Online Appendix (Not for Publication): Extensions to "Raising Retailers' Profits: On Vertical Practices and the Exclusion of Rivals "

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In this appendix, we begin by providing formal treatments of three instances in which the state-space/MPNE assumption is relaxed: first, when the entrant can play the same exclusionary tactic as the incumbent post-entry; second, when the manufacturer can collude post-entry; and, third, we consider an example of a retailer cartel being present. Following these extensions of our analysis, we review several historical accounts of RPM being used to induce an exclusionary effect.

An NBER working paper, Asker and Bar-Isaac (2010), also works through these (and other) extensions, including downstream retailer differentiation, albeit in a model specifically directed at the RPM case. That paper also has the feature of considering a model in which the entrant can undercut the incumbent for a period before inviting a competitive response. This makes exclusion harder as the entrant's profits are increased. That said, all results are qualitatively the same.

1 Collusion, and incumbent exclusion

In this section, we allow for different possible equilibria in the post-entry game, as discussed in Section 4.3 of the paper. First, the entrant and the retailers could try to exclude the incumbent in much the same way the incumbent excludes the entrant in the baseline model.

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Second, we might imagine that the incumbent accommodates entry and the manufacturers collude post-entry. Lastly, the retailers may collude. We consider each of these three cases in the following subsections, and show that, in each case, exclusion of the entrant by the incumbent, via RPM, may still occur.

Analysis of these cases require a little more structure than the reduced-form analysis in the main paper and, in particular, we assume quasi-concavity and differentiability of the profit functions for the retailers, incumbent, and entrant.

1.1 Post–entry exclusion of the incumbent

In this section we consider the ability of an entrant to induce exclusion of the incumbent, should entry occur. To do this we have to both relax the state-space/MPNE assumption and also relax the assumption in the baseline model that, once entry occurs, both firms can always get retail access (that is, retailer accommodation also carries with it some form of long-term agreement to stock the product).[1]

The analysis proceeds in a series of steps. First, we derive the equilibrium play when both the entrant and the incumbent are active in the market (analogous to play in the state C). Then we examine how this post-entry play impacts the ability of the incumbent to exclude an entrant.

We consider play post-entry in which the entrant offers a contract T_e to each retailer, if all retailers excluded the incumbent in the previous period (or if entry by the entrant occurred). If a retailer does not exclude the incumbent in the previous period, the game reverts to the equilibrium described in Lemma 1 in the paper (in which the retailers get zero rents).

For such a contract to induce exclusion of the incumbent, it must be the case that no individual retailer wishes to deviate. The benefit to deviating is that a retailer can expect to get a share of the profits earned by the incumbent. Since the incumbent gets zero profit if it is excluded, the incumbent is indifferent between being excluded and giving a deviating retailer all the future profits. The gain to a retailer from not deviating is the net present value of the profits afforded to them by complying with the entrant's 'exclusionary'

[1] We assume that the fixed cost of entry need not be incurred again by the incumbent should the incumbent be excluded and then re-enter. This colors the interpretation of the fixed cost slightly, suggesting that any relationship-specific or market-specific capital that may be embodied in this fixed cost element does not depreciate during periods of inactivity. This is mainly for expositional ease. It should be apparent that a small fixed cost could be imposed and the qualitative results derived here would survive.

strategy. This gives the following condition for exclusion of the incumbent by the entrant following entry:[2]

$$\frac{1}{1-\delta}\frac{1}{n}\pi_e^M \geq \pi_i^C \tag{1}$$

The level of transfer required to effect exclusion is thus $T_e = \pi_i^C$.

It should be noted that the entrant may choose not to try to induce exclusion if the profit from doing so is less than the profit from just accommodating the incumbent. That is, it is individually rational for the entrant to induce exclusion, given a set of prices, if:

$$\pi_e^M - nT_e = \pi_e^M - n\pi_i^C \geq \pi_e^C \tag{2}$$

If the above condition does not hold then the ability of the entrant to exclude the incumbent does not change any of the analysis in the baseline model. The cost to the entrant of engaging in exclusionary conduct post entrant is not offset by the gain and so the entrant will not do so. This means that, when this condition does not hold, even if the entrant has the ability to exclude post entry, the incumbent's ability to exclude is unchanged and the conditions in Proposition 1, in the paper, apply.

