Three Essays in Industrial Organization

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Für Frieda.

Preface

The research for this thesis has been conducted at the Friedrich-Alexander-Universität Erlangen-Nürnberg and the Düsseldorf Institute for Competition Economics (DICE) at the Heinrich-Heine-Universität Düsseldorf.

My work has strongly been influenced by and benefited from discussions with professors and colleagues at DICE and at Bundesnetzagentur as well as presentations at various national and international conferences, seminars and workshops. Thus, I am very grateful to all who supported my work during these years, specially to Jürgen Rösch, Johannes Fischer and Ulrich Heimeshoff.

I thank my supervisors, Justus Haucap, who introduced me to the fascinating field of industrial organization, and Hans-Theo Normann, for their excellent and insightful advice, encouragement and patience while writing this thesis.

My wife and my parents deserve a particular note of thanks: Thank you, Mama and Papa, for your support and guidance and for giving me the possibility and freedom to start my career in the first place. Thank you, Belén, for your patience, your support and your love.

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Chapter 1

Introduction

This dissertation deals with two main topics of industrial organization: cartels and natural monopolies. It examines the functioning and the effects of legal and illegal as well as explicit and tacit collusion and analyzes how policy recommendation deduced from economic theory are transferred into rules for the regulation of natural monopolies. Empirical, experimental and descriptive approaches are used for the different analyses.

Legal and Illegal Cartels in Germany

While the economic literature that empirically analyses international cartels has been growing over the last decades, there has been, quite in contrast, rather thin empirical literature about German cartels. Chapter 2 aims at closing this gap by empirically describing and analyzing legal and illegal cartels in Germany. For this purpose, a unique dataset was created. It consists of all 864 legal cartels approved by the Federal Cartel Office (FCO) from its foundation in 1958 until 2005, when the system of approval by the FCO was abolished. Furthermore, the dataset includes all of the 95 illegal horizontal cartels that have been detected and fined by the FCO over the same period.

This dataset allows to obtain unique insights into the development and economic history of cartels in Germany since World War II. Chapter 2, therefore, contains a brief description of German cartel law and its exemptions from the general cartel prohibition, some detailed descriptive statistics over legal and illegal cartels in Germany and some in-depth empirical analysis of factors affecting cartel fines and cartel duration.

Tacit and Explicit Collusion via Buyer Groups

The dataset used in Chapter 2 also showed that half of all discovered illegal cartels in Germany used lawful joint-market institutions for their organization. Similar results were obtained in international studies, and also, antitrust policy is aware of the possible anti-competitive effects of joint-market institutions. Both, EU and US Guidelines on horizontal co-operation, point out that competition may be harmed. Nevertheless, the existing data does not allow to analyze in depth the effect of joint-market institutions on cartel success. Therefore, an experimental approach is used

in Chapter 3.

The experiment is based on three-firm Cournot markets, in which the firms compete in the product market. Joint-market institutions are modeled as buyer groups that allow their participants to purchase inputs more economically. In a repeated game, abandoning the buyer group altogether or excluding single firms constitute credible threats. Hence, in theory, buyer groups facilitate collusion. Several experimental treatments are run to test the different effects of communication and the possibility to use the exclusion of single firms or the breakup of the buyer group as a punishment mechanism on the functioning of collusion.

Amendment of the German Incentive Regulation in 2016

While Chapter 3 aims at understanding the practices that facilitate tacit collusion in order to draw some policy recommendations, Chapter 4 takes a look at how such scientific recommendations are taken into account during legislative procedures.

It is dedicated to the development of incentive regulation in Germany and to the implications the last amendment of the German Incentive Regulation ("Anreizregulierungsverordnung") has for energy networks owned by public authorities. It is aimed at analyzing how an economic concept, such as incentive regulation of network industries, is implemented under political and social restraints.

Hence, Chapter 4 starts by explaining the evolution of the liberalization of the energy sector in Germany driven by European legislation on the basis of economic theory. This is followed by an analysis of how this process of liberalization has been carried out in a continuous conflict between economic principles and political interests often driven by the economic interests of the concerned sector. It then gives an insight into the process of the amendment of the German incentive regulation in 2016 that was undertaken in order to improve the conditions for investments into distribution networks. Chapter 4 closes with an analysis of the effect of the amendment on the operators of these networks.

Chapter 2

Legal and Illegal Cartels in Germany between 1958 and 2004*

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Legal and Illegal Cartels in Germany between 1958 and 2004[†]

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September 2010

Abstract

This paper offers a new and broad insight into the landscape of German cartels, utilizing a unique dataset of all illegal horizontal cartels detected by the German Federal Cartel Office (FCO) between 1958 and 2004 and all legal cartels authorized during the same time period. We also provide the first comparison of legal and illegal cartels in Germany. Legal cartels tend to last longer and to have more members than illegal cartels, while there are little differences with respect to the industries involved. The construction industries are the most cartelized sectors in Germany (29.8 % of all legal cartels, 43.2 % of all illegal cartels) followed by manufacture of metals and machinery (21.9 % of all legal cartels, 30.6 % of all illegal cartels). How the number of cartel members affects the duration of cartels is ambiguous. Cartels with no more than 12 members tend to last longer than cartels with more than 12 members. However, cartels with 5 to 12 members also tend to last longer than cartels with less than 5 members.

[†]We would like to thank our discussant, Lieselotte Locher, and other seminar participants at the 39th economic seminar at Ottobeuren for most helpful comments and discussions.

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2.1 Introduction

While Germany used to be the "land of the cartels" until World War II, it was also the first European country that introduced serious anti-cartel laws in 1958, following an intense debate in the public arena, the press and also in its parliament, the "Bundestag". Moreover, one of the most independent cartel authorities, the Federal Cartel Office (FCO), in German: "Bundeskartellamt", was established. The FCO is organized in a court-like manner so that not even its president can overturn a decision of any of the Office's chambers. While Germany does have the longest tradition of anti-cartel policy and enforcement in Europe, there is surprisingly little empirical work on cartels and cartel policy in Germany after World War II. Notable exceptions are Audretsch (1989), Dönnebrink (1995), Schwalbach and Schwerk (1999), and Lauk (2003). Among these papers, the first three exclusively focus on legal cartels that have been exempted from the general cartel prohibition enshrined in § 1 of Germany's Law against Restraints of Competition ("Gesetz gegen Wettbewerbsbeschrnkungen (GWB)").

In fact, one of the particularities of the GWB was not so much that it generally prohibits cartels in its § 1, but rather that it explicitly named various exemptions from its general cartel prohibition in §§ 2 to 7. Until the GWB was changed in 2005, firms were given the opportunity to formally apply for a legal exemption from the general cartel prohibition. The various exemptions are explained in more detail in the next section of our paper.

An overview over different exemptions from the general cartel prohibition is also provided by Audretsch (1989) who focuses on the so-called rationalization cartels, concluding that they tend to increase prices and to reduce quantities, thereby lowering allocative efficiency. In contrast, Schwalbach and Schwerk (1999) focus on the stability of legal cartels in Germany, analyzing the cartels' survival probabilities. Finally, Dönnebrink (1995) examines various types of exemptions and analyses how often various types of cartels are exempted from the general prohibition.

To our knowledge the only economic analysis dealing with a cross-section of illegal cartels in Germany has been provided by Lauk (2003) who examines cartels that have been detected and fined by the FCO between 1985 until 2000. The focus

of her analysis is on the question whether the cartels fined by the FCO share certain characteristics. To be more precise, Lauk (2003) finds that the markets in which cartels have been detected share a number of market characteristics.[1]

Finally, Hahn and Normann (2001) have provided an in-depth case study of a long-lasting cartel of power cable producers, explaining the exact working mechanism of that cartel.

While the empirical literature about cartels in Germany is rather thin, there has been, quite in contrast, a growing body of economic literature that empirically analyses international cartels. Two developments can be distinguished here. While a number of papers have used extensive datasets to analyze factors that determine the success and/or duration of cartels (see, e.g., Hay and Kelley, 1974; Levenstein and Suslow, 2006; Harrington, 2006), the forensic analysis of cartels has focused on specific cartels, analyzing the exact mechanisms of a cartel or calculating the overcharge or the damage for consumers (see, e.g., Schinkel, 2008; Connor, 2008).

The scarcity of empirical literature about cartels in modern Germany results in large parts from the lack of easily accessible information, as neither the courts nor the FCO systematically collect data on cartels. There has been no database on German cartels after World War II, while cartels before World War II are reasonably well documented.[2] Moreover, while decartelization measures were introduced directly after World War II (see Emmerich, 2006), the cartel authorities remained rather inactive and did hardly apply the new cartel law (Ortwein, 1998; Schmidt, 2005). Consequently, there is virtually no information about cartels between 1945 and 1958 when the new competition law, the GWB, was enacted. Therefore, our analysis starts in 1958.

This paper adds to the rather thin economic literature on cartels in modern Germany and empirically describes and analyses legal and illegal cartels in Germany. The main purpose of this paper is to shed some light on cartels in Germany

[1] Similarly, Lorenz (2006) focuses on market characteristics that can be used to screen markets in order to detect cartels more easily.

[2] Driven by the belief that cartels are beneficial as they lead to price stability by avoiding price fluctuation in times of economic instability (Schmoller, 1906), cartels were legal and price fixing contracts enforceable in the courts. It has been estimated that some 2000 to 4000 cartels existed at the end of the 1920s (Kling and Thomas, 2007). Also see Richter (2007) for a description of cartels in Germany before World War I.

and their characteristics from an empirical perspective. Hence, this paper aims at closing a gap within the economic literature on cartels in Germany.

For this purpose, we have created a unique dataset consisting of all 864 legal cartels approved by the FCO from its foundation in 1958 until the GWB was changed in 2005 to switch from a system of official approval to a system where firms have to self-assess the legality of their eventual cooperation. Furthermore, our dataset includes all of the 95 illegal horizontal cartels that have been detected and fined by the FCO over the same period. This dataset allows us to obtain some first insights into the development and economic history of cartels in Germany since World War II.

The remainder of this contribution is now organized as follows: In the next section we briefly describe the exemptions from the general cartel prohibition that have been enshrined in Germany's competition law until 2005. Section 3 then briefly describes our dataset, before sections 4 and 5 provide some detailed descriptive statistics over legal and illegal cartels in Germany, respectively. In section 6, we provide some more in-depth empirical analysis of factors (a) affecting cartel fines for illegal cartels and (b) cartel duration for both legal and illegal cartels. Finally, conclusions are drawn in section 7.

2.2 Legal and Illegal Cartels in Germany

The cartel prohibition enshrined in § 1 of the GWB is a central part of Germany's competition law since 1958. According to § 1 GWB any agreement, arrangement or coordinated behavior that prevents or restrains competition is prohibited. However, as mentioned above, until 2005 Germany's competition law used to be characterized by several exemptions from this general prohibition. To be more precise, firms had the possibility to obtain an authorization for their cartel, as long as the firms could demonstrate (or argue) that their cartel lead to an efficiency gain for the participating firms that was sufficiently large to also benefit consumers in the form of lower prices (see Audretsch, 1989; Dönnebrink, 1995). The following exemptions were enshrined in §§ 2 to 8 GWB until 2005:

Condition cartels: According to the old (pre 2005) § 2 GWB, agreements about general terms and conditions of business, delivery and payment were permis-

sible, as long as they did not concern prices or price elements. The ground for this exemption was the idea that condition cartels are likely to improve market transparency, thereby improving the efficiency of market transactions (by reducing search and bargaining costs) so that they have been considered to be pro-competitive.

Rebate cartels: According to the pre 2005 § 3 GWB, agreements about rebates and discounts were permissible. The ground for this exemption was also the idea that rebate cartels are likely to improve market transparency, thereby improving the efficiency of market transactions (by reducing search and bargaining costs) so that they have been considered to be pro-competitive. In addition, they were thought to prevent undesirable forms of "cut-throat competition" and unfair price discrimination.

Crisis cartels: According to the pre 2005 § 4 GWB the coordinated adjustment of productive capacity in consequence of a non-temporary reduction of demand (i.e., in shrinking industries) was permissible. Hence, in times of structural change industries were allowed to collectively agree on how to reduce excess capacities. The idea was that market forces may not be sufficient to eliminate excess capacity in an efficient manner.

Rationalization cartels: According to the pre 2005 § 5 GWB various forms of agreements were permissible if the arrangement served to rationalize economic activities and led to an increase in productive efficiency and an improvement in consumer welfare. The pre 2005 § 5 (1) GWB allowed for the uniform application of standards, while old § 5 (2) GWB allowed for arrangements that lead to an increase in "technical, organizational, or economic efficiency". Finally, the old § 5 (3) GWB made rationalization in conjunction with price agreements or the establishment of joint purchasing or selling organizations admissible. Hence, there have been three types of rationalization cartels: Standardization cartels concerned the uniform application of norms. The second type of rationalization cartel, (i.e., "simple rationalization cartels") involved agreements to reduce transport and inventory costs, and to stabilize "excessive" demand fluctuations. And, finally, "syndicate" cartels involved agreements on prices, production quotas, exclusive territories, customers, and marketing and procurement facilities.

Specialization cartels: In addition to the pre 2005 § 5 GWB, the old § 5a GWB allowed for specialization cartels in order to rationalize economic activities

if a substantial degree of competition was expected to continue to exist in the relevant market.

Cooperation cartels: Finally, cooperation cartels on variables other than specified in the old § 5a GWB were admissible under the pre 2005 § 5b GWB. As with the old § 5a GWB "competition must not be substantially impaired" for a cooperation cartel to be admissible. The intent was to allow small and medium-sized enterprises to cooperate to achieve critical production quantities in order to facilitate competition of smaller and larger firms and to reduce barriers to entry, thereby increasing effective competition in the long run.

Export cartels: First of all, pure export cartels that had no effect on the domestic market were not under the jurisdiction of the GWB. Secondly, export cartels were permissible by the FCO under the old § 6 GWB as long as they did not violate trade agreements or other international treaties. The objective of export cartels was to ensure competitiveness of German exporters in foreign markets without any or with less strict antitrust laws.

Import cartels: Under the pre 2005 § 7 GWB import cartels could be permitted in order to support German importers by bundling domestic demand in order to create buyer power to obtain price reductions and to be more competitive compared to foreign importers.

Minister (emergency) cartels: Under the old § 8 GWB the Federal Minister of Economics had the power to authorize any type of cartel that did not satisfy the conditions for exemption under §§ 2 to 7 GWB if it was considered to be in the public interest and if there were no other legislative or economic measures to avert a danger to the continued existence of a majority of the enterprises in an economic sector.

When the 7^{th} amendment of the GWB was enacted in 2005, the numerous exemptions outlined above, where cartels could be authorized ex ante, were replaced by a general legal exemption system where firms have to self-assess the legality of nay cooperation. This has brought Germany's competition law (GWB) in line with then article 81 (3) of the European Treaty (now: article 101 (3) of the Treaty on the functioning of the European Union). Hence, legal agreements are no longer authorized by the FCO and, therefore, also not documented in its files. For this reason our database ends in 2004.

2.3 The Dataset

As mentioned above, almost all legal cartels had to be authorized by the FCO, with the particular exception of export cartels that did not affect German customers at all. Until 2004, the FCO published information on authorized cartels in its annual reports. Our dataset of legal cartels contains all authorized legal agreements and is, therefore, complete (apart from export cartels). For our dataset the information contained in the annual reports is completed by data of around 5000 decisions taken by the FCO between 1958 and 2004. The dataset contains the name of the cartel, the industry concerned, the type of cartel, the number of its members, the duration of the FCO's investigation and the duration of the cartel.

In contrast, our dataset of illegal cartels is obviously not complete. There are two types of problems. Firstly, illegal cartels try to conceal their existence, exactly because they are illegal. Since the antitrust authorities' detection rate is below 100 percent, our dataset cannot contain every single illegal cartel that has existed in Germany since 1958. Secondly, even the information about the cartels detected by the FCO is not complete. As cartels try to minimize their fines when detected, they do not reveal all details of their agreements that may proof their guilt. At the same time, antitrust authorities face limited resources and often stop their investigations as soon as they have collected sufficient information in order to win the case even if they have not documented all details of a cartel's working. In addition, the FCO does not publish all information gathered during the investigation as some corporate data is classified as confidential. Hence, our dataset only contains information revealed by the FCO during the investigations and published by the FCO after closing the file. The data is, therefore, not complete. However, the dataset contains the name of the firms and persons fined (with their position in the firms), the fines against firms and persons, the domicile of firms and persons, the industry, the duration of the cartel, the year of detection, the type of agreement and some information on the demand side.

A full description of our variables and some descriptive statistics can be found in Tables 2.4 and 2.5, respectively, in the Appendix.

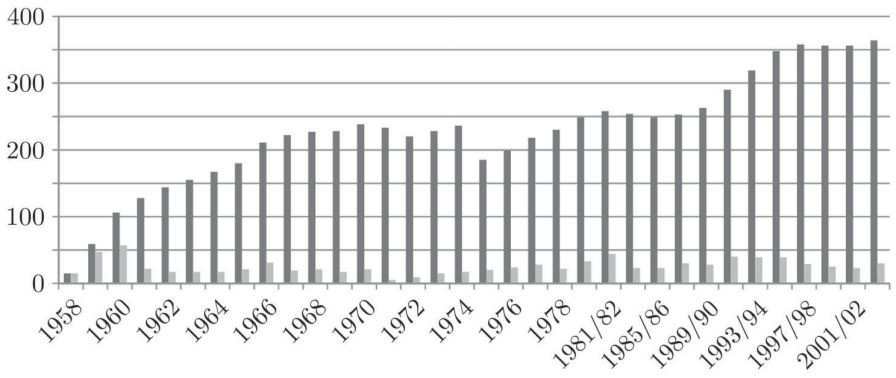

Figure 2.1: *New and Active Legal Cartels per year*

2.4 Legal Cartels

2.4.1 Number of Legal Cartels

Between 1958 and 2004 the FCO registered 864 legal cartels, of which 187 were authorized by State Cartel Offices (SCO). Furthermore, another 204 cartels applied for an authorization which was denied by the FCO. While only 15 cartels were registered in 1958, in 1959 and 1960 there were 47 and 57 cartels authorized, respectively. Some of them had already existed for decades then. During the 1960s the number of authorized agreements grew by around 18 new cartels per year. How the number of cartels has developed over time, is illustrated in Figure 2.1.

At the end of the 1960s a relatively stable level of 230 active legal cartels was reached. In 1974, however, the number of published legal cartels was reduced to 190, as the number of legal export cartels has not longer been published, following the 2nd amendment of the GWB in 1973, in order to better protect export cartels against foreign sanctions.[3] In the following, the number of new cartels was quite constant around 15 to 20 new cartels per year, and in the 1980s the number of authorized cartels reached again 250 registered cartels. After the German reunification the number of registered cartels increased up to 350 and stayed at this level until 2004.

[3]Until 1974 export cartels were published without the names of the companies involved.

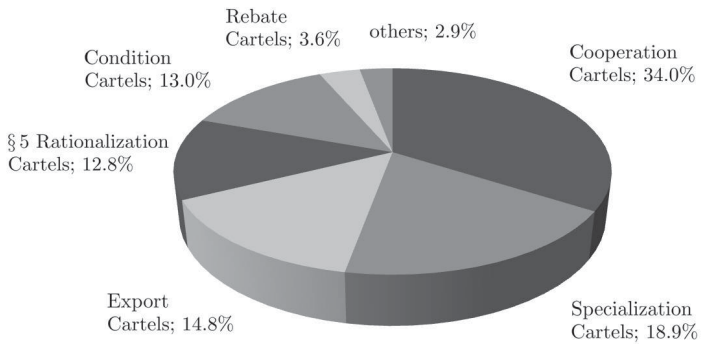

Figure 2.2: *Distribution of Types of Legal Cartels*

2.4.2 Types of Legal Cartels

Considering the several exemptions of the general cartel prohibition it is rather obvious that the freedom to compete was never the only goal of German competition law. In order to promote German businesses and in particular small and medium-sized enterprises the GWB allowed for an exemption for *rationalization cartels*. In fact, in our database two thirds of all legal cartels had been authorized as some sort of rationalization cartel. While 52.8 % of the cartels are specialization and cooperation cartels under § 5a and 5b GWB, respectively, another 12.8 % are rationalization cartels authorized under the old § 5 GWB.[4]

Some of these cartels are rather cumbersome. For example, since 1987, around 460 driving schools in Baden-Württemberg formed a total of 29 rationalization cartels, most of which still existed in 2004. According to information from the SCO in Baden-Württemberg these driving schools agreed on minimal class sizes in order to increase their profitability. Furthermore, the legalization of these cartels was apparently especially supported by the former director of the SCO, following the notion that driving schools had structural problems. Interestingly enough, driving schools in other federal states did not face the same problems, as Baden-Württemberg was the only federal state where this type of cartel was registered.

The *export cartels* registered until 1973 represent 14.8 % of all legal cartels in our database.They include agreements for the export of products ranging from mesh wire fences to submarines. The actual number of export cartels is not availa-

[4]For a detailed analysis of rationalization cartels see Audretsch (1989).

ble.

13.0 % of all legal cartels are agreements about *conditions, types and standards* such as agreements on flour classification or about the introduction of a bottle deposit system. Other interesting agreements include condition cartels of several cemetery gardeners in Rheinland-Pfalz and Hessen. Unfortunately though, we have not been able to find out on what the cemetery gardeners agreed.

Legal *rebate cartels* have been less important and account for only 3.6 % of all legal cartels while "other cartels" (2.9 %) include *structural crisis, import and buyers cartels*.

2.4.3 Duration of Legal Cartels

The average duration of all legal cartels is 13.4 years, the median is 11 years and the 90-quantile is 27 years. As the annual report of the FCO has been published biannually since 1979, we cannot determine the starting point of all cartels published. As a consequence of this biannual publication frequency, the mode is not significant (2 years). To correct for this error the trend line shows the moving average over two years. The synthetic mode is 3.

