Adverse Selection and Partial Exclusive Dealing

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ABSTRACT. I reconcile a disagreement in the literature regarding the impact of downstream price competition on anticompetitive exclusive dealing, and then extend the exclusive dealing literature to accommodate adverse selection. Adverse selection expands the scope of inefficient exclusion, and may also explain policies of *partial exclusion*, in which an incumbent profits by locking up select retailers even though the entrant's product is still competitively supplied in equilibrium. I relate my results to recent antitrust cases against Intel.

Consider a market entrant facing two key challenges: gaining access to consumers and convincing them that it sells a good product. These challenges are particularly dire because the incumbent may curtail the entrant's access to consumers by offering retailers exclusive contracts, and because the market is afflicted by adverse selection regarding the entrant.

I investigate the prospects for this entrant and the health of the overall market. I show that the scope of anticompetitive exclusive dealing is strongly influenced by adverse selection, and that jointly considering adverse selection and exclusive dealing leads to new insights on how regulators ought to look at exclusive dealing cases. For example, I show that the incumbent may gain from a policy of *partial exclusion* in which only select retailers are locked into exclusive contracts, seriously impairing competition—even though the entrant's product is readily available to all consumers through other retailers. Indeed, I argue that this helps explain facts surrounding the recent US and EU cases against Intel.

It may seem surprising that jointly studying exclusive dealing and adverse selection is useful. After all, it is already known that an incumbent can use exclusive deals to lock an entrant out of the market. For example, Rasmusen, Ramseyer, and Wiley (1991) and Segal and Whinston (2000) show that when an entrant faces fixed costs which can only be cleared by serving multiple end buyers, an incumbent can use a divide-and-conquer strategy to exclude the entrant at virtually zero cost. If the anticompetitive role of exclusive contracts is so clear, and the results so extreme, what is gained by incorporating adverse selection?

The kernel of the answer to this question lies in a series of recent papers that together suggest that, in fact, the scope for anticompetitive exclusive dealing is far from settled even in the absence of adverse selection. Fumagalli and Motta (2006), Simpson and Wickelgren (2007), and Abito and Wright (2008) all note that most prior analyses on (the anticompetitive effects of) exclusive dealing abstract away from downstream competition. Radically different conclusions on the impact of such downstream competition are reached by these authors,

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however. Fumagalli and Motta (2006) argue that exclusion should never occur in such cases whereas Simpson and Wickelgren (2007) and Abito and Wright (2008) contend that Fumagalli and Motta (2006)'s result is driven by an unbelievable modeling assumption and that, as in the prior literature, exclusion is in fact to be expected.[1]

My first contribution is a simple reconciliation of these diverging views—one that applies whether or not there is adverse selection. I suggest abandoning the typical assumption that suppliers can always make take-it-or-leave-it offers to downstream firms. Most crucially, I argue that if all but one retailer is locked into an exclusive contract with the incumbent, then the lone free retailer should be expected to share some of the rents that successful entry brings, by virtue of being pivotal for the entrant's quest to reach end consumers.

This relaxed contracting assumption leads readily to the result that whether or not an exclusionary equilibrium exists depends on how many retailers there are, not just whether the downstream market is competitive or not. In particular, there is a threshold number of retailers such that exclusion occurs only beneath it.

Because the exact threshold depends on the bargaining power of such a lone retailer, either the result of Fumagalli and Motta (2006) or of Simpson and Wickelgren (2007) and Abito and Wright (2008) can be obtained. In particular, if a lone retailer has significant bargaining strength, it may be that exclusion does not emerge even with a duopolistic downstream, whereas in the limiting case of zero retailer bargaining strength (as occurs under take-it-or-leave-it offers) exclusion persists even with infinitely many retail channels. Hence, relaxing the contracting assumption leads to a result that captures, as separate cases, the two extreme and contradictory results in the literature.

My second contribution is showing that the presence of adverse selection raises the retailer threshold below which exclusion occurs. In particular, when it takes time for the quality of the entrant's product to become known to the market, it is less costly for the incumbent to lock up retailers and so exclusion occurs over a broader range. This is not driven by any fixed costs of entry, which are zero in my analysis. Rather, adverse selection lowers the payoffs that retailers expect to receive if they spurn the incumbent's offer of exclusivity and bargain with the entrant, a fact that the incumbent is able to turn to its advantage. I show that this same effect implies that adverse selection allows the incumbent to exclude over a broader range of parameters even when exclusive contracts can be costlessly breached by retailers.

My third and final contribution deals with the case in which retailers have reputational capital that they might use to vouch for the entrant's quality, thereby potentially resolving the adverse selection problem. This is a very realistic possibility because many new entrants

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[1]Note that Simpson and Wickelgren (2007) are mostly interested in analyzing contractual breach and its impact on exclusivity deals under downstream competition. As part of their analysis they by necessity confront the question of what happens in the simpler case without breach.

are unknown to the market, whereas retailers may have established reputations and also be in a better position to ascertain the quality of a new product. For example, when the flat-panel TV manufacturer Vizio first entered the market, it distributed its products through Costco, a discount outlet known for its generous returns policy, and the ability of certain Original Equipment Manufacturers (OEMs) to legitimize entrants was a consideration in the recent antitrust case against Intel. This and related possibilities are identified in the work on middlemen by Biglaiser (1993) and Biglaiser and Friedman (1994), and that on "umbrella branding", in which a firm leverages its reputational capital with an existing product to convince the market of the quality of a new product (as in Wernerfelt (1988), Choi (1998), and Cabral (2000)).

I show that the incumbent may profit from a policy of partial exclusion in which it signs only high-reputation retailers to exclusive contracts. Such an equilibrium exists even when there are an infinite number of zero-reputation or "fringe" retailers who are just as efficient as the high-reputation retailers. In such an equilibrium, the entrant's product is competitively supplied, yet the incumbent still earns high profits and consumers are harmed.

This shows that exclusive dealing can be a profitable anticompetitive device even when such dealing does not restrict consumers' access to the entrant's product. Such an outcome is puzzling, and quite notably absent from the existing literature on exclusive dealing, in which there is either no gain to exclusive deals unless all channels can be locked up (this is the case with a competitive downstream) or no reason not to lock up all channels (as occurs when there is no downstream competition).

In addition to being of theoretical interest, there are practical applications of the idea of partial exclusive dealing, as I discuss in detail in Section 5. First, it fits the facts of the Intel case quite well, and may fit other cases given that observed exclusive deals rarely fully lock down the market. Second, antitrust authorities often operate under the presumption that observed exclusivity deals are not anticompetitive if there are sufficiently many alternate outlets available to an entrant, a presumption cast into doubt by my analysis.

Therefore, the prospect of partial exclusive dealing that I identify appears to be realistic, yet unexplained by the existing literature and almost entirely discounted as a competitive threat by regulators. Adverse selection provides a ready explanation for its emergence.

The remainder of this article is structured as follows. Section 1 reviews additional literature of relevance, Section 2 contains the base model, Section 3 presents the analysis with perfect information, Section 4 assesses the effect of adverse selection, and 5 handles the case in which retailers have reputational capital.

1. Related Literature

The questions I consider in this article are closely connected to the literatures on exclusive dealing, middlemen, reputational or brand conflict within the supply chain, and imperfect information and anticompetitive practices. Here I briefly discuss these connections.

I begin by highlighting some broad modeling differences between my article and those on exclusive dealing most closely related (namely, Rasmusen, Ramseyer, and Wiley (1991), Segal and Whinston (2000), Fumagalli and Motta (2006), Simpson and Wickelgren (2007), and Abito and Wright (2008)). As previously mentioned, I adopt different informational and bargaining assumptions, which will be discussed at greater length after I present my first results. Additionally, I focus on quality differences between firms (with the entrant potentially having the superior product), whereas these other articles have focused primarily on homogeneous products and differences in the marginal costs of production (with the entrant being more efficient). Finally, an important feature of these other articles is that, if exclusive dealing emerges in equilibrium it does so because it can deter a potential entrant from entering the market. In contrast, I assume that the entrant will always be present, but may be prevented from reaching the end consumer. Because many if not most real-world exclusive dealing cases consider circumstances in which existing firms are harmed by exclusive dealing, this is a realistic assumption.

Comanor and Frech (1985), Aghion and Bolton (1987), Mathewson and Winter (1987) and Bernheim and Whinston (1998) also examine anticompetitive exclusive dealing. Although Comanor and Frech (1985) and Mathewson and Winter (1987) are seminal contributions, neither addresses adverse selection or downstream competition. The focus of Aghion and Bolton (1987) is on the use of breach penalties in contracts between an incumbent and retailer to extract rents from an entrant. However, they also briefly discuss the prospect of adverse selection, but their main point in that section of their analysis is very different from mine; they point out that when an incumbent has better information about whether entry will occur than retailers, the contracts that it offers may signal this information. Bernheim and Whinston (1998) emphasize the role of an intertemporal contracting externality in sustaining inefficient exclusion in a model with neither downstream competition nor adverse selection.

Although I consider only anticompetitive exclusive dealing, there are a number of reasons why exclusive dealing might be pro-competitive. One possibility is that such contracts encourage efficient investments, as in Marvel (1982) and Besanko and Perry (1993). Martimort (1996) specifically considers the interaction of incentives and imperfect information in such relationships. Related to these ideas, but outside of the context of exclusive dealing as such, is the work on middlemen and umbrella branding mentioned earlier; a recent article on reputational leverage is Choi and Jeon (2007).

There is also a small literature that explores the more hostile side of reputational and branding issues in the supply chain. Johnson (2011) considers adverse selection in an infinite horizon supplier-retailer relationship, and asks how the identity of the reputational bond poster (that is, whether it is the supplier or instead the retailer) influences market outcomes. Among other results, I show there that each firm in the supply chain would prefer to be the reputational bond poster. I thereby synthesize previous work that deals separately with reputational bond posting (Klein and Leffler (1981)) with that on brand conflict between upstream and downstream firms (Kaldor (1950), Steiner (1973, 1978, 1993), and Farris and Albion (1980)). Here, I show that an incumbent supplier has an incentive to suppress the reputational capital of retailers using exclusive contracts, and that one possible outcome is that of partial exclusion mentioned earlier.

