the undertaking was aware or could not have been unaware of the fact that the conduct restricted competition.<sup>141</sup> The application of mitigating circumstances does not need to

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<sup>134</sup>Recital 29, point 1 fining guidelines 2006.

<sup>135</sup>Recital 29, point 2 fining guidelines 2006.

<sup>136</sup>Recital 29, point 3 fining guidelines 2006.

<sup>137</sup>Recital 29, point 4 fining guidelines 2006.

<sup>138</sup>Recital 29, point 5 fining guidelines 2006.

<sup>139</sup>Case T-472/13 Lundbeck v Commission, para. 841.

<sup>140</sup>Case T-472/13 Lundbeck v Commission, para. 834.

<sup>141</sup>Case T-472/13 Lundbeck v Commission, para. 830.

reduce the fine to zero in any of those circumstances, however, there is a wide discretion since the guidelines do not specify the margins of reduction.<sup>142</sup>

**Terminated infringement immediately after intervention** As was mentioned previously, in very few cases in the sample (and in general ) aggravating or mitigating circumstances are applied. In one case this issue was addressed: in this case the undertaking could present evidence the infringing behaviour stopped as soon as the Commission intervened. The Commission still did not apply this as a mitigating circumstance since they claim the circumstance does not apply to “*secretive agreements or practices, (in particular cartels)*”.<sup>143</sup> This seems to suggest this circumstance only applies in article 102 TFEU cases and not in article 101 TFEU cases.

Two factors were selected from the discussion above: firstly, the fact that there is proof that the infringement ended as soon as the Commission intervened, second, the question whether it is a case regarding article 101 or 102 TFEU. This last question seems obvious to be taken into account in the analysis and indeed I set out to assess the cases distinctly, however, till this point there were no substantive indicators within cases or the guidelines that this made a difference.

#### **Infringement as result of negligence**

This circumstance is linked to the next circumstance. In a case from the sample a few of the undertakings were granted lower fines since they were completely unaware of the situation for part of the continuous infringements.<sup>144</sup> This does not seem to be in line with what was set out above, where case law was mentioned that specifically prohibited this kind of reduction. In another case, the lack of awareness was also mentioned, linked to the limited participation in the infringement.<sup>145</sup> The difference with the Lundbeck case seems to be that the court held that the undertaking could not have been unaware that the conduct restricted competition.<sup>146</sup>

Two factors which were tested are distilled from this discussion: Firstly, the lack of awareness of the fact that the conduct restricted competition, secondly, the lack of awareness that the conduct was unlawful. Where the second cannot be present if the first one is not present.

#### **Involvement was limited and aimed to avoid application of infringement**

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<sup>142</sup>Recital 29 Fining guidelines 2006 only specify that the fine “may be reduced”.

<sup>143</sup>Case AT.40018 – Car battery recycling, at para 356.

<sup>144</sup>Case AT.40136 — Capacitors , at para 22.

<sup>145</sup>Case AT.40009 — Maritime Car Carriers, at para 21.

<sup>146</sup>Case T-472/13 Lundbeck v Commission, para. 830.

Linked to the last paragraphs, in some cases certain undertakings are less involved in the situation than others. this circumstance is also the only one determined partly by the conduct of other parties in the same case. In the cases from the sample, the reduction is only granted when the involvement was more limited than other parties.<sup>147</sup> It is not clear from the cases from the sample if the opposite factor is the role of the leader, and if for one undertaking this circumstance is applied, the role of a leader needs to be applied for the other. However, this means that there might be an interdependency in the data, which had to be addressed in the methodology of the regression. This was done in the data-cleaning section. In the end non of the factors were to highly correlated, which would have distorted the results.

The following factors were retained: the lower level of awareness of the infringement compared to the other parties, a lower level of involvement as shown by being part of a lower amount of contracts than other parties, lastly, being the undertaking most involved and most aware shown by other factors than being the leader.

### **Cooperation outside of the leniency notice**

The CJEU seemed to be concerned with the effectiveness of the leniency notice. As a result this circumstance can only be applied in exceptional circumstances, according to the court.<sup>148</sup> When the reduction is applied on the basis of the leniency notice, this circumstance can only be applied on a different facts of cooperation.<sup>149</sup> As a result in regards to leniency, there will need to be drawn a line between cooperation that fall within the scope of the leniency notice, and facts of cooperation falling under this section. However, this merits a completely separate research design thus this variable will be moved in the error term. If the error term would have been to big, future research would have been advised to duplicate the research while including this variable. However, as will be clear later, the results of my research seemed reliable enough. Still, future research may see fit to include this variable nonetheless.

In the Sample of cases, no reduction was granted on this basis. Again, I excluded this circumstance from the analysis.

### **Conduct authorised by authorities or legislation**

It seems within reason that if legislation or public authorities actively supported certain conduct, undertakings would follow these incentives. In a case from the sample, the Commission supported this statement by only applying a

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<sup>147</sup>Case AT.40009 — Maritime Car Carriers, at para 21; Case AT.40018 – Car battery recycling, at para 355; and Case AT.40136 — Capacitors , at para 22.

<sup>148</sup>Case T-254/12 Kühne and Nagel International and Others v Commission,para 287.

<sup>149</sup>Case T-251/12 EGL and Others v Commission, para. 189 to 193.

symbolic fine given those circumstances.<sup>150</sup> The circumstances of the case were such that the legislation was to such a degree ambiguous that the Commission acknowledged that there was an uncertainty about the legality of certain conduct.<sup>151</sup>

The analysis will thus test if a situation where there is legislation or public statements by public authorities present on which the undertaking could justify its behaviour, is taken into account.

### **Increase for deterrence**

There are two instances where the fine can be increased for deterrence: (i) “*in order to exceed the amount of gains improperly made as a result of the infringement where it is possible to estimate that amount*”,<sup>152</sup> and (ii) in case there is a particularly large turnover made by the undertaking that go beyond those captured under the relevant sales.<sup>153</sup> The CJEU held that if the Commission uses this step, it is under the right to be heard obligated to explain to the undertaking how it aims to achieve the deterring effect.<sup>154</sup> This element is important for the next step when determining factual situation: there needs to be information supporting this factor as a matter of law.

### **Exceeding gains improperly made**

This factor is self-explanatory: there would be no incentive to not infringe if the fine set would not have as a result that the undertaking ends up with no profit as a result of the conduct. However, in no cases from the sample this is an issue. However, since the factor is clear as is, it was retained: “Gains exceed potential fine without this factor.”

### **Particularly large turnover beyond relevant sales**

In multiple cases from the sample this factor was used.<sup>155</sup> In those set of cases there seem to be two instances that qualify as “particularly large turnover”: firstly, in case the turnover of one party is substantially larger than those of the other undertakings,<sup>156</sup> secondly, in case of a known international heavy weight, such as Google.<sup>157</sup> As is said in the Google case: “... *to ensure that the fine*

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<sup>150</sup>Case COMP/C 38238 - Raw Tobacco Spain, at para 425.

<sup>151</sup>Case COMP/C 38238 - Raw Tobacco Spain, at para 428.

<sup>152</sup>Recital 31 fining guidelines 2006.

<sup>153</sup>Recital 30 fining guidelines 2006.

<sup>154</sup>Case T-404/12 Toshiba Corp. v Commission, para 72 to 78.

<sup>155</sup>Case COMP/37956 - Reinforcing bars, re-adopted, at para 28; Case AT.39740 - Google Search (Shopping), at para 753; and Case AT.40113 - Spark Plugs, at para 107; (Not in eg. Case AT.40018 – Car battery recycling).

<sup>156</sup>Case COMP/37956 - Reinforcing bars, re-adopted, at para 28.

<sup>157</sup>Case AT.39740 - Google Search (Shopping), at para 750 to 753.

*has a sufficiently deterrent effect not only on Google and Alphabet, but also on undertakings of a similar size and with similar resources. . .*<sup>158</sup> This seems to suggest that the opportunity to fine such undertakings are used to set examples and send a message to similar heavy weight undertakings.

Particularly large turnover is split in two circumstances. Firstly, the undertaking's turnover exceeds by a large margin the turnover compared to other parties to the infringement. Secondly, if the firm is known as a heavy weight. This last circumstance is approximated roughly by the variable "market leader", already part of the analysis.

### **Technical aspect of determining variables**

In the course of my research I did quantify each variable according to specific factual situations. However, a master-thesis is (ideally) submitted within a year. assessing each variable in each cases, would have meant assessing around 850 data points per variable (around 25 500 data points in total). This was not feasible given the time constraint. In the end I opted for relying on the information provided within the fining decisions, and the use of the search application.

As is already indicated, the criterion to decide whether a variable needs to be coded 1 or 0 (present in the case or not) is: "Factor is in the fining decision mentioned to possibly be present and not presented as being mentioned *ex absurdo*"

## **3.2 Situational factors**

The factors determined in this step need to be very limited. Given the scope of the research, inferring factors unto the decision making process might not be fundamentally be justified. However, in case of justifiable suspicion, factors are retained at this point.

### **Factors relating to the party**

A first suspicion can occur for factors inherent to the party who gets fined. The protectionist hypothesis stems from such a suspicion. As I explained in the introduction, Americans feel unfairly treated and imply the unfair treatment is the result of them being American. This is the first variable outside of the fining guidelines.

#### **Nationality of the party**

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<sup>158</sup>Case AT.39740 - Google Search (Shopping), at para 753.



The question about possible influence of party's influence, the so called protectionist hypothesis, is sufficiently raised both by political figures,<sup>159</sup> journalists,<sup>160</sup> and academic literature.<sup>161</sup> Therefore, the factor "parties nationality" was tested.

However, setting a parameter around "parties nationality" is not straightforward. The discussion around what the nationality of a certain party is, is an issue in both private international law (to what law is the corporation subject, to what forum is the defendant called?) and tax law (where is the corporations tax liability).<sup>162</sup> How the issue is solved in both cases is presented in summary and with references to fining decisions a parameter will be decided.

In private international law, as a matter of court jurisdiction, the issue is not the "nationality" of the corporation but the "domicile" of the corporation.<sup>163</sup> Article 63 Brussel Ia, explains what counts as domicile of the defendant in case of a corporation. Even though this does not directly reference "nationality" it is relevant since the criteria are similar to those proposed in 1907, when nationality of corporations were debated.<sup>164</sup> The criteria in the article will thus be used as starting point to reference the historic options to decide nationality of corporations.

The first option is the statutory seat.<sup>165</sup> In the referenced foundational work, this is referenced as the first system, nationality is the one of the state that "authorised the existence" of the corporation.<sup>166</sup> In contemporary discussion, this is referenced as the "statutory seat'-school" (translated in Belgian jurisprudence: "statutaire zetelleer").<sup>167</sup> The historic case for this solution is

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<sup>159</sup>Two last US presidents: Murad Ahmed, Duncan Robinson and Richard Waters, "Obama attacks Europe over technology protectionism", *Financial Times* 17 februari 2015 and Kiran Stacy, Rochelle Toplensky and Demetri Sevastopulo, "Donald Trump attacks EU action against US tech groups", *Financial Times* 27 june 2019.

<sup>160</sup>Rochelle Toplensky, "Europe's Tougher Approach to Big Tech", *The Wall Street Journal* (10/11/2019); Priest, G., and F. Romani. "The GE/Honeywell precedent." *The Wall Street Journal*, (June 20 2001), p. A-18.

<sup>161</sup>See section 1.2: "The state of the art".

<sup>162</sup>Eg. See following footnotes.

<sup>163</sup>Domicile of the defendant decides jurisdiction in principle: Recital 15 Regulation (eu) no 1215/2012 of the European Parliament and of the Council of 12 december 2012 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters (hereafter Brussel 1a); is the case in eg. art. 17, 1, c) Brussel 1a.

<sup>164</sup>P.; Spear Arminjon, William E., Translator, *Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), And C. R. N. W. "Company—Nationality of Corporation—Acquisition of New Nationality Ipso Facto in Accordance with Treaty of Peace with Austria, Arts. 53, 70, 75, 249 (b), 263—Treaty of Peace (Austria) Order, 1920—Significance of 'Control' in considering Character of Corporation." *The Cambridge Law Journal* 3.2 (1928): 249-51. Web.

<sup>165</sup>Article 63, (a), Brussel Ia.

<sup>166</sup>P.; Spear Arminjon, William E., Translator, *Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), 8.

<sup>167</sup>Luc De Broe, Marit Peeters, "[Vennootschapsbelasting] Nieuwe 'statutaire zetelleer' versus fiscale 'werkelijke zetelleer'", *Fiscoloog* (2019), afl. 1607, 1-7.

the fact that the parties, who might come from different countries, need to have the freedom to choose the nationality of the corporation.<sup>168</sup> The corporation made themselves subject of a certain nation. Belgium recently also adopted the “statutory seat school” into their law.<sup>169</sup> The reason behind this change (before they adhered to the “factual seat’-school”<sup>170</sup>) is, most importantly, competition between member states of the EU for the most attractive corporate structure.<sup>171</sup> Member states who adhere to the “factual seat’-school” are at a disadvantage since it is more difficult for corporations to immigrate to the member state by changing the structure and location of the business than to change the place of statutory registration.<sup>172</sup> Another reason is that CJEU case law prohibits restrictions on the development by EU business, in other member states.<sup>173</sup> Member states can, according to the CJEU, not restrict immigration of EU corporations by change of statutory seat by other requirements.<sup>174</sup>

This preference for “statutory seat”-school, seems to be followed in the Commission fining decisions. The Commission references the statutory seat address to identify the parties.<sup>175</sup> In 2 decisions concerning the undertaking “Google”, the Commission references the party in the first case as “[...] *company based in the United states of America* [...]”<sup>176</sup> and in the second just as “*This Decision is addressed to Google LLC and Alphabet Inc., both [...] United States of America.*”<sup>177</sup>

Given the preference within the EU as suggested by the Belgian example, the CJEU caselaw, and the referenced fining Decisions, The parameter used will thus be: “The statutory seat is not within the EU”. The other options will briefly be listed but will not be used.

As mentioned above the other dominant school, is the “factual seat”-school. Referenced in Brussel Ia under article 63, 1), (b), as “central administration”. In the referenced foundational work this is called the second system:

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<sup>168</sup>P.; Spear Arminjon, William E., *Translator, Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), 22.

<sup>169</sup>Article 2:146 Belgian code of Corporations and Societies.

<sup>170</sup>See in the same paragraph. The idea is that the domicile of the corporation is where the corporation conducts business in fact: Old article 4, §3 Belgian Private international law code.

<sup>171</sup>Belgian Parl.St. “Kamer” 2018-19, nr. 54-3119/01, 15.

<sup>172</sup>Luc De Broe, Marit Peeters, “[Vennootschapsbelasting] Nieuwe ‘statutaire zetelleer’ versus fiscale ‘werkelijke zetelleer’”, *Fiscoloog* (2019), afl. 1607, 1-7.

<sup>173</sup>“The four freedoms”-case law: Eg. CJEU Case C-212/97, Centros and Case C-106/16, Polbud.

<sup>174</sup>Case C-106/16, Polbud; Luc De Broe, Marit Peeters, “[Vennootschapsbelasting] Nieuwe ‘statutaire zetelleer’ versus fiscale ‘werkelijke zetelleer’”, *Fiscoloog* (2019), afl. 1607, 1-7.

<sup>175</sup>Case AT.40099 – Google Android, at article 6; Case AT.40049 - MasterCard II, at para 11 to 14; Case AT.39881 - Occupant Safety Systems Supplied to Japanese Car Manufacturers, at para 10.

<sup>176</sup>Case AT.39740 - Google Search (Shopping), at para 4.

<sup>177</sup>Case AT.40099 – Google Android, at article 6.

“*Jurisdiction it has been organized*”.<sup>178</sup> This criteria is for example used when the taxation issue of domicile is raised.<sup>179</sup> Adjacent to this idea is the criteria of “principle place of business”.<sup>180</sup> Meaning, the place where the business activity actually takes place, not just management.<sup>181</sup> Other in 1907 proposed system included looking at the domicile of the shareholder or majority of shareholders.<sup>182</sup> In a contemporary context this criteria is still relevant in the tax law concept of Controlled Foreign Corporations (hereafter CFC).<sup>183</sup> A CFC is considered to be a resident of a state for tax purposes, even though they are not considered as such legally (on the basis of the before mentioned criteria), because a majority of shareholders are resident of that state. Lastly, the foundational work suggested as sixth system a decision by a judge in each case given the specifics of every case.<sup>184</sup> This is not present in contemporary state of the art, and displeasure about this solution was already present in the referenced work.

The parameter is thus: “The statutory seat is not within the EU” and “the statutory seat is in the US”

No other factors specific to the entity of the party are selected.

**Other factors specific to the infringement** Some factors, although mentioned by the Commission, are not indicated to be relevant. I assessed two: firstly, the novelty of an infringement, and, secondly, if the infringement had *actual* market impact.

### **Novelty of the infringement**

The factor is retained purely on a speculative basis. None of the literature in the literature review looked at this factor, nor did I find any publication (both academic and journalistic) which suggests this factor might have an impact. In other fields “first” or “landmark” cases do get some attention, which suggests a

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<sup>178</sup>P.; Spear Arminjon, William E., Translator, *Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), 9.

<sup>179</sup>Article. 2, § 1, 5°, b) Belgian Code on Taxation 1992; Section YD 1 New Zealand Income Tax Act 2007.

<sup>180</sup>Article 63, 1, (c), Brussels Ia.

<sup>181</sup>The fifth system: P.; Spear Arminjon, William E., Translator, *Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), 16.

<sup>182</sup>System three and system four: Spear Arminjon, William E., Translator, *Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), 11 and 13.

<sup>183</sup>Section EX 1 New Zealand Income Tax Act 2007; Anonymous. “Changes to UK Controlled Foreign Company Legislation.” *International Tax Review* (2012): N/a. Web; Jusela, Janne. “Finland: Court Case concerning Finnish CFC Law.(controlled-foreign Company)(Brief Article).” *International Tax Review* (2011), Web.

<sup>184</sup>The sixth system: P.; Spear Arminjon, William E., Translator, *Treatise on the Nationality of Corporations* (Washington: U.S. G.P.O., 1907), 18.

certain degree of gravity for this type cases, for example in the new GDPR regulatory field.<sup>185</sup> On a purely speculative basis there are three trains of thought: first, a new type of infringement might merit a strong signal to undertakings thus might influence the fine. Or, second, for a new type of infringement the commission might not yet have streamlined there analysis, thus have an impact. Lastly, if conduct was never deemed to infringe articles 101 or 102 TFEU, this might constitute a mitigating circumstance since the undertaking could not reasonable expect to be fined. Only a correlation factor might indicate which reasoning, if any need to studied in the future.

Given feasibility considerations,<sup>186</sup> the parameter for this factor will be: “*the Commission mentions the infringement is new, mentions the “novelty” of the infringement, or the lack of precedent.*”

### Market impact

As mentioned in the literature review, Page argues that if certain conduct, which might constitute infringement, does not result in inefficiency, it should not be fined.<sup>187</sup> This is a question towards the impact on the market, and is (in principle) not shared by the EU nor American competition authorities.<sup>188</sup> The Commission also takes into account the sales as soon as the conduct “could” have had anti-competitive effects.<sup>189</sup> Meaning the actual market impact does not matter in principle. Moreover, as explained in the paragraphs about “infringement touching upon policy considerations”, a heavy market impact is assumed, not tested in regards to certain qualifications (such as horizontal price fixing). However, since Page raises this issue I selected this variable to be tested.

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<sup>185</sup>First GDPR fine is mentioned on multiple blogs: EY, *First fine imposed by the Belgian Data Protection Authority*, (<https://www.eylaw.be/2019/06/04/first-fine-imposed-by-the-belgian-data-protection-authority/>) (consulted on 19/12/2019); Bernd Fiten on Timelex Blog, *First GDPR fine in Belgium: 2000 euro imposed on a mayor*, (<https://www.timelex.eu/en/blog/first-gdpr-fine-belgium-eu-2000-imposed-mayor>) (consulted on 19/12/2019); Local Knowledge, *First GDPR fine in Belgium* (<https://localknowledge.be/news/first-gdpr-fine-in-belgium/>) (consulted on 19/12/2019); *Sweden first GDPR fine: Biometric update, Swedish data protection authority issues first fine for biometrics use under GDPR*, (<https://www.biometricupdate.com/201908/swedish-data-protection-authority-issues-first-fine-for-biometrics-use-under-gdpr>) (consulted on 19/12/2019); ComputerWeekly, *Sweden's first GDPR fine sets regulatory tone*, (<https://www.computerweekly.com/news/252472366/Swedens-first-GDPR-fine-sets-regulatory-tone-tine>) (consulted on 19/12/2019).

<sup>186</sup>In the time constraint it is not possible to assess for each case if the infringement occurred in another time period. However, this factor can only be relevant, given my possible hypothesis if the Commission is aware they are dealing with a “new” infringement.

<sup>187</sup>William Page, “Antitrust damages and economic efficiency: an approach to antitrust injury”, *The University of Chicago Law Review*, (Spring 1980), Vol.47(3), p.467.

<sup>188</sup>See footnote 15

<sup>189</sup>Case T-254/12 Kühne + Nagel International and Others v Commission, para 226–228; Case T-265/12 Schenker v Commission, para 265–267; Case T-762/14 Koninklijke Philips and Other v Commission, para 297; Case C-101/15 Pilkington Group v Commission, para 19–23; Case AT.39740 - Google Search (Shopping), at para 737 and 738.

The coding will be done by the same method as the other variables, on the basis of mentions in the fining decisions.

## **Factors about context**

Fines are not only given to specific parties, nor for specific conduct, they also result from an economic and political climate. The last two variables included are thus about, which specific Commissioner pronounced the fine, and what was the economic situation at the time.

### **Political alignment Commissioner**

Even though in the course of this paper I mentioned “Commission” as a singular entity, since the introduction of the fining guidelines 3 different Commissioners have been tasked with Competition law enforcement.<sup>190</sup> It might be possible each Commissioner set different accents in their policy and enforcement, thus the fact a decision was taken by one or the other, might influence the fine. It is also possible the Bias question which arose under the GE/Honeywell case and the Boeing/McDonnell Douglas case under a previous commissioner, is only applicable to some or none of their successors.

Each factor will be considered present if the data of the decision falls within the term of each Commissioner. This means: for Neelie Kroes, decision took place between January 2006 and 9 February 2010. For Joaquin Almunia, from 9 February 2010 till 1 November 2014. And for Margrethe Vestager, from 9 February 2014 till present, in the case of the research 1 January 2020.

### **Economic situation**

On a purely speculative basis, one could consider the impact of the economic situation on fining decisions. The reasoning would be that fines would be less severe in case the economy is struggling to not burden undertakings any further. Alternatively, it is also possible in case the economic situation in EU is subpar, the Commission could try to protect its domestic undertakings. Another hypothesis could suggest that in case the economy is booming, the increased economic activity could mean more opportunity for deals, and thus more cartel cases, on which the Commission would try to crack down on. However, at this stage this are speculative theories, and as such of no value without testing the influence of the state of the economy. Based on these considerations, I included a dummy to test these hypothesis.

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<sup>190</sup>Margrethe Vestager, Commissioner 2014-now ([https://ec.europa.eu/commission/commissioners/2019-2024/vestager\\_en](https://ec.europa.eu/commission/commissioners/2019-2024/vestager_en)); Joaquin Almunia 2010-2014 (Rob Nicholls, “Something to remember him by: Commissioner Joaquín Almunia’s farewell gift”, *Law and Financial Markets Review*, (31 December 2014), Vol.8(4), pp.315-317) ;Neelie Kroes 2004-2010 (Andrea Da Silva, James Aitken, Alison Jones, and Michele Hearty, “Neelie Kroes: A Review of the Former EU Competition Commissioner’s Term of Office”, *Antitrust*, (Spring 2010), Vol.24(2), pp.57-64).

Traditionally, the state of the economy is measured as gross domestic product (GDP).<sup>191</sup> The Stiglitz and Fitoussi report suggest this might not be entirely accurate.<sup>192</sup> Some authors and reports suggest GDP misses large parts of the story.<sup>193</sup> (i) Firstly, GDP only measures volume, not the substance of the volume. The example given, is that volume could be made up of the Tobacco industry, which in the long term would put a strain on people's health and thus on the economy. (ii) Secondly, GDP misses a lot of political factors, which are relevant, such as the believe in the system. Distrust of the system could in the long term pose a danger to the economic development. In the before mentioned reports suggestions are made to the Commission to improve on this blind-spot which GDP has.<sup>194</sup>

However, as is also said by Rutger Bregman and Jesse Fredriks in their podcast: historically, GDP has never accurately shown economic activity.<sup>195</sup> Still, GDP is a widely reported and specific figure, which still functions as an important indicator, GDP will be used. To equalize historic difference in assessment of GDP, real GDP growth is used.

