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**Conference Paper**

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2020: Gender Economics

**Provided in Cooperation with:**

Verein für Socialpolitik / German Economic Association

*Suggested Citation:* Hunold, Matthias (2020) : Manufacturer Cartels and Resale Price Maintenance, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2020: Gender Economics, ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/224645>

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# Manufacturer Cartels and Resale Price Maintenance

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February 2020

*Preliminary version – feel free to ask the authors for the latest version.*

## Abstract

We provide a theory of how RPM facilitate upstream cartels absent any information asymmetries using a model with manufacturer and retailer competition. Because retailers have an effective outside option to each manufacturer’s contract, the manufacturers can only ensure contract acceptance by leaving a sufficient margin to the retailers. This restricts the wholesale price level even when manufacturers collude. In this context, resale price maintenance may only be profitable for the manufacturers if they collude. We thus provide a novel theory of harm for resale price maintenance when manufacturers collude and illustrate the fit of this theory in various competition policy cases.

**JEL classification:** L41, L42, L81

**Keywords:** resale price maintenance, collusion, retailing

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# 1 Introduction

Minimum resale price maintenance (RPM) has been used by colluding manufacturers of beer, gummi bears, chocolate, and coffee.<sup>1</sup> The case reports contain indications that RPM indeed helped making collusion successful. Regarding these cases, the German competition authority (Bundeskartellamt) states:

‘Most of the fines imposed in the proceedings concerned infringements relating to confectionery, coffee and beer. In these cases, the infringements were particularly anti-competitive and anti-consumer, because horizontal agreements between the manufacturers, which were also sanctioned by the Bundeskartellamt, were accompanied by vertical price-fixing measures in which major retailers participated.’<sup>2</sup>

In one instance, at least, the cartel apparently only became successful when the producers started using RPM in addition to coordinating their wholesale prices. Why should this be the case? For an upstream cartel, jointly increasing the wholesale prices should be an option if prices are too low from their perspective. Why is it helpful to control the retail prices as well?

While the suspicion that RPM facilitates collusion is not only backed by recent cases, but apparently also prevalent in competition policy circles, there is yet very limited economic theory in support of this link between RPM and collusion. The work of Jullien and Rey (2007) is a notable exception. They show that RPM can facilitate upstream collusion when retailers face privately observed shocks on demand or costs. Without RPM, a drop in demand can induce retailers to cut the retail price, which may induce other manufacturers to mistakenly think that the manufacturer deviated from the cartel agreement, inducing a price war. With RPM, the manufacturers can prevent such ambiguous retail price cuts and by this stabilize their cartel.

Whereas the theory of Jullien and Rey is sound, private information and sudden retail price cuts do not appear to be the main driver for the use of RPM in the above-mentioned instances. This raises the question why an upstream cartel may nevertheless benefit from RPM. A recent report by an OECD roundtable provides another hint.<sup>3</sup> It cites a number of cartel cases where manufacturers support retail cartels, i.e. hub and spoke cartels, by coordinating retail price cartels and organizing information exchanges.

Why would a manufacturer facilitate price increases of retailers, which one can expect to reduce demand? Increasing the wholesale price appears to be a more attractive alternative for a manufacturer cartel if the retail prices are too low from their perspective. Starting with this question, we provide a model in which manufacturers are not able to increase prices even if they prefer larger retail prices, as higher wholesale price are not accepted by retailers. The reason is that manufacturers need to ensure that retailers make sufficient profits in order to accept the wholesale contracts. In other words, retailers have a relevant outside option.

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<sup>1</sup>The cases concern Anheuser Busch, Haribo, Ritter, and Melitta; (last access 2020/02/03).

<sup>2</sup>See the press release (last access 2020/02/03).

<sup>3</sup>‘Roundtable on Hub-and-Spoke Arrangements – Background Note by the Secretariat 3-4 December 2019’; OECD; (last access 2020/02/03; ).

