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Do cartel breakdowns induce mergers? Evidence from EC cartel cases

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Kai Hüschelrath and Florian Smuda

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Non-technical summary

Cartel agreements between firms typically aim at reducing competition and increasing joint profits. Due to the fact that such agreements regularly cause substantial economic harm in the form of, e.g., elevated prices and reduced innovation activities, cartels are a major infringement of competition laws in most countries around the world. After the breakdown of cartels, anecdotal evidence often points towards an increased merger activity in the respective industries thereby raising the question whether mergers must be considered as a potential 'second-best' alternative to cartels.

Against this background, we investigate the impact of cartel breakdowns on merger activity. Merging information on cartel cases decided by the European Commission (EC) between 2000 and 2011 with a detailed data set of worldwide merger activity, we find that, first, the average number of all merger transactions increase by up to 51 percent when comparing the three years before the cartel breakdowns with the three years afterwards. Second, for the subset of horizontal mergers, merger activity is found to increase even more – by up to 83 percent – after the cartel breakdowns. Our results not only suggest that competition authorities should consider mergers as potential 'second-best' alternative to cartels but also imply that resource (re)allocations in competition authorities, law practices and economic consultancies may become necessary to handle the increase in merger cases.

Das Wichtigste in Kürze

Kartellabsprachen zwischen Wettbewerbern zielen typischerweise darauf ab, den herrschenden Wettbewerb zu reduzieren und gleichzeitig die Unternehmensgewinne zu erhöhen. Aufgrund der Tatsache, dass solche Vereinbarungen regelmäßig großen ökonomischen Schaden in Form von beispielsweise erhöhten Preisen oder reduzierten Innovationsaktivitäten verursachen, stellen sie weltweit einen schwerwiegenden Verstoß gegen die entsprechenden Kartellgesetze dar. Nach dem Zusammenbruch von Kartellen hat man verschiedentlich beobachtet, dass in den jeweils betroffenen Industrien die Fusionsaktivitäten angestiegen sind und daraus die Frage abgeleitet, ob Fusionen möglicherweise eine ‚second-best' Alternative zum (gerade zusammengebrochenen) Kartell darstellen können.

Vor diesem Hintergrund untersuchen wir den Einfluss von Kartellzusammenbrüchen auf die Fusionsaktivitäten. Durch die Zusammenlegung von Informationen über alle von der Europäischen Kommission zwischen 2000 und 2011 abgeschlossenen Kartelluntersuchungen mit einem detaillierten Datensatz weltweiter Fusionsaktivitäten finden wir, dass die durchschnittliche Anzahl an Fusionen nach einem Kartellzusammenbruch um bis zu 51 Prozent ansteigt (vergleicht man auf Branchenebene die drei Jahre vor dem Zusammenbruch des Kartells mit den drei Jahren danach). Betrachtet man lediglich horizontale Fusionen, so findet man sogar Anstiege in der Fusionsaktivität von bis zu 83 Prozent. Unsere Ergebnisse legen nicht nur nahe, dass Wettbewerbsbehörden Fusionen als mögliche ‚second-best' Alternative zu Kartellen betrachten sollten, sondern implizieren ebenso, dass Umschichtungen bzw. Erweiterungen von Ressourcen in Wettbewerbsbehörden, Kanzleien und ökonomischen Beratungsgesellschaften notwendig werden können, um den Anstieg an Fusionsfällen im zur Verfügung stehenden Zeitrahmen bewältigen zu können.

DO CARTEL BREAKDOWNS INDUCE MERGERS?
EVIDENCE FROM EC CARTEL CASES

Kai Hüschelrath[♣] and Florian Smuda[#]

June 2013

Abstract
We investigate the impact of cartel breakdowns on merger activity. Merging information on cartel cases decided by the European Commission (EC) between 2000 and 2011 with a detailed data set of worldwide merger activity, we find that, first, the average number of all merger transactions increase by up to 51 percent when comparing the three years before the cartel breakdowns with the three years afterwards. Second, for the subset of horizontal mergers, merger activity is found to increase even more – by up to 83 percent – after the cartel breakdowns. Our results not only suggest that competition authorities should consider mergers as potential 'second-best' alternative to cartels but also imply that resource (re)allocations in competition authorities, law practices and economic consultancies may become necessary to handle the increase in merger cases.

Keywords Antitrust policy, cartels, mergers, cartel breakdown, European Union

JEL Class L41, K21

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1. Introduction

Cartel agreements between firms typically aim at reducing competition and increasing joint profits. Due to the fact that such agreements regularly cause substantial economic harm in the form of, e.g., elevated prices and reduced innovation activities, cartels are a major infringement of competition laws in most countries around the world. After the breakdown of cartels, anecdotal evidence[1] often points towards an increased merger activity in the respective industries thereby raising the question whether mergers must be considered as a potential 'second-best' alternative to cartels.

Generally, such a potential substitute relationship between cartels and mergers is not a recently gained insight. On the contrary, after cartelization was prohibited by the Sherman Act in the United States in 1890, companies started to merge with their rivals thereby contributing to the development of the first great merger wave (see Bittlingmayer (1985) or Mueller (1996)). After realizing that mergers became a 'second-best' alternative to cartels – as part of the general desire of firms to increase market power and reduce competitive pressures – law makers in the US reacted by the adoption of the Clayton Act in 1914 which introduced – among other procedures – an ex-ante merger control aiming at prohibiting (or remedying) mergers with anticompetitive potential.

Although nearly a century has passed by since the birth of merger control, the underlying key motivations are still valid and relevant. Both national and international cartels still exist and mergers remain a threat for (re)gained competition after the detection of such serious infringements of competition law. Although modern merger control procedures are likely to foreclose the implementation of the most anticompetitive mergers (e.g., between former cartelists), merger reactions to cartel breakdowns must still be considered as both possible and desirable, first and foremost due to their potential role in reducing competitive pressures in the post-cartel world.

Against this background, we investigate the impact of cartel breakdowns on merger activity. Merging information on cartel cases decided by the European Commission (EC) between 2000 and 2011 with a detailed data set of worldwide merger activity, we find that, first, the average number of all merger transactions increase by up to 51 percent when comparing the three years before the cartel breakdowns with the three years afterwards.

