

# *Registered cartels in Austria: an overview*

**Nikolaus Fink, Philipp Schmidt-Dengler,  
Konrad Stahl & Christine Zulehner**

**European Journal of Law and  
Economics**

ISSN 0929-1261

Eur J Law Econ  
DOI 10.1007/s10657-017-9564-5

Volume 38, Number 2

October 2014

**ONLINE  
FIRST**

**European  
Journal of  
LAW AND  
ECONOMICS**

EDITOR

JÜRGEN G. BACKHAUS

Co-EDITORS

ALAIN MARCIANO

GIOVANNI BATTISTA RAMELLO

 Springer

 Springer

**Your article is protected by copyright and all rights are held exclusively by Springer Science+Business Media, LLC. This e-offprint is for personal use only and shall not be self-archived in electronic repositories. If you wish to self-archive your article, please use the accepted manuscript version for posting on your own website. You may further deposit the accepted manuscript version in any repository, provided it is only made publicly available 12 months after official publication or later and provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The final publication is available at [link.springer.com](http://link.springer.com)".**

## Registered cartels in Austria: an overview

Nikolaus Fink<sup>1</sup> · Philipp Schmidt-Dengler<sup>2</sup> · Konrad Stahl<sup>3</sup> ·  
Christine Zulehner<sup>4</sup>

© Springer Science+Business Media, LLC 2017

**Abstract** Cartels were legal to a large extent in Austria until the country's EU accession in 1995. We examine archival material on registered horizontal cartels to learn about their inner working. Applying content analysis to legally binding cartel contracts, we comprehensively document different collusion methods along the lines described by Stigler (J Political Econ 72:44–61, 1964). Quota cartels employ regular reporting schemes and use compensation mechanisms for departures from set quotas. Specialization cartels divide markets, and rely the least on information exchange and punishment. Price and payment condition cartels primarily aim to

---

We would like to thank the participants of the SEEK Workshops on Legal cartels in Mannheim, in particular David Genesove, and the Bergen Competition Policy Conference in 2015 for helpful comments. We are grateful to Stefan Weingärtner for excellent research assistance. Financial support from the Oesterreichische Nationalbank (Austria's central bank, Anniversary Fund, project number: 14449) and the ZEW under the SEEK programme is gratefully acknowledged.

---

✉ Christine Zulehner  
zulehner@safe.uni-frankfurt.de

Nikolaus Fink  
nikolaus.fink@rtr.at

Philipp Schmidt-Dengler  
philipp.schmidt-dengler@univie.ac.at

Konrad Stahl  
kos@econ.uni-mannheim.de

- <sup>1</sup> Austrian Regulatory Authority for Broadcasting and Telecommunications, Mariahilfer Straße 77-79, 1060 Wien, Austria
- <sup>2</sup> University of Vienna, WIFO, CEPR, CESifo, and ZEW, Oskar-Morgenstern-Platz 1, 1090 Vienna, Austria
- <sup>3</sup> University of Mannheim, CEPR, CESifo, and ZEW, L7, 3-5, 68131 Mannheim, Germany
- <sup>4</sup> Goethe-University Frankfurt, Telecom ParisTech, WIFO, and CEPR, Theodor-W.-Adorno-Platz 3, 60629 Frankfurt am Main, Germany

prevent secret price cuts, requiring information provision upon request, allow for discretionary decision-taking and (sometimes immediate) punishment. These stylized facts on the contractual arrangements suggest that the possibility to write legally binding agreements was employed to address the usual obstacles to sustain collusion.

**Keywords** Collusion · Cartels · Legal cartels · Contracts

**JEL Classification** L410 · L430

## 1 Introduction

We study archival materials from registered cartels in Austria to learn about the inner workings of cartels. Many countries allowed firms to engage in non-competitive practices, by registering agreements with a government authority. This was the case in several European countries, such as Austria, Denmark, Finland, Norway, and Sweden, after World War II, or in the United States during the National Industrial Recovery Act (NIRA). In Austria, this episode ended in the mid-1990s with the country's accession to the European Union.

To grasp the widespread activities and rules cartels stick to, we follow a descriptive approach. This enables us to present stylized facts that take into account theoretical insights and real world observations at once. Davis and Fletcher (2013) call for a better understanding of the mechanisms that firms employ to overcome the difficulties inherent in agreeing to collude. We hope to contribute to this understanding using the following approach. Based on established wisdom summarized exceptionally well in Stigler (1964) and in-depth content analysis of cartel contracts, we developed a coding scheme<sup>1</sup> capturing contract characteristics according to four methods of collusion: quotas, specialization, price fixing and payment conditions. Using a flexible and content-sensitive approach we developed categories to provide a broad description of these cartels.

Our main findings can be summarized as follows. Registered cartels included only a small subset of firms active in the Austrian economy. More than half of the cartels used more than one method of collusion. For instance, roughly one third of the cartels combine price and payment condition clauses. In quota cartels, the prevalence of provisions for information exchange and compensation mechanisms is in line with ideas put forward by Stigler (1964) and recent theory developed by Harrington and Skrzypacz (2011). Almost all quota cartels belong to the manufacturing sector. On average, quota cartels have fewer members compared to price and specialization cartels. Specialization agreements (allocating the market either regionally, by product, or by customer) stand out in terms of their simplicity, hardly specifying information provision requirements or punishment rules. Cartels

---

<sup>1</sup> For details see Fink et al. (2014).

fixing prices are comparatively large and often employ other methods of collusion as well. They more often use norms to prevent competition along dimensions other than price. Payment condition agreements primarily increase transparency, indicating an attempt to prevent secret price cuts. They tend to be the most complex agreements, relying more on information provision upon request and explicit punishment schemes. Almost three quarters of all agreements specify some form of punishment for contract violation.

We emphasize that legal cartels and their registration were part of the Austrian version of corporatism called “Social Partnership,” in which price ceilings (increases) were effectively regulated. Cartel contracts thus primarily served as a tool to realize the permitted maximum price avoiding its undercutting. Overall, we find that the agreements tend to address issues that the literature (see for instance Stigler (1964)) has raised as potential obstacles to sustaining collusion: they use compensation schemes, reporting requirements, rules for entry and exit, and ensure quick and credible punishment.

We contribute to an emerging body of literature comparing the details of inner workings of several cartels within a specific institutional environment. Levenstein and Suslow (2006) survey the literature on domestic and international cartels in different legal environments. Harrington (2006) describes the practices of 20 detected cartels, based on European Commission decisions over 2000–2004. Levenstein and Suslow (2011) focuses on the factors influencing duration of detected international cartels. Connor (2003) analyses the duration, the welfare impact and antitrust fines for international cartels discovered after 1990. While the aforementioned papers focus on environments where cartels were illegal, several studies focus on settings where cartels were legal. Taylor (2007) studies 66 cartels during the NIRA episode 1933–1935 when cartels were legal in the United States. He examines which industries were successful in achieving collusive outcomes and which provisions in cartel contracts led to successful cartelization.<sup>2</sup> Chicu et al. (2013) and Vickers and Ziebarth (2014) study the cement industry during the NIRA episode. Nakazawa and Weiss (1989) describes the nature of legal cartels in Japan after the second World War II. Approved cartels almost always focused on quotas, and never on prices. Symeonidis (2003) compares collusive and non-collusive industries the UK and finds cartels are more likely in capital intensive industries. Haucap et al. (2010) compare legal and illegal cartels in Germany over a time period including ours, and again use the duration of cartels as a success measure. Ciarreta (2012) estimates the effects of (legal) cartelization and regulatory policies on prices and real sales across industries in Sweden during the period 1976–1990.

Most closely related to our paper is the study of Finnish legal cartels by Hyytinen et al. (2014), identifying common patterns across cartel contracts within a specific legal environment. We will refer to the studies mentioned above to put our empirical results in context of existing findings from other countries. We rely on insights from detailed case studies and empirical analysis of individual cartels in both legal and illegal environments including Genesove and Mullin (2001), Asker (2010) and

---

<sup>2</sup> Alexander (1994) and Alexander (1997) provide additional evidence on these cartels.

Röller and Steen (2006) to develop the categories used to describe the cartels in Austria after World War II.

While the contract clauses used by legal cartels may offer useful insights for the detection of illegal cartels, we emphasize that comparing cartels in legal and illegal environments is not straightforward. Cross-sectional studies of detected illegal cartels contain information on the actual practices of the cartels, but may suffer from detection bias. Our study contains all legal cartels in Austria after World War II, but cartel practices may have differed from the contractual clauses. Legal cartels could openly engage in practices such as compensation, punishment, and information transfers, which illegal cartels must hide. Legal cartels can openly instruct all employees to behave according to the agreement, whereas in illegal cartels it is less clear who is informed and bound by the agreement. Finally, we do not observe clauses specifying rules for bidding rings, which are often among detected cartels (see for instance Harrington (2006)). Bidding rings were illegal in Austria.

The remainder of the paper is organized as follows. The next section presents the institutional background, describing how cartel registration worked and its place in the Austrian system of “Social Partnership.” Section 3 describes the archived cartel registry and the construction of our sample, as well as which industries are represented. Section 4 presents the contract characteristics. We first give an overview of the different collusion methods, the multiple use thereof, and the corresponding cartel and contract characteristics. We then go into more detail outlining the presence of additional clauses across the different collusion methods. Next we examine governance structures, like decision making bodies and their voting rules, cartel management, rules for information exchange, compensation and punishment schemes, as well as the regulations on entry and exit. Section 5 summarizes the key findings by collusion method. Section 6 concludes.

## 2 Institutional background

In this section we explain why and how registered cartels existed in Austria. We describe the legal setting requiring registration and incentives to register. We present information on cartel proceedings and the regulatory background dominated by social partnership.

### 2.1 Cartel law in Austria

The legal environment in Austria had always been rather favorable towards cooperative behavior. We focus on the post World War II period.<sup>3</sup> Although part of the Allied Council (both Soviet and United States elements) were opposed (see Johnstone (1951)), the first cartel law was passed in 1951. Macroeconomic conditions strongly influenced the attitude toward cartels. Cartels were considered to be a stabilizing force in the economy.<sup>4</sup> The 1951 law did not prohibit cartels. Instead

---

<sup>3</sup> See Resch (2002) for the situation before 1914.

<sup>4</sup> See Seidel (2005) and Butschek (2011) for a detailed documentation.

it required cartel agreements to be registered at court, thus providing a legal basis for cartelized activities.

Since we had access to registry files from 1973 on, the 1972 law is the most relevant for our purposes. According to the 1972 law, cartel agreements were defined as all binding agreements aiming at “regulation or limitation of competition, in particular with respect to production, sales, or prices” (KartG 1972, §1).<sup>5</sup> The law included a separate provision for “concerted practices”—cartel like behavior without explicit agreement—and “cartels by effect” (KartG 1972, §1). Registration of such cartelized activity was required upon notification by the chairman of the cartel court (KartG 1972, §16).<sup>6</sup> Finally, *de minimis* cartels (where the companies involved had less than 5% national and 25% local market share) were not obliged to register, although some did.

