Essays on the theory of collusion
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Chapter 9

Conclusion

9.1 Summary

Many countries, including Germany, the United Kingdom and the United States, have adopted antitrust (or competition) laws that prohibit firms to enter into agreements that are potentially harmful to society at large. Acts that are considered to be illegal include horizontal mergers that create a monopoly and price agreements. Although such laws have been in place for many years (the U.S. Sherman Act dates from 1890) and are uncontroversial among most economists and policymakers, there are still many open questions. The essays in this thesis apply game-theoretic tools to formulate and answer some of these questions.

A central tenet of the Chicago School is that a cartel bears the fruit of its own destruction, because supra-competitive profits attracts new firms. As this reasoning seems plausible, the open question here is why we still observe cartels. How long does it take for entry to destabilize a cartel? More generally, which factors determine the durability of a cartel? Chapter 2 presents a model to address this issue. It is shown that collusion is viable, even when cartel members face the threat of entry. The model allows for a closed-form expression of the expected lifetime of a cartel. Key determinants that affect a cartel’s stability are the number of cartel members and the cost of deterring entry.

\footnote{Robert Bork (1978) is one of the few outspoken critics of antitrust laws. He contends that the American antitrust policy slows down innovation and protects small businesses instead of consumers.}
One of the main activities of antitrust authorities is to detect and punish collusive behavior. Given the illegal nature of price conspiracies, firms try to keep their agreements private by negotiating in the proverbial “smoke-filled rooms”. The only information that may give away the presence of a cartel is therefore public information such as prices. A high price might indicate the presence of a cartel, but is also consistent with a high-cost industry. An antitrust authority has an *ex post* incentive to investigate the former industry but not the latter. Chapter 3 studies this game between firms and an antitrust authority. The analysis reveals that, when an antitrust authority is unable to commit, firms will collude with some probability. The government can decrease the incidence of collusion by instructing the antitrust authority to maximize consumer welfare instead of social welfare.

Chapter 4 considers semicollusion. When firms engage in semicollusion, they coordinate on some strategic variables, such as the range of products, prices or service provision, but act non-cooperative on others. Even though this form of collusion seems to be ubiquitous, the vast majority of the literature on collusion restricts attention to full collusion. An important open question is how semicollusion differs from full collusion. Does competition on the quality dimension wash away the collusive profits obtained by coordination of prices? Are consumers better off under semicollusion than under full collusion? The analysis in the chapter implies that semicollusion is still profitable for firms, as compared to non-cooperative behavior, but the optimal price depends on the firms’ ability to compete through service provision. In particular, when providing service is relatively costly, the cartel chooses to set a high price, knowing that firms will be restricted in competing the collusive profits away. On the other hand, when providing service is relatively easy the cartel chooses to set a low price, as compared to the non-cooperative price, to moderate the degree of competition through service provision. In general, consumers prefer non-cooperative behavior over semicollusion, and semicollusion over full collusion.

Chapter 5 revisits a classic topic of industrial organization: resale price maintenance. The classic Chicago position on vertical restraints such as resale price maintenance is that they are voluntarily agreed to by upstream and downstream firms, and necessarily enhance efficiency. The prevailing view, however, holds that resale price maintenance is pro-collusive and should therefore be banned. Chapter 5 studies a simple model of a manufacturer and two downstream retailers. Under the assumption that the manufacturer and retailers aim to maximize profits, it is shown that resale price maintenance may have an anti-collusive effect. The reason
is that by imposing a price floor, the manufacturer makes it impossible for retailers to form a cartel as a high price floor makes it attractive for retailers to deviate from a cartel agreement. This suggests another pro-efficiency interpretation of resale price maintenance.

An important question concerns the interplay between market characteristics and the scope for collusion. It is well-known that certain properties of markets may hinder or foster collusion between firms.\(^2\) For instance, it is easier to collude for firms when consumers order their goods regularly and frequently. There is, however, little systematic knowledge on this relation. Chapter 6 fills this gap by reviewing the existing literature on the ties between collusion and market characteristics for a market that becomes increasingly important: auctions. The bottom line of this chapter is that auctioneers may prevent collusion by twisting and tweaking the auction rules. In response to a cartel, an auctioneer has various tools at his disposal, such as adjusting the auction format, imposing a reserve price, or limiting the bidders discretion in submitting a bid. The task of deterring cartels, therefore, does not rest solely on the shoulders of antitrust authorities.