Given the fact that the Commission operates only when the European level is triggered, EU GDP will be used. The GDP of the year prior to the Commission decision will be used, as GDP can only be determined after a time period, and the Commission had to have knowledge of this factor in order for it to be able to influence the decision.

In total 36 independent variables were selected (including the "turnover stop" variable, to express when the legal maximum was applied), out of the discussion in this section (section 3: "Variable selection"). They are presented in the following table, each with the correspondent variable code.

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<sup>191</sup> Joseph Eugene Stiglitz, Sen A., Jean-Paul Fitoussi J., *Report by the Commission on the Measurement of Economic and Social Progress*, 2009.

<sup>192</sup>Ibid.

<sup>193</sup>M.D. Simonova, "Beyond GDP. Measuring What Counts for Economic and Social Performance", *GIMO Review of International Relations*. 2019;12(5):172-180.

<sup>194</sup>See footnote 191

<sup>195</sup>Said in their podcast: "De Rudi en Freddie Show", *De Correspondent*.

Table 1: Independent variables

#	Description	Code
1	Uncooperative (for information)	x2
2	Misleading information	x3
3	Did not rectify mistakes (about information)	x4
4	Important market	B1
5	Gateway market	B2
6	Local infringement	B3
7	Global scheme	B4
8	Entire EEA	B5
9	Not implemented	B6
10	Qualified infringement	B7
11	Duration (in months)	B8
12	Recidivism	G1
13	Cartel leader	G2
14	Market leader	G2b
15	Instigator	G3
16	Cartel case	G4
17	Abuse of dominance case	G5
18	Ended after intervention	M1
19	Not aware "unlawful"	M2
20	Unaware restrictive	M3
21	Lower involvement (than others)	M4
22	Less aware (than others)	M5
23	Legislative excuse	M6
24	Gains exceeded fine	D1
25	Very large turnover	D2
26	Fine forces into liquidation	x5
27	US firm	N1
28	Non-EU firm	N2
29	Novel infringement	Q1
30	Actual market impact	Q2
31	Commissioner (nominal variable)	Q3
32	Economic situation (continuous variable)	ES
33	Sector (nominal variable)	Sector
34	Leniency notice approved	LN
35	Sales (later excluded)	S
36	Turnover-stop	ST

"Important markets" means markets which are said to be important to the EU, "Gateway markets" are those which are said to be important for larger economic activity, "Qualified infringement" means qualified under Recital 23 of the 2006 fining guidelines (Eg. horizontal price fixing), "Legislative excuse" means policy and legislation by national governments which seemed to allow the conduct. Other factors are self-explanatory.

There are 10 dependent variables (listed in table 2), each of these variables were analyzed, except duration amount which is not part of any regression since the only relevant variable (infringement’s duration) is already known.

Table 2: Dependent variables

#	Description	Code
1	Basic amount	BA
2	Additional amount	AA
3	Duration amount	DA
4	Aggravating amount	AGA
5	Mitigating amount	MA
6	Deterrence amount	DETA
7	Total amount (before leniency)	TA
8	post-lenieny reduction	LA
9	Ultimate fine in percentage	UFA
10	Ultimate fine nominally	UFN

*Description corresponds to steps in 2006 fining guidelines methodology*

## 4 Data collection

### 4.1 Determining population (n)

The dataset *a priori* was determined by scrapping the table of all cases from January 2006 to January 2020 from the website of the Commission. A total of 191 different cases were determined this way.<sup>196</sup> Secondly, for each case the individual different fine were determined, addressed to each party. However, different undertakings belonging to the same group, which were severed with a collective fine, were treated as one fine (as to prevent inflating instances in the regression because of group structures). In total 817 different fines were determined.<sup>197</sup> The 817 instances were split up in to groups of how the Commission determines the “policy area”<sup>198</sup>: “Cartel” and “Antitrust”. “Cartel” is used as proxy to mean art. 101 TFEU cases. “Antitrust” is used to mean “not a cartel case”, approximating the “Abuse of dominance”-cases, however checked in a later phase. In total there were 672 “Cartel” instances, and 145 “Antitrust” instances (proxied as non-cartel cases).

Of those 672 “Cartel” instances, 28 were thrown out for various reasons. One case (containing 9 instances) was wrongly categorized by the Commission, since the prohibition decision was taken in 2004, thus outside the scope of our in-

<sup>196</sup>Checked again 5/04/2020 for “Cartel/Antitrust”-cases, time-frame “1/1/2006 till 1/1/2020” (site: <https://ec.europa.eu/competition/>).

<sup>197</sup>See annex excel sheet.

<sup>198</sup>First column on the table on the site. (site: <https://ec.europa.eu/competition/elojade/isef/>).



tended data-set.<sup>199</sup> Ten instances in the same case (however not excluding the entire case) were later repealed and censored in the published prohibition decision.<sup>200</sup> Another case concerning five instances was entirely censored.<sup>201</sup> One instance consisted of a “Rejection decision” meaning no action was taken and thus no fine was given.<sup>202</sup> Lastly, of 2 cases no summary nor prohibition decision was available, they were excluded as well.<sup>203</sup> The other cases were all selected. N=644 for the analysis.

Of those 145 “Antitrust” instances, in 76 instances no fine was calculated, mostly consisting of decisions rejection applications of competitors to inquire into practices. 28 were also excluded for various reasons, such as “no summary nor prohibition decision was available”, “No fine was given”, or “The case was about procedural fines”. Five out of 28 were instances where the proxy did not hold. One was a 106 TFEU case, the other four purely cartel cases (under 101 TFEU), they were excluded as well.<sup>204</sup> Lastly, two cases consisted of sui generis infringements: Cases which were both under article 101 and 102 TFEU. Because of the clear divide in analysis between article 101 and 102 TFEU cases they were excluded as well (amounting to 25 instances). In the end 13 instances remained. The number of variables surpassed the amount of instances (a standard big P, small N problem). Therefore, I decided to only look at the variables “Nationality US” (N1) and “Nationality Non-EU” N2, together with “Duration” (B8) towards the factors “Ultimate fine amount (in percentage)” (UFA) and “Ultimate fine amount in Nominal terms” (UFN).

## 4.2 Variable coding

The independent variables were manually coded with the help of a keyword search program specifically for our research purposes.<sup>205</sup> The coding was done in a binary fashion (factor is present or not), except for “duration” which is expressed in months, “Economic situation”, expressed as “real GDP growth, the year before the decision took place”, and “sector” and “Commissioner”, which are nominal variables. The decision to code a variable as “1” (factor is present), was done according to the criteria: “factor is mentioned within the fining decision and is not presented as being *ex absurdo*”. The variable “ability to pay” could not be coded since the Commission systematically censors the

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<sup>199</sup>Case COMP/38.238 – Raw Tobacco Spain.

<sup>200</sup>Case AT.38589 –Heat Stabilisers.

<sup>201</sup>The built-up of the fine and the ultimate percentages: Case AT.39633 – Shrimps.

<sup>202</sup>Case COMP/C-3/39.391 EFIM.

<sup>203</sup>Case 40127 Canned vegetables and Case 40135 FOREX.

<sup>204</sup>Since the coding fort he “antitrust” instances took place after the analysis for “Cartel” was finished they were not added to the other set.

<sup>205</sup>The Program showed keyword search hit simultaneously with all the parties from the documents case which enabled the data collector to select for which party the hit was relevant or if it was a false hit. Once selected the sentence from the hit was collected as proof. Keywords are presented in Annex (coding of the application was done by Joren Dumoulin, engineering student at KU Leuven)

parties who qualified for this factor.

The dependent variables were all coded manually, except Duration amount (factor code DA). It was seen to be calculated following a set structure by the Commission,<sup>206</sup> therefore, coding duration amount was done automatically by excel and verified. For the other dependent variables an issue arose because of systematical censoring by the Commission in publicly available versions of the decisions. Where "basic amount" was given in combination with total sale, "basic amount" in percentage could be imputed. In less than 20 cases (4% of n) basic amount was imputed as being around the median of all cases (being 15%). "Sales", however, was heavily censored in most decisions and could not be reliably imputed. This variable was thus dropped from the calculation.

Lastly, an infringement is considered local if the infringement took place in a local market (within a member-state) or a maximum of 3 neighbouring member states were targeted by the infringement. Inversely, an infringement concerns the entire EEA, if potentially the entire EEA was targeted. The variable "global scheme" was coded if undertakings who are not active within the EU were involved, or the cartel spread outside of the EEA.

### Observations out of coding phase

A few observations can be done purely from the coding stage, as well as some clarifications. These will be done in order of variables.

For variable x2: the variable has in the coding stage meant more broadly "did not cooperate". The factor was only considered to be present in case the undertaking was determined to not have cooperate. However, while coding I quickly noticed the commission often<sup>207</sup> mentions the following:

*"[party] did not cooperate beyond its obligation under Article 18 of Regulation (EC) No1/2003"*<sup>208</sup>

This is an interesting statement for two reasons. First, although not coded in the present research, the Commission claims to also take into account positively when people cooperate outside of the leniency notice scope. Second, the Commission claims to apply leniency to varies degrees of cooperation. However, in the before mentioned statement, there is a form of cooperation which is expected. For future research, it might be relevant to determine how this scale of

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<sup>206</sup>Expressed for example in Case COMP/B/37.766 — Dutch beer market, p. 2 of the Summary decision. *"The starting amount of the fines is generally increased by 10 % for each full year of infringement, and further increased by 5 % for any remaining period of 6 months or more but less than a year. All addressees of the Decision are liable for an infringement of 3 years and 8 months. This leads to an increase in the starting amount of the fine by 35 %."*

<sup>207</sup>Eg. Case COMP/39437 - TV and Computer Monitor Tubes; COMP/37.990 – Intel; Case COMP/39092 – Bathroom fittings and fixtures.

<sup>208</sup>Case COMP/39437 - TV and Computer Monitor Tubes.

cooperation works, and at what point and how cooperation is taken into account positively.

There is a clarification necessary for variable x3. The misleading nature, pertains only to misleading information. The Commission might consider certain arguments put forward by the parties as misleading, however, if the underlining information is not misleading this is not considered misleading information.<sup>209</sup>

For factor B8, it needs to be noted that the duration amount added in the end on the basis of this variable is set according to a set structure:

*“The starting amount of the fines is generally increased by 10% for each full year of infringement, and further increased by 5% for any remaining period of 6 months or more but less than a year. All addressees of the Decision are liable for an infringement of 3 years and 8 months. This leads to an increase in the starting amount of the fine by 35%.”*<sup>210</sup>

As a result of this set structure “Duration amount” (DA), is calculated by Excel and checked against the given “Duration increase” in the decision. However, B8 might still be relevant for other dependant variables and was thus kept in the analysis.

In regards to the level of awareness, such as in variable M5. It needs to be said that the Commission rarely accepts this as a circumstance even when undertakings show they were not. Often resorting to phrases such as:

*“Cannot have failed to take account of the information received from competitors when [...]”*<sup>211</sup>

Lastly, for x5, the Commission censors in any case which parties applied for an ability to pay circumstance and on which grounds such application was made. For example in the “Animal Feed Phosphates”-case, it is said the circumstance is present. However, the name and circumstances of the party to which the variable applies is censored.<sup>212</sup> Even if the application is rejected, the Commission still anonymizes the section and censors the information pertaining to the application.<sup>213</sup>

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<sup>209</sup>Eg. Case COMP/39.525 – Telekomunikacja Polska p. 221: *“The arguments put forward by TP cannot be accepted. It is misleading to try to explain the low broadband penetration in Poland on the basis of the GDP.”*

<sup>210</sup>Case COMP/B/37.766 — Dutch beer market, p. 2 of the Summary decision.

<sup>211</sup>Case AT.39914 – Euro Interest Rate Derivatives (EIRD), p. 108.

<sup>212</sup>Case COMP/38866 – Animal Feed Phosphates.

<sup>213</sup>Case COMP/38866 – Animal Feed Phosphates; Case COMP/39092 - Bathroom Fittings and Fixtures; COMP/39437 - TV and Computer Monitor Tubes; AT.39563 – Retail Food Packaging; AT.39610 - Power cables; COMP/39.396 – Calcium carbide and magnesium based reagents for the steel and gas industries.

A more general remarks follows this: the Commission censors a lot if information in the prohibition decisions. In another case they censored turnover,<sup>214</sup> in many cases either the basic amount was given nominally without percentage or inversely. As was already mentioned above, In the latter case it was still possible to obtain a percentage in case Sales were given. However, when neither were given (which only happened in a few instances), imputation was necessary. Imputation was done for “basic amount” (BA) in less than 20 cases (4% of n), and was done by taken the median amount of all cases (BA median=15%). In regards to Sales, those numbers were more often than not, not given. This resulted in a large set of missing values, and approximations by reversing the ultimate fine nominally with the ultimate fine in percentage, did not yield any results. Moreover, such an operation is not useful since the independent variable is directly calculated from the dependant variable. In the analyses “Sales” (S) was thus not used, with the exception of a regression to show this variable set was to flawed to use.

Lastly, the variable LA should de interpreted as meaning “Amount reduced between total amount and ultimate fine amount”. This is the result that an array of leniency instruments beyond the leniency notice were not part of the initial coding sheet (such as the reduction for long procedures). However, the factor LN (leniency) should still be interpreted as meaning “did the Commission apply the leniency notice, both for complete immunity and partial”.

## 5 Model technicalities

The theory behind the model was already explained at length in the beginning of this master-thesis. However, For the “Abuse of dominance” dataset, it should be noted that intermediate steps were often not given, and given the small number of n=13, no imputation was possible. The fines were determined as the fine nominally and the fine in percentage of turnover. In case the Commission did not give the fine as percentage of turnover, the percentage was calculated by looking up the relevant turnover<sup>215</sup> and calculating the proportion.

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<sup>214</sup>COMP/38.344 – Prestressing Steel.

<sup>215</sup>This is public information, and is publicly disclosed by the undertakings themselves.

## Part III

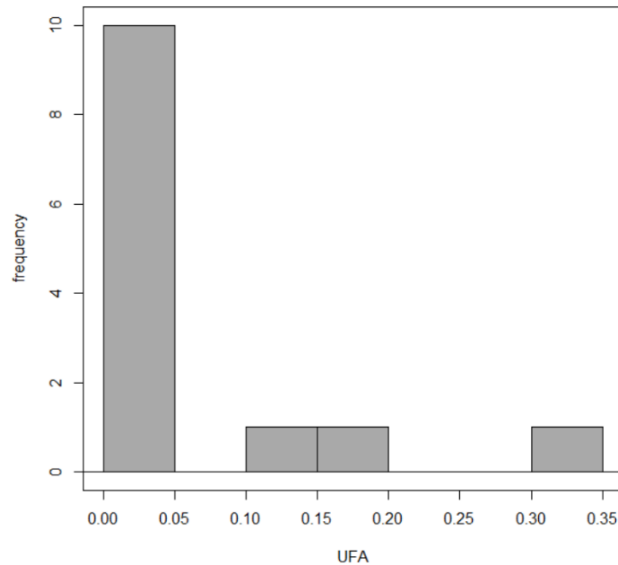
# Extended Result report

## 6 "Abuse of Dominance"-cases

### 6.1 Data-set description

As mentioned above only 3 independent (N1, N2, and B8) and two dependent (UFA and UFN) are used in the analysis given the number of instances (n=13). The following two histograms show the distribution of both the "Ultimate fine amount (in percentage)" (UFA), and the "Ultimate fine amount (nominally)" (UFN).

Figure 2: Histogram "Ultimate fine amount (in percentage)" (UFA) (Abuse of dominance dataset: n=13)

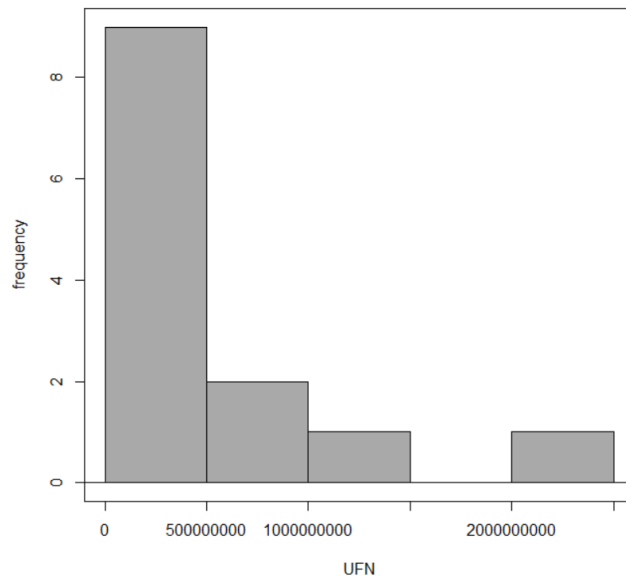


*Frequency of each percentage for "Ultimate fine amount" (UFA) (figure rendered in R.)*

As is clear from the distribution most fines do not exceed 5% of Turnover. Only 3 cases exceed this threshold the fines for: "Telefónica SA and its daughter company Telefónica de España SAU"<sup>216</sup>, "Telekomunikacja Polska S.A. ('TP')(14%), a telecommunications company belonging to the Telekomunikacja

<sup>216</sup>Case COMP/38.784 – Wanadoo España vs. Telefónica.

Figure 3: Histogram “Ultimate fine amount (nominally) (UFN) (Abuse of dominance dataset: n=13)

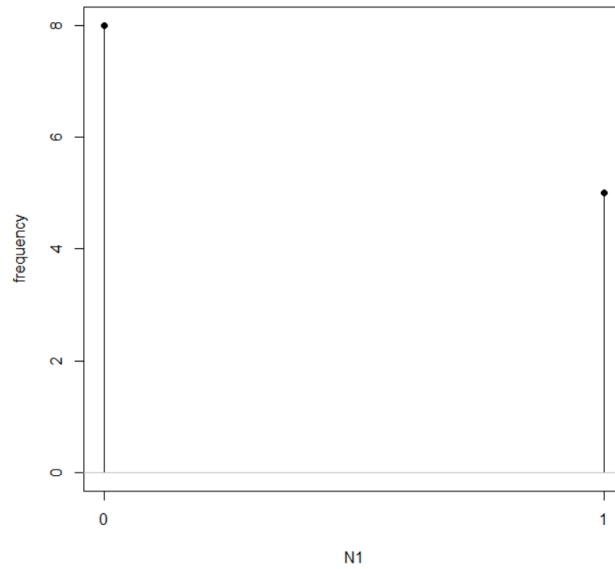


*Frequency of each figure for "Ultimate fine amount" (UFN) (figure rendered in R.)*

Polska Group”<sup>217</sup> (34%), and “Visa group”<sup>218</sup> (18%). In terms of the fine amount nominally, most fines do not exceed 5 000 000 000 Euro, and only one fine exceeds 20 000 000 000 Euro (A fine imposed on Google/Alphabet inc.).<sup>219</sup>The two furthest outliers in each histogram are thus not the same party.

The frequency plots for N1 (US firm) and N2 (non-EU firm) are shown next. The factors are heavily correlated ( $\rho > 0,85$ ), meaning ”non-EU” firms in this data set are mostly ”US” firms. Separate regressions were nonetheless run for both variables.

Figure 4: Frequency plot variable “US undertaking” (N1) (for Abuse of dominance dataset: n=13)

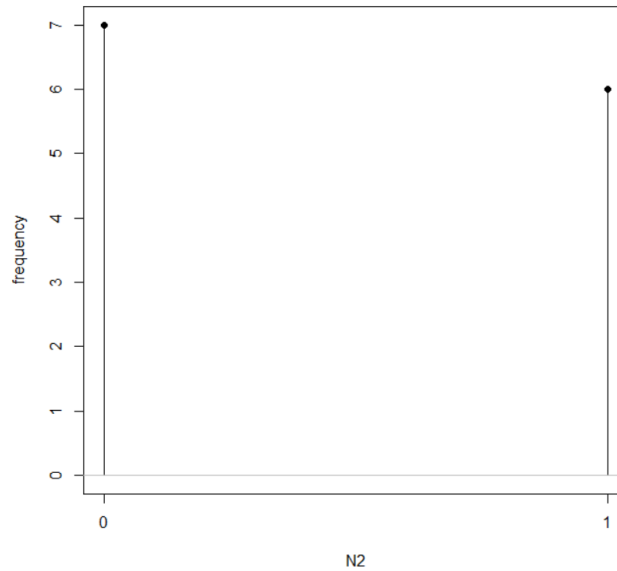


<sup>217</sup>Case COMP/39.525 – Telekomunikacja Polska.

<sup>218</sup>Case COMP/D1/37860 – Morgan Stanley / Visa International and Visa Europe.

<sup>219</sup>Case AT.39740 - Google Search (Shopping).

Figure 5: Frequency plot variable “Non-EU undertaking” (N2) (for Abuse of dominance dataset: n=13)



## 6.2 Result description

In a first calculation the correlation was determined between both the independent and the dependant factors.

Table 3: Spearman correlation between variables

	N1	N2	UFA	UFN
N1	1	0,8539126	-0,0972080	0,681963
N2	0,8539126	1	-0,1792204	0,579508
UFA	-0,0972080	-0,1792204	1	-0,2059470
UFN	0,681963	0,579508	-0,2059470	1

Spearman correlation was used which makes in the instances of N1 and N2 no difference with Pearson correlation. However, for UFA and UFN correlation this might be relevant to check correlation on order of rank,<sup>220</sup> to determine whether there is a link between UFA and UFN.

Before analyzing the results it should be said that when testing the correlation for significance, meaning is the correlation attributable to random variations or

<sup>220</sup>Spearman tests correlation in order, meaning the place in order (smallest amount to biggest) is taken into account.



not, only 1 (relation between N1 and UFN) came out as significant at  $P < 0,05$ , and another (relation between N2 and UFN) as significant at  $P < 0,10$ . Interestingly, The correlation between UFN and UFA is low and even negative (-0,21), however not significant ( $P = 0,7232$ ). This can be interpreted to mean that it is not the fines which are high in percentage are the ones that turn into high fines expressed nominally. This conclusion is consistent with the visual observation that the outliers in the percentage histogram (figure 1) are not the same as the outliers in the nominal histogram (figure 2). The correlation between N1 and N2, is 0,85 which means 85% of cases in which the undertaking was non-EU, the party was a US undertaking.

The only correlation that can be determined was the one between both N1 and N2 towards UFN. Meaning, the highest fines nominally seem to be given to US undertakings (a correlation of 0,68 and 0,57 respectively). The relations were checked with a control variable of the duration of the infringement.

Both the regression between N1 and N2 (with control of B8) towards UFA, was not significant and the multiple R squared did not rise above 0,07 (0,03634 and 0,06244, respectively). The Regression is thus not a good predictor of the fine. The estimates (meaning influence) of N1 and N2 respectively, are negative do not go beyond -0,03 and are not significant. Meaning, we cannot determine that the fact an undertaking is American (N1) or non-EU (N2) has any influence on the ultimate fine amount in percentages (UFA).

The regression between N1 and N2 (with control of B8 towards UFN) is a different story, however this needs to be nuanced later on. Both regressions are significant ( $P < 0,001$ ), and both estimates for duration and N1/N2 are significant. Moreover, both the multiple R-squared and the adjusted R squared are above 0,8 (for N1) and 0,7 (for N2). This means that the regression results cannot be attributed to random variability, and that the resulting regression formulae are a good predictor of the fines. The residual error for N1 is slightly smaller than for N2 regression (261400000 against 350200000), meaning the N1 regression is slightly more accurate.