Firms had to write a contract defining their cartel arrangement, as well as an economic justification thereof. Upon approval, the contract along with possible supplements (price lists, calculation schemes, etc.) was then filed in the cartel register. The decision as to whether a cartel agreement was registered was made by a three-judge panel at the cartel court. The judicature never formally nor materially clarified its interpretation of “economic justification,” since it never prohibited cartels based on the lack of it. Yet individual cartels were prohibited, when the contract on which they were based was deemed immoral according to the Austrian civil code. For example, a bidding ring was declared illegal in 1975. Consequently, there are no bidding rings among the registered cartels. Furthermore, the cartel law intended to contain the pressure both on members to stay within the cartel and to non-members to be part of the cartel. Hence, the period of notice for exit was limited to six months and penalties for an exit were forbidden.

In principle, unregistered cartel agreements were subject to criminal law. Criminal law needs enforcement by the government. Official conviction statistics show only two impositions in the period we study, suggesting that the fear of being caught and fined for operating an illegal cartel was not the main incentive to register a cartel. A registered contract constituted a legally binding agreement. The cartel could thereby be enforced either through fines and arbitration proceedings as specified in the contract, or through legal action in the courts.<sup>7</sup> The legally binding character of the agreements distinguishes the Austrian case from other environments where collusive agreements may have been legal, but were not enforceable in court, for example in the U.S. during the NIRA episode.

---

<sup>5</sup> The 1972 law remained in force until 1988. The 1988 law differed in one major aspect, namely that contracts could only be approved (or renewed) for a maximum length of five years at a time.

<sup>6</sup> Conversely, it was not required to register concerted practices and cartels by effect, as long as there was no such request. Such a request occurred only once (see Tüchler (2003)). The resulting registration request was actually declined. Therefore our registry involves no cartel registered upon request.

<sup>7</sup> Fines were subject to the judge’s discretion and could be lowered relative to the fines specified in the cartel contract.



## 2.2 Cartel registration within Austrian system of “social partnership”

To understand the cartel activities in Austria it is important to keep in mind the institutional structure governing economic activities in the period of study. Economic agents were represented in central organizations. The Chamber of Labor represented the interests of all dependent employees in Austria, and the Chamber of Commerce those of business. Membership in the respective chamber was mandatory for all dependent employees and firms. In addition, employees were represented by the Trade Union Federation, and farmers by the Chamber of Agriculture. These four major interest groups were members of the “Parity Commission” which was an informal body seeking to find compromises on price and wage issues. The institutional set-up at the court and within this system of “Social Partnership” is particularly relevant for the study of cartelization activities. Figure 1 in the Appendix illustrates the cartel registration process and the involvement of social partners.

First, the three chambers (Agriculture, Labor, and Commerce) were parties in the cartel application proceedings. Additionally, the federal financial agency was party of the proceedings as an attorney general for the federal government. The parties were eligible to request a review of an application as well as to appeal to the cartel court’s decision.<sup>8</sup>

Second, the “Parity Committee on Cartel Matters” prepared an expert opinion for the court, in particular on the agreement’s economic justification. The Chambers of Commerce and Labor each proposed members and jointly appointed its secretaries. Decisions were taken by a three member panel of the cartel court, consisting of a professional judge as well as two lay judges (appointed by the Chambers of Commerce and Labor respectively). The panel normally relied only on unanimous expert opinions by the Parity Committee. Representing both consumers and workers in this institutional setup, the Chamber of Labor often accepted cartels as part of greater compromise. This significantly weakened cartel review capabilities and explains that cartels were never denied registration due to lack of economic justification.

Third, the Parity Commission’s Subcommittee on Prices reviewed applications for price increases, as illustrated on the right panel of Fig. 1 in the Appendix. Applications came either from individual companies or trade associations representing a specific sector. Applications had to be justified with cost increases which could not be compensated by improvements in efficiency. Clearly, this centralized mechanism for realizing price adjustments could serve as a coordination device in collusive activities. Most of the registered cartels were part of this regime. Firms were allowed to ask for a price increase once a year at the Subcommittee on Prices. Cost-based price increases were normally approved. A procedure to decrease prices did not exist. For example, the oil crisis and the associated hike in thermal energy

---

<sup>8</sup> The Chamber of Labor requested reviews significantly more often in quota cartels which Stigler (1964) considered the most efficient form of coordinated behavior. The federal financing agency was more active in legal issues.



cost in 1973 and 1979 led to price increases for cement. During the 1980s—when energy prices decreased—the profit margin of the cement cartel increased.

Upon Austria's accession to the European Union in 1995, the approval of cartels that may affect trade was restricted to comply with E.U. competition law and subject to enforcement by the European Commission.<sup>9</sup>

### 3 The Austrian cartel registry

The registry lists about 125 cartel folders. A typical cartel folder includes an overview summarizing the list of events pertaining to an agreement. Every change in the agreement required re-approval by the cartel court. These could be a change in the contract due to a new firm joining the cartel or as simple as the representative of the cartel had changed. In addition to this overview, the folder includes the contract and amendments to the contract. The 125 files in the registry contain in total 149 agreements. We consolidated consecutive (for instance involving extending the duration of a contract) and add-on agreements (adding another member to an existing contract) into one contract each, and removed contracts that actually resembled a merger. We classified the remaining 99 contracts into three groups: pure vertical agreements that also included 12 vertical restraints originating from single upstream producers, 7 horizontal agreements with vertical elements, and 80 pure horizontal agreements.<sup>10</sup> In the ensuing presentation, we concentrate on these 80 pure horizontal agreements. Most of the cartels were initially registered in the 1950s. In 1973, continuing cartels were required to register again. We observe the cartel agreements that were (re-)registered in 1973 or later.

#### 3.1 Industries covered by the cartel registry

To examine which industries were covered by cartel registration, we classify the observed registered cartels according to a two digit industry classification. The details are reported in Table 14 in the Appendix. For many industries, we do not observe any registered cartels. This includes the construction industry which we probably do not observe because the cartel law explicitly prohibited bidding rings.

Based on the 2-digit classification which typically includes several product markets, the number of firms participating in cartels is small relative to the total number of firms. This indicates that formal cartels were not as widespread as one might have expected. Several explanations can be offered for this, given the legal environment and weak enforcement described in Sect. 2. One possible reason is the strong concentration in individual product markets. Further, arrangements serving to raise prices could be implemented easily without invoking any formal agreement, via price regulation by application of the industry associations to the Parity

<sup>9</sup> A major reform of the institutional set-up occurred in 2002 and 2005 when powers of social partners were restricted and the cartel registry was finally closed by end of 2006.

<sup>10</sup> We treat cartels as purely horizontal when they involved collective vertical restraints orchestrated by several upstream firms but without participation of downstream firms.

Commission. After all, administering and implementing a cartel agreement was a costly and time consuming enterprise. In addition, de minimis cartels were exempt from the registration requirement. Cartels by effect and concerted practices were required to register, but the enforcement was weak. Commentators state that cartels consequently often operated informally (Tüchler 2003, p. 134). In Table 15 in the Appendix, we match our cartels into the 4-digit NACE classification. This is done only for manufacturing on the basis of the 1995 Statistics of Manufacturing, as we lack details on the service sector at the 4-digit level. The match of products addressed in the cartels into the 4-digit NACE code is closer than the 2-digit NACE code but still imperfect. Yet the comparison of total number of cartelized firms with the firms at the 4-digit level is indicative of the coverage of the cartels.<sup>11,12</sup>

## 4 Collusion methods and contract characteristics

In this section, we describe the cartels for which we found contracts in the Austrian Cartel Court's register. We employ a coding protocol to format the information contained in the contracts as archived in the cartel registry. Based on this protocol we describe each cartel contract by a vector of contract clauses. In total, we coded 109 different contract clauses as specified in the contracts. However the average contract includes only 25 clauses. Including dates, classifications etc., we specified 200 categories in total.

Most of the contract clauses are coded as binary variables describing whether or not a specific contract clause is part of the agreement. For variables like the industry classification we use nominal categories. Dates, frequencies etc. are numerically coded. For other information, e.g. the products involved we resort to text format.<sup>13</sup>

In the first subsection, we survey the cartels by main method of collusion and broad cartel characteristics. In the second subsection, we discuss auxiliary collusive clauses. In the third subsection, we look at cartel governance.

### 4.1 Main collusive instruments: an overview

Here we introduce the main contract clauses we consider and their frequency of appearance in cartel contracts. We present marginal distributions in terms of cartel size, duration, and complexity. Finally, we describe economic justification provided by cartel applicants and to what extent cartel applications were subject to reviews requested by the Parity Committee.

---

<sup>11</sup> Unfortunately, information on market shares is not available, which would be a more informative indicator of cartel coverage by industry.

<sup>12</sup> The number of firms in the cartels sometimes exceeds the number of firms indicated in the 1995 statistics. This includes sugar (15.83), beer (15.96), and manufacturing of basic iron and steel (27.10). Altogether, the number of firms in manufacturing cartels exceeds the number of firms in the 1995 official statistics in 9 out of 63 manufacturing cartels. The reason is apparently a considerable consolidation in these industries before 1995. Further, for beer four different cartels with overlapping participants are observed in the registry.

<sup>13</sup> For a detailed description of our procedure see Fink et al. (2014).

#### 4.1.1 Instruments to influence market outcome

We start by defining the contract clauses to describe the main instrument(s) a cartel used to influence the market outcome. We base the selection of our main collusion instruments on Stigler (1964) who compares different methods of collusion with respect to their effectiveness against secret price cuts—the strongest impediment to cartel stability. This impediment is shared by legal cartels as well. Most comprehensive is a merger, followed by a joint sales agency. For all other methods, Stigler argues that secret violations of the agreement are profitable. Thus these methods need enforcement: Significant deviations need to be detected. The faster and the more complete detection is, the more stable is the cartel.

Stigler singles out quota agreements as the most efficient way of preventing secret price cuts, but emphasizes that they require output inspection and appropriate formulas for redistribution for departures from quotas. Harrington and Skrzypacz (2011) show that collusion in such a quota cartel can be sustained with truthful reporting of private information on sales. The direct allocation of customers is the next most effective method according to Stigler, as long as demand growth of the custom of various cartel members does not diverge too much. Customer allocation can also be achieved via exclusive territories. Finally, Stigler identifies pure price fixing cartels as the ones prone most to destabilizing action by the cartel members. It requires obtaining the transaction prices from the buyers to detect secret price cutting—although an oligopolist would make secret price cuts only for buyers beyond a certain size. He finally states that there are many different ways for secret price cutting that are difficult to grasp.

