BID RIGGING AND UMBRELLA DAMAGES

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When a cartel does not include all sellers in a market, it raises the possibility of buyers paying elevated prices on purchases made from non-cartel members and therefore suffering "umbrella damages" due to the cartel's conduct. While certain jurisdictions (e.g. the EU) allow plaintiffs to claim umbrella damages, it is not clear whether plaintiffs seeking umbrella damages in the U.S. have standing. This article analyzes the role of umbrella damages when conducting damage assessment in bid-rigging cases. The article explains why umbrella damages may be a consideration in certain auction formats but not others and describes the underlying economic rationale. It summarizes findings from a case study of these types of damages using data from the Texas dairy industry. It concludes with some practical considerations when assessing umbrella damages.

I. INTRODUCTION

Umbrella damages arise when non-cartel firms take advantage of the softening of market competition due to the presence of a cartel. For instance, non-cartel firms may have an incentive to put up prices in response to cartel members raising their prices, i.e. non-cartel firms may set higher prices under the "umbrella" of elevated cartel prices. As a result, purchasers from non-cartel firms may pay a price that exceeds what the market price would be in the absence of collusion. In this sense, damages inflicted by non-cartel firms can broaden the scope of cartel damages, as long as a causal link between the cartel's illegal conduct and a price increase by firm(s) not in the cartel is established. While U.S. courts have generally refrained from allowing umbrella damages,[2] other jurisdictions, such as the European Union[3] and Canada[4], recognize the possibility of plaintiffs seeking umbrella damages from cartelists.

Moreover, even where umbrella claimants have standing, as far as we are aware there has been no rigorous calculation of such damages in a manner that courts have accepted. This raises questions about how significant umbrella damages are and how one could quantify those damages in practice. Caoui (2022) tackles these questions in the context of bid-rigging in auction markets.[5] Auctions are widely used by both public and private entities.[6] In this article, we discuss some of the key insights of that paper.

We begin with a brief discussion of the susceptibility of the most commonly observed auction formats — namely, First Price Auctions ("FPAs") and Second Price Auctions ("SPAs")[7] — to bidder collusion and the likelihood of observing umbrella damages in those settings. We then discuss the empirical analysis of umbrella damages in Caoui (2022), which examines the bidding behavior of non-cartel bidders in Texas school milk FPAs, which were found to be subject to cartel behavior between 1980 and 1992. This analysis shows that umbrella damages in auction settings can be substantial: Caoui (2022) estimated that the size of umbrella damages in milk auctions in Texas was between 35 and 100 percent of the "direct" damages attributable to the cartel.

II. AUCTION FORMAT AND UMBRELLA DAMAGES

It is widely recognized in the auction literature that a SPA is more susceptible to bidder collusion than a FPA.[8] This is because, in a SPA, reaping collusive gains does not require most cartel members to alter their bidding behavior relative to how they would bid non-cooperatively.[9] Absent

2 See e.g. *Mid-West Paper Products Co v. Continental Group and In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation.*

3 *Kone and others v. ÖBB-Infrastruktur AG, Case C-557/12*

4 *Pioneer Corp. v. Godfrey, 2019 SCC 42 (CanLII), [2019] 3 SCR 295.*

5 Caoui, E. H. (2022). A study of umbrella damages from bid rigging. *The Journal of Law and Economics*, 65(2), 239-277.

6 For instance, in 2017 federal agencies in the U.S. conducted 19,000 auctions to award contracts worth $1.5 billion, and in 2022 globally art and antiques worth $27 billion were sold through auctions. See https://www.gao.gov/products/gao-18-446; and https://www.statista.com/topics/8930/auction-market-worldwide/#topicOverview.

