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ORIGINAL ARTICLE

The strategic impact of voluntary vs. mandated vertical restraints and termination restrictions on exclusion of rivals

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Abstract
It has been shown that manufacturers can employ vertical practices and restraints to prevent entry in markets where upstream entrants require downstream accommodation. I show that if downstream product investment is important and encouraged by the restraint, foreclosing entry this way may not be credible. Additionally, publicly mandated vertical restraints and termination restrictions could prevent foreclosure, but if these restrictions reduce downstream product investment, they could have the opposite effect and decrease entry.

Keywords Vertical restraints · Entry · Antitrust · Regulation

JEL Codes L12 · L42 · L51

1 Introduction

Many models explore how exclusivity in contracts may be employed to foreclose entry of rivals into markets.[1] Outside of work examining the use of exclusive contracts, relatively little theoretical work examines how other vertical practices and restraints relate to entry, with Asker and Bar-Isaac (2014) being a notable exception. Additionally, public policy often puts restrictions on vertical practices by mandating conduct regarding these vertical restraints or restrictions. These mandates may come in the form of franchise termination laws (which restrict firms from terminating, altering or non-renewal

[1] Aghion and Bolton (1987) is a classic example. See Rey and Tirole (2007) and Rey and Verge (2008) for summaries of this literature.

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of contracts), vertical divestiture or divorcement laws [such as in Vita (2000) and Kwoka et al. (2010)], or bans of certain vertical practices (such as banning the use of slotting fees, resale price maintenance, or exclusive territories). Alternatively, some public policies come in the form of mandates that *require* the use of a vertical restraint such as exclusive territories (see Sass and Saurman 1993; Lafontaine and Scott Morton 2010; Burgdorf 2019), resale price maintenance (Ornstein and Hanssens 1987), and other policies.[2]

The ambiguous nature of the impact of vertical practices and restraints is well known in the economic literature and was noted in the *Leegin* case, which overturned the per-se illegality of minimum resale price maintenance (RPM) established by the *Dr. Miles* case.[3] The majority ruling wrote,

> Vertical agreements establishing minimum resale prices can have either procompetitive or anticompetitive effects, depending upon the circumstances in which they are formed.[4]

This paper addresses some of these circumstances and presents a model that incorporates both anti- and pro-competitive uses of vertical restraints, including but not limited to RPM. The model considers under which equilibrium conditions the use of vertical practices may be used to foreclose entry or promote efficiency and how public mandates may alter this behavior. Using the baseline model of Asker and Bar-Isaac (2014), I first consider the setting in which entry may be prevented due to the use of vertical restraints. I then extend the model to consider mandates of vertical restraints which restrict firms from threatening termination of the contract or contractual provision and the effects this has on downstream product investment.

The baseline model of Asker and Bar-Isaac considers a setting in which an incumbent monopolist sells to many downstream retailers. An upstream rival wishes to enter the market, but in order to do so, it must be accommodated by a downstream retailer. The monopolist may be able to prevent entry by using a vertical restraint to transfer a stream of quasi-rents to the retailers downstream (via RPM, slotting fees, etc.) thus raising the retailers' profits. This transfer enables the monopolist to credibly threaten that if entry is accommodated by retailers, they will terminate this stream of quasi-rents and lower retailers' profits. If the quasi-rent stream the monopolist is willing to pay to the retailers to prevent entry is greater than what the entrant is willing to pay to enter, retailers will not accommodate new manufacturers in order to ensure that the payment of quasi-rents from the incumbent continues, and entry can be deterred.

This model is then extended in two dimensions that are applicable to industry settings and complementary to the baseline. First, vertical restraints that provide a stream of quasi-rents to downstream firms may be used to induce non-contractible downstream product investments, promotions, or services. This has both theoretical and empirical support; see for examples Telser (1960), Marvel and McCafferty (1984), Klein and Murphy (1988), Klein and Wright (2007), and Zanarone (2009). In these

[2] I adopt the distinction between mandated versus voluntary use of vertical restraints made in a summary of the empirical literature regarding vertical restraints in Lafontaine and Slade (2008).

[3] *Dr. Miles Medical Co. v. John D. Park and Sons*, 220 US 373 (1911).