In order to identify these methods in our cartel registry, we distinguish between the main instruments listed by Stigler: *quotas*, *specialization*, *price*. We add the separate category *payment conditions*, which is the most frequent clause indicating the risk of secret price cuts:

- *quota* includes agreements on sales, output, or purchases of the participating firms relative to each other, typically on the basis of expected aggregate output.
- *specialization* includes agreements on products, customers, suppliers or territories. Product specialization cartels assign one group of products to one firm and another group of products to the next firm. Customer or supplier specialization agreements assign either customers or suppliers to cartel members. Territorial specialization refers to agreements on exclusive territories or an allocation of customers based on least-freight.<sup>14</sup>
- *price* includes agreements on at least one of the following categories: fixed price, price floor, price book, common costing sheet, price adjustment.<sup>15</sup>
- *payment conditions* include agreements on the terms of payments, such as cash discounts, early payment discounts, and deferred payment.

<sup>14</sup> We observe 13 product specializations, 13 customer/supplier allocations, four exclusive territories and five least freight cost based allocations.

<sup>15</sup> We observe 27 fixed prices, six price floors, 25 price books, 14 price adjustment clauses and 16 common costing sheets.

**Table 1** Cartel clauses and combinations thereof

	...the clause		...only the clause	
	#	%	#	%
<i>Panel A: Cartels containing</i>				
Quota	37	46.3	10	12.5
Specialization	26	32.5	7	8.8
Price	41	51.3	7	8.8
Payment condition	44	55.0	13	16.3
<i>Panel B: Combinations of cartel clauses</i>				
Quota, specialization			5	6.3
Quota, specialization, price			3	3.8
Quota, specialization, price, payment cond's			4	5.0
Quota, price			3	3.8
Quota, price, payment conditions			11	13.8
Quota, payment conditions			1	1.3
Specialization, price			1	1.3
Specialization, price, payment conditions			3	3.8
Specialization, payment conditions			3	3.8
Price, payment conditions			9	11.3
Sum			80	100.0

In Table 1 we present numbers and frequencies of appearance of these instruments in the contracts. Among the 80 horizontal agreements, 37 (46.3%) contracts contain *quota* clauses. 10 (12.5%) of these cartels solely use this main clause. Almost three times as many, namely 27 (33.8%) combine the quota clause with one or more other clauses. The most frequent combination is that of quota, price and payment conditions.

We observe relatively few (26) cartel contracts containing a specialization clause, and even fewer pure specialization cartels. Simple customer allocations were deemed immoral according to the Austrian civil code (Schulte 1980, p.75).

Of the 80 registered horizontal cartels, 41 (51.3%) contain price agreements. This is a large number given that prices could also be coordinated on via the Subcommittee on Prices. We even find seven *pure* price fixing cartels. Agreements on a high price can easily be undermined by granting favorable payment conditions. It is therefore not surprising that 27 of the 41 price fixing cartels also include payment conditions clauses. In Appendix 2, we also present auxiliary collusive clauses, i.e., additional means to implement the desired outcomes: rules on pricing and discounts, capacity restrictions, and norms. In particular, we find that price cartels specify norms on quality and lot size to avoid non-price competition.

Next, we cross-tabulate other contract characteristics with these instruments to influence the market outcome. Again, we separately report contracts that feature a specific main clause exclusively ('pure cartels').

In Table 2 we list the distribution of the main instruments across different sectors. In what follows, the numbers reported represent the percentage of the cartels having

**Table 2** Instruments across sectors

	Cartels #	Manufacturing %	Trade %	Services %
Quota	37	97.3	0.0	2.7
Only quota	10	100.0	0.0	0.0
Spec.	26	80.8	7.7	11.5
Only spec.	7	71.4	14.3	14.3
Price	41	78.0	9.8	12.2
Only price	7	57.1	14.3	28.6
Pay.co.	44	79.5	18.2	2.3
Only pay.co.	13	61.5	38.5	0.0
# of contracts	80	64	10	6

Table presents percentage of agreement with row characteristics that involve column characteristics. Manufacturing includes 2-digits NACE codes 02 and 40. Trade includes 2-digits NACE code 50-52. Services includes 2-digits NACE code 55-90

both the row characteristic and the column characteristic. For instance the number 97.3 in the top of the second column of the table indicates that 97.3% (or 36 cartel) quota cartels were active in the manufacturing sector. Overall, 64 and thus 80.8% of our cartels are found in manufacturing, ten cartels are in the trade sector and six cartels are active in services. While quota cartels can primarily be found in manufacturing, specialization and price cartels are found across all industries. The findings are similar to Hyytinen et al. (2014) in the sense that quota and specialization cartels are more prevalent in manufacturing, at the same time manufacturing plays a more dominant role than in the Finnish cartels. It may be that other sectors are more likely not to being subject to registration requirement, as they operate on a more regional basis. The dominance of manufacturing also complements the finding in Symeonidis (2003) that cartels are more prevalent in capital intensive industries.

#### 4.1.2 Cartel orientation

We distinguish between buyer and seller, and import and export cartels and call this *cartel orientation*. In Table 3 we cross-tabulate these instruments. In what follows, observe that most contracts contain multiple clauses. For instance, the number 18.9 in top right of the table indicates that of the 37 agreement including a quota clause *amongst other clauses*, 18.9% (or seven cartels) also include a clause pertaining to exports. The numbers in the last row show that *most of the registered cartels are seller cartels*: 78 of the 80 cartels in the sample contain a seller cartel orientation. The total number exceeds 80, because some cartels include more than one orientation. For instance the sugar cartel not only regulated domestic sales, but also imports, exports and the purchase of sugar beets.

Note in particular that all pure price, payment condition and specialization cartels are also seller cartels. The only two cartels that are not at all sales oriented are a pure quota and a quota/specialization cartel. About one sixth of the cartels including a quota or a specialization clause and roughly a third of the pure quota cartels are buyer cartels. More than one fourth of the cartels involving a specialization clause are export oriented. Yet there is no export cartel focusing only on pricing or

**Table 3** Cartel orientation

	Cartels #	Buyer cartel %	Seller cartel %	Importer cartel %	Exporter cartel %
Quota	37	16.2	94.6	5.4	18.9
Only quota	10	30.0	90.0	10.0	10.0
Spec.	26	15.4	96.2	3.8	26.9
Only spec.	7	0.0	100.0	0.0	14.3
Price	41	9.8	100.0	4.9	14.6
Only price	7	14.3	100.0	0.0	0.0
Pay.co.	44	9.1	100.0	4.5	9.1
Only pay.co.	13	0.0	100.0	0.0	0.0
# of contracts	80	10	78	3	9

Table reports percentage of agreements with row characteristics involving column characteristics

payment arrangements. Secret price cutting for export markets appears to be less of a concern for registered cartels.

#### 4.1.3 Cartel size

We use the number of participants as specified in the first agreement as a measure of cartel size. Table 4 contains cartel size by instrument to influence market outcome. We observe that the number of participants in quota cartels is substantively smaller both in terms of average and maximum number of participants. One may infer that implementing quotas is easier with a relatively small number of cartelists. Hyytinen et al. (2014) report a slightly lower median cartel size, which may be explained by the exemption of smaller regional and de minimis cartels. The illegal cartels covered in Levenstein and Suslow (2011) have a smaller mean and maximum membership, which is probably due to larger cartels being viable only in our legally binding setting.

**Table 4** Cartel size (number of participants)

	#	Mean	SD	Median	Minimum	Maximum
Quota	37	7.57	5.56	6.00	2	21
Only quota	10	7.70	5.23	6.00	2	20
Spec.	26	11.38	15.00	6.50	2	58
Only spec.	7	13.00	19.43	5.00	2	56
Price	41	12.46	14.44	7.00	2	58
Only price	7	12.43	14.07	8.00	2	42
Pay.co.	43	13.84	16.63	7.00	2	76
Only pay.co.	12	20.50	23.16	12.00	4	76
All	79	12.42	15.36	7.00	2	76

For one agreement, the number of participants is missing

**Table 5** Censored duration (in years)

	#	Mean	SD	Median
Quota	37	13.01	9.28	13.00
Only quota	10	9.23	9.10	5.80
Spec.	26	15.77	8.52	17.81
Only spec.	7	13.80	8.89	13.96
Price	41	14.98	8.87	15.63
Only price	7	16.80	7.89	18.00
Pay.co.	44	15.72	8.83	16.51
Only pay.co.	13	15.74	9.56	17.63
All	80	14.34	8.97	15.54

52 cartels were left censored. The start of the median cartel is censored for all clauses but “only spec.” clauses and thus set to January 1st, 1976. Two cartels were terminated before January 1st 1976. The duration is set to zero. Cartels still registered in 2006 were censored to December 31st 2006 when the registry was formally closed

#### 4.1.4 Cartel duration

Cartels had to register since 1951. We observe registration only from 1973 on. As mentioned earlier, a continuing cartel had to re-register after 1973 and did so until late 1975. Consequently, we consider January 1st 1976 as the earliest birth date. Registered and approved cartels that were compatible with EU competition law were legal until end of 2006, and hence every file in the registry was closed by December 31, 2006. The maximal observed censored duration is thus 31 years. Table 5 provides details by cartel clause. Pure quota cartels turn out to be atypical: they exhibit a shorter average and median than any other cartel type. This may in part be due to social partners being more skeptical of quota cartels, and shorter time limits were part of a compromise within the system of social partnership. For example, three quota only beer cartels did not remain registered beyond 1978. The median duration is two years longer than that reported in Hyytinen et al. (2014) which may again reflect selection of larger and more involved cartels. The mean duration is substantially longer than what Levenstein and Suslow (2006) and Levenstein and Suslow (2011) report, which is also in line with the finding that legal cartels tend to last longer (Haucap et al. (2010)).

#### 4.1.5 Cartel complexity

We proxy cartel complexity by the number of pages of the first cartel contract available. These are presented in Table 6. To illustrate the effect of cartel size, the first three columns refer to absolute numbers, and the second three to numbers per cartel participant. Not unexpectedly, multiple clause cartels involve more voluminous contracts than single clause cartels in both, absolute number of pages and pages per cartel participant. The longest contract involving 105 pages is that of a sugar cartel using all four instruments to influence market outcomes. Pure price



**Table 6** Cartel complexity (number of pages)

	#	Total			Per participant		
		Mean	SD	Median	Mean	SD	Median
Quota	37	20.11	20.70	14.00	3.41	3.69	2.00
Only quota	10	12.00	12.11	9.00	2.10	2.02	1.33
Spec.	26	17.62	23.27	9.00	2.69	3.94	2.00
Only spec.	7	11.14	12.03	6.00	1.73	1.18	2.00
Price	41	20.32	19.35	14.00	3.22	3.65	2.25
Only price	7	7.29	2.75	9.00	1.17	0.84	1.12
Pay.co.	44	20.64	18.35	14.50	3.08	3.57	2.00
Only pay.co.	13	15.23	8.41	13.00	1.57	1.37	1.10
All	80	16.30	15.82	11.00	2.52	2.88	1.81

For one agreement, the number of participants is missing. This agreement was excluded in the statistics on pages per participant

cartels also stand out: they involve by far the shortest contract format. Restricting secret price cutting appears to be the most complex single task: pure payment condition contract are the longest within the group of cartels focusing on one instrument only.