[1] For example, Cosnita-Langlais and Tropeano (2013) report a case from the French local urban transport markets where two of the three cartelists announced their intent to merge in the aftermath of the detection and punishment of an illegal market sharing agreement. From a historical perspective, Kumar et al. (2012) present descriptive evidence of merger activity after collusive episodes in the ten largest US manufacturing industries around the time of the adoption of the Sherman Act in 1890. Interestingly, they find evidence of post-cartel merger activity in eight out of the ten industries.

Second, for the subset of horizontal mergers, merger activity is found to increase even more – by up to 83 percent – after the cartel breakdowns. Our results not only suggest that competition authorities should consider mergers as potential 'second-best' alternative to cartels but also imply that resource (re)allocations in competition authorities, law practices and economic consultancies may become necessary to handle the increase in merger cases.

The paper is structured as follows. The subsequent second section sheds light on the interaction between cartelization and merger activity. In addition to a general characterization of cartels and mergers, we particularly study merger activity before and after a cartel breakdown. Section 3 presents our empirical analysis. Subsequent to the detailed description of the construction of the data set in Section 3.1, we subdivide the reporting our empirical results into two sub-sections. While Section 3.2.1 concentrates on all mergers after cartel breakdowns, Section 3.2.2 redoes the analysis for the subset of horizontal mergers. Section 4 concludes the paper with a review of the key insights and the derivation of several important policy implications.

2. Interaction between cartelization and merger activity

In this section, we discuss the interaction between cartelization and merger activity from a mostly theoretical perspective. While the following Section 2.1 provides a brief general characterization of cartels and mergers, the subsequent Section 2.2 specifically focuses on an economic assessment of the impact of cartel breakdowns on merger activity.

2.1. General characterization of cartels and mergers

In this section, we briefly discuss the key motivations for cartel and merger formation followed by an assessment of their impacts on economic welfare.[2]

2.1.1. Cartels

A hard-core cartel ('cartel' in the following) is typically defined as "… a group of firms who have agreed explicitly among themselves to coordinate their activities in order to raise market price – that is, they have entered into some form of price fixing agreement" (Pepall et al., 2001, p. 345). The types of agreement that typically lead to such an increase in market price include not only price fixing agreements in the literal sense but also bid-rigging (collusive tenders), output restrictions and quotas, allocation of customers, suppliers, territories, and lines of commerce (see, e.g., Crampton, 2003, p. 5).

[2] This section partly follows Hüschelrath (2009).

From a business perspective, firms have an incentive to form cartels because coordinating the respective competitive activities leads to greater profits than acting independently. The basic rationale for this allegation lies in the internalization of a negative externality. In a competitive market, a firm is simply interested in how much a reduction in its own output benefits itself, while it ignores the (positive) effect that a reduction in output has on the profits of the other firms in the market (via the reduction in total market output and the corresponding increase in price). A cartel internalizes this effect by taking into account how changes in the output level of each firm affect joint cartel profits (see Carlton and Perloff, 2004, p. 122 for a detailed treatment). As a consequence, the cartel benefits from reducing total output below the competitive level and thereby increasing joint profits.

Although the identified incentives for cartelization can be considered as omnipresent, the respective costs and benefits in engaging in such agreements differ substantially between markets. The underlying economic reasons are twofold. On the one hand, the profit differential between the cartel profit and the competitive profit – i.e., "the difference between the most profitable outcome possible for the firms (the best possible Nash equilibrium) and the worst" (Whinston, 2006: 40) – depends on the specifics of the market and market interaction. On the other hand, the same is true for the costs of operating a cartel – i.e., reaching and monitoring cartel agreements, and possible antitrust fines and damages – which might become prohibitively high in certain constellations.

In fact, theoretical research has identified an ample number of so-called collusion factors which have the potential to influence the benefits and costs – and therefore the rationality and stability – of cartels and collusion. Rey (2006) – in accordance with many other commentators on the topic – subdivides these factors into structural, supply-related and demand-related factors. Structural factors that ease collusion include a low number of competitors, high entry barriers, frequent interaction between firms and market transparency. Demand-related factors include market growth, absence of significant fluctuations or business cycles, low demand elasticity, buying power and the absence of club and network effects. Finally, supply-related factors which ease collusive agreements include mature industries (with stable technologies), symmetric costs, symmetric capacities, product homogeneity, multi-market contact, structural links and various forms of contractual agreements. The theoretical reasoning upon which these different collusion factors are based can be found, for instance, in Rey (2006), Motta (2004), Ivaldi et al. (2003) and Grout and Sonderegger (2005).

Given our discussion of the business motivations for cartel formation, an assessment of the welfare effects is a straightforward exercise: a perfectly functioning cartel – involving all

firms in the market and referring to substitute products – is expected to lead to the same market outcome as a monopoly and therefore causes similar allocative, productive and dynamic inefficiencies. Additionally, cartels usually do not create any benefits to society which could be traded off against the anticompetitive effects from an antitrust perspective. As a consequence, contemporary cartels are a prime example for a per se prohibition in most jurisdictions around the world irrespective of the particular characteristics of the industry, product or type of agreement.

2.1.2. Mergers

A merger is generally defined as the act (or process) of combining two or more existing companies into one new company.[3] More specifically, mergers are typically categorized with respect to the position of the merging companies in the value chain (i.e., the production and distribution chain) of a certain product or service. Applying this logic, a horizontal merger takes place between two or more parties operating at the same level of the value chain for a certain product. A vertical merger, however, involves companies from different levels of the value chain of a certain product or service leading to either upward or downward vertical integration. The third and final category of mergers is the conglomerate merger, which involves two or more firms operating in different value chains (see ICN, 2006: 10ff. for a detailed discussion).

The literature studying the business motivations of mergers has grown to an impressive size (see Tichy, 1990, 2001, or DePamphilis, 2003: 19ff. for surveys). Although motivations partly diverge with merger type (see Mueller, 2004: 66ff.), the most fundamental and unifying reason to merge is the expectation to increase profits in some way.[4] The channels of how a merger can lead to such profit increases are again diverse, reaching from an increase in market power (which would allow price increases) via the realization of cost efficiencies (which would lead to lower production costs and therefore competitive advantages), up to a reduction of management inefficiencies via a market for corporate control (which would lead to the acquisition and restructuring of suboptimally managed firms). Further merger

[3] In the remainder of this paper, we refrain from differentiating between mergers and acquisitions. From an antitrust perspective, all that counts is the possibility of exercising decisive influence on an undertaking by controlling a substantial part of its assets (and the corresponding voting rights). While a merger certainly fits into that category, the effect of an acquisition depends on the respective scope of investment.

