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THE LAW AND ECONOMICS OF LIST PRICE COLLUSION

Willem Boshoff[*] *& Johannes Paha*[†]

ABSTRACT

Firms sometimes violate competition laws by agreeing on increases of list prices. The economic effects of such list price collusion are far from clear because the cartel firms might deviate secretly from the elevated prices by granting their customers discounts. This article presents case evidence suggesting that agreements on list prices are not infrequently observed in cartel cases. It also reviews theoretical, empirical, and experimental literature in economics showing under what conditions such list price collusion causes the discounted transaction prices to rise. This is relevant for competition authorities in developing a theory of harm when prosecuting cartels, and also for the customers of the cartel firms when suing the conspirators for the repayment of damages.

JEL: D43; K21; L41;

I. INTRODUCTION

Firms occasionally conspire by agreeing on increases of list prices. The effectiveness of such collusion on list prices, which are public information, is uncertain as each firm may potentially deviate from these agreements by granting its customers higher rebates, which are private information of each firm and each individual customer. This might result in transaction price being unaffected by the conspiracy. For example, in the context of the European thread cartel, one company noted that "list prices have more of a political importance than a competitive one." Another company held that "the list price increase did not mean that the actual net prices achieved in the relevant market also rose" and that "[c]ustomers are almost never charged the list prices."[1]

Despite this potential ineffectiveness, a number of collusion cases internationally involve conspiracies on list prices and some of these conspiracies have been active for a relatively long period. For example, a recent European case involved six manufacturers of medium and heavy trucks who, among others, had coordinated on prices at the gross list level. With these prices as a basis, final retail prices were determined after "further adjustments, [had been made] at national and local level, to these gross list prices."[2] The truck makers had colluded for 14 years, from 1997 to 2011, which is comparatively longer than the average cartel duration of around 8 years identified by Levenstein and Suslow.[3] This anecdotal evidence together with the lack of certainty of the effectiveness of such conduct suggests that it is important to understand the economic rationale for collusion on list prices better.

Our analysis of list price collusion addresses the presumption that rational firms would not engage in collusive behavior if it was ineffective, especially for extended periods of time. For example, in its assessment of the thread conspiracy the European Commission held that "the argument that list price increases had no real effect because the list prices were almost never applied and that list price increases did not automatically translate into increases in actual prices charged to customers cannot be accepted." We study whether collusion on list prices can affect market outcomes despite firms' incentive to grant discounts. More specifically, we study the conditions under which list price collusion causes the discounted transaction prices to rise and why it may be effective in doing so. This is relevant, for example, for competition authorities in developing a theory of harm when prosecuting cartels and for private litigants aiming to sue conspirators for damages related to list price collusion.

Consider a price fixing conspiracy in an industry where the list price, which may also be referred to as the posted price, and the transaction price (or: discounted price, net price) are identical, so that there are no customer-specific discounts. In this situation, supracompetitive prices can only be sustained as the result of collusion if it is unprofitable for the firms to deviate from the collusive agreement. Such a deviation may occur by setting a lower

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[1] Commission Decision as of 14 September 2005, COMP/38337/E1/PO, THREAD, C(2005)3452, https://goo.gl/u6wkvx, at paras. 159-160.

[2] European Commission, *Commission fines truck producers € 2.93 billion for participating in a cartel*, Press release IP/16/2582 (19 July 2016).

[3] Margaret C. Levenstein & Valerie Y. Suslow, *Breaking Up is Hard to Do: Determinants of Cartel Duration*, 54(2) J. COMPETITION L. & ECON. 455, 455-492 (2011).

than the agreed upon price and thus receiving a greater market share and higher profits in the short run. A deviation may be prevented by an appropriate side payment scheme[4] or if it would be punished with the losses resulting from the punishment outweighing the gains of the deviation. This illustrates why it is so important for the cartel firms to observe deviations and respond to them quickly. Harrington reviews some of the practices employed by cartel firms to monitor supposed deviations from collusive agreements.[5] These include instructions to a firm's salesforce to report aggressive conduct by competitors or the explicit exchange of data on sales. Cartels may also delegate monitoring to third parties, such as trade organizations or auditing companies.

Now consider an alternative setting, which is concerned with collusion when list prices and transaction prices diverge, and where firms agree only on list prices. There is a number of reasons why such list price collusion needs not raise transaction prices. One of these reasons relates to difficulties in monitoring adherence to such an agreement. The practice of negotiating discounts from list prices privately, i.e., between a specific seller and a specific buyer, makes it difficult to monitor deviations from collusion. Moreover, if firms collude on list prices but not on discounts, collusive agreements may not include provisions to punish the practice of granting higher discounts. Additionally, even if cartel agreements do include provisions to punish firms for granting higher discounts, it may be difficult to determine an effective punishment strategy if transaction prices are unobservable.

Despite such monitoring deficiencies, the European Commission argued in the thread case that list "prices are applied to small customers […]. Therefore, increases in list prices translate into increases in net prices for small customers. Furthermore, individual prices for customers are calculated by applying a rebate to the list price, with the consequence that an increase in list prices translates into an increase in net prices. […] Even if there was no general fixed amount of rebates, the list prices had a target function and served as a starting point for discussion, as well as an indicator from which a percentage discount could be deducted. Consequently, *they necessarily had at least a potential and even a likely influence on actual prices*" [emphasis added].[6]

Is the Commission's position in accordance with economic theory? Our review of the economics literature, as presented in Section III, considers the circumstances under which collusion on list prices might indeed be effective in damaging customers. As was alleged by the Commission in the thread case, list price collusion may be effective if, at least, some customers do not bargain for a discount, but pay list prices. This does not only imply the obvious result that those customers, who pay the list price (so called price takers), are overcharged. One also finds that collusion may be stabilized under such circumstances because, first, when defecting by granting higher discounts, the deviator only wins additional demand from bargainers but not from price takers, which reduces the profitability of a defection. Second, collusion may also be stabilized if deviations from the agreed-upon list price are easily observable by the other cartel firms and can immediately be punished by granting higher discounts.[7]

List price collusion may also have an effect in markets where customers are imperfectly informed about the firms' costs. Setting high list prices may help convince customers that all firms operate at high costs, which softens buyers' negotiation strategies, i.e., they would be more willing to accept higher prices. This benefits cartel firms with low costs *and* firms operating at high costs. Low cost firms would benefit from higher transaction prices. High cost firms would benefit because an agreement on setting high list prices raises the chances that customers also buy from the high-cost company. [8]

Moreover, if collusion on list prices is done by sales managers, while discounts are granted by sales representatives, transaction prices can be raised by devising incentive schemes for sales representatives that prevent them from granting (excessive) discounts. As a further issue, it has also been shown experimentally that price preannouncements can induce the participants of the experiments to set higher prices. As a list price can be interpreted as a preannounced price, there may also be behavioral explanations for *real* salespeople setting higher transaction prices under list-price collusion and customers accepting these, although a *homo oeconomicus* would not.

Before turning to these potential theories of harm in cases of list price collusion in Section III, we provide further case evidence in Section II. This sets out various conditions under which list price collusion may emerge and that this practice has been observed in a variety of cases. We discuss the practical implications of our analysis in Section IV, before concluding in Section V.

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[4] Jimmy Chan and Wenzhang Zhang, *Collusion enforcement with private information and private monitoring*, 157 J. ECON. THEORY 188, 188-211 (2015).

[5] Joseph E. Harrington, *How do cartels operate?*, 2 FOUND. TRENDS IN MICRO 1, 1-105 (2006), at 44.

[6] Thread, *supra* note 1, at 164-165.

[7] David Gill & John Thanassoulis, *Competition in Posted Prices with Stochastic Discounts*, 126 ECON. J. 1528, 1528-1570 (2016).

[8] Joseph E. Harrington & Lixin Ye, *Coordination on List Prices and Collusion in Negotiated Prices*, Working Paper, available at https://goo.gl/Z8THdB (1 Nov. 2016).

II. DEFINITION AND CASES

The present section starts by defining list price collusion. It then characterizes the features of this practice based on a presentation of several cases from practice.