In what follows we assume that $\pi_e^M - n\pi_i^C \geq \pi_e^C$ and hence that this exclusionary play by the entrant occurs following entry and investigate whether there exists scope for the incumbent to still induce the exclusionary style equilibrium we discuss in the baseline model (if $\pi_e^M - n\pi_i^C < \pi_e^C$ then play proceeds as in the baseline model and exclusion can occur as per that baseline model). Proposition 1 in the paper can be adjusted as follows to account for the different pattern of play post–entry.

Proposition 1 *Suppose that $\pi_e^M - n\pi_i^C \geq \pi_e^C$. Then an exclusionary equilibrium (one in which the entrant does not enter) exists if and only if*

$$\frac{\pi_i^M - \pi_i^C}{n(1-\delta)} \geq \frac{\pi_e^M - n\pi_i^C}{1-\delta} + \frac{\pi_i^C}{1-\delta} - F_e \tag{3}$$

Note that the difference between the proposition above and Proposition 1 in the paper is that the continuation value post-entry is changed to take into account the possibility

[2] In this section, it is convenient to assume that $\pi_i^M > \pi_i^C > 0$, $\pi_e^M > \pi_e^C > 0$, so that products are differentiated to some extent.

of exclusion of the incumbent by the entrant, the entrant's profits associated with doing that and the retailer's profit in case that entrant excludes the incumbent. Specifically, the first part of the right hand side of the inequality captures the entrant's profits net of all transfers exclusion requires to retailers (this, net of fixed costs, can be used as a transfer to an accommodating retailer), and the second part is the retailers profit stream in the exclusionary equilibrium post entry.

In general, as one would anticipate, Condition (3) is a more stringent condition than the analogous condition in Proposition 1 of the paper, where post-entry play is static Nash. This follows since post-entry collusion between retailers and the entrant allows for greater industry profits than can be generated through static Nash play. However, there is still room for the incumbent to exclude the entrant. It is easily verified by example. For instance, let the extent of differentiation, combined with demand elasticities and cost function to be such that $\pi_e^M = 30$, $\pi_i^M = 21$, $\pi_e^c = 20$ and $\pi_i^C = 3$. Let $\delta = 0.95$. Then, when the number of retailers is equal to two, if the fixed cost lies in the range $[360, 400]$ then the entrant can still be excluded.[3]

Lastly, we reiterate that, $\pi_e^M - n\pi_i^C \leq \pi_e^C$ the entrant will not elect to engage in exclusionary practices post entry and exclusion arises following the analysis in the baseline model and Proposition 1 in the paper.

1.2 Manufacturer collusion

We keep the retail sector as in the baseline model (i.e., competitive) and consider collusion among manufacturers post-entry.

Given a discussion of collusion requires a clear articulation of how the cartel works, we consider a specific model in which the goods sold by the manufacturers are homogenous, but in which the manufacturers have differing costs, with the entrant having a lower marginal cost than the incumbent.

One form of manufacturer collusion would involve the entrant simply paying off the incumbent for not producing at all. This is essentially an acquisition. Since we have assumed, so far, that the entrant cannot buy out the incumbent, we consider a different form of collusion. We consider collusion in which the manufacturers cannot make explicit

[3]Note that the upper bound on the fixed cost corresponds to level beyond which the entrant would not even enter in equilibrium contemplated in lemma 3 (i.e. the entrant would not enter in a benign competitive market). For fixed costs above this level the entrant would not enter; however, this would not reflect any exclusionary behavior on the part of the incumbent.

lump-sum payments to each other (that is, no side payments). Given this restriction, and retaining the assumption that the retail sector plays single-stage Bertrand, this means that collusion is brought into effect by splitting the market in some way between the entrant and incumbent (Harrington (1991) investigates the same cartel problem).