[4] Leegin Creative Leather Products, Inc. v. PSKS, Inc., 551 US 877 (2007).

settings, vertical restraints are used to align incentives between upstream and downstream firms. For example, an exclusive territory assigned to a downstream retailer by an upstream manufacturer may prevent other retailers from free-riding off of costly services and investments that improve the products. I incorporate this into the model, so the use of restraints could serve either pro- or anti-competitive purposes. Asker and Bar-Isaac suggest that when such services are relevant, the elimination of the restraint, if it is associated with lower services, would result in a trade-off similar to Williamson (1968) between efficiency gains of entry of a more efficient producer and efficiency losses of lower services. However, I show that under some conditions, when downstream product investment is sufficiently important for the monopolist, the threat that prevented entry in the baseline model is not credible. In these cases, elimination of the restraint would not result in a trade-off as entry deterrence would not occur—thus only efficiency losses would occur. I characterize equilibrium conditions for when this threat is credible.

Additionally, I consider mandates that apply to all firms in the industry, as is common in many cases. These mandates restrict the legality of termination of the contract or restraint and remove the threat that the monopolist employs to prevent entry in the baseline model. The mandates in the baseline setting would thus increase entry. However, a mandate also removes the threat to terminate the stream of quasi-rents if downstream firms shirk on investments for both the monopolist and the entrant. If a mandate sufficiently reduces downstream product investment, entry may become less profitable and decrease, which impacts the trade-off discussed above. Thus mandates have an ambiguous effect on entry, and I examine equilibrium conditions that would make mandates more likely to increase or decrease entry.

This paper also addresses a point raised in Cooper et al. (2005a). They argue that "...it is difficult to distinguish welfare-enhancing from welfare-reducing vertical practices based on evidence because the theory of vertical control tells us only that anticompetitive effects are possible. Until theory can be used to determine how likely it is that a restraint will lead to an anticompetitive outcome, it does not give us a way to interpret evidence in most cases." Understanding when vertical restraints are likely to have a pro- or anti-competitive effect is of importance, especially given a lack of consensus with regard to antitrust treatment regarding vertical restraints.[5] One goal of this paper is to bridge some of this gap by examining a theoretical basis for when vertical restraints are likely to be pro- or anti-competitive when downstream services are important and they can be used to prevent entry.

Section 2 details the baseline model of Asker and Bar-Isaac (2014), Sect. 3 extends the model to include downstream product investment, Sect. 4 describes the legal restrictions regarding vertical contracts considered in this paper and incorporates them into the model, Sect. 5 includes a discussion, and Sect. 6 concludes.

[5] While US antitrust authorities have taken a more lenient stance over time regarding vertical restraints, European antitrust authorities tend to be stricter than the US (Cooper et al. 2005b).

2 Baseline model

I begin with the baseline model proposed by Asker and Bar-Isaac (2014) and describe the structure of their model and results before extending the model to include downstream product investment and public mandates. In their baseline model, an incumbent monopolist transfers rents through vertical restraints to downstream retailers in a lump sum payment each period in an infinitely repeated game. The game begins at $t = 1$ in state M (incumbent monopolist). An incumbent monopolist upstream firm sells a good to $n \geq 2$ downstream retailers (which are perfect substitutes for each other) and absent any entry earns π_i^M as a monopolist. A potential upstream firm considers entry, but to enter, it must be accommodated by a downstream retailer to enter, and it must pay a fixed entry cost, F_e. If entry occurs, the game transitions to state C (post-entry competition), and the incumbent and entrant earn π_i^C and π_e^C, respectively. Quoting from Asker and Bar-Isaac (2014) (footnotes omitted), the timing of the game in state M is as follows:

"(i) the incumbent sets a wholesale price and gives a lump sum transfer $T_i^r \in [0, \infty)$ to each retailer r;
(ii) retailers compete in prices, and all profits are realized;
(iii) the entrant offers a transfer, $T_e^r \in [0, \infty)$ to each retailer r, payable if entry is accommodated;
(iv) retailers simultaneously choose to accept (accommodate entry) or reject the entrant's offer;
(v) if no retailer accommodates the entrant, the state in the next period will continue to be M; if at least one retailer accommodates, then the entrant can choose either to pay the fixed cost, F_e, or not enter. F_e is such that an entrant, faced with a market with competition (no exclusionary equilibria), will want to enter this market. The firm commits to pay F_e in the current period (that is, it becomes sunk), but the expense is incurred in the next. If the fixed cost is sunk, the state then transitions to C; otherwise, the state continues as M."

