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Exclusive Dealing and Buyer Initiatives

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Abstract

We analyze exclusive dealing when a buyer can exert costly efforts to facilitate entry by raising a potential entrant's probability of entry. In the absence of any cost, the introduction of an exogenous probability of entry does not refute the Chicago critique; the monopoly incumbent cannot profitably sign an exclusive dealing agreement with the buyer for exclusionary purposes. Costs of entry facilitation reduce the buyer's benefit from competition, but do not affect the incumbent's willingness to pay for exclusivity. With sufficiently large costs, the incumbent can secure exclusivity and foreclose the potential competitor. Our result is robust to an alternative environment (i) where the incumbent can commit to the future trading price in the exclusive dealing contract; (ii) where the buyer can breach the exclusive dealing contract by paying expectation damages; and (iii) where buyers are competing retailers, respectively.

Regarding welfare, we show that exclusive dealing saves the buyer's cost, which may be higher or lower than the socially optimal level, and generates an ambiguous welfare effect. The buyer's efforts tend to exceed the social optimum when the entrant is less efficient; prohibiting exclusive dealing improves social welfare only if the entrant is more efficient than the incumbent. Our result is consistent with the consideration of relative efficiency in exclusive dealing cases. The court or competition authority can use relative efficiency as a screening device: by rejecting exclusive complaints when the entrant is less efficient, and further investigating the competitive effect of exclusive dealing in cases where the entrant is more efficient than the incumbent.

Keywords: Chicago Critique, Exclusive Dealing, Market Foreclosure, Probabilistic Entry, Supply Management.

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1. Introduction

Exclusive dealing and related practices are designed to limit a trading partner's future transaction opportunities. Their purposes could be anti-competitive (such as foreclosing competitors) or pro-competitive (such as promoting relationship-specific investments), and their necessity lies in (potential) competition. There is no need to resort to such measures if the trading partner cannot trade with others. This seemingly trivial fact is somewhat overlooked by the economic literature on exclusive dealing, which typically starts with an entrant who is ready to enter and compete (perhaps at some entry costs and at a future date).

Competition, however, cannot be taken for granted. While lucrative business opportunities may over time attract new firms, entrants often face non-negligible obstacles before they can effectively compete with an incumbent. On the other hand, the management literature has emphasized "supplier selection," including identifying, evaluating, and providing crucial information to potential suppliers, as an important step in supply chain management. These strategic choices require careful planning, consume time and corporate resources, do not always succeed, but bring the benefits of better supply technology and intensified upstream competition[1]. From the buyer's point of view, supplier competition generates strategic advantages but can be difficult to nurture.

Some antitrust cases of exclusive dealing or loyalty rebates also involve buyers who are substantial market players. For example, in the recent *Intel* case[2], Intel was charged by

[1] Damian Beil, "Supplier Selection," in: James J. Cochran (ed.), *Wiley Encyclopedia of Operations Research and Management Science*, 1st ed., John Wiley and Sons, Inc. (2010). In economics, the literature of second sourcing also stresses the importance of supplier competition, sometimes created by the monopoly firm, to prevent buyer hold-up. *See*, for instance, Joseph Farrell & Nancy Gallini, "Second-Sourcing as a Commitment: Monopoly Incentives to Attract Competition," *103(4) Quarterly Journal of Economics*, 671-694 (1988).

[2] European Commission, "Case COMP/C-3/37.990 – Intel," http://ec.europa.eu/competition/sectors/ICT/intel_provisional_decision.pdf, last visited on date: 2017/11/8. Intel subsequently appealed the decision to the court. The European Union's General Court sided with the Commission in 2014 (*Intel v. Commission* (T-286/09, 'the judgment under appeal', EU:T:2014:547)). But the European Court of Justice (ECJ) remanded the case to the lower court in September 6, 2017. In its opinion, ECJ demanded the lower court to properly address arguments raised by Intel. In particular, the Court stated: "If, in a decision finding a rebate scheme abusive, the Commission carries out such an analysis, the General Court must examine all of the applicant's arguments seeking to call into question the validity of the Commission's findings concerning the foreclosure capability of the rebate concerned."

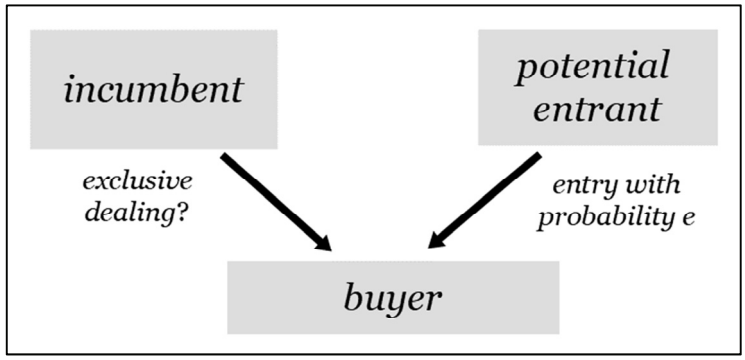

Figure 1 Market structure

the European Commission of offering loyalty rebates to original equipment manufacturers (OEMs) as an exclusionary practice. That is, the rebates were given on the condition that OEMs purchased all (or almost all) chips from Intel, thus excluded its main rival, Advanced Micro Devices. In this case, the recipients of the rebates, or the buyers, are Acer, Dell, HP, Lenovo and NEC. Exclusive dealing also appeared in *United States v. Microsoft Corp.*[3], where Microsoft was accused of entering into exclusive dealing arrangements with OEMs and internet access providers such as Compaq and America Online (AOL). For this class of market participants, it is hard to imagine that they would ignore supply management and accept the disputed exclusive arrangements without strategic calculations.