A. Definition

How can list price collusion be defined? Consider a market with two types of customers. Price takers buy the product at list prices. Bargainers negotiate with the suppliers about prices. The firms set prices in two stages. In stage one, every firm decides on a list price to be charged from price takers. In stage two, it negotiates with bargainers, i.e., it decides on a transaction price, which is equivalent to deciding on a discount to be subtracted from the list price. The practice of distinguishing between list prices and transaction prices allows the firms to price discriminate among the different groups of buyers.[9]

We define list price collusion by reference to explicit coordination in the list pricing stage. Coordination on the second, discounting stage may or may not occur. If in the second stage explicit coordination on discounts occurs, it may take a variety of forms. In some cases, firms set a maximum discount level or talk about avoiding discounts without, however, specifying a target. In other cases they agree to fix discount levels, often explicitly agreeing to eliminate them altogether. In this sense, list price collusion is different from traditional collusive practices in that it need not result in firms fully agreeing to fix final transaction prices. We identify the following types of list price collusion: full collusion (which involves explicitly fixing both list prices and discounts), list price collusion without coordination on discounts, schemes where list price collusion is backed up by provisions intended to reduce discounts such as certain incentive schemes for sales representatives or alternatively best price clauses, and lastly instances where list prices affect transaction prices by serving as focal points.

Before presenting cases exhibiting features of these types of list price collusion in Subsection B, we point out that our definition of this practice excludes mere list price parallelism, which refers to situations where the firms set identical list prices without however having formally agreed on them. Prior literature has asked whether the mere observation of identical list prices constitutes an agreement prosecutable under the Sherman Act in the USA despite the absence of express communication. Harrington studies the economic aspects of this question.[10] From a legal point of view, the position of courts, namely that equal list prices are not sufficient to infer collusive behavior, were summarized by Posner.[11]

Aside from the question of list price parallelism constituting an illegal agreement or not, presumptions on the effectiveness of list price parallelism may serve as a starting point for assessing the effectiveness of list price collusion. For example, in *Brooke v Brown & Williamson*[12] the court held that, parallelism of list prices cannot have an effect on transaction prices in the absence of explicit coordination on discounts, rebates and other promotions that ultimately determine the final, or net, price: "With respect to each product, the net price in the market was determined not only by list prices, but also by a wide variety of discounts and promotions to consumers and by rebates to wholesalers. In order to coordinate in an effective manner and eliminate price competition, the [competitors] would have been required, without communicating, to establish parallel practices with respect to each of these variables, many of which […] were difficult to monitor. [The plaintiff] has not even alleged parallel behavior with respect to these other variables, and the inherent limitations of tacit collusion suggest that such multivariable coordination is improbable." This view reflects the earlier assessment in *Reserve Supply v Owens-Corning Fiberglas,* in which the US court of appeals found that list price parallelism, without supporting further evidence of coordination, is unlikely to have an effect on transaction prices: "[T]o put it mildly, [identical list prices would be] an awkward facilitator of price collusion because the industry practice of providing discounts to individual customers ensured that the list price did not reflect the actual transaction price"[13].

This position may be contrasted with the European Commission's view in the thread cartel (see Section I) where the Commission held that the explicitly collusive agreement on list prices must have been effective because, otherwise, the firms would not have upheld this strategy of express communication for several years (see Section II.B.2 for further evidence).

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[9] This model structure was employed by, e.g., Gill & Thanassoulis, *supra* note 7.
[10] Joseph E. Harrington, *Posted Pricing as a Plus Factor*, 7 J. COMPETITION L. & ECON. 1, 1-35 (2011).
[11] R. Posner. *Oligopoly and the antitrust laws: a suggested approach,* STANFORD L. REV. 21: 1562 (1969).
[12] Brooke Group v. Brown & Williamson Tobacco Corp, 509 U.S. 209, 113 S. Ct. 2578, 125 L. Ed. 2d 168 (1993).
[13] Reserve Supply v. Owens-Corning Fiberglas, 971 F. 2d 37 (7th Cir. 1992).

B. Prominent types of list price collusion

To shed some additional light on the effectiveness of list price collusion, this subsection provides evidence of cases pertaining to the types of list price collusion defined above, these are, full collusion, pure list price collusion, setting incentives for sales representatives, and collusion when firms use best price clauses. To illustrate further potential effects of list price collusion, we also review a selection of related cases where firms apparently used list prices as focal points. This then sets the scene for a presentation of the relevant theories of harm that competition authorities or private litigants may consider in list price collusion cases, which are reviewed in Section III.

1. Full collusion

In some cases, firms implemented full collusion by agreeing on both list prices and setting either zero or a maximum level of admissible discounts. This was done, for example, in the European citric acid industry. The European Commission found Hoffmann-La Roche, Archer Daniels Midland, Jungbunzlauer, Haarmann & Reimer Corp and Cerestar guilty of colluding on the list prices of citric acid. The cartel also entailed an agreement to avoid discounts. There was an exception for the five largest buyers of citric acid internationally, for whom the cartel agreed that discounts might be granted, but capped at a maximum of 3% off the list price. Hence, with the exception of the largest buyers, the agreement to avoid discounts implied that final transaction prices equaled the list price. We will show in Section III that full collusion can even be more stable if the firms can segment the market by distinguishing between list prices and transaction prices as compared to setting just a single price. To provide an intuition, if a cartel firm deviates from a collusive agreement by granting a discount it only gains additional demand from bargainers but not from price takers who buy at list prices. Hence a deviation is less profitable compared to a situation with a single collusive price where a deviator – by setting a lower than the agreed-upon price – wins additional demand from all customers.

2. List price collusion without coordination on discounts

Cases of full collusion may not represent under-investigated conduct. From both a policy and academic perspective, the more interesting set of cases relates to those where there is no agreement on discounts. A number of cases in the US and Europe appear to involve such list price collusion where we are not aware of explicit attempts to coordinate discounts.

As a relevant takeaway of this subsection, courts have usually dismissed defendants' position that list price collusion had no market effect because the firms were free to set discounts. In *Plymouth Dealers Association v. United States* the US court of appeals found that list price collusion was intended to raise the profit, as list prices were commonly shown to customers as "the regular price"[14]. In its ruling in the *High Fructose Corn Syrup antitrust litigation*, the court of appeals held that list price-fixing must ultimately result in higher final prices and that "the list price is usually the starting point for bargaining and [that] the higher it is (within reason) the higher the ultimately bargained price is likely to be"[15]. In *Flat Glass Antitrust Litigation* the court followed the position in *High Fructose*, noting that "[the defendant] does not – it cannot – seriously contend that the competitors increased their list prices with no intention of affecting transaction prices"[16]. In 2005, private litigants opened a class-action suit against Dow Chemical and other chemical companies for alleged price-fixing in the urethane market. The coordination involved the chemical companies agreeing to lockstep increases in list prices of urethane chemicals, which, the jury found, ultimately increased the final prices.

Already these cases illustrate the importance of distinguishing between the *object* and the *effect* of the competitive restrictions. An agreement on list prices may have had the object of raising transaction prices. Yet, it is not clear whether it was actually effective in establishing this goal. In the following, we illustrate that courts in private litigation cases sometimes appear to have held the opinion that a restriction by object must also have created an anticompetitive effect. In 1979, US courts recognized that evidence of collusion on a base price – rather than on transaction prices – is sufficient evidence to certify a class for the purposes of class-action damage claims. In *Hedges Enterprises v Continental Group*[17], the court held that one may infer that all members of a class suffered if

[14] Plymouth Deals Association of Northern California v United States, 279 F.2d 128 (9th Cir. 1960).
[15] United States Court of Appeals, Seventh Circuit. IN RE: HIGH FRUCTOSE CORN SYRUP ANTITRUST LITIGATION. Appeal of A & W Bottling, Inc., et al. No. 01-3565. Decided: June 18, 2002.
[16] *In re* Flat Glass Antitrust Litigation, 385 F. 3d 350 (3d Cir. 2004) at 363.
[17] Hedges Enterprises, Inc v Continental Group, Inc, 81 F.R.D. 461, 475 (E.D.Pa. 1979).

"the defendants conspired to maintain an inflated 'base' from which all pricing negotiations began and that this 'base' price was higher than the 'base' price which would have been established by competitive conditions". In a number of subsequent class-action suits involving list-price collusion in a variety of industries, US courts struck a similar tone to that of *Hedges* in granting a group of plaintiffs class certification.

