

Discussion Paper No. 12-071

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in the European Union:
Determinants of the
Duration of Investigations**

Kai Hüschelrath, Ulrich Laitenberger,
and Florian Smuda

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Economic Research

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Non-technical summary

Although the public enforcement of anti-cartel laws in the European Union has recently attracted a substantial amount of economic research, several important and policy-relevant research questions remain unanswered. One particularly interesting area in this respect is empirical studies on the investigation procedures of the European Commission (EC) in general and the determinants of the duration of investigations in particular. A deeper knowledge of these determinants would not only allow conclusions on how authority procedures could be improved but would also help the involved firms to optimize their resource inputs during antitrust investigations.

Against this background, we present an empirical assessment of EC cartel enforcement decisions between 2000 and 2011. Following a general characterization of EC cartel enforcement activities by essentially interpreting basic descriptive statistics as well as selected time series, we empirically investigate the determinants of the duration of cartel investigations by the EC. We are able to identify several key drivers of investigation length such as the Commission's speed of cartel detection, the type of cartel agreement, the affected industry or the existence of a chief witness. Additionally, our analysis also reveals that both the number of cartel members and the number of national countries involved in the cartel did not have a significant effect on investigation length. The same conclusion is true for the number of detected cartels in the previous business year(s) and the existence of a repeated offender.

Das Wichtigste in Kürze

Trotz der in der jüngeren Vergangenheit festzustellenden verstärkten ökonomischen Forschung im Bereich der öffentlich-rechtlichen Kartellverfolgung sind einige wichtige und politikrelevante Forschungsfragen bislang unbeantwortet geblieben. Ein in diesem Zusammenhang besonders interessantes Themenfeld stellen Studien zu den entsprechenden behördlichen Untersuchungen im Allgemeinen und den Determinanten der Länge solcher Untersuchungen im Besonderen dar. Tiefgreifende Erkenntnisse zu solchen Determinanten würden nicht nur Schlussfolgerungen darüber erlauben, wie die entsprechenden Prozesse in den Behörden verbessert werden können, sondern würden ebenso den verfahrensbeteiligten Unternehmen bei ihrer Ressourcenplanung und -optimierung helfen.

Vor diesem Hintergrund führen wir eine empirische Untersuchung der Kartellentscheidungen der Europäischen Kommission (EK) von 2000 bis 2011 durch. Im Anschluss an eine generelle Beschreibung der entsprechenden Kommissionsaktivitäten durch eine Auswertung genereller deskriptiver Statistiken sowie ausgewählter Zeitreihen, untersuchen wir die Determinanten der Dauer der Entscheidungsfindung der EK. Wir sind dadurch in der Lage, einige zentrale Faktoren der Untersuchungslänge zu identifizieren, wie insbesondere die Geschwindigkeit der EK bei der Aufdeckung der Kartelle, dem Typ der Kartellabsprache, der Art der betroffenen Industrie sowie der Verfügbarkeit eines Kronzeugen. Zusätzlich führt unsere Studie auch zu Tage, dass weder die Anzahl der am Kartell beteiligten Unternehmen noch die Anzahl der am Kartell beteiligten Nationen einen signifikanten Effekt auf die Untersuchungslänge hat. Die gleiche Schlussfolgerung gilt auch für die Anzahl der in den Vorjahren aufgedeckten Kartelle sowie für das Vorliegen eines Wiederholungstäters.

CARTEL ENFORCEMENT IN THE EUROPEAN UNION: DETERMINANTS OF THE DURATION OF INVESTIGATIONS

*Kai Hüschelrath, Ulrich Laitenberger and Florian Smuda*¹

Abstract

We provide an empirical assessment of EC cartel enforcement decisions between 2000 and 2011. Following an initial characterisation of our dataset, we especially investigate the determinants of the duration of cartel investigations. We are able to identify several key drivers of investigation length such as the Commission's speed of cartel detection, the type of cartel agreement, the affected industry or the existence of a chief witness.