We set up a model of two competing manufacturers selling through an exclusive retailer each, a market structure similar to Bonanno and Vickers (1988). Each retailer has an outside option and manufacturers offer linear take-it-or-leave-it contracts. This implies that the manufacturer has to offer sufficiently low wholesale prices for the retailer to sell the product. In this setting, we compare manufacturer competition to manufacturer collusion with and without resale price maintenance (RPM). We find that collusion may only be effective, i.e., yield higher prices than competition, if the manufacturers can use RPM. We also distinguish between RPM being a price floor and a price ceiling. Price ceilings tend to be used only when competition is weak, that is, when the products sold at different retailers are strongly differentiated, such that a double marginalization problem exists and prices under competition already exceed the level that maximizes the industry's total profit. Otherwise, minimum RPM is used, which is profit enhancing for the cartel but may reduce the manufacturers profit when they compete. This shows that RPM may under certain market conditions only be desirable for manufacturers when they collude.

In an extension, we show that our results can also be obtained with secret contracts, non-linear tariffs and retail services.

## 2 Related literature

Our market structure of two manufacturers and two exclusive retailers is similar to Bonanno and Vickers (1988). We extend the model by allowing the retailers to have a substantial outside option to selling a manufacturer's product. Moreover, we first focus on linear tariffs.

Rey and Vergé (2010) show that resale price maintenance can result in monopoly market outcomes even without collusion in a setting of interlocking vertical relations, where multiple manufacturers sell through competing common retailers.

Dobson and Waterson (2007) consider a model where manufacturers negotiate linear wholesale prices with retailers. In this context, RPM can increase the equilibrium market prices in particular when retailers have strong negotiation power. Dobson and Waterson do not study collusion.

The market power of each manufacturer in our model is limited by an outside option that can be interpreted as a cost of providing promotional services for the manufacturer's product. In so far, our argument is related to the literature on retail services. According to the service argument, which goes back to Telser (1960) and was refined by Mathewson and Winter (1984), a monopoly manufacturer may use RPM in order to improve the service incentives of its retailers. Similarly to Hunold and Muthers (2017), the opportunity cost of selling a product might be driven by an outside option of promoting different products. For example, the 'service cost' of a supermarket for selling a coffee brand could be the opportunity cost of not being able to use the shelf space (and possibly the space in the promotional flyer) for other products.

When we extend the model to allow for secret contracts, we consider a market structure that is similar to Pagnozzi and Piccolo (2011). They consider a model of strategic delegation

à la Bonanno and Vickers (1988) with private contracts and show that, under symmetric beliefs, vertical separation increases the manufacturers' profits.

Hart et al. (1990) identify an opportunism problem when a monopoly manufacturer sells through competing retailers. When the manufacturer lacks the ability to publicly commit to the vertical contracts, each retailer fears that the other retailer may get a better deal from the manufacturer. This limits the manufacturer's ability to realize monopoly profits. In essence, with private contracts, the manufacturer competes with itself. Rey and Vergé (2004) show that resale price maintenance can solve the opportunism problem that a monopolist faces when contracts are private. We show in an extension that our argument on manufacturer collusion and RPM can also be related to the opportunism problem.

### 3 Model

#### Set-up

There are two manufacturers and two retailers. Let us abstract from any costs of production or retailing. Assume that each retailer is an exclusive seller of one of the manufacturer's products. The manufacturers offer contracts with a linear wholesale price (we relax the assumptions on exclusivity and linear pricing later on). Retailers only accept the contracts if the expected profits exceed a fixed outside option of value  $\Omega$ . The outside option encompasses the shelf space opportunity costs and marketing costs as well other retailing opportunity costs.

The timing is as follows:

1. each manufacturer  $i \in \{U, V\}$  offers its retailer a contract (a wholesale price  $w_i$ ; with RPM also a retail price  $p_i$ );
2. each retailer observes its contract offer, rejects the offer or accepts it and sets the price  $p_i$  (absent RPM);
3. consumers choose where and whether to buy.

