Exclusionary Minimum Resale Price Maintenance*

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Abstract

An upstream manufacturer can use minimum resale price maintenance (RPM) to exclude potential competitors. RPM lets the incumbent manufacturer transfer profits to retailers. If entry is accommodated by retailers, upstream competition leads to fierce downstream competition and the breakdown of RPM. Thus, via RPM, retailers internalize the effect of accommodating entry on the incumbent’s profits. Retailers may prefer not to accommodate entry; and, if entry requires downstream accommodation, entry can be deterred. We discuss empirical and policy implications, as well as the exclusionary potential of other methods of sharing profits between upstream and downstream firms.

JEL Codes: K21, L42, L12, D42

1 Introduction

A manufacturer engages in resale price maintenance (RPM) when it sets the price at which its distributors must sell its product to consumers. Minimum RPM involves the manufacturer setting a price floor for its distributors, whereas maximum RPM involves the manufacturer setting a price ceiling. In the US, for almost one hundred years, following

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the Supreme Court’s 1911 decision in Dr. Miles, minimum RPM was a per se violation of Section 1 of the Sherman Act, though statutory exemptions have existed at times (see Overstreet (1983) for a useful history and for data on the use of RPM under these exemptions). The most cited concern about minimum RPM—a concern that persists to this day—is that it constitutes a practice that facilitates retailer and manufacturer collusion, by coordinating pricing and making monitoring easier (see Yamey (1954) and Telser (1960) for early examples, and Shaffer (1991), Jullien and Rey (2007), and Rey and Vergé (2009) for formal treatments).

Largely in response to the per se status of RPM, a number of papers were written in the latter part of the last century to explore pro-competitive justifications for RPM (prominent examples include Telser (1960), Marvel and McCafferty (1984), Klein and Murphy (1988), Deneckere, Marvel, and Peck (1996, 1997), and Marvel (1994)). These papers suggest that RPM can be in the interest of both manufacturers and consumers.

In 2007, the Supreme Court finally overturned the per se rule against minimum RPM in the U.S. in the Leegin case, which decided that cases involving minimum RPM should be decided on a “rule of reason” basis. That is, courts are now required to balance the potential efficiency benefits of RPM against the potential anti-competitive harm. In reaching this decision, the court relied heavily on the pro-competitive theories of RPM that had been developed in the economics literature. In the wake of the Leegin decision, economists advising antitrust enforcers are now forced to provide explicit theories for competitive harm that arise from RPM and must be able to quantify the extent of this harm.

This paper develops a model of competitive harm that arises from the exclusion of a more efficient entrant by an incumbent manufacturer. In our framework, minimum RPM is necessary for this to occur. Our framework, therefore, builds a foundation for pursuing the third basis of antitrust harm raised in the Leegin decision (see Leegin at p.894)—the potential for RPM to be used to provide margins to distributors that will likely disappear.

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1 *Dr. Miles Medical Co. v. John D. Park and Sons*, 220 U.S. 373 (1911)
2 A per se violation means that the party bringing the case is not required to establish in evidence that harm to competition occurred. Instead, it is presumed by the mere existence of the conduct. Horizontal price-fixing agreements are another example of a per se violation. Posner (2001, p.176ff) describes the evolution of the Court’s treatment of the per se rule for RPM.
3 The extent to which RPM impacts consumer welfare varies over time and jurisdiction, often due to changes in laws. Gammelgaard (1958) reports that in the United Kingdom over 30% of consumer goods expenditure was affected by RPM between 1938 and 1950, and in Sweden in 1948 the same number was between 25 and 28%. These numbers cover periods in which RPM was legal in these jurisdictions.
4 *Leegin Creative Leather Products, Inc. v. PSKS, Inc.*, 551 U.S. 877 (2007), all page references are to the judgement as it appears in this reporter.
if entry occurs, resulting in exclusion.\textsuperscript{5} In the model, minimum RPM serves no purpose other than to provide distributors with incentives to exclude a potential entrant; that is, with no possibility of entry, there would be no reason to employ RPM.

The primary contribution of this paper is its rigorous framework for exploring the idea of RPM as an exclusionary device. It also gives some preliminary guidance about screens for, and empirical measures of, exclusion, which can be constructed from data using econometric methods that are standard in empirical industrial organization.\textsuperscript{6} The central idea of the paper is sketched out in the following informal treatment, which is then formally established and extended in the body of the paper.

\textit{A simple version of the model}

Consider a market with one incumbent manufacturer and a potential entrant interacting over many periods. The incumbent and entrant produce exactly the same product and have exactly the same marginal cost. There is no cost of entry; however, at least one of the \( n \) retailers has to agree to stock the entrant’s good for the entrant to gain access to consumers. The retailers are perfect substitutes and bear no cost other than the wholesale price. In each period, the incumbent manufacturer commits to a wholesale price and, if desired, a retail price (by using RPM). Then the entrant offers a lump-sum payment to a retailer for access, and if this offer is accepted, the entrant enters the market and sets prices. Following successful entry, both the incumbent and entrant remain active in the market in all future periods.

Figure 1 shows the key elements of the exclusionary equilibrium when there are two retailers (\( n = 2 \)). In Panel 1, the incumbent manufacturer, in the absence of the entrant, uses minimum RPM to set a retail price, \( p_i \), equal to the monopoly price, \( p_m \), for the good. Each retailer has no incentive to price higher than \( p_m \), since a competing retailer can then always undercut and capture all the market demand. The wholesale price is set (in this example) equal to marginal cost. Thus the profit each of the two retailers gets is equal to half of industry (monopoly) profits, \( \pi/2 \), represented by the shaded area.

Panel 2, in Figure 1, shows what happens if the entrant is accommodated by a retailer

\textsuperscript{5}The first two bases for harm are RPM as a practice facilitating upstream collusion and as a practice facilitating downstream collusion.

\textsuperscript{6}Empirical work on RPM is limited. All recent studies attempt to test theories of RPM different from ours. Ippolito and Overstreet (1996) and Ornstein and Hassens (1987) conduct industry case studies, Ippolito (1991) studies RPM litigation, while Gilligan (1986) and Hersch (1994) conduct stockmarket event studies. Earlier empirical work is extensively surveyed in Overstreet (1983). In this literature the evidence in support of collusive theories is mixed.
and enters. The entrant sets a retail price, via RPM, that is just below the incumbent’s retail price, and captures the entire market demand (since the goods are perfect substitutes). Thus, the profits made by the entrant in the period of entry are equal to the shaded area in panel 2 (that is, profits are equal to $\pi$).

![Figure 1](image)

**Panel 1:** The shaded area is the transfer from the incumbent, via RPM, to a retailer, when no entry occurs. The minimum RPM price is $p_i$ and the wholesale price is equal to marginal cost. The two retailers each get half the market demand.

**Panel 2:** The shaded area is the surplus captured by the entrant by just under cutting the incumbent in the period of entry, which can then be given to the accommodating retailer.

**Panel 3:** In periods following entry, prices get competed down to marginal cost and there is no further surplus available to any manufacturer or retailer.

**Figure 1:** Retailer profits with, and without, entry (assuming 2 retailers).

Panel 3, in Figure 1, shows what happens in all periods following entry. Since the entire market demand can be captured by any firm that just undercuts a competitor, prices get driven down to marginal cost (i.e. homogenous good Bertrand competition). No economic profits are made by any firm.