There are also a number of contributions that explore the interaction between imperfect or incomplete information and specific anticompetitive practices or entry in general. Schmalensee (1982) and Farrell (1986) show that there may be a first-entrant advantage in markets where consumers are unsure of the quality of future entrants. Milgrom and Roberts (1982b), Scharfstein (1984) and Fudenberg and Tirole (1986) give explanations for how information problems may sustain predatory pricing environments. Milgrom and Roberts (1982a) and Harrington (1986, 1987) show how an incumbent may try and fool a potential entrant regarding the incumbent's costs or provide a signal regarding the entrant's costs, thereby establishing a potential connection between the incumbent's pre-entry price and the entrant's profitability.

The main differences between my analysis and these works are as follows. First, I consider an entirely different anticompetitive practice, namely exclusive dealing, instead of predation or limit pricing. Second, the objective of the incumbent in these works is to deter entry or encourage exit, whereas I suppose that the entrant's product already exists and will continue to do so. Third, the informational problem at hand is the market's assessment of the entrant's quality, not what the incumbent's or entrant's costs are as in most of these other models (the exceptions being Schmalensee (1982) and Farrell (1986)). Fourth, because the incumbent has either private information or private actions in all of these models where the incumbent is trying to influence learning, it is in fact trying to deceive the entrant, which often fails in equilibrium because agents are rational. In contrast, in my analysis the incumbent may directly affect the learning that takes place as opposed to trying to fool the market, for example by limiting the reputational capital to which an entrant has access. This is related to Creane (1995), who considers how an incumbent's charging low prices may limit an entrant's sales and hence impede an entrant's ability to learn its own costs.

2. The Model

There is an incumbent (I), an entrant (E), and $M > 1$ undifferentiated retailers who compete to serve a unit mass of homogenous consumers. There are two periods in which consumers purchase non-durable products, with each consumer buying at most one unit in each period and having an outside option of zero in each period. All parties weigh the second period by the factor $\theta > 0$.

Consumers are expected utility maximizers, receiving $Q - p$ utility in any period in which they consume a good of quality Q at price p. The incumbent's product is known to be of quality Q_I, whereas the quality of the entrant's product is random, being either quality Q_L or $Q_H > Q_L \geq 0$, where quality is high with exogenously given probability π and low otherwise. Furthermore, $Q_H > Q_I > Q_L$, and the marginal costs for the incumbent and both types of entrant are constant and normalized to zero. Finally, I assume that

$$\pi Q_H + (1 - \pi)Q_L < Q_I.$$

The game takes place in five stages that comprise two periods of market competition. In stage one, the incumbent makes offers of exclusivity to some subset of the M downstream retailers, which are then accepted or rejected. These contracts exhibit a fixed transfer from I to each firm that accepts a contract, and all firms that are offered contracts must be offered the same terms. The terms stipulate only this fixed, upfront transfer from I to the retailer in exchange for the retailer only selling the incumbent's product in both periods; no wholesale prices are set in the contract. Contracts cannot be broken. At this stage, E is not present.

In the second stage, E enters the market and its quality is realized. I will consider multiple separate information structures. In the first, there is perfect information regarding E's quality. In the second, E's quality is initially unknown to the end consumers, although it is known to all other players. However, in the case of adverse selection, E's quality is revealed to all players with certainty at the beginning of period two, for example because of the emergence of product reviews, or because some small group of consumers (in a separate market) always purchase the entrant's product and report its quality to others. The parameter θ can be interpreted as a measure of how long it takes the market to learn exogenously the entrant's quality. (Note that E is assumed to enter the market—there will be no entry deterrence as such in this model, with exclusive dealing instead preventing E from reaching the end consumer and competing with I.)

Also in the second stage, E bargains with any free retailers (that is, retailers who are not tied to I through an exclusive contract) to carry its product, where M_f denotes the number of free retailers. This bargaining leads to these retailers agreeing to carry E's product in return for a fee, where this fee is determined as follows. Each free retailer receives a proportion β

of the marginal surplus created by it in the coalition of E and M_f free retailers, where β is an exogenous parameter representing the bargaining strength of the downstream retailers. This is an upfront fee and does not specify any future wholesale prices.

Note that it will be the case that downstream competition implies that the marginal contribution of a free retailer is zero whenever $M_f \geq 2$, because a single retailer is sufficient to serve efficiently the entire market; no retailer receives a positive payment from the entrant unless it is the only free retailer. Therefore, assuming that retailers have some bargaining power is consistent with the assumption that retailers compete fiercely with each other in the product market, because such bargaining power only exists when the entrant has no alternate retailer with whom to negotiate.

In the third stage, if $M_f \geq 1$ so that E can reach the end consumer, E and I simultaneously set wholesale prices and then retailers simultaneously choose retail prices, with I setting the same wholesale price to all retailers regardless of whether they have signed exclusive deals or not, where this assumption has no important effect.[2] If $M_f = 0$, then only I sets a wholesale price. In the fourth stage, consumers observe prices and make purchase decisions.

All four initial stages are part of period one. The fifth stage coincides with period two. At the beginning of this period, the quality of E's product is perfectly revealed to consumers if it is not already known. After that, wholesale and retail prices are again set, and final purchases are made.

Note that, because retailers are undifferentiated and compete in prices, no retailer has positive sales of a product if another retailer offers the same product at a lower price. Also, because consumers are homogenous, in equilibrium either all consumers buy the entrant's product or all buy the incumbent's product.

I restrict attention to pure-strategy equilibria. Also, I eliminate equilibria in which some retailers sign exclusive contracts for a zero fee but the payoffs to all players are as if no retailers signed such contracts. That is, I eliminate equilibria in which exclusive contracts are signed but have no effect.

Before moving on to the analysis of this model, I comment on the assumption that all firms have zero marginal costs. The main role of this assumption is a technical one; it ties down

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[2]Although this assumption may alter the profitability of being the lone defector from an exclusive offer by I, this has little practical impact on my results. The reason is that I already allow the bargaining power of retailers to vary as part of my model. To see how these defection profits might depend on this assumption (for the sake of completeness), suppose that E's quality is known to be high. Price competition ensures that I offers a wholesale price equal to its marginal cost either to the free retailer or captive retailers (or both), and that I earns zero profits. However, the free retailer earns positive profits if it happens to have access to I's good at marginal cost (and captive buyers face a higher price), but zero profits otherwise. In other words, if this retailer expects to have privileged access to I's product, then it has a higher outside option when it bargains with E. I eliminate these nuances and simply allow retailer profits to vary with β.

equilibrium pricing by ensuring that a firm with zero market share prices at marginal cost.[3] It might seem that setting costs to zero serves some role in determining whether there exists a separating equilibrium or not, in the case of adverse selection. However, as I explain in Section 4, this is not the case (briefly, this follows from the fact that the low type cannot earn profits in a separating equilibrium and that E's quality always becomes known in period two). Finally, note that variation in profits still exists across firm types, even with identical marginal costs, because quality levels vary across firms.

3. PERFECT INFORMATION

In this section I assess the scope for anticompetitive exclusion when there is perfect (and complete) information regarding the quality of the entrant's product.

3.1. **Analysis.** I begin by detailing the equilibrium prices and market shares in the relevant subgames, which are classified by the quality of the entrant and the number of free retailers M_f. Because consumers are homogenous and retailers are undifferentiated, downstream price competition ensures that the retail segment simply passes through whatever wholesale prices E and I set. The only potential exception would be if there were a single firm selling E's product, in which case that firm would set whatever markup that it could subject to consumers choosing it over I's product (which will be supplied at marginal cost by other retailers if E has positive equilibrium sales). However, in equilibrium E would choose to set a wholesale price such that there is no scope for a retailer markup, so that effectively the prospect of retailer markup can ignored. Consequently, any rents earned by retailers are in the form of the upfront payments made by I and E.

If $M_f = 0$, then E's product is not available to consumers and I acts as a monopolist in both periods, charging a wholesale price of Q_I. Gross of any fees that are paid to secure exclusivity, and because all marginal costs are normalized to zero, I's profits are

$$(1 + \theta)Q_I.$$

Now suppose that there is at least one free retailer ($M_f \geq 1$). If E is high quality, then, because $Q_H > Q_I$, price competition ensures that I prices at marginal cost and E serves the market at price $Q_H - Q_I$. E's profits, gross of fees paid to secure retailer participation, are

$$(1 + \theta)(Q_H - Q_I).$$

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[3]To elaborate, if marginal costs were positive, then—even in the absence of uncertainty—a firm with no equilibrium market share would be indifferent to charging all prices in some range beneath its marginal cost. Because there are quality differences between the firms, there would be a range of equilibria where the lower quality firm charges beneath its marginal cost, and the higher quality firm still maintains a price above its marginal cost and keeps its market share. Assuming that it is always dominated to charge less than zero (for example, because some group would buy such a firm's product even if they did not intend on using it), setting marginal costs to zero eliminates this range of equilibria by ensuring the firm with zero market share charges exactly its marginal cost.