In this paper, we build on the idea that the buyer has an interests in "stirring up" supplier competition, and re-visit the question raised by the Chicago School, namely, whether an incumbent supplier has any incentive to use exclusive dealing as an exclusionary measure. Referring to Figure 1, we consider an industry with an incumbent monopolist and a buyer, who is able to find an alternative supplier (the potential entrant) with a probability. We assume that this probability is increasing in the efforts of the buyer. For example, the buyer can (i) cast a wider search for the qualified supplier; (ii) help a

(ECLI:EU:C:2017:632, paragraph 141). The full Judgement of the Court (Grand Chamber) is available online, at http://curia.europa.eu/juris/document/document.jsf?text=&docid=194082&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=1430764, last visited on date: 2017/11/8.

[3] *United States v. Microsoft Corp*., 87 F. Supp. 2d 30 (D.D.C. 2000). The district court rejected the exclusive dealing claim, however.

potential supplier to re-design its product or fine-tune specifications so that it could effectively compete with the incumbent supplier, or (iii) alleviate the (initially) prohibitive high entry cost facing a potential supplier. While probabilistic entry is not a new feature in the literature of exclusive dealing, the buyer's ability to affect this probability or, more generally, buyer initiatives to change market structure at a cost distinguishes our paper with previous works[4].

It turns out that the buyer's cost, not just entry with probability, is crucial for our analysis. But before explaining our results, let us briefly discuss the economic literature of exclusive dealing.

Economists have come a long way to understand the rationales and competitive effects of exclusive dealing. Against decades of hostility from the court, the Chicago School argues that a monopolist cannot profitably use exclusive dealing to foreclose the competitor. As stated above, competition benefits the buyer. To relinquish competition, the buyer needs to be compensated by an amount greater than the gain of monopoly. This is too high a price to pay for exclusivity. Exclusive dealing, the Chicago School asserted, cannot be employed for exclusionary purposes, and must be for efficiency reasons[5].

Then, with the infiltration of game theory, economists have proposed various theories deviating from the Chicago view to show that, at least theoretically, exclusive dealing could be anti-competitive. Liquidated damages (i.e., the breach remedy specified in the contract) could be designed to extract surplus from a potential entrant, who then has a weaker incentive of entry, and (partial) exclusion occurs as a by-product[6]. Coordination

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[4] Uncertainty on the side of the potential entrant is a crucial element in the seminal paper of Professor Aghion & Bolton; *see* Philippe Aghion & Patrick Bolton, "Contracts as a Barrier to Entry," *77(3) American Economic Review*, 388-401 (1987); Zhijun Chen & Greg Shaffer, "Naked Exclusion with Minimum-Share Requirements," *45(1) RAND Journal of Economics*, 64-91 (2014). For an analysis of the signaling problem when only the incumbent, but not the buyer, learns the true type of the entrant, *see* Liliane Giardino-Karlinger, "Exclusive Dealing under Asymmetric Information about Entry Barriers," working paper (2015). In these studies, the relevant probability is exogenous.

[5] Richard Posner, *Antitrust Law: An Economic Perspective*, 1st ed., University of Chicago Press (1976); Robert Bork, *The Antitrust Paradox: A Policy at War with Itself*, 2nd ed., Free Press (1993). However, Professor Farrell criticizes the Chicago School reasoning from no anti-competitive motivation to pro-competitive rationales as the sole explanation; *see* Joseph Farrell, "Deconstructing Chicago on Exclusive Dealing," *50(3) Antitrust Bulletin*, 465-480 (2005).

[6] Philippe Aghion & Patrick Bolton, *supra* note 4.

failure among buyers could be exploited by the monopolist to achieve "naked exclusion,"[7] and with clever contract designs and bargaining protocols, the monopolist could ensure exclusivity at almost no cost[8]. These pioneering works are followed by vast academic interests in understanding exclusive dealing as well as other exclusionary practices[9].

These post-Chicago developments do not unambiguously condemn (or condone) exclusive dealing, nevertheless[10]. In addition, in a (perhaps more realistic) three-tier industrial structure consisting of wholesalers/manufacturers, retailers, and final consumers, economists are still debating the competitive effect of exclusive dealing at the wholesale level; we discuss this strand of literature in section 4.3. Even the traditional defense of exclusive dealing, namely to encourage relationship-specific investments, is not immune to theoretical scrutiny, and could play an important role in excluding competitors[11].

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[7] Eric Rasmusen, Mark Ramseyer & John Wiley, "Naked Exclusion," *81(5) American Economic Review*, 1137-1145 (1991).

[8] Ilya Segal & Michael Whinston, "Naked Exclusion: Comment," *90(1) American Economic Review*, 296-309 (2000a).