This means that the most that an entrant can pay an accommodating retailer is one period’s worth of $\pi$. Given this, for the exclusionary equilibrium illustrated in this paper to exist (that is, for a retailer to have no incentive to deviate from an equilibrium in which the entrant is not accommodated) we would need, for each retailer, the net present value of the profits they earn under the incumbent’s RPM contract to be equal to, or to exceed, the one-shot payoff that an entrant could offer. In terms of Figure 1, we need the net present value of earning the shaded area in Panel 1 every period, to be at least as much as earning
the value of the shaded area in Panel 2 in a single period. Expressing this algebraically, we need
\[
\frac{1}{(1 - \delta)} \pi n \geq \pi,
\]
which is satisfied when \( n (1 - \delta) \leq 1 \), (where \( \delta \) is the relevant discount factor). So when \( \delta = 0.95 \), exclusion is feasible in settings with up to twenty retailers.

When the condition holds, but the inequality is strict, the incumbent can set a wholesale price at some level above their marginal cost (thereby somewhat reducing the profits RPM transfers to the retailers), make economic profits, and still exclude the entrant. Thus, exclusion using RPM can be strictly profitable for the incumbent manufacturer.

Further remarks

At the heart of this paper is a familiar intuition: RPM limits downstream competition and, so, can allow downstream retailers to earn relatively high profits. Indeed, it is precisely these profits (and the threat of losing them) that have been used to provide a pro-competitive theory of RPM: Klein and Murphy (1988) argue that manufacturers can use these profits to entice retailers to provide the desired level of service. However, here, we highlight a more harmful implication of such profits.\(^7\) If an entrant cannot establish itself without some retailer support, then retailers may be hesitant to accommodate an entrant since following manufacturer entry, retail competition will be more intense.\(^8\) Even if the entrant manufacturer can offer RPM, retailers will shop among the manufacturers for better terms that allow them to compete more intensely with other retailers.\(^9\) Seeking to prevent the industry from evolving in this direction—which would reduce the profitability of the whole industry (and, in particular, their own profitability)—retailers will not accommodate entry.

The incumbent manufacturer, by an appropriate choice of RPM, can ensure that the industry as a whole earns the profits that a monopolized industry would earn, and, through an appropriate choice of the wholesale price, divide these profits between itself and the retail sector. As illustrated above, to exclude entry, the incumbent must ensure that

\(^7\) Shaffer (1991) also does this, in the context of RPM (and slotting fees) facilitating collusive outcomes among retailers.

\(^8\) Comanor and Rey (2001) make a related point in the context of exclusive dealing.

\(^9\) A more efficient entrant cannot simply replicate the incumbent manufacturer, since he faces a competitor. Even though all retailers might prefer an RPM agreement with the entrant, there is no way that they could commit to stick to such an agreement, absent collusion.
every retailer earns more than a competing manufacturer entrant could offer the retailer to stock its product; however, this may still allow the incumbent positive profits. Therefore, according to this theory, both the retail sector and the incumbent manufacturer can gain from RPM.\textsuperscript{10} This is in contrast to much of the policy discussion that suggests that there is less reason for antitrust concern when a manufacturer instigates RPM.

The paper continues by reviewing an older literature on RPM and exclusion, in Section 2, which includes discussion of some empirical examples of the phenomena we model. In Section 3, we carefully describe the model. Section 4, formalizes the intuitions presented above and establishes them in a more general framework. Section 4, in providing a formal characterization, also highlights how the possibility of exclusion and its harm might be assessed empirically. Section 5.1 contrasts the incumbent’s use of RPM with other means of transferring profits to retailers for the purpose of exclusion. In Sections 5.2 and 5.3, we discuss extensions of the model to differentiated products markets and alternatives forms of post entry market conduct. Section 5.4 relates our model to the related literature on exclusive dealing. In Section 6, we draw out policy implications of the analysis, including some implications for screens indicating the potential for exclusion. We then conclude.

2 RPM and exclusion

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.\textsuperscript{11}

\textsuperscript{10}In line with this observation, Overstreet (1983, p.145ff) describes lobbying by both manufacturers and retailers for the ‘Fair-Trade’ statutes that created exemptions from liability for RPM. These statutes lasted from the 1930s through to the mid-1970s, depending on the state(s) involved.

\textsuperscript{11}Indeed, as discussed above, Klein and Murphy (1988) highlight that a manufacturer’s threat to withhold super-normal profits can be efficiency-enhancing by helping to ensure appropriate service at the retailer level. Instead, our paper argues that the possibility of losing these super-normal profits as a result of a changing market structure can lead to exclusion of an efficient manufacturer. To the extent that efficiency-enhancing rationales are more effectively implemented when more surplus is available, our framework would also suggest a complementarity between the “pro-efficiency” rationales and exclusion.
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.¹²

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 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. 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.¹³

¹²None of the papers mentioned here develop a formal model.
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)). 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 principle purpose of the trust was to control the price and output of refined sugar in the U.S.. 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, 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.

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14See Zerbe (1969, p. 349), reporting testimony given to the House Ways and Means Committee by Havermeyer, one of the trustees.
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.

3 The baseline model

There are two manufacturers who produce identical goods. Total market demand in each period in this market is given by $q(p)$. There are infinitely many periods of competition. All firms discount future profits with discount factor $\delta$.\footnote{Realistic values for $\delta$ and indeed on the per-period demand $q(p)$ depend, as in all repeated games, on the interpretation of a “period,” which should be thought of as the length of time it takes for firms in a market to react to a change in circumstances.}

One manufacturer is already active in the market (the incumbent) and another is a potential entrant (the entrant). The incumbent’s constant marginal cost of manufacturing is given by $c_i$ and the entrant’s by $c_e$, where $c_i \geq c_e \geq 0$. We assume that $c_i < p_m^e$, where $p_m^e$ is the price that would be charged by a monopoly with cost $c_e$. In order to enter the market, the entrant has to sink a fixed cost of entry $F_e \in [0, \frac{(c_i-c_e)q(c_i)}{1-\delta}]$. The upper bound on this fixed cost will ensure that an entrant, faced with a market with competition (no exclusionary RPM) will want to enter this market. In practice, this fixed cost may be difficult for an antitrust authority to evaluate and turns out to play a somewhat limited role in our baseline analysis; consequently, in the analysis, we often focus on the limiting case where $F_e = 0$. It is important, however, that the entrant is considered to be present in the market only if a retailer accommodates entry—i.e., an entrant is not perceived to
have entered until its products are available to final consumers.\textsuperscript{16}

There are \( n \geq 2 \) retailers in this market. Retailers are perfect substitutes for each other, and their only marginal costs are the wholesale prices that they pay to the manufacturers.\textsuperscript{17}

Contracting between manufacturers and retailers occurs on two fronts: first, when the entrant seeks to obtain a retail presence; and, second, when a manufacturer sells its product to a retailer (that is, when exchange occurs). Each setting is dealt with in more detail in the next two paragraphs.

As described above, for the entrant to gain a retail presence at least one retailer must agree to stock the product. This means that the retailer must be better off stocking the product than not. To this end, the entrant can offer any form of payment (lump sum or otherwise) to induce a retailer to carry its product.\textsuperscript{18} Once a retailer has agreed to stock a product, it is always stocked. If the entrant’s product is stocked by a retailer, the entrant joins the incumbent in the set of (perpetually) active firms.\textsuperscript{19}

Conditional on being present in the market, a manufacturer sells to retailers via a per-unit wholesale price, \( w_i \) or \( w_e \), depending on whether the price is set by the incumbent or the entrant. Manufacturers are not permitted to price discriminate across retailers or over the quantity sold.\textsuperscript{20} Each manufacturer also has the option of setting a per-unit retail price (either \( p_i \) or \( p_e \)).\textsuperscript{21,22} We say that a manufacturer imposes RPM if this price is different

\textsuperscript{16}We assume that vertical integration is prohibitively costly. We also assume that a merger or acquisition of the incumbent by the entrant is not feasible.