7 In a FPA, the highest bidder wins the auction and pays the seller their winning bid. Analogously, in a first price *procurement*, the lowest bidder wins the competition, and the buyer pays the winning bidder the winning (lowest) bid. In an SPA, the highest bidder wins the auction and pays the seller the second highest bid. Analogous to an SPA, in a second price *procurement*, the lowest bidder wins the competition, but the buyer pays the winning bidder the *second* lowest bid. Because they are mirror images of each other, insights that apply to the auctions also apply to procurements. Since the empirical application discussed in the last section applies to a procurement setting, in the rest of this article when we refer to an FPA or an SPA, we refer to the procurement setting (where lower prices are preferred by the auctioneer).

8 See e.g. Marshall, R. C. & Meurer, M. J. (2004). Bidder collusion and antitrust law: refining the analysis of price fixing to account for the special features of auction markets. Antitrust Law Journal, 72, 83; Marshall, R. C. & Marx, L. M. (2007). Bidder collusion. Journal of Economic Theory, 133(1), 374-402 ("Marshall and Marx (2007)"); Lopomo, G., Marx, L. M. & Sun, P. (2011). Bidder collusion at first-price auctions. Review of Economic Design, 15(3), 177-211.

9 Marshall & Marx (2007).

bidder collusion, competing bidders in a SPA can do no better than simply bidding their marginal costs.[10] When bidding cooperatively (i.e. when colluding), as long as the cartel is successful in suppressing competition from the bidder with the second lowest cost, while the "cartel representative"[11] continues to bid its cost, collusive gains are obtained.[12]

On the other hand, collusion in a FPA does require changing bidding behavior relative to non-cooperative behavior, thus is seen as more challenging to sustain. Because the winner in a FPA is paid its winning (i.e. lowest) bid, bidders acting non-cooperatively have the incentive to bid an amount that is greater than their marginal cost (i.e. apply a "mark-up") to turn a profit.[13] In choosing the level of mark-up, bidders optimally trade off the profit they would make if they won, and the likelihood that their bid would be the lowest.[14] In order to obtain collusive gains in this setting, the cartel representative (in competition with non-cartelists) will have to inflate her bid (apply a greater mark-up) relative to what she would have bid when bidding non-cooperatively. But that inflation can incentivize other cartel members to undercut the cartel representative, rendering the cartel unstable.[15]

While the SPA may be more susceptible to collusion than the FPA, should a non-all-inclusive bidding ring (i.e. one that does not include all bidders competing in the market) exist, umbrella damages are less likely in a SPA than a FPA. This is because, in a SPA when competing against a cartel representative that is bidding its cost, non-cartel members have no incentive to bid anything other than their respective costs.[16] Therefore, if a non-cartel member wins the auction with the lowest bid (equal to its cost), the auctioneer will pay the lowest cost (equivalently, bid) among all other remaining collusive/non-collusive bidders, resulting in no umbrella damages. Indeed, Asker (2010) studies a non-all-inclusive bidding ring in an open outcry SPA setting where no umbrella damages were present.[17]

However, collusion in a FPA can result in umbrella damages, because if non-cartel members infer that colluding bidders are inflating their bids, it may induce the non-cartel bidders to inflate their bids "under the cartel's umbrella." As a result, the prices paid to non-cartel bidders may also be inflated relative to what they would have been absent collusion. Thus, the common wisdom that FPAs are preferred by the auctioneer because they are less prone to collusion than open/SPA is nuanced by the fact that umbrella damages may arise in a FPA. As discussed in the next section, which draws on Caoui (2022), the existence of umbrella damages may particularly be the case if, post-auction, bids and bidder identities are publicly revealed.