In the textile sector we find particularly long lasting cartel agreements with a condition cartel of yarn producers being the only one that has been existing for the entire 47 year time span of our observation between 1958 and 2005. In addition, cartels of the German tie-fabrics weaving mills association, the German cotton weaving mills convention, the German drapery convention and the convention of German silk and velvet producers have all lasted for more than 40 years.

2.4.4 Distribution of Legal Cartels across Industries

Manufacturers of textiles and leather have formed 8.7 % of all legalized cartels, while 14.4 % of all authorized cartels have concerned manufacturers of machinery and equipment. Cartels between firms involved in the extraction and processing of soil and stones account for another 24 % of all cartels. These firms usually supply the construction sector. Taken together these two industries account for 30 % of all authorized cartels, which is rather interesting given the frequency of illegal cartels in these two industries.

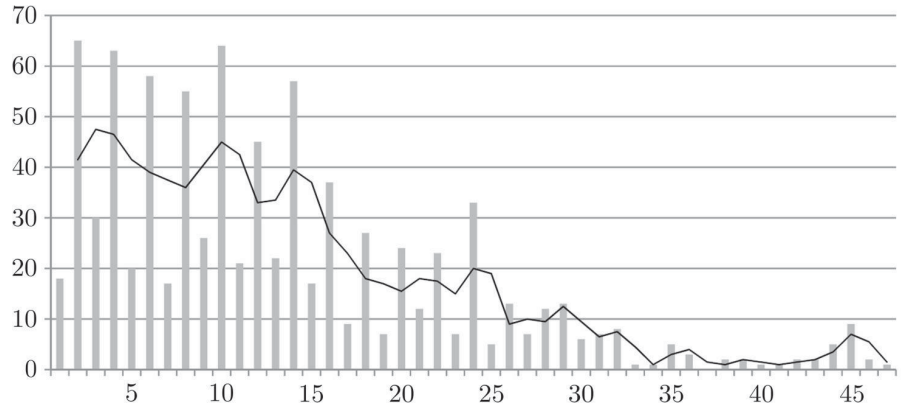

Figure 2.3: *Distribution of the Duration of Legal Cartels (in years)*

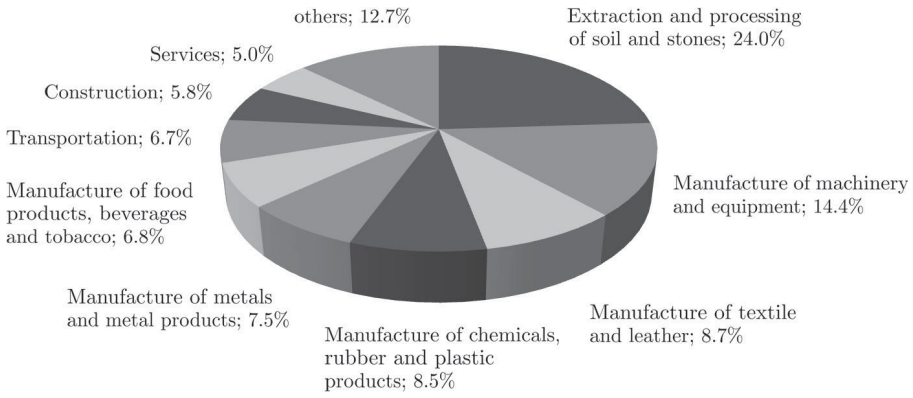

Figure 2.4: *Distribution of Legal Cartels across Industries*

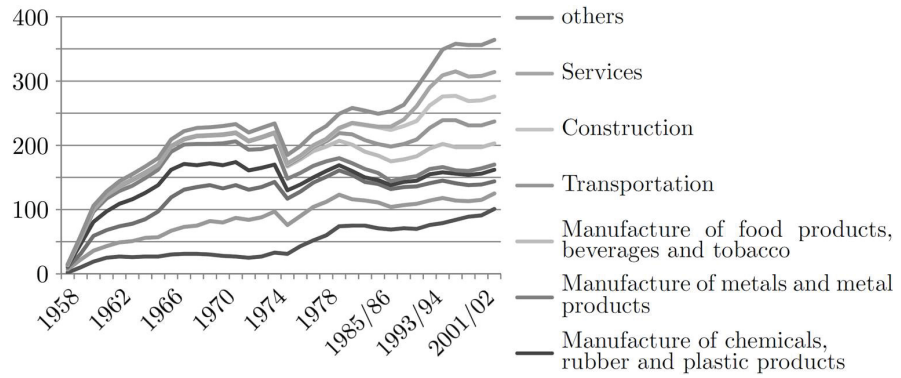

Figure 2.5: *Distribution of Legal Cartels across Industries over Time*

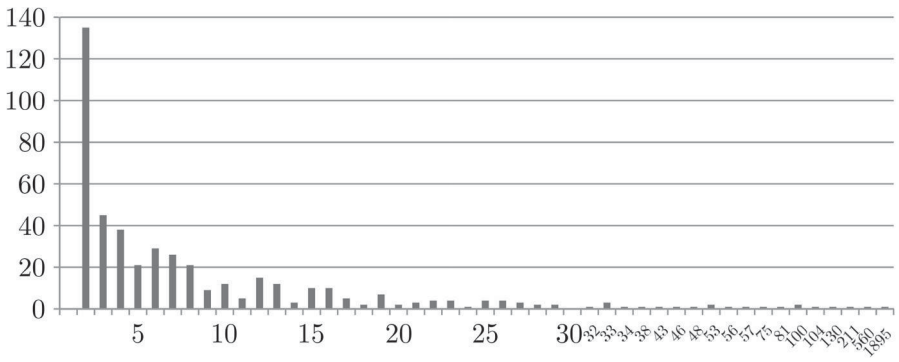

Figure 2.6: *Distribution of the Number of Members in Legal Cartels*

The shares reported in Figure 2.5 obviously vary over time. While cartels in the chemical industry accounted for 20 % of all authorized cartels in the 1960s, its share decreased to 5 % in the 1990s. A similar trend can be observed for the textile industry. In contrast, the relative number of cartels between firms involved in the extraction and processing of soil and stones (including cement and concrete) has steadily increased since the 1970s. Finally, both the machinery and equipment industry and the metal and metal product industry have fewer registered cartels in both relative and absolute terms in the 1990s than in the 1960s.

2.4.5 Number of Members in Legal Cartels

The number of cartel members is available for 53 % of all legal cartels. While the average cartel includes 15 members, this number drops to 10 of one rationalization cartel for the use of standardized beer-bottles with 560 members and another condition cartel formed by the central association of German watchmakers with 1,895 members are excluded. The median size is four and the mode two.

2.5 Illegal Cartels

2.5.1 Number of Illegal Cartels Discovered

Between 1958 and 2004 the FCO completed proceedings against around 800 firms and individuals involved in illegal cartels. This number does not only include horizontal cartels but also prohibited vertical restraints and other forms of coordinated

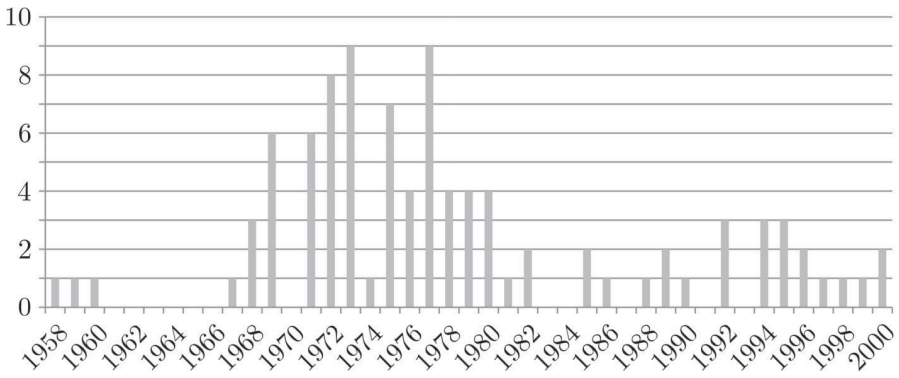

Figure 2.7: *Number of Illegal Cartels Discovered per year*

behavior such as coordinated delivery boycotts for rival firms. In total, there have been 95 horizontal cartels that are included in our database.

2.5.2 Fines

Cartel fines have increased continuously since the 1950s. An outstanding year has been 1972, where very high fines were handed out to two cartels. First, four firms involved in an import cartel for polyamide (nylon) had to pay fines of 21 million Euro. And secondly, seven breweries from Dortmund were fined 3.5 million Euro because of price fixing. In 1988, the FCO fined 14 cartel members involved in a cement cartel with the highest fine until then (115 million Euro). In contrast, fines for cartelists often amounted to only 200 Euro in the 1960s and the beginning of the 1970s, and fines did usually not exceed 50,000 Euro then. The development of fines underlines a change in the attitude of the FCO towards cartelists. The FCO's rather lenient attitude towards cartels and a policy mainly focusing on information and advice about competition policy rather than deterrence and punishment came to an end with the second GWB amendment in 1973 after which the FCO started to seriously enforce its anti-cartel policy and to punish hardcore cartels through increased fines.

In 1992, two salt producers that had formed an import cartel were fined 10 million Euro, and in 1996, the FCO discovered the high-voltage power cable cartel. According to various press reports, the cartel members were fined at least 130 million Euro, even though the FCO's official files only record 23 million Euro. The

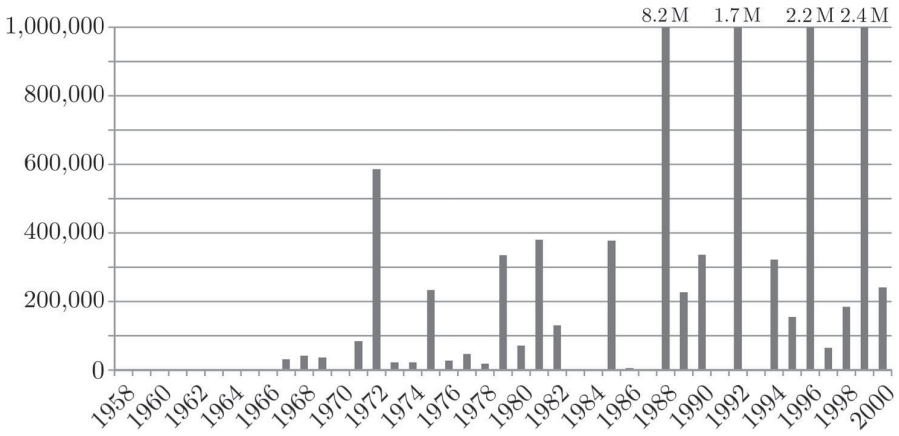

Figure 2.8: *Development of Average Cartel Fines per Year (in Euro)*

highest fines so far have been handed out in 1999 when 66 concrete producers had to pay an amount of 161 million Euro.

2.5.3 Distribution of Illegal Cartels across Industries

The construction sector and its sub-suppliers account for 43 % of all illegal cartels discovered between 1958 and 2005, or 41 of the 95 illegal cartels discovered. The high number of illegal cartels in this sector may be an indicator for a "Cartel tradition" and the traditionally very close relations between firms in this sector. In addition, the high number of legal cartels also indicates the sector's cartel affinity. In fact, the industry has attempted to justify its continued cartelization as an instrument to overcome the otherwise high uncertainty in the market (Bülow and Zubeil, 1977).

Other Industries with relatively high numbers of legal and illegal cartels include the metal producing and manufacturing industry (accounting for more than 20 % of all illegal cartels) and the machinery and equipment industry (with almost 10 % of all illegal cartels discovered).

2.5.4 Demand Side

As mentioned above, one idea was to analyze how the structure of demand affects cartel success. As the FCO usually does not report about the structure of demand,

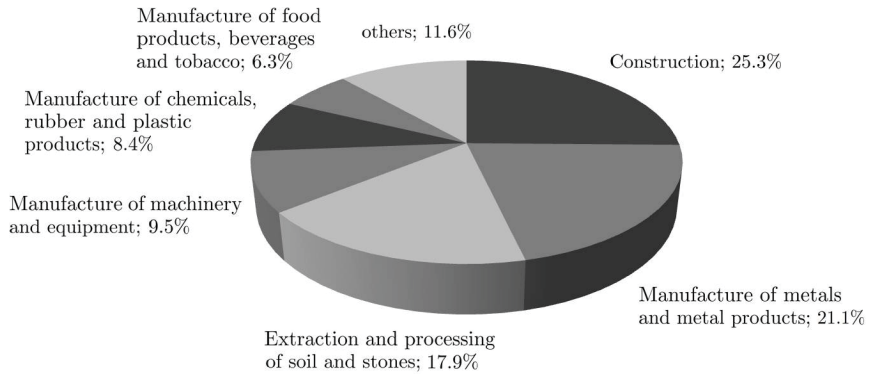

Figure 2.9: *Distribution of Illegal Cartels across Industries*

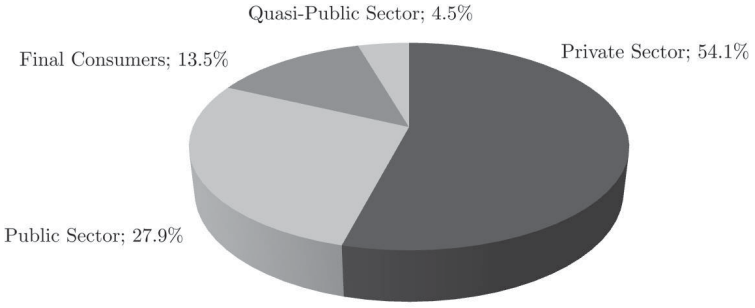

Figure 2.10: *Type of Consumers Harmed by Illegal Cartels*

we have deduced some information about the demand side from our knowledge about the cartelized products, the industry and typical buyers (Government versus private firms or final consumers). The distribution of different customer types is given in Figure 2.10.

More than 50 % of all consumers are private firms which should regularly act in at least imperfectly competitive markets. By contrast, firms from the public sector and the quasi-public sector are often monopolists themselves. Taken together they account for one third of the demand side in our database. In most of these cases local authorities were harmed by illegal cartels. Examples include cartels for school furniture and classroom flooring in the 1970s, for school gym separating walls in the 1980s and for learning aids or traffic signs in the 1990s. The German Postal Service ("Deutsche Bundespost") and the German Rail ("Deutsche Bundesbahn") have been part of the quasi-public sector and had protected monopoly positions until the end of the 1990s. Final consumers were directly harmed by 13.5 % of

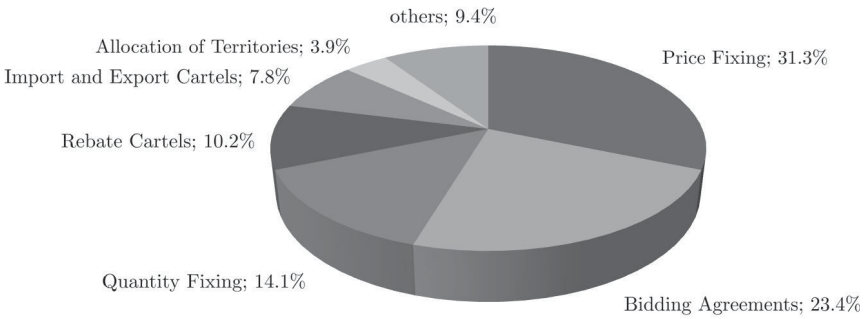

Figure 2.11: *Distribution of Types of Illegal Cartels*

all cartels. Examples include butter, washing machines, beer and batteries. It is noticeable though that, in very recent times, the FCO has apparently put more emphasis on cartels in end user markets such as coffee, chocolate, sanitary products and others.

2.5.5 Cartel Types

The three cartel types discovered and fined most frequently are so-called hardcore price fixing cartels. Most of them are price-fixing-cartels (31.3 %), while one quarter of all illegal cartels are bidding agreements. One bidding cartel included an average of over 200 single agreements. In order to handle the data we have aggregated the single agreements into one cartel following the FCOs approach. In 14.1 % of our cases, firms agreed on quantities, and in 10.2 % of the detected cartels firms illegally colluded over rebates.

2.5.6 Number of Members in Illegal Cartels

As mentioned above, our dataset is based on cases and information published by the FCO. Therefore, some detailed information is sometimes missing if it is not contained in the FCO's files. Moreover,the interpretation of the data can easily be misleading without knowledge of German competition law. For example, according to German competition law, a firm can only be fined for competition law violations if the responsible individual within the firm is also charged. However, it is not strictly necessary to impose sanctions or fines against firms if individuals are fined. In fact, there is quite a number of cases in which individuals have been fined but

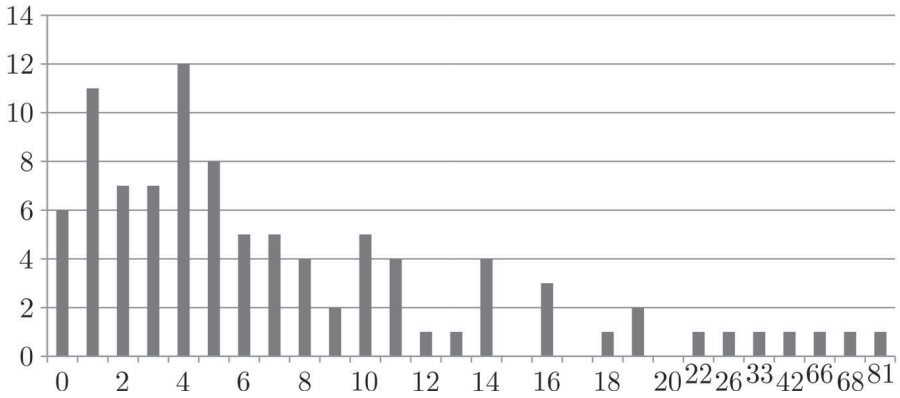

Figure 2.12: *Distribution of the Number of Members in Illegal Cartels*

not the respective company. Therefore, the number of cartel members reported in the FCO's files is systematically too low due to the fact that only the firms that are fined have been included in the files. For example, in Figure 2.12 there are six cartels without cartel members, i.e. the reported number of cartel members is zero while another 11 cartels had only one reported member. Hence, we have to keep in mind that the reported number of cartel members is systematically too low.

Taking this bias into account the difference between the number of members in legal (average: 10, median: 2, mode: 2) and in illegal cartels (average: 9, median: 5, mode: 4) is surprisingly small. Since legal cartels are (a) more stable as they can be enforced in the courts and (b) easier to organize as they do not have to be kept secret, the number of members in legal cartels should be higher than in illegal cartels. However, from our data we cannot observe a significant difference.

2.5.7 Duration of Illegal Cartels

Information about the duration of illegal cartels is unfortunately also biased due to the limited availability of public data. The FCO tends to end its investigation as soon as it has collected sufficient reliable information in order to bring and win a case. This means that the FCO may not fully investigate all details of a cartel including its true duration, so that cartels may have lasted for a longer period of time than can be proved by the FCO. The time of cartel duration depicted in Figure 2.13 is therefore systematically too short. It is not very surprising that illegal cartels are of shorter duration than legal ones. On average illegal cartels

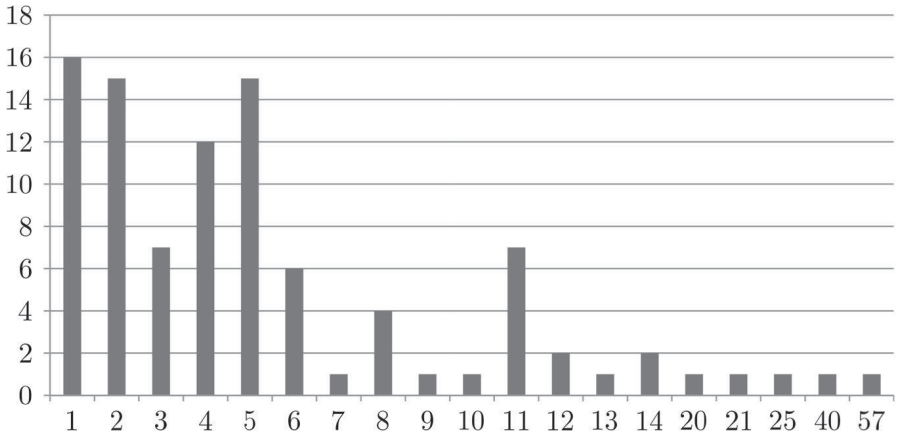

Figure 2.13: *Distribution of the Duration of Illegal Cartels (in years)*

last 6.2 years (legal: 13.4), the median is 4 years (legal: 11) and the mode is 1 year (legal: 3).

2.6 Empirical Analysis

2.6.1 Econometric Strategy

The empirical analysis is divided into two parts. In the first step, we analyze the determinants of fines per firm. As a result, we can only use a subsample of our whole dataset because this question only applies to illegal cartels. As our variable fine per firm is continuous, we use standard OLS regressions with Huber-White robust standard errors to take into account possible heteroskedasticity problems (see White, 1980). The main concern applying OLS to the subsample of our dataset is its relatively small size of 64 observations. Fortunately, linear models estimated by OLS are reasonably robust to several deviations from textbook assumptions which also include small sample size.[5]

As a second step, we analyze the duration of cartels which enables us to use the whole sample for our empirical analysis. The dependent variable is the duration of cartels (in months). As a consequence, we have to apply count data models because our dependent variable counts the number of months from the creation

[5]See Ullah (2004) for further discussion of characteristics of OLS estimators in finite samples.

to the break-up of a cartel. In econometrics a standard approach in the analysis of count data is the so called Poisson model (see Wooldridge (2002), 646-656, for further discussion), but this approach suffers several problems. The first is the well known over-dispersion problem. This means that the dependent variable has a variance greater than the mean which is not in line with the assumptions of the theoretical Poisson model. Furthermore, basic Poisson models do not account for the heterogeneity of observations. To avoid these problems, we apply the negative binomial model which contains a parameter to absorb unobserved heterogeneity and is more robust towards over-dispersion. The model is estimated using Quasi Maximum Likelihood techniques (see Wooldridge (2002), 657-659, for detailed information). One should also mention an additional problem with regard to our dataset. Usually most statistical procedures assume that the dataset is a random sample from the overall population. In case of our dataset this is clearly not the case. Since the cartels in our dataset are illegal cartels discovered by the FCO or legal cartels authorized by the FCO, it is straight forward that our dataset is not a random sample of the overall population of cartels. As a result, our estimations may suffer sample selection problems (see Heckman, 1978). While we are aware of this problem, we have to leave it unresolved for the moment. The results should therefore be interpreted with the necessary caution.