\textsuperscript{17}If there is only a single retailer, so that in effect, the industry is always monopolized, or, similarly, if retailers do not compete but operate as local monopolists or as final consumers, efficient entry can never be deterred as in the standard Chicago-school argument.

\textsuperscript{18}The contract space is left unrestricted here, as no further structure is required. If the entrant were limited to only offering transfers indirectly (for example, through a relatively low wholesale price), this would only make it more difficult for the entrant to transfer surplus and compensate the retailer for accommodating its entry. Thus, in making this assumption, we analyze the extreme case that makes it as difficult as possible for the incumbent to foreclose entry.

\textsuperscript{19}That is, a firm has to sink the fixed cost of entry only once.

\textsuperscript{20}In the model, there is no incentive to discriminate across retailers, so this assumption is not restrictive. The restriction on discrimination on the basis of quantity sold may be more restrictive. For instance, Marx and Shaffer (2004) and Chen and Shaffer (2009) suggest that minimum share agreements may have an exclusionary effect.

\textsuperscript{21}None of our arguments in the baseline model require the incumbent setting a maximum retail price limit. Minimum retail prices by the incumbent are necessary for exclusion in our framework and in formulating necessary and sufficient conditions for exclusion to be possible.

\textsuperscript{22}In this setting, the retailers will always be weakly better off accepting the RPM agreements that the manufacturers want to formulate; hence the retailer’s acceptance of the RPM agreement is assumed. While a more complicated bargaining structure between the retailer and incumbent could be considered, for expositional ease, we have implicitly employed a structure where the incumbent makes a take-it-or-leave-it offer to all retailers simultaneously.
from the one that any retailer would choose. The rationale for this definition is that if an unfettered retailer would, independently, charge the price that a manufacturer preferred, with no need for any (potentially costly) monitoring or enforcement, then RPM plays no role. Although this paper is focused on minimum RPM, this formulation of an RPM contract involves a manufacturer directly setting a retail price. We do this for expositional ease. As we will further detail, to implement the exclusion the model illustrates, the incumbent only needs to use minimum RPM.

3.1 Timing

Figure 2 shows the structure of moves within a period, assuming only two retailers; transitions between periods are indicated by a dotted line and the updating of the period counter, \( t = t + 1 \). There are two possible types of period, corresponding to different states of the manufacturer market, which we label M (incumbent monopolist), and C (competition).

The game begins in state M at \( t = 1 \). In this period the incumbent is active, but the potential entrant has yet to decide whether or not to enter. The order of moves within a period in state M is as follows:

1. the incumbent sets a retail price and a corresponding wholesale price \((p_i, w_i)\) for all retailers (node \(i_M\)); then,

2. the entrant attempts to enter by offering a transfer, \( R \in [0, \infty) \), to a single retailer, payable if entry is accommodated, and also by committing to an associated retail price and a corresponding wholesale price \((p_e, w_e)\) (node \(e_{M1}\)); then,

3. retailers \(r_1\) and \(r_2\) simultaneously choose to accept (accommodate entry) or reject the entrant’s offer (if more than one accepts, then the recipient of \( R \) is chosen at random) (nodes \(r^1_M\) and \(r^2_M\)).

4. if no retailer accommodates the entrant, then transactions occur, period profits are realized, and the period ends, with the state of the manufacturer market in the next period continuing to be M; otherwise,

\[\text{Figure 2 shows two retailers for expositional ease only. All arguments apply to the n-retailer case.}\]

\[\text{The dashed box in Figure 2 represents an information set.}\]
5. if at least one retailer accommodates, then the entrant can choose either to pay the fixed cost, $F_e$, or not (node $e_{M2}$). Following that decision, transactions occur, period profits are realized, and the next period begins. This next period, though, will be a competitive period, in which the state is $C$ if the entrant incurs the fixed cost.

Figure 2: A schematic of the sequence of moves within periods and the transitions from one state to another, with two retailers.

A period in state $C$ involves a simultaneous move game in which both the incumbent and entrant compete by setting a minimum retail price (should they wish) and a wholesale price.

Note that in this timing, we suppose that the fixed cost of entry is paid only if a retailer accommodates entry; this is a realistic assumption, for example, if the entrant needs access to final consumers for final product configuration or for the marketing of a new-product launch. Similar results apply if the fixed costs of entry are paid ex-ante as long as the entrant is not considered active until a retailer has accommodated the entrant.\textsuperscript{25} We

\textsuperscript{25}There would, therefore, be three states of the game. In addition to $M$ (where the entrant has not
present the timing with fixed costs paid only after accommodation, first, since the analysis is a little simpler and, second, since this timing reinforces the importance and central role of retailer accommodation.\footnote{As we discuss in greater detail in Section 5.4, the exclusive dealing literature has the retailers choosing to accommodate entry or not, prior to the entrant committing to any offer. If we adjusted our timing in this way, the inability of the entrant to commit to transfers post-accommodation can make exclusion easier than in the model we present here. We are grateful to a referee for pointing this out.}

The transfer, $R$, serves as an inducement to a retailer to carry the entrant’s product. We restrict this transfer to be paid only to one retailer, but given that all retailers are perfect substitutes in the baseline model, this is not restrictive: our interest is in equilibria in which all retailers choose not to accommodate the entrant (exclusionary equilibria). For such an equilibrium to exist it must be the case that, if all other retailers are not accommodating, then any particular retailer also chooses not to accommodate. By considering an inducement $R$ paid to a single retailer, we maximize the chance that this retailer would want to deviate from the exclusionary equilibrium and, hence, study a case in which exclusion is, if anything, harder to attain.

What is crucial is the requirement that at least one retailer agree to carry the entrant’s good for the entrant to become active. Hence, the transition from the state of the market $M$ to state $C$ requires a retailer to agree to stock the entrant’s product. The effect of such an agreement, which is effectively an assurance of perpetual market access, is to guarantee competition between the two manufacturers in all periods post-entry; in particular, it is assumed that following entry, the incumbent remains present as a competitive threat that does not require retailer-accommodation.

### 4 Analysis

Before analyzing the game outlined in Section 3, consider the behavior of an incumbent with no threat of entry. In the absence of RPM, Bertrand competition among retailers ensures that the retail price will simply be equal to the wholesale price that the incumbent manufacturer charged. The incumbent can, therefore, charge a wholesale price equal to its monopoly price, $p^m_i = \arg\max(p - c_i)q(p)$, and earn monopoly profits. It can do no better with RPM, and so without the threat of entry, in this model, RPM plays no role.\footnote{Indeed, this reasoning has led some commentators to suggest that a monopolist’s use of RPM reflects that retail service is an important factor (see, for example, Winter 2009).}
We characterize the Markov Perfect Nash equilibria of this game, where the states are given by the type of the current market structure. That is, following the notation in Figure 2, the state space is the finite set \{M, C\}. We use Markov Perfection to remove the possibility of firms’ colluding post-entry. However, note that since a “deviating” retailer who accommodates entry changes the state from \(M\) to \(C\), the equilibrium play in state \(M\) somewhat resembles a collusive outcome among retailers—we highlight that this can be beneficial for the incumbent manufacturer in excluding a rival.\(^{28}\) We first consider the absorbing state following entry (that is, the state \(C\)) and then turn to consider the entry decision (state \(M\)).