In *Fisher Brothers*[18], the court held that the fixing of price sheets for copper water tubing, from which buyers negotiated their discounts, were sufficient evidence for common impact. In particular, the court again held that transaction prices must be positively correlated with higher list prices, as these set the basis from which discounts are negotiated. In *Re Glassine and Greaseproof Paper Antitrust Litigation*[19] defendants argued that list price collusion could have had an impact only on those customers paying list prices. The court rejected this and granted plaintiffs class certification, based on the expectation that plaintiffs would show that a rise in list prices were followed by a rise in negotiated prices.

The relationship between list and transaction prices also featured centrally in *Re Polypropylene Carpet Antitrust Litigation*[20], which involved list-price collusion in the market for 100% polypropylene carpet and carpet containing polypropylene blends. Plaintiffs argued that firms colluded to set common list prices and that this collusion resulted in higher transaction prices. In certifying the class, the court accepted that the class of plaintiffs would be able to demonstrate a link between list and transaction prices and that this link is common to all plaintiffs. This inference was partly based on *Industrial Diamonds*, in which the court accepted a logical argument on the relationship between list and transaction prices: if list prices had no material impact on transaction prices, it is not clear why the firms would spend so much time updating and circulating them. The court's inference on a common class was also based on testimony from plaintiffs, including econometric evidence, that list prices closely approximated transaction prices and that discounts were quoted relative to list prices.

These rulings suggest that US courts often operate on the presumption that explicit collusion on list prices has an effect also on transaction prices. In particular, courts appear to have accepted an argument that higher list prices set an elevated starting point for bargaining and, hence, result in higher final prices. Courts left the proof of such effects to the plaintiffs. Such a proof requires a theory of harm showing how higher list prices translate into higher transaction prices. This is particularly relevant if none of the consumers is actually buying the product at the list price. In Section III, we thus explore the economic literature relevant for answering the question under which conditions list price collusion can be effective in charging higher discounted prices if the discounts are customer-specific and cannot readily be observed by the other firms.

3. Incentives for sales representatives

Further types of list price collusion can be identified lying somewhere between the extremes of full collusion and list price collusion without coordination on discounts. One particular form involves firms agreeing on list prices and attempting to control discounts (without however formally agreeing on them) by incentivizing their sales representatives to keep discounts small.

The issue of controlling the conduct of salespeople was, for example, reported for the 2002 fine arts auction house cartel where the CEOs had agreed on a non-negotiable common schedule of commissions to be charged from their customers.[21] Yet, the employees of the auction houses complained about the non-negotiability of the commission structure, which they tried to circumvent as they feared they would otherwise lose business to other auction houses. "To demonstrate that Sotheby's was 'following suit', [officer of Sotheby's] faxed Christie's with a copy of internal instructions given to staff confirming the strict new practice: all commissions are minimum rates and may not be waived or reduced. The instructions made clear that the new tariffs would be non-negotiable".[22]

Similar provisions can be observed in a 1994 case, in which the EC ruled on collusion in the bulk thermoplastic PVC market. The Commission suspected that competitors had adopted identical price lists but acknowledged that coordination was imperfect, that is, that the jointly agreed list or target prices were not fully implemented. The firms therefore accepted that they may never actually hit the target list price as transactional price, but were aiming to do so. The firms thus agreed on giving their salespeople specific instructions to aim at the target: "The available price instructions and internal documentation of producers often emphasize the need for sales offices to show firmness in support of a particular price initiative. This might involve confining sales to regular customers (avoiding 'tourism'),

[18] Fisher Brothers, 102 F.R.D. 570, 578 (E.D.Pa.1984).
[19] *In Re* Glassine and Greaseproof Paper Antitrust Litigation., 88 F.R.D. 302, 306 (E.D.Pa.1980).
[20] *In Re* Polypropylene Carpet Antitrust Litigation, 996 F. Supp. 18 (N.D. Ga. 1997).
[21] European Commission Decision as of 30 October 2002, COMP/E-2/37.784, FINE ART AUCTION HOUSES, COM(2002) 4283, https://goo.gl/AF6TKf.
[22] Fine Art Auction Houses, *supra* note 21, at para. 112.

allowing concessions off the new price list only after obtaining head office approval, or even refusing business rather than brake the price." [23]

4. Preventing deviations: Best price clauses

Another form of list price collusion in which discounts are influenced but not set explicitly involves the use of best price clauses. List price collusion is difficult to sustain if deviations of firms who grant high discounts cannot be detected easily. However, the firms in our sample found several ways of controlling discounts and preventing deviations. The wood pulp case[24] is an example, as it involved the adoption of a minimum list price and an agreement to report cases where transaction prices deviated from the agreed list price

Some firms also tried to reduce the threat of deviations at the discounting stage by using most-favored-customer clauses that reduced the profitability of a deviation. This is because a deviator would have had to (retroactively) grant more favorable conditions to all of its customers. Punishment may also have been augmented by meet-or-release clauses. This is because without such clauses and upon observing a deviation the cartel members might have offered a deviator's customers quite generous conditions. Under a meet-or-release clause, the deviator would have had to meet these conditions unless it wanted to lose its customers.

For example, in 1962 General Electric and Westinghouse were convicted of illegally fixing the selling prices of turbine generators in the US. Turbine generators are used in the generation of electricity and the typical buyers are utility companies. In 1963, both General Electric and Westinghouse changed their pricing strategies. Up to that point, each company had published a price book, which determined list prices and based on which discounts were determined and/or negotiated. Subsequently, General Electric published a simplified price book as well as a constant multiplier (which could be periodically updated), which could be used by customers (and of course competitors) to determine a final price. Importantly, General Electric also announced a policy of no discounts, together with a most-favored-customer policy that would see recent customers compensated in the event of a subsequent customer obtaining a discount. In 1964, Westinghouse followed General Electric in publishing a similar price book and zero-discount policy. The result was identical prices for the two competitors for a number of years.

5. List prices as focal points

The preceding sections set out the four main types of explicit list price collusion identifiable from case law. Some further cases appear to involve list prices functioning as focal points for collusion even if the agreements are not necessarily explicit. These cases involve the argument that higher list prices or even government-imposed price ceilings lead to higher transaction prices via a behavioral effect on firm conduct. We present a brief overview of some of these cases. Even so, we will argue in Section III that a focal point theory of list price collusion enjoys less support in the economic literature.

Focal point theories features prominently in competition policy. For example, in its *Horizontal Guidelines*, the European Commission is concerned that information exchange may help companies "to reach a common understanding on the terms of coordination, which can lead to a collusive outcome on the market."[25] In this context, list prices may represent an easy form of information exchange. For example, list prices as focal points featured in the Commission's assessment of Sony and BMG's joint venture for recorded music. The Commission found "a certain parallelism of the five [major music labels'] wholesale average prices […]. [The] Commission therefore examined whether any price coordination could have been reached in using list prices […] as focal points."[26] Indeed, the Commission found that the list prices were set closely together. Nevertheless, the Commission did not find sufficient evidence that discounts had also been aligned and, thus, did not challenge the merger on these grounds. This case illustrates the potential importance of list prices as focal points but also the relevance of discounts that allow for deviations from (tacit) collusion.

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[23] European Commission. 1994. Commission decision of 27 July 1994 relating to a proceeding pursuant to Article 85 of the EC Treaty (IV/31.865 – PVC). Official Journal of the European Union 94/599/EC, at para. 20.

[24] European Commission. 1984. Commission decision of 19 December 1984 relating to a proceeding pursuant to Article 85 of the EC Treaty (IV/29.725 – Wood Pulp). Official Journal of the European Union 85/202/EEC.

[25] European Commission, *Guidelines on the applicability of Article 101of the Treaty on the Functioning of the European Union to horizontal co-operation agreements*, 54 O.J., 2011/C11/01.

[26] Peter Eberl, *Following an in-depth investigation the Commission approved the creation of the Sony/BMG music recording joint venture on 19 July 2004*, 3 2004, Competition Policy Newsletter, at 7-10, https://goo.gl/kWAup3.