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10 This is best illustrated using a simple numerical example. Suppose there are three bidders, A, B and C, whose cost of providing a product or service can range between 1 and 10. For simplicity, we assume that bidders can only submit whole number bids (1, 2, 3 etc.). Consider bidder A with cost, say, $5. We first ask if A has an incentive to bid something less than $5. Suppose A bids $3, and wins the auction i.e. the second lowest bid was greater than $3. If that second lowest bid was also less than A's cost, say $4, then A would make a loss of $1 ($4 minus $5). If on the other hand the second lowest bid was greater than $5, say $7, then A would have still won by bidding its cost and turned a profit of $2 ($7 minus $5). Thus, it cannot be optimal to bid less than one's cost. It is also not optimal to bid greater than one's cost. To see why, suppose A (with cost $5) submits a bid of $8. It would win the auction if the competing bids were all greater $8, e.g. if the second lowest bid was, say, $9 the winning bidder would make a profit of $4 ($9 minus $5). However, A would lose the auction if competing bids were less than $8. In particular, if the winning bid was greater than A's cost ($5) but less than its bid ($8), say $7, then A could have won the auction by bidding its cost and turned a profit of $2 ($7 minus $5). If, however, the winning bid was less than $5, then A would be better off not winning the auction (as it would turn a loss). Thus, in a SPA it is optimal for a bidder to simply bid its cost. These arguments apply regardless of whether bidders write down their bid and submit it to the auctioneer, or whether bidding occurs through the more familiar 'open outcry' process of calling for a high bid and progressively lowering the bid until only one bidder remains. In the open outcry process, the "bid" is the price beyond which a bidder ceases to participate in the auction.

11 The cartel representative is the bidder designated by the cartel to behave competitively in the auction and receive the contract should it be won by the cartel. If the cartel's representative in an auction is the member with the lowest cost for that auction, the collusive mechanism is called "efficient". The mechanism is "inefficient" if the representative is chosen in some other manner (e.g. through randomization). See Caoui (2022) for a discussion of cartel damages under an inefficient collusive mechanism.

12 To see why, consider again the numerical example provided in footnote [[15]]. Suppose bidders A, B and C have costs $5, $6 and $8 respectively. Following the reasoning in the example above, absent any cartel each bidder would bid its cost, A would win the auction, be paid $6 and obtain a payoff of $1. B and C would each obtain a payoff of zero. Now suppose A and B (but not C) form a cartel. If B does not submit a competitive bid, then following the same reasoning as before, A and C would find it optimal to bid their costs. The cartel would thus win the auction with a bid of $5 and obtain a payoff of $3 ($8 minus $5), which the cartelists could split between themselves. Whereas a cartelist could benefit from submitting shill bids or not participating in the auction (through side-payments), should the cartelist choose to submit a serious bid, it is optimal for it to bid its cost. See Marshall and Marx (2007). For a formal treatment of the impact of auction rules on bidders' ability to collude in SPAs, see Marshall, R. C. & Marx, L. M. (2009). The vulnerability of auctions to bidder collusion. The Quarterly Journal of Economics, 124(2), 883-910.

13 Winning with a bid that is less than one's cost will only lead to the bidder making a loss. For example, if bidders' costs are distributed uniformly between 0 and 1, then one can show that the optimal non-cooperative bid for a bidder with cost c is (c+1)/2.

14 See Krishna, V. (2009). Auction theory. Academic press, Section 2.3.

15 This point is best seen through an all-inclusive cartel (i.e. where all bidders are colluding). In this case, the cartel representative may bid the reserve price (i.e. the highest price the buyer is willing to pay) while the other cartel members submit bids that are "too high". But then, a cartel member whose cost is below the reserve price may have an incentive to deviate from the collusive agreement and bid slightly below the reserve price but above its own cost. The deviating cartelist would be assured of winning the auction and turn a profit. Note that for it to be optimal to deviate from the collusive agreement in this manner, the returns to the deviating cartelist from winning the auction must be greater than any side-payment it may receive from the cartel for complying with the collusive agreement. See Marshall and Marx (2007).

16 See note [[15]].

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

III. QUANTIFYING UMBRELLA DAMAGES IN AUCTION SETTINGS

Caoui (2022) studies school-milk contracts awarded annually between 1980 and 1992 in three market areas in Northeastern and Southern Texas: Dallas-Fort Worth ("DFW"), Waco and San Antonio. Contracts were awarded at the school district level through procurement auctions to allocate contracts for the supply of school milk. Every year, between May and August, each district organized a first-price procurement auction. To solicit bids, a school district's food service director published a legal notice of "invitation-to-bid" that was shared with prospective dairy firms in the area. The notice included information on the time and place to submit the bids and the contract specifications. Bids were opened and the amounts and bidders' identities were publicly announced on the spot.