If E is low quality, then because $Q_L < Q_I$ it cannot have positive sales in equilibrium. Price competition leads to E pricing at marginal cost and I claiming the entire market in both periods at a price of $Q_I - Q_L$, for profits (gross of exclusivity fees) of

$$(1 + \theta)(Q_I - Q_L).$$

I prefers to exclude E so long as the cost is not too high, because this ensures it can maintain monopoly power. Maintaining an exclusionary equilibrium requires that I pays each retailer what it would expect to earn from being the lone retailer to spurn I's offer of exclusivity. By so doing, this retailer would ensure that E can compete against I as described above. Because E will only be able to secure positive profits if it is high quality, and because the defecting retailer can claim a proportion β of such surplus, the expected fee that a defecting retailer can claim is

$$\pi \beta (1 + \theta)(Q_H - Q_I).$$

Because securing exclusion requires paying this fee to each of the M retailers, I can (strictly) profitably exclude E if and only if

$$(1 + \theta)\left[\pi Q_I + (1 - \pi)Q_L\right] > M\pi\beta(1 + \theta)(Q_H - Q_I). \tag{1}$$

The left-hand side of Inequality (1) measures I's market gains from being a monopolist instead of facing competition, whereas the right-hand side measures the total exclusivity fees required to secure such a monopoly.

This leads directly to the following result.

Proposition 1. *Suppose that there is perfect information concerning product quality. If $\beta = 0$, then the incumbent excludes the entrant for any value of M, leaving consumers and downstream firms with zero surplus. However, if $\beta > 0$, then there exists a value $\hat{M}$,*

$$\hat{M} = \frac{\pi Q_I + (1 - \pi)Q_L}{\pi\beta(Q_H - Q_I)},$$

such that the following statements hold.

    (1) *If $M < \hat{M}$, the incumbent signs all downstream firms to exclusive contracts and monopolizes the market. Consumers receive zero surplus and each downstream firm earns positive profits.*

    (2) *If $M \geq \hat{M}$, the incumbent signs no downstream firms to exclusive contracts and the entrant serves the entire market in both periods if and only if it is of high quality. Consumers receive positive surplus and each downstream firm earns zero profits.*

Proposition 1 indicates that whether or not exclusion arises in equilibrium depends on the number of existing retail channels; when there are many, it is prohibitively expensive for I to exclude E whenever $\beta > 0$.

Additionally, Proposition 1 shows that the threshold $\hat{M}$ depends on two factors, these being the bargaining power β of a lone retailer negotiating with E, and a term that measures the relative gains and losses to I and E from exclusion, given by

$$\frac{\pi Q_I + (1 - \pi)Q_L}{\pi(Q_H - Q_I)}.$$

The numerator of this expression is I's per-period expected gain from excluding E, and the denominator is E's expected per-period profits. When this ratio is smaller, the range of exclusion as measured by $\hat{M}$ is smaller. Similarly, as β increases, retailers' ability to extract more rents at the bargaining table lowers the range of exclusion.

To gain a sense of the magnitude of $\hat{M}$, restrict attention to the case where $Q_L = 0$, so that $\hat{M}$ simplifies to

$$\hat{M} = \frac{Q_I}{\beta(Q_H - Q_I)}.$$

This is simply the ratio of the per-period profits of the incumbent as a monopolist to those of the (high quality) entrant as a duopolist, weighted by $1/\beta$.

We can see that if $\beta = 1/2$ and the entrant expects to earn profits half what I earns as a monopolist, so that $Q_I = 2(Q_H - Q_I)$, then $\hat{M} = 4$. If instead E's product constitutes an innovation significant enough that it can earn as much as I does as a monopolist, so that $Q_I = Q_H - Q_I$, then $\hat{M} = 2$—only when there is a downstream monopoly can I exclude E.

If $\beta = 1$, then even for the case of $Q_I = 2(Q_H - Q_I)$, exclusion only occurs in a downstream monopoly. The case of $\beta = 1$ case is of theoretical interest because it corresponds to the case where E offers all of its potential profits to a defecting retailer. Of course, as β becomes sufficiently small, $\hat{M}$ becomes infinitely large.

3.2. **Discussion.** Proposition 1 emphasizes the importance of the number of downstream retailers and the bargaining power of retailers in determining whether there is equilibrium exclusion or not; the number of existing retail channels, not merely the fact that any such retailers compete in price, is crucial.

I now explain how the modeling approaches adopted in the previous literature have downplayed these factors and led to seemingly conflicting results. Recall that Fumagalli and Motta (2006) argue that downstream price competition ensures that exclusion never arises, whereas Simpson and Wickelgren (2007) and Abito and Wright (2008) counter that exclusion always arises in such cases (or, if contracts can be breached, that the incumbent nonetheless secures monopoly profits), with Abito and Wright (2008) further arguing that exclusion also arises with weak downstream competition so long as suppliers can utilize two-part tariffs.

A key assumption made by all these authors is that upstream firms make take-it-or-leave-it offers to retailers. This shared assumption, along with a controversial assumption made

by Fumagalli and Motta (2006) about how many retailers will be present in the market if exclusive deals are signed, jointly explain the conflict.

To see this, suppose that E has a high quality good and that suppliers always make take-it-or-leave-it offers. When there is more than one retailer present at the stage in which retailers actually compete in the product market, this assumption (combined with other structural features of the market assumed by these authors) ensures that a retailer who spurns an offer of exclusivity from E earns zero rents. The reason is that the availability of the incumbent's product through other retailers serves as a binding constraint on the defecting retailer's ability to charge a markup over its wholesale price for E's good. E in turn exploits this by setting its wholesale price to capture all available industry surplus for itself.

In contrast, if a defecting retailer is the only retailer present at the product market competition stage, then it earns positive profits when E is high quality, even in the face of take-it-or-leave-it offers (assuming also that these contracts must be linear). The reason is that it is not constrained by the pricing of other retailers, yet has the option of selling I's product (obtainable at marginal cost) instead of E's, which means it has leeway to price above E's equilibrium wholesale cost.

These observations ultimately explain the different results in the literature. In particular, Fumagalli and Motta (2006) assume there are initially two retailers and that each must bear a (small) fixed fee to remain in the market. If one retailer accepts I's exclusive offer but the other does not, the one that has accepted has no hope of recovering the fixed fee and so will exit the market. Hence, a lone defecting retailer can expect to face no downstream competition and be able to support a retail price above E's wholesale price. Due to other parametric restrictions placed on the model, the consequent retailer profits are sufficient to ensure that exclusion is never profitable, leading Fumagalli and Motta (2006) to conclude that price competition destroys the prospect of exclusion.

Simpson and Wickelgren (2007) and Abito and Wright (2008) argue that it is unrealistic to assume that all but one retailer will exit in the scenario described by Fumagalli and Motta (2006); for example, a slight degree of product differentiation would ensure positive if small rents for I's product. Consequently, they argue that a lone defecting retailer cannot expect to earn meaningful rents. A similar conclusion is reached if upstream firms can offer two-part tariffs, even if retail price competition is weak, because such tariffs provide upstream firms with considerable leeway to extract rents from retailers. In either case, because retailers cannot earn rents from E if they spurn exclusive offers from I, I can lock retailers in at minimal cost exactly as in the literature that ignores downstream competition.

Although Simpson and Wickelgren (2007) and Abito and Wright (2008) are correct to argue that it is often more realistic to suppose that retailers carrying I's product will remain in the market, this criticism of Fumagalli and Motta (2006) is misplaced. Instead, the key

issue is that all of these authors assume that take-it-or-leave offers are made by upstream firms, and it is this assumption that is most unrealistic; there is little reason to believe that an upstream firm, perhaps especially a new entrant, would have complete bargaining power in negotiations with a single free retailer. (Note that there is no inconsistency in assuming both intense downstream price competition and retailer leverage over E at the bargaining table, because the bargaining scenario under consideration is where but a single retailer is available for E to bargain with.)

Allowing flexibility in the bargaining game is not only realistic, but also reconciles the conflict in the literature. The reason is that Proposition 1 admits both the case of costless exclusion present in Simpson and Wickelgren (2007) and Abito and Wright (2008) and the case of no exclusion present in Fumagalli and Motta (2006). Moreover, this resolution is provided without the assumption of retailer exit that is used by Fumagalli and Motta (2006).

More precisely, when β is small or actually zero, retailers are unable to claim much surplus if they spurn an offer of exclusivity, and so exclusivity arises even when there are many retailers, similar to what Simpson and Wickelgren (2007) and Abito and Wright (2008) suggest. But when β is sufficiently large, each retailer can command a steep fee for exclusivity and so exclusion will tend not to arise, similar to what Fumagalli and Motta (2006) suggest. Thus, everything else fixed, as β ranges from zero to one, the market outcome moves between the two extremes suggested in the literature.

In many cases, β is reasonably taken to be an intermediate value, in which case the equilibrium outcome lies between those suggested by the existing literature. That is, whether exclusion arises or not depends on whether there are sufficiently many retailers or not, with either exclusion or lack thereof being possible outcomes.

An alternative viewpoint is that Proposition 1 says that, so long as $\beta > 0$, Fumagalli and Motta (2006) are correct in their observation that exclusion is an unlikely equilibrium outcome when there is a highly competitive downstream, but only when the definition of "highly competitive" also means that there are sufficiently many downstream channels.

Indeed, as discussed directly after Proposition 1, for moderate values of β and other industry parameters, exclusion is not profitable for I even when M is fairly small. Although this is good news from a social perspective, I will show that the news is not so good when adverse selection is introduced; uncertainty over the quality of E has powerful effects on the equilibrium outcome. I turn to this issue below.

Before doing so, I note that retailers are beneficiaries of the exclusion of E in my model. That is, exclusivity provides a means for retailers to earn positive rents, whereas without exclusivity price competition drives retailer profits to zero. This stands in contrast to most previous

work, both that with and without downstream price competition, in which I typically is able to costlessly exclude E if it excludes at all.

There are two reasons why retailers may benefit from exclusion in my model but not in most previous work. First, in the articles that consider exclusive dealing in the absence of downstream competition, industry surplus is lower when exclusion occurs, and the incumbent is able to secure exclusion only by exploiting a contracting externality that exists among retailers. In contrast, in my analysis, industry surplus may be higher when exclusion occurs, due to the presence of downstream competition that passes surplus associated with quality improvements to consumers instead of industry players. Additionally, because retailers have positive bargaining power in my analysis, they may be beneficiaries of exclusion, whereas in previous articles that consider downstream competition upstream firms make take-it-or-leave-it offers that restrict retailers' ability to profit from exclusion.