Table 4: Linear regression N1 and duration (control B8) to UFN (Abuse of dominance dataset: n=13)

Dep. var.	Ind. var.	Estimate	Std. error	p- value
UFN	(Intercept)	-1091190717	209503524	0,000396
	B8	20621618	3380068	0,000116
	N1	955255566	149024181	0,0000773

*Residual standard error: 264100000 on 10 degrees of freedom*

*Multiple R-squared: 0,8867, Adjusted R-squared: 0,864*

*F-statistic: 39,13 on 2 and 10 DF, p-value: 0,00001866*

*UFN: Ultimate fine amount (nominally), N1: "US firm", B8: "duration (in months).*

Table 5: Linear regression N2 and duration (control B8) to UFN (Abuse of dominance dataset: n=13)

Dep. var.	Ind. var.	Estimate	Std. error	p- value
UFN	(Intercept)	-1170121650	289229160	0,002340
	B8	21687841	4534546	0,000743
	N2	838583474	195105960	0,001566

*Residual standard error: 350200000 on 10 degrees of freedom*

*Multiple R-squared: 0,7967, Adjusted R-squared: 0,7561*

*F-statistic: 19,6 on 2 and 10 DF, p-value: 0,0003471*

*UFN: Ultimate fine amount (nominally), N2: "Non-EU firm", B8: "duration (in months).*

If one would look only at the two tables (4 and 5), it might be tempting to conclude that there is some truth to the protectionist hypothesis in abuse of dominance cases. The fact that an undertaking is non-European, and even more so the fact an undertaking is a US undertaking, is a strong predictor that the fines given to those undertakings are higher. It will thus not be surprising if the protectionist hypothesis will once again stir up with the fine on Google Android,<sup>221</sup> the fine amounted to 4 342 865 000 Euro, double the amount of the highest fine in the current dataset (which was also a fine imposed on Google/Alphabet), and again a US company.

However, squaring this highly concerning result for the "Ultimate fine nominally" (UFN) with the result of the "Ultimate fine amount (in percentage)" (UFA) tells a different story. The UFA factor, consist of the UFN factor set to turnover. Meaning UFA also functions as a correction of the UFN regression

<sup>221</sup>Case AT.40099 – Google Android. Even though the decision was published on 20/09/2019, the decision did not show up in the dataset we scrapped from the Commissions website. I assume this is because there is a lag for decisions to show up in the search results.

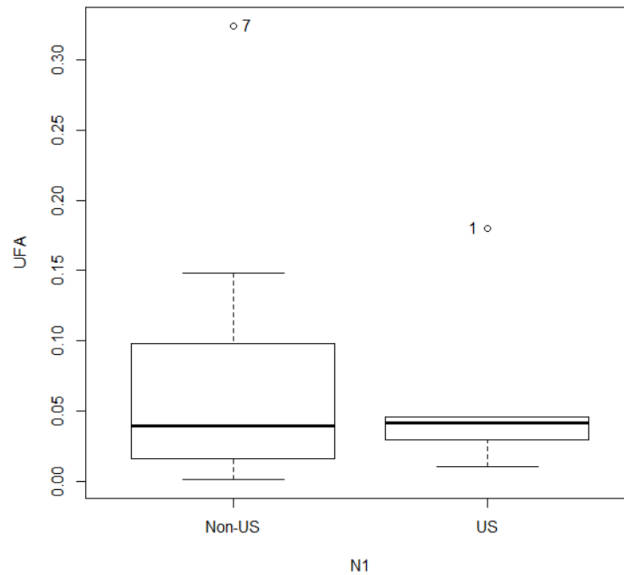
for a variable such as “particularly large turnover” or “heavy weight company”. Meaning what we can conclude from looking at both regressions, is the fact that American undertakings do tend to get larger fines in abuse of dominance cases, however, this cannot be said to be the result of any bias on the commissions side, but is simply the result of American undertakings tending to have much higher turnovers than EU undertakings. Moreover, in percentage the median of US and non-US fines are about the same, with non-US undertakings spreading out more beyond the median than in the US group. This is confirmed when looking at the mean, were US undertakings get an average slightly lower fines (in this data-set).

Table 6: Summary statistics for Abuse of dominance data set, grouped for N1, dependant variable UFA

<b>Group</b>	<b>Mean</b>	<b>sd</b>	<b>Std. IQR</b>		<b>n</b>
Non-US	0,07916315	0,10895623	0,05333346		8
US	0,06142961	0,06769978	0,01604278		5
<b>Group</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5</b>
Non-US	0,001162576	0,02011114	0,03928185	0,0734460	0,324663
US	0,010200000	0,02971304	0,04147916	0,04575582	0,1800000

*UFA is expressed in percentage of turnover. Q1-5: quantile 1 to 5.*

Figure 6: Boxplot comparison US vs non-US “Ultimate fine (in percentage)” (UFA)



*Comparison of UFA (in percentage of turnover ) for Non-US and US firms. UFA expresses the fine nominally controlled for by the turnover of the fine’s addressee the last year of the infringement.*

### 6.3 Summary

Given the restraints of a limited data-set (n=13), every conclusion drawn should be interpreted very conservatively. Yet, the data-set consists of every Abuse of dominance case which the Commission made readily available when searching there publication site, so in regards to what the Commission did in the past, some conclusions can de drawn.

As shown in the data, this analysis does not find any support in favour of the protectionist hypothesis but does find an explanation for its existence in abuse of dominance cases. US undertakings do not get fined heavier than EU undertakings. However, the fines in nominal terms are higher for US undertakings since the turnover for those undertakings are much larger than for non-US undertakings (including EU undertakings). This explains the persistence of the protectionist hypothesis and shows that on the basis of this analysis no merit can be given to the accusation of bias by the Commission.

## 7 ”Cartel”-cases

As mentioned above the dataset consists of  $n=644$  instances, and 46 variables of which 12 are dependant variables. Given the large set of variables not all plots nor regressions will be shown in the text. However, they are available in a separate Annex. The steps in the analysis are the following. 1) description of the dataset, 2) data cleaning (meaning excluding factors without variation and determining internal correlations), 3) univariate regression for each factor towards each dependant variable (excluding S), 4.1) selection of relevant variables for each multivariate regression towards building blocks of the fine (BA, AA, DETA, AGA, MA, and LA), 4.2) multivariate regression with selected factors towards building blocks of the fine (BA, AA, DETA, AGA, MA, and LA), 5.1) selection of relevant variables for each multivariate regression towards “Total fine amount (before leniency)” (TA) and “Ultimate fine amount (after leniency) (in percentage)” (UFA). 5.2) a multivariate regression is done with the selected variables towards “Total fine amount (before leniency)” (TA) and “Ultimate fine amount (after leniency) (in percentage)” (UFA). 6) with the same selection of variables a linear regression is done towards “Ultimate fine nominally” (UFN). Lastly, 7) a control linear model is done using the building block variables towards the “Total fine amount (before leniency)” (TA) and “Ultimate fine amount (after leniency) (in percentage)” (UFA) variables to show the consistency of the data. However, as mentioned above the UFN could not be made into a linear model given the factor “Sales” (S) could not be coded to a sufficiently accurate and complete degree, this is also shown under control models. These steps will be done by looking at the entire dataset. Based on the conclusions drawn by the analyses a separate analysis will be done by estimating a predictive formula.

### 7.1 Data-set description

The dependent variable’s description, the main conclusion to be drawn is there are far outliers. Ultimate fines in percentage of sales without outliers are between  $Q1 = 0\%$  and  $Q5 < 60\%$  (median:  $Q3 = + - 20\%$ ), while the two furthest outliers go beyond  $150\%$ .<sup>222</sup> These outliers can be explained as being cases where a deterrence effect was needed and the fine was heavily increased beyond the sales of the infringement. In nominal terms the same conclusion can be drawn. However, the distribution is different and the outliers are not necessarily the same instances. Fines nominally are usually between  $Q1 = 0EUR$  and  $Q5 < 70000000EUR$  (median:  $Q3 < 10000000EUR$ ), the furthest outlier goes beyond  $600\,000\,000$  EUR.

For the application of aggravating, mitigating and deterrence circumstances, the box-plots is one line on  $0\%$ , meaning the application of such circumstances are in principle outliers. For reductions after leniency application  $50\%$  of cases do not receive a reduction ( $Q3 = 0\%$ ) although the whisker extends to  $100\%$

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<sup>222</sup>Given the number of figures rendered, descriptions will be given instead. All figures are available in annex.

( $Q4 = 40\%$  and  $Q5 = 100\%$ ). As mentioned above: the variable "Sales" had to be excluded because of poor quality of the data.<sup>223</sup>

## Data cleaning

Given the amount of independent variables, not all graphs will be shown, but are available in annex. Data cleaning of the independent variables was done in the following steps.

- (i) Variables with no variation were excluded at this stage (6 in total: x4, B1, B2, x5. G4 and G5, are controls: if any variations would have occurred a wrong case would have found its way in the data set),<sup>224</sup>
- (ii) Correlated independent variables were flagged ( $\rho > 0,40$ )<sup>225</sup>, and will have to be part of separate regressions, if they are both selected for the multivariate regression. The only very heavily correlated variables are M2 and M5 ( $\rho = 0,65$ ), "unaware unlawful" occurs often in instances the party was "less aware" of the (extent of the)infringement.
- (iii) Univariate regressions were run for each factor towards each dependent variable.<sup>226</sup> Factors whose estimate were significant at a 90% confidence interval were selected for the multivariate regression of the corresponding dependent variable.

A few observations need to be mentioned. First, about a third of cases had some kind of beyond European dimension ("Global scheme" (B4), about 200 instances are coded as 1), and even more covered the entire EEA ("Entire EEA" (B5), about 250 cases are coded as 1). A paradox occurs for factor "Qualified infringement" (B7). Although, the fining guidelines claim the fact an infringement concerns a qualified infringement (pricing fixing, market sharing etc.), are circumstances which merit an additional increase in the fine, most fines are fines where this circumstance is present (about 450 instances). In terms of duration, the distribution of the factor is an inverse logarithmic curve. The highest frequency is at around 50 months and drops exponentially towards about 250 months at the far end.

There is a difference between the current and the previous dataset (abuse of dominance dataset), is the fact that US companies are clearly in the minority. And, even though Non-EU companies take up about a third of all fines, those are not American companies. At this stage it can already be said that the Commission does not target US companies in cartel cases in frequency. Non-EU companies in the cartel cases are often Asian companies (Toshiba, LG,

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<sup>223</sup>In a majority of cases this variable was censored.

<sup>224</sup>The fact there was no variation can be explained either by censorship in the decision or because the information was not available in the prohibition decision document itself through keyword searches.

<sup>225</sup>Our threshold is set very low to make sure we check for inference, and does not mean we consider these factors "heavily correlated".

<sup>226</sup>In total 232 different regressions were run, see annex.

Samsung, Panasonic, Sony, Denso, Fuji etc.) making up 146 of the about 200 fines directed at non-EU undertakings.

about the distribution among Commissioners, it is clear Commissioner Neelie Kroes and Commissioner Joaquín Almunia handled about the same number of cases in their respective time frames<sup>227</sup> (2006 till 2010, and 2010 till 2014). Commissioner Margrethe Vestager seems to have given fines to less undertakings, however, this discrepancy is most likely due to the latest cases not being published yet (there is about a two year lag between the time of the decision and the time of publishing) and not showing up in the search results scrapped from the Commissions website.

I remind the reader all figures are available in the annex document. Given the amount of figures rendered, my master-thesis would have been too voluminous if I had included the figures within the main text. Therefore, only descriptions are included in the text.

Lastly in this section, the correlations between variables are determined. This step is necessary to be able to exclude heavily correlated variables in the same multivariate regression later on. Spearman correlation is used except for the correlation between continuous factors. Since most factors are coded as binary, there should be no difference between using Spearman or Pearson correlation.

As is clear from the tables in annex, no factors are heavily correlated, the highest correlation is between M2 and M5 (correlation of 0,65). However, in order to approach the analysis with caution, multivariate regressions are also done separately in case factors are correlated with a factor more than 0,40.

### **Univariate regression for each factor towards each dependant variable**

This step serves to determine which factors to include in the multivariate regression. The reasoning behind this is: if there is no relation between the dependent and the independent variable in a one to one relation, including that independent variable in the multivariate regression would not only be useless but would also hinder an accurate picture of the other variables. To put it in more expressive terms: if one would have included in this dataset a variable for number of ants, birds and fish spotted in the year of the infringement, it is likely that statistically there would have been a very limited estimate which would probably not be significant between those factors and the fines. However, adding these small insignificant effects together, would have an impact on the effect (estimates) that are attributed to factors which are relevant because they

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<sup>227</sup>Commissioner Neelie Kroes started as Commissioner in 2004, however, the dataset starts from cases begin in 2006.

need to operate in interplay with these irrelevant factors. A second reason, is those irrelevant factors would affect how good the regression formula predicts the fine, the R-Squared adjusted would drop. Although the variables included in the dataset are not of the nature of ants, birds and fish, some still might have an affect which cannot be distinguished from random variability. Meaning we do not know if the effect of the variable is because of the variable or because of a random fluctuation. These variables are thus excluded later on in the multivariate regression.

However, a second consideration needs to be taken into account. Sometimes, variables which have small effects by themselves, have larger effects when combined with other variables and might become more significant when combining with other variables. This is also why the multivariate regression is done, because the interplay of other variables might induce effects on the effects of the other variable. Therefore, at this stage a factor is retained if the estimates are significant at a level of (alfa=10%, a 90 percent confidence interval) this low yet restricting threshold is chosen to leave room for interplay between the variables.

Lastly, again, since there are 29 independent variables and 8 dependant variables. Therefore, 232 different regressions are done for this section. The results for those 232 regressions can be consulted in Annex. In this section only the regressions with the factor which are relevant for the next step will be discussed, as well as those which were expected to be relevant but did not meet the threshold. As mentioned above, factors with no variance are already excluded from the analysis (variance=0: B1, B2, X4, X5, G4, and G5).

### **Univariate regression towards “Basic amount” BA**

What was expected to be relevant for the basic amount were only the variables under “x” and those under “B”. Secondly, the interest is also in the variables outside of the fining guidelines variables. The other variables were expected to have no influence since they are linked to other building blocks of the fine.

For the x variables (“Failed or refused to give information/ to cooperate” (x2) and “Incomplete or misleading information” (x3)) this expectation is not met. Although the intercept is significant and around 17%, which is the case for each of the regressions in this section, the factors themselves are not significant (p values of 0,658 and 0,493) and the absolute estimates are well below 0,03 and are negative, which is not logical given the nature of the variable. For the x variables it is thus clear they should not be retained for the multivariate regression.



The results for the “B” variables are more varied. The fact an infringement is local (“Sufficiently local” (B3)), has a significant effect ( $p=0.0142$ ). The impact of the factor in a univariate regression is  $-0,022355$ , meaning if the infringement is local the basic amount tends to be 2% lower than if the factor is not present. The inverse (however, not exact opposite situation) situation of an infringement concerning the entire EEA (“Entire EEA” (B5)) does not yield any results we cannot separate from random variability ( $p=0.182$ ). A global scheme (“Global scheme” (B4)) situation is treated in a different matter. Although the significance level is just over 0,10 ( $P=0,104$ ), with the theory of combined effect in mind, it is retained for the multivariate regression. No comment can be made on this variable at this point.

The variable “Not implemented” (B6) also yields a significant result ( $p=0.0858$ ). The effect on the basic amount is however very limited ( $-0,006626$ ). Given the selection criteria and given the limited effect makes sense since the factor is coded “the infringement was not implemented”, the factor is used in the multivariate regression. A factor with a very certain influence is “Qualified infringement” (B7). The influence of the factor to the basic amount is about 2% (with  $P=27 \times 10^{-9}$ ). Slightly significant ( $p=0.0993$ ), however an negligible effect on its own (estimate =  $0.00005377$ ), is the effect of “Duration” (B8). “Duration” is thus also taken into account to determine whether the interplay with other variables yield any effect.

The univariate regression of “USA company” (N1) to “Basic amount” (BA) does not yield a significant estimate, nor is the regression itself significant. Adjusted R-squared is even slightly negative, meaning the prediction of the regression using this factor is extremely poor. However, the neighbour variable “Non-EU company” (N2) does yield a significant result ( $p=0,0575$ ). The estimate shows a slightly negative influence on the basic amount of about  $-0,007082$ . However, it should be made clear that the adjusted R-squared for the regression is still  $0.004094$ , meaning the regression is not a good predictor of the fine. Still, some correlation between N2 and the “Basic amount” (BA) is seen, all be it in favour of non-EU undertakings. It will thus be included in the multivariate regression.

The factor “Market impact” (Q2) was only coded in case the Commission mentions the fact there was any market impact, or assumed that there was market impact. However, this factor proves to have a negative effect on the basic amount, the estimate is  $-0,016638$  ( $p=0,00028$ ). This seems counter intuitive and cannot be attributed to interpretation of market impact by the researcher, since the factor was coded on the basis of what the Commission claims the presence of market impact.<sup>228</sup> The factor is retained for the multivariate regression.

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<sup>228</sup>Eg. in cases: Case COMP/39.168 — PO/Hard Haberdashery: Fasteners and COMP/39.309 LCD (Liquid Crystal Displays).

Some variables which were not expected to prove relevant turned out to be relevant. The effect of “Recidivism” (G1) proved to not being able to be explained by random variation ( $p=57,1 \cdot 10^{-10}$ ). The effect on basic amount is 0,041244, which is the second largest effect of the basic amount which was determined on the basis of the selected variables in a univariate regression. This is closely followed by the effect of “Cartel leader” (G2), 0,034158 ( $p=71,61 \cdot 10^{-9}$ ). Although, it should be noted for both R squared adjusted is close to 0,05, which means the regression formula itself does not tell the whole story. The largest effect of almost 10% (estimate 0,091040), which is not explained by random variability ( $p=33,4 \cdot 10^{-8}$ ) is attributable to variable “Cartel instigator” (G3). Other variables (not mentioned further) did not yield any significant nor relevant results. However, these last results show that, at least insulated, what is considered “aggravating” circumstances could also already be taken into account when setting the basic amount (BA). In fact, these “aggravating” circumstances are estimated in univariate regressions to have a much bigger effect on the basic amount than factors which are said in the fining guidelines to relate to the basic amount. Lastly, a one-way ANOVA test for “Commissioner” (Q3) towards “Basic amount” (BA) shows that there is a slight difference in basic amounts given by Commissioner Neelie Kroes (mean=0,1852077) and the other two Commissioners (mean about 0,16). This difference is not accounted for by any difference in economic situation, since “Economic situation (in real GDP growth rate)” (ES) does not yield any significant results. The question is whether this difference is attributable to other differences in the types of cases handled by Commissioner Neelie Kroes and the following Commissioners or by a difference in fining methodology. If the former, this could be interpreted from the current data-set to some degree, however this falls outside of scope of the current research, if the latter this would mean the fining guidelines are supplemented by other means, since all fines are fines taken after the new fining guidelines entered into effect.

However, some variation is to be expected between Commissioners, which makes it more interesting the means for the basic amount for Commissioner Joaquín Almunia and Commissioner Margrethe Vestager are essentially the same (0,1619763 and 0,1618939, respectively). These means are very close and suggest some structural approach is taken in order to set fines at least for the basic amount. Which again raises the question what explains the difference with the mean of basic amounts given by Commissioner Neelie Kroes and the other Commissioners.

### **Univariate regression towards “Additional amount” (AA)**

The same reasoning is applied for “Additional amount” (AA) and “Basic amount” (BA). However, there is a higher expectation for factor “Qualified infringement” (B7) to yield significant results since it is this factor that is said to give rise to extra considerations in the first phase of the setting of the fine.

Neither x2 nor x3 yield any relevant results. “Sufficiently local” (B3) does yield an important and relevant result ( $p=3,42 \cdot 10^{-10}$ ). The impact of the local nature of an infringement has a negative effect on the additional amount with -0.104554. Since the intercept in this regression is 0.104554, this essentially means the local nature of an infringement cancels out the baseline of setting an additional amount. However, it should be noted the adjusted R squared for the regression is very close to zero (0,0584) which means the regression formula with only B3 as a factor is not a good predictor of what the additional amount will ultimately be. The (not exactly) inverse situations, “Global scheme” (B4) and “Entire EEA” (B5) also yield significant results ( $p=0,001298$  and  $p=1,92 \cdot 10^{-11}$ , respectively). The impact of each factor (0,022734 and 0,044185) suggest some consideration might be given to these factor by the Commission. The factors are thus taken for the multivariate regression.

“Not implemented” (B6) has a similar effect as the global nature of an infringement. The influence is about 2,6% (0,026379) ( $p=0,000205$ ). The “Duration” (B8) has an effect which is said to be non-attributable to random variability ( $p=7,65 \cdot 10^{-16}$ ), however, the effect itself negligible (estimate= -0,00047471) and the result is counter intuitive. The factors will nevertheless be used in the regression to see if some interplay happens.

What was expected to have some degree of influence, turned out to have some influence. “Qualified infringement” (B7) does have a certain influence of about 6 percent (estimate=0,059255) ( $p=2 \cdot 10^{-16}$ ). However this influence is a lot less than the influence of “Sufficiently local” (B3). Which will require an explanation when these results are also present in the multivariate regression.

“Recidivism” (G1) is said to have a non-random effect on the fine ( $p=0,00357$ ), however, this effect is very counter intuitive as it is said to have a negative effect (estimate = -0,038545). Since the adjusted R-squared is very close to zero, no conclusions can be drawn yet. The factor is retained for the multivariate regression. The same goes for “Cartel leader” (G2) (estimate = -0,039040,  $p=0,00095$ , but adjusted R-Squared = 0,01542) and “Cartel instigator” (G3) (estimate = -0,101591,  $p=0,00223$ , but Adjusted R squared =0,013). This last one is interesting because the result mirrors that of the “Sufficiently local” (B3) result. Which should serve as a reminder to wait out the results of the multivariate regression before jumping to conclusions and which serves as a reminder to not ignore adjusted R square when taking conclusions from these results. However, it is entirely possible that additional amount is not used in cases with aggravating circumstances which would explain why these factors seem to have a negative effect. In case these results prove relevant in the multivariate regression, this will be checked.

“Unaware restricted competition” (M3) also follows in that same line, however, the estimate is in line with what would be assumed from this factor

(estimate = -0,085169, p=0,00173, adjusted R-squared = 0,017372). Counter intuitively, the factor “Legislative excuse” (M6), which should be interpreted to mean “there is a plausible legislative excuse”, but which is not necessarily needed to be taken into account by the Commission, the effect is positive on the additional amount (estimate = 0,068428, p=0,00808). The same nuances as for the other results in this section need to be taken into account (adjusted R squared = 0,009379). “Leniency” (LN) is in a the same position (estimate =0,014567, p=0,0234, Adjusted R-squared=0,006461). Similar remark for “Gains exceeded fine without this factor” (D1), however the effect is in line with what is to be expected (estimate =0,078237) (p=0,00402 and adjusted R-squared = 0,01133).

In similar vain the results for N1 and N2 should be interpreted since adjusted R squared does not reach above 2% for either of the cases, even less so for N1(R squared adjusted is 0,005996 and 0,01742 respectively). However, some similarly positive effect of about 2% is deemed non random in this phase of the analysis (p=0,028 and p=0,000481) and thus the factors are taken for further exploration in the multivariate regression.

Lastly, the results of the one-way ANOVA test for the variable “Commissioner” (Q3), mirrors the result from the Basic amount. The mean given additional amount by Commissioner Neelie Kroes (6,867188%) differs significantly from those given by the Commissioners who succeeded her while those two mean given additional amounts are extremely close together (0,12126482 and 0,12310606). However, for this building block Commissioner Joaquín Almunia and Commissioner Margrethe Vestager are more severe than their predecessor. Since the result of the previous test is once again replicated, the same considerations as above could be mentioned again.

#### **Univariate regression “Duration” (B8) towards “Duration amount” (DA)**

This univariate regression is put in as a control of the software used. The duration amount is largely calculated by a set formula as mentioned above and only checked for deviations which were very few. Therefore, the prediction of the estimate should be fairly accurate (prediction is about 0,008). If this were not the case it could have been assumed the software was faulty.

The software proved robust since the estimate is significant (p=2\*e<sup>-16</sup>), the Adjusted R squared is high (0,6819) and the estimate only differs slightly from the prediction (estimate = 0,0076862). The difference can be explained since the regression also takes into account the intercept and some adjustments were made in some instances where the Commission did not adhere or varied slightly its methodology of the duration amount. Lastly, since the relationship

between number of months and the amount is not exactly linear there is also a difference.<sup>229</sup>

### **Univariate regressions towards “Aggravating circumstances amount” (AGA)**

What is expected in this section to yield some results are all the variables coded with “G”. The interest is, as with every univariate regression also towards the ex-fining guideline variables.