Keywords

Competition Policy; Empirical Analysis; Cartels; European Union; Fines; Leniency; Duration of Investigation

1. Introduction

The public enforcement of anti-cartel laws in the European Union has recently attracted a substantial amount of economic research. In addition to assessments of the question whether current fine levels are coming close to the theoretically optimal fines², the 2006 reform of the EU penalty guidelines led to several studies investigating the effects of the reform as well as – more generally – the determinants of cartel-related fines.³

Although existing cartel-related research generated interesting and policy-relevant insights on the efficiency of the current enforcement regime, several research questions remain unanswered. One particularly interesting area in this respect is empirical studies on the investigation procedures of the European Commission in general and the determinants of the

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² See, e.g., C. Veljanovski, Cartel Fines in Europe: Law, Practice and Deterrence, *World Competition* 30, 65-86, 2007, and F. Smuda, Cartel Overcharges and the Deterrent Effect of EU Competition Law, *ZEW Discussion Paper 12-050*, 2012, Mannheim.

³ See, e.g., C. Veljanovski, Deterrence, Recidivism, and European Cartel Fines, *Journal of Competition Law & Economics* 7, 871-915, 2011, and J. Connor and D. Miller, Determinants of EC Antitrust Fines for Members of Global Cartels, *Purdue University Working Paper*, 2009, West Lafayette.

duration of investigations in particular.⁴ A deeper knowledge of these determinants would not only allow conclusions on how authority procedures could be improved but would also help the involved firms to optimize their resource inputs during antitrust investigations.

Against this background, we present an empirical assessment of EC cartel enforcement decisions between 2000 and 2011. We start off in Section 2 with a general characterization of EC cartel enforcement activities by essentially interpreting basic descriptive statistics as well as selected time series such as the number of decided cases or the overall amount of fines imposed by the European Commission in the respective years. Subsequently, in Section 3, we concentrate on one particular empirical aspect which has not been investigated intensively so far: the determinants of the duration of cartel investigations by the EC. Section 4 concludes the article with a summary of the basic insights and a delineation of future research avenues.

2. General characterization of EC cartel enforcement between 2000 and 2011

In this section, we present several basic empirical insights on cartel enforcement by the EC between 2000 and 2011. In particular, we describe the dataset and the corresponding descriptive statistics in Section 2.1, followed by a discussion of time series of selected enforcement characteristics in Section 2.2.

2.1 Dataset and descriptive statistics

The dataset applied in this article contains information on all cartel cases decided by the European Commission between 2000 and 2011. The data were collected from decisions and press releases published by the EC in the course of its investigations and combine case-specific as well as firm-specific information. On the case level, information such as cartel type, cartel duration, number of cartel members, affected industry, relevant geographic market(s) and imposed overall fines are available. Regarding firm-specific data, we include information on the individual length of cartel participation, the level of fines imposed by the EC, whether the firm applied for leniency or not and the value of fine reductions following a successful leniency application. Furthermore, specific factors that are relevant for the calculation of the fine such as, e.g., aggravating and mitigating circumstances or repeated

⁴ We are only aware of one recent study which investigates the determinants of the duration of antitrust investigations. See A. Massadeh, *An Empirical Assessment of the European Commission Enforcement of Competition Law*, *University of East Anglia Working Paper*, 2011, Norwich.

offenders are included. In sum, the data set combines information on 73 EC cartel cases and 471 cartel members.⁵ Table 1 displays an excerpt of the descriptive statistics of the data set.

Table 1: Descriptive statistics

	<i>Mean</i>	<i>Median</i>	<i>Std. dev.</i>	<i>Min</i>	<i>Max</i>
Number of firms	6.45	5	3.90	2	17
Cartel duration (total, in months)	105.73	72	84.75	5	408
Cartel duration (firm specific, in months)	93.66	68	69.23	4	408
Total fine per case (m €)	228.04	109.90	283.95	0.45	1383.90
Individual fine per firm (m €)	35.39	10.64	78.87	0	896
Fine reduction per firm	0.21	0.01	0.31	0	1
Share of leniency cases	0.88.	1	0.33	0	1
Leniency collaboration rate per case	0.51	0.50	0.33	0	1

As shown in Table 1, the average number of cartel firms is 6.45 and the average overall cartel duration is 106 months (8.81 years). The median values of both factors are 5 firms and 72 months (6 years), respectively. The average firm-specific length of cartel participation is 94 months (7.81 years), which is close to the overall cartel duration and suggests that cartels are generally stable in terms of membership losses during cartelization. Interestingly, plotting cartel duration against the number of firms reveals a positive relationship, i.e., cartel duration increases with the number of firms in the cartel.⁶

Regarding cartel fines, the average fine per case imposed by the European Commission between 2000 and 2011 amounts to 228 million €. It varies between 450,000 € imposed in the Luxembourg brewer case and 1.38 billion € in the Carglass cartel. 88 percent of the cases show leniency applications and, on average, 51 percent of the firms in each case applied for fine reductions as part of the program. The average fine reduction per firm – which is not necessarily due to a leniency application but could also relate to, e.g., the inability to pay larger fines – is 21 percent of the initial base fine imposed.