We take the market structure as given. To ensure that all vertical contracts are accepted in equilibrium, we assume, for simplicity, that all firms make zero profits if the contract of one manufacturer is not accepted.<sup>4</sup> We solve the game for symmetric subgame perfect Nash equilibria. We compare price competition among the manufacturers with a manufacturer cartel, assuming first that it is public knowledge whether using RPM is feasible or not.

Demand for each product is given by a symmetric function  $D_i(p_i, p_{-i})$ . The profit of retailer  $i$  when accepting the contract and selling product of manufacturer  $i$  is

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<sup>4</sup>This ad hoc assumption ensures equilibrium existence for the case of public take-it-or-leave-it contracts. Otherwise, there is the following non-existence problem: If the outside option of a retailer is binding in equilibrium, each manufacturer can ensure that the contract of the other manufacturer is not accepted by lowering the input price marginally, which lowers the profit of the competing retailer such that the outside option is not satisfied any more. This problem has been pointed out by, for instance, Rey and Vergé (2010).

$$\pi_i = (p_i - w_i) \cdot D_i(p_i, p_{-i}),$$

and the profit of manufacturer  $i$

$$\Pi_i = w_i \cdot D_i(p_i, p_{-i}).$$

## Procedure

We compare the market outcomes under manufacturer competition and collusion both with and without RPM. We number the four scenarios as depicted in Table 1.

Scenario	Manufacturer competition	Manufacturer collusion
no RPM	1	2
RPM	4	3

Table 1: Numbering of scenarios

## Assumptions on demand and profits

Let us first consider the retailers' price setting without RPM after each has accepted the contract of a manufacturer. Each retailer faces a wholesale price  $w_i$  and both retailers set prices simultaneously, each solving the problem to

$$\max_{p_i} \pi_i = (p_i - w_i) D_i.$$

In equilibrium, retailers set a pair of prices  $p_i^*(w_i, w_{-i})$  that are mutual best responses. For the case that the input prices are known to both retailers, we make

**Assumption 1.** *The profit of each retailer,  $\pi_i^*(w_i, w_{-i})$ , is monotonically decreasing in the own input price  $w_i$  and monotonically increasing in the competitor's input price  $w_{-i}$ .*

Moreover, for the case that both retailers accept the manufacturers' contracts and the input prices are equal ( $w_1 = w_2 = w$ ), we focus on a symmetric subgame equilibrium with prices denoted by  $p^*(w)$ , and make

**Assumption 2.** *The competitive downstream price level  $p^*(w)$  increases in the uniform input price:  $p^{*'}(w) > 0$ . The retail profit  $\pi_i^*(w, w)$  decreases in the uniform input price  $w$ .*

On the upstream profits we make

**Assumption 3.** *Each manufacturer's reduced profit, which takes the retailers' equilibrium pricing into account, is single peaked in  $w_i$ .*

Moreover, we focus on the following conditions:

- Competition is sufficiently strong that the price level is below the industry profit maximizing level (we will be more precise below).
- The retailers' outside option is binding when manufacturers compete without RPM (we will be more precise below).
- The manufacturers are sufficiently patient such that collusion is sustainable. We investigate the incentive compatibility of collusion in an extension.

## 4 Solution (binding outside option, exclusive retailers)

Table 2 puts the different scenarios in perspective.

	Manufacturer competition	Manufacturer collusion
no RPM	<i>Scenario 1:</i> This scenario defines the competitive wholesale and retail prices. The wholesale prices are at a level such that the resulting retail profits equal the outside option $\Omega$ .	<i>Scenario 2:</i> There is no gain over scenario 1: the manufacturers cannot increase the wholesale prices as they cannot raise the retail prices above the competitive level absent RPM.
RPM	<i>Scenario 4:</i> The equilibrium wholesale and retail prices are lower than absent RPM (scenario 1) if the offers made to consumers are sufficiently differentiated. Minimum RPM tends to be unprofitable for the manufacturers: The retailers always obtain $\Omega$ and the industry profits are lower.	<i>Scenario 3:</i> The manufacturers set the retail prices at the monopoly level and adjust the wholesale prices such that the retailers get their outside options.