All firms have a common discount factor δ. For the main analysis, Asker and Bar-Isaac (2014; 2016) focus on the stationary Markov Perfect Nash equilibria of the game, where state C is absorbing and is similar to the static Nash solution. For the remainder of this paper, I focus on this equilibrium concept as well, and do not consider alternative equilibria concpets.[6] In Lemma 1, Asker and Bar-Isaac (2014) show that the incumbent will set $T_i^r = 0$ if entry occurs (the only reason for the incumbent to provide a transfer was to prevent entry—similar to a grim-trigger strategy). Lemma 2 of Asker and Bar-Isaac (2014) establishes that manufacturers offer transfers of 0 to retailers in the post-entry competition state C.[7] The reasoning here is straightforward: the incumbent only paid transfers to prevent entry, so once entry occurs, it has no incentive to continue transfers. The entrant offered transfers only for accommodation to enter the market, and likewise has no incentive to pay further transfers once entered. They further show

[6] In an online Appendix, Asker and Bar-Isaac (2014) consider alternative post-entry equilibria, including the possibility of post-entry collusion.

[7] Note that in stage (iii) the entrant can offer different transfers to different targeted retailers. If the entrant were required to offer the same transfer to each retailer, this would make it more difficult to enter.

that there exists an "exclusionary equilibrium" where no entry occurs if and only if

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

The left hand side is what the monopolist is willing to pay each retailer to prevent entry, while the right hand side is what the entrant is willing to pay to enter: both are discounted streams of future profit.

The intuition is simple: in a market with an incumbent manufacturer, the incumbent may opt to use a vertical restraint as a way to transfer rents to the downstream firms. Absent this restraint, downstream firms compete in prices and earn lower profits whereas the upstream firm has higher profit. If a potential entrant upstream must be accommodated by the downstream firms in order to enter, the incumbent manufacturer may find it worthwhile to continue to grant the retailer a rent-transferring vertical restraint with the threat of ending it if entry occurs. Thus, the voluntary use of vertical restraints may be entry inhibiting.[8]

The sole use of vertical restraints in the baseline model is to deter entry, and does not allow for other reasons such as encouraging product investment. Under this setting, a government mandate which removes the threat of terminating or amending the contract or contractual provision should increase entry. This follows as the threat of termination is precisely what prevented entry.

3 Downstream investment

I extend the model to allow investment in the product by the downstream firm to affect upstream profit. In many industries, downstream firms' incentives do not line up with the upstream firm, and concerns over underinvestment are a problem for the upstream firm. Telser (1960) postulated resale price maintenance may be used to induce services, and Klein and Murphy (1988) extended this analysis to show how vertical restraints can resolve unaligned incentives by providing a quasi-rent stream to retailers who perform well, thus increasing product investment by aligning incentives along the vertical supply chain.[9] As they state, "[m]anufacturers are assumed to induce desired dealer services through a private enforcement mechanism by which active manufacturer monitoring and the threat of manufacturer termination assures dealer performance".

I adopt this framework and assume downstream investment is non-contractible and affects upstream profits. I modify the model to have profits be a function of downstream

[8] Asker and Bar-Isaac (2014) show this can be applied to vertical practices such as resale price maintenance and exclusive territories.

[9] They use as an illustrating example how Coors brewery assigned exclusive territories and used resale price maintenance for their beer wholesalers. If multiple wholesalers sold to the same retailers, wholesalers would have an incentive to not take costly product investments, such as cold storage, promotional activity, etc. as consumers do not observe which wholesaler their beer was distributed by. By assigning exclusive territories and enforcing resale price maintenance, any underinvestment would have consequences only for Coors and that wholesaler, rather than being spread across multiple wholesalers. This removed the incentive to free ride and increased investment.

retailer investment, I^l, chosen by retailers for both the incumbent and entrant. I restrict the investment levels to a binary choice: either a high amount or low amount, notated $l = H, L$ where $I^H > I^L$.[10] In this section, I consider a case in which "active manufacturer monitoring and the threat of manufacturer termination" is viable. In Sect. 4 I extend this to another case where termination of the vertical restraints or contract is not viable due to regulations which restrict vertical practices and remove the legality of ending these vertical contractual provisions.