2.6.2 Results

Table 2.1 contains the results for the regressions using the subsample of illegal cartels. This first set of regressions analyzes the determinants of fines per firm. We find that an "agreement on areas", which means that firms do not compete with other cartel members in their regional market, has a statistically significant positive effect on fines. Positive effects on fines are also estimated for the second and the sixth amendment of the German competition law. Since we cannot included a time trend in our regression due to the limited sample size, these coefficients may also reflect the fact that fines have increased over time. Quite generally, it should be noted that our sample is rather small (64 observations) so that our results should be interpreted with the necessary caution. Fortunately though, the standard linear regression model is quite robust with respect to deviations from basic assumptions

(see Krämer and Sonnberger (1986) for a detailed discussion).

OLS Regressions				
Fines per Firm	Coefficient	Std. Err.	Coefficient	Std. Err.
Construction	-17.92	15.08	-17.92	15.08
Price Agreement	-4.09	13.74	-4.09	13.74
Agreement on Areas	-38.27**	19.09	-38.27**	19.09
Duration	1.71	1.76	1.71	1.76
Less than 5 Members	7.79	12.17		
5 to 12 Members			-7.79	12.17
More than 12 Members	-19.71	12.66	-27.49**	14.13
Public Sector Customers	-12.69	11.41	-12.69	11.42
2^{nd} GWB Amendment (1973)	30.95*	16.12	30.95*	16.12
3^{rd} GWB Amendment (1976)	16.39	10.66	16.39	10.66
4^{th} GWB Amendment (1980)	9.18	12.00	9.18	12.00
5^{th} GWB Amendment (1989)	10.50	15.69	10.50	15.69
6^{th} GWB Amendment (1998)	73.54**	30.76	73.54**	30.76
Cons.	15.44	12.63	23.23*	12.18
Obs.	64		64	
R^2	0.23		0.23	

***, **, * statistically significant at the 1, 5 and 10 % level

Table 2.1: *Determinants of Fines per Firm*

The analysis of fines per firm provides a first step in our analysis, but unfortunately we can only use a small subsample of our dataset, namely the illegal cartels. For the analysis of the duration of illegal and legal cartels we avoid this shortcoming and use our whole dataset of 959 cartels. The estimations for the determinants of cartel duration for legal and illegal cartels can be found in table 2.2.

Negative Binominal Count Data Regressions				
Duration	Coefficient	Std. Err.	Coefficient	Std. Err.
Public Sector Customers	-0.02	0.11	-0.02	0.11
Construction	0.03	0.06	0.03	0.06
Materials	-0.05	0.04	-0.05	0.04
Mining	-0.65	0.91	-.65	0.91
Chemicals	0.06	0.08	0.06	0.08
Forest	-0.48	0.35	-0.48	0.35
Car-Manufacturing	-0.01	0.19	-0.01	0.19
Transport	-0.02	0.10	-0.02	0.10
Food Sector	0.59***	0.11	0.59***	0.11
Less than 5 Members	0.21**	0.06		
5 to 12 Members	0.34***	0.07	0.14*	0.08
More than 12 Members			-0.21***	0.06
Legal Cartel	3.09***	0.10	3.09***	0.10
Cons.	1.83***	0.10	2.04***	0.10
Obs.	958		958	
R^2	0.05		0.05	

***, **, * statistically significant at the 1, 5 and 10 % level

Table 2.2: *Determinants of Cartel Duration I*

Obviously, a cartel's legal authorization has significant positive effects on its duration, which should result from the cartel contract being enforceable in court. This result can also be obtained from a non-parametric kernel density estimation of the duration of legal and illegal cartels in months. As can easily be seen legal cartels (on the right side of Figure 2.14) last much longer on average than illegal cartels (on the left side). The figures in Figure 2.14 are obtained from kernel density estimates of the probability density functions of the duration of cartels for illegal and legal cartels (see Härdle, 1990).

Furthermore, how the number of cartel members effects cartel duration is not linear. If the number of cartel members lies between 5 and 12 there is a stronger positive effect on cartel durability than a cartel size of below 5, while cartels are less stable (or durable) with more than 12 members, which has a statistically significant negative effect on cartel duration. We also find that cartels in the food sector tend to be more stable than their counterparts in other industries.

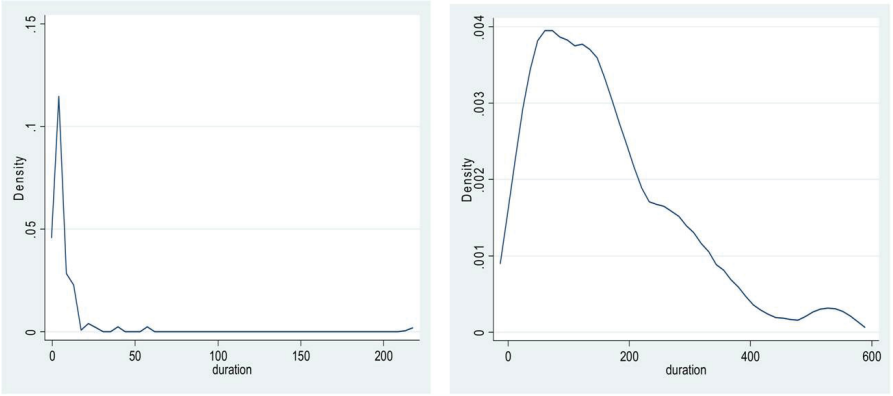

Figure 2.14: *Cartel Duration for Illegal (left) and Legal (right) Cartels*

Negative Binominal Count Data Regressions				
Duration	Coefficient	Std. Err.	Coefficient	Std. Err.
Public Sector Customers	-0.11	0.11	-0.12	0.11
Less than 5 Members	0.18**	0.06		
5 to 12 Members	0.31***	0.07	0.13*	0.08
More than 12 Members			-0.18***	0.06
Legal Cartel	2.96***	0.10	2.96***	0.10
Cons.	2.02***	0.10	2.20***	0.10
Obs.	958		958	
R^2	0.04		0.04	

***, **, * statistically significant at the 1, 5 and 10 % level

Table 2.3: *Determinants of Cartel Duration II*

Table 2.3 provides the same negative binomial regressions as 2.2, excluding the sector dummy variables as a robustness check. Despite smaller changes in sizes of coefficients, our results remain qualitatively unchanged so that these regressions demonstrate our results' robustness.

2.7 Summary and Conclusion

This paper has offered a completely new and broad insight into the landscape of German cartels. We have provided the first comparison of legal and illegal cartels in order to use legal cartels as a comparison to illegal ones. Legal cartels tend to last longer and to have more members than illegal cartels, while there are little

differences with respect to the industries involved.

The construction industries are the most cartelized sectors (29.8 % of all legal cartels, 43.2 % of all illegal cartels) followed by manufacture of metals and machinery (21.9 % of all legal cartels, 30.6 % of all illegal cartels). While we have not established any relationship between legal and illegal cartels, we believe that this may be a fruitful and interesting topic for future research.

How the number of cartel members affects the duration of cartels is ambiguous. Cartels with no more than 12 members tend to last longer than cartels with more than 12 members. However, cartels with 5 to 12 members also tend to last longer than cartels with less than 5 members. This may be due to two countervailing effects. On the one hand, cartels with fewer members face lower transaction and monitoring costs which should increase a cartel's stability. On the other hand though, cartels with fewer members may face more outside competition, decreasing the cartel's stability. Since we have no data about the cartels' market shares, we cannot control for this, unfortunately. Furthermore, in highly concentrated markets (with less than 5 participants) it may be not as necessary to form or to maintain a cartel, as tacit collusion may emerge even without cartelization. Tacit collusion, however, is more difficult to establish and to maintain in markets with many participants so that the "necessity" to establish and to maintain formal cartels is stronger than in highly concentrated markets. The fines imposed by the FCO are positively related to the 2nd and 6th amendment of the GWB. The effect of these two amendments can be possibly explained by their meaning for German competition law. The 2nd GWB Amendment in 1973 meant a change in cartel prosecution. The 6th amendment in 1999 was also very important, since the GWB was adjusted to European cartel law, including new handling of cartel prohibition.

Appendix

Variable Name	Description
Legal Cartel	Dummy Variable: Value 1 if cartel was legal.
Fine per Firm	Average fine against a cartel member.
Duration	Duration of the cartel in months.
Price Agreement	Dummy Variable: Value 1 if cartel had a price agreement.
Agreement on Areas	Dummy Variable: Value 1 if cartel had an agreement on areas.
Construction	Dummy Variable: Value 1 if cartel belonged to the construction sector.
Materials	Dummy Variable: Value 1 if cartel belonged to the materials sector.
Mining	Dummy Variable: Value 1 if cartel belonged to the mining sector.
Chemicals	Dummy Variable: Value 1 if cartel belonged to the chemicals sector.
Forest	Dummy Variable: Value 1 if cartel belonged to the wood and forest sector.
Car Manufacturing	Dummy Variable: Value 1 if cartel belonged to the car manufacturing sector.
Transport	Dummy Variable: Value 1 if cartel belonged to the transport sector.
Food	Dummy Variable: Value 1 if cartel belonged to the food sector.
Less than 5 Members	Dummy Variable: Value 1 if cartel had less than 5 members.
5 to 12 Members	Dummy Variable: Value 1 if cartel had more than 4 and less than 13 members.
More than 12 Members	Dummy Variable: Value 1 if cartel had more than 12 members.
Public Sector Customers	Dummy Variable: Value 1 if cartel's customers mainly belonged to public sector.
2^{nd} *GWB Amendment (1973)*	Dummy Variable: Value 1 if cartel was find after the 2^{nd} GWB Amendment.
3^{rd} *GWB Amendment (1976)*	Dummy Variable: Value 1 if cartel was find after the 3^{rd} GWB Amendment.
4^{th} *GWB Amendment (1980)*	Dummy Variable: Value 1 if cartel was find after the 4^{th} GWB Amendment.
5^{th} *GWB Amendment (1989)*	Dummy Variable: Value 1 if cartel was find after the 5^{th} GWB Amendment.
6^{th} *GWB Amendment (1998)*	Dummy Variable: Value 1 if cartel was find after the 6^{th} GWB Amendment.

Table 2.4: *Description of Variables*

Variable	Observations	Mean	Min.	Max.
Legal Cartel	959	80.59	0	655.66
Fine per Firm	64	37.72	1.60	299.96
Duration	958	145.45	1	564
Price Agreement	95	0.41	0	1
Agreement on Areas	95	0.04	0	1
Construction	959	0.09	0	1
Materials	959	0.14	0	1
Mining	959	0.001	0	1
Chemicals	959	0.13	0	1
Forest	959	0.01	0	1
Car Manufacturing	959	0.02	0	1
Transport	959	0.06	0	1
Food	959	0.06	0	1
Less than 5 Members	959	0.27	0	1
5 to 12 Members	959	0.18	0	1
More than 12 Members	959	0.73	0	1
Public Sector Customers	959	0.07	0	1
2^{nd} *GWB Amendment (1973)*	95	0.25	0	1
3^{rd} *GWB Amendment (1976)*	95	0.18	0	1
4^{th} *GWB Amendment (1980)*	95	0.22	0	1
5^{th} *GWB Amendment (1989)*	95	0.12	0	1
6^{th} *GWB Amendment (1998)*	95	0.17	0	1

Table 2.5: *Descriptive Statistics*

Chapter 3

Do Buyer Groups Facilitate Collusion?*

*This chapter is published in *Journal of Economic Behavior & Organization* 109, 72-84.

Do Buyer Groups Facilitate Collusion?[†]

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November 2014

Abstract

We explore whether lawful cooperation in buyer groups facilitates collusion in the product market. Buyer groups purchase inputs more economically. In a repeated game, abandoning the buyer group altogether or excluding single firms constitute credible threats. Hence, in theory, buyer groups facilitate collusion. We run several experimental treatments using three-firm Cournot markets to test these predictions and other effects like how buyer groups affect outcomes when group members can communicate. The experimental results show that buyer groups lead to lower outputs when groups can exclude single firms. Communication is often abused for explicit agreements and this strongly reduces competition.

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3.1 Introduction

Lawful joint-market institutions are often abused for the organization of cartels. This has been suspected at least since The Wealth of Nations: the well-known quote (Smith, 1776) that "*people of the same trade seldom meet together ..., but the conversation ends in a conspiracy against the public*" is after all a statement about joint-market institutions – platforms where people of the same trade meet. Recent studies confirm Smith's suspicion. In their meta study, Levenstein and Suslow (2006, p. 69) find that between 25 to 50 percent of the cartels covered in U.S. studies involved trade associations. Schultz (2014) obtains a similar figure for Germany: more than half of all illegal cartels fined by the Federal Cartel Office between 1958 and 2002 used lawful joint-market institutions for their organization.

Antitrust policy is aware of the anti-competitive effects joint-market institutions may entail. Buyer groups, trade associations or industry-wide information systems require an exemption from the general cartel prohibition. While in most cases these exemptions are granted, policy makers know these institutions may be abused. The new *EU Guidelines on Horizontal Co-operation Agreements* (EU Guidelines, 2011, p. C 11/4) point out that "horizontal co-operation agreements may lead to competition problems." This will be the case if the firms agree to raise prices or reduce outputs. Similarly, the *US Antitrust Guidelines for Collaborations Among Competitors* (US Guidelines, 2000, p. 6) mention that competition may be harmed.

At the same time, cartel law emphasizes the advantages joint-market institutions may have. "Horizontal co-operation agreements can lead to substantial economic benefits" (EU Guidelines, 2011, p. C 11/4). They "often are not only benign but pro-competitive" (US Guidelines, 2000, p. 1). Consumers may also benefit, so joint-market institutions may well improve welfare. It appears joint-market institutions can lead to cartelization but they can also be beneficial.

In this paper, buyer groups serve as an example for the analysis of the collusive effects of lawful joint-market institutions. Buyer groups are an important and frequent joint-market institution. In a buyer group, downstream competitors purchase their inputs jointly and obtain economies at the procurement level better than individual firms are able to (in Section 3.2 we discuss the literature on this

issue). As with joint-market institutions in general, the pro-competitive effects of buyer groups will typically be proudly advertised, however, much less is known about the dark side of such institutions. Our research aims at shedding light on these collusive effects.

Our first contribution is a novel analysis of the repeated Cournot oligopoly model which highlights two collusive effects of buyer groups. The first collusive effect arises since the buyer group may be abandoned altogether. Since joint procurement brings lower costs for the firms involved, dissolving the group constitutes a more severe but credible punishment strategy. Second, some buyer groups have the power to exclude individual firms from the group. Deviators from the collusive path can be severely and credibly punished this way. Repeated-game arguments hence suggest that such exclusionary buyer groups facilitate tacit collusion even further. The *EU Guidelines* (2011, p. C 11/45) presume that "incentives for price competition may be considerably reduced" and that buyer groups may "[...] foreclose competing purchasers by limiting their access to efficient suppliers".[1] These points in the guidelines are rationalized by our model. The theoretical analysis confirms the policy makers' worries that buyer groups may reduce the incentive to compete.

The exclusion mechanism introduces an interesting variant to the theory of infinitely repeated games. Usually, both the deviator as well as the cheated-upon players endure low payoffs along the punishment path (this is the case for Nash trigger strategies, optimal penal codes, and other punishments).[2] Exclusion from a buyer group, by contrast, allows for pinpointed, targeted punishments where the punishing (cheated-upon) players have higher payoffs than the punished players (deviators).

Our second contribution are laboratory experiments which complement the

[1] Another concern listed in the *EU Guidelines* is that buyer groups may reduce the range or quality of the products they produce. The *US Guidelines* also mention potential anti-competitive effects of buyer groups (US Guidelines, 2000, 3.31a). They "may facilitate collusion by standardizing participants' costs or by enhancing the ability to project or monitor a participant's output level through knowledge of its input purchases."

[2] With perfect monitoring, the punishment paths are never triggered, of course. They only serve as a threat. In games with imperfect monitoring (Green and Porter, 1984), the punishment path is occasionally carried out.

theoretical analyses. We run several experimental treatments in a three-firm Cournot framework. Next to a baseline standard triopoly, we have a 2×2 treatment design with buyer group and communication as the treatment variables. As in the *EU Guidelines* (2011) and in our theoretical analysis, we introduce two types of buyer groups: either the group can be joined by everyone or the group's rules allow for the exclusion of single firms. Communication, if enabled, allows for free chat via typed messages.

There are several motivations for running experiments in this case and for our specific design:

- First, whether facilitating factors like buyer groups affect market outcomes is an intriguing topic with policy implications. It it is well known that tacit collusion in the laboratory is more or less restricted to two players (Huck et al., 2004). Will the facilitating factor lead to tacit collusion with more firms? Experimental evidence may strengthen the policy makers' worries expressed in the guidelines.

- A second issue where experiments are useful is the impact of communication. We know (see below) that certain types of communication can lead to high levels of cooperation. Here, the issue is whether seemingly innocuous talk at the buyer group level has a collusive effect, or whether such talk is abused for explicit agreements. The *EU Guidelines* suspect that buyer groups "serve as a tool to engage in a disguised cartel [...]" (2011, p. C 11/45), but this is difficult to verify. Experiments allow for a clear-cut investigation.

- Third, the aforementioned exclusion mechanism is not only interesting from a theoretical perspective. In the experimental literature, Ostrom et al. (1992) and Fehr and Gächter (2000) introduce individually targeted punishments in public-good games, and show that they support cooperation. This has triggered a huge literature which we compare to our results in Section 3.6.2. Our mechanism is more intricate than the simple punishments in the previous literature. Yet, behaviorally, such punishment may be more likely to be observed. And finally, our experiments are tests of the theory.

Our experimental results show that buyer groups facilitate collusion only if

they involve a punishment mechanism to exclude deviating firms. If firms get excluded in our experiments, it is almost always the firm with the highest output (a deviator in the repeated game). By contrast, the threat of abandoning the buyer group altogether does not lead to lower outputs. Communication per se has a moderate collusive effect whereas explicit quantitative agreements on outputs have considerable anti-competitive effects. They can be considered an abuse of the buyer group institution.

3.2 Literature

We start with the theoretical literature. Closely related to our topic are analyses of the collusive effects of various joint-market institutions. Joint ventures are a prime example. Cooper and Ross (2009) analyze theoretically how joint ventures or strategic alliances between two or more firms in one market can serve to facilitate collusion in another possibly unrelated market. Goeree and Helland (2010) empirically estimate the collusive effect of joint ventures on product market performance. Martin (1995) introduces a model specifically on R&D joint ventures. Schultz (2002) shows that legal cooperation in the form of an export cartel can facilitate collusion in the domestic market. Normann (2001) analyzes exchange agreements where firms "cross supply" goods to competitors who could produce the good themselves. These agreements may save fixed costs, but they also facilitate tacit collusion.

There is also a small literature on the effects of buyers groups. One issue of interest is the analysis of the exact channel through which buyer groups obtain better conditions in procurements (see Ruffle (2009) for a survey). In Snyder (1996), large buyer groups are able to obtain better purchasing conditions because, in a repeated game, periods of high demand (booms) are more prone to price wars since today's demand is high relative to future demand. See Ruffle (2013) for an experimental analysis of the same setup. A second source of why buyer groups may be able to purchase at better conditions is the curvature of the surplus function; see Normann et al. (2007). Like our paper, Doyle and Han (2009) show that buyer groups have collusive effects but the channel they identify differs from ours. Their paper builds on Shaffer (1991) who shows that firms may soften competition by

procuring inputs at higher prices. Higher input prices imply higher output prices, but since increased input costs are refunded from suppliers, firms have higher profits. While this equilibrium breaks down with unobservable contracts, Doyle and Han (2009) argue that buyer groups rectify the problem and cause higher prices again. Related is Piccolo and Miklos-Thal (2012) who find that an implicit agreement on input supply contracts with above-cost input prices and negative fixed fees facilitates collusion on downstream prices.

We next turn to experimental papers on collusion. Since the literature is large (see the general surveys by Haan et al., 2009, and Potters and Suetens, 2013), we focus on experiments where, as in our case, an additional decision stage precedes the actual market game. Anderhub et al. (2003) analyze the impact of capacity choices on price competition and find not much of a collusive effect. Suetens (2008) examines an experiment where explicit R&D cooperation is possible before price competition kicks in. When firms can credibly commit to an R&D contract, the degree of price collusion turns out to be significantly higher. Nicklisch (2012) investigates advertising and finds that high spillovers between advertising expenditures lead to higher prices, however, only for experienced players.

Our research is further related to previous experiments with communication. This literature is also large and we refer the reader to Crawford's (1998) survey and Balliet's (2010) more recent meta study of dilemma games. Several experiments have shown that communication can improve cooperation in dilemma games. To what extent communication helps depends on the format of the communication. One-sided communication like unilateral price announcements typically loses its impact over time (Holt and Davis, 1990; Cason, 1995) whereas multilateral communication can lead to persistently higher prices (see the posted offer markets with face-to-face communication in Isaac et al. (1984)). Crawford (1998, p. 294) argues that multilateral communication has a "reassurance effect" which helps to coordinate on more efficient equilibria. Balliet (2010) finds a positive effect of communication on cooperation where the effect of face-to-face discussion is stronger compared to written messages (see also Brosig et al. (2003)).