Specifically, we assume that the entrant and incumbent collude on the price and the quantity that each provides to the market. Hence, the collusive agreement is over $< q_e, q_i >$ where the total market quantity, q, is equal to $q_i + q_e$, and the market price is $p(q)$. Employing a grim-trigger-strategy equilibrium, a collusive market split following entry must satisfy the following condition for the entrant (with an analogous condition for the incumbent):[4]

$$\begin{aligned}
&\text{Entrant's cooperation condition if } p(q) < p_e^m\text{:}\\
&\quad q_e \left[p(q) - c_e\right] \geq (1-\delta)\, q \left[p(q) - c_e\right] + \delta \left(c_i - c_e\right) q\left(c_i\right) \qquad (4)\\
&\text{Entrant's cooperation condition if } p(q) \geq p_e^m\text{:}\\
&\quad q_e \left[p(q) - c_e\right] \geq (1-\delta)\, q\left(p_e^m\right) \left[p_e^m + c_e\right] + \delta \left(c_i - c_e\right) q\left(c_i\right) \qquad (5)
\end{aligned}$$

The entrant's cooperation condition says that, if cooperation occurred in previous rounds, the entrant will continue to cooperate (in which case, the return in each period is their quantity allocation multiplied by the margin they earn) as long as the continuation value from deviating is less than the return from cooperating. The continuation value under a deviation is the one-period opportunity to just undercut the cartel price and meet total market demand at that price, followed by profits in the stage game (as per Lemma 1 of the paper) thereafter.

Faced with these conditions, there is a range of $< q_e, q_i >$ combinations that the manufacturer cartel can support. Lemma 1 below states an upper bound on the profit the incumbent can earn in the incumbent-optimal cartel.

Lemma 1 *An upper bound on what an incumbent can earn per period from colluding with an entrant is:*

$$\pi^{Collude} = \delta q\left(p_e^m\right)\left(p_i^m - c_i\right) - \delta\left(c_i - c_e\right) q\left(c_i\right) \frac{\left(p_i^m - c_i\right)}{\left(p_e^m - c_e\right)}$$

This bound is tight when $c_i = c_e$.

[4] Here, consistent with our approach in the paper, we restrict attention to strategies that are not weakly-dominated; that is, we suppose that the incumbent does not set a price below c_i. For an interesting analysis of collusion with asymmetric firms that does not impose such a constraint, see Miklos-Thal (2010).

Proof. The maximum profit an incumbent could obtain from the incumbent-optimal collusive scheme is given by the solution to

$$\max_{q,q_i} \left(p\left(q\right)-c_i\right) q_i, \tag{6}$$

subject to the cooperation constraints of the incumbent and the entrant. We proceed by relaxing the constraint set and considering only the entrant's cooperation constraint.

First we show that the incumbent-optimal cartel allocation occurs when q lies below $q\left(p_e^m\right)$.

Toward a contradiction, we assume that incumbent-optimal cartel allocation occurs when $p(q) < p_e^m$. The cooperation constraint of the entrant when $p(q) < p_e^m$ implies

$$q_i \leq \delta q - \frac{\delta\left(c_i - c_e\right) q\left(c_i\right)}{p\left(q\right)-c_e}. \tag{7}$$

Allowing the relaxed version of the above maximization problem to be written as (once it is observed that the cooperation constraint of the entrant must bind in the incumbent-optimal agreement)

$$\max_q \quad \frac{p\left(q\right)-c_i}{p\left(q\right)-c_e}\left(\delta q\left(p\left(q\right)-c_e\right)-\delta\left(c_i-c_e\right)q\left(c_i\right)\right), \tag{8}$$

which can be further rewritten as

$$\max_q \quad \overline{\pi}\left(q\right) \quad \equiv \quad \max_q \quad \frac{\pi_i\left(q\right)}{\pi_e\left(q\right)}\left(\pi_e\left(q\right)-\pi_e^c\right)\left(1-\delta\right), \tag{9}$$

where π_e^c is the competitive profit of the entrant (that is, $\left(c_i-c_e\right)q\left(c_i\right)$).