4. Adverse Selection

I now incorporate adverse selection into the model. E's type is initially unknown to end consumers, but known to all other players. Additionally, in period two, consumers learn E's type with certainty. As mentioned earlier, E's type might always be thus revealed (regardless of consumer purchasing decisions in period one) if product reviews emerge in period two, or if some group of consumers in a separate market always purchase E's good and report their experiences to others.

I address the following questions. First, exclusive dealing aside, how does adverse selection influence market outcomes, including consumer welfare and the profits of other players? Second, how does adverse selection influence whether exclusive dealing is practiced or not—does it become more or instead less prevalent? Third, how does adverse selection influence consumer welfare and the firms' profits when exclusive dealing is permitted, and how does this compare to the effect of adverse selection when exclusive dealing is not allowed? That is, is there a meaningful interaction between asymmetric information and exclusive dealing?

Before moving into the analysis, I describe the nature of the equilibria that I will consider. A main goal of this paper is to assess how uncertainty over the quality of an entrant, which is resolved over time, influences market outcomes. As such, it is natural to consider equilibria in which the entrant's types are pooled in period one, and this is what I shall do.

There are many pooling equilibria, but I will only consider the one in which consumers make no additional inferences regarding E's type, no matter what actions are taken by other players. In other words, consumers act as if E is selling a product of known quality $\pi Q_H + (1 - \pi)Q_L$, both on and off the equilibrium path, in period one.

Although considering pooling equilibria is most in line with my goals, it is worth mentioning that there are no "natural" separating equilibria in this model. In particular, there is no separating equilibrium in which consumers always buy the product with higher quality and in which E makes positive first-period profits when it is high quality.

This is not driven by the assumption that both the high and low types have the same marginal cost. Instead, the reason is that $Q_L < Q_I$ and that E's type is always learned in period two. The first assumption implies that the low type would always mimic the high type if the high type were earning positive first-period profits, whereas the second assumption ensures that E would never choose to suffer first-period losses to prove its type to the market; these implications would continue to hold if the high type entrant had a higher marginal cost than the low type entrant. (Indeed, with differing marginal costs, it is also the case that I earns zero profits in any separating equilibrium.) Thus, in any separating equilibrium of the form suggested, E earns zero profits regardless of its type.

4.1. **Analysis.** Answering the questions posed above requires solving for the market outcomes in periods one and two. As before, if I signs all retailers to exclusive contracts then it prices as a monopolist in both periods. Gross of exclusivity fees, this is the best outcome for I and so an important question once again is how costly it is to lock up all retailers. However, a preliminary step to computing these fees is assessing market outcomes when there is at least one free retailer ($M_f \geq 1$).

So long as there is at least one free retailer, the second-period outcome is exactly as in the case without adverse selection, because E's quality is known with certainty then; if the entrant is high quality then it serves the market at price $Q_H - Q_I$, whereas if it is low quality then I serves the market at price $Q_I - Q_L$.

The first period is where adverse selection plays a major role. Because E's type is unknown, because (as mentioned above) I am considering pooling equilibria in which consumers hold their initial beliefs in period one for any observed actions, and because by assumption

$$\pi Q_H + (1 - \pi)Q_L < Q_I,$$

price competition leads to I serving all consumers. In particular, E charges marginal cost and I prices so as just to attract consumers to its product, with price $Q_I - [\pi Q_H + (1-\pi)Q_L]$.

Hence, an important effect of adverse selection is that E does not serve the first-period market, even if it is high quality. E's presence nonetheless constrains I's first-period profitability; rather than charging the monopoly price of Q_I, I must cut its price so that consumers are willing to forego the expected surplus of $\pi Q_H + (1 - \pi)Q_L$ that E offers.

With this preliminary analysis complete, I now examine how adverse selection influences consumer welfare and firm profits. To isolate the effect of adverse selection itself, for the

moment I assume that exclusive dealing is prohibited (or that the parameters are such that it does not emerge in equilibrium).

Proposition 2. *Suppose that exclusive dealing is prohibited. Introducing adverse selection has the following effects.*

(1) *I's profits decrease.*
(2) *Consumer surplus increases.*
(3) *E's profits fall.*
(4) *The sum of consumer surplus and industry surplus falls.*

It is intuitive and expected that E's profits and total surplus fall as a consequence of adverse selection, as indicated in items (3) and (4) of Proposition 2. After all, adverse selection means that E's product will not be consumed in the first period even if it is better than I's product, which is socially inefficient and also clearly bad for E.

What is surprising is that consumers gain and the incumbent loses from adverse selection, despite the very fact that E's product will not be consumed in the first period. This occurs because prices—and hence the surpluses offered by firms to consumers—are endogenous, which in turn ensures that the consumer and incumbent surplus functions are, respectively, concave and convex in Q_E, the quality of E's product.

Consider consumer surplus. Price competition ensures that consumers receive the full surplus that the firm with lower quality (or expected quality) can offer. Absent adverse selection, expected consumer surplus is $\mathrm{E}\min[Q_E, Q_I]$, whereas it is $\min[\mathrm{E}Q_E, Q_I]$ in its presence.

Because $\min[Q_E, Q_I]$ is concave in Q_E, Jensen's Inequality ensures that

$$\mathrm{E}\min[Q_E, Q_I] < \min[\mathrm{E}Q_E, Q_I];$$

consumer surplus is higher under adverse selection. Economically, this argument is simply that consumers don't gain when Q_E exceeds Q_I (because E will price to capture the additional gross surplus $Q_E - Q_I$) and so have concave preferences over Q_E and hence prefer the "sure thing" of $\mathrm{E}Q_E$ as a purchasing option rather than a gamble over Q_L and Q_H.

This is the opposite of what happens if both firms always price at marginal cost, so that the surplus offered by the firms is exogenously fixed. In that case, absent adverse selection, consumers receive the maximum quality the two firms can offer, $\max[Q_E, Q_I]$, which is convex in Q_E. Again applying Jensen's Inequality,

$$\mathrm{E}\max[Q_E, Q_I] > \max[\mathrm{E}Q_E, Q_I];$$

consumers would dislike adverse selection if prices were exogenous. Of course, prices are not exogenous, and so consumers benefit from adverse selection even though they end up buying lower quality products on average as a result.

Similar analysis applies to I's profits. It expects to earn either $\mathrm{E}\max[0, Q_I - Q_E]$ (when there is no adverse selection) or instead $\max[0, Q_I - \mathrm{E}Q_E]$ (when there is adverse selection). By convexity and Jensen's Inequality,

$$\mathrm{E}\max[0, Q_I - Q_E] > \max[0, Q_I - \mathrm{E}Q_E],$$

so that I is hurt by adverse selection. Economically, this argument is simply that I's profit stops falling once Q_E exceeds Q_I, so that it prefers the risk associated with E's type being known to the sure thing of E's quality being taken as $\mathrm{E}Q_E$.

Although the underlying logic of Proposition 2 is quite strong, there are certainly circumstances in which it would fail. For example, if there were a fixed cost of entry, imperfect information might lower E's expected payoffs sufficiently much to discourage such investment. In that case, the predictions of Proposition 2 would be overturned, with I favoring adverse selection and consumers being harmed by it. Farrell (1986) provides a canonical discussion of this type of possibility.

Thus, my analysis is suited to cases in which entry occurs but the overall viability of the entrant is limited by uncertainty regarding its quality. Although this is admittedly a subset of all possible scenarios, it is a highly important one; real-world exclusive dealing cases typically assess the extent to which existing players are weakened by exclusive dealing, as opposed to how exclusive dealing deters entry.

With Proposition 2 having isolated the effect of adverse selection itself, I now assess its effect when exclusive contracts are permitted. The first step is determining when exclusion occurs, which in turn requires computing the exclusivity fees.

If a single retailer were to defect from an exclusive regime by spurning I's offer of exclusivity, then in bargaining with E it could expect to extract

$$\pi\beta\theta(Q_H - Q_I).$$

Locking E out of the market requires that I pay this to each of the M retailers. So doing is profitable if and only if

$$\pi Q_H + (1 - \pi)Q_L + \theta[\pi Q_I + (1 - \pi)Q_L] > M\pi\beta\theta(Q_H - Q_I). \tag{2}$$

Inequality (2) provides the adverse-selection variant of Inequality (1); each contains the benefits to I of exclusion on the left-hand side and the retailer fees on the right-hand side.

Proposition 3. *Suppose that there is adverse selection concerning the quality of the entrant. If $\beta = 0$, then the incumbent excludes the entrant for any value of M, leaving consumers and downstream firms with zero surplus. However, if $\beta > 0$, then there exists a value $\hat{M}_{AS}$*

such that I excludes E if and only if $M < \hat{M}_{AS}$. Furthermore,

$$\hat{M}_{AS} = \hat{M} + \frac{\pi Q_H + (1-\pi)Q_L}{\pi\beta\theta(Q_H - Q_I)},$$

so that the range of exclusion is strictly larger under adverse selection: $\hat{M}_{AS} > \hat{M}$.

The first fact that Proposition 3 establishes is that there is a critical threshold $\hat{M}_{AS}$ such that exclusion occurs in equilibrium if and only if the number of retailers is less than it. The exception to this occurs when $\beta = 0$, in which case I is always able to monopolize the market. Thus, as was true under perfect information, the key determinants of whether exclusion occurs or not are the bargaining power of retailers and the number of retailers.

The second fact that Proposition 3 establishes is that adverse selection heightens the incentives for I to exclude E, with the result that $\hat{M}_{AS} > \hat{M}$. Exclusive contracts become more appealing to I, although adverse selection itself may be detrimental to I's profits (as shown in Proposition 2).