Table 2: Summary of the different scenarios

### 4.1 No RPM and manufacturer competition (scenario 1)

Let us first consider that the manufacturers set the wholesale prices before the retailers set the retail prices. In stage 2, each retailer accepts the contract if the expected profit exceeds its outside option:

$$\pi_i(w_i, w_{-i}) \geq \Omega. \quad (1)$$

The outside option  $\Omega$  has only an effect when condition (1) is binding. The outside option is binding whenever the equilibrium disregarding the outside options yields a retail profit below  $\Omega$ . In that case, the condition determines the retail price that each manufacturer sets. Each manufacturer sets the largest wholesale price that satisfies condition (1).

As manufacturers are symmetric, following from Assumption 1, there is a unique symmetric combination of wholesale prices  $w^*$ , such that the retailers' participation constraints bind:

$$\pi_i^*(w^*, w^*) = \Omega. \quad (2)$$

It also follows that  $w^*$  decreases in  $\Omega$ . This results in

**Proposition 1.** *Whenever the participation constraint of the retailers is binding (equation (2) holds): Under manufacturer competition, there is an equilibrium with prices of  $p^*(\Omega)$  and  $w^*(\Omega)$ , which both decrease in  $\Omega$ .*

*Proof.* Consider an equilibrium with binding participation constraints (equation (2) holds). This implies  $\pi_i^*(w_i^*, w_{-i}^*) = \Omega$  for  $i = 1, 2$ . By Assumption 1 there is exactly one  $w_i$  for each  $w_{-i}$  that exactly satisfies this condition. By Assumption 3 each manufacturer chooses the highest  $w_i$  compatible with  $\pi_i^*(w_i^*, w_{-i}^*) = \Omega$ . There is a unique and symmetric equilibrium combination of  $w^* = w_i^* = w_{-i}^*$  that is the largest symmetric level of  $w$  compatible with condition (1). Any asymmetric combination of  $w$  cannot be an equilibrium as for any combination that satisfies condition (1) with  $w_i < w_{-i}$ , the profit of  $i$  can be increased by increasing  $w_i$  such that the condition is still satisfied for both manufacturers.  $\square$

In summary, whenever the outside option of the retailers is sufficiently attractive, the prices are pinned down by the retailers' participation constraints and not by the level of manufacturer competition.

## 4.2 No RPM and manufacturer collusion (scenario 2)

Suppose the manufacturers collude on  $w_A$  and  $w_B$  to maximize their joint profits. The underlying idea is that in an infinitely repeated game the manufacturers can sustain higher wholesale prices by employing a dynamic strategy that punishes deviation to lower wholesale prices with, for example, grim trigger strategies. We focus on the case of symmetric collusion, where the symmetric manufacturers collude using symmetric wholesale prices. In any symmetric equilibrium, both manufacturers contracts will be accepted and both products sold.

We assume that the retailers are not colluding. Thus, retailers react to the wholesale prices in the same way as without collusion.

**Proposition 2.** *If the manufacturers collude (in a way such that both products are offered each period) and the outside option was binding under competition, the resulting wholesale prices equal the competitive prices of  $w^*(\Omega)$ .*

*Proof.* Recall that, under competition,  $\pi_i^*(w^*, w^*) = \Omega$  holds for both  $i = 1, 2$  in the symmetric equilibrium. The colluding manufacturers would want to increase profits by increasing the wholesale prices. For any asymmetric level of  $w > w^*$ , it follows from Assumption 1 that  $\pi_i(w, w) < \Omega$ . Such contracts would not be accepted by both retailers. Hence, the best that can be done under symmetric collusion is to choose the symmetric level of  $w^*$ .



Alternatively one could consider asymmetric collusion with  $w_A \neq w_B$ .