⁵ It is worth noting that one cartel member is not necessarily represented by one single firm in our dataset. In cases in which several firms are jointly liable for the infringement, this ‘group of companies’ is treated as one observation.

⁶ On the surface, this finding contradicts with the basic theoretical industrial organisation literature which suggests that the larger the number of cartel members, the more difficult it is to reach consensus on an agreement (and its subsequent monitoring). However, case-study related evidence suggests that particular types of cartel agreements (such as especially market division agreements) are workable with even larger numbers of cartel members. Furthermore, as soon as industry associations or comparable organisations support their members in their coordination activities (e.g., by providing detailed industry-specific datasets), larger numbers of cartel members can be organised effectively.

2.2 Discussion of selected enforcement characteristics over time

In addition to the presentation of the descriptive statistics in the preceding section, a discussion of selected enforcement characteristics over time can create further insights on cartel enforcement in the European Union.

2.2.1 Number of decided cases and the role of leniency

The usual starting point of studies on cartel enforcement is a basic analysis of the number of decided cases over time. Figure 1 therefore illustrates the number of cases decided by the European Commission between 2000 and 2011.

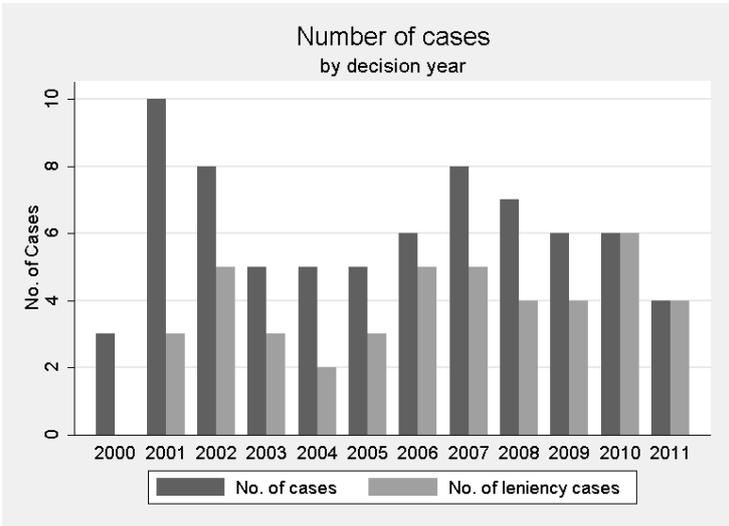


Figure 1: Number of cases and the role of leniency (2000-2011)

As revealed by Figure 1, the number of decided cases varies between a minimum of only 3 cases in 2000 and a maximum of 10 cases in the subsequent year 2001. In most years, between five and eight cases were decided by the Commission. It is further shown in Figure 1 that the number of leniency cases has increased substantially in recent years. While none of the 3 cases decided in 2000 involved any leniency application, all cases decided by the Commission over the last two years show at least one leniency application by a cartel member.

Although not displayed in Figure 1, our database allows a further characterization of the decided EC cartel cases. With respect to the affected industries, about 75 percent of all cartels in our database refer to the manufacturing industry while the remaining 25 percent largely belong to either wholesale trade or transporting and storage. Within the group of manufacturing, roughly 40 percent of the cartel cases referred to the sub-category ‘chemicals and chemical products’. Turning to the types of agreements, 60 cartel decisions by the

Commission referred to ‘information exchange’ as cartel type, followed by ‘market division’ in 38 cases, ‘quantity fixing’ in 20 cases and ‘price fixing’ in 19 cases.⁷ Interestingly, ‘bid-rigging’ only played a minor role and was mentioned as type of collusion in only 3 decided cases.

2.2.2 Sum of fines and average fines per firm

Complementary to an analysis of the number of cartel cases, an analysis of the sum of fines imposed together with the average fine per firm can add value. Figure 2 below displays the respective time series.