Several other cases also involve a focal point hypothesis, though the exact mechanism, how list prices affect transaction prices, remains somewhat unclear. In some cases, the focal points related to list prices may have helped to select one of several collusive equilibria. Sometimes, collusion may even have been facilitated by government intervention concerning list prices. For example, a recent South African case involved a recommended list price for diesel, published by the government. The South African government regulates a number of energy prices at the retail level, with the exception of diesel, for which it publishes only a recommended wholesale price ceiling, currently referred to as the wholesale list selling price (WLSP) of diesel. The government introduced the WLSP in 2002, after consultation with the energy industry, but had published similar list prices previously. In 2009, the South African competition authority launched an investigation into this and related conduct and filed a complaint against energy companies, claiming price-fixing in the wholesale diesel market using the price ceiling as a target price. The complaint was withdrawn after a settlement agreement, without any admission of guilt.

A focal point theory also features centrally in Knittel and Stango's analysis of the US credit card industry of the 1980s.[27] Interest rates (i.e., prices) in this industry were officially regulated by imposing a ceiling on prices. Knittel and Stango identify the distribution of prices under competition. They then show that the prices in several regional markets differed from this competitive distribution by being distorted upwards towards the price ceiling. They conclude from these empirical findings that price ceilings functioned as a focal point for tacit collusion among the firms even if the price ceilings were nonbinding. It is important to stress that their results apply for *nonbinding* price ceilings because the tacitly colluding firms could as easily have deviated from focal point pricing as firms, who are explicitly colluding on list prices, could deviate from the agreed-upon list prices. Knittel and Stango support their results by providing evidence of tacit collusion being observed more frequently in regional markets that are usually considered more conducive to collusion by being more concentrated. Similar results suggesting that price ceilings functioned as focal points for tacit collusion were obtained for Taiwan's flour industry.[28]

List prices may also have been used for a (unilateral) exchange of information about market conduct, whereas it is not necessarily clear whether the exchanged information constituted a credible signal or just cheap talk. For example, the US *Wall Products v National Gypsum*[29] case relates to collusive behavior in the market for gypsum wallboard. Wholesale buyers of wallboard brought a case under Section 1 of the Sherman Act against National Gypsum, Kaiser Gypsum and United States Gypsum in 1969, and the court subsequently decided in favor of the plaintiffs in 1971. As early as the end of WWII, wallboard manufacturers in the US relied on price lists, whether formally or informally communicated. Indeed, prior to 1962, sales of wallboard were usually at list prices. As gypsum wallboard is a homogenous product, the list prices of the various manufactures were virtually identical. Any increase in list prices by one manufacturer would typically be followed by changes to the list prices of others. From 1962, competitive pressures started compelling gypsum manufacturers to offer discounts off list prices. By 1965, wallboard prices were declining sharply. Consequently, in November 1965, United States Gypsum announced that it would no longer be offering discounts. This was followed by the announcements of a similar policy of zero discounting by other competitors, with effective dates close to or the same as the effective date of implementation by United States Gypsum. These developments prompted the court to conclude that the competitors engaged in consciously parallel action.

III. ECONOMIC ANALYSIS

The case evidence presented in Section II suggests a variety of list price collusion practices and provides a basis for reviewing and evaluating economic research aimed at explaining why the practice of list price collusion may harm customers by raising transaction prices or stabilizing collusion. Such a review of the economics of list price collusion is done in the following. Subsection A begins with an analysis of the effects of list price collusion if there are different customer types, before we turn to a situation with asymmetric information where customers are incompletely informed about firms' costs in Subsection B. High list prices may then convince the buyers that the sellers operate at high costs, which makes the buyers more likely to accept higher list prices. Subsection C continues

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[27] Christopher R. Knittel & Victor Stango, *Price Ceilings as Focal Points for Tacit Collusion: Evidence from Credit Cards*, 93 AM ECON. REV. 1703, 1703-1729 (2003).

[28] Tay-Cheng Ma, *Import Quotas, Price Ceilings, and Pricing Behavior in Taiwan's Flour Industry*, 23 AGRIBUS. 1, 1-15 (2007)
Further evidence to support the collusive effects of focal points was provided by Lewis for gasoline stations in the United States. However, this market is fundamentally different from the ones where list price collusion is most relevant. Notably, list prices and transaction prices are usually identical in the retail fuel market, which is also characterized by a high degree of market transparency that allows to detect deviations quickly. Matthew S. Lewis, *Odd Prices at Retail Gasoline Stations: Focal Point Pricing and Tacit Collusion*, 24 J. ECON. MANAGE. STRATEG. 664, 664-685 (2015).

[29] Wall Products v. National Gypsum 326 F.Supp. 295 (1971).

with theories where list price collusion translates into higher transaction prices because salespeople are incentivized to keep discounts small. Subsection D presents the effects of best price clauses on collusion before Subsection E concludes this section by elaborating on behavioral theories and experimental evidence helping to explain why higher list price may also lead to higher transaction prices, e.g., in the context of focal point pricing.

A. Different Customer Types

As a basis for studying list price collusion, we start by presenting some effects of the practice of setting list prices. The possibility to distinguish between list prices and transaction prices can lead to higher prices – even in competition – if there are several customer types.[30] The intuition is that the practices of list pricing and discounting allow firms to distinguish the different customer types and – similar to practices of price discrimination – achieve a greater producer surplus at the expense of consumers. For example, Raskovich assumes a model where some customers buy a company's product at list prices while other customers upon observing the list price make a counter-offer, i.e., they bargain for a discount.[31] Raskovich shows that if "many buyers have bargaining opportunities [… an] equilibrium emerges in which suppliers post the monopoly price and then negotiate discounts individually with buyers. In this equilibrium, discounted prices are above marginal costs and profits increase with concentration."[32]

Another instance, where bargaining was found to be disadvantageous for buyers, was obtained by Cason, Friedman and Milam in an experimental study with two treatments.[33] In the *posted offer* treatment the firms posted a price and customers could choose whether to buy at that price or switch to another buyer, while switching was costly. In the *haggle* treatment the buyers could negotiate discounts off the list price in addition to their decision to switch to another seller. From the viewpoint of the sellers there were essentially two types of buyers, i.e., existing customers and new customers. New buyers, who had shown their willingness to switch, were found to receive lower prices than existing customers. However, Cason, Friedman and Milam found that transaction prices were on average higher in the *haggle* treatment.

That bargaining can be disadvantageous for customers was also found in a model provided by Gill and Thanassoulis who study the effects of list pricing and discounting both in a model of competition and – other than Raskovich – also in a model of collusion.[34] Gill and Thanassoulis assume a model with two firms who supply a possibly differentiated product to two types of customers: price takers, who buy the product at its list price, and bargainers, who receive a discount off this list price with some probability. Making discounts probabilistic is motivated, among others, by the differing bargaining abilities of the firms' salespeople and of the buyers themselves.

When competing, the two firms i and j, first, simultaneously and independently set their list prices that are observed by the other firm before they decide, second, simultaneously and independently on the discounted price. If there are only price taking buyers the firms set some list price l_0 without offering a discount. However, if there are also bargainers firm i sets a list price l_i and a discounted price p_i* while reasoning as follows: "If a bargainer does not buy my product i, the bargainer may buy my rival's product j either at the list price l_j or, with some probability, even at the discounted price p_j*." Gill and Thanassoulis show that firm i would want to give a lower discount (i.e., set a higher discounted price p_i*) if its rival j sets a higher list price l_j and also a higher discounted price p_j*. The same is true for firm j. This strategic complementarity of prices causes both list prices *and* discounted transaction prices to be higher than the list price l_0 that would be set in the absence of bargainers.

Why is that? The possibility to set list prices before setting discounted transaction prices gives the firms the opportunity to signal each other their intention to raise their prices above the level l_0. Raising their list prices above l_0 is a credible signal because it is costly: If firm i set a high list price and firm j did not, firm i would lose price-taking customers to firm j. However, upon observing the lower list price of firm j, firm i would find it optimal to retaliate by granting a greater discount to bargainers and thus steal business from firm j. Anticipating that such a

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[30] Note that – given our focus on list price collusion – we concentrate on models where customers differ in their willingness to pay the list price as opposed to negotiating a discount. The literature on the sustainability of collusion in the presence of different customer types is actually broader than that. For example, Helfrich and Herweg consider a model of collusion with customers who differ in the intensity of their brand preferences, showing that the possibility to price discriminate reduces the sustainability of collusion.