#### 4.1.6 Economic justification of cartel formation

Upon application the cartelists were required to provide an economic justification for the formation of the cartel. Whereas this may have been primarily empty rhetoric, it is worth documenting the deficiencies that the cartelists claimed to resolve within a collusive arrangement. This was presumably done to appease the social partners involved in the approval process.

Overall, the justification provided most frequently is lack of job security (in 35% of all contracts), which is not surprising as the Chamber of Labor played a significant role in the registration process. Only in the applications of pure price fixing and pure specialization cartels job security is mentioned less often. The two next most prominent justifications are lack of security of supply (29%) and excessive competition (27%). Security of supply is considered an issue especially in (pure) quota and in specialization cartels. Pure price and pure payment condition cartels frequently invoke lack of transparency of competition. Agreements on payment conditions are primarily attempts to avoid secret price cuts and thus improve “transparency.” Lack of economies of scale and more so, scope are issues primarily addressed in cartels invoking quota and specialization clauses. “Excessive competition” stands out as a justification in pure quota cartels.

#### 4.1.7 Cartel application review

The cartel application was sometimes subject to review. We obtained information on reviews from the court’s ruling on the application as filed in the registry. We see

that the Chamber of Labor asked for a review in 42 (more than 50%), and the Federal Financial Agency in 17 (slightly more than 20%) of all contracts. For the Chamber of Commerce and the Chamber of Agriculture, a review request is not observed but in one case, which is hardly surprising: both are representatives of enterprises.

Overall, a modification of the initial agreement was observed in 29 (36% of all) agreements. In many cases this involved just limiting the contract period necessitating an earlier renewal application and reducing the size of compensations to increase the flexibility of quotas.<sup>16</sup> Only in four cases, there was a disagreement during the review. But that disagreement was overruled by the cartel court.

## 4.2 Cartel governance

One should expect that formal arrangements are much more prevalent in legal than illegal cartels. While the cartel contracts under scrutiny here contain governance rules in a detail we have not seen heretofore, they seem to be, at first glance, incomplete. We will discuss this at the points deemed relevant.

Below we summarize how cartels were organized and which rules were established to ensure stability: in Tables 7 and 8, we look at the prevalence of different decision making bodies depending on the type of cartel contract, as well as their responsibilities concerning decisions such as approval of entry, exclusion, and penalties. We then illustrate how day-to-day management is organized. The internal reporting and auditing schemes are described in Table 9. Compensation schemes as well as punishment of deviating behavior and its implementation are reported in Tables 10 and 11. Finally, we illustrate the rules governing entry and voluntary exit—information typically not available in this detail for detected illegal cartels.

### 4.2.1 Organization, decision making bodies

The decision taking bodies we observe in the cartel contracts are the plenary meeting, with some decisions delegated to a committee, the executive officer or the authorized representative—usually a lawyer from a small set of Austrian law offices dealing with cartel issues—, and an arbitration panel in case of internal disputes. Table 7 shows that the plenary meeting and the arbitration panel are bodies introduced in most cartel contracts, followed by delegation of some decisions by the plenary meeting to an executive committee. By comparison, (pure) specialization cartels rely much less on such institutions. To a certain extent, this also holds for pure price setting cartels.

The database reveals that the six cartels without a formal decision making body have four members or less. Five of the six include a specialization clause. Specialization agreements thus stand out in terms of simple governance. These cartels appear to have no need for regular decisions, as adherence to the contracts specifying specialization are themselves sufficient to attain the desired outcome.

---

<sup>16</sup> This is in line with available documentation (Wehsely 1978).

**Table 7** Decision making bodies

	Cartels		Plenary meeting %	Committee %	Executive officer %	Authorized representative %	Arbitration panel %	At least one body		Average sum of bodies #
	#	%						%	%	
Quota	37	81.1	48.6	5.4	16.2	91.9	94.6	2.43		
Only quota	10	60.0	30.0	0.0	10.0	100.0	100.0	2.00		
Spec.	26	76.9	42.3	3.8	11.5	69.2	80.8	2.04		
Only spec.	7	57.1	42.9	0.0	0.0	57.1	57.1	1.57		
Price	41	90.2	51.2	4.9	24.4	82.9	97.6	2.54		
Only price	7	71.4	28.6	14.3	14.3	42.9	85.7	1.71		
Pay.co.	44	93.2	56.8	6.8	25.0	86.4	100.0	2.68		
Only pay.co.	13	92.3	76.9	15.4	15.4	84.6	100.0	2.85		
# of contracts	80	65	39	5	15	64	74	2.35		

Table reports percentage of agreements with row characteristics involving column characteristics

**Table 8** Decision making bodies: day-to-day management

	Cartels #	Staffed office %	Trustee %	Independent auditor for investigations %	Leading cartel member %	Exclusive joint sales company %	Non exclusive joint sales company %	Average sum of bodies #
Quota	37	64.9	2.7	40.5	2.7	16.2	8.1	1.35
Only quota	10	70.0	0.0	30.0	10.0	0.0	10.0	1.20
Spec.	26	50.0	0.0	34.6	0.0	23.1	3.8	1.12
Only spec.	7	42.9	0.0	28.6	0.0	14.3	0.0	0.86
Price	41	56.1	2.4	34.1	2.4	17.1	4.9	1.71
Only price	7	28.6	0.0	14.3	14.3	28.6	0.0	0.86
Pay.co.	44	59.1	4.5	36.4	0.0	9.1	2.3	1.11
Only pay.co.	13	69.2	7.7	46.2	0.0	0.0	0.0	1.23
# of contracts	80	45	2	28	2	9	3	1.11

Table reports percentage of agreements with row characteristics involving column characteristics

**Table 9** Reporting and auditing rules

	Cartels #	Regular reports %	Reports upon request %	Reports via joint sales company %	None of them %
Quota	37	94.6	91.9	24.3	2.7
Only quota	10	100.0	90.0	10.0	0.0
Spec.	26	57.7	69.2	26.9	23.1
Only spec.	7	14.3	57.1	14.3	28.6
Price	41	58.5	75.6	22.0	19.5
Only price	7	14.3	28.6	28.6	42.9
Pay.co.	44	56.8	81.8	11.4	18.2
Only pay.co.	13	38.5	92.3	0.0	7.7
# of contracts	80	46	61	12	14

Table reports percentage of agreements with row characteristics involving column characteristics

**Table 10** Compensation schemes

	Cartels #	Carry-over to next period %	Cash payments %	Sales between cartelists %	Transfer customers/ orders %	Earnings redistribution %	At least one of those %
Quota	37	40.5	67.6	21.6	45.9	2.7	89.2
Only quota	10	20.0	90.0	30.0	40.0	0.0	90.0
Spec.	26	23.1	34.6	3.8	23.1	3.8	42.3
Only spec.	7	0.0	14.3	0.0	14.3	0.0	14.3
Price	41	29.3	29.3	9.8	24.4	0.0	46.3
Only price	7	0.0	0.0	0.0	0.0	0.0	0.0
Pay.co.	44	20.5	25.0	9.1	25.0	0.0	38.6
Only pay.co.	13	0.0	0.0	0.0	0.0	0.0	0.0
# of contracts	80	15	26	8	18	1	34

Table reports percentage of agreements with row characteristics involving column characteristics

Which key decisions are taken by which body? In a quarter to a third of all contracts, the plenary meeting is in charge of both, approval of entry and exclusion from the cartel. Only 20 cartel contracts explicitly specify an institution, namely the plenary meeting, to determine output, and only 19 do so for prices. Also, these decisions are delegated only in a small number of cases. However, one has to keep in mind that coordination on prices was feasible via the subcommittee on prices or via adhering to external reference prices. At last, for some cartels the plenary meeting is explicitly mentioned as responsible for all unspecified decisions. In 62

**Table 11** Forms of punishment

	Cartels #	Warning %	Monetary penalty %	Exclusion %	At least one clause %
Quota	37	10.8	62.2	27.0	64.9
Only quota	10	10.0	50.0	20.0	60.0
Spec.	26	7.7	46.2	34.6	61.5
Only spec.	7	0.0	28.6	28.6	57.1
Price	41	19.5	75.6	39.0	80.5
Only price	7	14.3	57.1	28.6	71.4
Pay.co.	44	18.2	77.3	47.7	86.4
Only pay.co.	13	23.1	84.6	53.8	92.3
# of contracts	80	12	51	30	59

Table reports percentage of agreements with row characteristics involving column characteristics

(or 77.5%) of all contracts, an arbitration panel constitutes the supreme body dealing with appeals against imposed penalties.

Next we examine the decisions on cartel output, price(s) and entry/exclusion in more detail. The mean majorities required for output measures are very high. Mean majority levels on prices are substantively lower. By comparison, mean majorities involving entry/exclusion decisions vary substantially across cartel clauses—quota and specialization cartels require majorities next to unanimity for entry approval. Payment condition cartels are less restrictive towards entry. Finally, mean majorities required to force the exit of cartel members are quite low, and—with the exception of pure payment condition cartels—lower than those required for entry decisions.

#### 4.2.2 Day-to-day management

Formally established staffed offices with specified duties are definitely a distinctive advantage of legal over illegal cartels. In slightly more than one half of the cartels, day-to-day management is handled by a staffed office as shown in Table 8.

35% of cartels rely on independent auditors for investigations. In about 15% of all cartels, primarily price and specialization cartels, a joint sales company is established, with the purpose of orchestrating the intermediation between the cartelists and their customers, and in particular maintaining control over the cartel arrangements.

#### 4.2.3 Information transfer

The incentives to defect in legal cartels are akin to those in illegal ones. In particular, holding cartel prices above competitive levels invites price undercutting in order to increase market share and profits. Therefore, transferring accurate information and monitoring the behavior of cartel members is essential of sustaining cartel stability. In Table 9 we summarize the reporting requirements as indicated in the contracts. All pure quota cartels and 35 out of the 37 cartels involving a quota

clause require regular reports from its members,<sup>17</sup> and most of them also require (additional) reports upon request. While regular reports are dominant in quota cartels, reports upon request are most common in pure payment condition cartels, with 12 out of 13 cartel agreements specifying them. We also observe that three of the seven pure price fixing cartels do not specify any reporting requirements.

A closer look at the 14 cartels not requiring any reporting reveals that six of them involve product specialization, custom, or territorial specialization. In these cases publicly available information may suffice to monitor conduct. The remaining cartels all fix prices, some of them supplementing the agreement with payment conditions. However, it remains an open question whether public information enables detection, or individual buyers are too small to trigger deviations by cartelists.

*Regular reports* Table 9 illustrates that regular reports are required in 46 out of the total of 80 contracts. We also investigated which where the key items that had to be reported for these 46 contracts—35 of them quota cartels. In the majority of these contracts, namely 28 (61%) of them, quantities had to be reported. In roughly one third of the cartel contracts involving prices, payment conditions or some form of specialization, every individual sale had to be reported ex-post. Notification of ex-ante supply—often prices—is combined with payment conditions in eight of nine cases. For the two cartels with ex-ante demand reporting requirements, we also find joint sales companies. Naturally, regular reports on quantities are primarily required in quota cartels. A third of cartels including quota clauses require reporting ex-post aggregate sales without a pre-specified frequency of reports.