Suppose that the state is \(C\), so that the period game has both the entrant and the incumbent active and simultaneously setting \((w_i, p_i)\) and \((w_e, p_e)\). Since the manufacturers’ goods are identical and the retailers are perfect substitutes, the equilibrium resembles a standard Bertrand equilibrium. The equilibrium has the wholesale price set at the marginal cost of the less efficient incumbent \(c_i\) and all retailers purchasing at this price from the more efficient entrant—i.e., \(w_e = w_i = c_i\).\(^{29}\) The retail price (which, in the model, we assume is determined by manufacturers through RPM) will also be set at \(c_i\), since at any higher price any manufacturer could attract all the retail customers by undercutting by an epsilon increment. The entrant has no incentive to force a lower price since it is assumed that \(c_i < p^m_c\) where \(p^m_c\) is the price that would be charged by a monopoly with cost \(c_e\). Note that Bertrand competition among retailers (since they are perfect substitutes) implies that RPM plays no role in this case and that competition among retailers is intense, in the sense that they earn no profits. The same outcome would arise—that is, retailers would set a retail price equal to \(w_e (= c_i)\)—whether or not the entrant used RPM, and so according to our definition, here there is no RPM. Since our equilibrium concept is Markov Perfection, there is no way to sustain pricing above \(c_i\); the state-space does not admit the possibility of collusion and a punishment phase that could be used to deter undercutting. This reasoning yields the following result.\(^{30}\)

\(^{28}\)The interaction between collusion and resale price maintenance is explored in Jullien and Rey (2007).

\(^{29}\)Since the entrant’s cost is lower than the incumbent’s, there are actually a range of equilibria that involve the incumbent’s pricing between \(c_e\) and \(c_i\) and the entrant just undercutting. As is standard, we ignore these equilibria since they involve weakly-dominated strategies that make little empirical sense and are not robust to trembling-hand style equilibrium refinements.

\(^{30}\)Shaffer (1991) considers a model that is analogous to our state \(C\), but interprets RPM as incorporating a form of commitment that is more binding than merely setting a wholesale price, so that if one firm uses RPM and the other does not, a leader-follower pricing game emerges. This interpretation may change the equilibrium payoffs. We have not adopted this interpretation, and so our state \(C\) is always a
Lemma 1 Post-entry (that is, when the state is equal to $C$) per-period profits are:

1. $\pi_i^{Entry} = 0$ for the incumbent;
2. $\pi_r^{Entry} = 0$ for any retailer; and
3. $\pi_e^{Entry} = (c_i - c_e)q(c_i)$ for the entrant.

Given this characterization for periods following entry, we can turn to characterizing the full game. Our interest is in highlighting when exclusion via RPM is possible in equilibrium. However, there are always equilibria with no exclusion.\footnote{Inasmuch as both exclusionary and non-exclusionary equilibria exist, exclusion may require coordination (if only in beliefs over the equilibrium being chosen) among the downstream retailers. As discussed in the earlier examples, sometimes this has been achieved through explicit downstream coordination via, for instance, trade associations.} We illustrate an example of such a no-exclusion equilibrium in Lemma 2 below.

Lemma 2 There is always an equilibrium in which entry takes place in the first period (in state $M$) and the entrant offers $R = 0$ and $p_e = w_e = c_i$ in state $M$.

Proof. Consider a period where the state of the market is $M$, and consider that part of the period in which retailers simultaneously choose whether to accept or reject the entrant’s offer of $R = 0$. If one retailer accepts the entrant’s offer, then the best response set of all other retailers will also include acceptance, as long as it is individually rational in the current period. This is because acceptance by one retailer ensures that entry occurs. If one retailer accommodates entry, then the entrant will get access to the market and be able to generate a retail price that undercuts all retailers that supply the incumbent’s good. This steals the market from the incumbent and retailers who sell the incumbent’s good. Given this entry, retailers anticipate making no profit in the current or future periods (following Lemma 1), and so it is weakly optimal to accommodate (and would be strictly so if the entrant offers any $R > 0$).

It is easy to verify that the incumbent choosing $p_i = w_i = c_i$ is a best response to the entrant offering $R = 0$ and $p_e = w_e = c_i$ in state $M$ when the incumbent expects that the entrant will be accommodated. Clearly, it is a best response for the entrant to choose $R = 0$ and $p_e = w_e = c_i$ in state $M$.\footnote{Simultaneous-move game. Adopting Shaffer’s interpretation would not qualitatively change the analysis in the baseline model. In the extensions that consider differentiation, this alternate view would change the analysis somewhat, but not the qualitative results.}
Note that here, there is no RPM (since if \( w_e = c_i \), then Bertrand competition among retailers would lead to the same retail price).

The equilibrium illustrated in Lemma 2 reflects a broader class of equilibria in which entry occurs. For instance, following the logic in the proof, if the entrant offers a payment of \( R = \epsilon > 0 \) to any accommodating retailer then an equilibrium would exist in which all retailers accommodate entry. That is, if all other retailers accommodate, it would be strictly optimal for any given retailer to also accommodate, since, at the very least, they get a payment \( R \) as opposed to not accommodating and getting a payment of zero. Clearly, any such payment \( R = \epsilon > 0 \) is unnecessary from the point of view of the entrant, since equilibrium only requires best responses to be weakly optimal. That is, the no exclusion equilibrium can involve no cost to the entrant as described in Lemma 2.

It is worth noting that, in setting up the model in Section 3.1, we assumed away the option of the entrant to offer a payment of \( R > 0 \) to all accommodating retailers, since our interest is in equilibria in which all retailers choose not to accommodate the entrant (exclusionary equilibria). As will become clear in the following analysis, for such an equilibrium to exist it must be the case that, if all other retailers are not accommodating, then any retailer also chooses not to accommodate. By considering an inducement \( R \) paid to a single retailer, we maximize the amount that the entrant would pay to any retailer and so also chance that this retailer would want to deviate from the exclusionary equilibrium; hence, we study a case in which exclusion is, if anything, harder to attain.

We now turn to the necessary and sufficient conditions for an exclusionary equilibrium to exist. By exclusionary, we mean an equilibrium in which the retailers never accommodate entry. We show that the use of minimum RPM by the incumbent can generate this exclusion.

Entry depends on whether a retailer will agree to carry the entrant’s products. Hence, the retailers’ equilibrium strategies in state \( M \) are determinative. As argued above, and illustrated in Lemma 2, there is an aspect of coordination around the retailer behavior. If a retailer anticipates that others will accommodate the entrant in state \( M \), then he also will prefer to do so. To determine the possibility of an exclusionary equilibrium, therefore, we must focus on the case where a retailer anticipates that no other retailer will accommodate the entrant. Exclusion is an equilibrium if under these circumstances a retailer prefers not to accommodate the entrant. We denote by \( \pi(Y, N) \) and \( \pi(N, N) \) the net present value of lifetime profits for a retailer who accommodates entry, or not, when anticipating that all
other retailers do not accommodate. Exclusion, therefore, requires that \( \pi(N, N) \geq \pi(Y, N) \).

Since exclusion results in a zero profit for the entrant, the entrant will always be happy to transfer as much surplus as is required to make sure that a retailer prefers to accommodate—that is, \( \pi(Y, N) > \pi(N, N) \)—if the alternative is exclusion, subject to meeting a non-negative discounted-profit-stream constraint. The maximal surplus that the entrant could transfer to a retailer is given by first covering the fixed cost of entry and then transferring as much as possible of the maximal profit that can be earned in the current period, if entry occurs, plus the discounted value of all future profits in state \( C \). The latter is easily determined given the characterization of per-period profits in Lemma 1. To compute the former, note that if the incumbent offers \((w_i, p_i)\), then the entrant would maximize its surplus extraction in the current period by setting a retail price of \( \hat{p}_e = \min\{p_i, p^m_e\} \).