Following logic similar to that of Klein and Murphy (1988), I assume that downstream retailers will choose I^H for the incumbent only when the transfer, T_i^r, meets a minimum level, denoted by $\mathcal{T}_i^r$ *and* the threat of termination is viable: this occurs when there are no mandates or termination restrictions.[11] In this setting, the voluntary use of a vertical restraint serves two potential purposes for the incumbent: to foreclose entry and induce product investment.

For simplicity I assume this is the same threshold for each retailer r, so $\mathcal{T}_i^r = \mathcal{T}_i$ $\forall\, r$, which reflects common costs of providing such investments across homogeneous retailers. Similarly, I assume if it is profitable for the upstream firm to induce I^H from one retailer, it is profitable to induce I^H from all retailers, again reflecting retailer homogeneity. Thus the incumbent's choice to transfer rents downstream to induce investment is $T_i^r = T_i$ $\forall\, r$. Note also that as in (Asker and Bar-Isaac 2014, p. 677), "to most effectively discourage entry, $T_i^r = T_i$ $\forall\, r$" as well. Thus when considering the incumbent's choice of transfers to retailers, $\{T_i^r\}$, we need consider only a single transfer level, T_i.

The entrant also must choose whether to induce a high or low level of investment. Similarly for the entrant, downstream firms will choose I^H for the incumbent only when the transfer, T_e^r, meets a minimum level, denoted by $\underset{\sim}{T_e^r}$ *and* the threat of termination is viable. Here also, I assume this is the same threshold for each retailer r, and since the focus of the paper is to examine the monopolist's use of restraints and not the entrant's, I also assume that any T_e^r accepted by the retailers is such that $T_e^r > \underset{\sim}{T_e^r}$ so the transfer by the entrant is always enough to induce a high level of investment if entry occurs and mandates are not present.

Profits for both firms are increasing in downstream investment. Given the assumptions above, we need only consider an individual retailer's choice on investment level, as they will be identical for all r. Abusing notation slightly by expressing only a single downstream retail investment decision in the profit function, we can express profits for the incumbent given the retailers' choice of investments as, $\pi_i^s(I^H) \geq \pi_i^s(I^L)$ for both states $s = M$ and $s = C$. Similarly, the entrant's profits are $\pi_e^C(I^H) \geq \pi_i^C(I^L)$.

I also generalize by dropping the assumption that "F_e is such that an entrant, faced with a market with competition... will want to enter this market." To allow entry to be a random event, I consider a case where the entrant's fixed cost of entry, F_e, is a

[10] This is also in line with the logic of Butz and Kleit (2001) who present a model where downstream firms' effort impacts upstream profits.

[11] If investment is costly, and if, as with franchise laws, termination is restricted, this gives retailers an incentive to shirk. Indeed, Klein (1995) characterizes franchise laws by stating, "[t]he effect of these provisions is to increase the franchisee's ability to not perform without being terminated," and other mandates could be used similarly.

random variable drawn from a distribution once before the game starts and known to all.

The exclusionary equilibrium defined in Eq. (1) now depends on $\underset{\sim}{T}_i$ and $\pi_i^s(I^l)$. Two cases arise with sub-cases that will now be explored.

Case (1): vertical restraints continue post entry

First assume

$$\pi_i^C(I^H) - n\underset{\sim}{T}_i \geq \pi_i^C(I^L) \tag{2}$$

This condition means that it is more profitable for the incumbent to transfer enough rents to the downstream firms to ensure high investment levels after entry occurs. The incumbent therefore will not stop all transfers if entry occurs but will transfer the minimum amount to each retailer to induce I^H, which is $\underset{\sim}{T}_i$. Two sub-cases arise.

Case (1.1)

$$\underset{\sim}{T}_i > \delta \frac{\pi_i^M(I^H) - [\pi_i^C(I^H) - n\underset{\sim}{T}_i]}{n(1-\delta)} \tag{3}$$

This condition means that the amount the incumbent needs to transfer to each retailer to induce I^H is more than he is willing to pay to prevent entry.