Suppose there is asymmetric collusion where  $w_A < w_B$  and  $\pi_A > \Omega$  and  $\pi_B = \Omega$ . This cannot be an equilibrium as both manufacturers benefit if  $w_A$  increases.

Suppose there is asymmetric collusion where  $w_A < w_B$  and  $\pi_A = \Omega$  and  $\pi_B < \Omega$ . Consequently, B would not be sold. By assumption we exclude potential asymmetric equilibria.  $\square$

By colluding, the manufacturers cannot implement higher (symmetric) wholesale prices than under competition. The underlying intuition is that manufacturers do not have sufficient instruments to ensure simultaneously that

1. the retailers have the right incentives to stock and promote the manufacturers instead of realizing the outside option, and
2. the retail prices maximizes industry profits.

*Remark 1.* We focus our analysis on symmetric equilibria. One could potentially construct an equilibrium with asymmetric collusion that yields larger profits than symmetric collusion and relies on only one manufacturer selling in each period. This could only be part of a collusive equilibrium if there are side payments between manufacturers or they could alternate whose product is accepted in between periods. In such an equilibrium, because of product differentiation, there is some profit lost from not offering both products in the same period. Our motivation for focusing on symmetric strategies in each period is that we consider it rather difficult and thus unrealistic that colluding manufacturers can coordinate on and implement an alternating sales pattern.

### 4.3 RPM and manufacturer collusion (scenario 3)

Suppose manufacturers can use RPM and they collude on  $w$  and  $p$ .

**Proposition 3.** *If manufacturers collude on wholesale price  $w$  and retail price  $p$  using RPM, the resulting retail prices maximize the industry profits and  $w$  is chosen to satisfy the retailers' participation constraint. RPM increases the manufacturer profits under collusion.*

*Proof.* Whenever the retailers' outside option is binding, the resulting price under collusion and competition is identical. Because of double marginalization, the resulting prices can be lower or higher than the industry profit maximizing prices, depending on the level of competition between retailers and manufacturers. With RPM the price is chosen to maximize industry profits. This is the case because, under RPM, the manufacturers can choose  $w$  such that the outside option is just binding for any given retail prices. That is, manufacturers have sufficient instruments to choose retail prices and extract all retail rents, up to the outside option of each retailer. As the outside option is fixed, the manufacturers effectively maximize industry profits. The retail profits are the same in all three scenarios we have analyzed so far and equal  $\Omega$ . Thus whenever industry profits increase, the manufacturer profits increase.  $\square$

## 4.4 RPM and manufacturer competition (scenario 4)

Suppose that both manufacturers use RPM and the retailers are aware of this. Confronted with the price  $w_i$  and  $p_i$  offered by manufacturer  $i$ , retailer  $i$  chooses whether to accept and sell the manufacturer's product. With RPM, each manufacturer can choose the retail price at a level that maximizes the joint profits with her retailer. The wholesale price can then be chosen to satisfy the participation of the retailer (that is, ensuring an expected profit of  $\Omega$ , given the beliefs of the retailer about the prices  $w_{-i}$  and  $p_{-i}$ ).

[Assume that each manufacturer can introduce RPM publicly in an initial stage of the game that precedes the game as described above.]

**Proposition 4.** *If the outside option of the retailer is binding and manufacturers compete, the retail prices are lower with RPM than without RPM.*

*Proof.* Suppose that with RPM the manufacturers choose the same prices as the retailers in the case without RPM and the same wholesale prices. Given this situation, no manufacturer has an incentive increase prices as the price was a best response of the retailer to the other retail price, taking into account the wholesale price  $w^* > 0$  as marginal costs. However, the marginal costs of the manufacturer are zero and thus lower. Thus, each manufacturer would have an incentive to reduce the price in order to increase the joint profits for the manufacturer-retailer pair. Consequently, each manufacturer charges a lower price and a lower wholesale price than without RPM. Unless the price level without RPM was larger than the monopoly level, the manufacturers make less profit when they both use RPM compared to a situation without any RPM.  $\square$

When the manufacturers compete, resale price maintenance has effects similar to vertical integration. It is thus not surprising that the arguments of Bonanno and Vickers (1988) and Rey and Stiglitz (1995) hold. Strategic delegation of pricing (which means *no RPM* in our model) tends to yield higher prices and manufacturer profits than vertical integration, which corresponds to RPM in our model.