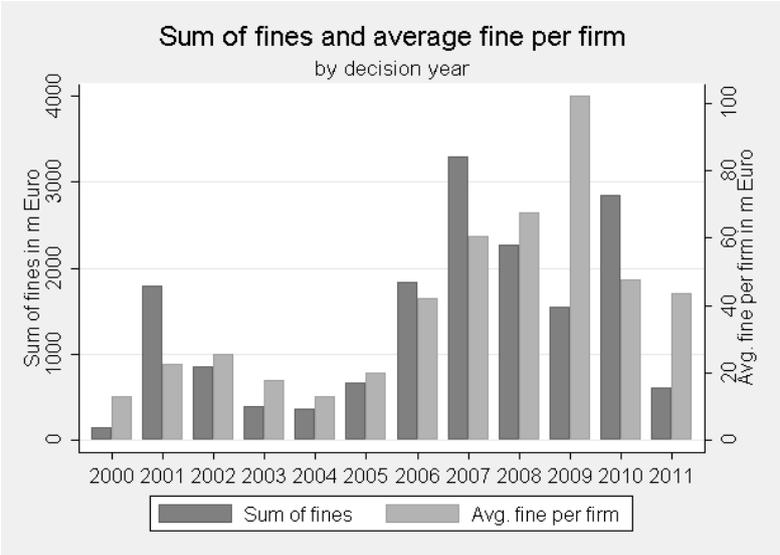


Figure 2: Sum of fines and average fines per firm (2000-2011)

As shown in Figure 2, the sum of fines fluctuates substantially in the period under investigation. While the year 2000 shows the smallest amount of fines of in sum €149.46 million, the largest amount (€3294.30 million) was reached in 2007. As already mentioned in Section 2.1 above, the sum of fines is often driven by one or a few very large cartels (in terms of revenue) and consequently very large fines.

In addition to the sum of fines imposed by the EC in the respective years, Figure 2 also displays the average fine per firm on a yearly basis. It is revealed that the average fine stayed at a relatively low level until 2004, however, experienced a substantial increase in subsequent years. Interestingly, the years 2010 and 2011 show a remarkable drop in the average fine (compared to its all-time high in 2009). One reason for this development could be seen in larger fine reductions granted by the EC.

⁷ It is important to mention here that many cartel cases involved more than one type of collusion.

2.2.3 Share of leniency applicants and average fine reductions

As already shown in Section 2.2.1 the share of leniency cases increased substantially in the EU from 2000 to 2011. As leniency programs do not only offer fine exemptions or reductions for the first firm which discloses its participation in a cartel but also aims at incentivizing other cartel members to come forward and cooperate with the Commission, an interesting question is how the share of leniency applicants other than the chief witness changed over time. Figure 3 below presents the respective time series.

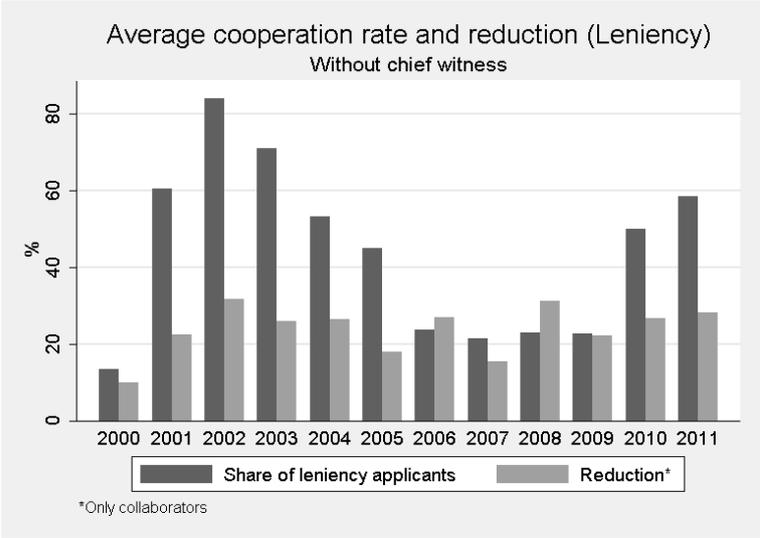


Figure 3: Average reduction of cartel fines for firms (2000-2011)

As shown in Figure 3, following a very small share of leniency applicants in the year 2000, a substantial increase was observed from 2001 to 2003 reaching values of above 60 percent. Interestingly, the following years experienced a constant decrease of the respective share to a minimum of less than 20 percent in 2007. In recent years, the share of leniency applicants in the respective cases increased again reaching a value of almost 60 percent in 2011. Although it is generally difficult to draw any meaningful conclusions on these isolated empirical observations, one possible explanation for the observed time trend could be seen in an increase in transparency on how the leniency program is applied together with first observable experiences that fine levels are reduced significantly in case a cartel member decides to fully cooperate with the Commission.