Thus, the maximal value of \( \pi(Y, N) \) that the entrant can generate is

\[
\text{max } \pi(Y, N) = (\hat{p}_e - c_e) q(\hat{p}_e) + \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i) - F_e.
\] (1)

This can be implemented through different combinations of \( R \) and \((w_e, p_e)\); for example, by setting \( w_e = c_e \) and \( R = \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i) - F_e \).

We now turn to the incumbent’s problem and, in particular, we consider the maximal value of \( \{\pi(N, N) - \text{max } \pi(Y, N)\} \), subject to the incumbent’s making non-negative profits, to address the question of whether the incumbent can foreclose entry. In practice, the incumbent would wish that retailers earn only enough profits for them to prefer not to accommodate entry—that is, so that \( \pi(N, N) = \text{max } \pi(Y, N) \)—and keep any additional profits; however, comparing \( \text{max } \{\pi(N, N) - \text{max } \pi(Y, N)\} \) as defined in (1) determines whether exclusion is possible. That is, it provides necessary and sufficient conditions for the existence of an exclusionary equilibrium.

Note that \( \pi(N, N) \) is simply determined as the discounted value of the stream of surplus that accrues to the retailers if all retailers deny access—that is, \( \frac{1}{1 - \delta} \frac{1}{n} (p_i - w_i) q(p_i) \), where the factor \( \frac{1}{n} \) reflects the fact that the \( n \) retailers share the market evenly when charging the same retail price. Note that since \( p_i \) can affect \( \hat{p}_e \) and, thereby, affect \( \text{max } \pi(Y, N) \), as defined in (1), the problem need not reduce to choosing \( p_i \) and \( w_i \) to maximize \( (p_i - w_i) q(p_i) \); however, \( w_i \) does not affect the entrant’s problem and so, clearly, the incumbent would choose \( w_i = c_i \) to guarantee itself non-negative profits and guarantee retailers all the

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32 Note that the entrant’s wholesale price is irrelevant in determining the maximum that the entrant can transfer to a retailer since any profits \((w_e - c_e) q(\hat{p}_e)\) that the entrant earns can either be transferred as part of the lump sum \( R \) or through choosing \( w_e = c_e \) instead.
surplus generated. The incumbent’s problem, therefore, is reduced to choosing \( p_i \) in order to maximize

\[
\frac{1}{1 - \delta n} (p_i - c_i) q(p_i) - \left( (\hat{p}_e - c_e) q(\hat{p}_e) + \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i) - F_e \right).
\]

First note that if \( p_i \geq p^m_e \), then the problem is trivially solved by setting \( p_i = p^m_e \). Consider, instead, the case \( p^m_e > p_i \), and note that the above expression can be rewritten as

\[
\max_{p_i < p^m_e} \left( \frac{1}{1 - \delta n} - 1 \right) (p_i - c_i) q(p_i) - (c_i - c_e) q(p_i) - \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i) + F_e.
\]

If \( \frac{1}{1 - \delta} \frac{1}{n} > 1 \), then, since \( p_i < p^m_e \leq p^m_i \), the incumbent prefers to set \( p_i \) as high as possible, both to make the first term in the expression above larger, and to make the second term smaller. However, this corner solution takes us back to the previous case, where the incumbent would prefer to set \( p_i = p^m_i \). Instead, if \( \frac{1}{1 - \delta} \frac{1}{n} < 1 \), then regardless of the incumbent’s choice

\[
\max_{p_i < p^m_e} \left( \frac{1}{1 - \delta n} - 1 \right) (p_i - c_i) q(p_i) - (c_i - c_e) q(p_i) - \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i) < 0,
\]

and so long as \( F_e \) is small enough, the incumbent can never foreclose entry.\(^{33}\)

This discussion establishes the following:

**Proposition 1** Suppose that \( \frac{1}{1 - \delta} \frac{1}{n} > 1 \). Then, an exclusionary equilibrium (one in which the entrant does not enter) exists if and only if

\[
F_e + \frac{1}{1 - \delta n} (p^m_i - c_i) q(p^m_i) \geq (p^m_e - c_e) q(p^m_e) + \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i).
\]

If \( \frac{1}{1 - \delta} \frac{1}{n} < 1 \) and fixed costs, \( F_e \), are sufficiently small, there is never an exclusionary equilibrium.

The following corollary is immediate and formalizes the discussion in the introduction.

**Corollary 1** An entrant with marginal cost \( c_e = c_i \) can always be excluded if \( \frac{1}{1 - \delta} \geq n \).

While Proposition 1 is derived assuming that RPM allows a manufacturer to set the retail price directly, all that is required for the incumbent to implement the exclusion

\(^{33}\)Note that meaningful exclusion may still occur for higher values of \( F_e \).
illustrated here is minimum RPM. That is, what the manufacturer needs to do is ensure that sufficient rents are transferred to retailers in the \( M \) state (the state in which only the incumbent is active). To do this the incumbent must ensure that retailers enjoy a large enough margin. This is done by removing the ability of retailers to undercut each other below a price set by the incumbent—that is, precisely the point of minimum RPM. Hence, minimum RPM is all the incumbent need use to exclude the entrant.

A comparison of the no-exclusion equilibrium illustrated in Lemma 2 (in which the accommodating retailers get zero rents) to the exclusionary equilibrium in Proposition 1 makes it clear that the retailers are better off in the exclusionary equilibrium. On this basis, one might think that the exclusionary equilibrium is more compelling as it is both individually and collectively better for the retailers. This argument is somewhat similar in spirit to the use of coalition-proof SPNE employed by Segal and Whinston (2000) in narrowing the set of potential equilibria in the context of exclusive dealing.\(^34\)

4.1 The distortionary effect of exclusionary RPM

In this setting, the efficiency cost of an exclusionary minimum RPM agreement comes from two sources.

First, there is the productive efficiency loss from having a low-cost manufacturer excluded from the market. In the baseline model, above, the per-period loss in producer surplus from this exclusion is \( (c_i - c_e) q(c_i) \).

The second source of inefficiency is due to a loss of consumer surplus. As argued in the paragraphs leading to Lemma 1, the retail price of the good, if entry occurs, is given by \( c_i \). In examining the possibility of foreclosure, Proposition 1 determines when exclusion is feasible. However, as long as the condition in Proposition 1 is met, there could be many equilibria where entry is foreclosed. In all reasonable equilibria, however, the retail price for the good is given by \( p_m^i \), with multiplicity arising from the differences in the division of producer surplus between manufacturer and retailers, via the choice of the wholesale price.\(^35\) Thus, the second source of welfare loss is the difference in consumer

\(^34\)We are grateful to a referee for pointing this out.

\(^35\)Formally, there may be other (unreasonable) equilibria that arise from the multiplicity and coordination among retailers discussed in Section 4. For example, all retailers may play the (perverse but) equilibrium strategy to deny entry only if the incumbent sets a retail price \( (p_m^i - k) \) for some constant \( k \) low enough. Then, the incumbent would impose a price of \( (p_m^i - k) \) using RPM. We argue that the sort of equilibrium selection process that is required by such an equilibrium is unconvincing. In any case, it does not undermine our main point: that RPM can support exclusionary equilibria.
surplus generated at \( p = p_e^m \) and \( p = c_i \) that is not captured by the incumbent as part of its monopoly rent.  