Aspects of the school milk market made it remarkably susceptible to bidder collusion. Firms competed only on prices as the terms of the contract (quantity and quality) were fixed and the product was homogeneous. There were many small contracts put out to bid, facilitating market division. Bids and bidders' identities were publicly announced, which helped detect price cuts by cartel members and increased the transparency of prices. Firms frequently interacted as auctions were not held on the same day, enabling retaliation in instances of cheating. The demand for milk was inelastic, so price-increases would yield higher profits without sacrificing much volume.[18] Finally, the market was relatively concentrated, helping coordination.[19]

Some of these market features also enabled potentially large umbrella damages. In particular, the public announcement of all bids and bidders' identities would result in non-cartel firms learning the price level in the rigged districts and potentially adapting to it. The adaptation was also potentially reinforced by the high frequency of interactions, due to the large number of contracts every year.

In 1992 and 1993, nine leading milk processors accused of collusion in the DFW market area settled with the state.

Caoui (2022) uses a dataset on auctions in this setting, collected by the Antitrust Division of the U.S. Department of Justice, to estimate umbrella damages. Pure Milk Co. was the largest non-cartel school milk supplier in the dataset. The firm's main plant was located in Waco, TX (i.e. in a different federal order zone than the DFW cartel). Although Pure Milk bid primarily for contracts near its plant in the Waco market area, it also participated in a non-negligible number of auctions for school districts in the DFW market area. On these occasions, Pure Milk bid against the cartel. Caoui (2022) focuses on the contracts in which Pure Milk bid in districts where the cartel was operating.

The paper primarily relies on data on 1,034 auctions, comprising 3,493 bids spanning markets with and without cartel operations, thus providing a unique opportunity to document how non-cartel firms' bidding behavior is affected by the cartel's presence.
Auctions in which Pure Milk bid are divided by counties into two separate types:

- *Collusive auctions*: school districts located in counties contiguous or close to Dallas Fort Worth in which the cartel presence was established by the Department of Justice. The counties are Comanche, Dallas, Erath, Hood, and Johnson. Such auctions form around 10 percent of Pure Milk's bids.
- *Competitive auctions*: school districts located in counties outside the Dallas-Fort Worth cartel territory (either in the Waco or San Antonio market areas). The counties are Bell, Bosque, Comal, Coryell, Falls, Hill, Limestone, and McLennan.

Caoui (2022) performed a "reduced form" analysis where Pure Milk's bid for whole white milk was regressed on a list of observable auction characteristics (e.g. price of raw milk, an input in production of whole white milk) and bidder specific characteristics (e.g. distance of bidder's closest plant to school district). The results provide suggestive evidence that Pure Milk bid less aggressively when facing the cartel. Pure Milk bid on average 6.2 percent higher in the collusive auctions (facing the cartel) relative to the competitive auctions.

Caoui (2022) also conducts a "structural" analysis of bidding.[20] Here, bidders' underlying cost distributions (which determine their optimal bids in the auction) were empirically estimated using *bid* data.[21] The estimates are then used to simulate a set of "but-for" auctions, in

18 Porter, Robert J. & J. Douglas Zona (1993), Detection of bid rigging in procurement auctions. Journal of political economy 101(3), 518–538.

19 For nexus between market concentration and cooperation, see e.g. Stigler, G. J. (1964). A theory of oligopoly. Journal of political Economy, 72(1), 44-61; and, Department of Justice and Federal Trade Commission (2010), Horizontal Merger Guidelines. Washington D.C.: U.S. Federal Government.

20 A structural analysis posits an explicit economic model (e.g. demand and supply, competition/collusion etc.). The values of the parameters which govern that economic model are then statistically estimated using market data. See e.g. Davis, P. & Garcés, E. (2009). Quantitative Techniques for Competition and Antitrust Analysis. United Kingdom: Princeton University Press, p 302.