[9] For literature reviews on exclusionary practices more generally, *see* Patrick Rey & Jean Tirole, "A Primer on Foreclosure," *Handbook of Industrial Organization, volume III*, 1st ed., North Holland (2006); Michael Whinston, *Lectures on Antitrust Economics*, 1st ed., MIT Press, chapter 4 (2006); Francine Lafontaine & Margaret Slade, "Exclusive Contracts and Vertical Restraints: Empirical Evidence and Public Policy," in: Paolo Buccirossi (ed.), *Handbook of Antitrust Economics*, 1st ed., MIT Press (2008). For more specific discussion of exclusive dealing, *see* Mark Ramseyer & Eric Rasmusen, "Exclusive Dealing: Before Bork, and Beyond," *57(S3) Journal of Law and Economics*, S145-S160 (2014).

[10] For a general analysis that analytically summarizes and illustrates important components in the literature, *see* David Spector, "Exclusive Contracts and Demand Foreclosure," *42(4) RAND Journal of Economics*, 619-638 (2011). Here we focus on exclusive dealing as an exclusionary practice that is available only to an incumbent firm. There is also a literature of "competing for exclusivity," where multiple firms offer exclusive dealing; *see* Frank Mathewson & Ralph Winter, "The Competitive Effects of Vertical Agreements: Comment," *77(5) American Economic Review*, 1057-1062 (1987); David Besanko & Martin Perry, "Exclusive Dealing in a Spatial Model of Retail Competition," *12(3) International Journal of Industrial Organization*, 297-329 (1994); Douglas Bernheim & Michael Whinston, "Exclusive Dealing," *106(1) Journal of Political Economy*, 64-103 (1998); Giacomo Calzolari & Vincenzo Denicolò, "Competition with Exclusive Contracts and Market-Share Discounts," *103(6) American Economic Review*, 2384-2411 (2013); Giacomo Calzolari & Vincenzo Denicolò, "Exclusive Contracts and Market Dominance," *105(11) American Economic Review*, 3321-3351 (2015).

[11] Chiara Fumagalli, Massimo Motta & Thomas Rønde, "Exclusive Dealing: Investment Promotion May Facilitate Inefficient Foreclosure," *60(4) Journal of Industrial Economics*, 599-608 (2012); also *see* Kathryn Spier & Michael Whinston, "On the Efficiency of Privately Stipulated Damages for Breach of Contract: Entry Barriers, Reliance, and Renegotiation," *26(2) Rand Journal of Economics*, 180-202 (1995). For an "irrelevance theorem," namely, exclusive dealing has no impact on purely internal investments that only affect the value of the transaction for the two contracting parties, *see* Ilya Segal & Michael Whinston, "Exclusive Contracts and Protection of Investments," *31(4) RAND Journal of Economics*, 603-633 (2000b); Catherine de Fontenay, Joshua Gans & Vivienne Groves, "Exclusivity, Competition and the Irrelevance of Internal Investment," *28(4) International Journal of Industrial Organization*, 336-340 (2010). For an analysis that restores the positive impact of exclusive dealing on specific investment, including the possibility of over-investment, *see* David de Meza & Mariano

Comparing with the literature, our main contribution is to point out that buyer initiatives can invalidate the reasoning of the Chicago School, and we reach this conclusion via a different mechanism, without resorting to familiar elements such as liquidated damages, coordination failure, buyer competition, or relationship-specific investments. To highlight the driving force of our main result, we conduct the analysis in an environment where there is a single buyer (so that there is no buyer coordination or competition), who cannot breach the exclusive dealing contract (and so breach damages play no role), and no party has any investment opportunity.

Our model also gives the buyer a more active role. In the majority of previous works, buyers only passively decide whether to accept an exclusive dealing contract before market competition (or lack of) ensues. A few studies do endow the buyer with more strategic decisions, i.e., the buyer can offer an exclusive dealing contract to the entrant[12] or incumbent manufacturers[13]. While the buyer in our model does not make offers, we explore another dimension and stress the buyer's ability to affect market structure.

As a benchmark, we first consider the case of an exogenous entry probability. We find that probabilistic entry alone does not overturn the result of the Chicago School. The entry probability only discounts the buyer's gain and incumbent's loss from competition. To the extent that entry probability is common knowledge (but exogenous), the expected loss in consumer welfare due to exclusive dealing is still greater than expected gains in monopoly profit. The incumbent cannot profitably sign an exclusive dealing contract with the buyer to prevent the entrant from entering and competing in the market.

When the buyer's efforts are costly, the conclusion of the Chicago School no longer holds. The reason is that this cost exerts an asymmetric effect on the buyer and incumbent. Following the Chicago analysis, we compare the buyer's and incumbent's payoffs with and without the exclusive dealing contract. After signing exclusive dealing, the buyer's

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Selvaggi, "Exclusive Contracts Foster Relationship Specific Investment," *38(1) RAND Journal of Economics*, 85-97 (2007).

[12] Robert Innes & Richard Sexton, "Strategic Buyers and Exclusionary Contracts," *84(3) American Economic Review*, 566-584 (1994).