[4] A complementary strand of research on the motives for mergers deviates from the assumption that mergers aim at maximising profits and instead explains merger activity by behavioural theories. Tichy (2001: 368) differentiates this group of merger explanations into approaches in which the manager incorrectly believes to be better able to manage the target (hubris hypothesis); the manager believes in the superior quality of management's investment decisions relative to those of the shareholders (free cash flow hypothesis); and the manager acts to get personal advantages (empire-building hypothesis).

motivations include financial distress, retirement or the realization of tax advantages (see Viscusi et al., 1997: 202).

From a welfare perspective, at first sight, there seems to be no fundamental difference between cartels and (horizontal) mergers. Whether two firms in a three-firm industry form a cartel or merge seem to make, ceteris paribus, no fundamental difference from a welfare point of view. However, there are at least two basic justifications why mergers should be treated differently. First, from an economy and industry level perspective, mergers and acquisitions are an important instrument for facilitating changes in industry structures, which may have become necessary because of technological changes, globalization, commoditization, low or high growth, chronic excess capacity, fragmentation, price volatility, demand shifts, new entries or deregulation (see Weston, 2001: 397, for the complete list as well as industry examples).

Second, from a product market perspective, mergers differ from cartels because mergers regularly contain the possibility of increasing welfare by the realization of so-called merger efficiencies. One prominent way to realize such efficiencies by a horizontal merger is generally through cost efficiencies, such as economies of scale or economies of scope, which allow the merged company to produce the product(s) cheaper than before the merger. An alternative source of such efficiencies may be realized via the combination of R&D assets, which allows an easier knowledge transfer and greater research output (probably combined with a reduction in fixed costs).

Taking such efficiencies into account leaves a (horizontal) merger with basically two opposite potential welfare effects: On the one hand, the inevitable increase in market concentration contains the imminent danger of making post-merger price increases profitable. If the underlying welfare standard is consumer surplus, such a price increase post-merger would allow the conclusion that the merger is reducing welfare. On the other hand, the creation of merger-specific efficiencies would allow the merged entity to reduce costs and to increase their profits. Consequently, it is the key aim of merger control procedures implemented in many jurisdictions around the world to evaluate the possible costs and benefits of mergers (reaching a certain minimum size) on a case-by-case basis and to make a decision on whether to approve or prohibit the respective transaction.[5]

[5] In principle, the same cost-benefit assessment applies to vertical mergers although the respective alleged pro- and anti-competitive effects partly differ. While pro-competitive effects include the avoidance of double marginalization or a reduction in quality-related free riding, potentially anti-competitive effects are (input or customer) foreclosure or an increased likelihood for collusion post-merger.

2.2. Merger activity before and after a cartel breakdown

Based on the isolated characterization of cartels and mergers in the previous section, this section continues with a discussion of the interaction of both competitive strategies in general and merger activity before and after a cartel breakdown in particular. Existing research focusing on these questions is quite limited. From a theoretical perspective, Mehra (2007) sees cartels and (horizontal) mergers as alternative arrangements to increase profitability and argues that the choice between the two forms is determined by factors such as the structure of industry, organization of firms, and, last but not least, existing antitrust laws. In a conjectural variation model, she shows that in the absence of cartel fines, a firm always prefers a cartel to merger, when the latter does not involve any efficiency gains. She further shows that when there is perfect competition among the competitive fringe, firms do not have incentives to form a cartel and they merge only if there are efficiencies involved.

In a recent paper, Kumar et al. (2012) are searching for explanations why – despite the inherent stability problems – firms might still prefer cartels over mergers. In addition to explanations relating to the reduced capital requirements for cartels compared to mergers (Stigler 1950)[6] or expected diseconomies from merger (Bittlingmayer 1985), they show that such a behaviour can be rational (i.e., profit-maximizing) as long as customers are uncertain as to whether non-merged firms are operating as a cartel or not.

From an empirical perspective, Bittlingmayer (1985) provides evidence for a substitute relationship between cartels and mergers for the United States. Inspired by the observation that companies started to merge with their rivals after cartelization was declared illegal by the Sherman Act in 1890 – culminating in the first big merger wave – he particularly investigates the question why firms preferred cartelization over merging in the first place. Starting from the observation that many cartelized industries were characterized by high fixed costs, a small number of firms and cyclical demand, he argues that cartels simply were a cheaper form of organization compared to mergers – partly because coordination was only needed in times of low demand. Inspired by the work of Bittlingmayer, Kumar et al. (2012) present further descriptive evidence of merger activity after collusive episodes in the ten largest US

[6] This is particularly true if it is considered that cartels typically (have to) include most (or even all) larger firms in the respective industry (in order to make it a profitable endeavour) while mergers typically take place between two firms only, i.e., while cartels allow a coordination of competition parameters among most or even all major players, mergers typically refer to a substantially smaller market share in the respective industry. Even if capital constraints are assumed to be non-binding, it would still be difficult in the short and medium run to implement a couple of subsequent mergers among all those major players in the respective industry (which would be necessary to mimic the market performance of a cartel).

manufacturing industries around the time of the adoption of the Sherman Act. Interestingly, they find evidence of substantial post-cartel merger activity in eight out of the ten industries.

Turning from the review of the sparse existing literature to a general assessment of the interaction between cartel breakdowns and mergers, in the following, we assume the existence of both cartel and merger enforcement in a certain jurisdiction and concentrate on particularly two periods in the cartel lifecycle: during cartelization and after cartelization. The *'during cartelization' period* starts with the implementation of a cartel agreement. As cartels can only be considered as stable if most (larger) firms are participating in it, reduced incentives to merge can be expected. However, mergers might still take place (a) between cartelists, e.g., in order to discipline a cartel breaker, (b) between cartelists and non-cartelists, e.g., in order to acquire a firm which refused to join the cartel or (c) between (smaller) non-cartel members, e.g., in an attempt to bundle powers against the cartel.