*Reports upon request and record keeping* Finally, we look in more detail at the 61 contracts reported in Table 9 that specify reports upon request. In 57 (93%) out of the 61 contracts, one of the decision making bodies could request information from the cartel members. In rare cases (4 out of 61) where the database lists six or fewer members, such information had to be given to all cartel members. We also observe that in all but pure specialization cartels members were required to record sales. At the same time it seems that these cartels were not concerned with sales outside the cartel. For two cartels, we also observe a duty to account for exports.

Comparing these rules to the informational requirements for cartel stability discussed in the theoretical literature by e.g. Cramton and Palfrey (1990) or Athey and Bagwell (2001), it is surprising to see that cost reporting was never specified in a cartel contract with the exception of the cement cartel. The absence of cost reports may be explained by the particular institutional setting of social partnership. As explained in Sect. 2, firms had to report their costs to the subcommittee on prices, whenever they requested a price increase.

#### 4.2.4 Compensation schemes

In quota cartels, the sharing rules are typically specified ex-ante, but not (exactly) realized ex-post. Thus, compensation schemes must be foreseen in the cartel

---

<sup>17</sup> The sole quota cartel without information exchange sets the domestic quota of one member to zero, whereas the remaining domestic suppliers form a separate cartel for insulated board.



contracts—to establish a cartel and to maintain its stability. In Table 10 we document the compensation schemes adopted by the cartels. Overall we find most quota cartels, 33 out of 37, foresee compensations. Cash payments are the most frequent form of transfers. This is in line with Athey and Bagwell (2001)'s consideration that in permissive legal environments, in-period transfer payments are the efficient form of compensation. The difference between the size of the compensating cash payment and the cartel gain per unit, if positive, might act as a penalty forcing to fulfil quotas as exactly as possible. As expected, other cartels do not foresee compensation schemes.

We looked at the remaining four quota cartel contracts in more detail to see whether they employed an alternative to a compensation scheme. One contract specifies that one member will stop production in exchange for lump sum, while the two remaining competitors agree on a compensation scheme in a separate agreement (insulated board). The Innsbruck hotel ring agrees on a quota on how to distribute incoming reservations at the central office. The edible oil producers operate via a joint sales company which is responsible for allocation of quotas. Only the producers of sickles and scythes fix quotas without specifying compensations.

#### 4.2.5 Punishment of deviators

Mechanisms to sanction deviations are necessary to sustain cartel stability. In Table 11 we document three forms of punishing deviators present in the cartel contracts: a formal warning of the cartel member not associated with any fines, monetary penalties, and the exclusion of the deviator from the cartel.

Of all 80 cartel contracts, only 59 explicitly address the issue of punishment. At first, this seems to be a rather small share as we would have expected all cartel contracts to contain explicit punishment clauses. However, even in absence of a specified punishment scheme, deviators could be taken to court for violating the contract. A closer look at the remaining 21 cartels also reveals that 18 either specialize or rely on quotas. Specialization often makes cheating impossible, quota cartels sometimes rely solely on compensations but not on fines—but over-compensating cash payments create the same incentives on exceeding the quotas as do fines (see Harrington and Skrzypacz (2007)). The remaining three cartels include a garbage recycling cartel operating a joint sales agency fully controlling prices and quotas, as well as a precious metal refining and a plumbing products cartel.

When we look at different forms of punishment, we observe that penalties are specified in only 50 and 57% of the pure quota and price cartels, respectively. Among pure payment condition cartels monetary penalty clauses are particularly common (85%).

Quota cartels rely least often on explicit exclusion as a form of punishment. We may thus infer that they prefer to keep every member within the cartel rather than creating an outsider. In contrast, exclusion is a relatively frequent form of punishment foreseen in payment condition agreements. This suggests that cartels that restrict price cutting accept the risk to create an outsider.

**Table 12** Reasons for monetary penalties

	Cartels	Deviation from market conduct	Refusal of information provision	Provision of incorrect information	At least one clause
	#	%	%	%	%
Quota	37	59.5	24.3	10.8	62.2
Only quota	10	50.0	10.0	10.0	50.0
Spec.	26	42.3	15.4	7.7	46.2
Only spec.	7	28.6	0.0	0.0	28.6
Price	41	73.2	29.3	12.2	75.6
Only price	7	57.1	14.3	0.0	57.1
Pay.co.	44	75.0	36.4	11.4	77.3
Only pay.co.	13	84.6	46.2	0.0	84.6
# of contracts	80	50	19	6	51

Table reports percentage of agreements with row characteristics involving column characteristics

Overall we find that all forms of punishment and compensation are substantially more prevalent in the Austrian setting than in the legal Finnish cartels (Hyytinen et al. (2014) report this for a subset of cartels). The fraction of firms having agreed to some form of compensation is surprisingly close to that in the illegal cartels in Levenstein and Suslow (2011). The fraction of cartels where exclusion and some other form of punishment *actually took place* in their sample, is not much smaller than the fraction of cartels that have a provision for these measures in our sample.

In Table 12 we document the contract violations triggering monetary penalties. They are specified in only slightly more than 60% of all contracts. The primary violation mentioned is deviation from market oriented conduct as specified in the contract. This is followed by the provision of incorrect information and the refusal to provide information at all to the relevant institutions.

Payment condition contracts specify contract violations triggering penalties most often, not only for market conduct but also for the refusal to supply information. Pure specialization cartels do not impose any penalties for providing incorrect information or refusal of information provision. This also holds for all but one of the pure price cartels.

We also analyzed the maximal monetary penalties quoted. While the maximum of these maximal penalties is about 75.000 Euros,<sup>18</sup> the median of the maximal penalties, say in the pure price cartels, is only slightly above 5.000 Euros. We do not know how often such penalties were actually imposed on deviating firms. The median level of monetary penalties suggests that they were not critical in enforcement.<sup>19</sup> This is supported by the fact that fines were not adjusted over the observation period.

<sup>18</sup> The consumer price index and the date of the agreement were used to calculate penalties in real terms. The reported penalties have been converted to 2014 Euro.

<sup>19</sup> Note that we do however observe nine cartels with an unlimited security deposit, see the discussion below.

To secure actual payment of the imposed penalties (and thus the credibility of punishment), the cartels sometimes resorted to security deposits. In 16 (20%) of the contracts, some form of security deposit was required by the cartelists, usually in form of a bill of exchange. These security deposits were actually *unlimited* in 9 (11%) of all contracts, requiring a blank bill of exchange. Both limited and unlimited security deposits are found most frequently in contracts involving payment condition clauses. While these provisions obviously made punishment of deviators credible, members were usually allowed to appeal against imposition of penalties (and compensation payments) to the decision bodies described above. Ten of our contracts included even two stages of appeal.

#### 4.2.6 Entry–exit rules

Finally, we look at the rules for the entry of firms into, and the exit from the cartel arrangement. Rules for admitting entry were specified explicitly in one half, and corresponding rules for exit in fewer, namely only one fourth of all the contracts. This can be explained with any change in membership requiring the re-registration of the cartel. Re-registration in turn required the consent of all cartel members. As shown in Table 13, an explicit approval of entry by one of the ruling decision bodies was primarily required in specialization cartels. The voluntary exit of a firm from the cartel usually required a six month's notice, the maximal period allowed by cartel law. Several cartel contracts contained clauses by which following the exit of a cartel member, the remaining members were allowed to exit immediately. This allows for the immediate dissolution of a cartel upon exit by one member. Quota cartels rely on such a clause most frequently. We thus observe both milder forms of punishment in Table 11, which may be less costly to the industry (like temporary price wars in Green and Porter (1984)), as well as the breakup corresponding to a 'grim trigger.'

## 5 Key findings by collusion method

We categorized the agreements found in the cartel registry into four different methods of collusion: quota, specialization, price, and payment conditions. The majority of contracts used more than just one of the four instruments. In particular, the cartels combining quota, price and payment conditions (11 contracts) and price and payment conditions (9 contracts) account for a quarter of all agreements.

### 5.1 Quota cartels

Quota cartels—36 out of 37 are in manufacturing—are often combined with other collusive instruments, but least often with payment condition cartels. They are smallest in terms of members, never including more than 21 members. Quota cartels often require unanimity among members on the admission of new members into the cartel and output decisions. Voting by less efficient cartel members could therefore

**Table 13** Rules on voluntary entry and exit

	Cartels #	Minimal entry requirements %	Explicit approval of entry %	Subsequent exit %
Quota	37	13.5	40.5	40.5
Only quota	10	0.0	10.0	30.0
Spec.	26	3.8	53.8	23.1
Only spec.	7	0.0	57.1	0.0
Price	41	19.5	43.9	34.1
Only price	7	14.3	14.3	28.6
Pay.co.	44	22.7	36.4	29.5
Only pay.co.	13	23.1	23.1	7.7
# of contracts	80	12	28	21

Table reports percentage of agreements with row characteristics involving column characteristics

lead to prices above monopoly prices as argued in Cave and Salant (1995). They often rely on a staffed office for internal management.

Regular reporting requirements are typical for quota cartels. Cash payments are the central mechanism to compensate for not exactly realized quotas, followed by transfer of orders or customers and sales between cartelists. Some quota cartels punish not only for deviating conduct, but also for failure to provide (correct) information. The provisions for regular reporting mechanisms as well as compensation schemes allowing for asymmetric treatment of deviators and non-deviators are in line with the theoretical work on quota cartels as in Harrington and Skrzypacz (2007) and more recently Harrington and Skrzypacz (2011).

If a member leaves the cartel, quota cartels allow, more often than others, immediate exit by the remaining members, indicating the possibility of Nash reversion as a threat. As in Harrington (2006) allocated market shares are remarkably stable over cartel duration, with only entry triggering an adjustment. We do not observe adjustments of market shares in response to capacity investments as in Harrington (2006). The ease of use of cash payments in a legal collusive environment may have further added to the stability of market shares.

## 5.2 Specialization cartels

Specialization cartels are the 26 agreements specifying the allocation of products, customers, suppliers and territories. More than a quarter of them are export cartels. Pure specialization cartels are less concerned with avoiding secret price cuts such as favorable payment conditions or discounts. Three out of the four agreements specifying exclusive territories also engage in joint advertising. They are most simple in terms of internal decision making bodies, some managing without any. However, about one quarter of them rely on joint sales agencies.

Only one of the seven pure specialization cartel relies on regular member reports. In general, specialization cartels are the ones least reliant on information exchange and internal punishments. Specialization cartels stand out in terms of explicitly

regulating entry into the cartel. Unanimous approval by existing members is regularly required to accept a new member. We also observed the lowest rate of reviews of such cartels in the registration process, suggesting that they were considered as the least damaging. In the few instances of direct customer allocation, historical precedent plays an important role as also observed by Harrington (2006). Overall the nature of the observed contracts confirms Stigler's (1964) view of the simplicity of this collusion method, although it is an option only for specific and easily divisible narrow markets.