Other experiments in industrial organization involving communication include Cooper and Kühn (2014) who analyze communication in a two-stage game of conditional cooperation. A cooperation stage is followed by a coordination ga-

me, and the credible threat to play a Pareto inferior Nash equilibrium in stage two can theoretically support cooperation in stage one. When unlimited pre-game communication is possible, substantial degrees of collusion occur. Furthermore, experiments on leniency programs typically involve communication and are therefore loosely related to our study (Apesteguia et al., 2007; Hinloopen and Soetevent, 2008; Bigoni et al., 2012).

3.3 The Model

In our model firms play a linear Cournot game. Before playing that market game, they may establish an input-purchasing group which affects their procurement cost. We consider two variants, the open buyer group and the closed buyer group.

Formally, there are n firms, indexed from $i = 1, ..., n$. Let $q_i \in [0, \infty)$ denote firm i's output. Inverse demand is assumed to be linear $p = \max\{a - \sum_{i=1}^{n} q_i, 0\}$. Firms procure at constant marginal production cost, c_i. Marginal cost can either be low ($\underline{c}$) or high ($\overline{c}$). Hence, firms' profit functions are

$$\pi_i = (\max\{a - \sum_{i=1}^{n} q_i, 0\} - c_i)q_i \tag{3.1}$$

with $c_i \in \{\underline{c}, \overline{c}\}$.

Firms play the following buyer group-participation game:

(1a) Firms simultaneously decide whether they wish to join the group. If at least $n - 1$ firms join the group, the in-group firms procure at low marginal cost, $\underline{c}$, whereas a firm that does not join procures at high costs, $\overline{c}$.[3] If $n - 2$ or fewer firms decide to join, all firms have high marginal cost.

(1b) *(Closed buyers groups only)* Provided all n firms join the group in Stage 1a, firms simultaneously suggest one firm (if any) for exclusion from the group.

[3]The motivation for this setup is that buyer groups must have a minimum size to be able to procure cheaper than single firms. To allow for outsiders to the buyer groups, we decided not to demand that the entire industry is required to join the group. It is straightforward to extend the model such that groups of size $n - k$, $k > 1$, are allowed.

Only if $n-1$ firms agree to exclude a firm is the targeted firm excluded from the group and has $c_i = \overline{c}$ whereas the other firms continue to have $c_j = \underline{c}$.

(2) Given buyer group participation and cost realization, firms play the n-firm Cournot game.

The proof of the following proposition can be found in Appendix A.

Proposition 1 (one-shot game). *In* open *buyer groups, both establishing a buyer group comprising all firms and not establishing a buyer group can be part of a subgame perfect Nash equilibrium. The same holds for* closed *buyer groups. Moreover,* closed *buyer groups exclude one firm in the subgame perfect Nash equilibria where the group is established.*

The intuition behind this proposition is as follows. Joining the buyer group is a weakly dominant strategy as a firm always benefits from having lower costs. So, one subgame perfect Nash equilibrium outcome has all firms joining the group. If $n-3$ or fewer firms join the group, a firm is indifferent between joining and not joining. Hence, a second subgame perfect Nash equilibrium outcome (in weakly dominated strategies) involves $n-3$ or fewer firms joining the group.[4] This holds for both the open and the closed buyer group. In the closed buyer group, it pays for any set of $n-1$ firms to exclude one firm. While firms might face a coordination problem of whom to exclude, exclusion is part of the subgame perfect Nash equilibrium.

Consider now infinitely many repetitions of the one-shot game. Time is indexed from $t = 0, ..., \infty$ and firms discount future profits with a common factor δ, where $\delta \in [0, 1)$. To investigate the stability of a possible cartelization of the market, we will look for a subgame perfect equilibrium where firms manage to sustain the symmetric joint-profit maximum by threatening to revert to a static Nash equilibrium in the case of a deviation (trigger strategy). Let δ_0 denote the smallest discount factor required for such a collusive equilibrium.

The analysis of the one-shot game above suggests three different outcomes: in the game without a buyer group ("baseline"), we have standard Nash reversions; for the open buyer group, not establishing a buyer group leads to lower profits

[4]To be precise, there are many pure-strategy equilibria of this type, all of which have $n-3$ or fewer other firms joining the group.

because firms have high costs; closed buyer groups can exclude in the case of a defection which yields even lower profits for the deviator. Since collusive and defection profits are the same in all three cases, we obtain (see Appendix A for details):

Proposition 2 (repeated game). *For the minimum discount factor required to sustain the joint-profit maximum as a subgame perfect Nash equilibrium with Nash reversions*

$$\delta_0^{baseline} > \delta_0^{open\ buyer\ group} > \delta_0^{closed\ buyer\ group}$$

holds. That is, open buyer groups facilitate collusion, and closed buyer groups facilitate collusion more strongly than open buyer groups.

Note that the proposition does *not* depend on the assumption that firms attempt to achieve the joint-profit maximum (see Appendix A). What our result does depend on is the assumption of trigger strategy reversions to a static Nash equilibrium.

3.4 Design and Hypotheses

We want to assess the collusive impact of buyer groups along two dimensions. One dimension is that buyer groups allow for more severe punishment strategies than standard oligopolies, as in points 201 and 203 of the *EU Guidelines*. Hence, we have the treatments exogenous buyer group (Baseline), open buyer group, and closed buyer group. The second dimension is that buyer groups legally enable communication between firms. This communication may be used for collusive agreements ("cartel in disguise"). Here, we have the variants Talk and NoTalk. Table 3.1 summarizes the treatment design.

The communication treatments were designed as follows. Subjects were allowed to communicate with one another for 40 seconds in every period of the experiment via typed messages, using an instant-messenger communication tool. Subjects were free to post as many messages as they liked, but they were not allowed to identify

Treatment	Baseline	Open_NoTalk	Closed_NoTalk	Open_Talk	Closed_Talk
Cost	$\underline{c}$	$\underline{c}$ or $\overline{c}$	$\underline{c}$ or $\overline{c}$	$\underline{c}$ or $\overline{c}$	$\underline{c}$ or $\overline{c}$
Buyer Group	exogenous	open	closed	open	closed
Communication	no	no	no	yes	yes
Stage 1	-	entry	entry	entry	entry
Stage 2	-	-	-	chat	chat
Stage 3	-	-	exclusion	-	exclusion
Stage 4	quantity	quantity	quantity	quantity	quantity
# Participants	27	36	36	33	36

Table 3.1: *Treatments*

themselves or post offensive messages. Subjects were aware that their communications addressed the whole group; addressing individual group members or subjects outside the group was not possible. The limit of 40 seconds was sufficiently long for the communication phase as most talk ended before the 40-second period was over. Subjects were only allowed to communicate at the buyer-group stage. The instructions (see Appendix B) regarding this point read "you are free to talk about whatever you wish, however, you must not explicitly agree on targets regarding the output decisions". We chose this implementation because it is relatively close to Article 101 of the European Treaty of Rome (which prohibits explicit agreements between firms that restrict competition) and Section I of the Sherman Act (which has a similar content). It is clear to subjects that communication about output targets is possible but not allowed.[5]

The Closed treatments are considerably more complex. One reason is that the group participation decision plus exclusion decision preceded the output decision. In the first period, players had to decide whether to exclude a firm even before playing the quantity game. We therefore decided to begin the Closed treatments with seven rounds of the Open buyer group treatment. After the seven rounds, the Closed buyer group mechanism was introduced and used for the rest of the game (see below). In order to account for the restart effect implied by this design,

[5]This is also the reason why we did not conduct a second baseline treatment with communication. Absent a buyer group decision, it would be implausible to allow for communication which, however, must not concern output decisions. Moreover, even in the Open_Talk treatment, it is trivial to discuss the decision to join (in fact, almost all subject always do so). An additional treatment without the buyer-group decision would not yield any additional insights.

we also began with seven rounds in Open and Baseline, although the treatment was not changed after the initial phase in these variants. The seven periods were announced in the introduction and we paid subjects for them. Below, we only report the data after the seven initial rounds.[6]

The buyer-group decisions were implemented exactly as described in the model section. In the *open buyer group*, firms simply decide whether they wish to join the group. In the *closed buyer group*, firms first decide whether to join the group and, given that all firms join, firms decide whether they wish to exclude a firm (if any).

The Cournot oligopoly model was employed with the following parameter values

$$n = 3, \quad a = 130, \quad \underline{c} = 10, \quad \overline{c} = 22. \tag{3.2}$$

At least three firms are needed to create buyer groups with the option of exclusion. Collusive outcomes without communication do typically not occur with more than three firms (Huck et al., 2004), hence $n = 3$ gives us a good chance to observe treatment effects. We chose the difference between $\underline{c}$ and $\overline{c}$ to be salient, such that being part of the group or being excluded from it has a sound effect on participants' payoffs. On the other hand, the difference should not be too big such that an excluded (or non-joining) firm still procures $\overline{q}^N > 0$. This is the case with $\underline{c} = 10$ and $\overline{c} = 22$.

All treatments were implemented as a repeated game (fixed-matching scheme). After the initial seven periods, there were at least 20 periods in all treatments. From the 21^{st} period onward, a random stopping rule determined whether the

[6] We dismissed the option of implementing a cartel authority in the lab. A cartel authority which investigates with a certain probability and imposes fines according to a set of rules would have complicated our design without adding any further insight into our main analyzed issues. While several laboratory experiments on leniency (Apesteguia et al., 2007; Hinloopen and Soetevent, 2008; Bigoni et al., 2012) have successfully conducted experiments with such a cartel authority in the lab, such a design faces several difficulties in our case. One difference is that subjects in the leniency experiments explicitly choose to communicate, knowing they may be penalized. In the case of communication in a buyer group, the opportunity to talk is always there, and it is legal; only certain content is illegal. This, however, requires the experimenters to actively monitor the communication content and intervene immediately in any period of violation. This may contradict the notion of participant anonymity. Also, given that up to 24 subjects simultaneously produce chat content (which can be rather cryptic), such immediate on-screen content analysis and intervention does not seem practical.

experiment would go on or would stop. The continuation probability was 2/3. The actual number of periods were not determined ex ante and thus differed between sessions (between 21 and 28 periods).

The feedback was as follows. Subjects were in every period informed about the buyer group participation decisions. In the open buyer group treatments, subjects were told, for example, "all firms decided to join the buyer group. All firms have low cost in this period," and similarly if one firm did not join. For the closed buyer groups, an additional feedback was given, for example, if firm 3 was excluded, "firm 1 and firm 2 are still in the buyer group." Subjects were eventually informed about quantity choices and profits.

We now turn to the numerical predictions for the parameters of the design. For the δ_0 of the repeated game, we obtain

$$\begin{aligned} \delta_0^{\text{baseline}} &= 0.57 \\ \delta_0^{\text{open buyer group}} &= 0.50 \\ \delta_0^{\text{closed buyer group}} &= 0.35 \end{aligned} \tag{3.3}$$

Table 3.2 states the static Nash equilibria and the symmetric joint-profit maximizing outcome.

output	$\underline{q}^C$	$\underline{q}^N$	$\overline{q}^N$	$\underline{q}^E$	$\overline{q}^E$
	20.0	30.0	27.0	33.0	21.0
profit	$\underline{\pi}^C$	$\underline{\pi}^N$	$\overline{\pi}^N$	$\underline{\pi}^E$	$\overline{\pi}^E$
	1,200	900	729	1,089	421

Table 3.2: *Benchmarks.*
Note: "C" refers to the collusive (joint-profit maximizing outcome), "N" is the symmetric low- and high-cost static Nash equilibria, and "E" refers the static Nash outcome where one firm is excluded.

Regarding the impact of buyer groups on collusion, we follow the common interpretation that a lower minimum-discount factor makes collusion easier.[7] Proposition 2 and the δ_0 in (3.3) imply

[7]Note that the discount factor implied by the termination rule (2/3) is higher than all δ_0 in (3.3). This suggests that, theoretically, players can sustain the joint maximum in all treatments.

Hypothesis 1. *(a) Buyer groups facilitate collusion. (b) Closed buyer groups are more collusive than open buyer groups.*

Communication may help to coordinate on a collusive equilibrium (see Crawford and Sobel, 1982; Farrell and Rabin, 1996; Cooper and Kühn, 2014). In repeated games, there are many collusive equilibria and therefore firms face a coordination problem. Cheap talk can enable firms to coordinate on a certain equilibrium (output targets, market shares, and punishment strategies). Thus, we expect communication to have a positive effect on cooperation. This is also consistent with the previous experimental evidence (see our literature survey above).

Hypothesis 2. *Industry output will be lower in the treatments with communication.*

Our hypotheses taken together imply rankings of industry outputs for our treatments. We have two predicted rankings as our hypotheses do not predict a ranking of outputs for Closed_NoTalk vs. Open_Talk. We should either observe

$$Q^{\text{Baseline}} > Q^{\text{Open\_NoTalk}} > Q^{\text{Closed\_NoTalk}} > Q^{\text{Open\_Talk}} > Q^{\text{Closed\_Talk}}$$

or

$$Q^{\text{Baseline}} > Q^{\text{Open\_NoTalk}} > Q^{\text{Open\_Talk}} > Q^{\text{Closed\_NoTalk}} > Q^{\text{Closed\_Talk}}.$$

3.5 Procedures

The experiment was conducted and framed as follows. In the instructions, subjects were told that they would act as a firm which, together with two other firms, repeatedly serves a market. They were asked to purchase units of a fictitious good. In each period, the number of units procured was automatically set equal to the

Our hypothesis is based on the observation that play in experiments depends on the magnitude of the punishment payoffs in that it affects the likelihood of collusion in the direction predicted by theory (see for example Rapoport and Chammah 1965). Dal Bó and Fréchette (2011), show that being an equilibrium action may be a necessary condition for cooperation when the supergame is repeated many times.

number of units sold on the downstream market (no inventory). We told them the input price of the good was either 22 or 10. In Baseline, the input price was 10 throughout.[8] We further described that subjects had the option to "join a buyer group" and how this choice affected their production cost. Next, we described the quantity decision.[9]

After having read the instructions, participants could privately ask questions. Before the start of the experiment, subjects were asked to answer several control questions. Only then did the actual experiment begin.

The experiments were computerized, using z-Tree (Fischbacher, 2007). Recruiting was done with the ORSEE (Greiner, 2004) online recruiting system.

The experiments were conducted at the laboratory of the Duesseldorf Institute for Competition Economics (DICE) in 2012 and 2014. In total, 177 subjects participated in sessions with 12 to 24 participants. We have between nine and 12 independent triopoly groups per treatment. (We aimed at two sessions and 12 groups per treatment; if the number of groups in a session was lower due to subjects not showing up, we conducted a third fully-fledged session.)

Participants were students from various departments, many from fields other than economics or business administration. The monetary payment was computed by using an exchange rate of 1,500 "points" for one Euro and adding a flat payment of 4 €. Subjects' average earnings were 21.24 € including the flat payment. The sessions lasted between 60 and 90 minutes.

[8] In order to keep the Baseline treatment comparable to the other treatments, we mentioned in the instructions that "the input price is usually 22" but "since you and the other two firms are in a buyer group" the price is 10. Hence, strictly speaking, Baseline is not a standard triopoly in terms of the frame but takes into account the aspects of buyer groups that characterizes the other treatments. As we will see below, the data in Baseline do not differ from previous three-firm Cournot experiments. Hence, it appears redundant to conduct a further neutrally-framed triopoly treatment.

[9] We told subjects that a higher aggregate output would lower the market price, and that for aggregate output levels of 130 or more the price would be zero. We did not provide payoff tables or further details of the functional forms. Instead, in each round, subjects had access to an on-screen profit calculator. As Requate and Waichman (2011) show, the use of a profit table or a profit calculator yields indistinguishable results in Cournot experiments.

3.6 Results

3.6.1 Overview and Main Results

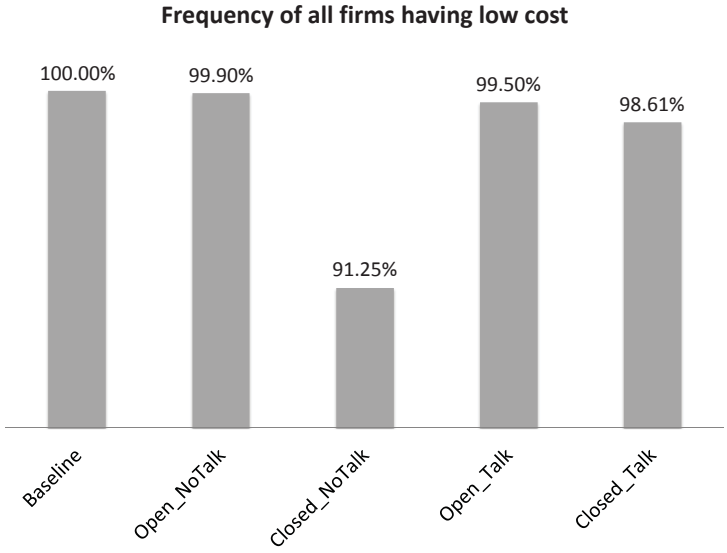

Figure 3.1: *Frequency of the cases where all firms have low cost. Note that in Baseline, the share low-cost firms is 100% by design.*

Figure 3.1 shows that almost all firms joined the buyer group in the two Open treatments, as predicted. Firms have low cost virtually all the time, that is, firms joined a buyer group in nearly all cases. This is also true for Closed_Talk. In Closed_NoTalk, the frequency of low-cost outcomes is significantly lower than in the other treatments (rank-sum tests, all $p < 0.001$, two-sided), although the rate is still above 90 %. We will cover the issue of who gets excluded and why in Section 3.6.2.

Next, we take a look at the average outputs. The left-hand side of Figure 3.2 shows these averages and the results of unrelated-sample ranksum tests (two-sided p values). Average outputs differ significantly and in the direction predicted, except for Baseline and Open_NoTalk which do not differ significantly. The differences

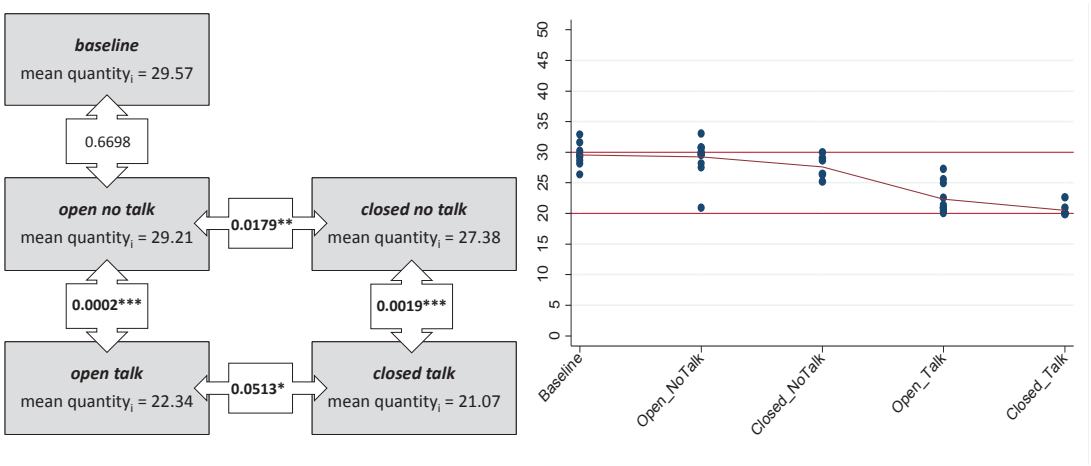

Figure 3.2: *Left-hand side: Rank-sum tests, p values are two-sided. Right-hand side: Group means across treatments.*
Note that the static Nash output is 30, joint-monopoly output is 20. Line connects treatment averages. The action space is $[0, 50]$

between the NoTalk and Talk treatments are highly significant. We observe one of the two predicted rankings of average outputs, so we can reject the null hypothesis that the ranking of average outputs are random.[10] Outputs for the Baseline and Open_NoTalk treatments are rather close to the static Nash equilibrium of 30. Both treatment variables have the predicted effects. Confirming Hypothesis 1, the closed buyer groups cause slightly reduced outputs compared to the open buyer groups. Supporting Hypothesis 2, the possibility of communication in the Talk treatments causes a substantial reduction of output.

The right-hand side of Figure 3.2 shows the group averages for each treatment. In Baseline and Open_NoTalk, some groups have average outputs above the static Nash prediction, some below (as has been observed by Huck et al. 2004). The other treatments have averages between the static Nash level of 30 and the joint-profit maximizing level of 20. Without communication, only one group managed to sustain an output level close to the collusive level of 20 whereas most groups in

[10]We have five treatments and $5! = 120$ possible rankings of average outputs. Two of the 120 rankings are consistent with our Hypotheses. As one of the predicted rankings materializes, we can reject the null hypothesis of random rankings at $p = 2/120 = 0.0167$.

Closed_Talk had an average close to 20.

Variable	(1)	(2)	(3)
buyer group	-0.493	-0.493	-0.3551
closed	-1.558**	-1.558**	-1.8319*
talk	-6.585***	-6.585***	-6.8734***
talkclosed			0.5650
period		-0.062**	-0.0623
constant	29.565***	30.219***	30.2187
N	3360	3360	3360
*** 1% level	** 5% level	* 10% level	

Table 3.3: *Panel regression analysis of firm-level outputs.*

The regressions in Table 3.3 provide further statistical support for our Hypotheses. We used a random-effects panel estimator and clustered the standard errors at the group level. The *constant* represents the Baseline treatment. The dummy *buyer group* is equal to one in all Open and Closed treatments.[11] Not supporting Hypothesis 1, we find that a buyer group per se does not facilitate collusion, as indicated by the insignificance of *buyer group*. Consistent with Hypothesis 1, *closed* buyer groups significantly facilitate collusion and, consistent with Hypothesis 2, the impact of *talk* is significant and substantial. The interaction *talkclosed* is not significant. A Wald test reveals that *closed* + *talkclosed* is weakly significant ($p = 0.077$), suggesting that the Closed mechanism has a similar albeit weaker impact in the Talk treatments. There is a significant negative trend time captured by the *period* variable which is, however, not very large.