[13] Tommy Staahl Gabrielsen & Lars Sørgard, "Discount Chains and Brand Policy," *101(1) Scandinavian Journal of Economics*, 127-142 (1999); Ryoko Oki & Noriyuki Yanagawa, "Exclusive Dealing and the Market Power of Buyers," working paper (2010); David Mills, "Buyer-Induced Exclusive Dealing," *84(1) Southern Economic Journal*, 66-81 (2017).

obligation to trade with the incumbent eliminates any incentive to facilitate entry. If not signing exclusive dealing, the buyer will spend some costs to increase the probability of entry. Higher entry probability increases the expected consumer surplus and raises the buyer's minimal "asking price" to sign exclusive dealing. It also reduces the incumbent's expected profit, which boosts the incumbent's maximal willingness to pay for exclusivity, or the "accepting price." The buyer's cost to achieve a given entry probability reduces the benefit from enhancing supplier competition, hence negatively affects the buyer's asking price. Since this cost is incurred by the buyer, fixing the entry probability, it does not change the incumbent's accepting price. By reducing the asking price without changing the accepting price, the introduction of the buyer's cost, it follows, creates some room for the two parties to reach an agreement. When the cost is sufficiently large, the incumbent's maximal willingness to pay will exceed the buyer's minimal acceptance price, and so an exclusive dealing agreement can be secured.

We also show that exclusive dealing, when it can be signed, has an ambiguous welfare effect. This indeterminacy comes from the discrepancy between private and social incentives to facilitate entry. When the entrant is less efficient than the incumbent, the buyer will exert more efforts than socially optimal to facilitate entry. In that case, exclusive dealing saves the cost and improves social welfare. On the other hand, the buyer tends to spend insufficient efforts when the entrant is (much) more efficient than the incumbent. The more efficient is the entrant, the more likely that prohibiting exclusive dealing will improve welfare.

As discussed above, we restrict our attention to the case of one buyer, a standard setup in the literature[14], in order to separate our analysis from those based on multiple buyers. While in practice few industries are characterized by one single buyer, the reason of adopting the single-buyer assumption is not merely for its analytical convenience. The single buyer case could reasonably be applied to situations where several buyers are

[14] Previous studies that employ the setting of 3 players (two competing firms and one buyer) include, for example, Philippe Aghion & Patrick Bolton, *supra* note 4; Robert Innes & Richard Sexton, *supra* note 12; Kathryn Spier & Michael Whinston, *supra* note 11; Douglas Bernheim & Michael Whinston, *supra* note 10; Ilya Segal & Michael Whinston, *supra* note 11; Chiara Fumagalli et al., *supra* note 11; Giacomo Calzolari & Vincenzo Denicolò, *supra* note 10.

present, but there is no significant strategic interdependence among them. Absent strategic interactions, we could replicate the analysis of the single buyer situation to each buyer in isolation. A generalization to multiple buyers, at least from the theoretical point of view, is often conducted to investigate strategic interactions arising from this environment. As we have mentioned, the literature offers two such strategic concerns: coordination failure[15] and buyer competition[16]. For the former, the "naked exclusion" literature, initiated by Rasmusen et al. (1991), has demonstrated that coordination failure can be exploited by the incumbent firm to achieve exclusivity; there is no need to further introduce buyer initiatives[17]. For the latter, the ongoing literature of competing buyers has not yet reached any consensus. To examine how buyer initiatives change the results of previous studies on buyer competition, we offer an extension along this line in section 4.

We proceed as follows: We introduce the model and consider the benchmark case of exogenous entry probability in section 2; we derive our main results in section 3, and then extend the model in several aspects in section 4, including price commitment, contract breach, and competing buyers. Lastly, we offer some concluding remarks in section 5.

2. Model

We consider a market as shown in Figure 1: An incumbent firm trades with a buyer,

[15] Eric Rasmusen et al., *supra* note 7; Ilya Segal & Michael Whinston, *supra* note 8.

[16] Chiara Fumagalli & Massimo Motta, "Exclusive Dealing and Entry: When Buyers Compete," *96(3) American Economic Review*, 785-795 (2006); John Simpson & Abraham Wickelgren, "Naked Exclusion, Efficient Breach, and Downstream Competition," *97(4) American Economic Review*, 1305-1320 (2007); Jose Mighel Abito & Julian Wright, "Exclusive Dealing with Imperfect Downstream Competition," *26(1) International Journal of Industrial Organization*, 227-246 (2008); Hiroshi Kitamura, "Exclusionary Vertical Contracts with Multiple Entrants," *28(3) International Journal of Industrial Organization*, 203-209 (2010); Linda Gratz & Markus Reisinger, "On the Competition Enhancing Effects of Exclusive Dealing Contracts," *31(5) International Journal of Industrial Organization*, 429-437 (2013).

[17] When multiple non-competing buyers can exert (costly) efforts to facilitate entry, and scale economy is absent (so that the entrant can enter as long as there is one trading partner), there emerges the problem of "free riding." That is, a buyer may let others spend the costs, and wait and enjoy the fruit of competition. We do not pursue this extension here for two reasons: (i) it seems to be a different form of coordination failure among buyers; and (ii) it might be somewhat alleviated by product differentiation, i.e., different buyers may need different types of goods, and so the entrant found by one buyer might not be able to satisfy all buyers. We acknowledge, nevertheless, that some interesting issues remain in both aspects. For the former, one might want to examine whether the mechanism of Eric Rasmusen et al., *supra* note 7, and Ilya Segal & Michael Whinston, *supra* note 8, could be applied to achieve exclusivity; for the latter, it might be interesting to check the role of exclusive dealing between the entrant and the buyer who "found" the entrant or who exerted the (most) facilitating efforts.

and a potential entrant may enter into the market with an identical product. The buyer has a downward-sloping demand function $D(p)$, with $D'(p) \equiv dD/dp < 0$. The incumbent has a constant marginal cost of production $c_I > 0$. Post entry, the entrant's marginal cost $c_E \geq 0$ is also constant. We allow for both cases of $c_E \gtrless c_I$, i.e., the entrant may be more or less efficient than the incumbent.