Interestingly, and with a very large effect (estimate = 0,103918, p=0,0961), “Failed or refused to give information/ to cooperate” (x2) does seem to have an influence on the aggravating circumstances amount, which does makes sense. However, the regression is not very accurate to predict the complete amount (adjusted R squared = 0,002756), as with the other intermediate analysis they are made to select factors for the multivariate regression which will give a more clear picture of what the effect really is. The same can be said for “Incomplete or misleading information” (x3), the effect is big (estimate = 20,3583%, p=0,059), however, the regression itself is not very accurate to predict the amount (0,003995). “Duration” (B8) does have a negligible impact (estimate=0,0003214) on the fine however not deemed to be the result of random variability (p=0,00451).

A factor which is seen as being reliable to predict the “aggravating circumstance amount” is “Recidivism” (G1) (adjusted R-Squared=0,5233). The impact of the variable is about 45% (estimate = 0,456291, p= 2\*e<sup>-16</sup>). This seems to be close, from visual inspection of the data-set, to what amount is given in case any amount is given. The expectation is thus that “Recidivism” will prove to be the best explanation for the “aggravating circumstances amount”, confirmed in the multivariate regression. Cartel leader also seems to have a certain impact, but is not nearly as accurate as “Recidivism” (Adjusted R-squared = 0,1082). The impact is estimated to be 0,185269 (p=2\*e<sup>-16</sup>). The results for “Market leader” (G2b) should be interpreted more in vain of the “B” variables (adjusted R squared = 0,009348). Some influence which cannot be attributed to random affect is seen however (estimate= 0,061712, p=0,00935). Similarly, “Cartel instigator” (G3) has a large effect of about 47% (estimate=0,474033) (p=8,44\*e<sup>-15</sup>), but the regression itself is bad at predicting the complete amount (adjusted R squared = 0,0882).

The factors which were expected to have an influence on the deterrence amount, both prove significant for their respective regressions towards Aggravating circumstances amount. “Gains exceeded fine without this factor” (D1)

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<sup>229</sup>The Commission uses thresholds: every year and every 6 months the infringement lasted.

has an effect of about 19% (estimate=0,188924, p=0,000206), again the regression itself does not predict the full amount (adjusted R squared= 0,01973). The same can be said for “Particularly large turnover” (D2) (estimate = 0,077566, p:  $8,14 \cdot 10^{-5}$ , adjusted R squared= 0,02239). “Market impact” (Q2), again, has a counter intuitive result (estimate=-0,05126, p=0,00126) but needs to be nuanced since for this regression the prediction value is very low (adjusted R squared=0,01455). “Leniency” (LN) also has a significant yet, counter intuitive result: the estimate is positive (estimate=0,022965, p=0,0564). However, again the predictive value is low meaning this result does not tell the whole story (Adjusted R squared = 0,004111).

The “Economic situation (in real GDP growth rate)” (ES) does prove to have some effect not attributable to random variability (p=0,00125), although upfront it should be said the predictive value of the regression is very low (Adjusted R squared = 0,01252). The effect the variable is said to have is 0,839750. It should be mentioned that this variable could not be compared to the results of the other variables, since apart from duration this variable is expressed in continuous terms, and different from duration, in a percentage. Therefore, one should be cautious to compare this estimate to the other estimates of other variables.

The factors “USA company” (N1) and “Non-EU company” (N2) both prove to have not to random variability attributable estimates (p=0,027 and p=0,0000181, respectively), although the prediction value of the regression is again low (adjusted R squared is 0,006101 and 0,02694, respectively). Interestingly, the effect is said to be negative (estimate= -0,05118 and -0,055254, respectively), which is not in line with the protectionist hypothesis. The multivariate regression will show if any merit should be given to this assessment.

Lastly, the pattern seen in the previous dependent variables in regards to the test relating to the “Commissioner” (Q3) variable does not hold for this dependent variable. As for all Commissioners the mean given aggravating amount is different (N.K. mean: 0,094980695, J.A. mean: 0,006324111, M.V.: 0,031060606). An explanation might be aggravating circumstances are less applied so regression towards the (metaphorical population) mean is less likely.

### **Univariate regression towards “Mitigating circumstances amount” (MA)**

What was expected to have some influence are the variables coded with “M”. Secondly, the non-implementation might be of interest. The variables outside of the fining guidelines 2006 will also be discussed. What needs to be clear is that the mitigating amount is reduced, meaning a higher mitigating amount is in the benefit of the undertaking.

Firstly, the infringement concerning the “Entire EEA” (B5) has a slightly negative effect on the mitigating amount (estimate=-0,013225, p=0,0283) and is retained for the multivariate regression. The same is said for “Qualified infringement” (B7) and “Duration” (B8) (estimates: -0,012273 and -0,00016331, respectively, p=0,0551 and p=0,00279), although for all mentioned the predictive value of the regression itself is close to zero (adjusted R squared= 0,005926; 0,004169 and 0,01238, respectively).

In the same vein, “Cartel leader” (G2) (p=0,005401), and “Market leader” (G2b) (p=0,0509) have a slightly negative effect on the mitigating amount (estimates -0,02267 and -0,022405). But this effect does not tell the complete story and the predictive value of the regression is low (Adjusted R squared: 0,005401 and 0,004375). The factors are retained for the multivariate regression to determine if any effect is really relevant to consider.

Secondly, the factors which were expected to be relevant do have some effect which is not due to random variability, however individually the predictive merit of the regression for these “M” variables are very low. “Unaware conduct was unlawful” (M2) (estimate=0,028542, p=0,00826), “Lower involvement” (M4) (estimate=0,180527, p=2,21\*e<sup>-8</sup>), “Lower awareness” (M5) (estimate=0,027372, p=0,0106), “Legislative excuse” (M6) (estimate=0,062090, p=0,00764), all have positive effects on the mitigating amount. However, even “lower involvement” which has an impact of about 18% does not serve as a good predictor in the regressions formulas as no adjusted R squared is above 5% (0,009274; -0,0004109; 0,04506; 0,008587; and 0,009385, respectively). The multivariate regression will thus show if the influence has any merit. The same goes for a counter intuitive effect of “Infringement ended after intervention” (M1) (Adjusted R squared= 0,006472), it should be noted that this factor is rarely accepted by the Commission to be taken into account and the factor is coded when the fact the infringement ended was established not whether the Commission agreed to take it into account. The effect is said to be -0,019728 (p=0,0231) which is thus slightly negative were the presumption was factors coded with “M” would return positive estimates. Again, the multivariate regression will determine the merit of these preliminary remarks.

“USA company” (N1) is said to have some influence (although against the hypothesis, in favour of the US undertaking) (estimate=0,023440, p=0,0342). The predictive value is again low (adjusted R-squared=0,005461). The factor is retained for the multivariate regression.

The best predictive regression for a variable on its own (Adjusted R-squared=0,2899) is “Novel infringement” (Q1). Moreover the effect ascribed to this variable is 0,58183 (p=2\*e<sup>-16</sup>), which in visual inspection of the dataset, seems close to values given as mitigating circumstance. This remark will have to be revisited later on after the multivariate regression is shown. “Market

impact” (Q2) is said to have a slight negative effect (estimate= -0,017500, p=0,0229). The predictive value of the regression is however very low (adjusted R squared=0,006496).

“Leniency” (LN) has a positive effect (estimate=0,022965, p=0,0564), slightly in line with what could be expected but strong remarks cannot be made since the predictive value is low (adjusted R squared=0,004111). “Economic situation (in real GDP growth rate)” (ES) has an effect (estimate=0,361222, p=0,00407) but the same concerns over the predictive merit can be made (adjusted R squared= 0,01126).

Lastly, for this section on mitigating circumstances, the same remarks as to the ANOVA test for “Commissioner” (Q3) to aggravating circumstances amount can be made. The means for the Commissioners do differ (N.K. mean: 0,01777220, J.A. mean:0,01300395, M.V. mean: 0,04204545). However, no conclusions can be drawn since the number of mitigating circumstances applied is very low and fines which did have mitigating circumstances applied are statistical outliers (see boxplot for mitigating circumstance amount (figure 14 and 15)). Therefore, not enough cases are present for the phenomenon “regression towards the mean” to take place.

### **Univariate regression towards “Deterrence amount” (DETA)**

The variables which are expected to be relevant are those coded as “D”. Variables which were taken outside of the fining guidelines are also of interest. It should be noted, as mentioned above, a deterrence amount is only applied as a last step to ensure sufficient deterrence in case the previous steps did not achieve this goal. Therefore, the two circumstances the fining guidelines mentions,<sup>230</sup> which are coded under “D1” and “D2” are expected to be relevant.

However, some relation is seen between “Sufficiently local” (B3) and the dependant variable at hand. The predictive value of the regression is low (adjusted R squared=0,03535), but the effect is said to be above 35% (estimate= 0,36843, p=9,38e<sup>-7</sup>). This would suggest there is the tendency in the data-set for local infringement cases to have a deterrence amount applied in the decision. Inversely (yet not complete opposite situation), “Entire EEA” (B5), again with a low predictive value (adjusted R squared=0,01401) is said to have a (compared to B3) small negative effect on the deterrence amount (estimate=-0,09455, p=0,00153). Which seems counter intuitive and will need to be revisited in the multivariate regression. In the same vain as “Entire EEA” (B5), “Qualified infringement” (B7) seems at first sight counterintuitive (estimate=-0,07114, p=0,0248, adjusted R squared=0,006288) but remarks will only be made after the multivariate regression. “Duration” (B8) is said to have a small

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<sup>230</sup>Recital 30 and 31 of the Fining guidelines 2006.



effect (estimate=0,0006048, p=0,02571) yet cannot be deemed a good predictor (adjusted R squared=0,006229).

Both “Recidivism” (G1), “Cartel leader” (G2), and “Cartel instigator” (G3) are said to have effect (estimates 0,31200; 0,17067; and 0,73655, p=11.57\*e<sup>-8</sup>, 0,00128 and 6,55\*e<sup>-7</sup>, respectively) but do not serve as good predictors (adjusted R squared= 0,04142 and 0,01454, respectively). “Infringement ended after intervention” (M1) is selected for the multivariate regression (estimate=0,09086, p=0,0347, Adjusted R squared= 0,005391), having a counter intuitive result. “Unaware conduct was unlawful” (M2) is said to have certain effect (estimate=-0,10806, p=0,0438) which does not raise the same concerns, however, as the previous variable, the predictive value of the univariate regressions are low (adjusted R squared=0,004777).

regression “Gains exceeded fine without this factor” (D1) and “Particularly large turnover” (D2) are as expected relevant. (D1) has an effect of about 27% (estimate 0,27801, p=0,0228). However, adjusted R squared is close to zero (0,006512), meaning the regression does not render an accurate predictive formula. “Particularly large turnover” (D2) does better (adjusted R squared=0,1432) but still does not function as a precise predictor of the deterrence amount on its own. The effect is said to be about 45% (estimate=0,45889, p=2\*e<sup>-16</sup>) which does not account for the often above 100% multiples.

Both “Market impact” (Q2) and “Economic situation (in real GDP growth rate)” (ES), with the same limitations of a low adjusted R squared (0,003566 and 0,01585, respectively), have some effect (estimate= -0,06911 and 2,08382, p=0,0698 and 0,00081, respectively). Again, the multivariate regression will have to show whether any conclusions can be drawn.

Lastly, the same remarks as for the previous two sections can be made about the ANOVA test in regards to the variable “Commissioner” (Q3) . They means for each Commissioner does differ (N.K. mean: 0,21608527; J.A. mean: 0,03162055; M.V. mean: 0,02196970) however, again no conclusions can be made since there are too few cases in which a deterrence amount is applied for the regression towards the mean to happen. No remarks can be made on the basis of this test.

### **Analyses of “Turnover stop” (ST) and correlation between variables**

In the fining methodology, at this point in the calculation, a legal maxim is checked. A fine cannot be above 10% of turnover of the preceding business year to the last year of the infringement.<sup>231</sup> This is in this analysis called

<sup>231</sup>Recital 31 fining guidelines 2006.

the “Turnover stop” (ST). Since the application of the “Turnover stop” makes the “Total amount” (TA) and the “Ultimate fine amount after leniency (in percentage)” (UFA) incomparable to those in which it was not applied (one has become a percentage based on turnover, the other remained a percentage based on sales), the fines in which a “turnover stop” (ST) was applied were taken out of the consideration. This was done by coding this as a non-numerical value “TURNOVER” which made R ignore these cases. However, no big impact on the quality of the data-set is expected since the frequency of the application is low.

The Turnover stop is also not correlated more than  $r=0,13$  to any variable in the dataset (see table 14 below). This means we can assume we do not miss any potential influence by any variable. We can thus safely apply the predetermined methodology explained in the previous paragraph.

### Univariate regression towards “Total amount before leniency” (TA)

I assumed for Total amount before leniency, factors which were relevant for the previous factors would be relevant here too. Since the previous dependent variables are the building blocks of this variable, a variables which is relevant in the previous sections, should also have some influence here.

However, no factors in the list until “Duration” (B8) yield significant results. This might be due to the fact the influence of those factors (x2, x3, and B1-till-7) are so small, even to the building blocks, that in the resulting “Total amount before leniency” (TA) they do not get picked up on and cannot be distinguished from random variability, even though some relation might exist. For example, “Qualified infringement” (B7) does not serve as good predictor (Adjusted R squared=0,00187), the estimates are around 3% (estimate=0,03467) even though they cannot be distinguished from random variability ( $p=0,144$ ). “Duration” (B8) does have certain influence (note again that this variable is expressed in number of months) of about 0,2% (estimate=0,0020360,  $p=2 \cdot 10^{-16}$ ) and serves as a better predictor of the fine (adjusted R squared= 0,1702). This makes sense this factor is used on its own as multiplier of the two first building blocks of the fine (BA and AA). Therefore, the effect is easier to be determined and to be distinguished from random variability.

“Recidivism” (G1) was said to be a good predictor, at least in a univariate regression, of the “aggravating amount” (AGA). Therefore, it is not surprising this factor serves as a predictor to some extent for the “Total amount” (adjusted R squared=0,1537). The impact is, similar to that for “Aggravating amount” (AGA), around 40 percent (estimate=0,42467,  $p=2 \cdot 10^{-16}$ ). Similar is “Cartel leader” (G2), which regressions is fairly similar in predictive value (adjusted R squared=0,1357) and which effect is around 36% (estimate=0,36550,  $p=2 \cdot 10^{-16}$ ).

Worse predictive values are attributable to the regressions “Market leader” (G2b) and “Cartel instigator” (G3) (adjusted R squared= 0,00523 and 0,0984). For the former the effect is said to be around 8% (estimate=0,08440, p= 0,0411), for the latter around 80% (estimate=0,83464, p=1,44\*e<sup>-15</sup>). “Infringement ended after intervention” (M1) has a slightly positive effect (estimate=0,09092, p=0,00547), “Unaware conduct was unlawful” (M2) a slightly negative effect (estimate=-0,06570, p=0,0915). The predictive value of the regression is for both very low (adjusted R squared= 0,01103 and 0,003051, respectively).

“Gains exceeded fine without this factor” (D1) and “Particularly large turnover” (D2), although the predictive value for the total amount is low (adjusted R squared= 0,02956 and 0,04503), is said to have an effect of 0,38161 (p=0,000012) and 0,18491 (p=76,4\*e<sup>-9</sup>), respectively. At this point it should be noted that both for aggravating (noted with G), mitigating (M) and deterrence (D) factors, it makes sense their predictive value for the total amount is low since they are not often applied, this do not provide a good picture of what the fine will be in instances where they are not applied.

A few factors outside of the fining guidelines proved relevant, although the predictive value of the regression is again low (adjusted R squared: Q1: 0,004224; Q2: 0,03193; ES: 0,0187). In circumstances of new types of infringements (“Novel infringement” (Q1) ), it is said they tend to have lower fines (estimate= -0,2853, p=0,0591). “Market impact” (Q2) is said to also have negative impact (estimate=-0,12999, p=55,2\*e<sup>-7</sup>). This should be considered as meaning, instances where the Commission discussed the market impact, the fines tend to be lower. The economic situation also has a positive effect (estimate=1,53677, p=0,000731).

“Non-EU company” (N2) is not a good predictor in a univariate regression (adjusted R squared=0,0124). The estimate is however negative (-0,06595; p=0,00357). Meaning, in the dataset the presence of the factor tends to be in instances where the fines are lower.

Lastly, again the One-way ANOVA test for “Commissioner” (Q3) shows an interesting pattern. the mean total amounts given by Commissioner Joaquín Almunia and Commissioner Margrethe Vestager are extremely close together, 0,2675143 and 0,2692267 respectively, however a clear divide is seen between the last two Commissioners and Commissioner Neelie Kroes, under whose guidance the mean total amount given is 0,4811258. This again strongly suggest there is some coordination in fining practices between the last two Commissioners which Neelie Kroes is not privy too, or the kinds of cases the, in the dataset chronologically, first Commissioner are fundamentally different to those of her successors.

## **Univariate regression towards “Leniency amount” (LA)**

The only relevant factor here is assumed to be “LN”, is leniency applied. It can be relevant to see what types of cases give rise to what type of leniency. However, the leniency amount question is outside of the scope of this research, therefore a good prediction of the leniency amount is not expected. Leniency and other after the fine reductions depend on other variables than those codes and rely on types of cooperation, which were not distinguished or coded for this dataset. Further research into this aspect might complement the current dataset. Some variables might yield significant results if there is any relation between the level of leniency amount and the specifics of the case.

“Sufficiently local” (B3) is such a factor in which, even though not a good predictor (adjusted R squared= 0,004018), the influence is said to be negative (estimate=-0,13119; p=0,059). Which means cases in which the factor is present, tend to be the cases in which a lower leniency amount is given. The same goes for “Not implemented” (B6) (estimate: -0,06105; p=0,0375; adjusted R squared=0,005207) and “Duration” (B8) (estimate=-0,0005779; p=0,0198; adjusted R squared=0,006938).

Interestingly, cases in which aggravating circumstances (coded with G) were present, tend to be the same instances the leniency amount is higher (estimate: G1: 0,12425; G2: 0,08571; G2b: 0,09016; G3: not significant; p: G1: 0,0226 ; G2: 0,0787 G2b:0,084 , respectively). Al though the regression of the variables do not function as good predictors (adjusted R squared: 0,006567; 0,003278; and 0,003113, respectively). Inversely, instances which tend to be associated with mitigating circumstances tend to be related to a lower leniency amounts (factors coded with M: M2: est.=-0,273731, p=0,00000116; M3: est.=-0,24217, p=0,0307; M5: est.=-0,22961, p=0,00000207; M6: est.=-0,271716, p=0,0413). The predictive value of the regression is again low (adjusted R squared=0,03491; 0,005745; 0,000002075; 0,004955, respectively). Undertakings with large turnover also tend to have a higher frequency amount, seem restriction as to the statements above apply (estimate=0,07419, p=0,0875, Adjusted R squared=0,00301).

Both “USA company” (N1) and “Non-EU company” (N2) do not have good predictive qualities (Adjusted R squared =0,002853 and 0,02757). However, in the dataset instances in which those variables are present, leniency amounts tend to be higher (estimate=0,08467 and 0,0291, p=0,0934 and 0,0000148, respectively).

Both “Economic situation (in real GDP growth rate)” (ES) and “Market impact” (Q2) are said to be related to the leniency amount, al be it in opposite directions (Q2: estimate= -0,06163, p=0,0782 and ES: estimate=2,40640, p=0,000022). Predictive value of the regression is again low (adjusted R squared= ES: 0,02637 and Q2:0,003294).

As expected “Leniency” (LN) serves as a good predictor to some degree (adjusted R squared=0,5494), however it needs to be taken into account other leniency programs such as reduction for length of procedure are not taken into account under this variable. The influence is said to be 0,496137 ( $p=2 \cdot e^{-16}$ ). Which means the leniency applied tends to be around 50 percent.

Lastly, the connection between the two last Commissioners seem to be severed at the leniency amount. The means between commissioners vary significantly (mean N.K.: 0,1706250, J.A.: 0,2137945, M.V.: 0,4201527). As Leniency is outside of the scope of the research no further remarks on this ANOVA test is given. However, it may be clear that the links between Joaquín Almunia and Margrethe Vestager breaks down at this point. There is something different in fining practices at this stage between all Commissioners. Therefore, in the next univariate regression towards “Ultimate fine amount after leniency”, this supposed link will not be visible anymore.

#### **Univariate regression towards “Ultimate fine amount after leniency” (UFA)**

The same variables as for total amount, together with the variables relevant for leniency amount are expected to be relevant here.

“Sufficiently local” (B3) (Adjusted R squared=0,00347) has an estimate of about 9% (0,091591:  $p=0,0781$ ). “Duration” (B8) is of stronger predictive value (adjusted R squared=0,1586), the influence is about 0,1% per month (estimate=0,0018050,  $p=2 \cdot e^{-16}$ ). Although Recidivism does not tell the entire story (adjusted R squared=0,0337), the influence is said to be large (estimate=0,185669,  $p=0,0000031$ ). The same can be said for “Cartel leader” (G2) (adjusted R squared=0,07885, estimate:0,25464,  $p=1,06 \cdot e^{-12}$ ) and “Cartel instigator” (G3) (adjusted R squared=0,01367, estimate=0,299355,  $p=0,0225$ ).

Only one of the “mitigating factors” (coded with M) can be said to have some relation: “Lower awareness” (M5) seems to be present in cases were the ultimate fine tends to be a notch higher (estimate=0,06162,  $p=0,0841$ ) but is not a good predictor of the entirety of the fine (adjusted R squared=0,003274). Even though the predictive value is similar (adjusted R squared 0,02053 and 0,02863, respectively), “Gains exceeded fine without this factor” (D1) and “Particularly large turnover” (D2), are said to have a bigger influence when present (estimate: 0,294801 and 0,13648,  $p=0,000231$  and 0,0000162, respectively).

Interestingly both “USA company” (N1) and “Non-EU company” (N2) are associated with slightly lower fines (estimate=-0,08134 and -0,08294,  $p=0,0299$  and 0,0000616). However adjusted R squared is still at the low end (0,006171 and 0,02476, respectively). Again “Market impact” (Q2) is similarly associated with lower fines (estimate=-0,08855,  $p=0,000767$ , adjusted R squared=0,0169).

The best predictor of all the variables for the ultimate fine amount (adjusted R squared=0,1053). Fines tend to be lowered about 15% (estimate=-0,15693, p=2\*e^16) when this factor is present. This suggests the ANOVA test will no longer show the connection between the two last Commissioners since the influence on the fine of this factor, which influenced the leniency amount, would drown out any links seen before the leniency amount was applied.

Indeed, the means for each Commissioner varies widely (mean: 0,3793737, 0,2091185, 0,153479, respectively). Although, except for the mean for Commissioner Kroes, the means are in 1 standard deviation distance of each other, meaning the link did not entirely disappear, however, is not as blatant as seen above.

### **Pearson correlation matrix between dependant variables**

Lastly, for this section, a correlation matrix is shown here, to indicate how strongly each building block is related to the next. More importantly, how each building block is related to the total and ultimate fine.

it needs to be noted the building blocks do not seem strongly linked to each other. Only the basic amount and the additional amount, and the aggravating and deterrence amount seem correlated at around 30% (0,30919139 and 0,31274472, respectively). This can be explained because the basic and additional some amount are amounts given in almost every instance at a point were not a lot of factors are yet brought into the discussion, thus some overlap might occur. Secondly, it makes sense instances with aggravating circumstances might be instances were deterrence circumstances are also present, given which factors contribute aggravating and deterrence circumstances, a slight overlap can be expected however no big relation should exist, which seems clear from the data.

Interestingly, the assumption made above that leniency changes the ultimate fine strongly compared to the fine before leniency, seems confirmed in the data. Even though total amount before and ultimate amount after leniency are correlated at around 60% (0,61217345), leniency amount accounts for a correlation of around -65% (0,644588763). Meaning the Total amounts gets impacted heavily by the leniency amount and in a large number of cases (otherwise the correlation could not be as strong).

The building block which has the second most relation(besides the leniency amount), is the duration amount at around 75 percent correlated (0,74773595) to the total amount before leniency and around 50% ultimately (0,53197807). This hints at duration being the most important factor in a fining decision. However, this will have to be confirmed in the next section.

## 7.2 Result description

The factors which proved relevant in univariate regressions have been used in multivariate regression. As explained above, in a multivariate regression interplay between the variables will have as an effect the variables function as controls for each other, resulting in a more accurate picture of what the influence of each factor is. Secondly, as mentioned above factors which are correlated do not function well together in a multivariate regression because it is unclear what factor between the two has the effect. This can be vividly explained by the following example. Imagine we want to quantify how strong our mint thee is. The mint thee is made both with black tea mixed with store bought mint thee, and fresh mint. Since both store bought mint and fresh mint similarly make the tea taste more like mint, a multivariate regression cannot separate if either the store bought or the fresh mint accounted for the strongness of the tea. Therefore, I conservatively set a threshold of 40% correlated as the threshold to run the regression with the factors separately. Because no variables are really strongly correlated above 60%, I run a test regression with all the factors at the end.