We summarize:

Result 1. Only the Closed buyer groups have significant collusive effects on outputs.

[11] If we set the dummy *buyer group* equal to one only when the buyer groups are active, the results are virtually the same.

3.6.2 Closed Buyer Groups

How do firms make use of the possibility to exclude? Table 3.4 shows that the inclination to suggest exclusion and actual exclusions differ strongly between Talk and NoTalk treatments. While in Closed_NoTalk exclusion was suggested in roughly half of the cases, this figure is only little more than 6% in Closed_Talk. The possibility to talk apparently decreases the willingness or need to exclude a firm from the buyer group.

Recall that exclusions are successful only if two firms suggest the same firm for exclusions. Interestingly, the share of successful exclusions is also lower in Closed_Talk (see Table 3.4). Whereas in the NoTalk treatment 44.38 % of the suggestions to exclude were successful, there were only 27.27 % in the Talk treatment (corresponding to six successful exclusions). The higher rate of successful exclusions in Closed_NoTalk is remarkable because firms cannot communicate whom to exclude.

	Closed_NoTalk	Closed_Talk
Exclusion suggested	49.44%	6.11%
Exclusion-suggestion successful	44.38%	27.27%

Table 3.4: *Suggestions for exclusions and actual exclusions. Note that rate of successful exclusions is conditional on exclusion being suggested.*

We now turn to the question of who gets excluded. Underlying the repeated-game analysis is that a deviator – a high-output firm – gets excluded in the subsequent periods. The one-shot game would instead suggest that any firm may get excluded because it gives higher payoffs to the excluding firms. The data shows it is the deviators who get excluded. In Closed_NoTalk, we have 79 successful exclusions from the buyer group but these cases distribute only on seven of 12 groups. Among these seven groups, six systematically exclude high-output firms.[12] The

[12]Further details may be instructive here. Five of the six groups repeatedly excluded one and the same maverick firm in all cases. The maverick firms initially produced more than the other two firms and was then excluded for one or more periods. The deviators in these five groups sometimes reduced their output in response (perhaps because of high costs) but once they are back in the buyer group produced more again which triggers more exclusions. In other cases, the maverick continued to produce high output despite being excluded and having high costs.

sixth group excludes different firms in different periods but, in six of eight cases, these groups exclude the high-output firm. The (seventh) outlier group excludes firms without any apparent system. In Closed_Talk we had six cases of successful exclusion. Three cases occurred in period one and are hence not meaningful in terms of punishment. In the remaining three cases, it was the high-output firm that got excluded: that firm produced 30 whereas the excluding firms produced 20.

We complement the descriptive analysis with the probit regressions, using the following variables. Let q_{-imax} denote the largest output produced by i's competitors. The variable $L1.max\{0, q_i - q_{-imax}\}$ then indicates to what extent firm i had the largest output in the previous period; it is zero if i did not have the largest output. Regressor $L1.max\{0, q_{-imax} - q_i\}$ shows by how much firm i's output was below that of the other firms in $t-1$; it is zero if firm i had the largest output in the previous period.

Variable	(1)	(2)
$L1.max\{0, q_i - q_{-imax}\}$	0.069***	0.029*
$L1.max\{0, q_{-imax} - q_i\}$	-0.023	0.054***
excluded $t-1$	1.225***	0.255
excluded_before	0.852**	-0.740**
talk	-1.318**	-2.707**
period	-0.016	0.033**
constant	-2.049***	-1.142**
N	1368	1368
*** 1% level	** 5% level	* 10% level

Table 3.5: *Panel probit analysis on (1) who gets excluded and (2) who wants to exclude, clustered at the group level.*

Regression (1) in Table 3.5 shows who gets excluded. Having the largest output in $t-1$ does significantly increase the likelihood of being excluded, consistent with the repeated-game analysis. Furthermore, a firm which was excluded in $t-1$ is significantly more likely to be excluded again in t. This is also consistent with our theory: firms might get excluded repeatedly as a result of a trigger-like strategy. Being excluded at any point before period t (*excluded_before*) is significant. The impact of *talk* is as expected from the above summary statistics.

Regression (2) in Table 3.5 analyzes who wants to exclude another firm. Interestingly, $L1.max\{0, q_i - q_{-imax}\}$ is positive and (weakly) significant, that is, the firm with the highest output is more likely to suggest exclusion. This could actually be some counter measure used by a firm when it (correctly) anticipates that it is in danger of being excluded. $L1.max\{0, q_{-imax} - q_i\}$ does also increase the likelihood of wanting to exclude, consistent with our theory. The variable *excluded_before* is negative and significant here.[13] We conclude:

Result 2. In Closed_NoTalk, some groups regularly exclude firms and, if so, it is almost always the deviators who get excluded. In Closed_Talk, exclusion occurs rather infrequently.

Our findings about exclusion in the Closed treatments are consistent with the literature on punishments in public-good games (e.g., Fehr and Gächter, 2000). In the punishment experiments, players can at a cost reduce targeted players' income. In contrast to our game, the punishments cannot be part of an equilibrium in a one-shot game or finitely repeated game. In public-good games with punishment, high levels of cooperation often occur. In our experiments, the effect due to exclusion from the buyer group is only moderate. High degrees of cooperation, however, are not observed throughout in public-good games with punishment (Nikiforakis and Normann, 2007). In the punishment experiments, sometimes the "wrong" players get punished (Cinyabuguma et al., 2006). This is consistent with our data where the high-output firm is more likely (to attempt) to exclude another firm. Finally, our mechanism is probably more complicated, not least since punishment depends on the coordination of two players against one. Altogether, our findings are similar to those of the public-good games with punishment literature.

[13] We also analyze *how* firms respond to exclusion in their output decisions. Regression analysis (see our discussion paper) of outputs in the Closed treatments shows that being excluded (and hence having high costs) strongly and significantly reduces output in all four regressions, as expected. If another firm in the market has been excluded increases output as predicted, although the effect is only moderate. Having been excluded at any point before period t insignificantly increases output.

3.6.3 The Talk Treatments

The design of the Talk treatments is aimed at two research questions. Do subjects abuse the prohibition of explicit agreements? And: through which channel do they achieve near-perfect collusion?

We analyzed the communication data according to whether there was an agreement, and if so, whether it was about an explicit quantitative target or merely a non-quantitative statement.[14] Specifically, we looked for explicit quantity agreements (e.g., "we should agree on 20"), non-quantitative formulations (e.g., "we should buy less") or no agreement at all. A group was characterized accordingly if at least one piece of communication was a *quantitative* or *non-quantitative* agreement.

Out of the 23 groups we had in the Talk treatments, nine groups (39.13 %) made explicit quantitative agreements at least once. All groups made non-quantitative agreements at least once. It appears that buyer groups often abuse the group as a platform for agreements.

To analyze the effectiveness of these agreements we added the data on agreements to a regression on outputs using the dummy variables *quantitative* and *non-quantitative* (see Table 3.6). If a *quantitative* or *non-quantitative* agreement occurred in period t, these dummies were set equal to one from t until the end of the game.[15] We observe that *quantitative* and *non-quantitative* have the expected sign; *quantitative* has a larger effect than *non-quantitative* and only *quantitative* is significant. Finally, note that the constant in the regressions is significantly below the Nash benchmark of 30 (Wald tests, specifications (1) and (3) $p < 0.001$, (2) $p < 0.05$). This indicates that communication per se has a moderate collusive effect on outputs even when we control for quantitative and non-quantitative

[14]Note that this analysis deliberately falls short of a full categorical analysis of the chat at the individual or group level (see e.g., Charness and Dufwenberg, 2006; Cooper and Kühn, 2014). We see two problems with this type of analysis in our case. First, we have a repeated game where endogeneity problems will arise. A second problem is that our oligopolies have more than two players. Fay et al. (2000) suggest that groups with more than two players have a fundamentally different way of communicating than two-player groups.

[15]This seems warranted since communication can have strong hysteresis effects, that is, the effect of communication carries over to non-communication phases of experiments. See Isaac and Walker (1988) and Fonseca and Normann (2012, 2014).

agreements. Scherer and Ross (1990, p. 235-6) mention social factors joint market institutions may bring along—this may be reflected in our data. Quantitative agreements, however, significantly intensify the collusive effect.

	(1)	(2)	(3)
closed	-1.267	-2.405***	-0.935
any		-2.890***	
quantitative			-2.425***
non-quantitative			-1.383
constant	23.113***	25.845***	25.250***
period	-0.074**	-0.065*	-0.006
N	1380	1380	1380
*** 1% level	** 5% level	* 10% level	

Table 3.6: *Panel regression analysis of firm-level outputs for Talk treatments, clustered at the group level.*

Result 3. The possibility to talk is regularly abused for explicit quantitative agreements on outputs. These quantitative agreements very effectively support collusion. By contrast, non-quantitative collusive statements do not seem to reduce competition in the markets.

3.6.4 Welfare

We conclude the discussion of our results with brief remarks on welfare. Assuming all firms procure at low cost, welfare (the sum of consumer and producer surplus) monotonically increases in industry output, Q, as long as $Q \leq a - \underline{c}$. For our model, welfare is given by $Q^2/2 + (a - \underline{c})Q$ when $c_i = \underline{c}\ \forall i$. In Figure 3.1, we saw that, except in treatment Closed_NoTalk, virtually all firms have low costs all the time.

Among our treatments, a social planner would prefer Baseline and Open_NoTalk to the two Talk treatments, and would prefer Open_Talk to Closed_Talk. Closed_NoTalk leads to lower outputs than Baseline and Open_NoTalk which are, moreover, inefficiently procured. Hence, we have a clear-cut policy conclusion against the Closed mechanism and against allowing communication. Since only buyer groups can obtain the cost reduction, treatment Baseline is not feasible for

a policy maker (unless he exogenously imposes the buyer group on firms) and Baseline would anyway not imply better welfare than Open_NoTalk anyway. Overall then, Open_NoTalk would be the policy maker's first choice.

3.7 Conclusion

In this paper, we analyze the collusive effects of buyer groups as an example of a lawful joint market institution. Policy makers are aware that these institutions can be abused for collusion, as reflected in the *US Antitrust Guidelines on Collaborations Among Competitors* (US Guidelines, 2001) or the recent *EU Guidelines on Horizontal Co-operation Agreements* (EU Guidelines, 2011). Empirically, we know that they often serve as a legal platform for illegal collusion, however, it is unclear just how these platforms are used to cartelize a market.

In our theory section, we show that the mutual dependence in buyer groups facilitates tacit collusion. There are two possible channels. First, the threat to abandon the buyer group altogether reduces the minimum discount factor required. Second, closed buyer groups which have the power to exclude specific firms facilitate tacit collusion even further. The analysis of the closed buyer group is novel in that it allows for individually targeted punishments which cost the deviator more than the punishing firms.

The experimental section of the paper partially confirms these predictions. Buyer groups per se do not facilitate tacit collusion, in contrast to the prediction. Supporting the theory, the possibility to exclude a single firm from the buyer group does result in significantly less competitive quantities. In almost all cases where the exclusion mechanism is used, it is the high-output firms that get excluded. Communication can very effectively support collusion, which is in line with previous experiments (see for example Isaac and Walker, 1984, and more recently Fonseca and Normann, 2012, Cooper and Kühn, 2014, Waichman et al., 2014). Interestingly, communication even has a moderate collusive impact when firms do not abuse the communication stage for explicit quantitative agreements.

Altogether, we confirm the policy makers' concerns with buyer groups. While generally we do not find "reduced incentives" from joint purchasing (*EU Guidelines*, point 201), we do observe that the possibility to exclude competitors from

the access to low input prices is detrimental to welfare (*EU Guidelines*, point 203). Finally, the *EU Guidelines* are right to suspect a "cartel in disguise" (point 205) because buyer groups enable communication between firms. Non-exclusionary buyer groups which limit the possibilities to communicate as much as possible are superior from a welfare perspective.

While competition authorities have become more effective at discovering and prosecuting explicit cartels, there has been far less progress with regards to more tacit forms of collusion. An effective policy for dealing with such forms of collusion has been, and will probably continue to be, identifying facilitating practices and either prohibiting them (in cases where there is no legitimate rationale for that practice) or using that practice – along with market evidence of collusion – to prosecute. Our research aims at understanding what those facilitating practices are: how they operate and what to look for are potentially relevant with regards to policy.

Appendix A

Proof of Proposition 1.

Recall that there are n firms. Let q_i denote firm i's output. Profit functions are $\pi_i = (\max\{0, a - \sum_{i=1}^{n} q_i\} - c_i)q_i$ with $c_i \in \{\underline{c}, \overline{c}\}$.

Stage 2. By backward induction, we solve for the quantity-setting stage first. If all firms are in the buyer group, they have low costs ($c_1 = c_2 = ... = c_n = \underline{c}$) and thus they produce

$$\underline{q}^N = \frac{a - \underline{c}}{n+1} \tag{3.4}$$

in equilibrium. If no buyer group is established, all firms have high costs ($c_1 = c_2 = ... = c_n = \overline{c}$) and we obtain

$$\overline{q}^N = \frac{a - \overline{c}}{n+1}. \tag{3.5}$$

In closed buyer groups, there may be one high-cost firm and $n-1$ low-cost firms. We obtain

$$\underline{q}^E = \frac{a - 2\underline{c} + \overline{c}}{n+1}, \quad \overline{q}^E = \frac{a + (n-1)\underline{c} - n\overline{c}}{n+1} \tag{3.6}$$

where we use the superscript E as it can refer to a buyer group variant where one firm is *excluded*. We use $\underline{q}^E$ and $\overline{q}^E$ for the outputs of the low-cost firms and the high-cost firm, respectively. We assume that cost differences are not too large, so that the high-cost firm still procure a positive amount $\overline{q}^E > 0$.[16] In all cases, Nash equilibrium profits are obtained by squaring the equilibrium outputs. That is, we have $\underline{\pi}^N = \left(\underline{q}^N\right)^2$, $\overline{\pi}^N = \left(\overline{q}^N\right)^2$, $\underline{\pi}^E = \left(\underline{q}^E\right)^2$ and $\overline{\pi}^E = \left(\overline{q}^E\right)^2$. Note that $\underline{\pi}^E > \underline{\pi}^N > \overline{\pi}^N > \overline{\pi}^E$.

Stage 1b. This stage concerns closed buyer groups only and occurs only if a buyer group was established in Stage 1a. Since $\underline{\pi}^N < \underline{\pi}^E$, $n-1$ firms find it worthwhile to exclude the remaining firm. Thus, in the subgame where all n firms join, the equilibrium involves the exclusion of one firm which then faces high marginal cost. There are n pure-strategy equilibrium outcomes of this type (and

[16] The exclusion mechanism can easily be generalized to $n-m$ (low cost) firms who exclude m (high cost, accordingly) firms, $0 \leq m \leq n$. We get $(a - (m+1)\underline{c} + m\overline{c})/(n+1)$, if $c_i = \underline{c}$ and $(a + (n-m)\underline{c} - (n-m+1)\overline{c})(n+1)$, if $c_i = \overline{c}$.

possibly also mixed-strategy equilibria), however, firms may face a coordination problem when deciding which firm to exclude.

Stage 1a. Two types of SGP Nash equilibrium outcomes for both the open and the closed buyer group are possible. Either all firms join and have low cost or $n-3$ firms or fewer firms join and all firms have high cost. To see this, note that joining the buyer group is a weakly dominant strategy as a firm always benefits from having lower costs. Specifically, if $n-2$ or $n-1$ of the other firms decide to join, firm i finds it strictly worthwhile to join since $\underline{\pi}^N > \overline{\pi}^N$ and $\underline{\pi}^N > \overline{\pi}^E$; otherwise, i is indifferent. Here, a subgame perfect Nash equilibrium outcome has all firms joining the group and then choosing outputs of $\underline{q}^N$ and earning $\underline{\pi}^N$. If $n-3$ or fewer other firms join the group, firm i is not pivotal and is thus, indifferent between joining and not joining. Hence, a second subgame perfect Nash equilibrium outcome (in weakly dominated strategies) involves $n-3$ or fewer firms joining the group; not joining is a best reply here, and the buyer group is not established. (To be precise, there are many pure-strategy equilibria of this type, all of which have $n-3$ or fewer other firms joining the group.) This completes the proof.

Proof of Proposition 2.

The symmetric *joint-profit maximum* is as follows. The profit maximum can be obtained only if all firms have low costs, thus all firms must join the buyer group and no firm must be excluded.[17] Outputs are

$$\underline{q}^C = \frac{a-c}{2n} \tag{3.7}$$

and

$$\underline{\pi}^C = \frac{(a-c)^2}{4n} \tag{3.8}$$

are the profits in the symmetric joint-profit maximum.

Consider now *defection* from the symmetric joint-profit maximizing outcome.

[17]Note that it does not pay for $n-1$ firms to exclude the n^{th} firm and then collude on outputs. The argument is the same as in the merger paradox of Salant et al. (1983), even though the excluded firm has high cost here. For a reasonably low number of firms, we find that $\underline{\pi}^C$ is larger than the profit from colluding among $n-1$ against one high-cost firm playing non-cooperatively.

The defecting firm will procure the best reply to $(n-1)\underline{q}^C$ at low cost, which is

$$\underline{q}^D = \frac{(a-c)(n+1)}{4n}, \tag{3.9}$$

and

$$\underline{\pi}^D = \frac{(a-c)^2(n+1)^2}{16n^2} \tag{3.10}$$

is the defection profit.

Next, we derive the minimum discount factor required for collusion. Collusion is a subgame perfect Nash equilibrium if and only if

$$\frac{\underline{\pi}^C}{1-\delta} \geq \underline{\pi}^D + \frac{\pi^P \delta}{1-\delta} \tag{3.11}$$

where π^P is the punishment profit following a deviation. Solving for δ, we obtain

$$\delta \geq \frac{\underline{\pi}^D - \underline{\pi}^C}{\underline{\pi}^D - \pi^P} \equiv \delta_0. \tag{3.12}$$

as the general minimum discount factor required for collusion.

We will derive δ_0 for three different cases: exogenous buyer group (labelled *baseline*), *open buyer group*, and *closed buyer group*. (i) Baseline is the standard Cournot oligopoly case, so we assume that all firms have low costs here, or that $\pi^P = \underline{\pi}^N$ in this case. It is straightforward to show that

$$\delta_0^{baseline} = \frac{(n+1)^2}{(n+1)^2 + 4n} \tag{3.13}$$

for baseline. (ii) With the open buyer group, there are two one-shot Nash equilibria as possible punishment strategies: all firms joining is an equilibrium but not setting up the group by not joining is also a subgame perfect Nash equilibrium. Since $\overline{\pi}^N < \underline{\pi}^N$, it follows that $\pi^P = \overline{\pi}^N$ is a credible trigger strategy and a more severe threat than in baseline. (iii) For the closed buyer group, excluding a firm from the group is a static Nash equilibrium and thus a credible threat. Excluding the deviator is firstly the harshest punishment in this case and, moreover, it also resolves the coordination problem of which of the n firms shall be excluded. So we

have $\pi^P = \overline{\pi}^E$ here.

We find that collusive (C) and defection (D) profits are the same in all three variants but punishment payoffs (N, E) differ; specifically, we have $\underline{\pi}^N > \overline{\pi}^N > \underline{\pi}^E$. Thus we obtain Proposition 2.

Appendix B

Instructions (translated from the German original, not intended for publication)

Welcome to our experiment.

Please read these instructions carefully. Please do not talk to your neighbors and be quiet during the entire experiment. If you have a question, please raise your hand. We will then come to your booth and answer your question personally.

In this experiment you will repeatedly make decisions and earn money. How much you earn depends on your decisions and on the decisions of two other randomly assigned participants. At the end of the experiment, you will get your profit paid in cash.

All participants receive (and are currently reading) the same instructions.

You will remain completely anonymous to us and to the other participants. We do not save any data in connection with your name.

* * *

In this experiment you will have to make decisions for one of three firms in a market. All three firms sell the same product. You have to buy the product from a supplier and then sell it to the customers. In each round, the quantity sold is equal to the purchased amount.

Throughout the whole experiment you will remain assigned to the same two other firms (or to the participants behind the firms, respectively).

All three firms will decide in each round:

1) Do you want to join a buyer group?
2) What quantity of the good do you want to buy?

The 1st decision:

The decision whether to join a buyer group determines the input price you have to pay per unit. Moreover, firms which have opted to join the buyer group are allowed to chat with each other after the first decision.

Through the joint purchase with one or two other firms, you and all other firms in the buyer group receive a discount. A buyer group can consist of two or three firms. One firm alone cannot form a buyer group, and there can be at most one buyer group in the market. In addition:

1. If no buyer group is established, the input price is 22 Talers per unit.
2. If a buyer group with two firms is established, the input price for the two firms in the buyer group is 10 Talers, and 22 Talers per unit for the outside firm.
3. If all three firms join the buyer group, the input price of all firms is 10 Talers per unit.

In each round you will be informed about the decisions of all firms regarding the buyer group (before the second decision).

Chat:

After the 1st decision you will be allowed to chat with the other members of the buyer group. What you talk about is up to you, however, you must not explicitly agree on targets regarding the output decision. The chat ends after 40 seconds.

The 2nd decision:

You have to choose the purchasing and therefore the sales quantity for your firm. This quantity must be between **10** and **50** units.

The following important rule applies. There is a uniform sales price for all firms in the market, which depends on the selected amount as follows; the greater the total amount of all firms, the lower the price you and the other firms receive in the market for the good. With each additional unit brought into the market, the sale price decreases by one Taler. If the total amount of all firms is 130 or above, the sale price is zero.

Your profit per unit sold is the difference between the sale price and the purchase price, which is (as shown) either 10 or 22 Talers. Note that you make a loss per unit purchased, if the sale price is below the purchase price of 10 or 22 Talers. Your total profit per round is equal to the profit per unit multiplied by the number of units sold.