21 For details of the empirical approach, see Caoui (2022) Sections 6.

which cartelized firms are modeled as bidding competitively. Using the auctions in this "but-for" model, Caoui (2022) is able to assess (i) the size of damages caused to school districts by the outsider firm when facing the cartel; and (ii) inefficiencies in contract allocation because the winner is not necessarily the lowest cost bidder. The latter can manifest when there are asymmetries between the cartel and the non-cartel bidders in terms of their respective cost distributions.[22]

Conceptually, estimates of damages to the auctioneer correspond to the difference between the winning bid of the collusive auction in which the outsider firm bids against the cartel and the winning bid of the competitive auction in which all firms bid non-cooperatively.

In this context:

- Cartel damages are the typical damages antitrust authorities aim to assess, that is, for auctions won by the cartel;
- umbrella damages, may be computed for auctions where the *outsider* wins against the cartel; and
- harm due to inefficiencies introduced by the cartel mechanism may be measured by the difference in the winner's cost in the competitive and collusive auctions.

Based on the simulated auctions (which rely on the structurally estimated cost distributions), Caoui (2022) finds that in auctions won by the cartel, the winning collusive bid is between 4.9 percent and 6.4 percent greater than the winning bid in the competitive auction, resulting in direct cartel damages to the auctioneer.[23] In addition, on average, in collusive auctions won by a non-cartel member, the non-cartel member's winning bid is 1.6 percent to 6.4 percent greater than its winning bid in a competitive auction, thereby resulting in umbrella damages to the auctioneer. Indeed, umbrella damages form a non-negligible fraction of cartel damages. Per contract, umbrella damages (conditional on the outsider winning) are estimated to be at least 35 percent of cartel damages (conditional on the cartel winning). Finally, inefficiencies amount to an increase of 5.9 percent of the winner's cost, equaling $2,337 per contract.

IV. PRACTICAL IMPLICATIONS FOR ASSESSING UMBRELLA DAMAGES

We discuss several practical considerations regarding the role of umbrella damages when conducting damage assessment in bid-rigging cases.

1. As Caoui (2022) shows, rigorous assessment of umbrella damages may be feasible in certain settings such as competitive auctions where bid data and well-developed econometric techniques for analyzing those data are available.
2. The presence of a non-all-inclusive cartel (or partial cartel) could result in an inefficient allocation i.e. the seller with the lowest cost may not win the auction: this occurs, in a FPA, if there are asymmetries in costs between the cartel and non-cartel bidders.
3. The existence of umbrella damages depends on the auction format: An SPA does not lend itself to umbrella damages while an FPA does.
4. The likelihood of observing umbrella damages increases if bidders can infer the existence of a cartel and resulting inflated bids. Factors that may facilitate such inference include (i) frequent interaction between bidders; and (ii) revelation of bidders' identities and their bids. In addition, umbrella damages may be more likely if the buyer (the auctioneer) is "passive" and does not take strategic actions to counter the cartel (e.g. by inviting new bidders).
5. Umbrella damages may be larger in the presence of an inefficient cartel than an efficient cartel: indeed, an inefficient cartel can be a "weaker competitor," therefore providing non-cartel firms a greater opportunity to raise their prices.
6. Umbrella damages are harder to establish the more differentiated the products sold in the different auctions are. This is because establishing umbrella damages requires empirically estimating non-collusive bidding behavior, which in turn requires bidding data from auctions where bidders were bidding non-cooperatively. If those non-cooperative auctions are not comparable to the auctions where there was collusion due to, say, product diversity, establishing umbrella damages will be challenging.

22 For this theoretical result, see e.g. Maskin, E. & J. Riley (2000). "Asymmetric Auctions". Review of Economic Studies 67.3, pp. 413–438.

23 The lower bound is achieved when the collusive mechanism is inefficient and the upper bound when the collusive mechanism is efficient. See Caoui (2022).

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