The *'after cartelization' period* certainly is the most crucial one for the purposes of our study. Several qualitative arguments speak for a general increase in merger activity after a cartel breakdown. First, the breakdown of the cartel must be understood as a shock for the respective industry in the sense that cartel-related structures (and profits) are gone thereby implying a detailed thinking on suitable 'second-best' strategies to regain profitability. While horizontal mergers can be an important tool to improve the relative position of the acquirer in the post-cartel world, vertical mergers might aim at securing important input goods (upstream), important customer channels (downstream), or might facilitate upstream collusion in the post-cartel world (see, e.g., Nocke and White, 2007, and Bittlingmayer 1985). Second, due to the end of the cartel, less efficient firms might run into financial problems making them suitable targets for an acquisition by competitors (and causing structural changes in the industry). Third, after the cartel breakdown, cartel breakers may be acquired as a measure of punishment (possibly in an attempt to either reinstate the cartel or switch to some form of tacit collusion afterwards).

Despite all these arguments for an increase in merger activity after cartel breakdowns, it is important to remark that the interaction between cartels and mergers can also be inverted in the sense that in the process of merging two companies, an involvement in a cartel is detected by the merging firms and subsequently reported – often under the leniency program – to the competition authority.[7] Although the European Union (EU) has experienced several of such cases in the past, it is on the one hand reasonable to assume that the majority of cartels are still detected by alternative methods. On the other hand, even if a particular merger has been

[7] We are thankful to Stephan Simon (European Commission, Brussels) for pointing this out to us.

the trigger for a cartel breakdown, most of the arguments for an increased merger activity mentioned above stay valid thereby still suggesting an increase in merger activity in the post-cartel world.

3. Cartel breakdowns in the European Union and merger activity

In this section, we study the relationship between EU cartel breakdowns and subsequent merger activity. We start in Section 3.1 with a detailed description of the construction of the data set followed by the presentation of our empirical results in Section 3.2. In a first step, we investigate the number of all merger transactions in the three years before and after the cartel breakdowns in the respective industries (Section 3.2.1), followed by conducting the same analysis for the subset of horizontal mergers in a second step (Section 3.2.2).

In both sections, we differentiate between three types of geographical scope of the mergers. In addition to an investigation of worldwide merger activity, we also report the respective results for the subsets of mergers in which either one EEA (European Economic Area) firm was involved or in which both parties were based in the EEA. Although it is reasonable to assume that the effect of European cartel breakdowns on mergers is strongest within the EEA, the still growing internationalization of markets does not rule out the possibility that a European cartel breakdown might motivate, e.g., a Canadian and an US firm to merge their businesses.

3.1. Construction of the data set

The backbone of any empirical investigation of the impact of cartel breakdowns on merger activity is the construction of a suitable data basis. The data set used in this article was constructed by two separate raw data sets.

Data set on EC cartel case decisions between 2000 and 2011

The first data set contains information on all cartel cases decided by the European Commission between 2000 and 2011. The data were collected from decisions and press releases published by the EC in the course of its investigations and combine case-specific as well as firm-specific information. On the case level, information such as cartel type, cartel duration, number of cartel members, affected industry, relevant geographic market(s) and imposed overall fines are available. Regarding firm-specific data, we have information on the individual length of cartel participation, the level of fines imposed by the EC, whether the firm applied for leniency and the value of fine reductions following a successful leniency

application. Furthermore, specific factors that are relevant for the calculation of the fine such as, e.g., aggravating and mitigating circumstances or repeated offenders are available. In sum, the data set combines information on 73 EC cartel cases and 464 cartel members.[8] Table 1 displays an excerpt of the descriptive statistics of the data set.

Table 1: Descriptive statistics of the cartel raw data set

	Mean	*Median*	*Std. dev.*	*Min*	*Max*
Number of firms per case	5.73	5	3.38	2	17
Cartel duration (total, in months)	101.91	74	77.94	3	419
Cartel duration (firm specific, in months)	89.16	70.5	66.79	3	419
Total fine per case (m €)	207.32	108.61	263.37	0.45	1383.9
Individual fine per firm (m €)	36.19	11.55	79.78	0	896
Fine reduction per firm	0.236	0.1	0.311	0	1
Share of leniency cases	0.926	1	0.26	0	1
Leniency collaboration rate per case	0.685	0.75	0.327	0	1

As shown in Table 1, the average number of cartel firms is 5.73 and the average overall cartel duration is 102 months (8.5 years). The median values of both factors are 5 firms and 74 months (6.17 years), respectively. The average firm-specific length of cartel participation is 89 months (7.43 years), which is close to the overall cartel duration and suggests that cartels are generally stable in terms of the number of participating firms.

Regarding cartel fines, the average fine per case imposed by the European Commission between 2000 and 2011 amounts to 207 million €. It varies between 450,000 € imposed in the Luxembourg brewer case and 1.38 billion € in the Car glass cartel. 93 percent of the cases show leniency applications and, on average, 68.5 percent of the firms in each case applied for fine reductions as part of the program. The average fine reduction per firm – which is not necessarily due to a leniency application but could also relate to, e.g., the inability to pay larger fines – is 24 percent of the initial base fine imposed.

Data set on worldwide merger activity between 1997 and 2013

For the study of merger activity, we make use of the ZEPHYR database provided by Bureau van Dijk. The ZEPHYR database includes detailed information on (completed) worldwide mergers and acquisitions such as deal type, transaction volume as well as target, acquirer and vendor financials and further details. In our raw data set, we do not include all transactions from ZEPHYR but restrict the number of deals according to the following selection

[8] It is worth noting that one cartel member is not necessarily represented by one single firm in our data set. In cases in which several firms are jointly liable for the infringement, such a 'group of companies' is treated as one observation.

procedure. First, we use information on cartel-affected industries from our cartel data set and only keep all completed mergers or acquisitions from these industries at NACE three- or four-digit level. Second, we only keep information on industries for which merger information was available three years before and after the respective cartel breakdowns. Third, we drop industries in which several cartels emerged in the observation period in order to avoid a problematic overlapping of observations.[9] Applying these selection criteria leaves us with 5244 mergers related to 24 industries on NACE three- or four-digit level. Table 2 displays an excerpt of the descriptive statistics of this data set.