Proposition 1.1 *(Non-credible exclusion) If both Eqs.* (2) *and* (3) *hold, the threat to end the stream of rent transfers T_i if entry occurs is not credible, and there is no exclusionary equilibrium.*

Proof This follows directly from the conditions in Eqs. (2) and (3). Once entry occurs, and the state transitions to C, the threat to end any level of transfers is non-credible, as by Eq. (3) the amount it takes to induce high investment levels is above the maximum amount the incumbent is willing to pay to prevent entry. But by Eq. (2) the incumbent firm finds it more profitable to induce high levels of investment than cease payments in the competitive state and receive a low level of downstream investment. Thus the threat to end transfers is not credible, and entry will occur if $\frac{\pi_e^C(I^H)}{1-\delta} - F_e \geq 0$. Thus the role of downstream investments may be sufficient to prevent the Asker/Bar-Isaac style exclusionary equilibrium.

Case (1.2)

Alternatively, consider the condition

$$\underset{\sim}{T}_i \leq \delta \frac{\pi_i^M(I^H) - [\pi_i^C(I^H) - n\underset{\sim}{T}_i]}{n(1-\delta)} \tag{4}$$

This condition means that the amount the incumbent needs to transfer to each retailer to induce I^H is less than he is willing to pay to prevent entry. Here, the incumbent can threaten credibly to end transfers above $\underset{\sim}{T}_i$ if entry occurs. □

Proposition 1.2 *(Weak exclusionary equilibrium) An exclusionary equilibrium, which I define as a "weak exclusionary equilibrium", exists if*

$$\delta \frac{\pi_i^M(I^H) - [\pi_i^C(I^H) - n\underset{\sim}{T}_i]}{n(1-\delta)} \geq \frac{\pi_e^C(I^H)}{1-\delta} - F_e \tag{5}$$

Proof Given the conditions in Eqs. (2) and (4), conditional on entry, the incumbent does not find it viable to end all transfers and receive a lower provision of downstream product investment, but will reduce the level of transfers to $\underset{\sim}{T}_i$. Similar to the condition for the baseline exclusionary equilibrium, the left hand side of Eq. (5) is how much additional over $\underset{\sim}{T}_i$ the incumbent is willing to transfer to prevent entry, while the right hand side is the amount the entrant is willing to pay to enter and thus if the conditions above hold, there exist exclusionary equilibria.

The equilibrium is "weak" in the sense that the incumbent cannot credibly threaten to completely eliminate transfers to retailers if entry occurs. □

Case (2): vertical restraints cease post entry

Assume

$$\pi_i^C(I^H) - n\underset{\sim}{T}_i < \pi_i^C(I^L) \tag{6}$$

This condition is the opposite of Eq. (2), implying that conditional on entry occurring, it is more profitable for the incumbent to cease transfers and receive a low level of product investment.

Proposition 2 *(Strong exclusionary equilibrium) The threat to end all transfers to downstream firms if entry occurs is credible and an exclusionary equilibrium, denoted "strong exclusionary equilibrium", exists if*

$$\delta \frac{\pi_i^M(I^H) - \pi_i^C(I^L)}{n(1-\delta)} \geq \frac{\pi_e^C(I^H)}{1-\delta} - F_e \tag{7}$$

Proof Given the condition in Eq. (6), there is no incentive for an incumbent to continue transfers post entry. In this case, the incumbent would not find it profitable to transfer rents to the retailers if entry occurs. Thus, the left hand side of Eq. (7) is how much the incumbent is willing to transfer to downstream firms to prevent entry, while the right hand side is the amount the entrant is willing to pay to enter.[12]

The equilibrium is "strong" in the sense that the incumbent can credibly threaten to completely eliminate transfers to retailers if entry occurs and the probability of an exclusionary equilibrium exisiting is higher in Case (2) than in Case (1.2). □

[12] The incumbent may be receiving I^H prior to entry in this equilibrium or not: this is unimportant as we only need to consider credible post-entry equilibrium behavior from the incumbent here. We can characterize the case where $\pi_i^M(I^H) - n\mathcal{T}_i < \pi_i^M(I^L)$. In this case, any use of vertical restraints to facilitate transfers is solely to prevent entry.