### 5.3 Price cartels

The 41 price cartels use clauses such as a fixed price, price floors, price books, common costing sheets or price adjustments. Only seven cartels are pure price cartels. These pure price agreements are the simplest as reflected by the fact that the contracts are the shortest. Most often these price agreements use further clauses to prevent secret price cutting. These include specific rules on payment conditions and the liability of sales agents to prevent resellers from undermining cartel objectives (a problem often faced by illegal cartels (Harrington (2006) and Genesove and Mullin (2001))). Norms on quality and lot size are most common for such cartels, apparently to avoid non-price competition. Some price cartels agree to an external reference price instead of fixing prices themselves. Decision taking is sometimes delegated to a body where not all members are represented, required majorities are on average lower than for decisions on output in quota cartels. On average these cartels have more members than quota cartels. One fifth of price cartels manage without any information exchange. Penalties are quite common.

### 5.4 Payment condition cartels

We have 44 agreements regulating payment conditions. They aim at preventing secret price cuts and are mainly combined with price clauses, often including clear rules on quantity or sales channels discounts and liability for sales agents. Payment condition cartels stand out by the sheer size in terms of number of members, as well as contract length and number of decision bodies as measures of complexity. About two thirds have a central staffed office for management. In these cartels information provision upon request is most prominent. Some even require notification of supply—often price—ex-ante, i.e. before a transaction takes place. Non-compliance with information exchange rule is often penalized. Punishment—be it a simple warning, a monetary penalty or exclusion—is most frequently specified in payment condition cartels. Half of them even require (sometimes unlimited) security deposits for immediate enforcement. The 13 pure payment condition cartels are reminiscent of the Sugar Institute (Genesove and Mullin (2001)), homogenizing business practices and specifying reporting schemes to make pricing more transparent.

## 6 Summary and conclusion

We have provided descriptive evidence on registered legal cartels in Austria. We find that firms used the possibility to write legally binding cartel contracts to prevent secret price cuts, the main impediment to attain a collusive outcome according to Stigler (1964). We find contractual arrangements requiring regular reporting in quota cartels to avoid information lags. Legal cartels make use of cash payments between cartelists to compensate for departures from the agreed outcome, allowing the cartel to efficiently respond to asymmetric developments in cost and demand.

Rather than just relying on the opportunity to take a party to court when violating the contract, the majority of cartels agreements specify penalties for deviating behavior (both in terms of market behavior and information provision). This is sometimes supplemented with requiring cash deposits, ensuring that punishment for deviating behavior is not only quick but also credible. Compensation payments and penalties enable them to treat deviators and non-deviators differently, which has been shown to be often necessary to sustain collusion (Harrington and Skrzypacz (2007)). While this seems to be in contrast to the idea that cartel contracts are legally enforceable, it allows avoiding time-consuming and costly court procedures.

Non-price competition is prevented by agreeing on product norms and delivery conditions. In line with Genesove and Mullin (2001) we find that also legal cartels delegate discretionary power to bodies to cope with the inevitable incompleteness of contracts. The legally binding nature of contracts allows the parties to bestow decision making authority to these bodies on issues including prices, quantities, entry and in particular penalties.

## Appendix 1

See Tables 14, 15, 16.

**Table 14** Cartels across 2-digit industries

2-digits NACE code <sup>a</sup>	Industry	# in industries			% of cartelized firms <sup>e</sup>
		Firms <sup>b</sup>	Cartels <sup>c</sup>	Firms in cartels <sup>d</sup>	
02	Forestry, logging and related service activities	NA	2	41	NA
15	Manufacture of food products and beverages	4736	11	117	2
17	Manufacture of textiles	962	6	69	7
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	3487	6	23	1
21	Manufacture of pulp, paper and paper products	143	8	49	34

**Table 14** continued

2-digits NACE code <sup>a</sup>	Industry	# in industries			% of cartelized firms <sup>e</sup>
		Firms <sup>b</sup>	Cartels <sup>c</sup>	Firms in cartels <sup>d</sup>	
22	Publishing, printing a. reproduction of recorded media	1436	1	8	1
24	Manufacture of Chemicals and Chemical Products	378	1	8	2
26	Manufacture of other non-metallic mineral products	1198	9	96	8
27	Manufacture of basic metals	152	4	29	19
28	Manufacture of fabricated metal products, except machinery and equipment	2968	8	37	1
29	Manufacture of machinery and equipment n.e.c.	1727	2	NA	NA
31	Manufacture of electrical machinery a. apparatus n.e.c.	385	4	41	11
36	Manufacture of furniture; manufacturing n.e.c.	4223	1	4	<1
40	Electricity, gas, steam and hot water supply	422	1	9	2
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	7489	1	8	<1
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	19176	7	274	2
52	Retail trade, except of motor vehicles and motor cycles; repair of personal and household goods	37504	2	33	<1
55	Hotels and restaurants	38768	1	6	<1
63	Supporting and auxiliary transport activities; activities of travel agencies	1872	2	100	5
71	Renting of machinery and equipment without operator and of personal and household goods	1453	2	23	2
90	Sewage and refuse disposal, sanitation and similar activities	598	1	4	<1
Sum			80	983	

<sup>a</sup> OENACE 95. This is the Austrian implementation of NACE Rev. 1. <sup>b</sup> Year: 1995, Source: Statistics Austria. <sup>c</sup> Year: 1973, Source: Cartel Registry. <sup>d</sup> Year: 1973; Source: Agreements in Cartel Registry. <sup>e</sup> Upper Bound since multiple counting of one firm due to membership in several cartels cannot be excluded. Industries for which no registered cartels are not included. The full NACE Rev.1.1 classification scheme of economic activities is available at [www.statistik.at](http://www.statistik.at)



**Table 15** Cartels across 4-digit industries

4-digits NACE code <sup>a</sup>	Industry	Turnover (Mio. ATS) <sup>b</sup>	# in industries			
			Employees <sup>b</sup>	Firms <sup>b</sup>	Cartels <sup>c</sup>	Cartelized firms <sup>c</sup>
02.01	Forestry and Logging				2	41
15.12	Production and preserving of poultry meat	1714	946	8	1	8
15.41	Manufacture of crude oils and fats	921	98	8	1	4
15.82	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes	2241	1250	10	1	2
15.83	Manufacture of sugar	C	C	1	1	5
15.87	Manufacture of condiments and seasonings	2698	817	25	1	13
15.89	Manufacture of other food products n.e.c.	6602	2349	46	1	5
15.96	Manufacture of beer	13,973	5747	49	4	75
15.98	Production of mineral waters and soft drinks	10,134	3630	75	1	5
17.11	Preparation and spinning of cotton-type fibres	8339	3415	14	1	22
17.21	Cotton type weaving	2875	2224	26	1	15
17.22	Woolen-type weaving	522	374	8	1	6
17.24	Silk-type weaving	C	C	8	1	11
17.30	Finishing of textiles	3480	2446	73	1	10
17.54	Manufacture of embroideries and of other textiles n.e.c.	6603	4901	455	1	5
20.20	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fiber board and other panels and boards	8857	3592	24	5	17
20.30	Manufacture of builders' carpentry and joinery	24,319	21,816	1458	1	6
21.11	Manufacture of pulp	5058	820	4	1	5
21.12	Manufacture of paper and paperboard, coating, covering and impregnation of paper and paperboard	36,459	8685	30	3	26
21.21	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	13,070	5974	73	1	7
21.22	Manufacture of household and sanitary goods and of toilet requisites	C	C	1	1	3
21.23	Manufacture of paper stationery	C	C	11	2	8

**Table 15** continued

4-digits NACE code <sup>a</sup>	Industry	Turnover (Mio. ATS) <sup>b</sup>	# in industries			
			Employees <sup>b</sup>	Firms <sup>b</sup>	Cartels <sup>c</sup>	Cartelized firms <sup>c</sup>
22.11	Publishing of books	4007	2119	139	1	8
24.16	Manufacture of plastics in primary forms	13,496	2415	15	1	8
26.13	Manufacture of hollow glass	2786	1788	91	1	4
26.40	Manufacture of bricks, tiles and construction products, in baked clay	3566	1644	32	1	21
26.51	Manufacture of cement	4968	2165	8	1	9
26.61	Manufacture of concrete products for construction purposes	10,694	5468	221	2	47
26.62	Manufacture of plaster products for construction purposes	1810	564	4	1	2
26.63	Manufacture of ready-mixed concrete	9130	3255	72	1	3
26.65	Manufacture of fiber cement	2559	1329	9	1	2
26.70	Cutting, shaping and finishing of stone	4046	3812	391	1	8
27.10	Manufacture of basic iron and steel and of ferro-alloys(ECSC)	8930	16,263	16	3	26
27.43	Lead, zinc and tin production	630	126	5	1	3
28.11	Manufacture of metal structures and parts of structures	31,938	19,548	562	1	2
28.62	Manufacture of tools	6300	5286	226	3	19
28.73	Manufacture of wire products	3240	2002	60	3	14
28.75	Manufacture of other fabricated metal products	8292	6135	304	1	2
29.14	Manufacture of bearings, gears, gearing and driving elements	5124	2908	32	2	NA
31.30	Manufacture of insulated wire and cable	8056	4551	23	3	35
31.50	Manufacture of lighting equipment and electric lamps	4801	3183	74	1	6
36.21	Striking of coins and medals	6341	258	5	1	4
40.20	Manufacture of gas; distribution of gaseous fuels via mains	14,411	3230	17	1	9
50.10	Sale of motor vehicles	151,096	31,643	1834	1	8
51.43	Wholesale of electrical household appliances and radio and television goods	32,749	7438	516	1	8
51.46	Wholesale of pharmaceutical goods	55,178	11,215	689	2	75
51.47	Wholesale of other household goods	62,804	17,469	1742	2	89

**Table 15** continued

4-digits NACE code <sup>a</sup>	Industry	Turnover (Mio. ATS) <sup>b</sup>	# in industries			
			Employees <sup>b</sup>	Firms <sup>b</sup>	Cartels <sup>c</sup>	Cartelized firms <sup>c</sup>
51.56	Wholesale of other intermediate products	25,192	2062	248	1	49
51.65	Wholesale of other machinery for use in industry, trade and navigation	76,740	21,593	2321	1	53
52.11	Retail sale in non-specialized stores with food, beverages or tobacco predominating	136,125	55,342	4517	1	2
52.48	Other retail sale in specialized stores	52,772	36,229	8360	1	31
55.11	Hotels and motels, with restaurant	60,494	90,890	12,939	1	6
63.40	Activities of other transport agencies	48,004	14,065	394	2	100
71.40	Renting of personal and household goods n.e.c.	9277	2547	891	2	23
90.00	Sewage and refuse disposal, sanitation and similar activities	18,872	11,178	598	1	4
Sum					80	

C: suppressed for confidentiality reasons. <sup>a</sup> OENACE 95. This is the Austrian implementation of NACE Rev. 1. <sup>b</sup> Year: 1995, Source: Statistics Austria. <sup>c</sup> Year: 1973, Source: Cartel Registry