For simulations of your potential profits, we will provide you with a **"Profit Calculator"**, which we will explain in detail before the start of the experiment.

Once all firms have made their decision you will receive a feedback on the quantity decisions of all three firms, the sale price, the profit you have made in this round, and your current total income for the experiment.

***

The experiment starts with **7 rounds**. Then there will be a change and you will receive new instructions.

As **start endowment** you get **6000 Taler**. This endowment will be offset against your profits and losses from all the rounds and at the end of the experiment, you get **1 Euro** per **1500 Talers** of your total income paid in cash.

2nd part of the instructions

From now on, all three firms have to take three decisions in each round, namely:

1) Do you want to join a buyer group? (as before)
2) Do you want to exclude a firm from the buyer group?
3) What quantity of the good do you want to buy? (as before)

You will still be assigned to the same two firms (or to the participants behind the firms, respectively) as before.

* * *

Now, after the chat, it may come to another decision:

If only two firms decide to join the buyer group or in case that no buyer group is established there is **no 2nd decision** and it continues with the 3rd decision as before. If **all three firms** have opted for joining the buyer group it comes to the **2nd decision**.

The 2nd decision:

In the 2nd decision it is possible to exclude a firm from the buyer group. For this purpose, any firm is able to suggest another firm. When two firms suggest the same firm, that firm will be excluded. The cost of firms inside the buyer group will still be 10 Talers per unit produced while the cost of the excluded firm will be 22 Talers. If no firm is excluded, all firms remain in the buyer group.

You will be informed about the exclusion decisions of all firms and will therefore also now your production costs. (Before the 3rd decision)

* * *

From now on, the experiment will last at least 20 rounds. Then, after each round, it is randomly decided if it comes to another round. The computer randomly chooses a number between 0 and 2. When it chooses 1 or 2 another round is played, when it chooses 0 the experiment is over.

Chapter 4

Auswirkungen der ARegV-Novelle auf kommunale Netzbetreiber*

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Auswirkungen der ARegV-Novelle auf kommunale Netzbetreiber

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[†]Die hier geäußerten Ansichten stellen die persönliche Meinung des Autors dar, nicht die Position des Bundesministeriums für Wirtschaft und Energie.

4.1 Einleitung

Die Novelle der Anreizregulierungsverordnung (ARegV) 2016 sollte in erster Linie der Verbesserung der Investitionsbedingungen für Verteilernetzbetreiber dienen. Ihr ging eine umfangreiche Diskussion um die prinzipielle Ausgestaltung des Regulierungsrahmens voraus, die sich zwischen der Fortführung der bestehenden Anreizregulierung und dem Wechsel zu einem kapitalkostenorientierten Modell bewegte. In dieser Debatte haben kommunale Netzbetreiber eine herausragende Rolle gespielt. Insbesondere der Verband Kommunaler Unternehmen (VKU) hat sich mit einem umfangreichen Forderungskatalog und der Kernforderung, den Zeitverzug abzuschaffen und damit den Budgetansatz für Kapitalkosten aufzugeben, an der Diskussion beteiligt.

Dieser Beitrag geht auf die Notwendigkeit einer funktionierenden Anreizregulierung, die Kritik an der ARegV auch von kommunaler Seite sowie Auswirkungen der ARegV-Novelle auf alle Verteilernetzbetreiber ein. Denn Auswirkungen, die kommunale Netzbetreiber anders als andere Netzbetreiber treffen, gibt es prinzipiell nicht. Das Energiewirtschaftsgesetz (EnWG) und die ARegV sind grundsätzlich trägerneutral ausgestaltet. Der durch das EnWG und die ARegV vorgegebene Regulierungsrahmen gilt für Netzbetreiber unabhängig davon, ob beispielsweise eine materielle oder lediglich eine formelle Privatisierung stattgefunden hat und somit existiert keine Sonderstellung für kommunale Unternehmen.[1]

4.2 Von der Liberalisierung bis zur Anreizregulierung

Die Öffnung der Strom- und Gasmärkte begann mit dem 1. Binnenmarktpaket aus den Jahren 1996 und 1998. Grundgedanke war, dass Branchen, bei denen es sich nicht um natürliche Monopole handelt, im Sinne volkswirtschaftlicher Effizienz und insbesondere zum Vorteil der Verbraucher nicht in Monopolstrukturen orga-

[1] Es wird darauf verzichtet, den Regulierungsrahmen für Betreiber von Übertragungs- und Fernleitungsnetzen explizit darzustellen, da die ARegV-Novelle insbesondere die Verbesserung der Investitionsbedingungen für Verteilernetzbetreiber im Blick hatte.

nisiert sein sollten.[2] Im Energiesektor waren bis dahin sämtliche Bereiche von der Erzeugung über den Handel und den Transport bis hin zum Vertrieb in monopolistischen, vertikal integrierten Energieversorgungsunternehmen (EVU) zusammengefasst, obwohl es sich lediglich beim Teilbereich des netzgebundenen Transports um ein resistentes natürliches Monopol handelt.

Im Zuge der nationalen Umsetzung wurden durch die Reform des EnWG und die Novelle des Gesetzes gegen Wettbewerbsbeschränkungen (GWB) von 1998 die ersten Grundlagen für die Liberalisierung der deutschen Energiemärkte geschaffen. Diese begann zunächst mit der Abschaffung des Systems der geschlossenen Versorgungsgebiete im Elektrizitätsbereich, um sogenannten Durchleitungswettbewerb zwischen den Netzbetreibern zu ermöglichen. Es wurde allerdings darauf verzichtet, Durchleitungsverpflichtungen und -entgelte explizit zu regeln. Stattdessen wurde auf den verhandelten Netzzugang gesetzt. Die daraufhin entstandenen Verbändevereinbarungen führten jedoch aufgrund der natürlichen Marktmacht der Netzbetreiber nicht zum gewünschten Ergebnis. Die Wettbewerbssituation blieb weiterhin unbefriedigend.[3]

Erst durch die EU-Beschleunigungsrichtlinien aus dem Jahr 2003 wurden die entscheidenden Voraussetzungen geschaffen, um auch in Deutschland den Wettbewerb auf den vor- und nachgelagerten Märkten der Strom- und Gasnetze voran zu bringen. Dazu dienten insbesondere striktere Entflechtungsvorgaben und die obligatorische Regulierung des Netzzugangs und der Netzentgelte durch unabhängige nationale Regulierungsbehörden. Die Umsetzung in Deutschland geschah mit der zweiten Reform des EnWG 2005.

Seitdem müssen Elektrizitäts- und Gasnetze grundsätzlich von der Erzeugung, dem Handel und dem Vertrieb operationell und rechtlich getrennt werden. Allerdings werden kleinere EVU durch eine De-Minimis-Klausel von diesen Vorschriften freigestellt.[4] Davon profitieren insbesondere kleine Stadtwerke, die lediglich informationell und buchhalterisch entflochten werden müssen. Die Trennung der Netze von den weiteren Stufen der Wertschöpfungskette der Energieversorgungsunter-

[2] Zur disaggregierten Betrachtung der Wertschöpfungskette vgl. Knieps (1999) und Coenen und Haucap (2013).

[3] Vgl. Bundesnetzagentur, 2008, S. 12 ff.

[4] Der Grenzwert beträgt gem. § 7 Abs. 2 EnWG 100.000 an das jeweilige Strom- oder Gasversorgungsnetz angeschlossene Kunden.

nehmen bildet die erste Säule der angestrebten vollständigen Liberalisierung.

Die zweite Säule besteht aus der Regulierung des Netzzugangs inkl. der Netznutzungsentgelte zur Sicherung der diskriminierungsfreien Nutzung der Infrastrukturen. Nach dem Scheitern des verhandelten Netzzugangs, wurden die Rahmenbedingungen für den Netzzugang explizit im EnWG geregelt und in den Strom- und Gasnetzzugangsverordnungen (Strom- und GasNZV) konkretisiert. In starker Anlehnung an die bis dahin gültigen Verbändevereinbarungen wurde die Bestimmung der Netznutzungsentgelte in den Strom- und Gasnetzentgeltverordnungen (Strom- und GasNEV) geregelt. Sowohl die Bedingungen als auch die Entgelte für den Netzzugang haben seitdem angemessen, diskriminierungsfrei und transparent zu sein. Darüber hinaus muss sichergestellt werden, dass sie für alle Kunden nicht ungünstiger sind, als die Bedingungen und Entgelte, die für verbundene oder assoziierte Unternehmen des Netzbetreibers gelten.

Die beiden genannten Säulen sollen allen Marktteilnehmern den Wettbewerb auf den vor- und nachgelagerten Märkten ermöglichen. In Ergänzung dazu bildet die Netzregulierung i.e.S., also die Regulierung der Energienetze selbst, die notwendige dritte Säule der liberalisierten Energiewirtschaft. Mit der Netzregulierung sollen allokative, produktive, dynamische und qualitative Ineffizienzen, die mit natürlichen Monopolen einhergehen können, verhindert werden.

Mit dem EnWG 2005 wurden zunächst insbesondere allokative Ineffizienzen adressiert. Der kostenbasierte Regulierungsansatz des § 21 EnWG und der Strom- und GasNEV zielte darauf ab, unangemessene Aufschläge auf die betriebsnotwendigen Kosten der Netzbetreiber auszuschließen. Diesen Monopolgewinnen wurde mit einer eingehenden Kostenprüfung durch die Regulierungsbehörden begegnet. Dabei wurden erhebliche Kürzungen vorgenommen.[5]

Es ist jedoch fraglich, ob im Fall der Energienetze allokative Ineffizienzen eine ausreichende Begründung für Regulierungshandeln darstellen (Vgl. Coenen und Haucap, 2013, S. 55 f.). Relevanter erscheint hier die sog. produktive Ineffizienz, die entsteht, wenn Unternehmen aufgrund mangelnden Wettbewerbsdrucks auf kostensenkende Maßnahmen verzichten (Vgl. Leibenstein, 1966).

Der produktiven Ineffizienz ist mit einer klassischen Cost-Plus-Regulierung wie sie von 2005 bis 2008 in Deutschland praktiziert wurde, nicht wirksam zu begegnen.

[5]Vgl. Bundesnetzagentur, 2006, S. 46.

Dem Regulierer fehlt aufgrund von Informationsasymmetrien das nötige Wissen, um Effizienzpotentiale bei Netzbetreibern aufzudecken (Vgl. Laffont und Tirole, 1993). Für Netzbetreiber wiederum besteht kein Anreiz, die Kosten zu senken, da sich ihre Erlöse bei der Cost-Plus-Regulierung direkt und ausschließlich aus ihren eigenen Kosten ableiten. Bei einer günstigen Verzinsung des eingesetzten Kapitals entsteht sogar ein Anreiz für überhöhte Investitionen und den ineffizienten Einsatz kapitalintensiver Technologien (Vgl. Averch und Johnson, 1962).

Folglich lässt sich mit diesem Ansatz auch nicht der dynamischen Ineffizienz, also dem Mangel an Innovationen, entgegenwirken. Fehlender Wettbewerb, fehlende Anreize zur Kostensenkung sowie Anreize für kapitalintensive Investitionen stehen auch Forschung und Entwicklung entgegen (Vgl. Arrow, 1962).

Schließlich mangelte es diesem ersten Ansatz zur Netzregulierung an einem Konzept zur Sicherstellung des in § 1 EnWG verankerten Ziels der Versorgungsicherheit und -zuverlässigkeit.

Erst mit Inkrafttreten der ARegV auf Grundlage des § 21a Abs.6 EnWG lagen die notwendigen Instrumente vor, um produktive Ineffizienzen abzubauen und darüber hinaus den Problemen dynamischer und qualitativer Ineffizienzen zu begegnen. Mit der Anreizregulierung wurde die dritte Säule der Liberalisierung, die Netzregulierung, vervollständigt.

4.3 Status Quo vor der ARegV-Novelle 2016

4.3.1 Konzept und Einführung der Anreizregulierung in Deutschland

Da es verschiedene Möglichkeiten zur Ausgestaltung einer Anreizregulierung gibt, wurde die Bundesnetzagentur in § 112a Abs. 1 EnWG mit der Ausarbeitung eines auf Anreizen basierenden Regimes zur Regulierung der deutschen Strom- und Gasnetzbetreiber beauftragt. Der vorgeschlagene Regulierungsrahmen kombinierte die sog. Revenue-Cap-Regulierung mit dem Ansatz der sog. Yardstick-Competition (Vgl. Bundesnetzagentur, 2007) und bedeutete einen Paradigmenwechsel in der

deutschen Netzregulierung.[6]

Kernelement dieser Form der Anreizregulierung ist, dass die individuellen Erlöse der Netzbetreiber zumindest teilweise von ihren individuellen Kosten entkoppelt werden und sich stattdessen an einem exogenen Maßstab orientieren. Indem für jeden Netzbetreiber für einen gewissen Zeitraum ein individuelles Budget in Form einer Erlösobergrenze festgelegt wird, entsteht der Anreiz, die Kosten zu senken, um die Differenz zwischen Erlösen und Kosten, also den Gewinn, zu maximieren.

Kostensenkungen und damit der Abbau produktiver und dynamischer Ineffizienzen liegen somit im Eigeninteresse der Netzbetreiber, ohne dass der Regulierer konkretes Effizienzpotential identifizieren oder Vorgaben zu bestimmten Technologien machen muss. Zudem wird der Abbau allokativer Ineffizienzen sichergestellt, indem innerhalb einer Regulierungsperiode die Erlösobergrenze um festgestellte Ineffizienzen gesenkt wird und zudem die erreichten Kostensenkungen zu niedrigeren Budgets in den Folgeperioden führen. Effizienzsteigerungen werden so in Form niedrigerer Netzentgelte an die Verbraucher weitergegeben. Ein regelmäßig durchgeführter Effizienzvergleich gibt die Effizienzvorgaben zur Bestimmung der Erlösobergrenzen vor und wirkt dem Anreiz entgegen, die eigenen Kosten zu erhöhen, um das Budget aufzublähen.

Zudem enthielt das Konzept bereits einen Vorschlag zur Einführung einer Qualitätsregulierung, mit der sichergestellt werden sollte, dass die oben genannten Kosteneinsparungen nicht zu Lasten der Netzzuverlässigkeit gehen. Dieses Konzept wurde mit der Einführung des sog. Qualitätselements zum 1.1.2012[7] umgesetzt.[8]

Die in dem Bericht zur Einführung der Anreizregulierung etablierten Grundprinzipien blieben in der ARegV erhalten. Im politischen Prozess wurden jedoch einige Maßnahmen zum Schutz der Netzbetreiber umgesetzt, die regelmäßig zu Lasten der Verbraucher gingen. So wurden die Effizienzanforderungen durch die Verlängerung der Regulierungsperioden und damit der Abbaupfade in § 3, die Absenkung des generellen sektoralen Produktivitätsfaktors in § 9 Abs. 2, die Ausweitung des Katalogs dauerhaft nicht beeinflussbarer Kostenanteile in § 11 Abs. 2, die Anhebung des Mindesteffizienzwertes in § 12 Abs. 4 sowie die zusätzliche

[6] Zu den grundlegenden Überlegungen zu diesen Ansätzen vgl. Littlechild (1983) und Shleifer (1985).

[7] Vgl. Bundesnetzagentur, 2011.

[8] Zur Funktionsweise und Umsetzung des Qualitätselements vgl. Herrmann und Gareis (2011).

Berücksichtigung nicht standardisierter Kosten im Effizienzvergleich in § 12 Abs. 4a erheblich gesenkt.[9]

Kleine Netzbetreiber profitierten insbesondere von der Ausweitung des vereinfachten Verfahrens auf Netzbetreiber mit bis zu 30.000 (Strom) bzw. 15.000 (Gas) Kunden. Das vereinfachte Verfahren gem. § 24 Abs. 1 räumt diesen kleinen Netzbetreibern ein Wahlrecht zur Teilnahme am Effizienzvergleich und der damit verbundenen Kostenprüfung ein.

Weitere Maßnahmen zum Schutz der Netzbetreiber, wie eine weitere Absenkung des generellen sektoralen Produktivitätsfaktors und der Vergleich mit einer „Gruppe der Besten“ anstelle des Vergleichs mit einem effizienten Unternehmen, fanden ihren Weg in die ARegV nur deshalb nicht, weil aufgrund der vorzeitigen Abreise der Vertreter aus Rheinland-Pfalz eine als sicher eingestufte Mehrheit im Bundesrat nicht zustande kam (Vgl. Bundesrat, 2007d, S. 301).

Darüber hinaus wurde darauf verzichtet, den Regulierungsrahmen im Sinne des Konzepts der Bundesnetzagentur über die zweite Regulierungsperiode hinaus festzulegen. Die Bundesnetzagentur hatte sich dafür ausgesprochen, nach den ersten beiden Regulierungsperioden, die der Angleichung der Effizienzniveaus der Netzbetreiber dienen sollten, zu einem reinen Wettbewerbsansatz überzugehen.

Das zentrale Element der Anreizregulierung ist wie beschrieben der Budgetansatz und somit die Erlösobergrenze. Die wesentlichen Komponenten der Erlösobergrenze werden im Folgenden beschrieben.

4.3.2 Funktionsweise der Anreizregulierung

Bestimmung des individuellen Kostenniveaus

Trotz Paradigmenwechsels ist die Kostenprüfung auch in der Anreizregulierung von zentraler Bedeutung. Denn anders als in einem reinen Yardstick-Competition-Ansatz, in dem sich die Erlösobergrenzen der Netzbetreiber ausschließlich an den effizienten Kosten eines vergleichbaren, effizienten Unternehmens orientieren, beginnt der sog. Erlöspfad in der Anreizregulierung bei den individuellen Kosten des jeweiligen Netzbetreibers (sog. Ausgangsniveau inkl. etwaiger ineffizienter Kosten)

[9] Vgl. Bundesrat, 2007a, 2007b; ARegV, 2007.

und senkt sich erst im Laufe der Regulierungsperiode auf das Niveau des effizienten Vergleichsunternehmens ab.

Die Kostenprüfung erfolgt in der Anreizregulierung wie bereits im Cost-Plus-Regime durch die zuständige Regulierungsbehörde gem. § 6 i.V.m. Teil 2 Abschnitt 1 GasNEV und Teil 2 Abschnitt 1 StromNEV. Dabei handelt es sich im Wesentlichen um eine formale und inhaltliche Überprüfung der von den Netzbetreibern gemeldeten Kosten des dem vorletzten Jahr einer Regulierungsperiode vorausgehende Jahres, des sog. Basis- oder Fotojahres.

Neben der Bestimmung des Ausgangsniveaus, dient die Kostenprüfung auch der Ermittlung der sog. Aufwandsparameter, der Kosten, die in den Effizienzvergleich einfließen. Da nur Kosten in den Effizienzvergleich einfließen sollen, die dem Grunde oder der Höhe nach vom Netzbetreiber beeinflusst werden können, werden zunächst die sog. dauerhaft nicht beeinflussbaren Kostenanteile gem. § 11 Abs. 2 ermittelt und von den Gesamtkosten abgezogen.

Um die Vergleichbarkeit der Kosten aller Netzbetreiber zu gewährleisten und Verzerrungen aufgrund unterschiedlicher Altersstrukturen der Anlagen oder unterschiedlicher Abschreibungs- und Aktivierungspraktiken zu vermeiden, werden die in den um den dauerhaft nicht beeinflussbaren Kostenanteil reduzierten Gesamtkosten enthaltenen Kapitalkosten gem. § 14 Abs. 1 Nr. 3 und Abs. 2 standardisiert.

Laut dem Konzept der Bundesnetzagentur sollten ausschließlich die standardisierten Kosten als Aufwandsparameter in den Effizienzvergleich einfließen. Der Bundesrat stimmte der ARegV jedoch nur mit der Maßgabe zu, dass gem. § 12 Abs. 4a zum Schutz der Netzbetreiber auch ein Effizienzvergleich mit Aufwandsparametern durchgeführt wird, ohne dass diese einer Vergleichbarkeitsrechnung unterzogen werden (Vgl. Bundesrat, 2007c, S. 7) Zugunsten der Netzbetreiber wird der bessere Effizienzwert aus beiden Berechnungen angewandt.

Bestimmung des effizienten Kostenniveaus

Das Budget ausschließlich auf der Grundlage der Kosten der Netzbetreiber zu bestimmen und dann für einen gewissen Zeitraum von diesen Kosten zu entkoppeln, reicht nicht aus, um sicherzustellen, dass bestehende Ineffizienzen abgebaut und künftige Ineffizienzen vermieden werden. Es würde der Anreiz entstehen, das

Budget durch überhöhte Kosten aufzublähen (Vgl. Vogelsang, 1983).

Je stärker die Erlösobergrenze an einen exogenen Maßstab gekoppelt wird, desto geringer ist dieser Anreiz (Vgl. Stronzik, 2013, S. 4 ff.). Bei der Definition dieses Maßstabs steht der Regulierer jedoch zunächst erneut vor der bereits beschriebenen Informationsasymmetrie. Ohne das überlegene Wissen der Netzbetreiber ist er nicht in der Lage sachgerechte Erlösvorgaben zu entwickeln. Die Informationsasymmetrie kann jedoch umgangen werden, indem zur Bestimmung des Maßstabs die effizienten Unternehmen der Branche herangezogen werden (Vgl. Shleifer, 1985; Littlechild, 1983; Baumol et al., 1982; Finsinger und Vogelsang, 1981). Dazu wird ein bundesweiter Effizienzvergleich gem. §§ 12 bis 14 unter Teilnahme aller Netzbetreiber im regulären Verfahren durchgeführt.

Im Effizienzvergleich werden die Kosten der Netzbetreiber (Input) ihrer gegebenen Versorgungsaufgabe (Output) in Form der Aufwands- und Vergleichsparameter gegenübergestellt. Zur Berechnung der Effizienzwerte sind gem. Anlage 3 Nr. 1 die Dateneinhüllungsanalyse (Data Envelopment Analysis - DEA) und die Stochastische Effizienzgrenzenanalyse (StochasticFrontier Analysis - SFA) anzuwenden.