Magdalena Helfrich & Fabian Herweg, *Fighting collusion by permitting price discrimination*, 145 ECON. LETT. 148, 148-151.

[31] Alexander Raskovich, *Competition or collusion? Negotiating discounts off posted prices?*, 25 INT'L. J . INDUS. ORG. 341, 341-354 (2007).

[32] Raskovich, *supra* note 31, at 341.

[33] Timothy N. Cason & Daniel Friedman & Garrett H. Milam, *Bargaining versus posted price competition in customer markets*, 21 INT'L. J. INDUS. ORG. 223, 223-251 (2003).

[34] Gill & Thanassoulis, *supra* note **Fehler! Textmarke nicht definiert.**.

situation would be suboptimal for both firms induces them to set both list prices l_i and l_j as well as transaction prices p_i* and p_j* above the level l_0. Gill and Thanassoulis find that compared "to a benchmark with only price takers, the presence of bargainers: (i) raises the list prices and discount price offers; (ii) raises the firms' profits; (iii) lowers consumer surplus; and (iv) lowers total welfare."[35] Consumer surplus falls not only because of the higher prices. It also falls because a bargainer who would actually have preferred good *i* might not receive a discount from firm *i* but one from firm *j* and – despite the perceived quality difference – decides for the cheaper good.

These welfare-reducing effects of setting list prices and discounted prices occur even if the firms do not collude. Gill and Thanassoulis then show that the presence of bargainers and the possibility to differentiate between list prices and discounted transaction prices also helps to stabilize collusion. To show this, they assume that the firms get together to set a supracompetitive list price above marginal costs *and* that they agree to eliminate discounts, i.e., the discounted price shall be the same as the list price. In terms of the terminology introduced in Section II, the firms engage in *full collusion*. A deviator from this agreement could then do one of two things, i.e., set the agreed-upon list price but grant a discount to bargainers off this list price or set a lower than the agreed-upon list price right away. In both cases, a deviation is less profitable compared to a situation without bargainers and just one price. This is because when setting a high list price but – contrary to the agreement – granting a discount to bargainers the deviator can attract only additional bargainers but no additional price takers, which limits the profitability of the deviation. When setting a lower than the agreed-upon list price right away the deviator may attract additional price-taking customers. However, as list prices are perfectly observable by the other cartel firms they may retaliate quickly by offering discounts to bargainers, which again reduces the profitability of the deviation. This diminished profitability of deviations helps to stabilize collusion.

The model of Gill and Thanassoulis illustrates that list price collusion harms at least those customers who do not want or who are in no position to demand a discount (i.e., the price takers), and that such collusive agreements may be exceptionally stable because of market segmentation, the perfect observability of list prices, and the possibility to retaliate by granting discounts to bargainers. Customers belonging to the group of bargainers would be harmed if the firms agreed on reducing or eliminating discounts off the list price. Again, such an agreement would be exceptionally stable because by, nevertheless, granting discounts the deviators can only win additional bargainers but no additional price takers.

Gill and Thanassoulis, thus, offer important insights into the nature of list price collusion. Yet, the question remains whether *pure* list price collusion, where the firms only agree on list prices but not on the elimination of discounts, may harm not only price-taking customers but also bargainers. We turn to this question in the following section.[36]

B. Asymmetric Information

Harrington and Ye provide an answer to the question whether pure list price collusion (i.e., the firms do not agree on discounts and none of the customers buys at the list price) may have an effect on the market.[37] They show that list price collusion may raise transaction prices even if none of the customers buys at list prices. This result occurs if the buyers are incompletely informed about buyers' cost-types.

Harrington and Ye assume a duopoly model where the sellers can be either of a high cost type or a low cost type. The firms know their cost types but at the time of setting their list prices they do not know the exact value of their costs. The buyers do not know the cost types of the companies but would still want to buy from a low cost company because a buyer can negotiate a lower transaction price if the company produces at low costs. The buyers

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[35] Gill & Thanassoulis, *supra* note **Fehler! Textmarke nicht definiert.**, at 1539.

[36] A further reason why price announcements in the form of setting list prices can possibly facilitate collusion was suggested by García Díaz, Herrnán González and Kujal. They study a Bertrand-Edgeworth duopoly model where firms *i* and *j* face capacity restrictions, i.e., if prices were at the level of marginal costs none of the firms would be able to supply the entire market. They then show that there is an equilibrium where firm *i* sets a list price low enough such that it is more profitable for firm *j* to monopolize the remaining customers (i.e., residual demand) rather than undercutting firm *i* in the subsequent stage of setting discounts. They hypothesize (p. 720) that in "this sense the list pricing institution acts as a facilitating device [of collusive conduct] between the firms." This hypothesis deserves a more detailed investigation as this remark on collusion is mainly a side note in their article. Moreover, a conspiracy of this type would somewhat differ from the cartels that are at the core of this current article, where the firms conspired on jointly raising list prices. Finally, customers are implicitly categorized into different groups because it plays a role in their model how customers are divided among the companies. Technically speaking, the specification of residual demand, i.e., proportional or efficient, affects the outcomes of their model.

Antón García Díaz & Roberto Hernán González & Praveen Kujal, *List pricing and discounting in a Bertrand-Edgeworth duopoly*, 27 INT'L. J. INDUS. ORG. 719, 719-727 (2009).

[37] Harrington & Ye, *supra* note 8.

thus solicit bids from the companies and buy a unit of the product if the bid is at or below a previously specified reserve price. A fraction of the customers solicits bids from both sellers while the remaining customers are assumed to solicit an offer only from a single seller.

In this setting, two effects apply. The *inclusion effect* refers to the fact that a buyer is more likely to solicit a bid from a seller who sets a low list price, which is taken as a signal of the seller being of the low cost type. The *bargaining effect* refers to the fact that a buyer sets a lower reserve price (i.e., it negotiates more aggressively) if a firm has set a low list price. These effects are countervailing: By setting a high list price a firm can possibly induce the buyer to negotiate less aggressively and buy the good at a higher transaction price. By setting a low list price a firm can raise its chance of making a sale at all. Harrington and Ye show that with competing sellers there may exist separating equilibria where the buyers set a high reservation price for firms with a high list price and a low reservation price for firms with a low list price. This ensures that it is optimal for a low cost firm to reveal its cost type by setting a low list price, which raises its chances of being included, and for a high cost firm to set a high list price, which prevents it from making losses.

This illustrates why firms of *both* cost-types would want to collude with each other in the form of setting a high list price. In doing so, they make the buyers believe they all would produce the good at high costs, such that the buyers set higher reserve prices and ultimately pay higher transaction prices than otherwise. Low cost firms benefit from higher transaction prices as a result of this agreement because customers negotiate less aggressively when the list price is high. High cost firms benefit because an agreement on setting high list prices raises the chances that customers also buy from the high-cost company. As is standard, collusion is a stable equilibrium if the firms are sufficiently forward looking such that they weigh the losses following a deviation higher than the excess profits resulting from the deviation.

Colluding would, however, be unprofitable for the firms if they set high list prices even in competition. First, this will be the case if the firms are symmetric and operate at high costs. Second, the firms also find it optimal to set high list prices irrespective of their cost type if all buyers solicit bids from both sellers, i.e., in this case a separating equilibrium does not exist. To see this, consider that the *inclusion effect* vanishes when bids are collected from all firms irrespective of their list prices. As only the *bargaining effect* remains, both firms would have an incentive to set a high list price hoping that this results in a higher transaction price. More generally, the firms would set a high list price irrespective of their cost type if the fraction of buyers who solicit bids from both companies is sufficiently close to one.

The model of Harrington and Ye suggests that collusion would only occur if otherwise the buyers managed to set reservation prices such that the sellers revealed their cost type by choosing their list price to be either low or high. Such a separating equilibrium exists if the firms are asymmetric and if sufficiently many buyers solicit bids from only part of the companies. It remains an empirical question to explore which industries might possibly be characterized by such conditions.