In addition to the share of leniency applicants, Figure 3 also shows the average percentage reduction for firms collaborating with the competition authority under the leniency program. As revealed by the time series, the average reduction fluctuates between 10 percent and 30 percent with the year 2000 showing the lowest value (of about 10 percent) and the year 2002 showing the highest value (of about 33 percent).

3. Determinants of the duration of cartel investigations by the European Commission

In this section, we complement our general characterization of the enforcement of anti-cartel laws by the European Commission with an empirical investigation of one particular procedural aspect: the length of investigations by the Commission. In addition to a descriptive analysis of different enforcement periods and a collection of potential determinants of the duration of investigations, we particularly conduct an econometric analysis to investigate the key determinants of investigation length.

In general, several arguments suggest that an analysis of the length of the investigation in general and the determinants of this length in particular can add value. First, from the perspective of the affected firms, a longer investigation period increases legal uncertainty in the sense that firms do not know for sure whether their behavior is classified as hardcore cartel and what fine they eventually will have to pay. Furthermore, longer investigation periods are typically connected with larger resource inputs that need to be allocated to both in-house and external activities (in the form of advice by lawyers and/or economists).

Second, from the perspective of the responsible authority, the length of the investigation could be interpreted as a measure of administrative efficiency in the sense that the quicker a decision is reached (with a fixed number of staff), the more efficient are the internal procedures of the authority.⁸ Furthermore, additional knowledge on the determinants of the duration of investigations can point towards possible procedural improvement potential.

Last but not least, the length of the investigations has implications for further stakeholders. For example, the longer the respective investigation period, the longer tax payers have to wait to profit from the collected fine payments. Furthermore, longer investigation periods delay possible private enforcement activities (as long as these are planned as follow-on suits)⁹ and therefore weaken the deterrent effect of antitrust laws generally.

3.1 Descriptive analysis of enforcement periods

In formal investigations of competition policy cases in general and cartel cases in particular, several enforcement periods can be differentiated. First, there is the time span between the end of the cartel and the beginning of the investigation. Generally, one would expect that the usual procedure is that the competition authority detects a cartel and starts an investigation

⁸ However, it is important to mention at this point that a trade-off between the quickness of the decision and its accuracy can be assumed, i.e., an economic solution has to find an optimal investigation length (which typically is not the minimum investigation length).

⁹ Although interest payments may compensate for the longer waiting time, there might be occasions in which harmed customers go bankrupt before they are awarded with the respective damages.

shortly afterwards. As shown in Figure 4, this expectation is only met in several years of the investigation period.

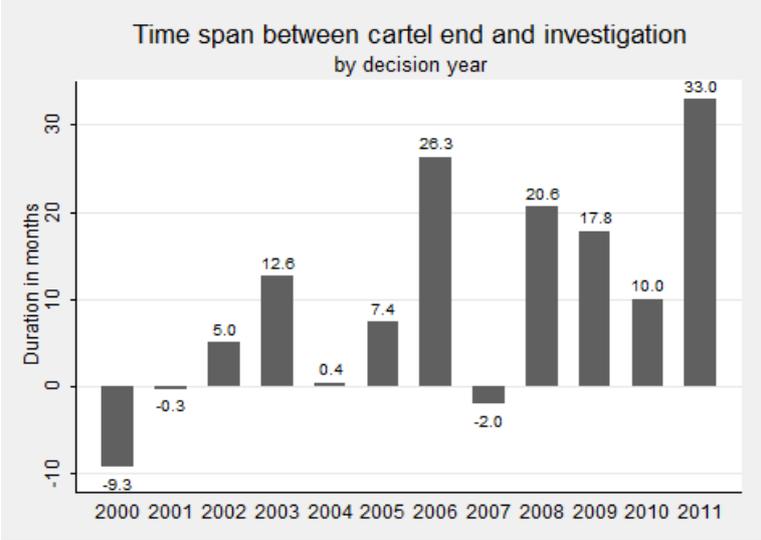


Figure 4: Time span between cartel end and beginning of investigation (2000-2011)

Although several years show the expected short period from the end of the cartel to the beginning of the investigation, especially the last few years in the dataset experience a substantial increase in the average time span. One explanation for this development could be seen in an increase in cartels that were reported by involved firms long after they were actually terminated. Such behavior could, e.g., be rational when a newly installed management would like to start off with a clean record and therefore decides to report old infringements of competition law. The possibility of applying for leniency motivates such a behavior further. In a sense, the time series could reflect an increase in the ‘passive’ detection of cartels through the leniency program and a corresponding decrease in the ‘active’ cartel detection activities (or successes) of the Commission.¹⁰

A second enforcement period of potential interest is the time span between the beginning of the investigation and the decision by the competition authority. Figure 5 shows the respective development for the EC for the period from 2000 to 2011.