The variables which are relevant per "amount" are shown in the next table. Per amount only the most relevant regression is shown, although, all "runs" are set out in the annex document.

Table 7: Selected factors for Multivariate regressions

dep. var.	selected factors
BA	B3, B4(p=0,104), B6, B7, B8, G1, G2, G3, N2, Q2
AA	B3, B4, B5, B6, B7, B8, G1, G2, G3, M3,M6, D1, N1, N2, LN
DA	(not used in regression)
AGA	x2, x3, G1, G2, G2b, G3, D1, D2, N1, N2, Q2, ES, LN
MA	B5, B7, B8, G2, G2b, M1, M2, M4, M5, M6, N1, Q1, Q2, ES, LN
DETA	B3, B5, B7, G1, G2, G3, M1, M2, D1, D2, Q2, ES
TA	B8, G1, G2, G2b, G3, M1, M2, D1, D2, N2, Q1, Q2, ES
LA	B3, B6, B8, G1, G2, G2b, M2, M3, M5, M6, D2, N1, N2, Q2, ES, LN
UFA	B3, B8, G1, G2, G3, M5, D1, D2, N1, N2, Q2, LN
UFN	(poor quality of data "S" made it impossible to run analysis)

*explanation for factor and variable code in table 1 and table 2. (Selection based on analysis from previous section)*

### Regression "Basic amount" (BA)

The results of the regression is shown in the next table:

Table 8: Result regression towards basic amount

Dep. var.	Ind. var.	Estimate	Std. error	p- value
BA	(Intercept)	0,15209286	0,00427868	< 2e-16
	B3	-0,02096148	0,00866550	0,01585
	B4	0,00080284	0,00392102	0,83783
	B6	-0,01274649	0,000399247	0,00148
	B7	0,02697967	0,00382767	4,78e-12
	B8	0,00003086	0,00003138	0,3573
	G1	0,02796359	0,00700074	7,26e-5
	G2	0,01984913	0,00640616	0,00203
	G3	0,05228810	0,01833546	0,00449
	N2	0,00186621	0,00370419	0,61457
	Q2	-0,01391040	0,00490093	0,00468

*Residual standard error: 0,04014 on 627 degrees of freedom  
(6 observations deleted due to missingness)*

*Multiple R-squared: 0,1796, Adjusted R-squared: 0,1666*

*F-statistic: 13,73 on 10 and 627 DF, p-value: < 2,2e-16*

*B3: "Local infringement", B4: "Global scheme", B6: "Not implemented", B7: "Qualified infringement", B8: "duration", G1: "Recidivism", G2: "Cartel leader", G3:"Instigator", N2: "non-EU firm", Q2: "Actual market impact", and BA: "Basic amount".*

The most important conclusion is that the regression formula does not serve as a good predictor of what the basic amount will be (adjusted R-squared=0,1666), although the multivariate regression in general serves as a better predictor as the factors taken in univariate regressions. However, this relatively low adjusted R-squared tells us the factors we selected or the way we interpreted them in coding, do not tell us to a sufficient degree what the basic amount will be. However, still some conclusions can be drawn.

Firstly, the intercept is estimated to be around 15% (estimate=0,15209286,  $p=2 \cdot 10^{-16}$ ). This is not attributable to random variability, meaning we can determine the basic amount would generally be 15% if other factors are not present which would increase or decrease the basic amount. In the same vain, 2 factors do, with some degree of certainty ( $p=4,78 \cdot 10^{-12}$ , and  $7,26 \cdot 10^{-5}$ ) seem to have an influence non attributable to random variability. The fact an infringement is a "Qualified infringement" (B7) attributes an additional 2,5% to the fine (0,0269767) and the fact a party was fined in a previous decision accounts for roughly an additional 2,5% (0,02796359).

An additional 4 variables within the regression can be said to be non-random at an  $\alpha=0,01$  level ( $p=0,00148$ , 0,00203, 0,00449 and 0,00468, respectively). Instances were at least part of the infringements were not implemented (B6) seem to reduce the basic amount by 1% (estimate=-0,01274649). The



cartel leader (G2) tends to have the basic amount raised by about 2% (estimate=0,01984913). The instigator sees an increase of 5% (estimate=0,05228810). Lastly, cases where the Commission assessed the market impact tend to be instances where the basic amount is lowered by 1% (estimate=-0,01391040). Lastly, significant at  $\alpha=5\%$  ( $p=0,01585$ ), cases in which the infringement is considered “sufficiently local”, fines get reduced by about 2% (estimate=-0,02096148).

The influence of the “Duration” (B8) and the fact an infringement is “global” (B4) on the basic amount, cannot be distinguished from random variability when these factors are controlled by the other selected variables. Meaning we cannot know if any influence is present.

In regards to the protectionist hypothesis at this stage. Only the variable “N2” meaning “non-EU undertaking” proved to be potentially relevant. However, controlled for other factors, this effect is completely absent. There is a 61,457% probability any noticed effect is completely due to random variability, and the estimate is 0,00186621, which means no merit can be given towards the protectionist hypothesis in any form, at least when to the “basic amount” of the fine is concerned.

The Basic amount regression formula, with only significant variables is:

Formula 8: Basic amount regression formula

$$BA = 0,15209286 - 0,02096148 B3 - 0,01274649 B6 + 0,02697967 B7 + 0,02796359 G1 + 0,01984913 G2 + 0,05228810 G3 - 0,01391040 Q2$$

*BA: Basic amount, B3: Local infringement, B6: said to be not implemented, B7: qualified infringement, G1: Recidivism, G2: Cartel leader, G3: Cartel instigator, Q2: actual market impact*

The residual standard error of this equation is 0,04014 on 627 degrees of freedom.

### Regression “Additional amount” (AA)

There were 3 runs done for this dependent variable. In all three regressions the same 9 variables (and the intercept) prove to have an effect which is non-attributable to random variability. Those factors are B3, B5, B7, B8, D1, G3, LN, and M6. It is clear neither N1 (US undertaking) nor N2 (non-EU undertaking) are present in the list. In none of the regressions can any effect of an undertaking being US or non-EU be distinguished from mere random variations. In Run 1 there is even a 81% ( $p=0,81740$ ) probability that any effect is attributable to random variability. For N2 this is 19% ( $p=0,19125$ ). Therefore, as far as the “additional amount” (AA) is concerned, no merit can be given to the protectionist hypothesis.

As N1 and N2 seem irrelevant and all the same factors are relevant in each run, with very similar estimates. The regression with the highest predictive value, meaning the highest Adjusted R squared is selected to put forward a predictive formula. This is run 2 with adjusted R squared being 0,3056, and a residual standard error of 0,06775 (compared to run 1: adjusted R squared=0,3038, residual standard error=0,6784 and run 3: adjusted R squared=0,3046, residual standard error=0,0678). It is run 2 which is shown here:

Table 9: Result regression towards additional amount

Dep. var.	Ind. var.	Estimate	Std. error	p- value
AA	(Intercept)	0,07376640	0,00799164	< 2e-16
	B3	-0,07273591	0,01454110	7,39e-7
	B4	0,00447641	0,00661537	0,49887
	B5	0,02891258	0,00631768	5,71e-6
	B6	0,00798396	0,00691160	0,24847
	B7	0,04721857	0,00684188	1,27e-11
	B8	-0,00036993	0,00005354	1,21e-11
	D1	0,04364517	0,02366510	0,06562
	G1	-0,03174759	0,01205039	0,00863
	G2	-0,01380763	0,01093584	0,20720
	G3	-0,05996474	0,03156657	0,05794
	LN	0,01603982	0,00560403	0,00435
	M3	-0,02503107	0,02368446	0,29099
	M6	0,06537725	0,02209659	0,00321
	N1	-0,00414564	0,01187583	0,72715
	N2	0,00933632	0,00700235	0,18292

*Residual standard error: 0,0678 on 622 degrees of freedom*

*(6 observations deleted due to missingness)*

*Multiple R-squared: 0,321, Adjusted R-squared: 0,3046*

*F-statistic: 19,6 on 10 and 622 DF, p-value: < 2,2e-16*

*B3: "Local infringement", B4: "Global scheme", B5: "Entire EEA", B6: "Not implemented", B7: "Qualified infringement", B8: "duration", G1: "Recidivism", G2: "Cartel leader", G3:"Instigator", LN: "Leniency notice applied", M3: "Unaware restrictive", M6: "Legislative excuse", N1: "US firm", N2: "non-EU firm", and AA: "Additional amount".*

The additional amount with all other variables not present would generally be about 7% (estimate=0,0737983,  $p=2 \times 10^{-16}$ ). When the infringement is sufficiently local (B3), the amount goes down by about 7% (estimate= -0,0728831,  $p=6,83 \times 10^{-7}$ ). When the entire EEA (B5) is involved however, the additional amount increases with around 2% (estimate=0,0292163,  $p=3,65 \times 10^{-6}$ ). Qualified infringements (B7) again increase the additional amount with around 4,5% (estimate=0,470421,  $p=1,29 \times 10^{-11}$ ). Counterintuitively the amount is decreased by around 0,03% per month that the infringement lasted (B8) (estimate=

0,0003683,  $p=1,20 \cdot 10^{-11}$ ). Again, counterintuitively the fact an undertaking is a recidivist (G1), decreases the additional amount with about 3% (estimate=-0,0316754,  $p=0,00873$ ) and when Leniency is applied in the case this predicts an increase in the additional amount with about a 1% (estimate=0,0160568,  $p=0,00428$ ). Lastly, when parties claimed legislative excuses (M6), the additional amount tends to be 6% higher (estimate=0,0652631,  $p=0,00324$ ). These factors are all significant at  $\alpha=5\%$ , ergo at a 95% confidence interval. However, it needs to be clear some factors might have an influence because of relations to other factors. For example, cases in which a legislative excuse was brought up (M6), might be cases of a particular kind, in which particular set of factors are co-morbidly present often enough, which do push the additional fine up. Therefore, future research is advised to tease out factors which seem counter intuitive to see what could explain those effects. This is especially the case for D1 (gains exceeded amount of the fine) and G3 (instigator). Certainly for D1 again, it is advised for future research to look into this contradictory effect of the supposed factor. It is highly likely other factors are co-morbidly present in cases in which D1 is present, which were not part of the analysis which are really relevant.

The predictive formula for “Additional amount” (AA) with only relevant factors is:

Formula 9: Additional amount regression formula

$$AA = 0,0737983 - 0,0728831 B3 + 0,0292163 B5 + 0,0470421 B7 - 0,0003683 B8 + 0,0429439 D1 - 0,0316754 G1 - 0,0599062 G3 + 0,0160568 LN + 0,0652631 M6$$

*AA: Additional amount, B3: Local infringement, B5: Entire EEA, B7: qualified infringement, B8: Duration, G1: Recidivism, G3: Cartel instigator, LN: Leniency notice applied, M6: Legislative excuse*

With a residual standard error of 0,06775.

### Multivariate regression aggravating circumstance (AGA)

There were 5 different runs (all available in the annex document), Different factors are relevant when combined with different other factors. However, to select the regression for the predictive assessment, the regression which is the most accurate in predicting the aggravating amount is selected. Meaning the regression with the smallest residual standard error and the largest adjusted R-squared.

Run 5 seems to be the most accurate even though less factors are said to be relevant than for example in run 3 (residual standard error=0,09639, adjusted R squared=0,6025). This can be explained because run 5 includes all selected

factors, hence the control for each variable by the other variables is larger as a result factors which are slightly relevant because being partly related to which are really relevant do not pass the threshold anymore.

The most accurate run is shown in the next table, although the reporting will include reference to the other runs.

Table 10: Result regression towards Aggravating amount

Dep. var.	Ind. var.	Estimate	Std. error	p- value
AGA	(Intercept)	0,014602	0,006192	0,018678
	D1	0,044435	0,033689	0,187655
	D2	0,018885	0,013038	0,147972
	ES	0,701010	0,170624	0,0000451
	G1	0,419846	0,017385	<2e-16
	G2	0,145735	0,016371	<2e-16
	G2b	-0,056648	0,017189	0,001038
	G3	0,034936	0,045395	0,441824
	LN	-0,004825	0,007899	0,541575
	N1	-0,008515	0,016262	0,600733
	N2	-0,0144497	0,009351	0,121572
	Q2	-0,018341	0,010644	0,085345
	x2	0,055333	0,042919	0,197791
	x3	0,244846	0,072157	0,000734

*Residual standard error: 0,09639 on 624 degrees of freedom  
(6 observations deleted due to missingness)*

*Multiple R-squared: 0,6107, Adjusted R-squared: 0,6025*

*F-statistic: 75,28 on 13 and 624 DF, p-value: < 2,2e-16*

*D1: "Gains exceed fine", D2: "Very large turnover", ES: "economic situation", G1: "Recidivism", G2: "Cartel leader", G2b: "Market leader", G3: "Instigator", LN: "leniency notice applied", N1: "US firm", N2: "Non-EU firm", Q2: "Actual market impact", x2: "Uncooperative (for information)", x3: "misleading information", and AGA: "Aggravating circumstances amount".*

In the most accurate run (run 5), no merit can be given towards the protectionist hypothesis. Neither N1 (US undertaking) and N2 (non-EU undertaking) show any results distinguishable from random variability. However, in run 3 and 4 "non-EU undertaking" is said to be relevant (p=0,005466 and 0,067074) these runs have less control variables (since there are less variables used). It should be said the same cannot be said for "US undertaking" N1, even with less control the supposed influence cannot be distinguished from random variability. Even in the regressions in which "non-EU undertaking" is said to be relevant no merit can be given to the protectionist hypothesis, since the influence is said to be negative (estimate= -0,025341 and -0,015953). This would mean, at least

as so far as aggravating circumstances amount is concerned, the Commission would be more lenient. However, this effect completely vanishes from being relevant once the control of variables G2 and G2b are introduced. Even if the attributable effect (estimate) is still negative (estimate=-0,014497), this effect is no longer distinguishable from random variability. The added controls are “Cartel leader” and “Market leader”.

From the accurate regression (run 5), 5 variables are said to be relevant (at  $\alpha=0,05$ ). The intercept is significant ( $p=0,018678$ ), however, this statistical relevance does not have practical relevance. The estimate is about 1% (estimate=0,014602), meaning given none of the selected factors are present the aggravating amount would be about 1%. This is from a practical relevance only an indication that either not all relevant variables are present in the regression or the relevant variables need to be defined a little differently and coded differently. As was seen in the descriptive statistics, giving aggravating circumstances is an outlier, therefore the intercept should be close to zero.

Secondly, an interesting result is obtained from the factor “ES” ( $p=0,000451$ ). Per percentage point of real GDP growth, the aggravating amount tends to be increased by 70%. It is not clear if a causal relation can be inferred however, what can be inferred is that in better economic situations aggravating amounts tend to be higher.

3 out of 4 variables coded as being relevant for aggravating amount (coded with “G”) proved to be relevant. Firstly, (G1) the fact that an undertaking is a recidivists accounts the most for the aggravating amount, contributing about 40% when present (estimate=0,419846,  $p;2^*e^{-16}$ ). The fact an undertaking had a cartel leadership role (G2), accounts for another 15% (estimate=0,145735,  $p;2^*e^{-16}$ ). However, undertakings which are said to be market leader tend to get fined less in the aggravating amount stage (estimate=-0,056648,  $p=0,001038$ ). If this is directly practically relevant or indicative of something else needs to be verified by future research.

The second biggest predictor is x3, this makes sense since x3 is coded as meaning active non-cooperation, by for example submitting misleading or false information. According to the analysis, active non-cooperation tends to get penalised at this stage and accounts for about 25% (estimate=0,244846,  $p=0,000734$ ). Cases in which the Commission assessed the market impact, tend to have slightly lower aggravating amounts (estimate=-0,018341), however, this influence does not the threshold for being considered relevant or non-attributable to random variability ( $p=0,085345$ ). However, in order to more closely preserve the predictive formula, this factor is used in the resulting predictive formula.

Formula 10: Aggravating amount regression formula

$$AGA = 0,014602 + 0,7010 ES + 0,419846 G1 + 0,145735 G2 - 0,056648 G2b - 0,018341 Q2 + 0,244846 x3$$

*AGA: Aggravating amount, ES: Economic situation (in real gdp growth), G1: Recidivist, G2: Cartel leader, G2b: Market leader, Q2: Actual market impact, x3: Misleading information*

With residual standard error of 0,09639

### Multivariate regression “Mitigating circumstances” (MA)

Again, the regression which is considered the most accurate (residual standard error low and adjusted R squared high), is selected for the discussion. In this case, the most accurate run is “run 4” (other runs are shown in annex) (residual standard error=0,05682, adjusted R squared=0,3974). This run excluded factor G2 and M5 and included G2b and M2. The result of this run is shown in the table:

Table 11: Result regression towards mitigating amount

[H] Dep. var.	Ind. var.	Estimate	Std. error	p- value
MA	(Intercept)	0,04537118	0,00630567	1,80e-12
	B5	-0,01604433	0,00512290	0,001818
	B7	-0,01179405	0,00534649	0,027752
	B8	-0,00013417	0,00004371	0,002235
	ES	0,3852816	0,10703562	0,000366
	G2b	-0,01899669	0,00905646	0,036344
	LN	-0,00048576	0,00473001	0,918236
	M1	-0,03286168	0,00743034	1,15e-5
	M2	0,02389908	0,00882443	0,006949
	M4	0,17665128	0,02570682	1,54e-11
	M6	0,01172466	0,01897800	0,536931
	N1	-0,01613426	0,00930014	0,083264
	Q1	0,56531943	0,03478623	< 2e-16
	Q2	-0,02054138	0,00649307	0,001634

*Residual standard error: 0,05682 on 623 degrees of freedom  
(7 observations deleted due to missingness)*

*Multiple R-squared: 0,4097, Adjusted R-squared: 0,3974*

*F-statistic: 33,26 on 13 and 623 DF, p-value: < 2,2e-16*

*B5: "Entire EEA", B7: "Qualified infringement", B8: "duration" ES: "Economic situation", G2b: "Market leader", LN: "Leniency notice applied", M1: "Ended after intervention", M2: "Not aware 'unlawful'", M4: "Lower involvement", M6: "Legislative excuse", N1: "US firm", Q1: "Novel infringement", Q2: "Actual market impact", and MA: mitigating circumstances amount".*

10 factors are considered to have an effect non attributable to random variability. The same discussion as for aggravating amount in regards to the intercept applies (estimate=0,04537118). The intercept suggests not all relevant factors were part of the regression or some variables need to be defined slightly differently. Again the economic situation seems to have some relation to the amount. In this case the mitigating amount tends to be about 38% higher per percentage point of real GDP growth (p=0,000366). The fact an undertaking is considered a market leader (G2b) seems to relate to a slightly lower mitigating amount (estimate=-0,01899669, p=0,036344).

The fact an infringement covered the entire EEA (B5) tends to result in a slightly lower mitigating amount (estimate=-0,01604433, p=0,001818). The same goes for an infringement considered a qualified infringement (B7) (estimate=-0,01179405, p=0,027752). Infringement which lasted longer also have slightly lower mitigating circumstances applied to it, about -0,01% per month that the infringement lasted (estimate=-0,00013417, p=0,002235). Cases in which the market impact was assessed tend to have a lower mitigating amount with about 2% (estimate=-0,02054138, p=0,001634).

The variables which were coded with an assumed effect on the mitigating amount (coded with M) did not prove to be the largest explainer of the mitigating amount. The fact the decision mentions the infringement ended after intervention, is related with a slightly lower mitigating amount (estimate=-0,03286168, p=1,15\*e<sup>-5</sup>). Again, this remark cannot be taken at face value. It is more likely the fact a decision mentions this variable is indicative of other circumstances which were not represented in the variables. Future research is thus advised to tease out cases in which this remark was made or this circumstance was brought up by the parties to identify the real culprit of the effect.

The fact an undertaking claims credibly that they were unaware the conduct was unlawful (M2), is related with an increase of about 2% in the mitigating amount (estimate=0,02389908, p=0,006949). Of the second most impactful variable is the fact an undertaking had a lower involvement in the infringement (M4). This circumstance has an impact of about 17% on the mitigating amount (estimate=0,17665128, p=1,45\*e<sup>-11</sup>). The most impactful factor, which accounts the most for the level of a given mitigating amount is Q1, the circumstance were an infringement is considered novel. A mitigating amount is increased by about 55% (estimate=0,56531943, p<sub>i</sub>2\*e<sup>-16</sup>). Given the very slim chance the effect of the variable is due to random variability, and given the very specific nature of the variable, we can assume that there is indeed some merit to the conclusion. New infringements do tend to be treated with a higher reduction at the mitigating circumstances stage.

In regards to the protectionist hypothesis, the factor “US undertaking” (N1) is not considered relevant at this stage. The estimate is not significant

at  $\alpha=0,05$ , meaning I do not consider the estimate to not be not due to random variability. However, at the  $\alpha=0,10$  level, some effect is noticed, mainly a relation of a slightly lower mitigating amount of about 1% (estimate=-0,01613426,  $p=0,083264$ ). The conclusion thus needs to be more nuanced in regards to any merit towards the protectionist hypothesis, it cannot be said, given our statistical framework, that any merit can be attributed towards the hypothesis. However, since at a different  $\alpha$  level some effect is noticed, future research is advised to tease out more the fining practices at the mitigating circumstances to determine what the reason for this slight doubt at this stage is. In order to preserve the predictive formula as close as possible to the regression formula the factor is put into the formula.

Formula 11: Mitigating amount regression formula

$$MA = 0,04537118 - 0,01604433 B5 - 0,01179405 B7 - 0,00013417 B8 + 0,38352816 ES - 0,01899669 G2b - 0,03286168 M1 + 0,02389908 M2 + 0,17665128 M4 - 0,016113426 N1 + 0,56531943Q1 - 0,02054138Q2$$

*MA: Mitigating amount, B5: Entire EEA, B7: Qualified infringement, B8: Duration, ES: Economic situation (in real gdp growth), G2b: Market leader, M1: ended after intervention, M2: not aware "unlawful", M4: Lower involvement (than others), N1: US firm, Q1: Novel infringement, Q2: Actual market impact*

With residual standard error of 0,05682

### Multivariate regression "Deterrence amount" (DETA)

There was only one run necessary for this variable. The result is shown in the next table.



Table 12: Result regression towards Deterrence amount

Dep. var.	Ind. var.	Estimate	Std. error	p- value
DETA	(Intercept)	0,087984	0,026890	0,00113
	B3	0,332801	0,065843	0,000000567
	B5	-0,112008	0,028190	0,000079069
	B7	-0,025010	0,029415	0,39552
	D1	0,109309	0,110327	0,32218
	D2	0,429354	0,042575	<2e-16
	ES	1,746352	0,581576	0,00278
	G1	0,118078	0,055865	0,03494
	G2	0,037822	0,049502	0,44512
	G3	0,661599	0,146282	0,000007297
	M1	0,002591	0,041363	0,95007
	M2	-0,067249	0,047568	0,15793
	Q2	-0,047917	0,035306	0,17520

*Residual standard error: 0,3145 on 629 degrees of freedom  
(2 observations deleted due to missingness)*

*Multiple R-squared: 0,269, Adjusted R-squared: 0,2551*

*F-statistic: 19,29 on 12 and 629 DF, p-value: < 2,2e-16*

*B3: "Local infringement", B4: "Global scheme", B5: "Entire EEA", B7: "Qualified infringement", D1: "Gains exceeded fine", D2: "Very large turnover", ES: "Economic situation", G1: "Recidivism", G2: "Cartel leader", G3: "Instigator", M1: "Ended after intervention", M2: "Not aware "unlawful", Q2: "Actual market impact", and DETA: "Deterrence amount".*

Six factors reach the set thresholds for being considered relevant. For deterrence there is no question about the protectionist hypothesis since even without control no potential influence of the variables N1 and N2 could be considered. The residual standard error for this regression is 0,3145. This is very large meaning the adjusted R-squared is at the low end (0,2551), however still increased compared to the factors on their own. The factors which are considered relevant all contribute an amount above —10—%, mostly above —30—%.