Thus, the efficiency loss from exclusionary RPM, in the baseline model of Section 3, is given by \(^{36}\)

\[
\text{RPM Welfare Cost} = \frac{1}{1 - \delta} \left[ \int_{c_i}^{p_i^m} [q(x) - q(p_i^m)] \, dx + (c_i - c_e) q(c_i) \right] - F_e > 0. \quad (5)
\]

### 4.2 The range of exclusion

Next, we turn our attention to the range of costs that can be excluded using minimum RPM in this manner. The upper bound on this range is given by Corollary 1 above. That is, if \( \frac{1}{1 - \delta} \geq n \), then the range of excluded costs is \([c_e, c_e]\), where \( c_e = c_i \). To articulate the lower bound, the value of \( F_e \) needs to be fixed. To examine the size of a ‘smallest’ range of exclusion, we set \( F_e = 0 \).

**Corollary 2** Provided that \( \frac{1}{1 - \delta} \geq n \), the lowest marginal cost able to be excluded, \( c_e \), is implicitly defined by

\[
\frac{1}{1 - \delta} (p_i^m - c_i) \frac{1}{n} q(p_i^m) = (p_e^m - c_e) q(p_e^m) + \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i). \quad (6)
\]

The expression in Corollary 2 is perhaps more useful via the derivation of a bound on \( c_e \). Note that

\[
\frac{1}{1 - \delta} (p_i^m - c_i) \frac{1}{n} q(p_i^m) = (p_e^m (c_e) - c_e) q(p_e^m (c_e)) + \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i) \\
\quad \geq (p_i^m - c_i) q(p_i^m) + \frac{\delta}{1 - \delta} (c_i - c_e) q(c_i),
\]

which can be rearranged to yield

\[
(c_i - c_e) \leq \frac{(p_i^m - c_i) q(p_i^m)}{n q(c_i)}. \quad (7)
\]

The empirical utility of this bound lies in the fact that it uses only information about the incumbent firm. That is, it is based on information that is potentially estimable using

\(^{36}\) We assume that the Hicksian and Marshallian demand curves are the same (due to, say, quasi-linear utility).
observable price and quantity data.

A sense of the extent to which exclusion is possible from RPM can be obtained from Figure 3, which compares the exact range of the excluded costs of the entrant for two parametrizations of the model, as the number of retailers changes. The panel on the left is computed using a constant elasticity demand curve, while the right uses a linear specification. The specifications are generated so that the incumbent’s monopoly price in both settings is the same. The marginal cost of the incumbent is equal to four. The grey column shows the exact value of $c_i - c_e$, where $c_e$ is defined by (6) given that $c_i = 4$, while the black interval indicates the difference between the exact measure and the upper bound computed using expression (7) calculated at equality.

Notes: The horizontal axis is the number of retailers in the market. The vertical axis is the difference between $c_i = 4$ and either the exact measure of $c_e$ (the grey column; $c_i - c_e$) or the upper bound computed using Equation (7) (grey and black columns combined). The left panel is constructed using the demand specification $\log(q) = 5.6391 - \frac{7}{3} \log(p)$, while the right panel is constructed using the demand specification $q = 10 - p$. The marginal cost of the incumbent is set equal to 4. The demand specifications generate the same monopoly price and quantity for the incumbent. We have set $\delta = 0.95$, which results in exclusion being impossible if the number of retailers is greater than 20 (see Corollary 1).

Figure 3: The interval of excluded costs, and the bound.

The simulations suggest that the range of costs that can be excluded is sufficiently large as to be economically meaningful. In the specification on the left (which uses a constant elasticity demand specification), when there are two, five, and ten retailers, the
range of excluded costs is 10.2, 4.1, and 2.0 percent of the incumbent’s marginal cost, respectively. In the specification on the right (which uses a linear demand specification), the corresponding range of excluded costs is 18.8, 7.5, and 3.8 percent of the incumbent’s marginal costs. Recall that these simulations assume that there are no fixed costs of entry and, so, these likely underrepresent the extent of possible exclusion.

Particularly in markets where there are relatively few retailers and, hence, where the exclusionary potential of a minimum RPM agreement is greatest, the bound appears to be useful. When there are only two retailers, the additional range indicated by the bound is 7 and 8 percent of the length of the true interval, for the constant elasticity and linear specifications, respectively.

5 Discussion and Extensions

In this section we discuss various extensions of the basic model. In particular, we explore the extent to which an incumbent manufacturer might prefer to use RPM as an exclusionary device, as opposed to, say, some form of lump-sum payment, like a slotting fee or loyalty payment. We then discuss extensions to differentiated goods markets and various relaxations of the Markov Perfection Nash equilibrium restriction. Finally, we briefly discuss the relationship between our environment and results, and those studied in the exclusive dealing literature.

5.1 RPM vs other restraints

In our framework RPM provides a mechanism through which upstream profits can be shared with retailers, giving them an interest in preserving a market structure without upstream competition. This provides an incentive for them to exclude a potential entrant. There are, of course, many ways in which an upstream firm can share profits with a retailer. For instance, they may use lump-sum transfers in the form of slotting fees, loyalty rebates, or similar. Alternatively, forms of payment closer in character to RPM might be used, like some form of revenue-sharing agreement. If we adopt the simple model in the
introduction,\textsuperscript{37} then the condition for an exclusionary equilibrium to exist is

\[
\frac{1}{(1 - \delta) n} \pi_n \geq \pi. \tag{8}
\]

We observe that $\pi/n$ can be transferred from the incumbent to the retailer in a number of ways.

On closer inspection, however, the various ways of making payments from the incumbent to the retailers are not equivalent. RPM (and revenue-sharing agreements) require monitoring efforts, while lump-sum payments likely do not. RPM on the other hand, has the virtue that the implicit transfer is proportional to the amount the retailer actually sells. Consequently, should entry occur, RPM saves the incumbent from making any transfers. Lump-sum payments still have to be made. This is relevant if, in the long run, entry is inevitable, but in the short-run exclusion is profitable.\textsuperscript{38}

To see this in a model, consider the simple framework represented by Equation (8), but extended so that in any period there is a probability given by $1 - \theta$ that the entrant has marginal costs so low as to make exclusion impossible (i.e. Equation (4) cannot be satisfied). With probability $\theta$ marginal costs of the incumbent and entrant are equal. Thus in the long run, the market power of the incumbent cannot be sustained, but exclusion can make it last as long as possible. Say the minimum transfer needed to make Equation (8) hold is given by $t$, and the extra monitoring cost of RPM is given by $\mu$. In the most profitable exclusionary equilibrium for the incumbent, using RPM, the incumbent’s expected profit in each period from an exclusionary equilibrium is $\theta (\pi^M - t) - \mu$, whereas with a lump-sum payment it is $\theta (\pi^M - t) - (1 - \theta) t$, since the lump-sum payment needs to be made whether the entrant enters or not.\textsuperscript{39} Hence, the incumbent faces a trade-off in choosing between a lump-sum style transfer and RPM, weighing off the extra cost of monitoring against the extra cost should entry occur (RPM is preferred if $\mu < (1 - \theta) t$).\textsuperscript{40}

\textsuperscript{37}This is the main model with the entrant having the same marginal cost as the incumbent and the fixed cost of entry set to zero.