C. Principal Agent Theories

One concern about the effectiveness of list price collusion relates to the fact that a firm's negotiations with potential buyers are not observable by its competitors. There is also a delegation issue insofar as collusion is often undertaken by CEOs or (sales) managers higher up in a firm's hierarchy, whereas negotiations with customers are led by salespeople, who are not directly part of the collusive agreements. Therefore, the increase in list prices, which was illegally brought about by collusion among sales managers, may be secretly offset by higher discounts given by salespeople in order to win some deal. The discounted transaction prices could then easily remain at the competitive level.

However, the evidence presented in Section II (for example, on the fine art auction houses cartel) suggests that list price collusion among sales managers may be effective if these managers incentivize the salespeople in a way that prevents them from granting excessive discounts off the list price. This calls for an analysis of the employment contracts of salespeople, which in game theory are also referred to as incentive contracts. For example, collusion on list prices would raise transaction prices if the incentive contracts of salespeople were set such that they only receive a bonus on top of a fixed wage if the discounts granted to customers are sufficiently low.[38]

[38] A review of the collusive effects of incentive contracts was provided by Daniel Herold, *Compliance and Incentive Contracts*, in: JOHANNES PAHA, Competition Law Compliance Programmes 87-102 (2016)

The relevance of incentive contracts for the sustainability of collusion was, for example, shown by Fershtman, Judd and Kalai.[39] One version of their argument goes as follows: Consider an industry with two symmetric firms.[40] The firms may now collude by, e.g., jointly setting prices above the competitive level, or they may compete by playing their best responses, i.e., individually setting prices at the profit-maximizing level given their expectations about the price set by the other firm. If both of them compete (indexed by c) each of them makes of profit π_c. If both of them collude (indexed by k) each of them makes a profit π_k that is above the competitive profit ($\pi_k > \pi_c$). If one firm sets the collusive price while the other deviates by setting a somewhat lower price (i.e., by choosing its best response) the deviator (indexed by d) attracts additional customers and makes a profit π_d that is above the collusive profit ($\pi_d > \pi_k$). The other, betrayed firm (indexed by $-d$) serves only fewer, if any, customers and makes a profit π_{-d} that may even be below the competitive profit ($\pi_{-d} \leq \pi_c$). This sets up the standard prisoner's dilemma with $\pi_d > \pi_k > \pi_c \geq \pi_{-d}$, which – because of the opportunity to earn even higher than collusive profits – establishes that collusion is no equilibrium unless there is the opportunity to punish a deviation in the future and if a potential deviator puts a sufficiently high weight on this punishment to refrain from the deviation.

Fershtman, Judd and Kalai then show how collusion becomes an equilibrium of this game even without the threat of future punishments. This can be achieved if both firms each hire a salesperson who is responsible for setting the price to be paid by customers. The salesperson receives a fixed wage w and a bonus b if the profit π of a firm is at or above the collusive profit ($\pi \geq \pi_k$). Hence, the salesperson receives a compensation $w+b$ both when setting the price such as to collude effectively or when deviating from a collusive agreement. The salesperson receives a compensation w when competing effectively or when being betrayed by a deviator.

This delegation of pricing responsibilities makes collusion a weakly dominant strategy that will be played by the salespeople of both firms. In other words, each salesperson has an incentive to set the collusive price. If the other salesperson also sets the collusive price each of them earns $w+b$. If the other salesperson does not set the collusive price each of them earns w, which is no lower than in the situation where both set the competitive price. Hence, there is no downside to setting the collusive price even in the situation of being betrayed. Yet, there is no upside to deviating from collusion by setting any other than the collusive price either. This is because in case of a deviation from the collusive price the deviating salesperson would still earn no more than $w+b$, which is the same as in the situation where both salespeople set the collusive price. The incentive contract where a salesperson receives a fixed wage w and a bonus b if $\pi \geq \pi_k$ makes the salesperson less greedy than the residual claimant of each company and, thus, helps to stabilize collusion.

Going beyond the study of Fershtman, Judd and Kalai, one finds that the profit target above which salespeople receive a bonus can be set such that they decrease discounts off list prices. The firms may even abandon profit targets at all and condition the payment of bonuses directly on price. "For example, an office products supplier had a commission plan with a multiplier linked to average selling price performance. Deals booked at more than 3% below list price earned the salesperson a base commission rate. For deals booked within plus or minus 3% of list price, salespeople earned the base commission rate times a 1.1x multiplier. For deals booked at more than 3% above list price, salespeople got the base rate times a 1.25x multiplier. The multipliers discouraged salespeople from conceding price in order to outperform on volume."[41] Similar schemes have been used by cartel firms as was shown in Section II.

D. Best price clauses

As was outlined above, the main reason why list price collusion might not be fully effective is the conspirators' ability of granting discounts to their buyers that cannot easily be observed and punished by the other cartel firms. The firms will thus be motivated to eliminate this source of deviation, for example, by explicitly agreeing on an admissible level of discounts, which however requires intense monitoring. The firms may also employ techniques for controlling the level of discounts that require lower monitoring efforts. This section explores best price clauses as a means for firms to control discounts without the need to engage in intense monitoring.

Excessive discounting can, for example, be avoided by combining list price pre-announcements with best price provisions that "give buyers both meet-or-release and most-favored-customer protection. A meet-or-release clause

[39] Chaim Fershtman & Kenneth L. Judd & Ehud Kalai, *Observable Contracts: Strategic Delegation and Cooperation*, 32 INT'L. ECON. REV. 551, 551-559 (1991).

[40] The term *firm* is a placeholder for the residual claimants (i.e., the shareholders or an owner-manager). It may also stand for a CEO who is correctly incentivized to maximize the profits of the firm on behalf of the residual claimants.

[41] Andris A. Zoltners & PK Sinha & Sally E. Loriner, *When Sales Incentives Should Be Based on Profit, Not Revenue*, HARV. BUS. REV., published online: https://goo.gl/TuK8gR (10 June 2015)

requires a seller to meet a lower offer to his customer or to release the customer from the contract; a most-favored-customer clause guarantees that the buyer is receiving the lowest price offered to anyone by the seller."[42] Holt and Scheffmann analyze these provisions in a static model of homogeneous goods that are sold to many small, price-taking buyers. While in a baseline model with posted prices the firms would settle at a price equaling marginal costs, this is different in Holt and Scheffman's model who assume that in a first stage the firms select list prices and in a second stage they decide about discounts. Consider list prices being above marginal costs, then a firm who offers a discount cannot divert existing sales from its competitors if they employ a meet-or-release clause. This is because upon observing a better offer elsewhere customers, who already entered into a contract with some supplier, will approach their supplier to meet the better conditions or being released from the contract. The current supplier would optimally respond by meeting the other firm's discount because otherwise it would lose all its sales to this other firm. Given firms' most-favored-customer clauses the lower prices would then be offered to all customers.

Offering discounts thus creates no business stealing effect but only has an effect on the *total* quantity demanded which will be higher if prices are lower. If this quantity effect outweighs the price effect (i.e., achieving lower margins because of the lower prices) the firms will offer discounts off the list price, yet, the discounted prices will still be above marginal costs. Technically speaking, "using best-price clauses changes the usual Bertrand analysis of the profitability of discounting into a Cournot problem" and, in equilibrium, transaction prices will thus be at their Cournot levels.[43] Holt and Scheffmann show that the firms would optimally set list prices at these Cournot levels without offering any discounts. Yet, if list prices are set above these levels discounts will ensure that they return to exactly these transaction prices.

Combining list prices with best price clauses thus softens competition even if the firms do not collude. Advance-notice and best-price practices would thus not necessarily result in *full collusion*, and transaction prices would remain below the jointly profit maximizing prices. However, it has been shown by Cooper that most-favored-customer clauses can help to sustain even perfectly collusive equilibria.[44] The intuition of his argument goes as follows: Suppose a firm sells its good at a high price while promising its customers a refund if the firm charges a lower price from other customers in the future. This reduces the profitability of future price cuts. And it also gives the firm's competitors an incentive to charge higher prices and implement most-favored-customer policies themselves.[45]

The exact interplay of meet-or-release and most-favored-customer clauses was analyzed by Schnitzer.[46] She points out how both types of policies help to stabilize collusion, yet, in different ways. A most-favored-customer clause makes a deviation from collusive prices less attractive because the price reduction has to be granted also to the deviator's previous customers. The collusion-enhancing effect of most-favored-customer clauses may thus even grow over time. It results from the fact that, by employing such a clause, a firm restrains *itself* by making a deviation less profitable. Schnitzer points out that meet-or-release clauses tend to be even more powerful. This is because one firm can punish *another* firm for its deviation from the collusive agreement. The punisher would reduce its price which requires the deviator to match this price. In combination with a most-favored-customer clause, prices would then have to be lowered not only for present and future customers but also for customer who have bought the product previously.