As was already clear from the adjusted R-Squared figure, the intercept again hints at either missing variables or at the fact the current variables definitions need to be tweaked. The intercept is estimated to be 0,087984 (p=0,00113). The two factors with the least influence are the fact an infringement took place in the entire EEA (B5), which has a negative influence on the deterrence amount (estimate=-0,112008, p=0,000079069) and G1 which has in quantity the same effect op positively (estimate=0,118078, p=0,03494). There is no apparent reason why the simple fact an infringement covered the entire EEA should negatively impact the deterrence amount. Therefore there is again a possibility the variable "entire EEA" (B5) is comorbid with another variable which is related. Future research is advised to tease out cases in which the

variable B5 was present for other potential variables comorbid with B5. The impact of recidivism (G1) might be lower than other relevant factors because recidivism has a big impact on the aggravating amount and deterrence amount is only applied if the fine without the application does not pose sufficient deterrence. Chances might be lower of this being the case when heavy aggravating circumstances were already applied.

As was the case for variable “Entire EEA” (B5) could similarly be said for the (to an extent) inverse situation of B3, infringement being sufficiently local. The variable seems to increase the deterrence amount by around 30% (estimate=0,332801, p=0,00000567). Chances are this is not the result directly of the fact the infringement was local but is more likely infringements which are local tend to have other characteristics which are directly relevant. Future research is advised to tease out the characteristics of local infringements.

Strangely, the factor coded specifically for the deterrence amount (D1), “gains exceeded the fine without this amount”, does not seem relevant while the other circumstance (D2) “undertaking has a particularly large turnover” does have a heavy impact (estimate=0,429354,  $p_2 \cdot 10^{-16}$ ). This might be explained due to the fact the first circumstance is not applied sufficiently. As is clear from the frequency plots in annex, D2 gets applied much more than D1, at least according to this data-set.

The same tendency noticed in the aggravating circumstances in regards to the economic situation is noticed for deterrence amount. Per percentage point of real GDP growth the fine tends to increase by 1,746352 (p=0,00278), which suggest the Commission tends to be more severe when the economy is in better shape. The factor which is said to have the most impact on the deterrence amount is whether the party was the instigator of the infringement (estimate=0,661599, p=0,000007297). Given the fact this amount is said to ensure deterrence, the reasoning might be parties which are the source of the infringement might be considered in need of heavy deterrence to prevent future missteps.

The predictive formula for the deterrence amount is given as:

Formula 12: Deterrence amount regression formula

$$DETA = 0,087984 + 0,332801 B3 - 0,112008 B5 + 0,429354 D2 + 1,746352 ES + 0,118078 G1 + 0,661599 G3$$

*MA: Mitigating amount, B5: Entire EEA, B7: Qualified infringement, B8: Duration, ES: Economic situation (in real gdp growth), G2b: Market leader,*

*M1: ended after intervention, M2: not aware "unlawful", M4: Lower involvement (than others), N1: US firm, Q1: Novel infringement, Q2: Actual market impact*

With residual standard error of 0,3145.

## Multivariate regression “Leniency amount” LA

It should be noted this research overlooked the diversity of applications of leniency and overlooked key more broad “leniency” applications which exist. Therefore, it is not assumed leniency will be able to be accurately be predicted, the interest thus focusses mostly on the protectionist hypothesis for leniency amount: do non-EU/US undertakings get snubbed at the leniency level?

Given the many variables selected which are considered to also be tested separately from each other, 13 runs were done. To safe guard the readability of the result discussion, the tables containing the regression results are referred to in the annex table 261 and onwards under subtitle “Regression “Leniency amount” (LA)”. Only the most accurate regression is shown here in the following table.

Run 6 out of 12 has the highest adjusted R squared: 0,5642. The standard error is 0,2192. The results of the regression are shown in the table:

Table 13: Result regression towards Leniency amount

Dep. var.	Ind. var.	Estimate	Std. error	p- value
LA	(Intercept)	0,0274121	0,0205337	0,18237
	B3	-0,0383905	0,0471647	0,18237
	B6	-0,0191048	0,0211223	0,36609
	B8	-0,0003651	0,0001715	0,03366
	D2	0,0332559	0,0291338	0,24510
	ES	1,1626046	0,3904386	0,00302
	G1	0,0056081	0,0375420	0,88130
	G2	0,0661776	0,0332165	0,04677
	LN	0,4669602	0,0182662	< 2e-16
	M5	-0,0460218	0,0329183	0,16259
	N2	0,0541959	0,0199842	0,00687
	Q2	-0,0316152	0,0258558	0,22189

*Residual standard error: 0,2192 on 624 degrees of freedom  
(8 observations deleted due to missingness)*

*Multiple R-squared: 0,5717, Adjusted R-squared: 0,5642*

*F-statistic: 75,73 on 11 and 624 DF, p-value: < 2,2e-16*

*B3: "Local infringement", B6: "Not implemented", B8: "duration", D2: "Very large turnover", ES: "Economic situation", G1: "Recidivism", G2: "Cartel leader", LN: "Leniency notice applied", M5: "Less aware", N2: "non-EU firm", Q2: "Actual market impact", and LA: "Reduction after leniency".*

As expected the most relevant factor is the one indicating whether the leniency notice was applied (LN) (estimate=0,4669602,  $p_2 \cdot e^{-16}$ ). There is ten-

dency for longer infringements (“Duration” (B8)) to get lower leniency amounts around 0,03% per month lower (estimate=-0,0003651, p=0,03366). Lastly, some tendency can be noticed that cartel leaders get slightly higher leniency amounts about 6% (estimate=0,04677, p=0,04677), this is consistent in other regressions runs too, however the p value does in some cases tip over our alfa threshold towards just under an alfa=0,10%. Therefore, it is a real possibility cases in which an undertaking acted as Cartel leader tend to have other characteristics in common which do make sense. Further research is advised to pay attention to this when researching leniency, which is a blind spot in this study.

Interestingly, some relation seems to exist between the state of the European economy and the level of the leniency amount. Per percentage point of real GDP growth there is an increase of about 1,1626046 (p=0,00302). This seems to suggest the Commission applies more leniency when the economy is doing well.

In regards to the protectionist hypothesis. In none of the runs does the variable “US undertaking” (N1) yield any result which can be distinguished from random variability, neither at alfa =5% nor at alfa=10%. However, the influence of the fact an undertaking is “non-EU” (N2), does proof to be relevant (p=0,00687). However, the influence is in opposite direction to what the protectionist hypothesis would suggest. The estimate suggests non-EU undertakings get an increased 5% in the leniency amount compared to undertakings who do not qualify under this variable (estimate=0,0541959). It thus seem uncontroversial to say this again is a “correlation is not causation” result. Further research which is more targeted towards the leniency amount, might control for factors which are co-morbid to the “non-EU” nature of undertakings, which might explain the results indicated as slightly relevant.

The predictive formula for the “Leniency amount” (LA), which should not be considered accurate since this research did not focus on this result is given in the next formula:

Formula 13: Leniency amount regression formula

$$LA = -0,0003651 B8 + 1,1626046 ES + 0,0661776 G2 + 0,4669602 LN + 0,0541959 N2$$

*LA: Reduction after leniency amount, B8: Duration, ES: Economic situation (in real gdp growth), G2: Cartel Leader, LN: Leniency notice applied, N2: Non-EU firm*

With residual standard error of 0,2192.

**Multivariate regression towards “Total fine amount (before leniency)” (TA) and “Ultimate fine amount (after leniency)” (UFA)**

One might be forgiven to think that this step did not need to be done by yet another multivariate regression. As will be shown in the control models, coding of each dependent variable was done to a sufficiently accurate degree in order to be confident the “Total fine amount” amount is consistent with the building blocks applied in the right formula. The same goes for the “Ultimate fine amount” (UFA). However, since most separate building blocks are considered to be outliers in regards to the application this might not yield accurate results. Using a constructed formula based on the previous predictive formulas for general application, meaning to answer the question what fine will be given, might yield misleading results because part of the formula is constructed from blocks which are more likely than not, not being triggered. Furthermore, using the building blocks would add all the residuals errors till the error is larger than the amount itself. Therefore, while the predictive formulas for the building blocks might be relevant to predict the building blocks themselves, stringing this formulas together would not yield relevant results. Hence why this section analyses the “Total fine amount (before leniency)” (TA) and “ultimate fine amount (after leniency)” (UFA) directly.

It needs to be noted that the predictive formulas in this section serve only as a theoretical framework to assess how fines were given since introduction of the fining guidelines. The predictive formula will be construed below with insights from the analysis.

The reporting will be done slightly backwards. The report on the fine after leniency (UFA) will be done first. This is because the fine before leniency (TA) is run twice, once on the complete data-set, once without the cases Commissioner Kroes decided. In the data-cleaning phase a pattern seemed to suggest that Commissioner Kroes uses a distinct formula from her successors. Moreover, her successors seemed to apply the exact same methodology. Therefore, I set the hypothesis that excluding Commissioner Kroes’ cases from the analysis will drastically improve predictive quality of the regression. Since this is the key inside of my master-thesis, it is placed at the end of the reporting section.

#### **Multivariate regression “Ultimate fine amount (after leniency) (in percentage)” (UFA)**

Again, multiple runs are necessary. The 3 runs can be consulted in annex. The run with the most accurate result is shown here (run 2: residual standard error=0,1903, Adjusted R-squared=0,368).

Table 14: Result regression towards fine after leniency (in percentage)

Dep. var.	Ind. var.	Estimate	Std. error	p- value
UFA	(Intercept)	0,219559	0,0174298	<2e-16
	B3	-0,0028211	0,0424478	0,94703
	B8	0,0014510	0,0001548	<2e-16
	D1	0,1903200	0,0656531	0,00388
	D2	0,1090709	0,0264188	0,000041773
	G1	0,1553051	0,0353328	0,000013108
	G2	0,1683893	0,0323789	0,000000274
	G3	0,0239542	0,0882292	0,78610
	LN	-0,1724944	0,016173	<2e-16
	M5	-0,0009409	0,0292464	0,97435
	N2	-0,0072881	0,0177808	0,68204
	Q2	-0,0412050	0,0221563	0,06342

*Residual standard error: 0,1903 on 590 degrees of freedom*

*(42 observations deleted due to missingness)*

*Multiple R-squared: 0,3802, Adjusted R-squared: 0,3687*

*F-statistic: 32,9 on 11 and 590 DF, p-value: < 2,2e-16*

*B3: "Local infringement", B8: "Duration", D1: "Gains exceeded fine", D2:*

*"Very large turnover", G1: "Recidivism", G2: "Cartel leader", G3:*

*"Instigator", LN: "leniency notice applied", M5: "Less aware", N2: "non-EU firm", Q2: "Actual market impact", and UFA: "Ultimate fine amount (in %)".*

The intercept is around 21% (estimate=0,2192559,  $p_i2^*e^{-16}$ ), meaning if none of the selected factors are present, fines tend to be around 21%. Less factors are said to be relevant at the stage after leniency than before leniency. This might be explained due to the heavy impact of leniency, which was not represented in the coded variables. Indeed, "Leniency applied" (LN) accounts for an impact on the fine of around -17% (estimate=-1724944,  $p_i2^*e^{-16}$ ). The factors "Duration" (B8) (estimate=0,0014510,  $p_i2^*e^{-16}$ ), "Gains exceeded fine before deterrence application" (D1) (estimate=0,1903200,  $p=0,00388$ ), "particularly large turnover" (D2) (estimate=0,1090709,  $p=0,000041773$ ), "Recidivism" (G1) (estimate=0,1553051,  $p=0,000013108$ ), and "Cartel leader" (G2) (estimate=0,1683893,  $p=0,000000274$ ), all have comparable effects as they had for "Total amount" (TA). The same can be said for the decrease related to the "Market impact" (Q2)<sup>232</sup> variable, although at this stage only at an  $\alpha=10\%$  level (estimate=-0,0412050,  $p=0,06342$ ).

Given the lack of variables which can quantify the exact height of the leniency amount, the adjusted R squared, thus the value of the regression, is

<sup>232</sup>As mentioned above, this should be interpreted as: the Commission considered the market impact in the case.

lower here than for the amount before leniency. The predictive formula based on this regression is given by:

Formula 14: Ultimate fine amount (in percentage) regression formula

$$UFA = 0,2192559 + 0,0014510 B8 + 0,1903200 D1 + 0,1090709 D2 + 0,1553051 G1 + 0,168393 G2 - 0,1724944 LN(-0,0412050 Q2)$$

*UFA: Ultimate fine after leniency in percentage, B8: Duration, D1: gains would exceed fine without this factor, D2: particularly larger turnover, G1: recidivist, G2: Cartel leader, LN: Leniency notice was applied, Q2: Novel infringement (just not significant at alfa 5%)*

With residual standard error of 0,1903.

#### **Multivariate regression towards “Total fine amount nominally” UFN**

The “ultimate fine amount nominally” UFN could not be modeled. Given the strong dependency on “Sales” (S) it is essential this data is to an accurate and sufficiently complete degree present in the analysis. An issue with the data collection occurred since the Commission in virtual all cases censors sales. “Guesstimations” were made when at some stage in the process both the percentage and nominal amount was given, but even so in 105 out of 644 cases this was not possible and no value was even imputed. These “guesstimations” are also highly questionable and have proven to be of very poor quality in the control models (available in the annex document). Therefore, no complete regression towards the nominal amount is made.

Learning from the “abuse of dominance”-analysis, it might however be the case that the protectionist hypothesis is a result of the difference in basis on which the fine is calculated. Therefore, a multivariate regression using only the factors “US undertaking” (N1) and “Non-EU undertaking is done” (N2) to check if any influence is noticed without controls. The result is shown in the following table:

Table 15: Result regression towards fine after leniency, nominally

Dep. var.	Ind. var.	Estimate	Std. error	p- value
UFN	(Intercept)	30454042	3295810	<2e-16
	N1	14032413	11429393	0,220
	N2	-3694356	6399901	0,564

*Residual standard error: 68740000 on 636 degrees of freedom  
(5 observations deleted due to missingness)*

*Multiple R-squared: 0,002374, Adjusted R-squared: -0,0007629*

*F-statistic: 0,7568 on 2 and 636 DF, p-value: 0,4696*

*UFN: "Ultimate fine amount (in Euro)", N1: "US firm", N2: "non-EU firm".*

It is clear a similar pattern to the “abuse of dominance” situation cannot be determined. None of the variables influence can be differentiated from random variability. However, in the data-set “US undertakings” N1 do have to some extent higher fines according to this analysis and “non-EU” N2 lower. However, since even isolated the variables do not reach any customary significance level, it is very likely when controlled for by, among other controls, “Sales” (S) (when data is available) even this effect will disappear.

Therefore, even at the nominal expression no merit can be given to the protectionist hypothesis when looking at the complete data-set.

#### **Multivariate regression “Total amount (before leniency)” (TA)**

Since two factors which show some degree of correlation were both selected in the univariate regression phase, out of caution multiple runs will be done. The different runs are represented in the tables in annex, the most accurate run will be shown and discussed here. The most accurate run is the one including all the selected factors with a residual standard error of 0,194, Adjusted R-squared=0,4486. The following table shows the result of run 3. The second table shows the same regression but on the data-set where cases by Commissioner Neelie Kroes were excluded:



Table 16: Result regression towards Total amount (with complete data-set)

Dep. var.	Ind. var.	Estimate	Std. error	p- value
TA	(Intercept)	0,200614	0,016501	< 2e-16
	B8	0,001668	0,000159	< 2e-16
	D1	0,203308	0,067322	0,00264
	D2	0,120852	0,026933	8,69e-6
	ES	1,182429	0,359913	0,00108
	G1	0,276427	0,035760	4,69e-14
	G2	0,236471	0,036712	2,47e-10
	G2b	-0,126028	0,0358323	0,00047
	G3	0,489666	0,092300	1,60e-7
	M1	-0,011625	0,026893	0,66569
	M2	-0,049628	0,029971	0,09828
	N2	-0,001785	0,018077	0,92140
	Q1	-0,205250	0,113786	0,07177
Q2	-0,050117	0,022848	0,02867	

*Residual standard error: 0,194 on 587 degrees of freedom  
(43 observations deleted due to missingness)*

*Multiple R-squared: 0,4605, Adjusted R-squared: 0,4486*

*F-statistic: 38,55 on 13 and 587 DF, p-value: < 2,2e-16*

*textit B8: "duration", D1: "Gains exceeded fine", D2: "Very large turnover", ES: "Economic situation", G1: "Recidivism", G2: "Cartel leader", G2b: "Market leader", G3:"Instigator", M1: "Ended after intervention", M2: "Not aware "unlawful", N2: "non-EU firm", Q1: "Novel infringement", Q2: "Actual market impact", and TA: "Total amount (before leniency)".*

Table 17: Multivariate regression for TA: Data-set without Cases by Commissioner Kroes

Dep. var.	Ind. var.	Estimate	Std. error	p- value
TA	(Intercept)	0,1729978	0,00460442	< 2e-16
	B8	0,00146232	0,00005463	<2e-16
	D1	NA	NA	NA
	D2	0,04574602	0,00785953	0,0000000132
	ES	-0,10572268	0,08878332	0,2345
	G1	0,06755881	0,01246089	0,0000001099
	G2	0,02984402	0,01272823	0,0196
	G2b	-0,01393797	0,01104134	0,2077
	G3	NA	NA	NA
	M1	-0,00425813	0,02392855	0,8589
	M2	-0,00800357	0,00839476	0,0301
	N2	0,01042151	0,00478633	0,0301
	Q1	NA	NA	NA
Q2	0,02581494	0,00612689	0,0000320036	

*Residual standard error: 0,04105 on 325 degrees of freedom  
(22 observations deleted due to missingness)*

*Multiple R-squared: 0,7314, Adjusted R-squared: 0,7237*

*F-statistic: 95,83 on 10 and 352 DF, p-value: < 2,2e-16*

*codes, see table 16*

I ignore the second table for the following paragraphs, and assess the regression on the complete data-set.

The intercept is set at around 20% ( $p=2 \times 10^{-16}$ ), which means undertakings can expect a baseline of 20% before any other factors start affecting the fine. Secondly, most of the considered variables, which turned out to be relevant, tend to push the fine upwards. The effect of the duration of the infringement (B8) in the resulting fine is about 0,1% per month (estimate=0,001668,  $p=2 \times 10^{-16}$ ). The circumstances of D1 (gains exceeded the fine before deterrence application), tend to push the fine up by around 20% (estimate=0,203308,  $p=0,00264$ ). In the same vein, undertakings with particularly large turnovers tend to be fined around 12% more (estimate=0,120852,  $p=8,69 \times 10^{-6}$ ). Variables coded for aggravating circumstance (coded as G) also account for big increases of the fine: recidivists (G1) tend to have their fine increased by over 25% (estimate=276427,  $p=4,69 \times 10^{-14}$ ), cartel leaders (G2) by just under 25% (estimate=0,236471,  $p=2,47 \times 10^{-10}$ ), and the biggest increase is said to be for cartel instigators (G3) by close to 50% (estimate=0,489666,  $p=1,60 \times 10^{-7}$ ). This suggests the Commission does tend to crack down on prominent and repeated players in cartels. A factor coded under “G” which might be miscategorised, is the circumstance of “market leader”. The Commission tends to fine market leaders lower by around 12% (estimate=-0,126028,  $p=0,00047$ ).

Consistent with findings for the building blocks of the fine, the Commission tends to fine bigger in times that the economy is doing well, at least according to our proxy. Per percentage point of real GDP growth, the fine tends to be 118% lower (bear in mind this amount is multiplied by the percentage point thus the estimate is difficult to compare to others) (estimate: 1,182429,  $p=0,00108$ ). Lastly, significant at alfa 5%, instances in which the market impact was assessed tend to be fined around 5% lower (estimate=0,050117,  $p=0,02867$ ). The same remark applies as under the building blocks: it is likely cases in which the market impact was assessed do show other characteristics which might explain the negative impact of the variable.

When looking at an alfa=10% level, which is not considered a strong enough threshold, two other variables impact the fine negatively. Firstly, undertakings which claim they were unaware the conduct was unlawful (however seldom accepted as a credible excuse) tend to get slightly lower fines (estimate=-0,049628,  $p=0,09828$ ). Secondly, a slightly similar situation seems to impact the fine negatively. Infringement which are considered “novel” tend to get much lower fines (estimate=-0,205250,  $p=0,07177$ ). This is consistent which was seen as relevant in regards to the mitigating amount.

The predictive formula for the Total amount before leniency is given as:

Formula 15: Total fine amount (in percentage) regression formula

$$TA = 0,200614 + 0,001668 B8 + 0,203308 D1 + 0,120852 D2 + 1,182429 ES + 0,276427 G1 + 0,236471 G2 - 0,126028 G2b + 0,489666 G3(-0,049628 M2) - (0,20520 Q1) - 0,050117 Q2$$

*TA: Total fine amount before leniency (in percentage), B8: Duration, D1: Gains exceed fine without this factor, D2: particularly large turnover, ES: Economic situation (in real gdp growth), G1: Recidivist, G2: Cartel leader, G2b: Market leader, G3: Cartel instigator, M2: not aware "unlawful" (only significant at alfa: 10%), Q1: novel infringement (only significant at alfa: 10%), Q2: Actual market impact.*

With residual standard error of 0,194.

The working hypothesis was that Commissioner Neelie Kroes used a different formula but the last two Commissioners used the same one. If this were the case, excluding the cases decided by the other formula, would make the prediction more accurate.

Looking at the results, three variables do not seem to have been present<sup>233</sup> other than in cases by Commissioner Kroes (D1, G3, Q1), yet the result of the regression improved drastically in quality. The residual standard error went down from 19,4% to just above 4% (0,04105), the adjusted R squared went up from 0,4486 to 0,7237. This means the predictive value of applying the same formula but filtered for fines which were hypothesized to be made using another formula, improved the quality from only an indicative value to a fairly accurate prediction. This can only be explained by assuming the hypothesis of "Commissioner Almunia and Vestager have coordinated to a specific degree" to be true. The most reasonable assumption is that this coordination is done by a fining formula, in one form or other. If such assumption is deemed proven by this calculation, no other conclusion can be reached that this fining formula was introduced after Commissioner Kroes was succeeded, except if the cases Commissioner Kroes handled were of an exceptionally different nature.

In regards to the existence of a "fining formula", it may be assumed such a formula exists.

Using only the factors which proved relevant the following regression is done, which excludes a number of cases from the sample. Those cases are then used as control for the predictive value of the regression formula:

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<sup>233</sup>Or were not picked up on using my coding strategy.

Table 18: Multivariate regression for TA, excluding Com. Kroes cases, and test cases

Dep. var.	Ind. var.	Estimate	Std. error	p- value
TA	(Intercept)	0,16327576	0,00461393	< 2e-16
	B8	0,00158854	0,00005867	<2e-16
	D2	0,03998558	0,00807906	1,18e-6
	G1	0,08114514	0,01265703	4,93e-10
	G2	0,01808057	0,00964997	0,061853
	N2	0,01794759	0,00481599	0,000228
	Q2	0,02586477	0,00597908	2,01e-5

*Residual standard error: 0,04004 on 334 degrees of freedom  
(17 observations deleted due to missingness)*

*Multiple R-squared: 0,7293, Adjusted R-squared: 0,7245*

*F-statistic: 150 on 6 and 334 DF, p-value: < 2,2e-16*

*B8: "duration", D2: "Very large turnover", G1: "Recidivism", G2: "Cartel leader", N2: "non-EU firm", Q2: "Actual market impact", and TA: "Total amount (before leniency)".*

Table 19: Regression formula (for TA, dataset without Com. N. Kroes cases) applied to the 29 test cases.

#	Real TA	Predicted TA	difference real/predicted
1	0,51	0,28447845	0,22
2	0,41	0,35291527	0,06
3	(Turnover limit)	0,35390056	/
4	0,42	0,35390056	0,07
5	0,36	0,31736414	0,04
6	0,36	0,31736414	0,04
7	0,40	0,35734972	0,04
8	0,46	0,42247986	0,04
9	0,37	0,39277125	0,02
10	0,35	0,32736903	0,02
11	(turnover limit)	0,44492099	/
12	0,38	0,44492099	0,06
13	0,38	0,44492099	0,06
14	0,38	0,44492099	0,06
15	0,38	0,44492099	0,06
16	0,34	0,44492099	0,10
17	0,34	0,44492099	0,10
18	0,38	0,52606613	0,15
19	0,38	0,44492099	0,06
20	(turnover limit )	0,44492099	/
21	(turnover limit )	0,44492099	/
22	(turnover limit )	0,44492099	/
23	0,41	0,44492099	0,03
24	0,26	0,26065035	0
25	0,26	0,24270276	0,02
26	0,26	0,26065035	0
27	0,25	0,24953057	0
28	0,23	0,2125205	0,02
29	0,24	0,23205663	0

*The 29 cases on which the regression formula was applied: the actual Total amount compared to the predicted total amount.*

The regression formula based on all cases is:

Formula 16: Total fine amount (in percentage) regression formula (formula based on data-set without Com. Kroes) 18)

$$TA = 0,1710129 + 0,00148278 B8 + 0,04510598 D2 + 0,0,06853528 G1 + 0,0278849 G2 + 0,01033588 N2 - 0,050117 Q2$$

*TA: Total fine amount before leniency (in percentage), B8: Duration, D2: particularly large turnover, G1: Recidivist, G2: Cartel leader, N2: Non-EU firm, Q2: Actual market impact.*

With residual standard error of 0,04103.