Table 2: Descriptive statistics of the merger raw data set

	Mean	*Median*	*Std. dev.*	*Min*	*Max*
Mergers	0.010	0	0.101	0	1
Acquisitions	0.990	1	0.101	0	1
Deal value (m €)	322.660	13.765	4625539	0.01	189951
Mergers with EEA involvement	0.161	0	0.368	0	1
Mergers within EEA only	0.373	0	0.484	0	1
Mergers outside EEA	0.423	0	0.494	0	1
Horizontal M&A	0.331	0	0.471	0	1
Vertical or conglomerate M&A	0.669	1	0.471	0	1

As shown in Table 2, 99 percent of the transactions refer to acquisitions leaving only 1 percent for pure mergers. The average and median deal values are 323 million € and 14 million €, respectively. The highest deal value is 190 billion € and was paid as part of the merger between Smithkline Beecham and Glaxo Wellcome in 2000. The geographical breakdown of the data reveals that about 16 percent of the observations refer to mergers in which at least one firm originates from the EEA, while 37 percent represent transactions within the EEA and 42 percent of the mergers and acquisitions took place outside the EEA.[10] Last but not least, Table 2 reveals that 33 percent of the mergers and acquisitions in the data set were horizontal leaving the remaining 67 percent for either vertical or conglomerate mergers.[11]

[9] For example, if a cartel in a particular industry ended in 2002 and another cartel in the same industry in 2006, the number of transactions in 2005 in this industry would be assigned to both categories 'three years after cartel breakdowns' and 'one year before cartel breakdowns' in our empirical analysis. As such an overlap would bias our results we only keep industries in which either only one cartel emerged in the observation period or in which the time distance between two cartels is sufficiently large to avoid the described overlap.

[10] The remaining five percent are transactions for which the originating country of either the acquirer or the target is not stated in the ZEPHYR database. Please note that these observations are dropped for the analysis of EEA mergers in the subsequent sub-sections.

[11] As ZEPHYR does not provide information on the type of transaction, we define a merger as horizontal if the primary 4-digit NACE codes of the acquirer and the target are identical.

Merging the two raw data sets

The two data sets were merged via industry three- or four-digit NACE codes, resulting in an overall data set that contains cartel and merger data for 24 industries on a yearly basis. We provide an overview of the respective industries (including the NACE code) in Table 5 in the Annex. Furthermore, Table 3 below provides a characterization of the 22 cartels included into our analysis.

Table 3: Characteristics of cartels included in the empirical analysis

EU Case No.	Industry	No. of cartelists	Begin of cartel (m/y)	End of cartel (m/y)	Duration of cartel (months)
37512	Manufacture of pharmaceutical preparations	8	9/1989	2/1999	113
37750	Manufacture of beer / Wholesale of beverages	2	3/1996	12/1999	45
37800	Manufacture of beer	4	10/1985	2/2000	172
37956	Manufacture of doors and windows of metal	7	12/1989	7/2000	127
37978	Manufacture of other chemical products n.e.c.	2	11/1990	12/1999	109
38279	Wholesale of meat and meat products	6	10/2001	1/2002	3
38344	Manufacture of basic iron and steel and of ferro-alloys	16	1/1984	9/2002	224
38354	Manufacture of plastic packing goods	13	1/1982	6/2002	245
38432	Manufacture of consumer electronics	3	8/1999	5/2002	33
38543	Other transportation support activities	10	10/1984	9/2003	227
38645	Manufacture of plastic plates, sheets, tubes and profiles	5	1/1997	9/2002	68
38823	Manufacture of lifting and handling equipment / Other construction installation	4	5/1996	1/2004	92
38899	Manufacture of electricity distribution and control apparatus	5	4/1988	5/2004	193
39092	Manufacture of ceramic sanitary fixtures / Manufacture of other plastic products / Manufacture of other taps and valves	17	10/1992	11/2004	145
39125	Manufacture of other parts and accessories for motor vehicles / Sale of motor vehicle parts and accessories	4	3/1998	3/2003	60
39129	Manufacture of electric motors, generators and transformers	6	6/1999	5/2003	47
39165	Manufacture of flat glass	4	1/2004	2/2005	13
39309	Manufacture of computers and peripheral equipment	6	10/2001	2/2006	52
39396	Manufacture of other inorganic basic chemicals / Other non-ferrous metal production	7	4/2004	1/2007	33
39401	Distribution of gaseous fuels through mains	2	1/1980	8/2000	247
39579	Manufacture of soap and detergents, cleaning and polishing preparations	3	1/2002	3/2005	38
39600	Manufacture of other pumps and compressors	5	4/2004	10/2007	42

In addition to the case number of the corresponding EC cartel decision, we further report the respective industry, number of cartelists, begin and end of the cartel as well as the resulting cartel duration (in months). As implied by the table, we were only able to include 22 out of 73 EC cartels (about 33 percent) which were decided between 2000 and 2011 in our empirical

analysis. While several cases had to be dropped due to missing data, the majority had to be excluded due to cartel overlaps, i.e., we excluded the industry as soon as an overlap of two or more cartels was identified. This process was necessary in order to correctly identify the effect of *one* cartel breakdown on merger activity.

3.2. Empirical results

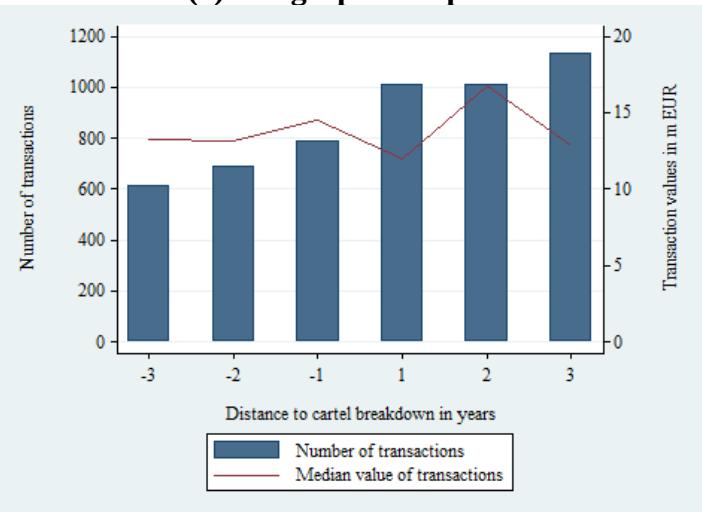
In this section, we present the results of our empirical analysis. The subsequent Section 3.2.1 concentrates on all kind of mergers (horizontal, vertical and conglomerate) while Section 3.2.2 then restricts our analysis to horizontal mergers only. In both sub-sections, we provide the results for three different geographical scopes of mergers: worldwide mergers, mergers in which one EEA firm was involved and mergers in which both parties were based in the EEA.