**Table 16** Verbal description of cartels

NACE	# of firms	Verbal description
02.01	21	Wood processing firms agree on individual quotas for the buying of kindling and chopped wood
02.01	20	Members restrict the buying of domestic pulp wood by agreeing on a mandatory import quota
15.12	8	Poultry slaughterhouses agree on sales quotas for their products and services
15.41	4	Producers of edible oil form a non-exclusive joint sales agency for certain customers and allocate sales based on individual quotas
15.82	2	Producers of soup garnish form an exclusive joint sales agency and use a common costing sheet for pricing
15.83	5	Sugar factories regulate the buying of sugar beets and the selling of sugar and molasses for the domestic and the export market; the agreement includes quotas, exclusive territories, customer/supplier allocation and price fixing
15.87	13	Producers of fermentation vinegar allocate the buying of vinegar sprit and the selling of fermentation vinegar based on quotas
15.89	5	Compressed yeast producers agree on sales quotas and restrict capacity
15.96	6	Beer producers agree on quotas for bottled beer within the city of Salzburg

**Table 16** continued

NACE	# of firms	Verbal description
15.96	56	Beer producers agree on customer specialization and compensation payments for customer-specific investments
15.96	8	Beer producers agree on quotas for bottled beer within the city of Vienna
15.96	5	Beer producers agree on quotas for bottled beer within the city of Linz
15.98	5	Producers of liquid carbon dioxide agree on customer specialization and allocate orders based on least freight cost
17.11	22	Cotton spinner firms regulate the payment conditions for selling their products
17.21	15	Cotton-weaving firms agree on payment conditions for sales
17.22	6	Wool-weaving firms agree on payment conditions for sales
17.24	11	Silk-weaving firms agree on payment conditions for sales
17.30	10	Textile finishers agree on payment conditions for sales
17.54	5	Producers of bandage material fix the price and payment conditions for different sales channels and their sales agents
20.20	1	Producer of insulated board commits to specialize on the export market, whereas two other producers supply the domestic market
20.20	2	Remaining insulated board producer (see above) agree on quotas and least freight based allocation of orders
20.20	2	Producers of hardboard regulate sales quotas and payment conditions, agree on a price book and on quantity discounts
20.20	5	Producers of wood-wool slab agree on sales quotas, payment conditions and sales channels discounts
20.20	5	Flake board producers agree on sales quotas, a price book and payment conditions
20.30	6	Producers of pre-fabricated concrete garages agree on sales quota and cooperation in buying input material
21.11	5	Firms agree on sales quotas for sulphite pulp, fix the price based on average cost and regulate payment conditions
21.12	17	Producers of paper products form an exclusive joint sales agency. They specialize on different products, allocate quotas and customers, fix the price based on average cost and allocate orders based on least freight cost
21.12	6	Mill board producers fix the price, payment conditions and quantity discounts based on average cost
21.12	3	Producers of machine-made board agree on product specialization, payment conditions for their sales including their sales agents
21.21	7	Producers of corrugated board and paper agree on sales quotas, payment conditions and a common costing sheet
21.22	3	Producers of household and sanitary paper agree to specialize on certain products and certain customers
21.23	3	Producers of rolls splicing tapes agree on sales quotas, payment conditions, price and quantity discounts
21.23	5	Producers of letter paper and envelopes fix the price and payment conditions and use a common costing sheet
22.11	8	Firms specialize on different kinds of textbooks based on a quota system and sell the textbooks jointly and are subject to official price regulations
24.16	8	Producers of polystyrene cellular plastics agree on sales quotas, payment conditions, a price book and quantity discounts; they use a common costing sheet

**Table 16** continued

NACE	# of firms	Verbal description
26.13	4	Producers of clear hollow glas fix payment conditions and quantity discounts and restrict their capacity
26.40	21	Producers of brick in the federal state of Styria agree on sales quotas, fix the price, use a price book, regulate payment conditions and sell through an exclusive joint sales agency
26.51	3	Producers of ready-mixed concrete in some districts of Upper Austria agree on sales quota and/or exclusive territories and they agree on a price book
26.51	9	Cement producers agree on sales quotas, fix the price and payment conditions based on average cost, use a common costing sheet and restrict capacity investment
26.61	20	Producers of large concrete ceilings in Tyrol and Salzburg agree on sales quotas and a price floor
26.61	27	Producers of various building materials fix the price and payment conditions for the region of Carinthia and the nearby district of Osttirol
26.62	2	Producers of gypsum plasterboard agree on sales prices, a price book, payment conditions and quantity discounts
26.65	2	Producers of fiber cement products (for roofing and sheeting as well as pipes) fix sales quotas and quantity discounts
26.70	8	Producers of natural stone agree on a price floor, payment conditions and on capacity restriction. The use a price book and specialize on customers
27.10	8	Members agree on sales quotas for steel for reinforcement of concrete; the price and quantity discounts are fixed, members are liable for their sales agents; individual capacity is restricted
27.10	13	Steel producers specialize on customers for steel and steel-mill products
27.10	5	Steel producers specialize on different kinds of cold rolled strip steel, regulate payment conditions and quantity discounts and also form a buyer cartel
27.43	3	Producers of plumb products (pipes and siphons) fix sales prices based on a price book, agree on payment conditions and use a common costing sheet
28.11	2	Firm allocate quotas for the selling of brick ceiling systems, fix the price based on a price book. Additionally, they form a buyer cartel
28.62	10	Producers of sickles and scythes fix sales quotas and agree on a price book
28.62	7	Producers of saw blades and machine cutting tools agree on product specialization, payment conditions, quantity discounts and sales channels discounts; they also engage in joint buying
28.62	2	Producers of hand and machine tools agree on product specialization and sell via a joint sales agency on domestic and foreign markets
28.73	7	Producers of steel wire and wire nails agree on sales quotas and products specialization and form an exclusive joint sales agency to fix the price, payment conditions and to allocate orders based on least freight cost
28.73	3	Producers of construction steel grids agree on sales quotas, payment conditions, price and quantity discounts. Additionally, they restrict capacity, operate a joint sales agency, use a price book and cooperate in the export market
28.73	4	Producers of wire ropes agree on sales quotas, payment conditions, a price floor, quantity and sales channels discounts and use a common costing sheet
28.75	2	Producers of enamel cookware agree on sales quotas and product specialization
29.14	2	Producers of engine bearings and bearing bushings agree on product specialization, payment conditions and a price book

**Table 16** continued

NACE	# of firms	Verbal description
29.14	n.a.	Suppliers of motor repair services agree on payment conditions, quantity and sales channels discounts
31.30	9	Producers of power cables form a joint sales agency for domestic and export markets; they agree on sales quotas, customer specialization, payment conditions, a fixed price and quantity discounts; they use a price book and a common costing she
31.30	18	Firms agree on a price book for installation services for low- and high tension current; they use a common costing sheet, base the price on average cost and condition the price on travel distance
31.30	8	Producers of insulated cable form an exclusive joint sales agency for domestic and export markets, agree on product and customer specialization, fix the price, use a price book and regulate quantity discounts; They are liable for their sales
31.50	6	producers of light bulbs fix payment conditions and quantity discounts also for themselves and for sales agents. Additionally, capacity is restricted
36.21	4	precious metal refiners cooperate in buying and selling, the price is based on a common costing sheet
40.20	9	distributors of liquid gas agree on a floor for the security deposit for 33 kilo gas cylinders
50.10	8	Opel retailers agree on a price floor and include sales agents, too
51.43	8	disc producers agree on payment conditions and quantity discounts
51.46	14	wholesalers of pharmaceuticals that are subject to retail price regulation agree on payment conditions and quantity discounts
51.46	61	producers of pharmaceuticals that are subject to retail price regulation agree on payment conditions, liability of sales agents and quantity discounts
51.47	76	wholesaler of general rubber goods and asbestos goods agree on payment conditions, quantity discounts, sales channels discounts and liability for sales agents
51.47	13	importers and producers of photographic cameras and related products agree on payment conditions and liability of sales agents; a central part of the agreement are rules for standardized distribution agreements for retailers
51.56	49	wholesaler of paper and card board agree on a price book, payment conditions and quantity discounts and use a common costing sheet
51.65	53	Wholesalers of insulated cables cooperate in joint buying, importing and selling; they fix payment conditions, use a price book to fix prices, regulate quantity discounts and restrict capacity
52.11	2	A grocery and a restaurant in a local village agree to specialize on grocery and restaurant services respectively
52.48	31	Retailers of solid and liquid fuels that are subject to retail price regulation agree on a price book, payment conditions, quantity discounts and use a common costing sheet; the agreement covers only Linz and its surroundings
55.11	6	Hotels in Innsbruck regulate prices for their customers and allocate excess reservations within the cartel
63.40	58	Supplier of consolidated cargo services by rail agree on customer specialization, a fixed price and liability for sales agents
63.40	42	Suppliers of consolidated cargo services by truck agree on sales prices and liability for sales agents
71.40	13	Suppliers of reader circle services agree on a price floor, payment conditions and liability for sales agents
71.40	10	Suppliers of textile care services agree on exclusive territories

**Table 16** continued

NACE	# of firms	Verbal description
90.00	4	Supplier of recycling services for garbage and compost in Upper Austria form a joint sales agency and agree on a fixed price

## Appendix 2: Auxiliary collusive clauses

In this subsection, we look at additional means to implement the desired outcomes: rules on pricing and discounts, capacity restrictions, and norms. Again, we relate these features to the main collusion methods categorized in Sect. 4.

### Prices and discounts: additional variables

Table 17 provides details on pricing arrangements. Rules for quantity discounts are specified in one half of all payment condition agreements and in more than one third of the pure price fixing agreements. Many cartel contracts involving pricing and payment conditions also include a liability clause for sales agents, presumably serving as a precautionary device against delegating undercutting strategies. Five pure payment condition cartels are not combined with any of the clauses listed in Table 17. Additional information from the database reveals that they are all active in textile manufacturing.