\textsuperscript{38}Another benefit of RPM arises if demand is fluctuating in non-forecastable ways and the incumbent faces financial frictions. RPM can be implemented on a balance-budget basis in each period, whereas lump-sum payments would require inter-temporal borrowing and lending (that is, budget balance is not necessarily achievable within each period).

\textsuperscript{39}If the payment were contingent on no entry, then this would be, effectively, an exclusive dealing contract. That is, outside the scope of contracts considered in this paper.

\textsuperscript{40}Again, to the extent that revenue-sharing does not impose any additional monitoring beyond that generated by RPM, revenue-sharing agreements operate the same way.
5.2 Accommodation, collusion, and exclusion by the entrant: Implications of relaxing MPNE

The structure of the baseline model sets a particular model of competition post entry: competition in the style of one-period Nash in the C state. Examination of Condition (4) in Proposition 1 makes it clear that the view the modeler takes of competition post-entry will have an impact on the range of exclusion that is possible. The Markov Perfect Nash Equilibrium assumption, given the structure of our state space, does the job of restricting us to this simple competitive equilibrium post entry.

Relaxing the MPNE assumption enlarges the equilibrium set, post-entry. In analyzing any potentially exclusionary scenario, the analysis has to take a view as to what competition, post-entry looks like—that is, select a particular equilibrium from this set. Our baseline model adopts the post-entry equilibrium that we view as the simplest, most widely appropriate, and most commonly applied notion of equilibrium (at least in empirical work): static Nash (for an overview see Ackerberg et al (2007)).

However, in some settings there may be evidence to suggest that other forms of post entry equilibrium may be appropriate (for instance, drawing the analogy to merger analysis, if strong evidence supporting some sort of coordinated effects were present.) In Asker and Bar-Isaac (2011) we formally examine a variety of alternative equilibrium structures; in all of them exclusionary equilibria can be supported over some range of the parameter space. In what follows we sketch two such alternatives.

One alternative structure is to give an entrant the ability to induce equilibria that mimic the incumbent’s exclusionary equilibria illustrated in the baseline model. Allowing the entrant to do this (weakly) increases the entrant’s post-entry profit. The increase is weak in the sense that, if the entrants marginal cost is sufficiently low, the entrant is better off not excluding the incumbent, as the profit sharing required to do this can decrease profits by more than just setting \( p_e = c_i \) and retaining all generated profits (i.e. playing as per Lemma 1). Hence, it is unsurprising that, when the entrant’s marginal cost is low, and the fixed cost is high, exclusion by the incumbent can still occur.

Another alternative structure is to allow manufacturers to collude post-entry. This

\footnote{Where empirical work in IO has explicitly taken into account dynamics, it has tended to be in a MPNE framework (Doraszelski and Pakes (2007) and Ackerberg et al (2007)). Even in these settings pricing is often assumed to be resolved according to static Nash, and dynamics enter through investment decisions (see for example, Collard-Wexler (2011)).}

\footnote{Obviously, regardless of who ends up excluding who, welfare and competition is still harmed.}
gives the incumbent the option of accommodating entry and then initiating a cartel, which raises the question of whether exclusion can still be desirable. In light of the Arbuckle and American Sugar example in Section 2 this seems empirically relevant.

One possible 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 that the entrant (for whatever reason) cannot buy out the incumbent, we consider a different form of collusion. We consider collusion in which the manufacturers cannot make explicit lump-sum payments to each other (that is, no sidepayments). 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).43

Thus, the incumbent has a choice of whether to accommodate entry and collude, or to exclude the entrant by transferring rents to the retailers (via RPM). It can be shown that, when the difference between the marginal costs of the incumbent and entrant is sufficiently large, and when fixed costs of entry are large enough, exclusion is the more profitable policy for the incumbent.

The underlying force at work is that the entrant cannot 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. Thus, the incumbent makes relatively little profit in the cartel. 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.

43For an empirical analog, consider the lysine cartel described in de Roos (2006).
5.3 Product Differentiation

We now turn to a discussion of the effect of product differentiation on the exclusionary equilibrium illustrated in the baseline model. We restrict the discussion to the case in which manufacturers are differentiated, although similar intuition applies if retailers are differentiated.\textsuperscript{44} The central finding is that greater product differentiation can make exclusion easier for the incumbent, particularly in those cases where the entrant’s marginal cost is significantly lower than that of the incumbent.

Paraphrasing Equation 4, for exclusion to work it must be that

\[
\frac{1}{1 - \delta} \frac{1}{n} \pi^m_t \geq \pi^e_{\text{entry period}} + \frac{\delta}{1 - \delta} \pi^e_{\text{post entry}} - F_e.
\]

We consider differentiation in the context of a standard Hotelling line. Consumers are distributed uniformly on the line with quadratic costs parameterized to ensure full coverage. The incumbent sits at the left end of the line. The entrant can have be either close or far from the incumbent. Thus, prior to entry, the maximum that the incumbent can transfer to the retailers via RPM is unaffected by differentiation. Hence differentiation affects the entrant’s profit in the entry period (\(\pi^e_{\text{entry period}}\)) and in periods following entry (\(\pi^e_{\text{post entry}}\)).

The entrant’s profit in the entry period is strictly decreasing as the entrant moves from being close, to being far from the incumbent on the Hotelling line. This is because, as the manufacturers get more differentiated, the entrant has to offer a lower price to steal the marginal consumer away from the incumbent. We refer to this as the ‘business-stealing effect’.

Once entry has happened, the impact of differentiation on the entrant’s profits depends on a trade-off between this business-stealing effect and the familiar ‘competition-softening effect’ of differentiation. If the entrant’s marginal cost is similar to the incumbent’s, then the competition-softening effect dominates. However, if the entrant has much lower marginal costs than the incumbent, the value of competition-softening is relatively low, and the entrant is better off with comparatively less differentiation, as this makes it easier to steal consumers without dropping price too much below the entrant’s monopoly level (business-stealing).

Thus, in moving from a position somewhat close to the incumbent to a position somewhat further away from the incumbent, the relative impacts of the business-stealing effects

\textsuperscript{44}For a formal treatment of both cases see Asker and Bar-Isaac (2011).
and competition-softening effects can mean that both $\pi_e^{\text{entry period}}$ and $\pi_e^{\text{post entry}}$ decrease.\footnote{Deneckere (1983), Chang (1991), and Ross (1992) point out similar effects in the context of collusion in differentiated products markets.} Hence, particularly if the entrant’s marginal cost is low and the fixed cost of entry is high, an increase in product differentiation between the incumbent and the entrant can make it easier for the entrant to be excluded by the incumbent.

### 5.4 Relationship to the exclusive dealing literature

Aside from the RPM literature already discussed in the introduction, another related literature is that on naked exclusion arising from explicit exclusive dealing arrangements (See Ch. 4 of Whinston (2006), Rey and Tirole (2007), and Rey and Vergé (2008) for useful overviews). The most important difference between the exclusive dealing literature and this paper is that we consider exclusion arising, via RPM, through what might be viewed as a tacit understanding between an incumbent manufacturer and retailers, as opposed to an explicit exclusivity clause in an enforceable contract. With no explicit exclusive contract, some of the fine details that arise in the literature—such as the nature of damages in the event of contractual breach—are not relevant in our environment.