3.2.1. Results for all mergers

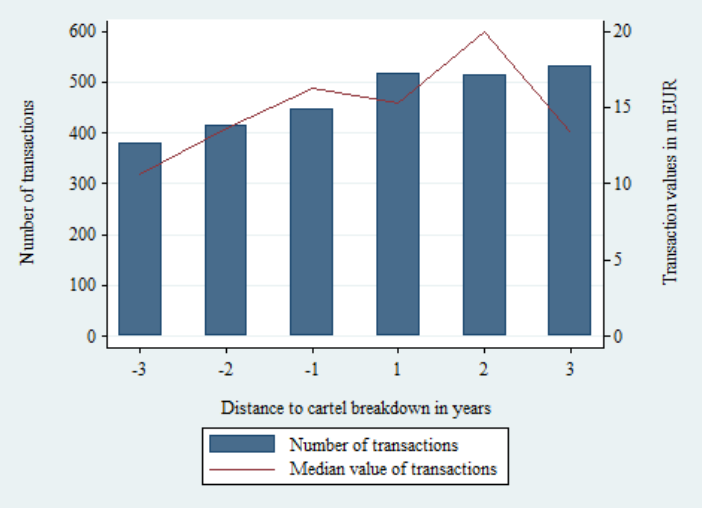
Although market power issues are typically assumed to be strongest for horizontal mergers, the discussion in Section 2.2 above revealed that especially vertical (but also conglomerate) mergers have the potential to change the structure of the post-cartel industry and may lead to increases in market power. In a first step, we therefore report the number of all merger transactions in the three years before and after the cartel breakdowns in the respective industries[12] for the three geographical scopes.

[12] The yearly distances 1, 2 and 3 are based on monthly time spans, i.e. [1;12], [13;24] and [25;36] months after cartel breakdowns. The same definition applies to the distances before the cartel breakdowns (-1, -2 and -3).

(a) Geographic scope: worldwide



(b) Geographic scope: at least one merging firm stems from EEA



(c) Geographic scope: both merging firms stem from EEA

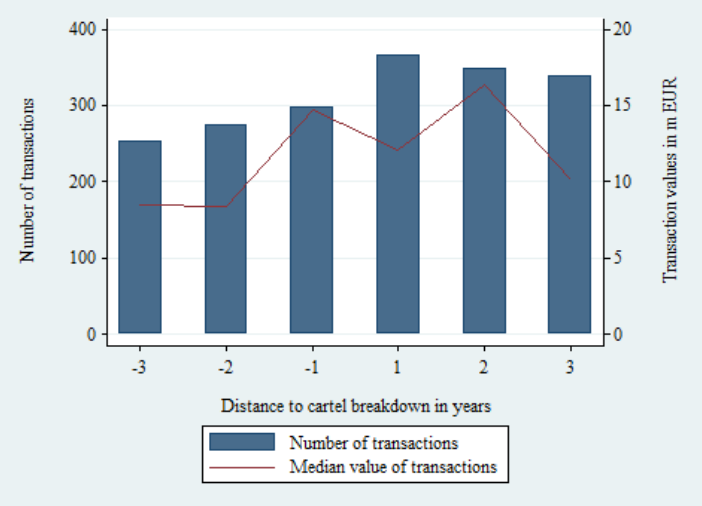


Figure 1: Number of merger transactions and their median values three years before/after cartel breakdowns (all mergers)

As revealed by Figure 1(a), we observe a clear increase in merger activity in the three years after the cartel breakdowns (compared to the three years before the cartel breakdowns). Although a stepwise increase in merger activity is already identifiable in the three-year-window before the cartel breakdowns, the average number of transactions still increases from 696 in the three years before to 1052 in the three years after the cartel breakdowns; a rise of about 51 percent.

Extending our analysis to the remaining two geographical scopes shown in Figure 1(b) and 1(c) reveals that – despite the expected reduction in the number of transactions – the general shapes of the pre-/post-cartel breakdown values stay quite similar; although the percentage-changes are reduced to 25 percent (EEA firm involved) and 28 percent (only EEA firms involved), respectively. However, while Figure 1(a) still shows an additional small increase in worldwide merger activity in the year +3, activity stays almost constant for mergers with EEA involvement (Figure 1(b)) and even decreases in the sub-sample of EEA mergers (Figure 1(c)). However, in sum, our descriptive results support the hypothesis that merger activity increases in the year after cartel breakdowns in the cartel-affected industries leading to a corresponding increase in the average number of merger transactions in the three years after the cartel breakdowns.

With respect to changes in the median deal values over time, we observe a remarkable drop in transaction size in the year after the cartel breakdowns in all three graphs, suggesting that a larger number of smaller mergers is realized in that period. This decrease in the median transaction value is, however, followed by an up-and-down pattern in the succeeding two years making any consistent interpretation difficult. Furthermore, the three graphs in Figure 1 also reveal that absolute median values are located between EUR 15 million and EUR 35 million suggesting that a substantial fraction of all mergers in the dataset are rather small transactions.[13]

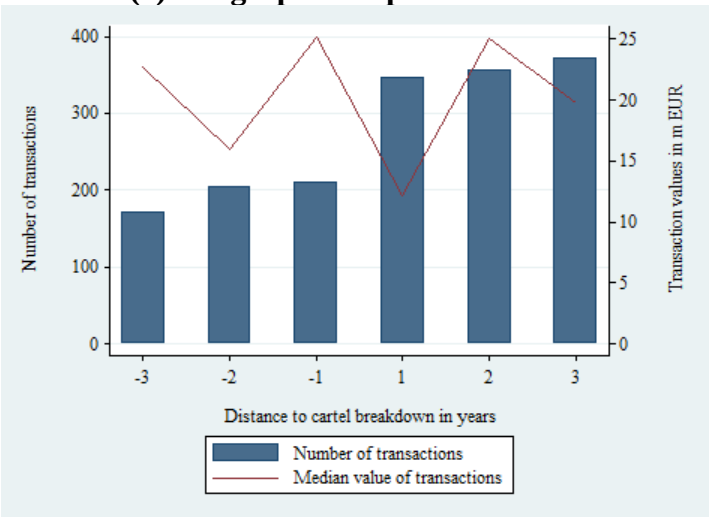
3.2.2. Results for horizontal mergers only

Although a cartel breakdown might also motivate vertical and conglomerate mergers, it is reasonable to expect that horizontal mergers are the primary candidate; basically because, by definition, the respective cartels referred to the horizontal level and it is therefore reasonable to assume that the desire to merge is strongest on this horizontal level in the post-cartel world.