**Table 17** Prices and discounts: additional variables

	Cartels #	Quantity discounts %	Sales channels discounts %	Liability for sales agents %	At least one of these %
Quota	37	27.0	13.5	13.5	40.5
Only quota	10	10.0	10.0	10.0	20.0
Specialization	26	23.1	3.8	23.1	38.5
Only spec.	7	0.0	0.0	14.3	14.3
Price	41	39.0	9.8	26.8	58.5
Only price	7	0.0	0.0	42.9	42.9
Pay.co.	44	50.0	22.7	22.7	65.9
Only pay.co.	13	53.8	30.8	30.8	61.5
# of contracts	80	26	11	18	39

Table reports percentage of agreements with row characteristics involving column characteristics

**Table 18** Capacity restrictions

	Cartels #	Restriction on capacity %	Restriction on cap. diversion %	At least one of these %
Quota	37	21.6	10.8	29.7
Only quota	10	10.0	10.0	20.0
Specialization	26	23.1	11.5	30.8
Only spec.	7	14.3	14.3	28.6
Price	41	19.5	7.3	26.8
Only price	7	0.0	14.3	14.3
Pay.co.	44	20.5	6.8	25.0
Only pay.co.	13	23.1	7.7	23.1
# of contracts	80	14	8	20

Table reports percentage of agreements with row characteristics involving column characteristics

## Capacity restrictions

Contractual arrangements invoking capacity restrictions are an obvious instrument to restrict the quantities brought to the market, allowing the cartel to maintain high prices. Conversely, unrestricted capacity facilitates deviations (see for example, Ivaldi et al. (2003)). However, the numbers in Table 18 show that this instrument is used rarely—on average in less than a fifth of all cartel contracts. This may reflect the original intent of cartel legislation to foster exports: Imposing capacity restrictions would have limited exporting capabilities. Restrictions on capacity diversion (prohibiting the provision of free capacity by cartel members to outsiders) feature even less frequently—although capacity diversion could be quite easily used to undermine the cartel contract, by strengthening outsiders' production potential.

## Norms

To control the cartellists' pricing decisions effectively and reduce the dimensionality of the pricing arrangements, we expected frequent restrictions to be placed on product quality, lot sizes, or the reliance on official norms typically defined by a standard-setting body. In line with this prediction we observe, in Table 19, that about two thirds of the cartels that contain pricing arrangements also involve specifications of that kind.

## Joint ventures

The cooperation of firms within an industry in research and development and (informative) advertising could lead to substantive savings in social costs, due to internalizing R&D externalities. Indeed, the competition laws in several countries, notably the U.S., allow explicitly for R&D cooperation of some form. The 1972



**Table 19** Norms

	Cartels	Official norms	Lot size	Standardization of product quality	At least one of those
	#	%	%	%	%
Quota	37	24.3	10.8	29.7	48.6
Only quota	10	0.0	0.0	10.0	10.0
Spec.	26	15.4	3.8	30.8	42.3
Only spec.	7	0.0	0.0	14.3	14.3
Price	41	26.8	19.5	36.6	63.4
Only price	7	0.0	28.6	14.3	28.6
Pay.co.	44	27.3	15.9	25.0	50.0
Only pay.co.	13	0.0	0.0	7.7	7.7
# of contracts	80	14	9	20	33

Table reports percentage of agreements with row characteristics involving column characteristics

**Table 20** Joint ventures

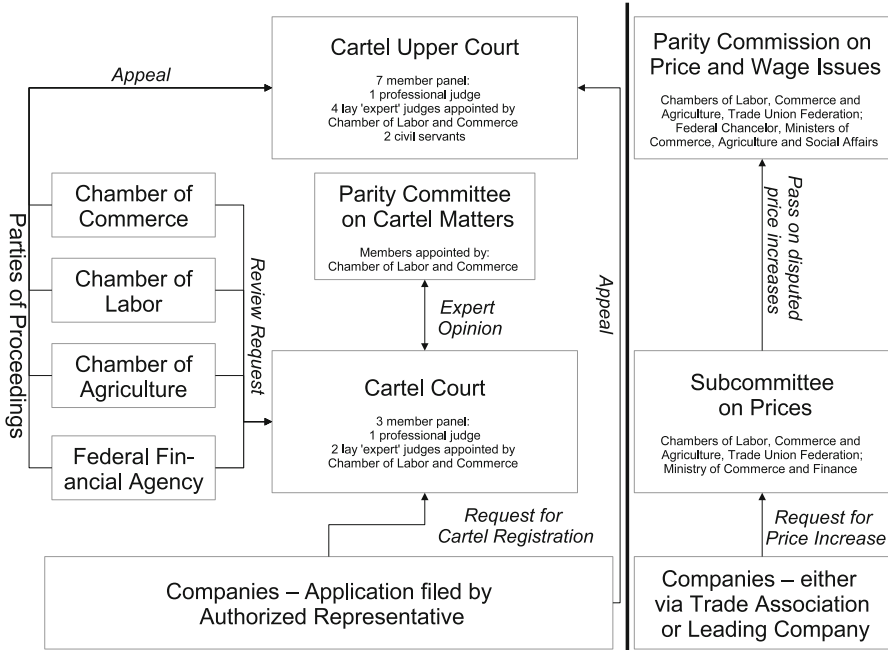
	Cartels	Joint R&D	Joint advertising	At least one of those
	#	%	%	%
Quota	37	21.8	27.0	32.4
Only quota	10	10.0	10.0	10.0
Spec.	26	11.5	26.9	26.9
Only spec.	7	0.0	28.6	28.6
Price	41	17.1	22.0	26.8
Only price	7	14.3	28.6	28.6
Pay.co.	44	13.6	15.9	18.2
Only pay.co.	13	0.0	0.0	0.0
# of contracts	80	11	16	18

Table reports percentage of agreements with row characteristics involving column characteristics

Austrian cartel law exempted research and development joint ventures and joint advertising from the registration requirement. Nevertheless, we observe that cooperation in these dimensions is explicitly foreseen in one fourth of all cartel contracts (Table 20). Provisions for joint advertising are observed slightly more often than joint R&D. In particular, three out of the four contracts involving exclusive territories (a subcategory of specialization) also involve joint advertising.

### Appendix 3

See Fig. 1



**Fig. 1** Institutional Set-Up (KartG 1972 and Farnleitner (1977))

### References

Alexander, B. (1994). The impact of the national industrial recovery act on cartel formation and maintenance costs. *The Review of Economics and Statistics*, 76(2), 45–54.

Alexander, B. (1997). Failed cooperation in heterogeneous industries under the National Recovery Administration. *The Journal of Economic History*, 57(2), 322–344.

Asker, J. (2010). A study of the internal organization of a bidding cartel. *The American Economic Review*, 100(3), 724–762.

Athey, S., & Bagwell, K. (2001). Optimal collusion with private information. *The Rand Journal of Economics*, 41(1), 92–117.

Butschek, F. (2011). *Österreichische Wirtschaftsgeschichte: von der Antike bis zur Gegenwart*. Böhlau.

Cave, J., & Salant, S. W. (1995). Cartel quotas under majority rule. *American Economic Review*, 85(1), 82–102.

Chicu, M., Vickers, C., & Ziebarth, N. L. (2013). Cementing the case for collusion under the National Recovery Administration. *Explorations in Economic History*, 50(4), 487–507.

Ciarreta, A. (2012). Cartels and regulation: effects on prices and real sales in Sweden (1976–1990). *European Journal of Law and Economics*, 34(1), 127–146.

Connor, J. M. (2003). Private international cartels: effectiveness, welfare, and anticartel enforcement. *Working Papers*, 12(03).

- Cramton, P., & Palfrey, T. (1990). Cartel enforcement with uncertainty about costs. *International Economic Review*, 31(1), 17–31.
- Davis, P., & Fletcher, A. (2013). Contributions to competition economics: Introduction. *The Economic Journal*, 123(572), F493–F504.
- Farnleitner, J. (1977). *Die Paritätische Kommission: Institution und Verfahren*. Prugg, Eisenstadt, 2. Auflage Edition.
- Fink, N., Schmidt-Dengler, P., Stahl, K., & Zulehner, C. (2014). *Registered cartels in Austria—coding protocol*. Technical report, ZEW Mannheim.
- Genesove, D., & Mullin, W. P. (2001). Rules, communication, and collusion: Narrative evidence from the sugar institute case. *American Economic Review*, 91(3), 379–398.
- Green, E. J., & Porter, R. (1984). Noncooperative collusion under imperfect price information. *Econometrica*, 52(1), 87–100.
- Harrington, J. E. (2006). *How do cartels operate?*. Boston, Delft: Now Publishers Inc.
- Harrington, J. E., & Skrzypacz, A. (2007). Collusion under monitoring of sales. *The RAND Journal of Economics*, 38(2), 314–331.
- Harrington, J. E., & Skrzypacz, A. (2011). Private monitoring and communication in cartels: Explaining recent collusive practices. *American Economic Review*, 101(6), 2425–49.
- Haucap, J., Heimeshoff, U., & Schultz, L. M. (2010). Legal and illegal cartels in Germany between 1958 and 2004. *mimeo*.
- Hyytinen, A., Steen, F., & Toivanen, O. (2014). Anatomy of cartel contracts. *mimeo*.
- Ivaldi, M., Jullien, B., Rey, P., Seabright, P., and Tirole, J. (2003). The economics of tacit collusion. IDEI Working Papers 186, Institut d'Économie Industrielle (IDEI), Toulouse.
- Johnstone, H. W. (1951). The restraint of competition in the Austrian economy. *mimeo*.
- Levenstein, M. C., & Suslow, V. Y. (2006). What determines cartel success? *Journal of Economic Literature*, 44(1), 43–95.
- Levenstein, M. C., & Suslow, V. Y. (2011). Breaking up is hard to do: Determinants of cartel duration. *Journal of Law and Economics*, 54(2), 455–492.
- Nakazawa, T., & Weiss, L. W. (1989). The legal cartels of Japan. *Antitrust Bulletin*, 34, 641.
- Resch, A. (2002). *Industriekartelle in Österreich vor dem Ersten Weltkrieg. Marktstrukturen, Organisationstendenzen und Wirtschaftsentwicklung von 1900 bis 1913. Mit ... Wirtschafts- und Sozialgeschichte; SWS 74*. Duncker & Humblot GmbH.
- Röller, L.-H., & Steen, F. (2006). On the workings of a cartel: Evidence from the norwegian cement industry. *The American Economic Review*, 96(1), 321–338.
- Schulte, H. (1980). *Das österreichische Kartellrecht vor 1938*. Dissertation, Westfälische-Wilhelms-Universität.
- Seidel, H. (2005). *Österreichs Wirtschaft und Wirtschaftspolitik nach dem Zweiten Weltkrieg*. Universitätsbuchhandlung: Manz'sche Verlags- U.
- Stigler, G. J. (1964). A theory of oligopoly. *The Journal of Political Economy*, 72(1), 44–61.
- Symeonidis, G. (2003). In which industries is collusion more likely? Evidence from the U.K. *The Journal of Industrial Economics*, 51(1), 45–74.
- Taylor, J. E. (2007). Cartel code attributes and cartel performance: An industry-level analysis of the national industrial recovery act. *Journal of Law and Economics*, 50, 597–624.
- Tüchler, M. (2003). Die Entwicklung des österreichischen Kartellrechts. In A. Resch (Ed.), *Kartelle in Osterreich* (Vol. 23, pp. 121–148). Wien: Veröffentlichungen der österreichischen Gesellschaft für Unternehmensgeschichte.
- Vickers, C., & Ziebarth, N. L. (2014). Did the national recovery administration foster collusion? evidence from the macaroni industry. *Journal of Economic History*, 74, 831–862.
- Wehsely, H. (1978). Kartellrecht und Kartellpolitik in der Praxis. Wiener Juristische Gesellschaft. *Österreichische Juristen-Zeitung*, pp. 465–467.