Entry is a random event. With probability e, the potential entrant can "find" the buyer and enter the market without incurring further entry costs. The entrant and incumbent then engage in Bertrand competition. With probability $1-e$, the potential entrant misses the business opportunity, and the buyer faces the incumbent as a monopolist. Alternatively, the potential entrant's product may meet the requirement of the buyer with probability e, in which case it provides the same value as that of the incumbent (but with marginal production cost c_E that may be different from c_I); and with probability $1-e$ the buyer does not want to consume the potential entrant's product. Or, the potential entrant has to pay a fixed cost of entry that could be either prohibitively high (with probability $1-e$) or low (with probability e); only with low entry cost, which is assumed to be zero, is the entrant able to enter into the market.

Without any effort, the probability of entry is $e_0 \in [0,1]$. The buyer can raise the entry probability at a cost $\psi(e) \geq 0$. The buyer may eagerly search for other sources of supply in order to put competitive pressure on the incumbent; or facilitate entry by helping the potential entrant to re-design its product, so that it could fit the buyer's need with a higher probability; or help reduce a prohibitively high entry cost. The cost function is twice differentiable (with first and second order derivatives ψ' and ψ'', respectively), strictly convex, and satisfies Inada condition: $\psi(e_0) = \psi'(e_0) = 0, \psi'(1) = \infty, \psi'(e) \geq 0$, and $\psi''(e) > 0$ for all $e \in [e_0, 1] \subseteq [0,1]$.

The timing is as follows[18]:

- At stage 1, the contracting stage, the incumbent offers the buyer an exclusive dealing contract, which consists of a payment x (a "sign-up bonus") in return for the buyer's promise not to deal with other suppliers.

[18] We discuss this timing in footnote 23.

- At stage 2, the entry stage, the buyer exerts an effort $e \in [e_0, 1]$ at a cost $\psi(e)$. Then the potential entrant enters with a probability e.
- At stage 3, the trading stage, the outcome of market competition is determined by whether an exclusive dealing agreement is signed and whether there is entry.

Following the literature, we assume that the incumbent cannot commit to the future trading price in the contract[19]. This is consistent with the idea that initially no one has yet a clear idea of the exact specifications of the product the buyer would require. The buyer's effort level e is also assumed to be non-contractible. And we also rule out contract breach; once agreed, the buyer can only trade with the incumbent[20].

At the end of stage 2, all parties observe whether the potential entrant has entered into the market. If there is no entry, or if the buyer has signed exclusive dealing, then the incumbent becomes the monopolist at stage 3. Let π^m and CS^m be the firm profit and consumer surplus, respectively, under monopoly (with marginal cost c_I). Referring to Figure 2, p^m and Q^m are the monopoly price and quantity corresponding to c_I,

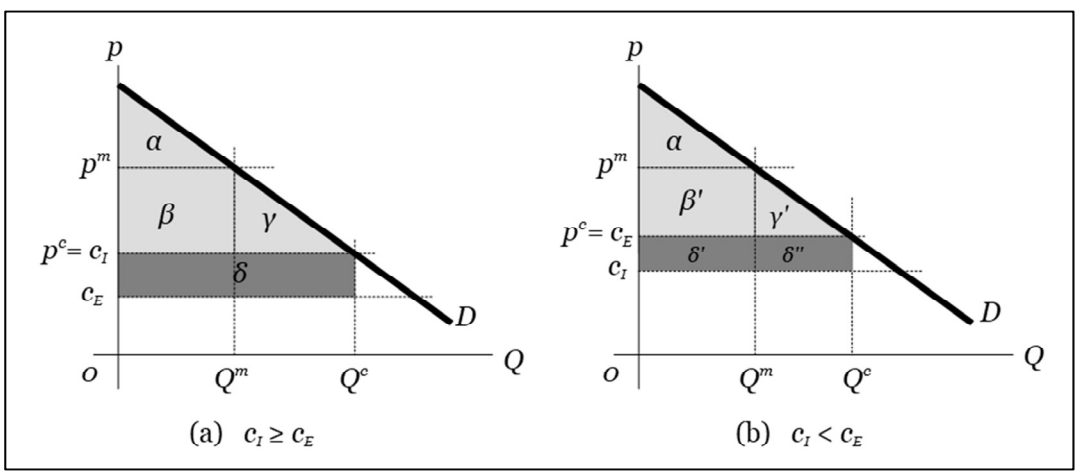

Figure 2 Market outcome

[19] Among others, this modeling choice is adopted in Rasmusen et al. (1991), Segal & Whinston (2000a), Fumagalli & Motta (2006), Simpson & Wickelgren (2007), Abito & Wright (2008), Kitamura (2010), and Gratz & Reisinger (2013). Price commitment is included in Aghion & Bolton (1987), Innes & Sexton (1994), and Spier & Whinston (1995). We will relax this assumption in section 4.1.