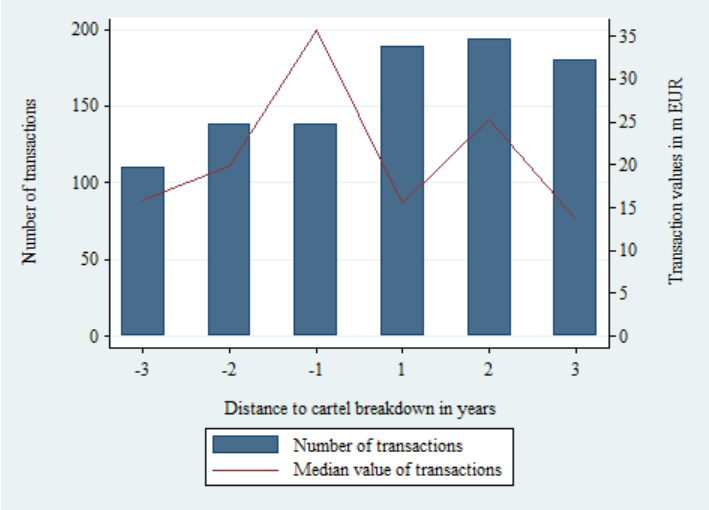
[13] In this respect, it is important to mention that restricting the dataset to only those transactions in which at least 50 percent of the target firm was acquired (thereby dropping smaller transactions) reveals an almost identical pattern, i.e., our general results are not driven by the fact that a substantial amount of small transactions is included. The number of transactions, however, does differ quite substantially.

In order to investigate this hypothesis, Figure 2 below provides the above results for the subset of horizontal mergers (for the three geographical scopes).

(a) Geographic scope: worldwide



(b) Geographic scope: at least one merging firm stems from EEA



(c) Geographic scope: both merging firms stem from EEA

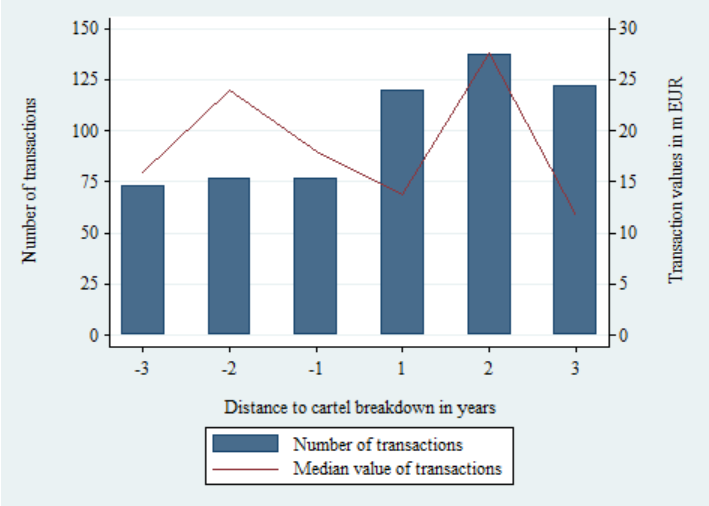


Figure 2: Number of merger transactions and their median values three years before/after cartel breakdowns (horizontal mergers only)

As revealed by Figure 2(a), we observe an even more pronounced increase in merger activity in the three years after the cartel breakdowns (compared to the three years before the cartel breakdowns). While the stepwise increase in merger activity in the years before the cartel breakdowns – identified in Figure 1(a)) – is reduced or even disappears, the average number of transactions increases substantially from 196 in the three years before to 359 in the three years after the cartel breakdowns; a rise of about 83 percent.

Extending our analysis to the remaining two geographical scopes shown in Figure 2(b) and 2(c) reveals that – despite the expected reduction in the number of transactions – the general shapes of pre-/post-cartel breakdown values stay quite similar, although the percentage-changes are reduced to 48 percent (EEA firm involved) and 66 percent (only EEA firms involved), respectively. Again, while Figure 2(a) shows an additional small increase in merger activity in year +3, activity is visibly reduced in Figures 2(b) and 2(c). However, in sum, our descriptive results support the hypothesis that horizontal merger activity increases substantially in the years after cartel breakdowns in the cartel-affected industries leading to a corresponding increase in the average number of merger transactions in the three years after the cartel breakdowns.

With respect to changes in the median deal values over time, we observe a remarkable increase in transaction size in the year before the cartel breakdowns in Figures 2(a) and 2(b) and already in year -2 in Figure 2(c). Although increases in the median value suggests that a number of larger mergers were realized in the respected period, the developments reported in the figures are again difficult to interpret without a detailed case-based assessment of the respective mergers.

In a nutshell, comparing the average number of merger transactions and percentage changes between Figure 1 (all mergers) and Figure 2 (horizontal mergers only) reveals a substantial increase in post-cartel merger activity for both breakdowns of the data set. However, as expected up-front, results for the subset of horizontal mergers are much clearer compared to the entire data set including all merger transactions. Table 4 below summarizes the key results by providing the average number of merger transactions and percentage changes three years before and after the cartel breakdowns.

Table 4: Average number of merger transactions and percentage changes three years before and after the cartel breakdowns

	Average number of transactions					
	All mergers			Horizontal mergers		
Geographic scope	*3 years before cartel break-downs*	*3 years after cartel break-downs*	*%-change*	*3 years before cartel break-downs*	*3 years after cartel break-downs*	*%-change*
Worldwide	696	1052	*+51.2*	196	359	*+83.2*
At least one merging firm stems from EEA	414	522	*+25.1*	129	188	*+45.7*
Both merging firms stem from EEA	275	351	*+27.6*	76	126	*+65.8*

As shown in Table 4, the percentage change in the average number of transactions lies between 25 percent for all mergers in which at least one merging firm stems from the EEA and 83 percent for worldwide horizontal mergers. Although admittedly part of these differences might be driven by other factors, the dimension of the observed changes together with the different points in time at which the cartels ended provide a strong case for a direct relationship between cartel breakdowns and merger activity.