The formula used, where the test cases are exclude is:

Formula 17: Total fine amount (in percentage) regression formula (formula based on data-set without Com. Kroes) 18)

$$TA = 0,16327576 + 0,00158854 B8 + 0,03998558 D2 + 0,08114514 G1 + 0,01808057 G2 + 0,01794759 N2 + 0,02586477 Q2$$

*TA: Total fine amount before leniency (in percentage), B8: Duration, D2: particularly large turnover, G1: Recidivist, G2: Cartel leader, N2: Non-EU firm, Q2: Actual market impact.*

With residual standard error of 0,0404.

The result of this regression suggest only 6 variables are necessary to predict fines in the dataset with only a residual standard error of about 4% (0,04103), with an Adjusted R squared of 0,7239. The biggest influences on the fine are the “Particularly large turnover” (D2) of an undertaking (estimate=0,04510598, p=0,000000180) and the fact an undertaking is a “Recidivist” (G1) (estimate=0,06853528, p= 0,0000000557). Special case is the fact that per month about 0,1% gets added to the total amount of the fine (“Duration” (B8): estimate=0,00148278, p=2\*e<sup>-16</sup>), this cannot be compared to the impact of the other factors since this is the only continuous variable present.

Strangely, what was disproven in the earlier analysis show up in this more accurate regression. The fact an undertaking is “Non-EU” (N2), seems to add about a 1% to the amount of the fine (estimate=0,01033588, p=0,0268). It was not necessary to check the recent suggestion made by Auer and Manne to check for industry influence.<sup>234</sup> However, it should be noted this suggestion by Auer and Manne related to the abuse of dominance cases, an issue which is addressed above and which did not find any ground to the supposed bias in those cases. In

<sup>234</sup>Dirk Auer and Geoffrey Manne, ‘Is European Competition Law Protectionist? Unpacking the Commission’s Unflattering Track Record’ (2019) *ICLE Issue Brief* 2019-03-25.

Table 20: ANOVA test sector at second level to "total amount (before leniency)"

Indus. code	mean	sd	n	data:NA
C.17	0,2501250	NA	1	0
C.20	0,2913256	0,07846322	4	0
C.26	0,2890430	0,08167780	56	4
H.51	0,2203715	0,05649814	57	0
C.24	0,3633952	0,10858439	28	3
C.23	0,2757346	0,06459119	56	0
C.25	0,241088	0,04716304	12	0
A.01	0,1472000	0	2	0
C.22	0,2620569	0,03728234	30	0
C.28	0,2204617	0,01873330	5	0
C.27	0,2586415	0,06491570	28	0
C.29	0,2804564	0,07193409	61	10
K.64	0,1820694	0,01310023	9	0
K.66	0,1902400	0	4	0
D.35	0,1706667	0	2	0
C.10	NA	NA	0	1
H.50	0,2957809	0,02834325	4	1
E.38	0,2018250	0	4	0
H.49	0,3716668	0,02076599	3	0

*Indus. code: Industry code as Commission classifies themselves, mean: statistical mean, sd: standard deviation, n: number of instances, data: NA: number of cases excluded because of no data.*

the present analysis this might however be relevant to check whether any effect is noticeable. Therefore, a one-way ANOVA with industry is done. The level of specificity of the industry is set at the second level (form eg. C.20).

The biggest fines are given in sectors H.49 (mean=0,3716668, although a very low number of cases), C.24 (mean=0,3633952), H.50 (mean=0,2957809), C.20 (0,291356), C.26 (mean=0,2890430), and C.29 (mean=0,2804564).

To assess whether this explains the influence of the "non-EU" (N2) factor, we crudely assess the relation between the sector and the factor. Since N2 is coded as a numeric variable (either 0 or 1), we can use the "mean" of N2 per sector as a percentage of "non-EU undertakings" present in each sector. This way, we can assess if the biggest fines are given in sectors where many "non-EU" undertakings are present, thus crudely assess whether any relation exists.

In sector H.49 no fines were given to "non-EU" undertakings, neither in sector C.24. About 60% of fines given in sector H.50 are given to "non-EU" undertakings, howevern there are only 5 cases. Same remark applies for C.20:

Table 21: Percentage of “non-EU undertakings” (N2) in “sector” (by means of anova command in R)

Indus. code	mean	sd	n	data:NA
C.17	0	NA	1	0
C.20	0,25	0,5	4	0
C.26	0,8333333	0,3758230	57	0
H.51	0,45614035	0,5025000	57	0
C.24	0	0	31	0
C.23	0,07142857	0,2598701	56	0
C.25	0	0	12	0
A.01	NA	NA	0	2
C.22	0	0	30	0
C.28	0,60	0,5477226	5	0
C.27	0,53571429	0,50787745	28	0
C.29	0,60563380	0,4921926	71	10
K.64	0,8888888	0,3333333	9	0
K.66	0,25	0,50	4	0
D.35	0	0	2	0
C.10	0	NA	1	0
H.50	0,60	0,5477226	5	0
E.38	0	0	4	0
H.49	0	0	3	0

*Indus. code: Industry code as Commission classifies themselves, mean: statistical mean (can be interpreted as percentage of instances in that industry addressed at Non-EU undertakings), sd: standard deviation (irrelevant here), n: number of instances, data: NA: number of cases excluded because of no data.*

25% on 4 cases. However, on two of the most populated sectors: C.26 and C.29, which are not the most heavily fined but still in the top 6, some merit might be given. In C.26 about 83% are “non-EU” undertakings out of 60, and in C.29 this is about 60% out of 71 cases.

Auer and Manne’s claim is slightly plausible, future research is advised to control their analysis for those specific sectors.

Getting back to the results of the prediction in table 19, the table needs to be interpreted accordingly. The first Column is the actual “Total amount” (TA), the second the predictive using formula 20, the third the difference between real and predictive in absolute terms. The fourth column is the prediction done on the basis of formula 19 (which did have all cases in the regression), the sixth the difference between the real and total amount with formula 20 prediction. Lastly, the last column is the presence of the N2 factor.

What is clear is that in most cases the deviation between real and predictive is almost always smaller than 0,06. The 4 out of 29 (24 without turnover limit cases), which are or above 10% deviation are the same cases where formula 20, which took these cases into account, deviates. Meaning big deviations are not the result of over fitting but of particularities of those instances which are not captured in the formula.

It should be very clear the fact 22 out of 24 cases in the control set are predicted with a 90% accuracy, shows the existence of a formula is very plausible. Moreover, it is very plausible formula 20 seems to function as a useful approximation of said formula.

The deviations do not seem to occur specifically in the N2 cases, but is hard to tell since most cases are N2 cases. Looking at the entire set being predicted, a pattern can also not be distinguished. Future research is thus advised to test controls for the N2 (Non-EU undertaking) variable. However, as far as the protectionist hypothesis goes towards US undertakings, No influence could be determined which could not be attributable to random variability. This means that even if the protectionist hypothesis is not disproven for Non-EU undertakings (N2), there is no evidence for any protectionist tendencies against US undertakings.

### 7.3 Summary

The main conclusion for cartel cases is that cartel fines are not “magic numbers”,<sup>235</sup> but are set according with a high degree of specificity. Moreover,

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<sup>235</sup>A EU General Court judge in the earlier mentioned *Graphite Carbon* case reportedly asked where these “Magical numbers” came from (according to: Patrick Van Cayseele, Peter Camesasca and Kristian Hugmark, “The EC Commission 2006 fining guidelines reviewed from



this research pin points the introduction of the current “formula” to have accord during the tenure of Commissioner Joaquín Almunia. Given the fact the research largely concerned the analysis of the fining practices since the fining guidelines introduction in 2006, the sub-conclusions need to be split up in conclusions when looking at the last 14 years combined, and looking at the track record of the two last Commissioners.

Before diving into the sub-conclusions it also needs to be said that the accuracy of the analysis varies and brakes down at the leniency level since the leniency level is a blind spot in this research. However, it can still be said that what is concluded about a possible fining formula for the last two Commissioners does not hold for the leniency level nor after the leniency level. There is no “regression towards the mean” for the Commissioners towards the same mean for leniency, and the surprisingly similar means for the two Commissioners which hold for the “Total amount before leniency” completely vanish when leniency is added. Therefore, this research suggests although there is a possibility of a formula for the “Total amount before leniency”, leniency seems to be subject to heavy influence by individual Commissioners.<sup>236</sup>

The following sub-conclusions could be determined:

Firstly, not all factors said to be relevant in the fining guidelines turned out to have been important in the last 14 years. Moreover, some factors which were relevant in regards to some building blocks are not mentioned in the fining guidelines (such as the novelty of the infringement (Q1) and the economic situation of the EU (ES)), or at any rate factors which are co morbid with these variables which are also not mentioned in the fining guidelines.<sup>237</sup>

Secondly, for both the last 14 years and for the last 2 Commissioners tenure, no evidence could be found for the protectionist hypothesis being true in regards to US undertakings specifically. The only instance in which the influence of “US undertaking” (N1) slightly survives the control of other variables, is in regards to the “Mitigation amount” (MA), even so no merit could be given since the influence was positive, meaning US undertaking tend to be advantaged for this building block compared to non-US undertakings.

Thirdly, for “non-EU” undertakings the conclusion is more nuanced. When looking at the complete data-set of the last 14 years (since the introduction of the fining guidelines in 2006), again no merit could be given to the protectionist hypothesis, although some of the building blocks did show relevant influence by “non-EU undertaking” (N2). This influence was however mostly in the benefit of these non-EU undertakings: the leniency amount tends to be higher,

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an economic perspective: risking overdeterrence’ (2008) 53 *The Antitrust Bulletin* 1083.)

<sup>236</sup>Below a suggestion is done for future research to test this hypothesis.

<sup>237</sup>If they were mentioned they would have functioned as control for the variables.

the aggravating amount tends to be lower. Since it is unlikely the Commission would disadvantage “their own” undertakings, it is strongly suggested to future research to look into this result and turning the question of the protectionist hypothesis away from anti-US bias towards in what respect non-EU which are non-US cases differ from cases about EU and US undertakings.

This question about “non-EU” (N2), however not US, raised seems be amplified when looking at the dataset for just the last two Commissioners, thus the commissioners which are suspected to use the same fining “formula”. The predictive formula using the relevant variables, show that some relation exists between an undertaking not having their main office in the EU, and an increase in the “Total fine amount before leniency” (TA). Moreover, the formula which includes the effect of this factor serves as a good predictor of fines on the control set. This raises the question whether Commissioner Kroes is the driving factor behind the negative answer in regards to the conclusion for the entire dataset of the last 14 years, and the question needs to be reactivated anew. However, there is a slight indication control for certain sectors might explain partly this effect and further research is advised to search for new controls.

Thus, in regards to the existence of the formula, the formula seems likely to exist. In regards to the protectionist hypothesis, no evidence could be found for bias against US undertakings, however, the question for bias against Non-EU undertakings has no clear answer. Further research designs for the latter is suggested below.

## Part IV

# Discussion and findings

## 8 Limitations

The limitations of this study are the result of the tight time constraint of this study, since the study needed to be completed within less than a year after starting the project. This study had to keep the feasibility in mind thus limiting the amount of data and variables that could be collected, limiting the options for how to collect the data, and limiting the number of different ways of analyzing the data. The implication for each constraint will be listed here.

Firstly, relating to the data collection. The cases used, are a near exhaustive set collected in the time-frame since the introduction of the fining guidelines in 2006. However, not every decision was publicly available, or available only in summary form. Even when decisions were published often some parts of the decision were censored. Both “Sales” and the variable “Ability to pay” could not be included since there was not enough or, in the latter case, no information to be found. 2 cases were miss categorized and were as a result not used in the cartel dataset analysis, although on a dataset of  $n=644$  this should not make a difference to the conclusion nor remarks.

Secondly, relating to the variables used. It should be clear this analysis is done mostly on the basis of variables that are mentioned in the fining guidelines and variables which were collected on the basis of a qualitative analysis of the fining decision (under title: “Theoretical groundwork”). However, given feasibility concerns (each added variable came down to another 700 data point to assess) not every possibly relevant factor was used, and only few variables outside the scope of what is talked about within the framework of the Commissions public communications are considered. Therefore, variables said to be relevant are subject to the question whether the facts are only co-morbid to the real relevant factors. However, given the amount of variables that were coded and used (a little above 25), it can be assumed some control already occurred between factors.

Thirdly, relating to the coding of variables. There were around 18 000 data points to be filled in. Even though the program streamlined this process somewhat, human error should not be excluded from consideration. Some precautions were taken to prevent this. For instance where it was determined the variable was present, a reference is collected to the hit which gave rise to the coding. This “justified” data-set is also available in annex. The output created by using the program was later checked while filling in the dependent variables (which was done directly into excel), limiting the risk for persistence of mistakes somewhat. The high accuracy of the predictive value should also be

considered as meaning the ultimate data-set has at least cleared the threshold of being “usable”. Even so, variables were considered present when they were mentioned in the prohibition decision and seemed plausible. Thus, the threshold was not “does the Commission states they take it into consideration”. This proved a good decision since both “novelty” and “unaware of the illegal nature” are strongly presented by the Commission as not relevant, but did show a possible impact on the fine. However, the analysis might differ in case doubles are included, one which is coded as meaning “the Commission says they apply the variable”. It should also be noted that a more in depth coding of variables (meaning assessing if for example an infringement is really new or not instead of following what is said) might yield different results.

Concerning the limitations of this study, a last remark relates to developments in the field of statistics: the debate about the use of statistical significance. Many studies criticize the use of statistical significance levels on a theoretical and practical level.<sup>238</sup> The allegation, is that the significance level used in most studies using the Fisher-Pearson method is too high. When studies were assessed by the, according to some more accurate, Bayesian statistical method, they came to the conclusion most published studies which are said to be “significant” are actually not relevant and do not prove the underlining point. As statisticians also want to inform the public of: statistical significance does not mean a statement is true or even relevant.<sup>239</sup> Bayesian statistics seem to suggest, according to these authors, the threshold in Fisher-Pearson should at least be  $\alpha=0,005$ . Indeed, the conventional  $\alpha=10\%$  and  $\alpha=5\%$  (which are used in this study) threshold only exist because of the publication by Fisher of a table to check which scores from distribution related to which significance level. No other reasoning was done why 90% or 95% confidence are to be used. As is clear, this study did use 10% confidence level for data cleaning purposes and did use a 5% threshold for result to be deemed relevant. I tried to be specific in

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<sup>238</sup>For Eg.: Blakeley B Mcshane, David Gal, Andrew Gelman, Christian Robert, and Jennifer L Tackett, “Abandon Statistical Significance”, in *The American Statistician: Statistical Inference in the 21st Century: A World Beyond  $p < 0.05$* , 29, (March 2019), Vol.73, pp.235-245; Deirdre N McCloskey, and Ziliak, Stephen T., *The cult of statistical significance: how the standard error costs us jobs, justice, and lives*, Ann Arbor : University of Michigan Press, (2011), 321p.; Dominic Cicchetti, Catherine Lord, Kathy Koenig, Ami Klin, and Fred Volkmar, “Reliability of the ADI-R for the Single Case-Part II: Clinical Versus Statistical Significance”, *Journal of Autism and Developmental Disorders*, (2014), Vol.44(12), pp.3154-3160; Brian D Haig, “Tests of Statistical Significance Made Sound.”, *Educational and psychological measurement*, (June 2017), Vol.77(3), pp.489-506; Dominic Cicchetti, Kathy Koenig, Ami Klin, Fred Volkmar, Rhea Paul, Sara Sparrow, “From Bayes through marginal utility to effect sizes: a guide to understanding the clinical and statistical significance of the results of Autism research findings”, *Journal of Autism and Developmental Disorders*, (2011), Vol.41 (2), pp. 168-174; Jean-Marc Bernard, Marie-Claude Bert, Henry Rouanet, *New ways in statistical methodology: from significance tests to Bayesian inference*, New York (N.Y.): Lang, (1998), 276p.; and (master thesis) Sophie Soete, The use and abuse of statistical significance: a case study of the spirit level, (2012), published on *KU Leuven e-theses*.

<sup>239</sup>For eg. Daniel Levitin (translated by Carla Zijlemaker), *Uit onbetrouwbare bron*, Atlas contact, 2016, 256p.; and David Spiegelhalter, *Learning from data: the art of statistics*, Pelican, 2019, 365p.

what was meant by relevant in each instance it was used to avoid the confusion around significance. Although, I am convinced the threshold should go down even in a legal analysis context, out of fear of missing relevant factors because slight miss-captures as a result of the coding threshold, the conventional thresholds were used. It should be noted that because the main question was whether “Non-EU” (N2) and “US undertaking” (N1) have an influence, a low bar to clear gave the benefit of the doubt to the protectionist hypothesis, which did not result in a relevant result for “US undertaking” (N1), and leaves a question open for “non-EU” undertakings (N2). The p values are mentioned each time which should enable the reader to inform themselves.

The suggestion to use confidence intervals instead of p values, was not picked up on since the question in this study only needs an answer if there is a possibility of influence, meaning the influence goes beyond random variability, and does not claim to produce a complete and exhaustive formula. Merely, a prove of concept.

## 9 Protectionist hypothesis

The protectionist hypothesis is only considered to hold if US (or non-EU) firms get higher fines compared to European undertaking in the same circumstances. This means it might be entirely justified US (or Non-EU) undertakings tend to get higher fines, as long controlling for other factors make this *prima facie* bias disappear.

Even though, the original conception of the protectionist stems from apparent anti-US bias, I also focused on anti-European bias in general. I defined “European undertakings” more broadly than just part of the EU, but to part of the European continent. This means Swiss firms were not coded as “non-EU”.

I analyzed the data for abuse of dominance and cartel cases separately. Since there are only few abuse of dominance cases which result in a fine, I consider the cartel data-set more representative of how the Commission acts.

### Abuse of Dominance

Our different variables for “US firm” and “Non-EU firm” was unnecessary for abuse of dominance cases. Almost all non-EU firms who got fined are US firms. At face value it does seem US/non-EU firms do get much higher fines. Tables 4 and 5 show regression for the ultimate fines in nominal terms, with high R-squared (both multiple and adjusted), which show significant estimates positively influencing the fine. However, I drew an important condition: the apparent bias could only proof the protectionist hypothesis if no other factors could explain the difference in treatment.

The fact US undertakings pay more for abuse of dominance infringements can possibly be explained quite easily: fines are calculated on the basis of turnover, and US firms have much higher turnover than European undertakings.

This is clear when looking at table 6 and corresponding figure 5. When fines are expressed on the basis of turnover (in percentage), there is no real difference between the fines. On average Non-US undertakings are fined slightly higher. Looking at the median, non-US firms only lag about 0,1% behind, which cannot be determined to mean anything on the basis of only 13 cases. The furthest outlier is not a fine addressed at a US undertaking but at a non-US firm, and Q4 and Q5 of the non-US fines are distantly ahead of the same points of the US box-plot. The non-US Q5 point is even almost double the US Q5 point.

When taking turnover into account I could no longer determine any apparent bias, without the need of including other controlling variables. I thus concluded that on the basis of this research there is no evidence for the protectionist hypothesis in the actual fining process for abuse of dominance cases.

## **Cartel**

In cartel cases no evidence could be found for the protectionist hypothesis relating to US undertakings, not for any step in the fine giving process. For some dependent variables, some influence could be seen at a univariate level, however, when controlled by other factors in multivariate regression these influences could no longer be distinguished from random variability. The only instances in which this conclusion could not be drawn was for the multivariate regression for the mitigating amount, in which the influence is said to benefit the US undertakings, however at high (yet significant) p value. This does not seem to fit with the protectionist hypothesis and I expect further research to eliminate this effect when adding the relevant controls.

Even though there is no proof for the protectionist hypothesis relating to US undertakings, this strong conclusion cannot be drawn for an assessment done for “non-EU” undertakings in cartel cases. At least the story is more nuanced. In general terms, when looking at all decisions since the introduction of the fining guidelines in 2006, there does not seem to be any bias against non-EU undertakings. Similarly to the assessment for US undertakings, any potential effect found in univariate regression, disappear when adding controls in the multivariate regression. Again, any effect which was not discarded was in the benefit of the undertaking (higher leniency amounts, lower aggravating amount). At a first stage, the protectionist hypothesis did not seem to hold, at least, no evidence in favour was found.

However, when looking at the last 10 years, thus excluding cases by Neelie Kroes, for the total amount of the fine before leniency, some influence is seen by

the factor “non-EU undertaking”. The regression formula using this factor did produce fairly accurate results when applied to a control data-set. Therefore, it cannot be said that no merit can be given to this assessment. This contradicts the conclusion drawn on the basis of the entire data-set. A control for “industry” might give some explanation, but is left for further research.

The discussion about the protectionist hypothesis thus needs to shift away from the US question and towards the question of non-EU (and non US) undertakings. This question needs to be answered for cartel cases in the last 10 years and needs to shift from general considerations towards Commissioner specific analysis. For abuse of dominance cases, the question needs to shift away from the fine giving process towards the selection process of cases which are fined, since after selection turnover explains supposed influence.

## 10 Fining formula thesis

This research strongly suggests a fining formula exist, at least for cartel cases. It seems very unlikely the means in multiple building blocks of the fine should be exactly the same by accident if not for a strongly consistent approach. I suspected the phenomenon ”regression towards the mean” took place. This might also explain why the pattern did not hold for steps in the fine which are only applied in outlier (and thus fewer) cases: there was not enough data to set the mean towards the (metaphorical) population mean.

This consistent approach should be difficult to achieve if not for a “fining formula” in one form or another. This was further confirmed by the drastic improvement of the predictive value of the regression when eliminating cases by Commissioner Kroes, who is considered to have used another formula. However, this “fining formula thesis” only seems to hold up until leniency and adjacent leniency programs are applied.

Simply put, there is a very high probability of a fining formula having being introduced by Joaquín Almunia, which was still in use by Magrethe Vestager at least until the chronologically last cases of the dataset. Leniency remains an open question, however, since this research was not focussed on leniency programs no strong remarks on this point can be made.

On the basis of the analysis I put forward a “fining formula thesis”: *“The Commission uses a specific fining formula to set fines at least before leniency.”*

## 11 Bounds of the fine

On the basis of the regression of the last 14 years, building blocks of the fine and the total and ultimate fine itself, can be determined on the basis of the formulas to an improved degree than was the case up until this research.

However, the margin were still very large, leaving a large fork of possible fines, just not between 0 and the legal maximum. I expect the reported results to speak for themselves which factors influence to what extent.

However, when using the conclusion on the existence of a fining formula, this fork is (at least for Total amount) reduced to about 5% theoretically which mostly seems to hold for test cases. This formula is not yet the aspired exhaustive predictive formula, however it is the proof of concept such a formula is just within reach.

I leave it to the reader to interpret the table for specific variables. However, I want to emphasize the fact factors which were not present in the fining guidelines, did prove relevant in this analysis. The fact an undertaking is a market leader should not be relevant, yet in table 7.2, the variable (G2b) shows a significant and negative influence on the aggravating amount. Moreover, for the mitigating circumstances reduction, the fact an infringement is said to be novel, is one of the driving forces of the amount level, even though this is not reflected in the guidelines. The economic situation also seems to be taken into account when applying the deterrence amount (table 7.2), again not mentioned in the fining guidelines.

These influences still hold when looking at the total amount of the fine before leniency, meaning they are not just the result of the fact the mentioned building blocks are only applied in outlier cases.

Even though the bounds of the fine can to some extent be explained by following the fining guidelines, to which my analysis suggests quantified effects, the full extent of the fine seems to hinge on other variables as well. However, my initial statement the Commission acts in a coherent and rational matter seems to hold. We could, to some extent, obtain relevant approximations of fines by linear regression, Especially once excluding the Commissioner Kroes cases (see table 18 and table 19). This would not be possible if there was not any logic to the fining practices.