¹⁰ The negative values in 2000, 2001 and 2007 indicate that in some cases, investigations already started before the actual cartel breakdown. This might be due to the fact that either the EC already attracted attention in such cases or the chief witness in the course of the leniency program collected further evidence in coordination with the EC while the cartels were still active. Furthermore, there might be cases in which it was legally unclear whether the identified firm collaboration actually was an infringement of competition law and the firms therefore decided to continue their cooperation after the investigation has been opened.

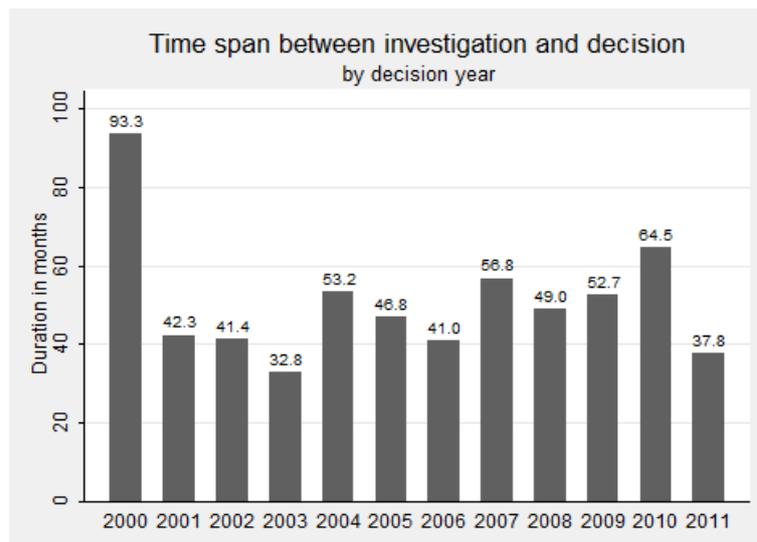


Figure 5: Time span between beginning of investigation and decision (2000-2011)

As shown in Figure 5, the time span between the beginning of the investigation and the decision fluctuates from on average 93.3 months (about 7.7 years) in the year 2000¹¹ to 32.8 months (about 2.7 years) in the year 2003. On average, a cartel investigation lasted about 50.8 months (about 4.2 years) for the entire period from 2000 to 2011 and 46.6 months if the (exceptional) year 2000 is excluded from the analysis.

In addition to the two enforcement periods discussed so far, further periods could be identified. For example, the time span between the decision of the Commission and a first court decision could be analyzed. Another option would be to investigate the full time span from the beginning of the investigation until a final decision is reached. Without wanting to disregard the relevance of a detailed analysis of all these different time periods, the following section concentrates on an empirical analysis of the determinants of especially one time period: from the beginning of the investigation until the competition authority reaches a final decision on the respective cartel case.

3.2 Potential determinants of the duration of investigations

Before we turn to our empirical analysis, it is necessary to generally think about potential determinants of the duration of investigations. First, it can be expected that the duration increases with the length of the cartel. *Ceteris paribus*, a cartel that only lasted a year should be easier to investigate than a cartel with a length of ten years (possibly including several price wars etc.). Second, we expect a positive relationship between the time from the end of

¹¹ The long time span in the year 2000 is largely driven by one cartel case with an exceptionally long investigation length.

the cartel until the beginning of the investigation and the duration of the investigation, basically because the shorter the respective period, the easier is information gathering for the authority.

Third, it can be expected that the number of cartel members and the number of national countries involved in the cartel, *ceteris paribus*, increase investigation length as complexity on the side of the authority is increased substantially. Fourth, both the type of the cartelized product and the type of the cartel agreement might influence the duration of the investigation. *Ceteris paribus*, it can be expected that the more homogenous the product, the easier it is for the authority to investigate and the simpler the cartel agreement, the easier (and quicker) it is for the authority to collect sufficient evidence.