Best price clauses were used, for example, by the firms participating in the turbine generators cartel introduced in Section II.B.4. We hypothesize that similar effects to those described by Holt & Scheffmann, Cooper, and Schnitzer can be obtained in practice, even if a legally binding sales contract with an explicit best price clause does *not* exist. It might suffice if buyers have received a quote from a sales representative who then offers to renegotiate the terms of sale should the buyers get a better deal from another company.

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[42] Charles A. Holt & David T. Scheffman, *Facilitating practices: the effects of advance notice and best-price policies*, 18 RAND J. ECON. 187, 187-197 (1987), at 187

[43] Holt & Scheffmann, *supra* note 42, at 190.

[44] Thomas E. Cooper, *Most-Favored-Customer Pricing and Tacit Collusion*, 17 RAND J. ECON. 377, 377-388 (1986)

[45] Cooper (*supra* note 44) shows that this allows the firms to sustain collusion at jointly profit-maximizing prices even if the game is finite, i.e., under conditions that typically do not allow to sustain collusive equilibria.

[46] Monika Schnitzer, *Dynamic duopoly with best-price clauses*, 25 RAND J. ECON. 186, 186-196 (1994).

E. Behavioral Theories, Experimental Evidence, and Focal Points

Beyond theories of rational agents, behavioral economics also offers explanations of how list price collusion may affect firm conduct. For example, list price collusion may change agents' reference points. The present section reviews some literature from behavioral and experimental economics studying the effect of, e.g., non-binding price pre-announcements and communication.

An experiment by Davis and Holt supports the theory that explicit collusion on list prices is difficult to sustain if the firms can grant secret discounts off list prices.[47] They analyze the prices that subjects set in four treatments of a repeated game. First, sellers independently post prices on a take-it-or-leave-it basis at the beginning of each market period. Second, sellers post prices as before but at the end of each period may talk to each other in person. Third, sellers post prices as before but buyers may individually demand a discount. At the end of the period, the sellers may talk to each other. Fourth, sellers post prices, buyers may ask for secret discounts, sellers may talk to each other, and they learn the sales of other at the end of the period.

Davis and Holt find that the opportunity to talk causes collusion among the sellers with prices being perceptibly higher in the second treatment with talk than in the first non-talk treatment. The opportunity of giving secret discounts is an important impediment to the success of explicit conspiracies with discounted prices being close to competitive levels. However, the opportunity of inferring deviations from sales data restores collusive pricing. The results appear to support cartel firms' defense that *pure* list price collusion (i.e., without coordinating on discounts etc.) hardly has an effect on the market. However, the results also show that small changes in the experimental design can restore collusive outcomes. Here, the firms use sales reports as a facilitator of collusion. One may presume that, e.g., best price clauses have a similar strong effect.

Inferences about list price collusion may possibly also be drawn from the experimental literature on price pre-announcements. Price pre-announcements share some similarities with list prices because they are public information among the cartel firms, they are set before the market clears, and they may differ from final transaction prices. However, a price announcement is a unilateral message sent by each firm individually while list price collusion entails a mutual agreement by several companies, which may have a greater commitment value. Therefore, one may hypothesize that list price collusion has a stronger impact on the market than unilateral price announcements.

The collusive effects of price announcements were studied experimentally by Harrington et al.[48] They study the pricing and output choices of their subjects (i.e., students of a major US university) in treatments that differ across the following three dimensions. First, they vary the number of firms from 2 over 3 to 4. Second, they study cost-symmetric and cost-asymmetric firms. Third, there are three communication treatments. In *No Communication* sellers cannot communicate in any form with their rivals. In *Price Announcement* each period consists of two stages. In the first stage, sellers simultaneously choose (or not) to make a non-binding announcement of the transaction price that they are going to set. In the second stage, they choose the transaction price which may equal the pre-announced price or not. In *Chat* the subjects can exchange messages in an online chat room. The subjects are randomly matched at the beginning of a session, and this matching is kept fixed throughout the session. Subjects are told that a session lasts for at least 40 periods. Later, there is a 20% chance that the game does not progress to a further period.

Harrington, Gonzalez and Kujal find that in the *Price Announcement* treatment duopolistic firms set higher prices as compared to *No Communication*. This applies both to symmetric and asymmetric firms. Moreover, there is evidence of more coordination among the firms in the *Price Announcement* treatment. Coordination is measured by the variable *Same*, which is defined as the number of periods for which sellers set the same price exceeding the competitive price, and the measure *Duration*, which is defined as the longest number of consecutive periods for which sellers set identical prices. The values of both measures are about twice the size in the *Price Announcement* treatment as compared to *No Communication*. However, price announcements are not found to produce supracompetitive prices or greater coordination if there are more than two firms.[49] Harrington et al. hypothesize that this is because coordination is more difficult with more than two firms: "With a duopoly, a firm that announces a high price need only convince the other firm that it intends to set a high price in order to induce the rival firm to also

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[47] Douglas D. Davis & Charles A. Holt, *Conspiracies and Secret Discounts in Laboratory Markets*, 108 ECON. J. 736, 736-756 (1998).

[48] Joseph E.Harrington & Roberto H. Gonzalez & Praveen Kujal, *The relative efficacy of price announcements and express communication for collusion: Experimental* findings, 128 J. ECON. BEHAV. ORG. 251, 251-264 (2016).

[49] The finding that collusion can hardly be observed in settings with more than two firms is fairly robust and has been shown by a variety of other experiments. For an overview, see Marco A. Haan & Lambert Schoonbeek & Barbara M. Winkel, *Experimental results on Collusion: The Role of Information and Communication*, in: Jeroen Hinloopen & Hans-Theo Normann, Experiments and Competition Policy 9-33 (2009).

set a high price. But that is insufficient when there are three firms. The announcement of a high price by firm 1 may convince firms 2 and 3 that firm 1 intends to raise price but firm 2 may be uncertain as to whether firm 3 drew the same inference and thus uncertain as to whether firm 3 will raise price."[50] In contrast, prices in the *Chat* treatment are often at or near monopoly levels and provide also evidence of much coordination.

Their findings suggest that non-binding price announcements can lead to higher prices if there are only few, symmetric firms. Yet, the overcharge and the degree of coordination are lower than with express communication. We hypothesize that similar results carry over to the topic of list price collusion, and we would like to see more experimental evidence on this issue. Moreover, in developing a theory of harm it will be interesting to explore the reasons why non-binding communication apparently may have an impact on the market at all, i.e., despite having no commitment value at all.

In this context, it is important to note that especially in markets with asymmetric information there may be a multiplicity of collusive and non-collusive equilibria. Agreeing on list prices may then function as a device that helps the firms to coordinate on an equilibrium with higher profits than would have been obtained otherwise. List prices might then function as a focal point that helps to coordinate on this equilibrium. This raises the question whether the hypothesis of focal points playing a role for collusion, which was derived from field evidence (see the cases reviewed in Section II.B.5), can be supported scientifically. As the supposed relevance of focal points refers to a psychological phenomenon "there is no formal model strengthening" this hypothesis.[51] This then poses the question whether focal-point effects can be found in the laboratory.

Yet, the experimental evidence does not offer much support for the hypothesis that nonbinding price ceilings facilitate collusion by establishing a focal point. For example, Engelmann and Normann conduct an experiment where firms / subjects compete in a market by setting prices.[52] After 30 out of 60 periods the authors either introduce or remove a price ceiling that can either be high or low. They find that the prices in all treatments are often close to the prices predicted for a competitive Nash equilibrium. They do not find support for the hypothesis of price ceilings functioning as focal points. Yet, there are hardly any attempts to collude in their experiment in general. This might be because of their assumption of a finite game where collusion – according to the predictions of economic theory – cannot be stabilized. Moreover, it was argued above that tacit collusion is hardly ever observed in experiments if the number of subjects is larger than two. Therefore, their experimental design might inhibit collusion irrespective of price ceilings being present or not. This criticism was taken up by Engelmann and Müller who ran a similar experiment that was explicitly "designed to facilitate collusion at a price ceiling, while making collusion in the absence of a price ceiling relatively difficult."[53] Despite these efforts they do not find any evidence suggesting that price ceilings have a collusive effect by being considered focal points of firms' coordination efforts.