[20] We will relax this assumption in section 4.2, where the buyer can breach the contract and pay the incumbent "expectation damages" (John Simpson & Abraham Wickelgren, *supra* note 16; Linda Gratz & Markus Reisinger, *supra* note 16).

respectively. The monopoly profit π^m is the rectangle β in panel (a), which illustrates the case of $c_I \geq c_E$ (i.e., the potential entrant is more efficient than the incumbent), and the rectangle $\beta' + \delta'$ in panel (b), which illustrates the case of $c_I < c_E$ (the potential entrant is less efficient). Consumer surplus CS^m is the triangle α in both panels.

When the potential entrant enters and the buyer is not bound by exclusive dealing, we assume that neither firm enjoy a cost advantage so large that it effectively becomes a monopolist. More precisely, (i) the potential entrant does not bring a drastic process innovation to the market even if it is more efficient ($c_E \leq c_I$), i.e., the monopoly price under the marginal cost c_E is greater than c_I; and (ii) when the potential entrant is less efficient, $c_E > c_I$, it can still constrain the pricing strategy of the incumbent so that the latter cannot charge the monopoly price, i.e., $c_E < p^m$ as shown in Figure 2(b).

By these assumptions, price competition with homogeneous products drives the market price down to $p^c = \max\{c_I, c_E\}$. Competition benefits the buyer and raises consumer surplus, whether the entrant is more or less efficient than the incumbent. Let CS^c be the consumer surplus under competition, and $\Delta CS \equiv CS^c - CS^m > 0$ the improvement of consumer surplus brought by competition.

On the other hand, the firm with a higher marginal cost obtains zero profit. (By convention, we assume that upon indifference the buyer will only purchase from the firm with a lower marginal cost.) Also denote π_I and π_E as the profit of the incumbent and potential entrant, respectively, under competition. When $c_I \geq c_E$, as shown in Figure 2(a), the incumbent cannot compete against a more efficient potential entrant; it obtains zero profit, $\pi_I = 0$. In this case, the market price is $p^c = c_I$ and output $Q^c = D(p^c)$. The profit of the potential entrant is $\pi_E = (c_I - c_E) \cdot Q^c \geq 0$, represented by the deep grey rectangle δ. (If $c_I = c_E$, then the standard Bertrand competition leads to zero profit for both firms, $\pi_I = \pi_E = 0$, and the area δ vanishes). Consumer surplus CS^c expands to the whole light grey triangle $\alpha + \beta + \gamma$; the improvement of consumer welfare ΔCS is equal to the trapezoid $\beta + \gamma$. By the same token, when $c_I < c_E$, as shown in Figure 2(b), market price is $p^c = c_E$ and output is $Q^c = D(p^c)$. The entrant's profit π_E is zero, the incumbent's profit is $\pi_I = (c_E - c_I) \cdot Q^c$, represented by the deep grey area $\delta' + \delta''$, and consumer surplus is the area $\alpha + \beta' + \gamma'$. Again, the difference in consumer surplus ΔCS,

represented by the area $\beta' + \gamma'$, is strictly positive.

2.1 Benchmark I: The Chicago critique

We first consider the case of an exogenous probability of entry, $e_0 \in [0,1]$, which is common knowledge between the incumbent and buyer. Absent exclusive dealing, at stage 3 the market outcome is characterized by Bertrand competition with probability e_0, and monopoly with probability $1 - e_0$. The buyer obtains an expected return $e_0 CS^c + (1 - e_0)CS^m$, and the incumbent obtains $e_0\pi_I + (1 - e_0)\pi^m$, where $\pi_I > 0$ if and only if $c_I < c_E$.

Let the incumbent offer the buyer a payment x for exclusivity. If the buyer accepts, the market will become monopoly at stage 3, with consumer surplus CS^m for the buyer and profit π^m for the incumbent. According to the Chicago School[21], the incumbent must sufficiently compensate the buyer for the welfare loss. The payment x must satisfy

$$CS^m + x \geq e_0 CS^c + (1 - e_0)CS^m \implies x \geq e_0 \vartriangle CS. \quad (1)$$

On the other hand, the incumbent won't pay more than what exclusivity is worth. The payment x must also satisfy

$$\pi^m - x \geq e_0\pi_I + (1 - e_0)\pi^m \implies x \leq e_0(\pi^m - \pi_I), \quad (2)$$

for the incumbent to be willing to offer. Combining the two conditions, at stage 1 the incumbent and buyer can sign an exclusive dealing contract if and only if $e_0 \vartriangle CS \leq x \leq e_0(\pi^m - \pi_I)$, which in turn requires $\vartriangle CS \leq \pi^m - \pi_I$, or, equivalently[22],

$$CS^c + \pi_I \leq CS^m + \pi^m. \quad (3)$$

This condition compares joint surplus of the incumbent and buyer at different price levels. The left-hand side is joint surplus at the price p^c and right-hand side at p^m. Since the competitive price $p^c = \max\{c_I, c_E\}$ will not be strictly smaller than c_I, i.e., the incumbent will not sell at a loss, lower price and so higher quantity will lead to higher

[21] Richard Posner, *supra* note 5; Robert Bork, *supra* note 5.
[22] When $e_0 = 0$, there will be no entry and no need for the incumbent to offer exclusive dealing.

joint surplus. We must have $CS^c + \pi_I > CS^m + \pi^m$ for both $c_I \gtrless c_E$. Indeed, standard price theory indicates that, as long as competition pushes down market price, allocation efficiency improves. Condition (3) cannot be satisfied, and the Chicago critique holds when the probability of entry is exogenous[23].