Bei der DEA wird die Effizienzgrenze ermittelt, indem die Kostenfunktion gesucht wird, die die Input-Output-Verhältnisse aller Unternehmen möglichst eng umschließt. Der Abstand jedes individuellen Input-Output-Verhältnisses zu dieser Grenze wird als Ineffizienz interpretiert. Gem. Anlage 3 Nr. 4 sind dabei nichtfallende Skalenerträge zu unterstellen, um Größenunterschiede der Netzbetreiber bei der Ermittlung der Effizienzgrenze zu berücksichtigen.

Bei der SFA handelt es sich um ein parametrisches und stochastisches Verfahren. Die Effizienzgrenze wird in Form der minimalen Kosten für die gegebenen Versorgungsaufgaben geschätzt. Die individuellen Ineffizienzen werden ermittelt, indem für jedes Unternehmen der Abstand zu dieser Effizienzgrenze durch zusätzliche Verteilungsannahmen in einen Fehlerterm und einen Ineffizienzterm aufgeteilt wird.

Um zu verhindern, dass die Effizienzgrenze durch einzelne Netzbetreiber unsachgemäß beeinflusst wird, sind Netzbetreiber mit extremen Einfluss auf die Effizienzwerte der übrigen Netzbetreiber gem. Anlage 3 Nr. 5 aus dem Datensatz zu entfernen.

Von den vier Effizienzwerten, die sich aus der Kombination der Methoden (DEA/SFA) mit den Aufwandsparametern (standardisierte/nicht-standardisierte Kosten) ergeben, wird für jeden Netzbetreiber der günstigste Effizienzwert gem. § 12 Abs. 3 und 4a (sog. best-of-four-Abrechnung) angewendet. Liegt der Effizienzwert für ein Unternehmen unter 60 %, ist gem. § 12 Abs. 4 ein Effizienzwert von 60 % anzusetzen.

Der so ermittelte Effizienzwert teilt die Gesamtkosten abzüglich des dauerhaft nicht beeinflussbaren Kostenanteils in den effizienten sog. vorübergehend nicht beeinflussbaren Kostenanteil und den ineffizienten sog. beeinflussbaren Kostenanteil ein.

Festlegung der Erlösobergrenze zu Beginn der Regulierungsperiode

Die Erlösobergrenze wird anhand der Regulierungsformel in Anlage 1 (zu § 7) ermittelt. Sie setzt sich im Wesentlichen aus den dauerhaft und vorübergehend nicht beeinflussbaren Kostenanteilen sowie den im Laufe der Regulierungsperiode abzubauenden beeinflussbaren Kostenanteilen zusammen.[10]

Zur Einführung der Anreizregulierung wurden den Netzbetreibern zwei Regulierungsperioden zur Angleichung ihrer Effizienzniveaus gewährt. Der individuelle Abbaupfad gem. § 16 Abs. 1 wurde daher so festgelegt, dass die individuelle Erlösobergrenze ausgehend vom individuellen Ausgangsniveau zum Ende der zweiten Regulierungsperiode den Kosten des effizienten Vergleichsunternehmens entsprach.

Zum Ausgleich der allgemeinen Geldwertentwicklung wird die Erlösobergrenze gem. § 8 mit dem Verhältnis des Verbraucherpreisgesamtindex des jeweiligen Jahres der Regulierungsperiode zum Verbraucherpreisindex des Basisjahres bereinigt. Dabei werden Preis- und Produktivitätsunterschiede zwischen der Netz- und der Gesamtwirtschaft gem. § 9 anhand des generellen sektoralen Produktivitätsfaktors berücksichtigt.

[10] Auf das Qualitätselement und die volatilen Kostenanteile wird im Folgenden nicht weiter eingegangen, da sich durch die ARegV-Novelle keine Änderungen ergeben haben.

Berücksichtigung von Investitionen im Laufe der Regulierungsperiode

Kosten, die im Laufe einer Regulierungsperiode aus Ersatzinvestitionen oder aus Investitionen aufgrund von Veränderungen der Versorgungsaufgabe entstanden, wurden bei der Festlegung der Erlösobergrenze zu Beginn der jeweiligen Regulierungsperiode naturgemäß noch nicht berücksichtigt. Erst über die Berücksichtigung bei der Ermittlung des nächsten Ausgangsniveaus flossen diese Kosten in die Erlösobergrenze der nächsten Regulierungsperiode ein. Bis dahin entstand ein sog. negativer Sockelbetrag, der sich aus den anfallenden Abschreibungen und Zinseffekten ergab. Dieser Betrag wurde in den ersten beiden Regulierungsperioden für Ersatz- und Erweiterungsinvestitionen unterschiedlich ausgeglichen.

Der Teil des negativen Sockelbetrags, der durch Ersatzinvestitionen entstand, wurde im bisherigen Budgetansatz durch einen positiven Sockelbetrag kompensiert. Dieser resultierte analog zum negativen Sockelbetrag aus der Fixierung der Kapitalkosten im Ausgangsniveau. Da die kalkulatorischen Restbuchwerte des Sachanlagevermögens der Bestandsanlagen im Laufe der Regulierungsperiode sinken, sinken auch die darauf entfallenden Zinsen (1. Sockeleffekt). Endet zudem die Abschreibungsdauer von Anlagegütern im Laufe einer Regulierungsperiode, entfallen im weiteren Verlauf die entsprechenden Kapitalkosten aufgrund von Abschreibungen dieser Anlagen (2. Sockeleffekt). Da beide Effekte bei der Festlegung der Erlösobergrenze zu Gunsten der Netzbetreiber jedoch nicht berücksichtigt wurden, entstand auch ohne Effizienzanstrengung des Netzbetreibers eine Differenz zwischen den Kapitalkosten eines jeden Jahres und der jeweiligen Erlösobergrenze. Diese Differenz bildete den positiven Sockelbetrag, der dem Substanzerhalt dienen oder als Gewinn ausgeschüttet werden konnte. Für Ersatzinvestitionen bedurfte es demnach keiner Anpassung der Erlösobergrenze.

Der Teil des negativen Sockelbetrags, der durch Erweiterungsinvestitionen entstand, wurde im bisherigen Budgetansatz in erster Linie durch das Instrument des sog. Erweiterungsfaktors gem. § 10 kompensiert. Die Anpassung der Erlösobergrenze mittels Erweiterungsfaktor war nicht an die Kosten einzelner Erweiterungsinvestitionen gekoppelt, sondern erfolgte im Sinne des Budgetansatzes pauschal in Abhängigkeit der Veränderung der Versorgungsaufgabe. Der Erweiterungsfaktor entsprach dem Verhältnis der Veränderung der Strukturparameter gem. § 10 Abs. 2

und der Festlegung BK8-10/004 der Beschlusskammer 8 der Bundesnetzagentur. Die Anpassung der Erlösobergrenze entsprach gem. Anlage 1 (zu § 7) dem Produkt des Erweiterungsfaktors mit den vorübergehend nicht beeinflussbaren und beeinflussbaren Kostenanteilen. Dieses Instrument ergänzte somit den Budgetansatz für Gesamtkosten um ein Budget für Erweiterungsinvestitionen mit den entsprechenden Effizienzanreizen.

Einen Bruch mit dem Budgetansatz stellt das Instrument der Investitionsmaßnahme gem. § 23 dar, das mit der ARegV-Novelle 2012 auch für Verteilernetzbetreiber grundsätzlich geöffnet wurde.[11] Verteilernetzbetreiber konnten gem. § 23 Abs. 6 für Investitionen in der 110-kV-Ebene, die nicht über den Erweiterungsfaktor berücksichtigt wurden und die mit erheblichen Kosten verbunden waren, eine Investitionsmaßnahme beantragen. Dadurch wurden die Kapitalkosten dieser Investition inkl. einer Betriebskostenpauschale von 0,8 % auf Basis von Planwerten ohne Zeitverzug in die Erlösobergrenze aufgenommen. Eine Effizienzprüfung folgte erst im Effizienzvergleich der nächsten Regulierungsperiode nach Abschluss der Investitionsmaßnahme. Aufgrund des direkten Bezugs der Erlösobergrenzenanpassung zu den Kosten der jeweiligen Investition ergaben sich aus diesem Instrument Fehlanreize in Analogie zur Cost-Plus-Regulierung.

4.4 Die ARegV-Novelle 2016

4.4.1 Von der Kapitalkostendifferenz zum Kapitalkostenabgleich

Der Novelle der ARegV 2016 ging eine teilweise sehr kontroverse Debatte über Investitionsanreize in der Anreizregulierung und die Passgenauigkeit der vorhandenen Instrumente voraus. Der bereits beschriebene Zeitverzug bis zur Berücksichtigung von Investitionen in der Erlösobergrenze wurde trotz existierender Ausgleichsmechanismen (s. Sockeleffekte und Erweiterungsfaktor) als entscheidendes Investitionshemmnis angeführt.

Die Debatte führte zunächst zur sog. Kapitalkostendifferenz (KKD) (Vgl. Schä-

[11] Das durch das Instrument der Investitionsmaßnahme abgelöste Instrument der Investitionsbudgets stand den Verteilernetzbetreibern nur im Einzelfall offen.

fer, 2012). In diesem nach seinem Autor auch Schäfer-Modell genannten Vorschlag, sollten steigende und sinkende Kapitalkosten jährlich abgeglichen und die Erlösobergrenze entsprechend durch den Netzbetreiber angepasst werden. Das Budgetprinzip für Kapitalkosten sollte damit aufgegeben werden. Durch die Berücksichtigung der Kapitalkosten auf Basis von Planwerten würden positive wie negative Sockelbeträge abgeschafft und die Instrumente Erweiterungsfaktor und Investitionsmaßnahme obsolet. Ergänzt wurde dieses Modell durch eine sog. Opex-Pauschale. Ein Budget, dass den Netzbetreibern in Abhängigkeit ihrer Kapitalkosten zur Deckung ihrer Betriebskosten pauschal zur Verfügung gestellt werden sollte. Alle anderen Elemente der Anreizregulierung, insbesondere die Dauer der Regulierungsperioden, der Effizienzvergleich und der Abbaupfad für Ineffizienz sollten unverändert bestehen bleiben.

Da sämtliche Investitionen umgehend zu entsprechenden Erlösen geführt hätten, besteht kein Zweifel an der Investitionsfreundlichkeit dieses Ansatzes. Wesentliche Ziele der Anreizregulierung, insbesondere der Effizienzgedanke und die Technologieneutralität wären mit der KKD jedoch aufgegeben worden. Kapitalkosten wären durch eine Berücksichtigung ohne Zeitverzug gegenüber Betriebskosten, die weiterhin über Budgets abgebildet worden wären, bevorzugt worden. Darüber hinaus hätte die Opex-Pauschale wie eine zusätzliche Verzinsung des eingesetzten Kapitals und damit als weiterer Anreiz für den bevorzugten Einsatz von Kapital gegenüber Betriebskosten gewirkt.

Dieses Konzept wurde von der Branche abgelehnt, da von einem Systemwechsel nur Netzbetreiber profitiert hätten, die bereits in den folgenden Jahren überdurchschnittlich viel investieren mussten. Auch der VKU lehnte dieses Modell aufgrund dieses sog. Investitionszwanges ab (Vgl. VKU, 2012).

Nach dem Scheitern der KKD legte die Landesregulierungsbehörde Bayerns 2013 ein alternatives auf der KKD aufbauendes Modell vor, die Investitionskostendifferenz (IKD). Mit dieser „Kompromisslösung“ ging man auf die Netzbetreiber zu, die keinen akuten Investitionsbedarf hatten, indem man im Gegensatz zur KKD nicht sämtliche positive Sockeleffekte abschaffen wollte. Steigende Kapitalkosten sollten wie in der KKD in vollem Umfang zu einer höheren Erlösobergrenze führen, während sinkende Kapitalkosten nur teilweise berücksichtigt werden sollten. Durch dieses sachlich nicht zu begründende Budget konnten nahezu sämtliche

Verteilernetzbetreiber und ihre Verbände hinter diesem Modell vereint werden, das Mehrkosten gegenüber den tatsächlichen Kapitalkosten von ca. 6,9 Mrd. Euro verursacht hätte (Vgl. Bundesnetzagentur, 2015).

Der Vorschlag mündete schließlich in einer Empfehlung des Wirtschaftsausschusses des Bundesrats zur Einführung der IKD (Vgl. Bundesrat, 2013b). Im Bundesratsplenum wurde sie jedoch abgelehnt und stattdessen eine Entschließung gefasst, die Bundesregierung solle den Budgetansatz der ARegV durch einen neuen Mechanismus auf Grundlage der IKD ersetzen (Vgl. Bundesrat, 2013b, S. 31 ff.; Bundesrat, 2013d, S. 413) Die Abschaffung des Zeitverzugs durch die Einführung eines IKD-Modells war seitdem die Hauptforderung des VKU (Vgl. VKU, 2015a, S. 6 f.; VKU, 2015b, S. 4; VKU und BDEW, 2015, S. 2).

Das Ziel, die Rahmenbedingungen für Verteilernetzbetreiber investitionsfreundlich auszugestalten wurde auch im Koalitionsvertrag zwischen CDU, CSU und SPD für die 18. Legislaturperiode verankert (Vgl. Bundesregierung, 2013, S. 58). Eine etwaige Anpassung sollte u.a. die Ergebnisse des Evaluierungsberichts der Bundesnetzagentur (2015) berücksichtigen.

In diesem Bericht lehnte die Bundesnetzagentur KKD und IKD klar ab (Vgl. Bundesnetzagentur, 2015, S. 377 f., S. 389 ff.). Stattdessen schlug sie vier Modelle und verschiedene unabhängige Anpassungen des Regulierungsrahmens vor. Sie sprach jedoch keine konsequente Empfehlung für ein Modell aus und öffnete damit womöglich den Raum für die Abkehr vom Budgetansatz. Denn obwohl sie in dem Bericht zu dem Schluss gekommen war, dass es keinen akuten Handlungsbedarf zu Verbesserung der Investitionsbedingungen gab, regte sie mit dem Modell 2 „Differenzierung in ARegV 2.0“ eine weitere Öffnung der Investitionsmaßnahme für Verteilernetzbetreiber an. Sie verzichtete auch darauf, trotz der Konvergenz der Effizienz der Netzbetreiber in den ersten beiden Regulierungsperioden das ursprüngliche Ziel eines Yardstick-Competition-Ansatzes, das sie im Bericht zur Einführung der Anreizregulierung selbst gesetzt hatte, weiter ernsthaft zu verfolgen.

Die Eckpunkte des Bundesministeriums für Wirtschaft und Energie vom 13.3.2015 basierten auf dem Modell der differenzierten ARegV 2.0. Demnach sollte der Regulierungsrahmen grundsätzlich beibehalten, einzelne Elemente wie der Erweiterungsfaktor und der Effizienzvergleich jedoch angepasst werden. Insbesondere

sollte es Netzbetreibern mit erhöhtem, energiewendebedingtem Investitionsbedarf ermöglicht werden, Investitionsmaßnahmen zu beantragen.

Dieser Vorschlag stieß auf breite Ablehnung der Bundesländer, die auf ihre Entscheidung im Bundesrat zur IKD verwiesen. Ebenso forderten VKU und BDEW in ihren Stellungnahmen die konsequente Abschaffung des Zeitverzugs für alle Investitionen aller Verteilernetzbetreiber (Vgl. VKU, 2015b, S. 4; BDEW, 2015, S. 8 ff.).

4.4.2 Referentenentwurf vom 19.4.2016

Vor dem Hintergrund der politischen Diskussion und der Haltung der Bundesländer (Vgl. Wirtschaftsministerkonferenz, 2015, TOP 4.5) rückte das Bundesministerium für Wirtschaft und Energie schließlich von seinem Vorschlag einer geringfügigen Anpassung der bestehenden Anreizregulierung ab und legte einen eigenen Vorschlag zur vollständigen Abschaffung des Zeitverzugs bei der Anerkennung von Kapitalkosten vor (Vgl. Bundesministerium für Wirtschaft und Energie, 2016).

Der sog. Kapitalkostenabgleich (KKA) sah wie die KKD einen jährlichen Abgleich sämtlicher Kapitalkosten vor, um sämtliche Investitionen ohne Zeitverzug in der Erlösobergrenze zu berücksichtigen. Wie in der KKD sollten positive wie negative Sockel grundsätzlich vollständig entfallen und die Instrumente Erweiterungsfaktor und Investitionsmaßnahme für Verteilernetzbetreiber durch den KKA ersetzt werden. Allerdings sollte in der dritten Regulierungsperiode ein sog. Übergangssockel Netzbetreiber kompensieren, die zwischen 2008 und 2016 investiert hatten.

Um die negativen Effekte dieses Ansatzes auf die Technologieneutralität der Regulierung abzufedern, sollten die Effizienzanforderungen erhöht werden. Insbesondere sollten die Effizienzvergleiche häufiger durchgeführt und festgestellte Ineffizienz schneller abgebaut werden.

Beide Maßnahmen schafften es jedoch nicht in die Novelle. Die häufigere Durchführung des Effizienzvergleichs wurde bereits vor der Abstimmung im Bundesrat aus dem Referentenentwurf entfernt (Vgl. Bundesrat, 2016a) und die Verkürzung des Abbaupfads wurde durch eine Maßgabe des Bundesrates geändert (Vgl. Bundesrat, 2016c, S.5).

4.4.3 Die ARegV-Novelle 2016 und ihre Auswirkungen

Beseitigung des Zeitverzugs

a) Kapitalkostenaufschlag gem. § 10a

Ab der dritten Regulierungsperiode tritt der Kapitalkostenaufschlag gem. § 10a für Verteilernetzbetreiber an die Stelle des Erweiterungsfaktors gem. § 10 und der Investitionsmaßnahme gem. § 23. Auf Antrag des Netzbetreibers gem. § 4 Abs. 4 Nr. 1 können Kapitalkosten aus Investitionen, die seit dem letzten Basisjahr getätigt wurden oder bis zum jeweils folgenden Jahr geplant sind und somit nicht im Ausgangsniveau berücksichtigt wurden, ohne Zeitverzug und in tatsächlicher Höhe in der Erlösobergrenze berücksichtigt werden. Der Budgetansatz für Kapitalkosten wird dadurch abgelöst.

Der Antrag erfolgt für getätigte Investitionen anhand von Ist-Kosten und für geplante Investitionen auf der Basis von Planwerten. Der Netzbetreiber ist gem. § 5 Abs. 1a für den nachträglichen Plan-Ist-Abgleich bis zum 30.6 des Folgejahres verantwortlich. Differenzen werden über das Regulierungskonto zeitnah ausgeglichen. Dazu wurde das Verfahren zur Führung und Auflösung des Regulierungskontos stark vereinfacht.

Der Kapitalkostenaufschlag ist gem.§ 10a Abs. 3 die Summe der kalkulatorischen Abschreibungen, kalkulatorischen Verzinsung und kalkulatorischen Gewerbesteuer, die auf der Grundlage der Anschaffungs- und Herstellungskosten ermittelt werden. Es gelten die Grundsätze der Strom- bzw. GasNEV.

Da der Antrag auf Kapitalkostenaufschlag jeweils für ein Jahr gilt, ist voraussichtlich jährlich ein Antrag zu stellen. Der daraus resultierende Mehraufwand wird jedoch durch den Wegfall des Erweiterungsfaktors kompensiert.

Der Kapitalkostenaufschlag bedeutet die vollständige Anerkennung aller Investitionen ohne Zeitverzug. Für alle Netzbetreiber bedeutet dies eine sichere unverzügliche Refinanzierung ihrer Anlagen. Kapitalkostenunterdeckungen sind mit dem Kapitalkostenabgleich nicht möglich. Insbesondere profitieren davon die Verteilernetzbetreiber, die vor erheblichen Investitionen in den nächsten Jahren stehen.

b) Kapitalkostenabzug gem. § 6 Abs. 3

Da steigende Kapitalkosten ohne Zeitverzug anerkannt werden, ist der positive Sockel nicht mehr gerechtfertigt. Er ist auch nicht mehr systemimmanent, da Kapitalkosten nicht mehr zu Beginn einer Regulierungsperiode im Ausgangsniveau festgeschrieben werden. Die Regulierungsbehörde ermittelt gem. § 6 Abs. S. 1 vor Beginn der Regulierungsperiode für jedes Jahr der Regulierungsperiode den Kapitalkostenabzug nach Maßgabe der Sätze 2 bis 5 und der Anlage 2a und berücksichtigt so die im Zeitablauf sinkenden Kapitalkosten aufgrund sinkender kalkulatorischer Restbuchwerte des Sachanlagevermögens der Bestandsanlagen. Kapitalkosten im Sinne des Kapitalkostenabzugs sind die Summe der kalkulatorischen Abschreibungen, der kalkulatorischen Eigenkapitalverzinsung, der kalkulatorischen Gewerbesteuer und des Aufwandes für Fremdkapitalzinsen.

Der Kapitalkostenabzug ist die logische Konsequenz des Kapitalkostenaufschlags. In Analogie zum oben beschriebenen Wegfall der Kapitalkostenunterdeckungen durch den Kapitalkostenaufschlag entfallen nun auch sämtliche Kapitalkostenüberdeckungen, die insbesondere bei den Netzbetreibern entstanden wären, die die Sockelbeträge nicht für Reinvestitionen verwendet, sondern als Gewinn ausgeschüttet hätten.

c) Berücksichtigung von Betriebskosten gem. § 6 Abs. 1 und 2

Die Berücksichtigung der Betriebskosten geschieht weiterhin im Rahmen der Bestimmung des Ausgangsniveaus gem. § 6 Abs. 1 und 2. Eine Anpassung der Erlösobergrenze aufgrund sich ändernder Betriebskosten findet nicht statt. Für Betriebskosten bleibt der Budgetansatz also bestehen.