4 Mandates restricting vertical practices

Now consider mandates related to the vertical practice or regulations that restrict contract terminations. I consider any policies that prevent the threat of terminating the restraint. This can come in the *requirement* to use a vertical restraint or policies which prohibit vertical practices and/or restrict when contracts can be terminated. Both cases are common in many settings. Mandates that require vertical restraints to be used include mandates requiring exclusive territories or resale price maintenance. Requiring assignment of exclusive territories are common US state regulations in industries such as automotive franchises and alcohol distribution; mandating resale price maintenance can also be seen in a variety of jurisdictions. India, for example, requires manufacturers to label packaged products with a maximum resale price, above which it is illegal for retailers to sell.[13] In the US, many states in effect mandate RPM in the context of spirits sales (Ornstein and Hanssens 1987), and minimum resale prices for goods such as cigarettes can also be considered a form of mandated RPM with the minimum price set by the state.

In the case of mandates which restrict vertical practices, many jurisdictions and industries ban the use of RPM and slotting fees, require divorcement along the vertical supply chain, or impose franchise termination laws which restrict when firms can end or alter contracts. Franchise termination laws are present not just in business format franchises, but also industries such as alcohol distribution, gasoline, and the automotive industry (so-called "Dealers' Day in Court Act" at the federal level, but also vary at state levels). They typically only prohibit termination without "good cause" (or similar language). Good cause can be limited to a narrow range of reasons, and contracts that specify additional causes for termination not included in the legal definition are frequently not enforceable.[14] As such, since the investment of the downstream firm is assumed to be non-contractible, in this context, franchise laws prohibit termination upon entry or under-provision of service.[15]

In both cases, requiring or restricting vertical practices removes the threat of terminating the vertical restraint used by the upstream firm to transfer rents downstream; this threat is precisely the mechanism which sustained the equilibria above. Therefore removing the viability of the threat the upstream incumbent could employ has two effects: first, it removes the mechanism for entry deterrence. Second, it removes the mechanism for inducing downstream investments which was sustained by monitoring and "the threat of manufacturer termination," and thus downstream retailers will have an incentive to shirk and will choose $I^l = I^L$

[13] See, for example, https://indianexpress.com/article/cities/pune/newlaw-in-making-to-punish-vendors-charging-overmrp/.

[14] For one such example, see Virginia's Beer Franchise Act, §4.1-505. Cancellation, which reads, "*Notwithstanding the terms, provisions or conditions of any agreement*, no brewery shall unilaterally amend, cancel, terminate or refuse to continue to renew any agreement,... unless ... good cause exists for amendment, termination, cancellation, nonrenewal, noncontinuation or causing a resignation". (Emphasis added).

[15] Even if we relax the assumption that the investment downstream is non-contractible, such laws may still have the effect of restricting even some justifiable terminations, if the downstream firm is likely to sue upon termination, or due because of imperfections or frictions in enforcement.

Thus, the incumbent firm will not provide the retailers with the quasi-rent stream, and there is no entry deterrence from the exclusionary equilibria. Entrants now can pay a transfer of $T_e^r = 0$, and it is weakly dominant for retailers to accept this and accommodate the entrant. However, the threat of termination being absent, the retailers will now provide a low investment level, and choose $I^l = I^L$.

Entry now occurs only if

$$\frac{\pi_e^C(I^L)}{1-\delta} - F_e \geq 0 \tag{8}$$

Proposition 3.1 *Mandates will reduce the probability of entry unambiguously if Case* (1.1)*, non-credible exclusion, holds.*

Proof Entry was not deterred in Case (1.1), as the incumbent could not credibly threaten to stop rent transfers. The probability of entry in Case (1.1) was $Pr\left[\frac{\pi_e^C(I^H)}{1-\delta} - F_e \geq 0\right]$. With a mandate, the probability of entry is the probability that Eq. (8) holds. Since $\pi_e^C(I^H) \geq \pi_e^C(I^L)$, the proposition holds.