To illustrate, when $c_I \geq c_E$, the area $\alpha + \beta$ in Figure 2(a) corresponds to $CS^m + \pi^m$, and the area $\alpha + \beta + \gamma$ corresponds to $CS^c + \pi_I = CS^c$. The difference, area γ, is the familiar deadweight loss. When $c_I < c_E$, we have $CS^m + \pi^m$ equal to the area $\alpha + \beta' + \delta'$, which is smaller than $CS^c + \pi_I$, represented by the area $\alpha + \beta' + \gamma' + \delta' + \delta''$. The difference, area $\gamma' + \delta''$, is derived from high outputs $Q^c - Q^m$ induced by competition.

Proposition 1

When the probability of entry is fixed, condition (3) fails and so the incumbent and buyer cannot sign an exclusive dealing agreement.

Proof. For a general demand function D, let D^{-1} be its inverse demand function. Given the market price p, the quantity demanded is $Q = D(p)$, or $p = D^{-1}(Q)$, and consumer surplus is $CS = \int_0^Q D^{-1}(q)dq - p \cdot Q$.

Under the monopoly price p^m and quantity Q^m, we have $CS^m = \int_0^{Q^m} D^{-1} - p^m Q^M$ and $\pi^m = (p^m - c_I)Q^m$. The right-hand side of condition (3) is

$$CS^m + \pi^m = \int_0^{Q^m} D^{-1} - c_I Q^m = \int_0^{Q^m} (D^{-1} - c_I). \tag{4}$$

When there is competition, the market price decreases to $p^c = \max\{c_I, c_E\} < p^m$ and quantity expands to $Q^c = D(p^c) > Q^m$. If $c_I \geq c_E$, then $p^c = c_I$ and $\pi_I = 0$, generating consumer surplus

$$CS^c = \int_0^{Q^c} D^{-1} - p^c Q^c = \int_0^{Q^c} (D^{-1} - c_I) > \int_0^{Q^m} (D^{-1} - c_I), \tag{5}$$

[23] This result also explains our choice of timing, i.e., the buyer exerts efforts after the contract negotiation stage. If we reverse the first two stages and let the incumbent offer the exclusive dealing contract after the buyer's entry facilitation decision, then at the stage of contract negotiation the buyer's cost has become sunk and entry probability fixed. The argument here applies and there will be no exclusive dealing.

where the inequality holds for $Q^c > Q^m$ and $D^{-1}(q) \geq c_I$ for all $q \in [0, Q^c]$. Hence condition (3) fails. Next, if $c_I < c_E$, then $p^c = c_E$ and

$$CS^c + \pi_I = \int_0^{Q^c} D^{-1} - p^c Q^c + (p^c - c_I)Q^c = \int_0^{Q^c} (D^{-1} - c_I) > \int_0^{Q^m} (D^{-1} - c_I) \qquad (6)$$

for the same reason; condition (3) again fails.

2.2 Benchmark II: Social optimal efforts

Suppose that the buyer can facilitate entry and increase the probability of entry at a cost $\psi(e)$. Here we consider the socially optimal level of such efforts.

If there is no entry, the market remains monopoly, with social welfare $W^m \equiv CS^m + \pi^m$. Post entry, social welfare becomes $W^c \equiv CS^c + \pi_I + \pi_E$, where $\pi_I = 0$ for $c_I \geq c_E$ and $\pi_E = 0$ for $c_I < c_E$. Since $W^c \geq CS^c + \pi_I$, the failure of condition (3) implies that $W^c > W^m$ for both $c_I \gtrless c_E$. The socially optimal probability of entry, denoted as e^*, is determined by[24]

$$e^* = \text{argmax}_e \ (1-e)W^m + eW^c - \psi(e)$$

$$\Rightarrow \quad \text{FOC: } W^c - W^m \equiv \psi'(e^*). \qquad (7)$$

The socially optimal effort e^* equates the marginal cost of a higher probability of entry with the marginal benefit brought by entry (and competition), $W^c - W^m$.

3. Buyer initiatives

Let the buyer choose the effort level according to private concerns. After signing the exclusive dealing contract, without the possibility of breach, the buyer is prevented from trading with other suppliers. Consumer surplus remains at CS^m even if the potential entrant enters; the buyer will not exert any effort after signing exclusive dealing.

If the buyer does not sign the exclusive dealing contract, entry increases consumer

[24] The second-order condition holds because of a strictly convex cost function ψ. The same is true in other optimization programs we consider and is omitted.

surplus from CS^m to CS^c. The privately optimal level of entry probability, denoted by $\hat{e}$, is determined by

$$\hat{e} = \text{argmax}_e(1-e)CS^m + eCS^c - \psi(e)$$

$$\Rightarrow \text{ FOC: } \Delta CS \equiv \psi'(\hat{e}), \tag{8}$$

where $\Delta CS \equiv CS^c - CS^m$. Denote $\hat{\psi} \equiv \psi(\hat{e})$ as the cost of exerting the buyer's optimal choice $\hat{e}$.