Taking the derivative with respect to q yields

$$\begin{aligned} \frac{\partial \overline{\pi}\left(q\right)}{\partial q} &= \frac{\pi_i'\left(q\right)}{\pi_e\left(q\right)}\left(\pi_e\left(q\right)-\pi_e^c\right)+\frac{\pi_i\left(q\right)}{\pi_e\left(q\right)}\pi_e'\left(q\right)-\frac{\pi_e'\left(q\right)\pi_i\left(q\right)}{\left(\pi_e\left(q\right)\right)^2}\left(\pi_e\left(q\right)-\pi_e^c\right) && (10)\\ &= \frac{\pi_i'\left(q\right)}{\pi_e\left(q\right)}\left(\pi_e\left(q\right)-\pi_e^c\right)+\frac{\pi_i\left(q\right)\pi_e^c}{\pi_e\left(q\right)^2}\pi_e'\left(q\right) && (11) \end{aligned}$$

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Evaluating this derivative at any point in the interval $[q(p_e^m), q(c_i)]$ yields

$$\left.\frac{\partial \overline{\pi}(q)}{\partial q}\right|_{q\in[q(c_i),q(p_e^m)]} < 0, \tag{12}$$

where we have used the fact that, in this interval, $\pi_i'(q) < 0$ and $\pi_e'(q) \le 0$. Hence, the optimal level of q lies below $q(p_e^m)$, establishing the contradiction.

As a consequence, the correct constraint to work with is

$$q_i \le q - \frac{(1-\delta)\, q(p_e^m)[p_e^m - c_e] + \delta(c_i - c_e)\, q(c_i)}{[p(q) - c_e]}. \tag{13}$$

Following the same procedure as above, the incumbent-optimal q is the solution to

$$\max_q \quad \tilde{\pi}(q) \quad \equiv \quad \max_q \quad \frac{\pi_i(q)}{\pi_e(q)}\left(\pi_e(q) - (1-\delta)\,\pi_e^m - \delta\pi_e^c\right) \tag{14}$$

and,

$$\frac{\partial \tilde{\pi}(q)}{\partial q} = \frac{\pi_i'(q)}{\pi_e(q)}\left(\pi_e(q) - (1-\delta)\,\pi_e^m - \delta\pi_e^c\right) + \frac{\pi_i(q)\left((1-\delta)\,\pi_e^m + \delta\pi_e^c\right)}{\pi_e(q)^2}\pi_e'(q)\,; \tag{15}$$

further,

$$\left.\frac{\partial \tilde{\pi}(q)}{\partial q}\right|_{q=q(p_e^m)} < 0 \quad \text{and} \quad \left.\frac{\partial \tilde{\pi}(q)}{\partial q}\right|_{q\in\left[0,q\left(p_i^m\right)\right]} > 0, \tag{16}$$

noting that (13) implies $q_i = 0$ if $\pi_e(q) \le (1-\delta)\,\pi_e^m + \delta\pi_e^c$.

Hence, the optimal level of q lies in the interval $[q(p_i^m), q(p_e^m)]$. This leads to the conjecture that the incumbent's profit is bounded by the profits that accrue from setting $p = p_i^m$ and q_i equal to that implied by (13) when the inequality binds and $q = q(p_e^m)$. To convert this conjecture to a proposition, it must be established that q_i is greatest when $q = q(p_e^m)$, as compared to any other point in the interval $[q(p_i^m), q(p_e^m)]$.