Fifth, it can be expected that the duration of the investigation increases with the number of detected cartels in the previous year(s), basically because the fixed staff of the authority gets busier. Sixth, it can be expected that the existence of a chief witness makes it easier for the authority to collect sufficient evidence and should therefore speed up the investigation. The same argument holds for the degree of cooperation among further cartel members. The larger this share, the easier (and quicker) the investigation by the authority.

Seventh, cases of repeated offenders might allow the authority to increase investigation speed as they already gained substantial knowledge of the respective industry in preceding investigation(s). Eighth, on a more general level, it could be expected that the authorities' staff realize general learning economies in processing cases over time causing a general downward trend in average duration of the investigation.

3.3 Empirical analysis and results

In order to find out which factors actually determine the duration of EC cartel investigations, we conduct an econometric analysis. Based on our data set of 73 decided EC cartel cases from 2000 to 2011, we apply a multivariate regression approach with the time span between the beginning of the investigation and the decision ('duration of investigation') as dependent variable. The independent variables are subdivided in five categories (largely referring to our general assessment in the previous section): *Cartel duration and detection; type of cartel; cooperation with Commission; industry and time trend*. Table 2 presents the key results of the regression analysis.

Table 2: Regression results

<i>Variables</i>	<i>Coefficient</i>		<i>S.E.</i>
Cartel Duration and Detection			
Duration of the cartel	0.0416		(0.0290)
Period until detection	-0.303	***	(0.0701)
Cartel detected before terminated	20.22	***	(7.400)
Type of Cartel			
Market division	-13.94	*	(7.589)
Price and quantity fixing	-26.01	***	(9.499)
Price fixing and market division	-11.58	*	(6.657)
All three simultaneously	-14.25	*	(7.778)
Cooperation with Commission			
Chief witness	-9.717	*	(5.357)
Average reduction due to leniency	4.807		(20.04)
Industry			
Beverages	13.03		(10.01)
Transportation	5.965		(12.50)
Wholesale Trade	7.273		(11.04)
Manufacturing	19.17	**	(8.709)
Time trend			
Constant	35.76	***	(8.130)
<i>Observations</i>	73		
<i>R²</i>	0.425		
<i>Adjusted R²</i>	0.286		

*Robust standard errors in parentheses; Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$*

As shown in Table 2, our estimation explains 42.5% of the variation in the length of the investigation. In the *cartel duration and detection* category, cartel duration is found to affect the duration of the decision positively, however, the coefficient is not significantly different from zero. Furthermore, we find that the larger the period between the end of the cartel and the beginning of the investigation, the quicker the respective decision by the Commission. Although surprising at first sight, several possible explanation are conceivable. First, such cartels are usually reported by cartel firms (and not detected by the authority) and, consequently, these firms have strong incentives to provide the necessary proofs right away thereby speeding up the investigation. Second, as these cartel cases are older, a smaller amount of evidence is available (that needs to be investigated before a decision is made). With respect to the third variable – Cartel detected before terminated – we find that processing such cases take on average about 20 month longer. Generally, a cartel can be detected before it ends for two reasons. First, there might be cases in which it was legally unclear whether the identified firm collaboration actually was an infringement of competition law (and the firms decided to continue their cooperation after the investigation has been opened). Second, in leniency cases, the Commission might have been forced to wait for more evidence before it was able to extend the investigation to further cartel members.

Turning to the *type of cartel* category, we differentiate between four groups: ‘Market

division', 'price and quantity fixing', 'price fixing and market division' and 'all three simultaneously'.¹² Our reference group is all cartel cases in which only prices were fixed. For any other type of cartel which involves quantity fixing and/or market division we observe that on average the decision takes significantly less time (as indicated by the negative coefficients shown in Table 2). For instance, for the combination of price and quantity fixing, investigation length is 26 months shorter compared to a case which only involved price fixing. There are several reasons which can explain this finding. First, quantity fixing is usually done in industries in which firms have to plan production capacities. In such an environment, a cartel agreement often demands a detailed documentation which eases the investigation once the cartel is discovered. Second, cases in which territories or customers are divided between the colluding parties are easy to prove by the Commission as soon as, e.g., customers are found who experienced refusals to deal in a certain territory.