The discussion on collusion in auctions continues in chapters 7 and 8. Chapter 7 studies collusion in a multidimensional auction, in which a firm’s bid consists of a price and a quality index. The analysis consists of two parts. First, the chapter presents a derivation of the optimal collusive scheme when firms can and cannot make transfers to each other. This exercise helps to understand how cartels work in actual multidimensional auctions. Moreover, the analysis is instrumental in the second part of the chapter, where a number of anti-collusive strategies are discussed. The main insight is that, in order to lower the costs of collusion, auctioneers should not merely announce a minimum quality level and a maximum price, but try to construct a scoring method that ranks price and quality pairs and announce a minimum score below which bids are not eligible. This method is more efficient in the sense that it results in the socially optimal quality level and yields the auctioneer a higher surplus.

Although auctions are a popular method in procurement, an even more frequently used method is to negotiate. This seems puzzling, as auctions are easy to conduct and tend to deliver the buyer better terms of trade than negotiations. Chapter 8 analytically compares the two mechanisms, and find that in some cases negotiations do outperform auctions. Most importantly, a seller is better off negotiating when he is certain that a relatively large bidding ring exists.

\(^2\) See Motta (2004), chapter 4 for a discussion of these factors.
9.2 Avenues for further research

Hopefully, the essays in this thesis provide convincing evidence that collusive behavior forms a rich source of interesting research. There are many ways in which the above models can be extended or modified to yield new insights or applications. This section discusses a few.

The first essay offered a theory of entry deterrence and finite cartel duration. That model is still highly stylized. For instance, entrants are passive bystanders. In practice, entrants do not wait patiently for the incumbents to fail but actively lobby the government as well. A promising extension would therefore be to explicitly model the lobbying process by adding a ‘political economy’ component in which incumbents, entrants and politicians have a strategic role. Another challenging question is to formulate an econometric model and estimate the expected duration of cartels.

The essay on antitrust enforcement, chapter 3, studied a model in which firms may have two types; low costs or high costs. An obvious extension is to analyze the ‘continuous-type’ version of the model, in which the costs of firms is drawn from a continuous interval. A related adjustment is to drop the assumption of common costs and consider the case where firms’ costs are correlated.

Chapter 4 considered semicollusion. The analysis in that chapter simply assumed semicollusive behavior. It would be interesting to understand why firms adopt this type of collusion instead of full collusion. An answer presumably relies on imposing costs of observing a firm’s strategic decisions and assuming that those costs differ across strategic variables. It is arguably easier to observe a competitor’s price than its level of service.

The analysis in chapter 5 suggests that it is worthwhile to examine the effect of vertical restraints other than a price floor on the ability to collude. Empirical research is also welcome. Despite the controversial nature of the topic, and the existence of a large theoretical literature, there are few empirical studies of the economic effects of vertical restraints. An empirical study may also provide insights about the empirical relevance of the various theoretical explanations of vertical restraints, including the one proposed in this thesis.

Chapter 6 reviewed the literature on collusion in auctions. The most urgent challenges in this field are empirical: how to detect collusion and how to estimate the welfare costs of collusion? An answer to these questions can probably only be given in the context of a case study, where the researcher has access to detailed (cost) data. An open theoretical issue is to explain the often used practice of orga-
nizing a knockout after the actual auction. This method is inefficient and does not seem to maximize a cartel’s revenue.

The most promising approach for new research related to chapters 7 and 8 seems to be empirical. There is little empirical research on multi-dimensional auctions. By estimating bid functions for these auctions, economists can potentially estimate the welfare gains or losses of alternative auction formats. Explaining the choice of a mechanism seems to be a highly relevant research topic as well. Insights from such a study could improve auction theory. Understanding the determinants of the choice of a mechanism may also guide public policy. When is it sensible to instruct government agencies to use a particular procurement mechanism? Rich and reliable data are often scarce and an alternative method to study collusive behavior in auctions are experiments.