## Part V

# Conclusion

My main research question was *"How does the Commission decide fines regarding infringements of article 101 and 102 TFEU?"* The most accurate answer to date, stemming from this research is: *"Most likely, at least up until the total amount before leniency, with a formula introduced in the tenure of Commissioner Joaquín Almunia."* Based on this assertion I postulate a "fining formula thesis", which is the same answer as for my research question. I assert that in order to reverse engineer this *"magic formula"*, future research should take into account individual Commissioners, and not treat the Commission as a continuous from term to term, stable entity.

I suggest the protectionist hypothesis should be discussed differently. For abuse of dominance cases, I did not find any evidence of bias once we controlled for the firm's turnover. However, just as Auer did before, I also noticed a large proportion of fines are given to US firms. The discussion needs to shift away from the fine setting process towards the Commission's process of selecting cases they fine. If any appearance of bias needs to be dispelled, this selection to fine should be looked into.

For cartel cases, the answer to the protectionist hypothesis is more nuanced. For US undertakings, this research did not find any evidence any bias against those US undertakings exists. However, for "non-EU" undertakings, which include US undertakings but is more concerned with Asian companies, a contradictory result was obtained. When looking at the entire data-set, not differentiating between Commissioners, no support could be found in favour of the protectionist hypothesis. The analysis showed a small effect but in the benefit of the Non-EU undertaking. This suggests co-morbid variables which were not present in the current analysis are the real driving force.

The protectionist hypothesis is not dispelled completely. When taking into account the intermediate conclusion the probable current fining formula seems to have been introduced after the tenure of Commissioner Neelie Kroes, the analysis for the total amount of the fine before leniency was done again without cases decided by Commissioner Kroes. This regression formula, which has a very low error margin, not only adds to the likeliness of the fining formula thesis, but this is also a highly accurate formula. This formula includes the variable for "non-EU undertaking" having an apparent biased effect against those non-EU undertakings, an increase of 1%. Therefore, as far as the protectionist hypothesis relates to simultaneously non-Eu and non US undertakings in cartel cases, this research cannot assess whether no merit needs to be given. However, this research strongly indicates we need to start thinking differently about the question.

The analysis of the data-set with the selected variables proved to determine the impact of a number of variables mentioned in the fining guidelines, which was to be expected. However, other variables which are said to be relevant do not seem to have had any influence on decisions taken since the introduction of the fining guidelines in 2006. Moreover, some factors which the Commission claims are not taken into account in the prohibition decision (although mentioned), and which are not mentioned in the 2006 fining guidelines did prove to have some effect (clear example is “Novelty of the infringement”). This suggests the fining guidelines do not provide the complete picture of how fines are decided on.

My research strongly indicates the question, “*How does the Commission decide fines regarding infringements of art 101 and 102 TFEU?*”, does have a complete answer. I showed prove of concept of a predictive formula, at least for the total amount of the fine. This means the exact amounts of the building blocks and the ultimate fines are no “magical numbers”. My research showed proof of concept to opening up “the black box” of fining decisions.

# Suggestions for future research

## Suggestions about specific variables

*(Note: It should be noted some research already exists on this point, most notably by Prof. Dr. Wouter Wils)*

Future research might look into the scale of assessment for cooperative behaviour. What merits consideration under the leniency notice, what merits consideration outside the leniency notice, and what is the difference between cooperating and fulfilling once duty to cooperate?

Future research might look into the ability to pay question since this research stumbled upon the censorship wall relating to this factor.

Relating to the additional amount, future research might look into the effect of cases in which parties claimed a legislative excuses, and cases in which the gains exceeded the fine before deterrence was added. These variables had counter intuitive or even highly unlikely effects on the additional amount, meaning chances are highly comorbid factors to those variables are the driving force.

Future research also needs to assess why undertakings considered “market leaders” tend to get lower aggravating amounts. Possible hypothesis include the usual comorbid factors, such as different behaviours exhibited by market leaders, or different attitudes towards market leaders.

Future research might look into cases in which the fact “an infringement ended after intervention” since they result in lower mitigating amounts. Possible hypothesis included the usual co morbid factors, such as, possibly, the absence of other good arguments for mitigating the fine.

Future research might also tease out the reason why EEA wide infringements tend to get slightly lower deterrence amounts applied to it, while local infringements tend to get higher deterrence amounts applied.

Future research might tease out comorbid factors relating to nationality of the party.

## Suggestions about future research design

Future research might specify or at least test their hypothesis separately for different Commissioners, since it can no longer be assumed their fining practices are the same.

Future research might test the current hypothesis and considerations by using a Bayesian statistical research design instead of the Fisher-Pearson model or at any rate lower the alfa value to well below 1%.

Future research might test the protectionist hypothesis at the “selection of cases which are brought to the fining stage”-process.

## **Suggestions about ”Fining formula thesis”**

The “fining formula thesis” could be tested by comparing the means during certain periods of amounts (such as the total amount) within tenures of the same Commissioner. Commissioners with longer tenures, such as Commissioner Neelie Kroes and Commissioner Margrethe Vestager seem targets for this research design. However, Commissioners with shorter tenures could still be included by bootstrapping the data from each relevant period.

Future research reverse engineering the supposed fining formula, might use factors already substantiated as potentially relevant, which could not be tested given the constraints of this research project. Variables which were used here, are advised to be further split up in their relevant sub-categories.

## **Suggestions about legal implications of this research**

Future research might assess the possible justifications for the weight given to each factor. Or, to assess what constraints there are to weights given to each variable.

Future research might look into cases, in the current dataset, which do not fit the (prove of concept or later substantiated) prediction formula.

Future research might assess whether using a set formula for fines is justifiable at all.

Future research might assess the rights parties can claim from the (possible) existence of such a formula.

Future research should assess the meaning and legal impact of recital 37 of the fining guidelines in light of the possibility factors outside of the ones listed in the fining guidelines are systematically used in setting fines.

## Part VI

# Bibliography

### Regulation

In order of authority:  
Council regulation (EC) No 1/2003, on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty.  
Guidelines on the method of setting fines imposed pursuant to Article 23(2)(a) of Regulation No 1/2003 (2006/C 210/02)

### Case law

#### Court of Justice of the EU

In chronological order:  
Case C-328/05 P, SGL Carbon v Commission. Case C-514/15 P HIT Groep v Commission.  
Case C-101/15 Pilkington Group v Commission. Case T-762/14 Koninklijke Philips and Other v Commission.  
Case C-373/14 P Toshiba Corporation v Commission.  
Case T-471/13 Xellia Pharmaceuticals and Alpharma v Commission.  
Case T-472/13 Lundbeck v Commission.  
Case T-216/13 Telefónica v Commission.  
Case T-208/13 Portugal Telecom v Commission.  
Case T-409/12 Mitsubishi Electric Corp. v Commission.  
Case T-270/12 Panalpina World Transport and Others v Commission.  
Case T-251/12 EGL and Others v Commission.  
Case T-265/12 Schenker v Commission.  
Case T-264/12, UTI Worldwide v Commission.  
Case T-254/12 Kühne + Nagel International and Others v Commission.  
Joined Cases T-389/10 and T-419/10 SLM and Other v Commission.  
Case T-146/09, Parker ITR Srl, Parker-Hannifin Corp. v. Commission.  
Case C-89/85 DEP, A. Ahlström Osakeyhtiö and Others v. Commission (Wood pulp).  
Case T-102/96 Gencor Ltd v. Commission.

#### National case law (Belgian)

In chronological order:  
Cass. 13 march 2012, Arr.Cass. 2012, 644; Pas. 2012, 571.  
Gent (7e k.) nr. 2013/AR/3019, 19 januari 2015, DAOR 2015 (summary), afl. 114, 126.  
Bergen 16 october 1989, RPS 1990, 68.

## Commission decisions

### Decisions: factor selection

In chronological order:

Summary of Commission Decision of 5 March 2019 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (Case AT.40481 — Occupants Safety Systems (II) supplied to the Volkswagen Group and the BMW Group).

Commission decision of 22/1/2019 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA agreement (AT.40049 - MasterCard II).

Summary of Commission Decision of 21 March 2018 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (Case AT.40136 — Capacitors).

Commission decision of 21/2/2018 Relating to proceedings under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (AT.40113 - Spark Plugs).

Summary of Commission Decision of 21 February 2018 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (Case AT.40009 — Maritime Car Carriers).

Commission decision of 21/2/2018 relating to a proceeding under article 101 of the Treaty on the Functioning of the European Union and Article 53 of the Agreement on the European Economic Area (AT.39920 - Braking Systems).

Summary of Commission Decision of 24 January 2018 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement (Case AT.40220 — Qualcomm (Exclusivity Payments)).

Commission decision of 8/12/2017 relating to proceedings under Article 101 of the Treaty on the Functioning of the European Union (the Treaty) and Article 53 of the EEA Agreement (AT.40208 - International Skating Union's Eligibility rules).

Commission decision of 22/11/2017 relating to proceedings under Article 101 of the treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (AT.39881 - Occupant Safety Systems Supplied to Japanese Car Manufacturers).

Commission decision of 2/10/2017 relating to proceedings under article 102 of

the treaty on the functioning of the European Union (AT.39813 - Baltic Rail).

Commission Decision of 27/6/2017 relating to proceedings under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the Agreement on the European Economic Area (AT.39740 - Google Search (Shopping)).

Summary of Commission Decision of 21 June 2017 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (Case AT.40013 — Lighting Systems).

Summary of Commission Decision of 16 June 2017 amending Decision C(2014) 9295 final relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (Case AT.39780 — Envelopes).

Summary of Commission Decision of 17 March 2017 — Relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union, Article 53 of the EEA Agreement and Article 8 of the Agreement between the European Community and the Swiss Confederation on Air Transport (Case AT.39258 — Airfreight).

Summary of Commission Decision of 8 March 2017 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (Case AT.39960 — Thermal Systems).

Commission decision of 8/2/2017 relating to proceedings under Article 101 of the Treaty on the Functioning of the European Union (AT.40018 - Car battery recycling).

Commission Decision of 20/9/2016 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement (AT.39756 - ARA Foreclosure).

Commission Decision of 25/5/2016 relating to a proceeding under Article 101 of the Treaty on the Functioning of the European Union and Article 53 of the EEA Agreement (AT.39792 - Steel Abrasives).

Summary of Commission Decision of 8 december 2009 relating to a proceeding under Article 65 of the ECSC Treaty (COMP/37956 - Reinforcing bars, re-adopted).

Commission Decision of 20/X/2004 relating to a proceeding under article 81 (1) of the EC Treaty (Case COMP/C 38238 - Raw Tobacco Spain).

## Decisions: analysis (simplified list)

(Simplified list of all cases with prohibition decisions used during coding)

34579 Master Card I // 37766 Netherlands beer market // 37860 Morgan Stanley Dean Witter- Visa // 37956 Reinforcing steel bars // 37990 Intel // 38113 Prokent- Tomra // 38121 Fittings // 38344 Pre-stressing steel // 38432 Professional videotape // 38432 Bitumen Nederland // 38511 Drams // 38543 International removal services // 38589 Heat stabilisers // 38606 Groupement des cartes bancaires CB // 38620 Hydrogen peroxide (and perborate) // 38628 Nitrile butadiene rubber // 38629 Chloroprene rubber // 38638 Butadiene rubber emulsion styrene butadiene rubber // 38645 Methacrylates // 38695 Sodium chlorate // 38698 CISAC agreement // 38700 Greek lignite and electricity markets // 38710 Bitumen Spain // 38784 Telefonica SA broadband // 38823 Elevators and escalators // 38866 Animal feed phosphates // 38899 Gas insulated switchgear // 38907 Steel beams // 39092 Bathroom fittings and fixtures // 39125 Carglass // 39129 Power transformers // 39165 Flat glass // 39168 Fasteners // 39180 Aluminium Fluoride // 39181 Candle waxes // 39188 Bananas // 39226 Lundbeck // 39234 Alloy surcharge re-adoption // 39258 Airfreight // 39039 LCD // 39326 E. On et al on the seal issue // 39396 Calcium carbide and magnesium based reagents // 39401 E. On – GdF collusion // 39406 Marine hoses // 39437 TV and computer monitor tubes // 39452 Mounting for windows and windowdoors // 39462 Freight forwarding // 39482 Exotic fruit // 39523 Slovak Telekom // 39525 Telekomunikacja Polska // 39530 Microsoft tying // 39562 Slovakian postal law // 39563 Retail food packaging // 39574 Smart card chips // 39579 Consumer detergents // 39600 Refrigeration compressors // 39605 CRT glass bulbs // 39610 Power cables // 39611 Water management products // 39612 Perindopril Servier // 39633 Shrimps // 39639 Optical disc drives // 39685 Fentanyl // 39740 Google search shopping // 39748 Automotive wire harnesses // 39759 ARA foreclosure // 39780 Envelopes // 39792 Steel abrasives // 39793 EPH and others // 39801 Polyurethane Foam // 39839 Telefonica and Portugal telecom // 39847 Ebooks // 39861 Yen interest rate derivatives // 39881 Occupant safety system // 39904 Rechargeable batteries // 39914 Euro interest rate Derivatives // 39920 Braking systems // 39922 Automotive bearings // 39924 Swiss Franc interest rate derivatives // 39952 Power exchanges // 39960 Thermal systems // 39965 Mushrooms // 39965 Mushrooms // 39984 OPCOM Romanian power exchanges // 39985 Motorola – enforcement of GPRS standard essential patents // 40009 Maritime car carriers // 40013 Lighting systems // 40018 Car battery recycling // 40028 Alternators and starters // 40055 Parking heaters // 40098 Blocktrains // 40113 Spark plugs // 40136 Capacitors // 40153 E books MFNs and related matters Amazon // 40208 International skating union’s eligibility rules // 40220 Qualcomm exclusivity payments // 40481 Occupants safety systems II



## Substantive academic literature

In chronological order:

Anu Bradford, Robert J. Jackson, Jr. and Jonathon Zytnick, “Is E.U. Merger Control Used for Protectionism? An Empirical Analysis”, *Journal of Empirical Legal Studies*, Volume 15, 2018, Issue 1, 165–191.

Eric Barbier de La Serre and Eileen Lagathu, “The Law on Fines Imposed in EU Competition Proceedings: Time for a Refresh of the Fining Guidelines?”, *Journal of European Competition Law & Practice*, 2017, pp. 409-419.

Johanna Waelkens, “Vervulling faillissementsvoorwaarden.”, *NJW* 2016, afl. 352, 879-880.

Tomaso Duso, Klaus Gugler and Florian Szücs, “An Empirical Assessment of the 2004 EU Merger Policy Reform”, *Economic Journal*, November 2013, Vol.123(572), pp.F596-F619.

Leszek Balcerowicz mentioned in: Leondis, Angelique. ”A Move Towards a Sovereign Bankruptcy Regime: Definition of Sovereign Insolvency.” *Banking & Finance Law Review* 29.1 (2013): 113-28.

Nihat Aktas, Eric de Bodt, Marieke Delanghe and Richard Roll, “Market Reactions to European Merger Regulation: A Reexamination of the Protectionism Hypothesis,” *Working Paper, AFFI Conference*, 2012.

Stephen Davies, Matthew Olczak and Heather Coles, “Tacit collusion, firm asymmetries and numbers: Evidence from EC merger cases”, *International Journal of Industrial Organization*, 2011, Vol.29(2), pp.221-231.

Martin Carree, Andrea Günster, Maarten Pieter Schinkel, “European antitrust policy 1957-2004: an analysis of commission decisions”, *Review of Industrial Organization*, 2010, Vol.36(2), pp.97-131.

Philip Kienapfel and Geert Wils , “Inability to Pay – First cases and practical experiences”, *Competition Policy Newsletter* 2010, pp.7.

Keith N. Hylton, “Cartels”, in Keith N. Hylton, *Antitrust law- Economic theory and common law evolution*, cambridge university press, 2009 online, pages: 68-89.

Arie Melnik, Oz Shy and Rune Stenbacka, “Assessing market dominance”, *Journal of Economic Behavior & Organization*, Oct 2008, Vol.68(1), p.63

Patrick Van Cayseele, Peter D. Camesasca and Kristian Hugmark, “The EC commissions 2006 fining guidelines reviewed from an economic perspective: risk-

ing overdeterrence”, *The antitrust Bulletin*, volume 53, no 4, 2008, 1083.

Ghosal, V., & Stennek, J., *The political economy of antitrust*. Amsterdam, Science Direct, 2007, 1-489.

Nihat Aktas, Eric de Bodt, and Richard Roll, 2007. “Is European M&A regulation protectionist?” *Economic Journal* 117, 2007, 1096–1121.

Jordi Gual and Nuria Mas, “Industry characteristics and anti-competitive behavior: Evidence from the EU”, *IDEAS Working Paper Series from RePEc*; St. Louis, 2007.

Cento Veljankovski, “Cartel fines in Europe, Law, practice and deterrence”, *World Competition*, March 2007, Vol.30(1), pp.65-86.

Enrico Leonardo Camilli, “Optimal Fines in Cartel Cases and the Actual EC Fining Policy”, *World Competition*, December 2006, Vol.29(4), pp.575-605.

John Connor, “Extraterritoriality of the Sherman Act and Deterrence of Private International Cartels”, *IDEAS working paper*, 2005.

Çaglar Özden, “International Dimensions of Competition Policies: European Responses to American Mergers”, *Revue économique*, 1 November 2005, Vol.56(6), pp.1413-1442.

Mats Bergman, Maria Jakobsson, & Carlos Razo, “An Econometric Analysis of the Commission’s Merger Decisions”, *International Journal of Industrial Organization*, 2005, Vol.23(9), pp.717-737.

Damien Geradin and David Henry, “The EC Fining Policy for Violations of Competition Law: An Empirical Review of the Commission Decisional Practice and the Community Courts’ Judgments”, *European Competition Journal*, 01 October 2005, Vol.1(2), p.401-473.

Jonathan Baker, ”The Case for Antitrust Enforcement.” *Journal of Economic Perspectives*, 2003 17 (4): 27-50.

Alistair Lindsay, Emanuela Lecchi And Geoffrey Williams, “Econometrics study into Commission merger decisions since 2000”, *European Competition Law Review*, Dec, 2003, Vol.24(12), p.673-682.

Aktas, N.; E. de Bodt; M. Levasseur; and A. Schmitt. “The emerging role of the Commission in merger and acquisition monitoring: The Boeing/McDonnell Douglas case.” *European Financial Management*, 7 (2001), 447–480.

Vivek Ghosal and Joseph Gallo, “The cyclical behavior of the Department of

Justice's antitrust enforcement activity", *International Journal of Industrial Organization*, 19 (2001) 27–54.

William Kovacic and Carl Shapiro "Antitrust Policy: A Century of Economic and Legal Thinking." *Journal of Economic Perspectives*, 2000, 14 (1): 43-60.

Joseph Gallo, Kenneth Dau – Schmidt, Joseph Craycraft and Charles Parker, "Department of Justice Antitrust Enforcement, 1955–1997: An Empirical Study.", *Review of Industrial Organization*, August, 2000, Vol.17(1), p.75(59).

Roberto, S. "Boeing/McDonnell Douglas merger review: A serious stretch of European competition powers." *Brooklyn Journal of International Law*, 24 (1998), 593–616.

Joseph C. Gallo, Jos L. Craycraft and Shantanu Dutta, "Incarceration and fines: An empirical study of antitrust sanctions", *Review of Industrial Organization*, June 1986, Volume 3, Issue 2, pp 38–66.

Josepu Gallo, Joseph Craycraft and Steven Bush, "Guess who came to dinner", *Review of Industrial Organization*. Summer1985, Vol. 2 Issue 2, p106-130. 25p.

William Page, "Antitrust damages and economic efficiency: an approach to antitrust injury", *The University of Chicago Law Review*, Spring 1980, Vol.47(3), p.467.

Richard A. Posner, "A Statistical Study of Antitrust Enforcement," *Journal of Law & Economics* 13, no. 2 (October 1970): 365-420.

#### **(Literature concerning the issue of "statistical significance")**

Blakeley B Mcshane, David Gal, Andrew Gelman, Christian Robert, and Jennifer L Tackett, "Abandon Statistical Significance", in *The American Statistician: Statistical Inference in the 21st Century: A World Beyond p j 0.05*, 29, March 2019, Vol.73, pp.235-245.

Deirdre N McCloskey, and Stephen T. Ziliak, *The cult of statistical significance: how the standard error costs us jobs, justice, and lives*, Ann Arbor : University of Michigan Press, 2011, 321p.

Dominic Cicchetti, Catherine Lord, Kathy Koenig, Ami Klin, and Fred Volkmar, "Reliability of the ADI-R for the Single Case-Part II: Clinical Versus Statistical Significance", *Journal of Autism and Developmental Disorders*, 2014, Vol.44(12), pp.3154-3160.

Brian D Haig, "Tests of Statistical Significance Made Sound.", *Educational and psychological measurement*, June 2017, Vol.77(3), pp.489-506.

Dominic Cicchetti, Kathy Koenig, Ami Klin, Fred Volkmar, Rhea Paul, Sara Sparrow, “From Bayes through marginal utility to effect sizes: a guide to understanding the clinical and statistical significance of the results of Autism research findings”, *Journal of Autism and Developmental Disorders*, 2011, Vol.41 (2), pp. 168-174.

Jean-Marc Bernard, Marie-Claude Bert, Henry Rouanet, *New ways in statistical methodology: from significance tests to Bayesian inference*, New York (N.Y.): Lang, 1998, 276p.

(master thesis) Sophie Soete, *The use and abuse of statistical significance: a case study of the spirit level*, 2012, published on KU Leuven e-thesissen.

Daniel Levitin (translated by Carla Zijlemaker), *Uit onbetrouwbare bron*, Atlas contact, 2016, 256p.

David Spiegelhalter, *Learning from data: the art of statistics*, Pelican, 2019, 365p.

#### ***News paper articles***

Priest, G., and F. Romani. “The GE/Honeywell precedent.” *The Wall Street Journal*, (June 20 2001), p. A-18.

Kiran Stacy, Rochelle Toplensky and Demetri Sevastopulo, “Donald Trump attacks EU action against Us tech groups”, *Financial Times* 27 june 2019.

Murad Ahmed, Duncan Robinson and Richard Waters, “Obama attacks Europe over technology protectionism”, *Financial Times* 17 februari 2015.

# Part VII Annex

## Coding program (picture)

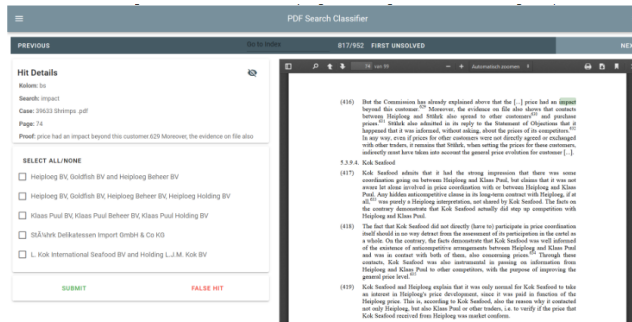


Figure 7:

## Coding keywords (list)

Table 22: Search terms per column (in excel sheet, seperate annex)

column	Search Term
ab	horizontal price
ab	market sharing
ab	output limitation
af	previous decision
af	recidivism
ah	leader
aj	leader
al	instigated
al	instigator
ar	ended
ar	intervention
at	not aware
at	unaware
av	not aware
av	unaware
az	follow-my-leader
bb	follow-my-leader
bb	least aware
bb	not aware
bb	unaware
bd	legislation
bd	legislative
bf	gains
bh	particularly large turnover
bl	bankruptcy
bl	liquidation
bq	new infringement
bq	no previous
bq	novel
bs	impact
h	seal
h	seals
j	cooperate
j	cooperated
j	failed to
l	incomplete information
l	mislead
l	misleading
n	rectified
n	rectify
p	important market
r	access to the market
t	geographical
t	geography
t	locally
v	beyond the eea
v	non eu
v	non-eu
v	outside the eea
v	outside the eu

## Reference to external Annex

- a) Dataset abuse of dominance and cartel cases (with justification) (excel spread sheet)
- b) Dataset imputed in R (both for 101 and 102 TFEU cases) (excel spread sheet)
- c) Complete list of analysis run (both for art 101 and 102 TFEU cases) (external text document)