## 5 Discussion

**Unilateral introduction of RPM.** Suppose one manufacturer introduces RPM and the other manufacturer observes this. We distinguish two cases:

1. The other manufacturer observes the retail price fixed by RPM before setting her wholesale price  $w$ ;
2. the manufacturer using RPM sets  $w$  and the retail price  $p$  simultaneously.

Let us first consider the second case. Is the competitive equilibrium still an equilibrium? Suppose that the manufacturer with RPM implements  $w^*$  and  $p^*$ . The other manufacturer has no incentive to deviate from  $w^*$  as an increase would result in delisting, whereas a decrease of the wholesale price would result in lower profits as well.

Would the manufacturer using RPM want to charge different prices? Whenever  $p^*$  does not maximize the joint manufacturer-retailer profits, the manufacturer using RPM can deviate by playing the best response to  $p^*$  and ensuring that the outside option holds by adapting  $w$  accordingly.

Given that the retailer chooses  $p^*$  as a best-response to  $p^*$  when she faces marginal costs of  $w$ , a manufacturer controlling the retail price and facing marginal costs of zero would always choose a price smaller  $p^*$  as a best response to  $p^*$ . Anticipating this, the other manufacturer would also lower  $w$ . This could be profitable if demand increases sufficiently and thus depends also on demand assumptions.

**RPM: price ceiling or price floor?** For the competition policy discussion, it is important to differentiate between minimum and maximum RPM as they are often treated differently. While maximum RPM is usually considered to solve double marginalization problems in the interest of manufacturers and consumers, minimum RPM is considered to be more suspicious. Indeed, we find that RPM, as used by a cartel to increase prices, is always minimum RPM. We model RPM as a fixed price. To distinguish between maximum and minimum RPM, we can evaluate whether a retailer would want to deviate from the fixed price by lowering or by increasing its retail price.

For the case that manufacturers compete with RPM, it always takes on the form of maximum RPM in our model. While retailers would set prices taking into account the positive wholesale price they face, manufacturers choose the fixed price taking only the true marginal costs into account (which we normalized to zero). Otherwise, the manufacturers face the same level of competition as retailers. Consequently, the retailers would always want to set higher prices than the manufacturers. This implies that RPM acts as a price ceiling, i.e., maximum RPM:

In contrast, when manufacturers and the retailers' participation constraint binds, RPM is effectively minimum RPM, i.e., a price floor. Each retailer has the same profit as without RPM, equal to the outside option value of  $\Omega$ , but the wholesale price  $w$  is larger than absent RPM. The retail price  $p$  thus cannot be smaller than the price retailers would choose because then the retail profits at a higher  $w$  would be smaller than  $\Omega$ . Thus, retailers would choose lower prices, which means that there is effectively minimum RPM.

**Welfare.** The retail price level across the different scenarios has a clear order. Without RPM, the retail prices equal  $p^*(\Omega)$ , both under competition and collusion. With RPM and manufacturer collusion, the retail price increases to the industry profit maximizing level that is larger than  $p^*(\Omega)$ . With RPM and manufacturer competition, the prices are below  $p^*(\Omega)$ . In all cases, the equilibria have symmetric prices for both products and retailers. Thus, RPM reduces the consumer surplus under collusion, where it effectively imposes a retail price floor, but reduces prices under competition, where it effectively imposes a retail price ceiling. As we have focused on the case where the outside option of the retailers binds, the retail profits are the same in all four scenarios and equal  $\Omega$ . The manufacturer profit thus moves in the same way as the producer surplus and opposite to the consumer surplus. The producer surplus

is largest under collusion with RPM and smallest under competition with RPM. The clear implication from these results is that minimum RPM can facilitate collusion and increase the consumer harm of collusion.