The *cooperation with Commission* category refers to the role of leniency programs. Leniency rules were introduced to destabilize existing cartels through an increase in the probability of detection. In our regression analysis reported in Table 2 above, we find that in cases with a chief witness, it took the Commission on average 9.71 months less to finalize a decision. This is understandable as a chief witness is providing hard evidence that can directly be used to build up the specific case. Furthermore, the EC leniency program also contains the possibility of fine reductions for other cartel members as soon as they decide to fully cooperate with the Commission. Instead of including the share of collaborators we controlled for the average reduction for subsequently collaborating cartel firms as a measure for the effectiveness of the collaboration. We find that more collaboration has a positive (but insignificant) effect on duration length suggesting that the respective increase in the workload on the side of the Commission (due to the additional evidence handed in) delays the respective decisions.

Furthermore, we introduce the *industry* category to control for possible industry differences. As our dataset is relatively small, we deviate from the classical standard industrial classification and defined four broader industry groups – Beverages, Transportation, Wholesale Trade and Manufacturing - and used the remaining cases as reference category. As shown in Table 2, compared to all other industries, cartel investigations in the manufacturing sector took more than one and a half years longer than other investigations. This finding can be explained by the typically complex markets and products in this sector and the consequently larger amount of time needed to fully investigate the alleged cartel agreements.

¹² We also did not control for bid-rigging cases as we have only three observations in the dataset.

For the other three industry groups we also find positive, but smaller and insignificant effects.

Last but not least, we have included a *time trend* variable in our estimation. Our results reveal a positive and significant development over time. This suggests that, since the beginning of our dataset in 2000, the Commission needed almost one and a half months longer every year to reach a decision in the respective cartel cases.

In addition to the variables reported in Table 2, we tested several specifications with different selections of (further) variables. Referring to our discussion of potential determinants of the duration of investigations in Section 3.2, it turned out that the number of cartel members and the number of national countries involved in the cartel did not have a significant effect on investigation length. The same conclusion is true for the number of detected cartels in the previous business year(s) and the existence of a repeated offender. Due to the restricted number of observations and the remaining degrees of freedom we abstracted from including these variables.

4. Summary and conclusion

In this article, we presented an empirical assessment of EC cartel enforcement decisions between 2000 and 2011. We started off in Section 2 with a general characterization of EC cartel enforcement activities by essentially interpreting basic descriptive statistics as well as selected time series such as the number of decided cases or the overall amount of fines imposed by the European Commission in the respective years. Subsequently, in Section 3, we concentrated on one particular empirical aspect which has not been investigated intensively so far: the determinants of the duration of cartel investigations by the EC. Our empirical analysis was able to identify several key drivers of investigation length such as the Commission's speed of cartel detection, the type of cartel agreement, the affected industry or the existence of a chief witness.

Given these key results of our analysis, what can be concluded with respect to policy recommendations? On the surface, our results suggest that – in order to speed up the investigation procedure – the Commission is well advised to focus on the factors which were identified as drivers of a longer investigation period. Consequently, it could be concluded that the Commission should improve their analytical skills with respect to pure price agreements, should further promote the leniency program or should extend their knowledge in manufacturing industries to speed up the respective investigations.

Although our results would in principle support such conclusions, they mask important shortcomings of the analysis. Most importantly, we usually have to expect a trade-off between the speed of the investigation and the accuracy of the decision. Although cartel cases are relatively easy to detect and handle compared to other infringements of competition law, a detailed analysis by the Commission is still needed to build a strong case that stands in subsequent court investigations. As a consequence, the derivation of an optimal investigation speed clearly is a non-trivial exercise and our analysis does not allow any conclusion on whether this optimal level is achieved by the current enforcement practice. Furthermore, the speed of an investigation by a competition authority surely depends on many unobservable factors. For example, it is unclear to what extent an increase in the number of staff of the competition authority is able to speed up the investigation procedure. If general case worker capacities are the bottleneck, such a step would surely help. However, if a large part of the investigation consists of waiting time for the respective firms to respond to information requests, additional staff cannot be expected to further increase the speed of investigation.

Our empirical results together with the identified shortcomings immediately suggest several avenues for future research. One interesting area in this respect is field studies in competition authorities to learn more on the real bottlenecks in their every day investigation work. Such studies are likely to allow the inclusion of further variables (possibly) reaching an even better explanatory value of an empirical analysis. Another fruitful area of future research is international comparisons of the investigation lengths and their determinants. Although it is obvious that legislative differences across countries will complicate such an endeavor, benchmarking exercises would still enable efficiency comparisons and would therefore allow basing policy conclusions on more robust foundations.