It is difficult to tell why a collusive focal point effect cannot be found in the laboratory although there appears to be empirical evidence for such an effect in the field. Engelmann and Müller formulate two hypotheses to explain this finding. First, "there is something fundamentally different about market structure or market participants between the laboratory and the field and […] all experiments failed to reflect crucial aspects that enable the focal-point effect in the field. [… Second,] in spite of its apparent support in the field […] the reason for the field phenomena is not the focal-point effect either."[54] Moreover, as concerns the topic of this article, i.e., list price collusion, one might also ask whether list prices that were endogenously set as the result of explicit collusion have fundamentally different effects than an exogenously imposed price ceiling. To sum up, the contradictory nature of evidence from the field and from the laboratory leaves it open whether a focal-point effect exists and whether it facilitates collusion or not.

Let us turn to a slightly different interpretation of the focal point effect. Previously, we assumed that list prices serve as focal points, e.g., for bargaining, and higher list prices translate into higher transaction prices. A related, yet different, issue would concern focal points in discounting. For example, there might be focal points insofar as typically a *focal* discount, say a round number like 10%, is subtracted from the list price. In such a case, an increase in list prices would again translate into higher transaction prices. Scherer provides the following example: "The Mirror Manufacturers Association published during the 1950's a list price booklet covering roughly 2,000 standard

[50] Harrington et al, *supra* note 48, at 258.
[51] Engelmann & Normann, *supra* note 52, at 62.
[52] Dirk Engelmann & Hans-Theo Normann, *Price ceilings as focal points? An experimental test*, in: Jeroen Hinloopen & Hans-Theo Normann, Experiments and Competition Policy 61-80 (2009).
[53] Dirk Engelmann & Wieland Müller, *Collusion through price ceilings? In search of a focal-point effect*, 79 J. ECON. BEHAV. ORG. 291, 291-302 (2011), at 293.
[54] Engelmann and Müller, *supra* note 53, at 301.

mirror sizes, and […] nearly all wholesale transactions were made at round number discounts – i.e., 80 percent and then 10 percent off the list price."[55]

IV. DISCUSSION

The practice of posting list prices (as opposed to negotiating prices with every customer individually) has an efficiency justification. Posted prices may lower customers' search costs, potentially causing a more intense search for the lowest price, which may then lead to lower prices overall. Posting prices may also reduce firms' selling costs which raises total welfare and also elevates consumer surplus if (parts of) these cost reductions are passed on to customers in the form of lower prices.[56] Yet, the practice of explicit list price *collusion* is aimed at increasing prices and thus hardly creates any additional efficiency effects over competitive list pricing strategies. Competition authorities thus typically consider it a restriction by object as was argued in Section II.B.2.

However, the question remains under what conditions list price collusion also constitutes a restriction by effect. For example, cartel firms might try to defend their conduct by arguing that it was ineffective in raising the transaction prices ultimately paid by their customers. Such a defense was brought forward, for example, by some defendants in the thread case that was presented in the introduction. Our review of the literature on list price collusion shows that this practice is neither anticompetitive nor ineffective *per se*. An assessment of this defense, i.e., list price collusion being ineffective, should thus be done on a case-by-case basis and is particularly important in private litigation cases when customers claim damages for the harm incurred, because such claims require estimates of the overcharge caused by the conspiracy.

In the following, we present a checklist that helps to assess whether list price collusion may have been effective in raising transaction prices. One may think of mainly two effects caused by collusion on list prices. First, it may help generating an overcharge by elevating transaction prices. Second, it may raise the internal stability of the collusive agreement, i.e., the duration of the conspiracy would go up.[57] Answers to the following questions may help to assess these effects:

1. What is the proportion of customers (i.e., price-takers) who pay the list price? The higher this proportion, the closer is the agreement on list prices to an agreement on transaction prices. A higher proportion of price-takers also helps to stabilize collusion by reducing the profitability of a deviation from the agreement in the form of granting discounts to bargainers.
2. What information do bargainers possess about the production costs of the cartel firms? Would they possibly take list prices as a signal about firms' production costs? Can list price collusion possibly lure them in the false belief that production costs are higher than they actually are? Would this induce buyers to negotiate less aggressively?
3. How are the sales representatives of the cartel firms incentivized? Do they receive a bonus for granting particularly small rebates?
4. Do the firms offer meet-or-release, most-favored-customer, or best-price clauses; be it explicitly or implicitly as an apparent concession of their sales representatives?

In private litigation cases, customers might also allege that agreements on list prices established or altered a focal point for firms' market conduct, which ultimately lead to higher prices. It cannot be precluded that list prices, especially ones that were set in a coordinated manner, may have such a focal point effect on transaction prices, which would support plaintiffs' claim. Yet, such a claim cannot be proven by factual evidence, while there is also ample evidence from laboratory experiments that a focal point effect does not exist. Hence, customers who are about to claim damages for alleged harm caused by firms who colluded on list prices are well-advised to also consider alternative theories.

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[55] Frederic M. Scherer, *Focal Point Pricing and Conscious Parallelism*, 12 ANTITRUST BULL. 495, 495-503 (1967).
[56] A more detailed review of these efficiency effects was provided by Harrington, *supra* note 10, at 7.
[57] A potential third effect relates to the external stability of the collusive agreement, i.e., certain practices might help to foreclose other, non-cartel firms from the market. Yet, our analysis of list price collusion cases does not suggest any such effect in practice.

V. CONCLUSION

Before starting the research underlying this paper we had two presumptions. First, given the prevalence of, e.g., market or customer allocation schemes we thought that collusion on list prices is a rare phenomenon. Second, given the possibility to secretly deviate from the agreed-upon list prices we expected the practice to be relatively ineffective. We were proven wrong.

The evidence presented in this article suggests that collusion on list prices can be observed in many cases and thus is more than a marginal phenomenon. In this context, the practice of setting list prices and giving discounts itself may help to stabilize collusion. This is because a deviation from list prices can be observed easily and be punished quickly by the other firms, because they can immediately respond by granting higher discounts to their customers. Alternatively, if leaving list prices at collusive levels but granting higher discounts a deviator can only attract additional demand from *some* customers, i.e., the ones who bargain individual transaction prices. This reduces the profitability of a deviation and raises the stability of collusion.

However, in defending themselves cartel firms might argue that practically *all* of their customers paid individually negotiated transaction prices, and that the agreement among the firms did not entail any provisions on admissible discounts, customer allocation, or market allocation. They might on these grounds claim that the agreement on list prices could not have been effective. Yet, such an argument would be unfounded, among others, if the companies used best price clauses (including most-favored-nation and meet-or-release clauses) or schemes aimed at preventing salespeople from giving excessive discounts. Such clauses and schemes may even have been present before the agreements on list prices were made.

Plaintiffs claiming repayments for damages should, however, be careful in bringing another often-heard argument, i.e., list prices were a starting point for negotiations and thus had an effect on transaction prices. When bringing this argument, plaintiffs should be prepared to show *why* upon observing higher list prices they did not ask for higher discounts. One reply would be that they incorrectly inferred from the higher prices the sellers would operate at high costs, which caused them to accept the prevailing prices that were also paid by other buyers. Plaintiffs should, however, be careful in arguing that list prices constituted a focal point that *somehow* translated into higher transaction prices. The factual and experimental evidence concerning this argument is inconclusive.

This article reviews case evidence, economic theory, and experiments. Future work might therefore be directed at measuring overcharges when collusion concerns list prices. This poses a challenge to econometricians because discounted transaction prices – other than the list prices themselves – may not be observable by academics. The task is only slightly alleviated for economic consultants who receive this data from either plaintiffs or defendants in cartel damages cases. However, even in this case the counterfactual transaction prices depend on unobservables such as the firms' relative bargaining power, their outside options, or the exact nature of the negotiation process used when bargaining about discounts. More work may thus be needed to develop identification strategies for measuring the overcharge in list price collusion cases.