## 6 Extensions

### 6.1 Non-linear tariffs

So far we have assumed that the contracts only contain linear tariffs and that the outside option is a fixed sum ( $\Omega$ ). When assuming a fixed outside option, the question arises whether a fixed transfer (as part of a two-part tariff, for instance) could solve the manufacturers' problem with no need for RPM. Under certain conditions, the answer is *yes*: the part of the outside option that is fixed and vanishes with the contract acceptance could be compensated for with a fixed transfer from the manufacturer to the retailer. Thus, a two-part tariff with a slotting allowance for retailers can, in certain cases, be sufficient to achieve higher wholesale prices under collusion. However, the fixed transfer can only cover the outside option in so far as it is an outside option to the contract itself. When service decisions during the lifetime of the contract are the basis for the outside option, then a fixed transfer might already be sunk when the retailer decides on the shelf space allocation, on the placement of the products in promotional flyers, and on consumer advice. In these cases, RPM may still be necessary even with non-linear wholesale tariffs.

### 6.2 Unobservable linear tariffs

In certain industries, it is conceivable that the contracts offered to competing retailers are not observable when a retailer decides on the own supply contracts.

To study such instances, we now consider a market structure that is similar to Pagnozzi and Piccolo (2011). Each retailer observes the contract offered to her, but not the contract offered to the competing retailer. Hence, the retailers set prices and decide whether to accept contracts based on the wholesale price they observe and the belief they have about the other wholesale price. Let us assume that the retailers hold passive beliefs about the other's wholesale price. We maintain the assumption that the manufacturers can publicly commit to using RPM in scenarios 3 and 4. We solve the new game for perfect Bayesian Nash Equilibria (PBNE).

Consider first the case that the manufacturers collude and do not use RPM. Under public contracts, we obtained the equilibrium that each manufacturer sets  $w^*(\Omega)$ . This is still an equilibrium outcome with unobservable contracts. Suppose a retailer observes a contract offer with  $w = w^*(\Omega)$  and expects that the other contract offer to its competitor is the same. Both retailers would accept such a contract, yielding prices  $p^*(\Omega)$  and a retail profit of  $\Omega$ . Would the colluding manufacturers want to deviate? Offering a larger wholesale price is not profitable, as such a contract would not be accepted by any retailer. Offering a lower wholesale price

is also not profit increasing for a manufacturer. Hence, the equilibrium outcome is the same under observable as under unobservable contracts.

Next, consider collusion with RPM. As RPM is observable, the retailers face no uncertainty when accepting a contract and will only accept contracts that, given the fixed retail price, ensure a retail profit of at least  $\Omega$ . Hence, again, the outcome is the same as under observable contracts. Each manufacturer offers the industry-profit-maximizing price and chooses the highest feasible wholesale price (such that the retailers get profits equal to  $\Omega$ ).

The comparison of these two cases already highlights that RPM increases profits under collusion.

Finally, consider the cases of competition. First, assume that manufacturers compete without RPM. Again, suppose that the equilibrium wholesale prices equal  $w^*(\Omega)$ . The retailers set  $p^*(\Omega)$  and accept the contracts. Would a manufacturer want to deviate? Increasing the wholesale price under passive beliefs does not change the expectation for the wholesale price of the competing retailer. Thus a contract with a higher proposed wholesale price would not be accepted by the retailer.<sup>5</sup> Lowering the wholesale price would not change the acceptance decision, but would lead to lower manufacturer profits as well. With RPM, again, the same result is obtained as with observable wholesale tariffs.

In summary, the results obtained under observable contracts carry over to a situation with private contracting between manufacturers and retailers.

## 7 Conclusion

We started from the puzzle that resale price maintenance (RPM) has been used by colluding manufacturers in various cases and even appeared to be an important factor in making collusion successful. Studying these cases, we found that the explanation of Jullien and Rey (2007) does not seem to apply there as it relies on information asymmetries about demand, which we could not identify as a driving force.