In the exclusive dealing literature, the closest papers to ours are Fumagalli and Motta (2006), Abito and Wright (2008), and Simpson and Wickelgren (2007), which consider exclusive dealing arrangements between manufacturers and retailers.\footnote{Earlier papers, by Rasmusen, Ramsayer and Wiley (1991), and Segal and Whinston (2000) are distinct in assuming that buyers (equivalently, retailers) act as local monopolists.} Fumagalli and Motta (2006) and Abito and Wright (2008) do not allow for breach of contract (or equivalently suppose that damages are effectively infinite). Retailers must decide whether or not to sign such exclusive contracts before the entrant can commit to any offer. Instead, in our environment, the incumbent and retailer enter into an arrangement but the retailer can decide whether or not to stick to it after the entrant has committed to an offer (at least for that period). Consequently, with identical retailers in Bertrand competition and the entrant and incumbent offering homogeneous goods, whereas exclusion is always possible in the contractual environment considered by Abito and Wright (2008) and an equilibrium with entry always arises in the principal contractual environment considered by Fumagalli and Motta (2006), in our environment the possibility of an equilibrium with no entry depends on parameter values.\footnote{The stark differences in the conclusions of Abito and Wright (2008) and Fumagalli and Motta (2006) depend on differing assumptions on whether or not non-deviating retailers remain in the industry as compet-}
no contracts to breach), our setting is, perhaps, closer to Simpson and Wickelgren (2007) which does allow retailers to breach exclusive contracts, albeit at the cost of damage payments to the incumbent. However, in Simpson and Wickelgren (2007), the entrant always enters (Proposition 2) whereas this is not always the case in our environment as a result of the repeated game environment that we consider.48

6 Policy implications

Antitrust practitioners and academic economists have long debated RPM (the OECD (2008) roundtable provides a wide-ranging discussion; Matthewson and Winter (1998) and Winter (2009) provide useful overviews). Recognizing that “respected economic analysts . . . conclude that vertical price constraints can have procompetitive effects” (p.1), the U.S. Supreme Court, in its 2007 Leegin ruling, overturned the 1911 Dr. Miles decision that viewed RPM as a per se antitrust violation. Similarly, in the E.U., the 2010 Guidelines on Vertical Restraints allow parties to plead an efficiency defense under Article 101(3) (see p.63, paragraph 223). These new antitrust regimes, therefore, require antitrust authorities and other interested parties to trade off the consumer and social benefits of RPM against the possible harm. To this end, clearly articulated theories of harm are necessary.

It is interesting to note that both Leegin and the E.U. Guidelines on Vertical Restraints explicitly highlight that “a manufacturer with market power . . . might use resale price maintenance to give retailers an incentive not to sell the products of smaller rivals or new entrants” (Leegin p.894) and that “resale price maintenance may be implemented by a manufacturer with market power to foreclose smaller rivals” (p.64, paragraph 224). In contrast, most of the economics literature, perhaps due to a reasonable desire to explain why rule of reason might be more appropriate than per se treatment of RPM, has not focused on this possible cause of harm (see the literature discussed in Section 2 of this paper for exceptions). Thus, the absence of a formally-articulated theory has, perhaps, led to less attention to this cause than is warranted among some policy makers.49

48Loosely, the difference works as follows. Consider the equilibrium in Proposition 2 of Simpson and Wickelgren (2007), where a single buyer deviates. In our environment, the “breaching buyer” would have to compensate for (1/nth) of the full NPV of lifetime monopoly profits, and while this buyer earns the full monopoly profit in the current period, this is not true for future profits, since other buyers costlessly “breach” in future periods.

49For example, the OFT’s submission to the OECD roundtable (2008) does not address this cause of
In addition to reinforcing the idea that RPM can be used as a means of upstream exclusion, in presenting this formally-articulated theory of harm, we provide a counterpoint to some of the screens that have been suggested for determining legitimate uses of RPM. Policy makers (such as in the OECD (2008) roundtable) and commentators have suggested that antitrust authorities should distinguish between manufacturer- and retailer-initiated RPM. For example, the *Leegin* ruling (p.898), citing Posner (2001) states:

> It makes all the difference whether minimum retail prices are imposed by the manufacturers in order to evoke point-of-sale services or by the dealers in order to obtain monopoly profits.

In this context, it is worth highlighting that in the exclusion theory articulated above, both the incumbent dealer and retailers stand to gain from RPM, and either side might initiate RPM for the purpose of exclusion.

Similarly, while the importance of competition (or lack of it) is often stressed, our analysis suggests a nuanced view insofar as imperfect competition through differentiation can have ambiguous consequences for the possibility of exclusion, though our analysis clearly relies on some upstream market power. In particular, if the strength of competition between manufacturers (or retailers) is measured using cross-price elasticities, then increased competition may strengthen (or weaken) the potential for exclusion. Where our theory is unambiguous is in saying that, all things being equal, adding an extra retailer makes exclusion harder.

Our analysis highlights a necessary condition for RPM to be used to exclude an entrant manufacturer: It is critical that the entrant requires an accommodating retailer to compete; if it is easy for an entrant to vertically integrate or otherwise deal directly with final consumers, there is no possibility of exclusion in our model. Similarly, another critical assumption in the model is that an incumbent manufacturer does not simply disappear post-entry, leaving the entrant and retailers to share monopoly profits; instead, the industry earns only duopoly profits if entry occurs, so that overall industry profits may be lower following entry, providing the possibility that the incumbent can use RPM to share surplus with retailers and foreclose entry.

In outlining economic theories (pp. 204-207) nor does the United States’ submission in its review of theories of anti-competitive uses (pp.218-9), and, more generally, there is no mention of exclusion at all in this 300-page OECD report.
Lastly, we show that when a monopolist uses RPM, antitrust harm can still emerge. In particular, in markets where the good sold is undifferentiated (such as—recalling the American Sugar Refining Company—sugar) and a dominant firm exists, the use of RPM can be a cause for concern. Existing efficiency-based theories of added service or anti-competitive theories of collusion facilitation have trouble with this setting, as neither fits the institutional setting.

Unfortunately, the above discussion suggests that many existing screens for the existence of harm deserve cautious application. Should concerns regarding exclusion be raised, the bound suggested in Section 4.2 might provide a useful first indication of whether the scope of possible exclusion is large enough to be problematic. This bound can be estimated by using standard methods (see Ackerberg et al. (2007)). The use of this bound may be helpful in much the same way that a simple Lerner index is helpful in the evaluation of market power. If there is little indication that exclusion would be large enough to matter in an economic sense, then existing screens are likely reasonable. Otherwise, the use of RPM by a manufacturer with considerable market dominance may warrant further inspection, where, perhaps, under current screens it would not.

7 Conclusion

This paper presents a formal model in which an incumbent manufacturer is able to exclude a more efficient entrant, by using minimum RPM to increase the profits of retailers in the event that they refuse to accommodate entry. This makes it prohibitively expensive for the potential entrant to enter. We formalize notions of exclusion due to RPM that have repeatedly surfaced in the economic literature, at least since the 1930s. The recent decision of the U.S. Supreme Court in *Leegin*, together with recent policy developments in Europe, has generated an increased need for theoretical and empirical work on how RPM may harm competition. This paper explores exclusion as a theory of harm by grounding it in a theoretical framework. This provides a foundation for further research in the area, both theoretical and empirical.

While in this paper we focus on the extent to which RPM, on its own, can be used to generate exclusion (absent an explicit contractual exclusivity restriction), it is easy to see how exclusivity provisions in an agreement between retailers and a manufacturer can reinforce, or be reinforced by, the exclusionary effect of an RPM contract. In practice one might consider exclusivity as giving explicit form to the agreement and, possibly, helping
coordinate the equilibrium, while RPM may well render implicit form, especially in the face of uncertain enforceability of an exclusivity provision. To this extent, one might view RPM and exclusive dealing in some instances as being complementary exclusionary devices.

References