To understand why I is able to exploit adverse selection to exclude profitably when facing a larger number of retailers, consider how the benefits and costs to I of exclusion change with adverse selection. In particular, compare Inequality (1) to Inequality (2), leading to two key observations. First, whether there is adverse selection or not, I gains in both the first and second periods if E is excluded, because it can charge monopoly prices in that case—this is evident from inspection of the left-hand sides of these equations. In fact, I's first-period gain from exclusion is higher under adverse selection (a consequence of Proposition 2). Second, when there is adverse selection, E cannot seize first-period market share, whereas it could in the absence of adverse selection so long as it were high quality. This implies that a retailer who spurns I's offer of exclusivity expects to receive a smaller payment from E. Combined, these two facts imply that I excludes over a broader range of parameters when there is adverse selection.

A simpler explanation is that although I always benefits in both periods from the exclusion of E, whenever there is adverse selection it need only compensate retailers for the benefits it gleans in the second period; adverse selection allows I to exclude E "for free" in period one, with greater levels of exclusion being a consequence.

I now extend Proposition 2 by considering the welfare effects of adverse selection when exclusive dealing is permitted. Note that because that proposition also applies to the case where $M > \hat{M}_{AS}$ yet exclusive contracts are permitted (because such contracts would never be used in this region), I focus here on the case where $M \leq \hat{M}_{AS}$.

Proposition 4. *Introducing adverse selection has the following effects (when exclusive contracts are allowed).*

(1) *There exists an* $\tilde{M}$, *with* $\hat{M} < \tilde{M} < \hat{M}_{AS}$, *given by*

$$\tilde{M} = \frac{1+\theta}{\theta}\hat{M},$$

   such that for $M \leq \tilde{M}$, *I's profits increase. For* $M > \tilde{M}$, *I's profits decrease.*

(2) *If* $M \leq \hat{M}_{AS}$, *consumer surplus decreases.*

(3) *If* $M \leq \hat{M}$, *retailer profits decrease, but for* $\hat{M} < M \leq \hat{M}_{AS}$, *retailer profits increase.*

(4) *Overall surplus and E's profits always decrease.*

Proposition 4 complements Proposition 3 by further emphasizing that the impact of exclusive dealing is amplified by adverse selection; not only does exclusive dealing arise for a larger range of parameters, but welfare results change dramatically.

To wit, the availability of exclusive contracts implies that I benefits from adverse selection over a broad range of M (that is, whenever $M \leq \tilde{M}$), whereas we know from Proposition 2 that adverse selection alone always lower I's profits in this range; the combination of (the prospect of) exclusive dealing and adverse selection substantially reverses I's preferences for adverse selection regarding E. The rough intuition for this follows directly from the discussion of Proposition 3: the cost of exclusion falls because the entrant earns zero rents in period one, effectively allowing I to exclude costlessly for that period.

The full reasoning is more complicated. Although achieving exclusion is less costly, electing not to exclude E leads to lower profits. I therefore faces a tradeoff, as one option has become more attractive whereas the other has become less attractive. Although on balance these effects benefit I for many values of M, as M grows large enough the total costs of exclusion again become high enough that I is worse off due to adverse selection. Indeed, $\tilde{M} < \hat{M}_{AS}$ so that there is a range where adverse selection harms I even though I chooses to lock E out of the market (in fact, in the range $M \in (\tilde{M}, \hat{M}_{AS})$ consumers are worse off, too).

Although I often benefits from adverse selection, consumers are often harmed by it, as indicated in item (2). Indeed, these two results are closely connected; adverse selection harms consumers in a broad region of parameters precisely because exclusive dealing becomes more cost-effective for I, so that $\hat{M}_{AS} > \hat{M}$. Hence, consumers are more frequently left without access to the entrant's product.

The explanations for the remaining items of Proposition 4 are as follows. When $M \leq \hat{M}$, retailers can extract smaller fees from I, and hence are worse off. However, because exclusion may occur over a larger range of M, retailers benefit from adverse selection if it leads to their being able to reap some exclusivity fees when they otherwise would not; this happens

for $\hat{M} < M \leq \hat{M}_{AS}$. Finally, as expected, overall surplus and E's profits never benefit from adverse selection, because the range of exclusivity grows and because, even outside that range, E never gains positive market in period one.

4.2. **Discussion.** The most important result of this section is that adverse selection causes exclusionary contracts to emerge over a broader set of parameters, as detailed in Proposition 3. I will argue below that this increase in the range of exclusion can be significant, but first I provide additional insight into why the region indeed expands (so that $\hat{M}_{AS} > \hat{M}$).

Suppose that at the start of the game I makes two separate offers of exclusivity, one covering only the first period and the other covering only the second period. Denote the thresholds beneath which exclusion would occur by $\hat{M}^i$ and $\hat{M}_{AS}^i$, for $i \in \{1, 2\}$, in the case without and with adverse selection, respectively. Note that, as we would intuitively expect, the actual equilibrium values $\hat{M}$ and $\hat{M}_{AS}$ that emerge when I can make only a single long-term offer of exclusivity lies between the within-period thresholds.

Absent adverse selection, the only difference between the two periods is that the profits from the second one are assigned weight θ. Hence, the within-period gains to I from exclusivity are identical, and so are the within-period profits that E might earn if instead a retailer were free. Consequently, in each period the potential gains and the required fees to secure exclusivity are identical, meaning that exclusion would occur in exactly the same circumstances in period one as in period two: $\hat{M}^1 = \hat{M}^2 = \hat{M}$. By this same logic (and as confirmed in Proposition 1), $\hat{M}$ does not depend on the discounting as measured by θ.

When there is adverse selection, the second-period gains and costs of exclusivity to I are the same as when there is not, because E's type is always known at that time. That is, $\hat{M}_{AS}^2 = \hat{M}^2$. The situation is different in period one, as the costs of exclusion are lower (in fact they are zero) because E cannot earn profits that period. Additionally, the gains from exclusivity in the first period are higher; this is a consequence of I being hurt by adverse selection when exclusive contracts are ignored, as stated in Proposition 2, so that I is willing to pay more to reach the first-period monopoly outcome when there is adverse selection.

However, the fact that the first-period gains from exclusivity are higher is somewhat superfluous, as the costs of exclusion being zero is itself enough to ensure that $\hat{M}_{AS}^1 = \infty$. Because $\hat{M}_{AS}$ must lie between $\hat{M}_{AS}^1$ and $\hat{M}_{AS}^2 = \hat{M}^2 = \hat{M}$, it follows that $\hat{M}_{AS} > \hat{M}$, so that exclusion is more prevalent under adverse selection.

It can now be seen why the increase in the range of exclusivity, as measured by $\hat{M}_{AS} - \hat{M}$, may be sizable and impose a significant social cost. Most notably, this difference grows unboundedly large as θ becomes small, as is clear from Proposition 3. There are two elements to the intuition for this. First, as noted above $\hat{M}$ does not depend on θ, because $\hat{M}^1 = \hat{M}^2$.

Second, as θ becomes smaller, the threshold that emerges under adverse selection becomes more biased towards $\hat{M}_{AS}^1 = \infty$.

θ being small corresponds to the case where the market is afflicted by uncertainty over E's quality for a greater period of time relative to the length of the first period. Hence, whenever it takes a long time for the quality of E to be transmitted to the market, exclusion occurs over a much wider range. Observe that, even when θ is small, E serves an important market function in the absence of exclusive contracts, because E's presence disciplines I's first-period pricing. Indeed, the extent to which I is constrained is determined by the expected surplus E can offer in the first period, which is $\pi Q_H + (1 - \pi)Q_L$ and hence independent of θ. Furthermore, as indicated in Proposition 4, consumer welfare falls upon the introduction of adverse selection in the range $M \leq \hat{M}_{AS}$.

The arguments above also indicate that, were long-term exclusive contracts prohibited but short-term contracts allowed, adverse selection would ensure that I could always costlessly exclude E in period one by using a short-term contract.

Proposition 5. *Suppose that exclusive contracts covering period two are prohibited, but that exclusive contracts covering period one are permitted. Also, assume $\beta > 0$.*

    (1) *In the absence of adverse selection, I signs all retailers to exclusive contracts covering period one in exactly the same circumstances as when exclusive contracts covering both periods are permitted, that is, if and only if $M < \hat{M}$.*

    (2) *In the presence of adverse selection, I signs all retailers to exclusive contracts covering period one, for all values of M.*

Proposition 5 indicates that the presence of adverse selection has a particularly dramatic effect on equilibrium exclusion when only shorter-term contracts are feasible. Thus, even if E can ensure it has access to consumers in the second period, its ability to constrain I's pricing in the first period can be severely hampered by I engaging retailers in short-term contracts, with consequent cost to consumers.

A further implication is that, if I had the option of offering either short- or long-term contracts, it would always find it profitable to engage in some form of exclusive dealing. The reason is that, even if M were large enough for long-term contracts to be prohibitively expensive, short-term exclusion could still be achieved at minimal cost in the presence of adverse selection.

A related argument applies in cases where retailers may breach their contracts with I. Intuitively, if long-run contracts would be breached in equilibrium (at least if E turned out to be high quality), exclusivity could still have important welfare costs for consumers. The reason

is that retailers would have minimal incentives to breach contracts in the first period in the presence of adverse selection, due to E's inability to take market share from I at that time.

Although a complete analysis of contract breach would be too much of a diversion from the main goal of this paper (see Aghion and Bolton (1987) and Simpson and Wickelgren (2007) for careful work in which contract breach and breach payments play important roles), it is easy to formalize the above intuition in a rudimentary special case.[4] In particular, suppose that I can only offer long-term exclusive contracts and that these may be costlessly breached by any retailer in either period (so that, in particular, I cannot or does not sue for damages). Breaching a contract allows a retailer to negotiate with E exactly as in earlier analysis (as if it had never contracted with I). Breaching a contract in period one ensures that the retailer is free in both periods. I restrict attention to equilibria in which retailers breach their contracts whenever E is known to be high quality, and for brevity consider the case where $\beta > 0$.