Setting (13) to bind and taking the derivative of q_i with respect to q yields

$$\frac{\partial q_i}{\partial q} = 1 + \frac{(1-\delta)\, q(p_e^m)[p_e^m - c_i] + \delta(c_i - c_e)\, q(c_i)}{[p(q) - c_e]^2}\frac{\partial p(q)}{\partial q}. \tag{17}$$

From the first-order condition of the entrant's monopoly pricing problem, it must be the case that in the interval $[q(p_i^m), q(p_e^m)]$,

$$\frac{\partial p}{\partial q} \geq -\frac{(p(q) - c_e)}{q}, \tag{18}$$

with equality when $q = q(p_e^m)$. Hence, substituting this in yields

$$\frac{\partial q_i}{\partial q} \geq 1 - \frac{(1-\delta) q(p_e^m)[p_e^m - c_i] + \delta(c_i - c_e) q(c_i)}{[p(q) - c_e] q}. \tag{19}$$

Provided that the numerator is less than the denominator, $\frac{\partial q_i}{\partial q} > 0$, which is sufficient for $q = q(p_e^m)$ to be the largest q_i in the relevant range. Note that if the numerator is greater than the denominator, then, from (13), $q_i = 0$.

It follows that q_i is greatest when $q = q(p_e^m)$, as compared to any other point in the interval $[q(p_i^m), q(p_e^m)]$. This is sufficient to establish that the incumbent's profit is bounded from above by the profits that accrue from setting $p = p_i^m$ and q_i equal to that implied by (13) when the inequality binds and $q = q(p_e^m)$. This upper bound on profit is given by $\pi^{Collude} = \delta q(p_e^m)(p_i^m - c_i) - \delta(c_i - c_e) q(c_i) \frac{(p_i^m - c_i)}{(p_e^m - c_e)}$. ■

This upper bound is constructed by observing that the incumbent-optimal collusive agreement involves setting a price between p_e^m and p_i^m, with the incumbent's quantity set by making the entrant's cooperation condition bind. The bound is reached by setting the collusive price equal to p_i^m, but with the the quantity supplied by the industry as a whole consistent with a price of p_e^m (and noting that the incumbent's quantity is decreasing in the price in this range).

Following the logic of Proposition 1, in the paper, it follows that the optimal profit that an incumbent can enjoy in excluding an entrant is

$$\pi^{Exclude} = \pi_i^m - n\underline{T}_i = (p_i^m - c_i) q(p_i^m) - n[(1-\delta)(p_e^m - c_e) q(p_e^m) + \delta(c_i - c_e) q(c_i)] + (1-\delta) nF_e,$$

where $\underline{T}_i$ is the lowest transfer that would allow for exclusion.

On the assumption that the incumbent can get its optimal surplus under either scheme, we can understand when the incumbent might prefer to exclude, rather than accommodate and collude, by comparing $\pi^{Exclude}$ and $\pi^{Collude}$.[5]

[5] One reason to prefer one over the other is the relative ease of coordinating exclusion and collusion. In this subsection we ignore this consideration.

Examination of these conditions suggests that exclusion is attractive when the entrant has a low marginal cost, but high fixed cost. To see this, consider two polar cases, first the case where $c_e = c_i$. In this instance, the (best-case) return from collusion is $\delta\left(p_i^m - c_i\right) q\left(p_i^m\right)$, while the (best-case) return from exclusion is $(n\delta - 1)\left(p_i^m - c_i\right) q\left(p_i^m\right)$, which is always strictly less than the return from collusion, except when $\delta = 1$ and $n = 2$.[6] Next, consider the case where c_e is so low that $p_e^m = c_i$, but the fixed cost is so high as to make entry marginal in a competitive environment (that is, $F_e = \frac{1}{1-\delta}\left(c_i - c_e\right) q\left(c_i\right)$). In this instance, the incumbent's collusive return is equal to zero, while the exclusionary return is equal to the incumbent's monopoly profit.

The underlying force at work is that the entrant can not credibly commit to give the incumbent a high collusive rent. Indeed, once entry has occurred and the fixed cost is sunk, a low-cost entrant requires a high proportion of market quantity to be induced to cooperate in a collusive agreement since the difference between the collusive payout and the competitive payout is comparatively small. Any commitment to give the incumbent a large share of any subsequent agreement would not be credible in the face of the temptation to deviate. However, prior to the fixed cost being sunk, it can be cheap for the incumbent to exclude the entrant since the fixed cost offsets much of the rent that the entrant might expect to earn post entry (and this reduces how much the entrant can afford to compensate retailers for accommodating).