Now I consider Cases (1.2) and (2) in which exclusionary equilibria exist. As in Asker and Bar-Isaac (2014), these are not unique equilibria. There are accommodating equilibria with no exclusion: If one retailer accepts the entrant's offer of $T_e^r = 0$, this acceptance ensures entry (so long as F_e is low enough). Thus it is a best response for all other retailers to accept and accommodate, and $T_e^r = 0$ is optimal as well. However Asker and Bar-Isaac also point out that "there is a sense in which the exclusionary equilibrium is more appealing. In the accommodating equilibrium ... no retailer earns profits, and the incumbent is worse off with the presence of the entrant as a competitive threat; by comparison, in the [exclusionary equilibrium], retailers earn profits and the incumbent is better off." This similarly holds here, and thus for the purposes of comparisons below of entry with and without mandates, I assume that if an exclusionary equilibrium exists, it is selected over the accommodating equilibrium.

Proposition 3.2 *Mandates will reduce the probability of entry in Case* (1.2)*, weak exclusionary equilibrium, if*

$$\Pr\left[\frac{\pi_e^C(I^L)}{1-\delta} - F_e \leq 0\right] < \Pr\left[\frac{\pi_e^C(I^H)}{1-\delta} - F_e \leq \delta\frac{\pi_i^M(I^H) - [\pi_i^C(I^H) - n\underset{\sim}{T}_i]}{n(1-\delta)}\right] \tag{9}$$

and will increase entry otherwise.

Proof The left hand side of Eq. (9) is the probability of entry with a mandate corresponding to Eq. (8), and the right hand side is the probability of entry without a mandate, corresponding to the exclusionary equilibrium in Eq. (5).

This implies the probability of entry will be reduced from a mandate if

$$\pi_e^C(I^H) - \pi_e^C(I^L) > \frac{\delta}{n}[\pi_i^M(I^H) - [\pi_i^C(I^H) - n\underset{\sim}{T}_i]] \tag{10}$$

Proposition 3.3 *Mandates will reduce the probability of entry in Case (2), strong exclusionary equilibrium, if*

$$\Pr\left[\frac{\pi_e^C(I^L)}{1-\delta} - F_e \leq 0\right] < \Pr\left[\frac{\pi_e^C(I^H)}{1-\delta} - F_e \leq \delta\frac{\pi_i^M(I^H) - \pi_i^C(I^L)}{n(1-\delta)}\right] \tag{11}$$

and will increase entry otherwise.

Proof The left hand side of Eq. (11) is the probability of entry with a mandate corresponding to Eq. (8), and the right hand side is the probability of entry without a mandate, corresponding to the exclusionary equilibrium in Eq. (7).

This implies the probability of entry will be reduced from a mandate if

$$\pi_e^C(I^H) - \pi_e^C(I^L) > \frac{\delta}{n}[\pi_i^M(I^H) - \pi_i^C(I^L)] \tag{12}$$

and increased otherwise. Therefore theoretically, the impact of a mandate is ambiguous; it could either promote or hamper competition. Mandates are more likely to reduce entry in the case of a weak exclusionary equilibrium [described in Eq. (10)] than in a strong exclusionary equilibrium [Eq. (12)]. □

5 Discussion

Now consider equilibrium conditions for when it is more likely that mandates will decrease rather than increase entry. This discussion is similar to the screens Asker and Bar-Isaac (2014) propose as tests for whether vertical restraints are likely to be exclusionary, but are framed here in the context of regulations mandating vertical practices. Asker and Bar-Isaac propose four screens that must be passed for exclusionary uses of vertical restraints: (i) accommodation downstream must be necessary, (ii) if entry occurs, the monopolist's profit must fall, (iii) the quasi-rents passed to retailers would fall if entry occurs, and (iv) more retailers makes it more difficult to exclude entry. All these apply here as well, and also have implications for regulating vertical restraints, all else equal. Mandating vertical practices can increase entry only when exclusionary equilibria exist.