Proposition 6. *Suppose that retailers can costlessly breach contracts, and that $\beta > 0$. For any M, I signs all retailers to exclusive contracts. Furthermore:*

(1) *If there is no adverse selection, consumers always have access to the entrant if it is high quality: contracts are breached in period one if the entrant is high quality.*

(2) *If there is adverse selection, consumers have access to the entrant's product only in the second period and then only if it is high quality: contracts are never breached in period one, and only breached in period two if the entrant is high quality.*

Proposition 6 shows that the ability of retailers to breach exclusive contracts changes but does not eliminate the power of such contracts to restrict E's ability to compete. Most notably, an entrant of high quality will always be able to reach the end consumer in the absence of adverse selection, but only in the second period when adverse selection prevails. Again, adverse selection leads to greater levels of equilibrium exclusion.

Indeed, for any value of M, competition is harmed in the presence of adverse selection because E is always excluded in the first period, whereas in the absence of the prospect of breach we know that for M sufficiently large the entrant would have access to the market regardless of its type. Hence, the prospect of contractual breach functions much the same as allowing I to offer contracts of limited duration, such as in Proposition 5. In either case, although E may gain access to the market in the second period, it is shut off from the first period market.

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[4]Note that Aghion and Bolton (1987) also discuss the prospect of adverse selection. Their main point in that portion of their analysis is that when I has better information about whether entry will occur than retailers, the contracts that I offers may serve as a signal of this information.

In the second period, however, the outcome with the prospect of breach differs from that when only shorter term contracts are permitted: even in the second period, I can exclude the low-type entrant for any value of M, when contractual breach is possible. In fact, this occurs whether there is adverse selection or not, because retailers do not breach their contracts when E is low quality. Moreover, the equilibrium exclusivity fees are zero.

The logic is as follows. Because retailers will choose to breach their contracts whenever so doing allows E to achieve positive market share, I is not buying exclusivity in those states. Rather, it is implicitly buying exclusivity only in states where E can gain no market share and hence has nothing to offer retailers. More precisely, in the case of no adverse selection, I is in effect only purchasing exclusivity in the case where E is low quality and hence E can offer retailers no fees if they breach their contracts with I, whereas in the case of adverse selection E can only earn positive rents if it is high quality and it is the second period, so that I is effectively purchasing (for free) exclusivity in all other circumstances.

I now discuss the robustness of my results. One might wonder what would happen if the expected quality of E's product exceeded Q_I, contrary to my assumption so far. However, so long as it remains the case that $Q_L < Q_I$, the qualitative nature of all results of this section still hold. Thus, assuming that $\pi Q_H + (1 - \pi)Q_L < Q_I$ mostly serves to provide an intuitive scenario and also restrict the number of cases that must be considered.

Consider, for example, the result that more exclusion occurs under adverse selection. Even removing the restriction that E receive no market share in period one under adverse selection, E still expects to earn lower overall profits in the first period in the presence of adverse selection.[5] Thus, even though adverse selection allows E to seize full market share in period one, the amount that E would offer to a retailer who has spurned I's offer of exclusivity is lower, so that I can again exclude over a broader range.

One might also wonder whether the assumption that $Q_L \geq 0$, so that the low product is no worse than the outside option, plays any role. If $Q_L < 0$, then it is still the case that adverse selection always (at least weakly) expands the range of exclusion.

However, if $Q_L < 0$ then there exists a value π^* such that if $\pi < \pi^*$, then the welfare results for I and the end consumer as stated in Proposition 2 are reversed. That is, I favors adverse selection in this case and consumers do not. Loosely speaking, the reason is that when $Q_L < 0$ the objective function of, say, E is convex in one region but concave in another, so that its preferences over dispersion of the entrant's type can go in either direction, depending on π. A sufficient but not necessary condition for such a reversal is that $\pi Q_H + (1 - \pi)Q_L < 0$, leading to the more concise intuition that with adverse selection E does not constrain I's pricing in period one, causing I to favor adverse selection.

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[5]This follows from the fact that $\pi Q_H + (1 - \pi)Q_L - Q_I < \pi(Q_H - Q_I) \iff Q_L < Q_I$, which always holds.

5. Retailer Reputation, the Intel Case, and the Puzzle of Partial Exclusion

Here I incorporate the possibility that retailers may help resolve the adverse selection problem. In so doing I show that an incumbent may gain from a policy of *partial exclusive dealing* in which only certain retailers are locked into exclusive deals. Surprisingly, or even paradoxically, the effect of such a policy is that, although the entrant has equal access to all consumers via competitive downstream channels, it is nonetheless disadvantaged in competition against the incumbent.

Additionally, I show that in at least one major antitrust case (the recent one against Intel) the theoretical arguments presented in this section appear to apply. That is, I present evidence from the antitrust proceedings that suggest that adverse selection, retailer reputation, and partial exclusive dealing were important elements.

It is natural that retailers may be able to help resolve the adverse selection problem. The reason is that they may be well established and hence have reputational capital to stake as a bond to vouch for the quality of the entrant, whereas entrants are frequently new players without established reputations. Additionally, retailers may be better able to ascertain the quality of a new product than the typical consumer is.

Indeed, the literature on middlemen (Biglaiser (1993), Biglaiser and Friedman (1994)) formally shows that intermediaries may stake reputational bonds to facilitate the acceptance of a new product into the marketplace. Although this seemingly is good news for entry, an important feature of this literature is that it abstracts away from the possibility that incumbent suppliers may be harmed by successful entry of other manufacturers. This is a notable omission because there is, of course, also a large literature examining the ability of incumbent suppliers to exclude new entrants by locking up intermediaries with exclusive contracts. This raises the question of whether intermediaries can be expected to promote efficient, high-quality supplier entry when incumbent suppliers can offer exclusive contracts.

5.1. **Details of the Intel Case.** Both the US and the EU alleged that Intel sought to weaken its primary rival AMD, with the EU further alleging that a specific goal was to lock up OEMs who could legitimize AMD by creating consumer trust in AMD's products.

Intel used two tactics to reduce the number of AMD units and products sold by OEMs. First, it engaged in formal exclusive dealing with some OEMs. Second, it used secret contractual terms that featured large rebates that kicked in only when a certain proportion an OEM's sales were of Intel chips. These tactics were used in conjunction with each other. Throughout this section, I will simply refer to "exclusive dealing" and not differentiate between these two

tactics. From the standpoint of the model, however, I continue to consider naked exclusion as in earlier analysis.

Authorities in both the US and EU concluded that these devices were designed specifically to lower the sales of AMD through the targeted OEMs. Both cases went against Intel, leading to significant restrictions and, in the EU, a fine exceeding one billion euros.

In the present context, properly capturing the Intel case requires accommodating two details. The first is that not all OEMs were signed to exclusive contracts, but instead only a select few. Moreover, which submarkets the exclusivity provisions affected varied by OEM. For instance, whereas there was a broad exclusivity agreement with Dell (which only sold Intel-based systems until 2006), the agreement with Hewlett-Packard (HP) covered only corporate desktops, whereas terms with Acer and Lenovo covered only notebooks. The net effect is that AMD's products were still readily available to end consumers. Yet, AMD was unable to achieve significant share in the affected markets.

Of course, a simple explanation for AMD's failings is that their products were objectively of such low quality that few consumers demanded them. There are at least two problems with this explanation. First, there is evidence that AMD's chips were actually high quality, and that specifically they had been improving in the timeframe of relevance (the early-to-mid 2000s). Although I do not summarize this evidence here, it is documented in the EU's Committee decision regarding Intel.[6] Second, there is evidence that Intel perceived AMD as a potential threat, and engaged in exclusive dealing as a response to such improvements by AMD. Most particularly, why would Intel go to the effort and expense of engaging in exclusive contracts with certain OEMs if AMD's chips were so bad? In any event, both the US and EU antitrust authorities rejected efficiency-based explanations for Intel's exclusive dealing and concluded the practice was anticompetitive.

Thus, this first detail represents a puzzle—how can a policy of partial exclusion, in which an entrant's products (in this case, AMD's) remain readily available to end buyers, impede E's ability to compete effectively with an incumbent (in this case, Intel). I will show that a resolution to this puzzle builds on a second additional detail of the Intel case.

This second detail is that there is seemingly asymmetry among OEMs' ability to legitimize new products. That is, OEMs have differing amounts of reputational capital to stake on an entrant being high quality, with some being more capable of doing so in certain segments than others, and with others (including but not limited to discount or so-called "white box" OEMs) being generally incapable of doing so at all.

Among other specifics, the EU report mentioned above writes (p. 455),

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[6]I am referring to the provisional, non-confidential European Commission Decision of May 13, 2009.

> "[T]he largest OEMs have a greater ability to legitimise (that is to create consumer trust in the capabilities of a new product) a new x86 CPU in the market, and hence provide an important springboard for a x86 CPU supplier that wants to significantly increase its penetration in the market."

Thus, this report directly acknowledges both the presence of uncertainty amongst consumers regarding AMD's quality, and the role of OEMs in resolving this issue in the minds of consumers. The report makes it clear that Dell and HP are the two OEMs that are most significant in this regard. Also, in reference to HP's contemplated (but ultimately sidelined) introduction of an AMD-based line called the D315, the report writes (p. 456),

> "Intel itself expressed concern that success for AMD with HP corporate desktops would lead to a 'spillover possibility of D315 products into corporate space 'legitimizing' AMD platform.' "

And (p. 456),

> "The flip-side of large OEMs' importance in legitimising a product is that smaller OEMs are not able to do so in the same way. This is explicitly recognised by one such OEM, Fujitsu Siemens, which in 2006, although it was the next largest OEM after IBM in terms of market share...expressed concerns vis-à-vis AMD that it saw itself 'as too small to legitimize AMD for enterprise.' "

5.2. **Explaining the Intel Case: Model Changes and Analysis.** To incorporate these details, and ultimately to offer an explanation for a profitable policy of partial exclusion, I extend the model with adverse selection in two ways. First, I assume that there are two types of retailers, those with reputational capital and those without. Specifically, I suppose that there is a single retailer (retailer 1) with a stock of (exogenously given) reputational capital $r > (Q_H - Q_I)/\theta$ that it may choose to stake as a bond on the quality of the entrant, and that all other retailers (retailers $2, ..., M$) have zero reputational capital.