Lastly, note that this argument was developed for the case where the incumbent faces a single potential entrant. If the incumbent were to face many entrants, then exclusion would continue to be equally effective, while accommodation and subsequent collusion would become a markedly less attractive option. Thus, relative to manufacturer collusion, exclusion becomes more likely as potential entrants become more numerous.

[6] Recall that fixed costs are assumed to be low enough to allow entry when the market is competitive, when $c_i = c_e$ that implies $F_e = 0$.

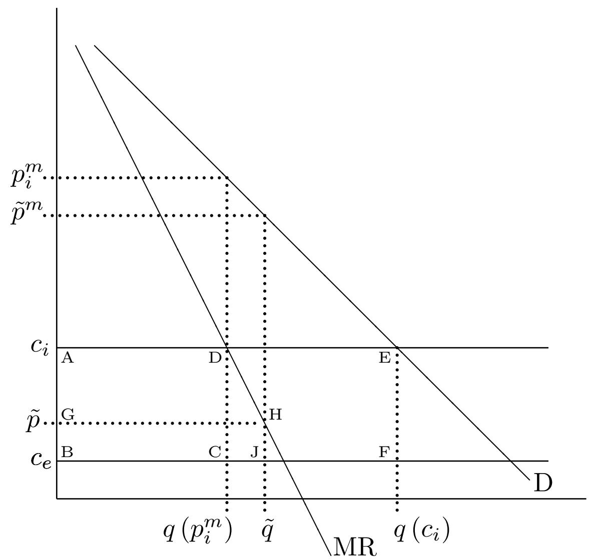

Figure A1: Pricing by a retailer cartel and the entrant's wholesale price response.

1.3 Retailer collusion

We now turn to the possibility of the retailers forming a cartel in the product market, while the manufacturers set the wholesale price competitively.[7] The retail cartel we have in mind is supported by standard grim-trigger strategies in a repeated game. Figure A1 depicts the market following entry, when the retailers collude in the product market. The retailers act like a monopolist, taking the wholesale price as given. Since the entrant has the lower marginal cost, the outcome of competition (as in Lemma 1 of the paper) is that the entrant serves the wholesale market. However, the monopoly distortion coming from the retailers means that some quantity less than $q\left(c_i\right)$ gets demanded. That is, we observe standard double marginalization. The amount transacted will either be $q\left(p_i^m\right)$, if the entrant charges

[7] Another scenario might be that the retailers also use a repeated game mechanism to extract more-favorable terms from the manufacturers, wherein the threat to manufacturers might be to not stock the product. This could occur in combination with product-market collusion. Examining this case, which seems interesting and important, involves a substantial modeling exercise beyond the scope of this paper. We are unaware of any papers that consider a retail sector colluding to extract rents from upstream manufacturers and consumers simultaneously.

a wholesale price of c_i, or some quantity $\tilde{q}$, if it is profitable to drop the wholesale price to induce the retail cartel to sell more quantity.

Regardless of the actual wholesale price the entrant sets, the entrant's profit is less than that described in Lemma 1 in the paper when everyone competes. That is, if everyone competes, the entrant's post-entry, per-period, profit is represented by rectangle ABFE. However, if the entrant charges a wholesale price of c_i, profits are ABCD, and if the entrant charges a wholesale price of $\tilde{p} < c_i$, then profits are GBJH.

Hence, if the fixed costs of entry are sufficiently high, such that $(1-\delta)F_e$ is greater than the post-entry, per-period profit when the retail cartel operates, then the entrant will not enter. This, of course, is good news for the incumbent. Indeed, the presence of the retail cartel can ensure that the incumbent need not expend resources on exclusion, whether via loyalty payments, RPM or otherwise. Instead, the only problem the incumbent faces is how to mitigate the damage caused by the double-margin distortion imposed on its profits by the retailer cartel. If maximum RPM is available, then this is an easy contractual solution (set $w_i = p_i = p_i^m$). In the absence of maximum RPM, the incumbent still enjoys profits, and possibly more than if it had to use RPM (or some other restraint) as an exclusionary device.