Die unterschiedliche Behandlung von Kapital- und Betriebskosten gefährdet die Technologieneutralität der Regulierung. Mit dieser Begründung wurde im Rahmen der IKD und der KKD eine Betriebskostenpauschale (sog. OPEX-Pauschale) vorgeschlagen, um den Netzbetreibern ausreichende Mittel für Betriebskosten, die im Zuge von Investitionen entstehen, abzudecken. Dieser Ansatz verkennt jedoch die Wirkung solcher Budgets. Durch die Kopplung einer solchen Pauschale an die Höhe der getätigten Kapitalinvestitionen würde diese einen weiteren Anreiz für kapitalintensive Investitionen setzen und die Versuche, Technologieneutralität zu wahren, konterkarieren.

Effizienzanreize

a) Effizienzvergleich gem. § 12

Der Effizienzvergleich gem. § 12 ist im Grundsatz unverändert geblieben. Angepasst wurde jedoch das Vorgehen bei der DEA gem. Anlage 3 (zu § 12) Nr. 4. Anstelle nicht-fallender Skalenerträge sind nun konstante Skalenerträge zu unterstellen. Durch diese Annahme werden sämtliche Netzbetreiber, unabhängig von ihrer Größe, an einem konstanten, effizienten Input-Output-Verhältnis gemessen. Die ursprüngliche Regelung zum Schutz kleiner Netzbetreiber wird abgelöst, da der anfängliche Adressatenkreis üblicherweise das vereinfachte Verfahren gem. § 24 wählt und nicht am Effizienzvergleich teilnimmt. Eventuell befeuert diese Änderung den Trend zur Netzabspaltung und zur Gründung noch kleinerer Netzbetreiber.

Die sog. best-of-four-Abrechnung gem. § 12 Abs. 3 und 4a wurde entgegen dem Vorschlag aus den Eckpunkten des BMWi nicht verändert.

b) Vergleichsparameter gem. § 13 Abs. 3 und 4

Aus den sog. Pflichtparametern gem. § 13 Abs. 4 ergab sich bislang ein Widerspruch innerhalb des § 13. Die Anforderungen an Vergleichsparameter und die Liste möglicher Vergleichsparameter in § 13 Abs. 3 wurden bereits zur Einführung der ARegV zum vermeintlichen Schutz der Netzbetreiber durch eine Liste verpflichtender Vergleichsparameter für die ersten beiden Regulierungsperioden ergänzt. Der Widerspruch ergab sich daraus, dass einige Pflichtparameter entweder im Einflussbereich der Netzbetreiber lagen (Leitungslänge) oder redundant waren (Anzahl der Anschlusspunkte und Fläche des versorgten Gebiets) und damit den Voraussetzungen des § 13 Abs. 3 entgegenstanden und die sachgerechte Auswahl der Vergleichsparameter erschwerten (Vgl. Bundesnetzagentur, 2015, S. 246, S. 269).

Durch den Verzicht auf eine Verlängerung der Anwendung des § 13 Abs. 4 entgegen der erneuten Forderung einiger Länder (Vgl. Bundesrat, 2016b, S. 8 f.), wurden die Möglichkeiten zur sachgerechten Auswahl der Vergleichsparameter wesentlich verbessert. Eine sachgerechte Auswahl hilft nicht nur dabei, Technologieneutralität zu wahren, indem Fehlanreize zur Optimierung auf diese Parameter vermieden werden. Sie ermöglicht auch eine bessere Abbildung der unterschied-

lichen gebietsstrukturellen Gegebenheiten und der verschiedenen Versorgungsaufgaben der Netzbetreiber sowie eine flexible Anpassung des Vergleichsmodells an energiewirtschaftliche Entwicklungen.

Aus der Änderung ergeben sich nicht per se bessere oder schlechtere Effizienzwerte. Vielmehr können die Effizienzwerte nun sachgerechter ermittelt werden, was außerdem zur Akzeptanz des Effizienzvergleichs beitragen kann.

c) Effizienzbonus gem. § 12a und sonstige Effizienzanreize

Der Effizienzbonus sollte gemeinsam mit einer Verkürzung der Regulierungsperiode gem. § 3 und der damit verbundenen häufigeren Durchführung des Effizienzvergleichs sowie einem kürzeren Abbaupfad für Ineffizienzen gem. § 16 zusätzliche Effizienzanreize als Gegengewicht zur kapitalfreundlichen Ausgestaltung des KKA bilden (Vgl. Bundesministerium für Wirtschaft und Energie, 2016, S. 4, S. 9). Während die Verkürzung der Regulierungsperiode bereits vor der Debatte im Bundesrat aus dem Referentenentwurf entfernt wurde (Vgl. Bundesrat, 2016a), scheiterte die Verkürzung des Abbaupfads am Widerstand der Bundesländer (Vgl. Bundesrat, 2016c, S. 5).

Dabei handelt es sich bei der Gestaltung des Abbaupfads um ein wesentliches Gestaltungselement der Yardstick-Competition. Er determiniert die Entkopplung der Erlöse von den Kosten der Netzbetreiber. Je länger der Abbaupfad, desto so geringer die Entkopplung und desto höher der Anreiz, die eigenen Kosten im Basisjahr aufzublähen, um in der nächsten Regulierungsperiode einen noch höheren Abbaupfad zu generieren (sog. Fotojahreffekt). Der bisherige Abbaupfad hat zur Folge, dass in der ersten Regulierungsperiode durchschnittlich 70 % und in den folgenden Regulierungsperioden immer noch 40 % der ineffizienten Kosten über Netzentgelte refinanziert wurden bzw. werden.[12] Ein vollständiger Abbau allokativer Ineffizienzen aufgrund der Effizienzvorgaben des Abbaupfades ist somit nur äußerst langfristig möglich. Hinzu kommt der bereits beschriebene Fotojahreffekt, der regelmäßig dazu führt, dass im Laufe einer Regulierungsperiode errungene Effizienzvorteile nicht an den Verbraucher weitergegeben werden, da sie im Basis-

[12] Beispielrechnung für die zweite Regulierungsperiode: Im ersten, zweiten, dritten, vierten und fünften Jahr der Regulierungsperiode waren 80 %, 60 %, 40 %, 20 % bzw. 0 % der Ineffizienz in der Erlösobergrenze enthalten, durchschnittlich also 40 %.

jahr nicht zur Geltung kommen. Somit muss auch der Abbau dynamischer und produktiver Ineffizienzen im Rahmen der Anreizregulierung hinterfragt werden.

Der Effizienzbonus ist ein Aufschlag auf die Erlösobergrenze der anhand der Supereffizienzanalyse innerhalb der DEA ermittelt wird. Ihn erhalten Netzbetreiber, die über der Effizienzgrenze liegen, die von den übrigen effizienten Netzbetreibern gebildet wird. Bislang wirkten Effizienzverbesserungen nur in der laufenden Regulierungsperiode zugunsten der Netzbetreiber und wurden am Ende der Periode - abgesehen vom soeben erläuterten Fotojahreffekt - vollständig abgeschöpft. Mit dem Effizienzbonus wird dieser Effizienzgewinn in der Erlösobergrenze der nächsten Regulierungsperiode berücksichtigt.

Der Effizienzbonus bietet damit Anreize für Investitionen oder Innovationen, deren Effizienzvorteile innerhalb einer Regulierungsperiode nicht ausreichen, um die zuvor generierten Erlöseinbußen auszugleichen. Er dient damit der Beseitigung dynamischer Ineffizienzen.

Verfahrensvereinfachungen

a) Regulierungskonto gem. § 5

Der Mechanismus des Regulierungskontos wurde vereinfacht und der Tatsache angepasst, dass es nicht mehr, wie zur Einführung der Anreizregulierung vorgesehen, ausschließlich der Berücksichtigung von Mehr- und Mindererlösen aufgrund von Mengenschwankungen gem. § 5 Abs. 1 dient. Insbesondere werden gem. § 5 Abs. 1 S. 2 Anpassungen dauerhaft nicht beeinflussbarer Kostenanteile sowie gem. § 5 Abs. 1 S. 3 Kosten des Messstellenbetriebs berücksichtigt.

Die Auflösung des Regulierungskontos am Ende der Regulierungsperiode und die anschließende Verteilung des Saldos durch gleichmäßige Zu- und Abschläge auf die Erlösobergrenze über die folgende Regulierungsperiode gem. § 5 Abs. 4 (alt) wurde durch die jährliche Auflösung und Verteilung über die drei folgenden Jahre ersetzt § 5 Abs. 3 (neu). Durch die Änderung sollen Sprünge in den Netzentgelten vermieden werden.

b) Personalzusatzkosten und Entschädigungen nach § 15 Abs. 1 EEG gem. § 11 Abs. 2 S. 1 Nr. 9 und 17

Entgegen der Empfehlung der Bundesnetzagentur wurde der Katalog der dauerhaft nicht beeinflussbaren Kostenanteile nicht auf faktisch nicht beeinflussbare Kosten wie Steuern, Konzessionsabgaben etc. beschränkt. Er wurde bereits mit der Einführung der Anreizregulierung und im weiteren Verlauf immer wieder um Kosten erweitert, die dem Grunde oder der Höhe nach durchaus im Einflussbereich des Netzbetreibers liegen, jedoch aus politischer Motivation heraus vom Effizienzdruck ausgenommen werden sollten. Dieser Gestaltungsspielraum wird durch § 21a Abs. 6 S. 2 Nr. 7 EnWG eröffnet (Vgl. Herrmann, 2015, S. 18 ff.).

Zu diesen Kosten gehören auch die sog. Personalzusatzkosten gem. § 11 Abs. 2 S. 1 Nr. 9. Der Bestandsschutz für Lohnzusatz- und Versorgungsleistungen aus Vereinbarungen vor Geltung der Anreizregulierung wurde auf Leistungen ausgedehnt, die bis zum 31.12.2016 vereinbart wurden. Dadurch wurde den Netzbetreibern ermöglicht, betriebliche und tarifrechtliche Vereinbarungen zu Lohnzusatz- und Versorgungsleistungen anzupassen, ohne dass ihnen dadurch Nachteile im Effizienzvergleich entstehen.

Die Aufnahme der Entschädigungszahlungen nach § 15 Abs. 1 EEG als dauerhaft nicht beeinflussbarer Kostenanteil nach § 11 Abs. 2 S. 1 Nr. 17 geschah durch Maßgabe des Bundesrates (Vgl. Bundesrat, 2016c, S. 3). Vorgesehen war ursprünglich, diese Zahlungen als volatilen Kostenanteil nach § 11 Abs. 5 einzustufen (Vgl. Bundesrat, 2016a, S. 5 ff.). Damit wären sie in den Effizienzvergleich eingeflossen und hätten im Laufe der Regulierungsperiode angepasst werden können. Das hätte zum Wettbewerb zwischen den Technologien „Einspeisemanagement“ und „Netzausbau“ geführt. Durch die Einstufung als dauerhaft nicht beeinflussbarer Kostenanteil werden die Kosten des Einspeisemanagements dem Effizienzvergleich entzogen, wodurch diese Lösung gegenüber klassischem Netzausbau, dessen Kosten in den Effizienzvergleich einfließen, attraktiver wird. Durch die Einstufung als dauerhaft nicht beeinflussbarer Kostenanteil ist die jährliche Anpassung der Kosten des Einspeisemanagements gem. § 4 Abs. 3 S. 1 Nr. 2 gleichermaßen gewährleistet.

c) Vereinfachtes Verfahren gem. § 24

Die pauschale Berücksichtigung von 45 % der Gesamtkosten als dauerhaft nicht beeinflussbarer Kostenanteil gem. § 24 Abs. 2 S. 3 wurde zur Einführung der Anreizregulierung ohne genaue Kenntnis über das Verhältnis dieser Anteile zu den

Gesamtkosten zur Vereinfachung der Prüfung der Kosten der Netzbetreiber im vereinfachten Verfahren aufgenommen. Die Erfahrung hat gezeigt, dass dieser Wert bei Netzbetreibern im Regelverfahren bei ca. 34 % (Strom) und im Gasbereich sogar nur bei ca. 13 % liegt (Vgl. Bundesnetzagentur, 2015, S. 317 f.). Es kommt hinzu, dass vermiedene Netzentgelte und vorgelagerte Netzkosten zwischen den Netzbetreibern stark schwanken, sodass ihre Berücksichtigung in dieser Pauschale nicht sachgerecht ist. Die Kostenbestandteile wurden daher aus dem Pauschalwert entfernt und dieser wurde auf 5 % gesenkt.

Um zu bewerten, ob weitere Anpassungen des vereinfachten Verfahrens, insbesondere der Höhe der Schwellenwerte sinnvoll sind, wurden die Berichtspflichten der Bundesnetzagentur mit § 33 Abs. 8 um einen Bericht zur Struktur und Effizienz von Netzbetreibern im vereinfachten Verfahren erweitert.

Für Netzbetreiber im vereinfachten Verfahren bedeuten die geringeren dauerhaft nicht beeinflussbaren Kostenanteile gem. § 24 Abs. 2 S. 3. geringere Erlösobergrenzen, da ein größerer Teil der Gesamtkosten dem Abbaupfad der Ineffizienzen unterliegt. Mit der Berichtspflicht der Bundesnetzagentur gem. § 33 Abs. 8 sind zudem Datenerhebungen nach § 27 Abs. 8 verbunden, sodass auf diese Unternehmen einmalig ein erhöhter Verwaltungsaufwand zukommt.

d) Teilnetzübergänge gem. § 26 Abs. 2 bis 6

Das Verfahren zur Aufteilung der Erlösobergrenzen bei Teilnetzübergängen wurde vereinfacht. Differenzen zwischen der abgebenden und der aufnehmenden Vertragspartei hatten zu erheblichen Verzögerungen bei der Festlegung von Erlösobergrenzen geführt. Die Grundlage der Entscheidung der Regulierungsbehörde über die Aufteilung der Erlösobergrenze bildet gem. § 26 Abs. 2 der einvernehmliche Antrag der beteiligten Netzbetreiber. Um das Verfahren zu vereinfachen findet keine Neufestlegung der Erlösobergrenze statt. Stattdessen werden die Erlösobergrenzen um den übergehenden Erlösanteil erhöht bzw. reduziert. Darüber hinaus wird der aufnehmende Netzbetreiber berechtigt, schon vor der Festlegung des übergehenden Erlösanteils angemessene Netzentgelte zu erheben. Sofern innerhalb von sechs Monaten keine Einigung erzielt werden kann, teilt die Regulierungsbehörde gem. § 26 Abs. 3 bis 5 die Erlösobergrenze dem Verhältnis der Verbrauchsmengen des betroffenen Teilnetzes zum Gesamtnetz entsprechend auf.

Für Netzbetreiber bedeutet dies, dass die oft langwierigen Verfahren der Teilnetzübergänge erheblich beschleunigt werden. Sollte es zu keiner Einigung kommen, kann die Aufteilung der Erlösobergrenze anhand der jeweiligen Verbrauchsmengen künftig als Richtschnur für die Einigung zwischen dem abgebenden und dem aufnehmenden Netzbetreiber dienen. Ob die in § 26 Abs. 3 bis 5 beschriebene Hilfsmethode zur Aufteilung der Erlösobergrenzen bei Teilnetzübergängen damit de facto zur Regel wird, bleibt abzuwarten.

e) Veröffentlichung von Daten gem. § 31

Mit den neuen Veröffentlichungspflichten für Regulierungsbehörden in § 31 werden Regulierungsentscheidungen und das Investitionsverhalten der Netzbetreiber grundsätzlich transparenter. Für Außenstehende wird das Handeln der Regulierer dadurch jedoch nicht unbedingt besser nachvollziehbar. Dazu müssten beispielsweise für den Effizienzvergleich auch die Parameter veröffentlicht werden, die nicht in die finalen Effizienzwertberechnungen eingeflossen sind. Die Wirkung dieser Regelung wird insbesondere von der Umsetzung durch die Regulierungsbehörden abhängen.

Für die Netzbetreiber bedeutet die neue Regelung des § 31 zunächst keinen Mehraufwand, da die zu veröffentlichen Werte den Regulierungsbehörden ohnehin vorliegen. Durch die Veröffentlichung der aggregierten Information könnte jedoch das Interesse der Öffentlichkeit auf spezifische Themen gelenkt und schließlich auch ein Zweck der Regelung, nämlich Effizienzdruck durch öffentliche Kontrolle erfüllt werden.

4.5 Fazit

Die Investitionsbedingungen für Verteilernetzbetreiber, einschließlich kommunaler Netzbetreiber, haben sich durch die ARegV-Novelle grundlegend verbessert. Sowohl der bisherige Zeitverzug bei Investitionen außerhalb des Basisjahres, als auch mögliche Fehlbeträge aufgrund des Budgetansatzes wurden eliminiert. Hiervon profitieren insbesondere Netzbetreiber, die aufgrund von Veränderungen ihrer Versorgungsaufgabe, wegen Restrukturierungsmaßnahmen oder in den Ersatz ihrer Anlagen investieren müssen. Netzbetreiber ohne Investitionsbedarf werden durch

die ARegV-Novelle im Vergleich zum bisherigen Rechtsrahmen schlechter gestellt. Allerdings liegt das daran, dass sie unter dem bisherigen Regulierungsrahmen Einnahmen durch den positiven Sockelbetrag erwarteten, denen keine Ausgaben gegenüberstanden.

Gewiss hat sich die Anreizwirkung des Regulierungssystems verschlechtert. Der Anspruch, einen technologieneutralen Regulierungsrahmen zu gestalten, um alle Lösungsoptionen im Wettbewerb antreten zu lassen und den Netzbetreibern die Wahl der effizienten Mittel zu überlassen, wurde zu einem gewissen Grad aufgegeben. Die unterschiedliche Behandlung von Kapital- und Betriebskosten bei der Erlösobergrenzenfestlegung und -anpassung wurde schließlich nicht durch neue Effizienzanreize kompensiert. Daraus folgt, dass Netzbetreiber, die ihr Netz modernisieren wollen, bald merken werden, dass sich mit klassischem Netzausbau statt intelligenter Netzsteuerung in Zukunft weiterhin besser Geld verdienen lässt.

Chapter 5

Conclusion

This thesis deals with two main topics of industrial organization: collusion and natural monopolies. I briefly summarize the main results.

Chapter 2, *Legal and Illegal Cartels in Germany*, offers a completely new and broad insight into the landscape of German cartels. It provides the first comparison of legal and illegal cartels in order to use legal cartels as a benchmark for illegal ones. Legal cartels tend to last longer and to have more members than illegal cartels, while there are little differences with respect to the industries involved.

How the number of cartel members affects the duration of cartels is ambiguous. Cartels with 5 to 12 members tend to last longer than cartels with less than 5 or more than 12 members. This may be due to two countervailing effects. On the one hand, cartels with fewer members face lower transaction and monitoring costs which should increase a cartel's stability. On the other hand though, cartels with fewer members may face more outside competition, decreasing the cartel's stability.

The fines imposed by the FCO are positively related to the 2nd and 6th amendment of the GWB. The effect of these two amendments can be possibly explained by their meaning for German competition law. The 2nd GWB Amendment in 1973 meant a change in cartel prosecution. The 6th amendment in 1999 was also very important since the GWB was adjusted to European cartel law including new handling of cartel prohibition.

Chapter 3, *Do Buyer Groups Facilitate Collusion?*, analyzes the collusive effects of buyer groups as an example of a lawful joint market institution. Policy makers are aware that these institutions can be abused for collusion, as reflected in the *US Antitrust Guidelines on Collaborations Among Competitors* (US Guidelines, 2001) or the *EU Guidelines on Horizontal Co-operation Agreements* (EU Guidelines, 2011). The data from Chapter 2 shows that they often serve as a legal platform for illegal collusion, however, it is unclear just how these platforms are used to cartelize a market.

In the theory section, it is shown that the mutual dependence in buyer groups facilitates tacit collusion. There are two possible channels. First, the threat to abandon the buyer group altogether reduces the minimum discount factor required. Second, closed buyer groups which have the power to exclude specific firms facilitate tacit collusion even further. The analysis of the closed buyer group is novel in that it allows for individually targeted punishments which cost the deviator

more than the punishing firms.

The experimental section of Chapter 3 partially confirms these predictions. Buyer groups per se do not facilitate tacit collusion, in contrast to the prediction. Supporting the theory, the possibility to exclude a single firm from the buyer group does result in significantly less competitive quantities. Communication can very effectively support collusion, which is in line with previous experiments. Interestingly, communication even has a moderate collusive impact when firms do not abuse the communication stage for explicit quantitative agreements.

Altogether, the analysis confirms the policy makers' concerns with buyer groups. While generally "reduced incentives" from joint purchasing cannot be found(*EU Guidelines*, point 201), it can be observed that the possibility to exclude competitors from the access to low input prices is detrimental to welfare (*EU Guidelines*, point 203). Finally, the *EU Guidelines* are right to suspect a "cartel in disguise" (point 205) because buyer groups enable communication between firms. Non-exclusionary buyer groups which limit the possibilities to communicate as much as possible are superior from a welfare perspective.

Chapter 4, *Auswirkungen der ARegV-Novelle auf kommunale Netzbetreiber*, gives an overview on the implementation of the regulation of natural monopolies in the German energy sector since the liberalization at the end of the last century and analyzes the last amendment of the German Incentive Regulation.

The goal of network regulation is to minimize allocative, productive, dynamic and qualitative inefficiencies that might result from natural monopolies. Nonetheless, the high influence of public authorities owning energy networks on the legislative process has led to a regulatory framework that focuses more on securing revenues than on achieving overall efficiency. Therefore, investment conditions for network system operators have been improved significantly affecting negatively the productive, dynamic and allocative efficiency of the regulatory system.

The amendment introduces a change back to cost-plus-regulation and forecloses technology neutral competition of network system operators by privileging capital-cost-based solutions compared to operating-cost-based ones.

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