The payoff to retailer 1 is augmented as follows. If it carries E's product in the first period, and E is low quality, then it loses the value r in period two. This serves as a reduced-form reputational capital story; my goal here is merely to assess how the presence of a firm with such capital influences market outcomes, not to provide a detailed story of the origin of retailer reputation.

Second, I assume that the low-type's product provides no surplus above consumers' outside option, so that $Q_L < 0$, and moreover that $\pi Q_H + (1 - \pi)Q_L < 0$; this implies that consumers with only their prior beliefs about E's quality would not substitute to E's product if I's were

unavailable. Although this assumption is stronger than required to explain partial exclusion, it simplifies the explanation and intuition.[7]

As discussed at the end of Section 4, under these conditions the predictions of Proposition 2 are reversed: I benefits from the presence of adverse selection when exclusive dealing is prohibited, and consumers are worse off. The reason is that, under this parametric restriction, E does not meaningfully constrain I's pricing when there is adverse selection in period one.

In the Intel case, it is probably reasonable to suppose that this outside option is a lower quality or previous generation Intel chip that is sold to a market distinct from the one under consideration, and whose price can be taken as fixed for purposes of this analysis. For instance, if the main market is corporate buyers, than the outside option might be a chip marketed to non-corporate consumers with lower preferences for quality.

I now explain that the presence of reputational capital serves the role expected, so long as exclusive contracts are prohibited. In particular, there exists a separating equilibrium in which retailer 1 carries E's product if and only if it is high quality.

To see that this is so, suppose that consumer beliefs are such that they infer quality based solely on whether 1 carries E's product or not. If E turns out to be low quality, E would still wish 1 to carry its product, because so doing would ensure that it could capture the first-period market. However, because E's quality would be revealed to be low in the second period, it would earn no profit there. Hence, if E could convince 1 to carry its product in period one, it would secure gross profits of $Q_H - Q_I$.

Of course, 1 would sacrifice its reputational capital r in period two by carrying a product it knows to be low quality in period one. Hence, so long as $\theta r > Q_H - Q_I$, 1 will not agree to do this, and a separating equilibrium can be maintained.

Therefore, as expected, the presence of retailer reputational capital leads to the same outcome as if there were no adverse selection whatsoever—so long as exclusive dealing is prohibited. Recall, from the discussion at the beginning of Section 4, that in the absence of retailer reputation there is no such separating equilibrium. Hence, retailer reputation serves an important role, absent exclusive dealing.

I now examine what happens when exclusive dealing is allowed. To bias the case in favor of the entrant, I assume that consumer beliefs are based only on what retailer 1 does, in the following manner. Whenever 1 is not signed to an exclusive deal, consumers believe E is high quality if 1 carries its product but believe it is low quality otherwise. However, if 1 is locked into an exclusive contract, consumers maintain their prior beliefs.

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[7]Partial exclusion is profitable for some parameters even when $\pi Q_H + (1-\pi)Q_L$ is positive, so long as $Q_L < 0$. Thus, it need not be the case that E presents zero competitive threat in expectation, although a product known to be low quality must be worse than the outside option.

Proposition 7. *Consider the model described above in which there is retailer reputational capital. If $\beta > 0$ and $Q_I > Q_H - Q_I$, then there exists a value $\hat{M}'_r$ such that*

    (1) *for $M \leq \hat{M}'_r$, all retailers sign exclusive contracts with I, and I monopolizes the market in both periods.*

    (2) *For $M > \hat{M}'_r$, only retailer 1 signs an exclusive contract with I, and all other retailers carry E's product in both periods. Nonetheless, E's type is not learned by consumers in period one, and I prices as a monopolist in that period, serving the entire market. In period two, E serves the market if it is high quality, but otherwise I does.*

5.3. **Discussion.** Proposition 7 confirms that I may gain through a policy of partial exclusion. Such a policy entails locking up only the retail segment with reputational capital, and emerges when the number of (zero-reputation) retailers grows large enough that full exclusion becomes too costly. Indeed, this strategy remains profitable even when the retail segment grows so competitive that there are infinitely many zero-reputation retailers, a sharp contrast to earlier analysis in which there was always some threshold level of retail competition beyond which exclusive contracts served no role.

The prospect of partial exclusion is very much in contrast to what the existing literature has suggested. In the existing literature, there is no possible gain from partial exclusive dealing if the downstream market is competitive, because so doing does not restrict the entrant's access to the end consumer. And, when the downstream market is not competitive, there is no reason not to exclude in all markets, and moreover exclusion typically goes hand-in-hand with deterring the entrant from making an investment to enter the market in the first place.

Yet, as suggested by the Intel case, partial exclusion is a realistic market outcome. Indeed, in most exclusive dealing cases, the incumbent does not lock up the entire market. Thus, understanding partial exclusion is important from both theoretical and practical perspectives.

In resolving the puzzle of partial exclusion, Proposition 7 shows that exclusive contracts may be valuable anticompetitive devices even when they do not deter entry or limit consumers' ability to physically obtain an entrant's good. Such was certainly the situation in the Intel case, in which AMD's products were widely available, but realized few sales. Indeed, as suggested by the earlier quotations from the EU decision, it is precisely those firms that were considered to have the ability to legitimize AMD in certain submarkets that Intel sought to lock into exclusive deals for those submarkets.

Partial exclusion is effective because it stalls learning about E's quality, which renders E an ineffective competitor in period one. That is, locking up retailer 1 ensures that consumers maintain their prior expectation of E's quality in period one, which is assumed here to be sufficiently low so as not to constrain I's pricing (even though E's product is available for purchase at all other retailers). Note that this so even though, by assumption, consumer

beliefs off the equilibrium path are such that E would be inferred as high quality if 1 carried its product. In other words, it is not merely the case that there exists an equilibrium in which E's types are pooled, but rather that there does not exist an equilibrium in which separation occurs and E profits in period one.

Exclusive contracts therefore allow I to curtail dramatically the effectiveness of retailer reputation in resolving adverse selection concerning an entrant. This is similar in spirit to Proposition 3, which showed that adverse selection raises the retailer threshold beneath which exclusion occurs; once again we see that there is a potent interaction between adverse selection and exclusive dealing.

The good news is that, if E is high quality, it is able to seize market share in period two; learning is slowed but not stopped. Unfortunately, there is little guarantee that this learning will happen quickly—θ may be small, or even zero if the exogenous learning in period two posited in the model is unrealistic in the market in question. If most consumers ultimately depend on trusted retailers to vouch for the quality of a product before trying it (whether in period one or two) then locking up key retailers may dramatically limit E's appeal in both periods, so that the anticompetitive power of partial exclusion becomes even stronger.

There is more bad news. First, in markets with rapid innovation and successive generations of products, such as the CPU market, it may be that delaying learning about E's quality for even a moderate period of time is sufficient for I to maintain long-term monopoly pricing power. The reason is that, depending on exactly how learning works, consumers may never learn enough about a given generation of E's products to reach the conclusion that future generations will be high quality.

Second, if E must bear fixed costs of innovation and entry, partial exclusion will reduce the incentives for E to invest. In the semiconductor industry, this is a plausible concern, because designing chips is extraordinarily costly, as is building efficient manufacturing facilities.

Third, the prospect of I partially excluding E remains even if the timing of the game is changed so that E can counter I's offers of exclusivity to retailer 1. I's continued ability to exclude E follows from the assumption that $Q_I > Q_H - Q_I$, so that the value of the incumbent's monopoly is greater than E's duopoly value, so that I will outbid E to lock up retailer 1. Note that, in Proposition 7, although E cannot explicitly bid against I, the role of this assumption is as if it could. That is, this assumption guarantees that for any $\beta > 0$, I can pay retailer 1 more than this retailer can expect to get from E by spurning I's offer. In particular, this is so for $\beta = 1$ so that retailer 1 expects fully to extract surplus from E if it spurns I's offer (which is the most E would ever propose as a counteroffer).

Because AMD was already present when Intel extended exclusivity deals to certain OEMs, it is reassuring to know that Proposition 7 is robust to the possibility of the entrant making

counteroffers to the incumbent's offers of exclusivity. Indeed, in many actual exclusive dealing cases, the firms adversely affected by exclusivity deals are already present in the market, in contrast to the modeling assumptions made in most of the literature.

Note that, in my model and also in the existing literature, downstream competition is required for exclusion to remain an equilibrium outcome, if the entrant is able to make counteroffers. This follows from the fact that, in the absence of downstream competition, competition between the entrant and the incumbent does not dissipate industry profits, because each retailer can capture such profits by virtue of its monopoly position. Therefore, given that the entrant is higher quality or more efficient, it would always be willing to match any exclusivity fee offered by the incumbent to end retailers.

The lessons of Proposition 7 extend beyond the Intel case, and influence how regulators ought to assess the competitive harm wrought by exclusive contracts. The key point is that locking up certain downstream players may be more important in effectuating exclusion, and that locking only such players up may have powerful effects due to the presence of adverse selection. There are undoubtedly other informational environments that would sustain similar conclusions.

For instance, suppose that there is no adverse selection but that consumers only become aware of new products if they are carried by certain large retailers. Then, even if there exists a highly competitive fringe of smaller retailers to whom consumers look for comparison pricing, exclusive contracts with the large retailers can have a significant effect. To wit, locking up such retailers may prevent an entrant from gaining any sales; even though its products are available on the shelves of fringe retailers, consumers are simply unaware of it.