An important point is that the cartel suffers from not having the entrant in the market, since, with the entrant active, the wholesale price must decrease. This raises the question of why the retail cartel does not accommodate entry. The problem is that retailers are unable to commit to not colluding post-entry, and, hence, even if they are keen to accommodate the entrant, the entrant will stay away. Faced with this commitment problem, the retailers might be able to subsidize entry using a lump-sum transfer or increase their ability to commit to not colluding by using antitrust regulators and inviting regulatory scrutiny via, say, whistle-blowing behavior. Of course, either of these measures involves costs on the part of the retailers and, depending on the parameters, may not be worthwhile.

Hence, collusion by the retailers in the product market creates a series of problems that can work to the incumbent's advantage. Indeed, in the case illustrated here, it can remove the need for minimum RPM as an exclusionary device altogether. Instead, maximum RPM becomes useful for the incumbent to mitigate the distortion caused by the cartel, resulting in highly profitable exclusion.[8]

[8] When two manufacturers are present, reasoning analogous to that used in Lemma 1 of the paper implies that maximum RPM ceases to be useful.

2 Historical accounts of exclusion: Focusing on RPM

In the paper we refer to a literature that discusses the history of RPM being used to effect exclusion. Below, we provide a brief survey of this old, but rich, literature.

The idea that RPM may have exclusionary effects has a long history in the economics literature. As early as 1939, Ralph Cassady, Jr. remarked on the potential for distributors to favor those products on which they were getting significant margins via RPM, noting that since "manufacturers are now in a real sense their allies, the distributors are willing (nay, anxious!) to place their sales promotional effort behind these products, many times to the absolute exclusion of non-nationally advertised competing products"(Cassady (1939, p. 460)). Cassady's remarks are interesting in that they suggest a complementarity between some of the exclusionary and pro-efficiency reasons for RPM, as we discuss in Section 5.

Following Cassady's early remarks, the potential for RPM to be viewed as an exclusionary device did not surface again until the 1950s with the work of Ward Bowman in (1955) and Basil Yamey in (1954). Yamey describes a "reciprocating" role of price maintenance whereby, "(t)he bulk of the distributive trade is likely to be satisfied, and may try to avoid any course of action, such as supporting new competitors, which may disturb the main support of their security"(1954 p. 22). Yamey (1966) also raises the possibility of exclusion, suggesting that "Resale Price Maintenance can serve the purposes of a group of manufacturers acting together in restraint of competition by being part of a bargain with associations of established dealers to induce the latter not to handle the competing products of excluded manufacturers"(p. 10). The quote is particularly interesting in its suggestion of some complementarity between the possibility that RPM facilitates collusion, and the exclusionary effect. Gammelgaard (1958), Zerbe (1969), and Eichner (1969) make similar suggestions regarding the possibility of exclusion . More recently, following the *Leegin* decision, Elzinga and Mills (2008) and Brennan (2008) have discussed the exclusionary aspect of RPM that is mentioned in the majority judgement.[9]

Bowman (1955) describes several examples of RPM's use for exclusionary purposes involving wallpaper, enameled iron ware, whiskey, and watch cases. Many of these examples are drawn from early antitrust cases and involve a cartel, rather than a monopolist firm, as the upstream manufacturer instigating exclusion. Bowman also gives a few examples of implicit upstream collusion rather than explicit cartelization and the use of RPM for exclusion; specifically, he highlights the cases of fashion patterns and spark plugs. Given

[9]None of the papers mentioned here develop a formal model.

that a cartel will wish to mimic the monopolist as much as possible, these examples are consistent with the setting considered in this model. They also underline the complementarities between the view that RPM facilitates collusion, and the exclusionary perspective articulated here.