In light of the case material, we have developed a new theory of how RPM can facilitate upstream collusion absent any information asymmetries. We start with the assumption that retailers have an effective outside option to each manufacturer's contract, such that the manufacturers can only ensure contract acceptance by leaving a sufficient margin to the retailers. This restricts the wholesale price level even when manufacturers collude. We show that collusion may only be effective, i.e., yield higher prices than competition, if the manufacturers can use minimum RPM. The reason is that minimum RPM allows the manufacturers to ensure sufficiently high retail profits on their products even if the wholesale prices are at the high collusive level. Otherwise, without RPM, imperfect cost-pass-through at the retail level and decreasing demand can make selling the cartelized products unattractive for the retailers.

Our baseline model features two competing manufacturers, of which each sells through an exclusive retailer, similar to Bonanno and Vickers (1988). Each retailer has an outside

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<sup>5</sup>Note that even under symmetric beliefs, since there is no larger symmetric combination of  $w$ s that satisfies the participation constraint of the retailers, a price increase is not profitable.

option and manufacturers offer linear take-it-or-leave-it contracts. In this setting, we study manufacturer competition as well as collusion, both with and without RPM. We extend our model in various ways and show that our theory applies under various market conditions.

Beyond our formal analysis that relies on effective outside options of retailers, our theory addresses a general puzzle regarding the relevance of RPM for collusion. The more general insight is that an upstream cartel still suffers various fundamental problems regarding the coordination of competing downstream firms that also an upstream monopolist suffers. RPM is capable of solving various of these problems. These problems may be less of an issue when there is upstream competition and no, or only limited, market power upstream, such that RPM is less needed. RPM can even intensify manufacturer competition and by this reduce their profits. However, once the manufacturers collude and act similar to an upstream monopolist, RPM becomes, quite generally, a desirable tool and increase the collusive profits, or even enables collusion at all.

## References

- Bonanno, G. and Vickers, J., “Vertical separation.” *The Journal of Industrial Economics*, Vol. 36 (1988), pp. 257–265.
- Dobson, P. and Waterson, M., “The competition effects of industry-wide vertical price fixing in bilateral oligopoly.” *International Journal of Industrial Organization*, Vol. 25 (2007), pp. 935–962.
- Hart, O., Tirole, J., Carlton, D. W., and Williamson, O. E., “Vertical integration and market foreclosure.” *Brookings papers on economic activity. Microeconomics*, Vol. 1990 (1990), pp. 205–286.
- Hunold, M. and Muthers, J., “Resale price maintenance and manufacturer competition for retail services.” *The RAND Journal of Economics*, Vol. 48 (2017), pp. 3–23.
- Jullien, B. and Rey, P., “Resale price maintenance and collusion.” *The RAND Journal of Economics*, Vol. 38 (2007), pp. 983–1001.
- Mathewson, G. F. and Winter, R., “An Economic Theory of Vertical Restraints.” *The RAND Journal of Economics*, Vol. 15 (1984), pp. 27–38.
- Pagnozzi, M. and Piccolo, S., “Vertical separation with private contracts.” *The Economic Journal*, Vol. 122 (2011), pp. 173–207.
- Rey, P. and Stiglitz, J., “The role of exclusive territories in producers’ competition.” *The RAND Journal of Economics*, Vol. 26 (1995), pp. 431–451.
- Rey, P. and Verge, T., “Bilateral Control with Vertical Contracts.” *RAND Journal of Economics*, Vol. 35 (2004), pp. 728–746.
- Rey, P. and Vergé, T., “Resale Price Maintenance and Interlocking Relationships.” *The Journal of Industrial Economics*, Vol. 58 (2010), pp. 928–961.
- Telser, L., “Why should manufacturers want fair trade?” *Journal of Law and Economics*, Vol. 3 (1960), pp. 86–105.