Thus, whether it be that consumers must discover new products at certain retailers or that consumers rely on the reputational capital of retailers, the general point is that different downstream channels serve different roles, and an incumbent supplier can weaken an entrant by locking up only a key group of downstream players—the mere existence of free channels doesn't imply that observed exclusivity elsewhere does no competitive harm.

This is in contrast to how some antitrust authorities assess exclusive deals, and suggests that the current mode of assessment is flawed, at least in some circumstances. For example, on its website, the Federal Trade Commission (FTC) addresses (in a question and answer format) the hypothetical case of a flatpanel monitor manufacturer.[8]

> Q: I am a small manufacturer of high-quality flat-panel display monitors.
> I would like to get my products into a big box retailer, but the company

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[8]See www.ftc.gov/bc/antitrust/exclusive_dealing.shtm. I have added the emphasis. The omitted text refers to the prospect of a Marvel-style pro-competitive effect of exclusivity.

says it has an agreement to sell only flat-panel display monitors made by my competitor. Isn't that illegal?

A: Exclusive distribution arrangements like this usually are permitted.... *As long as there are sufficient outlets for consumers to buy your products elsewhere, the antitrust laws are unlikely to interfere with this type of exclusive arrangement.*

In contrast to the FTC's assessment, Proposition 7 shows that exclusive contracts are powerful tools for preventing retailers from using the trust placed in them by consumers to facilitate the market success of an entrant. Indeed, to the extent that big box retailers are most likely to have significant reputational capital, this hypothetical example of policy in action is particularly problematic.

Antitrust law that ignores the important role of retailers in legitimizing new products in the minds of consumers is misguided. Instead, policy ought to recognize this special role, and recognize that exclusive contracts that lock up such retailers may cause significant harm, even if other retail outlets are available.

Appendix

Proof of Proposition 1:   Because the case of $\beta = 0$ is more straightforward, I consider only the case of $\beta > 0$ here. Suppose that $M < \hat{M}$ and that there is no equilibrium exclusion, so that $M_f \geq 1$ on the equilibrium path. As shown in the text, I would be be willing to pay (slightly more than) $\pi\beta(1+\theta)(Q_H - Q_I)$ to each retailer if so doing would secure exclusion. If I made such offers to all retailers, they would be accepted. The reason is that a given retailer expects less than this fee in any continuation game because if $M_f > 1$ the marginal contribution of any free retailer to E's profits is zero, whereas if $M_f = 1$ the expected contribution is $\pi(1+\theta)(Q_H - Q_I)$, of which the free retailer expects to gain a share β.

Suppose instead that $M > \hat{M}$. It was shown in the text that no exclusionary equilibrium could exist in this case, so I must merely show that some equilibrium indeed exists in which no retailer signs an exclusive contract. Consider any continuation game in which I offers exclusivity contracts for a fee of $w > 0$, and define the retailer strategies as follows. If $w \geq \pi\beta(1+\theta)(Q_H - Q_I)$, all retailers accept the offer, but for any smaller value of w all retailers except retailer 1 accept the offer. If $w = 0$, all retailers reject the offer.

Given these strategies, it is optimal for I not to make any exclusivity offers, because exclusion can only be secured by offering each retailer more than $\pi\beta(1+\theta)(Q_H - Q_I)$, which amounts to a total cost exceeding the gain. Retailers are also optimizing. Most particularly, for $w < \pi\beta(1+\theta)(Q_H - Q_I)$, because retailer 1 is rejecting the offer, and thereby securing a fee greater than w from E, all other retailers are better off accepting I's offer because instead

rejecting it will lead to $M_f > 1$ so that any retailer who has rejected I's offer receives zero from E. ∎

Proof of Proposition 2: Parts (3) and (4) are immediate because adverse selection leads to E's product only being consumed if it is high quality and it is the second period, whereas in the absence of adverse selection E's product is consumed in both periods if it is high quality.

Parts (1) and (2) follow from Jensen's Inequality as explained in the text, where the strictness of the inequality follows from the parametric assumptions (such as $Q_L < Q_I < Q_H$). ∎

Proof of 3: Because consumer beliefs are specified, both on and off the equilibrium path, so that consumers maintain their prior beliefs concerning E, the situation is as if there were perfect information and E were selling a product of quality $\pi Q_H + (1 - \pi)Q_L$. Hence, the arguments from the text combined with details from the proof of Proposition 1 apply here with minimal modification, and so I only demonstrate the claim that $\hat{M}_{AS} > \hat{M}$. Direct computation from Inequality (2) shows that

$$\hat{M}_{AS} = \frac{\pi Q_H + (1 - \pi)Q_L + \theta[\pi Q_I + (1 - \pi)Q_L]}{\pi \beta \theta (Q_H - Q_I)} = \hat{M} + \frac{\pi Q_H + (1 - \pi)Q_L}{\pi \beta \theta (Q_H - Q_I)},$$

using the definition of $\hat{M}$ from Proposition 1. ∎

Proof of 4: Items (2)–(4) are explained in the text, and so I will only prove Item (1) here. To show that $\tilde{M} \in (\hat{M}, \hat{M}_{AS})$, note first that when there is adverse selection I's payoffs are strictly decreasing in this range. The reason is that I is excluding E in this range and the cost of securing exclusion increases with M.

Second, note that at $M = \hat{M}$, I is strictly better off under adverse selection. The reason is that in the absence of adverse selection I is indifferent to excluding E or not, and because adverse selection strictly lowers the cost of exclusion for any given number of retailers (and of course the gross profits associated with exclusion do not depend on whether there is adverse selection or not, because in either case E provides no competition).

Third, note that at $M = \hat{M}_{AS}$, I is strictly worse off under adverse selection. The reason is that in the presence of adverse selection I is indifferent to excluding or not, and because Proposition 2 implies that when I does not exclude it is worse off under adverse selection.

Hence, the exact value of $\tilde{M} \in (\hat{M}, \hat{M}_{AS})$ which makes I indifferent between whether there is adverse selection or not can be computed by finding the value of M such that I is indifferent between not excluding in the absence of adverse selection and excluding in the presence of

adverse selection. The first returns a payoff of

$$(1 + \theta)(1 - \pi)(Q_I - Q_L),$$

whereas the second returns

$$(1 + \theta)Q_I - \pi\beta\theta M(Q_H - Q_I).$$

Equating these and doing some minor algebra yields the result, appealing to the value $\hat{M}$ from Proposition 1. ■

Proof of Proposition 5: The proof follows directly from the discussion in the text. ■

Proof of Proposition 6: Suppose that there is no adverse selection. Then, if the entrant is high quality at least one retailer must breach its contract with I in period one, because by so doing it ensures a positive payment from E and suffers no loss from breaking its contract with I. On the other hand, if E is low quality, it is weakly optimal for all retailers not to break their contracts in either period. Also, note that retailers will agree to such exclusivity contracts for any fee, no matter how small, because they can always break them. Finally, because I benefits from exclusion in period one if E is low quality, contracts are signed for any value of M.

Now suppose that there is adverse selection. In period two, at least one retailer must breach its contract if E is high quality. Hence, it is weakly optimal for all retailers to breach their contracts at that time if they have not breached in period one. On the other hand, there is no gain from breaching if the entrant is the low type. Hence, specify that all retailers break their contracts in period two, but only if E is high quality.

Now consider period one. Because all other retailers will breach in period two if E is high quality, there is no gain for a retailer to breach in period one, because E cannot seize positive profits in that period given that E's type is still unknown. Hence, it is an equilibrium for retailers to breach their contracts only in period two, and then only if E is high quality. Moreover, as in the case of no adverse selection, I can sign up retailers for zero cost, because retailers always have the option to break their contracts. ■

Proof of Proposition 7: Consider the incentives of any retailer to spurn an offer of exclusivity from I, given that all other retailers are accepting such an offer. For any retailer besides 1, doing so has no impact on E's first-period profits, which will continue to be zero because consumer beliefs will not adjust to give E first-period market share. Hence, as in the analysis of Section 4, in which there is adverse selection, such a retailer expects to earn

rents associated with E's second-period profits. I must pay each of these retailer a fee of

$$\pi\beta\theta(Q_H - Q_I).$$

Retailer 1 must be paid more, because it could spurn I's offer and guarantee E first-period sales, at least if E turns out to be high quality. The reason is that beliefs are specified so that retailer 1 rejecting I's exclusive offer and carrying E's product leads consumers to believe E is high quality. Hence, 1 must be paid a fee of

$$\pi\beta(1 + \theta)(Q_H - Q_I),$$

exactly as in the analysis of Section 3, in which there is perfect information. It is evident that there is some threshold level of retailers beneath which full exclusion is more profitable than no exclusion, and that I can profitably offer fees sufficient that all retailers will find it dominant to accept exclusivity deals.

Now consider partial exclusion, in which only retailer 1 is signed to an exclusive deal. The net gain to I, relative to no exclusive dealing whatsoever, is

$$\pi Q_I - \pi\beta(Q_H - Q_I).$$

The first term represents I's increased profits resulting from ensuring that consumers do not learn E's type in period one. This lets I price as a monopolist in that period regardless of E's actual type, whereas without signing 1 to an exclusive deal, I would only be able to price as a monopolist if E were low quality. (I earns no additional profits in period two by locking 1 into an exclusive deal, because in this case other retailers are free in that period and E's type is always known in period two.) The second term represents what I must pay to 1 to secure exclusivity. Note that this term only captures E's profits from period one, because E can secure second-period profits without retailer 1's assistance, because by assumption other retailers are not signed to exclusive deals.

Clearly, a sufficient condition for partial exclusion to be preferred to no exclusion, for any β, is that $Q_I > Q_H - Q_I$. Moreover, I can profitably make an offer to retailer 1 that will be dominant to accept.

Finally, because the profits of partial exclusion are always positive and independent of M, and because the profits of full exclusion are decreasing with M and eventually negative, the Proposition follows. ∎

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