First, a mandate will be more likely to decrease entry the more important downstream product investment is for the entrant. In cases where the difference in the entrant's profits from high and low investment levels, $\pi_e^C(I^H) - \pi_e^C(I^L)$, is large, regulations mandating vertical restraints may actually decrease entry. Similarly, if downstream investment is important enough for the incumbent, it may not be willing to decrease quasi-rents passed to retailers upon entry, violating screen (iii). This is not always clearly the case. As pointed out by Asker and Bar-Isaac, it is difficult to see how the services provision is applicable to some settings, such as the American Sugar Trust of the 1890s.[16] Other cases are more clearly applicable: in the US brewing industry wholesalers engage in a variety of services, including refrigerated storage,

[16] The trust sold a homogeneous good with little use for product investment (Zerbe 1969).

monitoring retail shelves, kegs and keg lines, and engaging in promotional activity and stocking at the retail level.[17] Auto dealers in the US also provide a number of promotional services, and the use of vertical restraints in the industry is common. Regulations mandating restraints are common in both industries also, which could have the potential to increase shirking. In both industries, regulations prohibiting vertical integration are present,[18] meaning downstream accommodation is necessary, and mandates to use exclusive territories and franchise termination laws are common.

Second, a mandate will be effective in increasing entry only if it prevents the exclusionary use balanced against any negative impact on entrant profits. So similar to screen (ii) above, a mandate will be less likely to increase entry the lower $\pi_i^M(I^H) - \pi_i^C(I^L)$ is, holding all else equal. This can occur if the entrant produces a good that is not a close substitute to that of the incumbent, or is relatively small. Similarly, a mandate will be less likely to increase entry the lower $\pi_i^M(I^H) - [\pi_i^C(I^H) - n\mathcal{T}_i]$ is, all else equal. This too occurs if competition does not decrease the monopolist's profit much, but it may also be the case if inducing downstream investment is costly ($\mathcal{T}_i$ is high). Third, as in screen (iv), the presence of more retailers increases the costs of excluding entry, so when there are more retailers, a mandate is more likely to decrease entry, all else equal.

Perhaps the most straightforward application is to slotting contracts, where a manufacturer pays a retailer for shelf space, corresponding directly to the transfers in this model. This is common in several industries (see Klein and Wright 2007) and has raised concerns over exclusionary impacts. Additionally, for new manufacturers to get shelf space, they must be accommodated by the retailer. As such, these arrangements have been of interest to antitrust authorities (see FTC Staff Study 2003), and banning slotting fees could have the effect of increasing entry. However, as Klein and Wright (2007) point out, slotting contracts may be used as a promotional service. Banning them, therefore could reduce the profitability of entry and decrease entry if their promotional effect is large enough.

Lastly, the discussion thus far has assumed the mandates fall on all firms equally. While this is often true in how regulations are implemented (US auto and brewing industry regulations, e.g.), this need not be the case. Consideration of market power is likely important, and thus treatments of vertical restraints such as the European Commission's stance, which are harsher against dominant firms (Cooper et al. 2005b), may be warranted.

[17] In an extreme case, the Michigan based Bell's Brewery exited the entire Illinois market due to concerns that a Chicago wholesaler would not invest enough in Bell's brands. See "Bell's Brings Beer Back to Area." Chicago Tribune, August 1, 2008, http://articles.chicagotribune.com/2008-08-01/business/0807310746_1_brewers-association-new-distributors-craft-brewer.

[18] Many states require the use of independent beer wholesalers, which is similar to requirements of independent dealers in the auto industry. The latter prevents Tesla from their preferred method of "direct selling" in several states. See, e.g. http://www.autonews.com/article/20150403/RETAIL07/150409912/tesla-blocked-in-w.va.-as-governor-signs-bill.

6 Conclusion

The model incorporates two contrasting uses of vertical restraints, both providing a quasi-rent stream of profits to downstream firms, for the purposes of either foreclosing entry or promoting investment, and I consider the impact of regulations regarding these practices. It has broad applications to industries where vertical restraints are common and industries that are governed by franchise termination laws and other vertical regulations. This model gives practical considerations as to whether the use of vertical restraints can be used to foreclose entry, and whether or not mandates would mitigate this effect, or decrease the likelihood of entry. While direct empirical tests of the considerations discussed in Sect. 5, such as the importance of downstream services, or the reduction entry would cause on an incumbent's profits, are difficult or impractical to directly estimate, ex-post tests can be constructed by examining the impact of public policies which restrict vertical behavior so long as these policies are exogenous and a credible counterfactual is available. As many of these public policies are enacted at the state level in the United States, for example, this research suggests standard empirical techniques such as differences-in-differences can be a useful test in examining vertical restraint's impact on entry.

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