3.3. Challenges of an econometric implementation

Given the substantial investment in the construction of the data set applied in this study, the original plan was to complement the descriptive evidence presented in the previous sections with econometric evidence on the question whether cartel breakdowns lead to a significant increase in merger activity. In particular, we aimed at applying either a difference-in-differences approach or a before-during-after approach to substantiate our analysis. Despite the undisputed general value of such econometric investigations, we decided to abstain from them in this paper for the following reasons.

In principle, a difference-in-differences approach would be a suitable empirical method to investigate our research question. In addition to substantial data needs, a key challenge in an application of such a method lies in the choice of a suitable control group. For several reasons, we believe that such a suitable control group cannot be identified in our case. First, cartels are not equally likely in all markets and industries and as a consequence, it would be necessary to include industries in which cartels are in principle possible. Second, even if such industries can be identified, they would face the challenge of containing undetected cartels thereby questioning these industries as suitable control group. Third, our data set only

includes cartels detected on the level of the European Union and therefore ignores the (potentially substantial) impact of either national cartels in the EU or international cartels outside the EU (which might still have an impact on European markets).

Complementary to a difference-in-differences approach, a before-during-after approach could be applied. In principle, such an approach could explain merger activity before, during and after cartelization while controlling for other drivers such as the general economic development, interest rate levels or more specific trends in particular industries (which might determine general merger activity). In addition to possible methodological problems of such an approach (e.g., due to overlaps between different cartels at a particular point in time causing severe identification problems), an application as part of this study is foreclosed due to a lack of sufficiently detailed data.

Despite the described challenges of an econometric implementation – which led to the decision not to undertake them as part of this study – we do believe that the findings derived as part of our descriptive empirical analysis provide a strong case for an existing impact of cartel breakdowns on merger activity. Although admittedly part of the observed differences might be affected by other drivers such as, e.g., general waves in the economic development, the fact that the cartel breakdowns included in our analysis took place at different points in time is likely to reduce the impact of such effects on our key results.

4. Conclusion

In the aftermath of the breakdown of a German cement cartel in early 2002, one of the large former cartel members tried to acquire the cartel breaker – Readymix AG – probably in an attempt to both ‘pacify’ the industry and punish the deviator. The German Federal Cartel Office, however, prohibited the transaction thereby avoiding the (partial) substitution of cartel-related market power by merger-related market power. In the end, Readymix was nevertheless acquired – by Cemex, a larger Mexican cement company which was not active in the German market before the transaction.

Although admittedly anecdotal evidence, the aftermath of the breakdown of the German cement cartel provides a nice example of the interaction between cartel breakdowns and merger activity in a world with workable antitrust enforcement. The breakdown of the cartel led to an increased desire to merge and antitrust policy was – albeit able to foreclose the (likely) most anticompetitive merger – not in the position to entirely prohibit subsequent mergers in the post-cartel world. More generally, the case suggests that modern antitrust

policy certainly can have an influence on the choice of the merging parties, however, is typically unable to disrupt the general incentives to merge after a cartel breakdown.

Against this background, we have investigated the impact of cartel breakdowns on merger activity. Merging information on cartel cases decided by the European Commission between 2000 and 2011 with a detailed data set of worldwide merger activity, we find that, first, the average number of all merger transactions increase by up to 51 percent when comparing the three years before the cartel breakdowns with the three years afterwards. Second, for the subset of horizontal mergers, merger activity is found to increase even more – by up to 83 percent – after the cartel breakdowns. Our results stay largely robust for variations in the geographical scope (worldwide, EEA firm involved, only EEA firms involved). Although several methodological (and data) problems did not allow us to put our descriptive results on the econometrics test bed, we do believe that they provide a strong case for an existing impact of cartel breakdowns on merger activity.

Due to the limitations of our empirical analysis, policy conclusions should be derived with care. In principle, our results on the one hand suggest that competition authorities should consider mergers as a potential 'second-best' alternative to cartels, i.e., they should take the prior collusion history of the industry into account during the merger control procedure (in order to avoid a simple replacement of the type of market power). On the other hand, our finding that cartel breakdowns are followed by an increased merger activity also implies that resource (re)allocations in competition authorities, law practices and economic consultancies may become necessary to handle the respective increase in the workload.

Last but not least, our study points towards two interesting future research areas. On the one hand, the observed merger activities suggest additional research on ex-post merger assessments that explicitly take a prior collusion history into account. Such studies would allow detailed answers to the question whether approved mergers in the respective industries should in fact had been prohibited or – more generally – whether merger control in such cartel-affected industries should become tougher in order to increase the probability that competition has 'a fair chance' to grow.

On the other hand, although merger activity after cartel breakdowns can be motivated by anticompetitive purposes, it is reasonable to assume that a substantial fraction of these transactions rather follow efficiency motivations; e.g., post-cartel mergers might play an important role in facilitating the transition from old and inefficient cartel industry structures to more efficient competitive market structures. As a consequence, a fruitful area of future research is detailed case studies on such transition processes in general and the role of

mergers in particular. Such investigations are especially likely to provide answers to one key question this study had to leave open: the true motivations underlying the identified substantial increase in merger activity after cartel breakdowns.

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Annex

Table 5: Industries included in the empirical analysis

Industry	NACE Code
Manufacture of beer	1105
Manufacture of soap and detergents, cleaning and polishing preparations	2041
Manufacture of other chemical products nec	2059
Manufacture of plastic plates, sheets, tubes and profiles	2221
Manufacture of plastic packing goods	2222
Manufacture of other plastic products	2229
Manufacture of flat glass	2311
Other non-ferrous metal production	2445
Manufacture of doors and windows of metal	2512
Manufacture of electric motors, generators and transformers	2711
Manufacture of electricity distribution and control apparatus	2712
Manufacture of other pumps and compressors	2813
Manufacture of other taps and valves	2814
Manufacture of lifting and handling equipment	2822
Manufacture of other parts and accessories for motor vehicles	2932
Distribution of gaseous fuels through mains	3522
Other construction installation	4329
Wholesale of meat and meat products	4632
Wholesale of beverages	4634
Other transportation support activities	5229
Manufacture of pharmaceutical preparations	212/2120
Manufacture of basic iron and steel and of ferro-alloys	241/2410
Manufacture of computers and peripheral equipment	262/2620
Manufacture of consumer electronics	264/2640