These cases often involve contracts that include more-explicit exclusionary terms in conjunction with the use of RPM. For example, in 1892, the Distilling and Cattle Feeding Company, an Illinois corporation, controlled (through purchase or lease) 75-100 percent of the distilled spirits manufactured and sold in the U.S.[10] It sold its products (through distributing agents) to dealers who were promised a five-cents-per-gallon rebate provided that the dealers sold at no lower than prescribed list prices and purchased all their distillery products from their (exclusive) distributing agents. This example is also interesting in demonstrating the blurred line between practices best characterized as RPM and loyalty rebates, and suggests the usefulness of a conceptual framework able to accommodate a variety of related practices.

Another well-documented example is that of the American Sugar Refining Company, discussed at some length by Zerbe (1969) (see, also, Marvel and McCafferty (1985), and Genesove and Mullin (2006)). The American Sugar Refining Company was a trust formed in 1887 that combined sugar-refining operations totaling, at the time of combination, approximately 80 percent of the industry's refining capacity. The principal purpose of the trust was to control the price and output of refined sugar in the U.S..[11] After a wave of entry and consolidation, by 1892, the trust controlled 95 percent of U.S. refining capacity. In 1895, the wholesale grocers who bought the trust's refined sugar proposed an RPM agreement. Zerbe reports that the proposal came in the form of "a threat and a bribe": The bribe was that, in return for the margins created by the RPM agreement, the grocers would not provide retail services to any refiner outside the trust. The threat was in the form of a boycott if the trust refused to enter into the RPM agreement. The exclusionary effect of the RPM agreement was only partial at best: In 1898, Arbuckle, a coffee manufacturer, successfully entered the sugar-refining business. In some regions, Arbuckle was unable to get access to wholesale grocers and had to deal directly with retailers. Thus, while not prohibiting entry, the RPM agreement may have significantly raised the entry costs of this new competitor by forcing it to integrate a wholesale function. Ironically,

[10] As recorded in *U.S. v. Greenhut et al.* 50 Fed., 469, and *U.S. v. Greenhut et al.* 51 Fed., 205.

[11] See Zerbe (1969, p. 349), reporting testimony given to the House Ways and Means Committee by Havermeyer, one of the trustees.

after several years of cutthroat competition, Arbuckle and the trust entered into a cartel agreement that persisted in one form or another until the beginning of the First World War.

The sugar trust is informative in that it involves RPM's use in a setting in which the product is essentially homogeneous (see Marvel and McCafferty (1985) for a chemical analysis supporting this claim) and the manufacturer has close to complete control of existing output. The lack of product differentiation makes theories of RPM enhancing service or other non-price aspects of inter-brand competition difficult to reconcile with the facts. Clearly, there was no reason to use RPM to facilitate collusion on the part of refiners, since the trust already had achieved that end. The grocers may well have wanted to facilitate collusion at their end, but the openness with which they negotiated with the trust suggests that it was more in the spirit of good-natured extortion: a margin in exchange for blocking entry.

The sugar example fits the setting considered in our model, in which an incumbent monopolist faces entry by a lower-cost entrant. All products are homogeneous, and there is no differentiation between retailers. This gives the model the flavor of cutthroat competition familiar from standard Bertrand price competition models. In particular, there is no scope for service on the part of retailers, and the manufacturer easily solves the classical double-marginalization problems by simply using more than one retailer. If the entrant enters, then retailers and the incumbent see profits decrease (to zero), and the entrant captures market demand at a price equal to the incumbent's marginal cost. To deter this entry, the incumbent offers an RPM agreement which, over time, more than compensates the retailers for any one-off access payment that the entrant may be able to afford. At its heart, the RPM agreement is successful in that it forces individual retailers to internalize the impact of competition on the profitability of the incumbent's product and on the margins of all retailers. A feature of the model, which sits well with the sugar example, is that both the incumbent and the retailers benefit from the RPM-induced exclusion. In this sense, the fact that the grocers suggested the RPM agreement in the sugar example—in contrast to the distilled spirits example in which the upstream firm initiated the agreement—is entirely consistent with the exclusionary effect explored here.

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