Of course, there are many other issues left to be explored in antitrust economics. For instance, the profession is now starting to integrate insights from the endogenous growth literature into industrial organization models. In models of endogenous growth (the seminal reference is probably Aghion and Howitt, 1992), firms invest in R&D to become the market leader and render the previous market leader’s product obsolete. An important characteristic of endogenous growth models is that firms do not compete ‘on’ the market, but rather ‘for’ the market. Segal and Whinston (2007) investigate some implications of this form of competition for antitrust policy. As this literature is still to be developed, there are many interesting open questions. What is, to name just an example, the scope for collusion when firms are involved in a perpetual R&D race? What is the relevance of merger policy in such an environment?

There exists a large body of knowledge on political economics. The majority of articles in that field, however, restricts attention to macroeconomic issues such as monetary policy, income distribution or economic growth, see for instance the textbooks by Drazen (2000) and Persson and Tabellini (2000). Antitrust policy often has a significant political dimension. Governments sometimes encourage a merger of large national firms to create a ‘national champion’. And a supra-national or federal antitrust authority, such as the European Commission, may encounter strong local political opposition when it decides to impose a huge fine for price fixing. This political dimension of antitrust is usually ignored in the literature. An exception to this claim are papers by Röller and his co-authors (see Neven and Röller, 2005 or Röller and Waverman, 2001). There are many interesting problems in ‘political industrial organization’. How should we view the interaction between politicians
and the antitrust authority? In the spirit of the central banking literature, are politically independent antitrust authorities better capable of deterring collusion than dependent ones?

### 9.3 Policy recommendations

Every essay in this chapter is a theoretical exercise. Yet, one can distill several insights that are relevant for policymakers. Perhaps the most general lesson that can be drawn is that there are many ways to combat cartels. Investigating industries and imposing a fine if a cartel is found is not the only strategy. There are other, more creative, solutions. This section discusses the policy implications in more detail.

The analysis in chapter 2 suggests that the antitrust authority should take the expected duration of a cartel into account when deciding to investigate an industry. The model suggests that industries with a well-organized trade union are more likely to accommodate a long-lived cartel, as are industries which are protected from vigorous competition by an import barrier. Investigation is costly, and should therefore be targeted toward the (potential) cartel with the largest negative impact. A second implication is that policymakers can attempt to decrease the durability of cartels. For instance, the government can lower the import tariffs to induce entry of foreign firms. The strategy of decreasing the durability of cartels can be seen as an indirect way to combat cartels, as compared to the traditional strategy of fining cartels.

The lesson of chapter 3 is that policymakers should carefully rethink the objectives of the antitrust authority. Does the antitrust authority have the right incentives to effectively deter collusion? Related to this issue is the question of how the antitrust authority can be held accountable. In contrast to central banking, where the performance of the central bank can be measured according to an inflation target, there is no obvious, measurable, target in antitrust.

The results in chapter 4 warn antitrust authorities not to take quality, service, or other non-price strategic variables as given when setting a fine for a cartel. Assuming that non-price strategic variables are unchanged under collusion tends to yield biased estimates of the welfare costs of collusion.

The immediate policy implication of chapter 5 is that the current European ban on resale price maintenance should be lifted. The arguments in favor of resale price maintenance, which may be summarized under the header of pro-efficiency, are more compelling than the traditional view that resale price maintenance fosters col-
Conclusion. The simple model in this chapter demonstrates that resale price maintenance may actually be anti-collusive, which undermines the pro-collusive argument against this vertical restraint.

The U.S. Supreme Court decided in *Leegin* to abolish the illegal treatment of resale price maintenance, and now favors a rule of reason standard. This seems to be an attractive option for the European Union as well. With a rule of reason, the European Union effectively adopts a ‘wait-and-see’ strategy. When the pro-collusive view turns out to be correct, the Union can still refuse upstream firms to use this restraint.

The articles surveyed in chapter 6 clarify the role of the auctioneer in preventing collusion. By responding to signals for collusive behavior, an auctioneer can adjust the design of the auction to prevent the emergence of a cartel or at least mitigate the negative revenue effects. Thus, collusion can be deterred *ex ante* at the market design stage, instead of *ex post*, by prosecuting an existing cartel.

The most important implication of chapter 7 is that an auctioneer in a multidimensional setting should construct a scoring index to rank multidimensional bids and announce a minimum score below which bids are not eligible. Of course, the construction of such an index can be a difficult exercise, and in some cases prohibitively costly.

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