Comparing e^* and $\hat{e}$, the difference between private motivation and social concerns to facilitate entry is firm profit, which is ignored by the buyer. That is

$$\Delta CS - (W^c - W^m) = \pi^m - (\pi_I + \pi_E), \tag{9}$$

which can be positive or negative. When $c_I < c_E$, a less efficient potential entrant obtains no profit after entry, $\pi_E = 0$, and by definition $\pi^m > \pi_I$. The buyer's effort level is higher than the socially optimal level, $\hat{e} > e^*$. In Figure 2(b), ΔCS is represented by the area $\beta' + \gamma'$ and $W^c - W^m$ by the area $\gamma' + \delta''$; the difference between ΔCS and $W^c - W^m$ is the size difference between the area β' and δ''. Competition reduces the profit of the incumbent, which causes the area $\beta' + \delta'$ to be greater than the area $\delta' + \delta''$, and so the area β' greater than δ''. Intuitively, when the entrant is less efficient, it does not get any profit post entry. Competition, while expanding outputs and raising total surplus, redistributes some surplus from the incumbent to the buyer, with $\pi_I < \pi^m$ and $CS^c > CS^m$. The buyer's effort decision only depends on the change in consumer surplus, while socially optimal efforts would also take into account firm profit. The buyer exerts more efforts than socially optimal.

On the other hand, if $c_I > c_E$, then $\pi_I = 0$ and the relative size of π^m and π_E depends on the magnitude of $c_I - c_E$, namely, the entrant's efficiency improvement over the incumbent. In Figure 2(a), ΔCS is represented by the area $\beta + \gamma$ and $W^c - W^m$ by the area $\gamma + \delta$, where β and δ correspond to π^m and π_E, respectively. The difference between ΔCS and $W^c - W^m$ is the size difference between the area β and δ. Fixing c_I, as c_E decreases, i.e., as the potential entrant becomes more efficient, the area β is intact and the area δ expands. The buyer tends to exert insufficient efforts when the

potential entrant is more efficient. Intuitively, the profit π_E is included in social welfare W^c but not in consumer surplus CS^c. In fact, under Bertrand competition, once $c_E < c_I$, market price p^c remains at c_I no matter how efficient the entrant is. Consumer surplus CS^c depends only on c_I, but not on c_E. It follows that, as c_E decreases, social welfare W^c increases (because of higher π_E) but CS^c keeps the same; social concerns would call for more efforts (higher e^*), but the privately optimal choice $\hat{e}$ would not change.

At stage 1, the negotiation stage, failing to reach an agreement, the buyer will choose an entry probability $\hat{e}$ later and obtain an expected payoff $\hat{e}CS^c + (1 - \hat{e})CS^m - \hat{\psi}$. The incumbent's expected payoff is $\hat{e}\pi_I + (1 - \hat{e})\pi^m$. After signing the exclusive dealing contract, the buyer will not exert any effort and the incumbent can maintain monopoly. Comparing the two scenarios, the incumbent is willing to pay x for exclusivity if

$$\pi^m - x \geq \hat{e}\pi_I + (1 - \hat{e})\pi^m \quad \Longrightarrow \quad x \leq \hat{e}(\pi^m - \pi_I), \tag{10}$$

and the buyer is willing to accept if

$$CS^m + x \geq \hat{e}CS^c + (1 - \hat{e})CS^m - \hat{\psi} \quad \Longrightarrow \quad x \geq \hat{e}\,\Delta\, CS - \hat{\psi}. \tag{11}$$

Combining the two conditions, exclusive dealing is feasible when

$$\hat{e}(\pi^m - \pi_I) \geq \hat{e}\,\Delta\, CS - \hat{\psi} \quad \Longrightarrow \quad \hat{\psi} \geq \hat{e}[\Delta\, CS - (\pi^m - \pi_I)]. \tag{12}$$

Different from the benchmark case of exogenous entry probability in section 2.1, the cost $\hat{\psi}$ creates some scope for the incumbent and buyer to agree on exclusive dealing. The buyer's costly efforts to facilitate entry undermine the Chicago argument because the two parties can cooperate and sign a contract to save the cost $\hat{\psi}$ that the buyer would spend in the absence of exclusive dealing. After signing exclusive dealing, the buyer will not exert any effort, and the potential entrant will enter with the minimal probability e_0. With or without entry, the buyer only trades with the incumbent. Exclusive dealing therefore excludes the potential competitor.

To evaluate the welfare effect of exclusive dealing, suppose that condition (12) holds, i.e., exclusive dealing can be signed. Allowing exclusive dealing, the incumbent and buyer will sign an agreement and generate social welfare W^m. Banning exclusive dealing, on

the other hand, generates social welfare $\hat{e}W^c + (1-\hat{e})W^m - \hat{\psi}$. Prohibiting exclusive dealing strictly raises social welfare when

$$\hat{e}W^c + (1-\hat{e})W^m - \hat{\psi} > W^m$$

$$\Longrightarrow \ \hat{e}(W^c - W^m) = \hat{e}[\Delta\, CS - (\pi^m - \pi_I) + \pi_E] > \hat{\psi}. \tag{13}$$

A necessary condition for the prohibition of exclusive dealing to improve social welfare is $\pi_E > 0$, which excludes the case of $c_E > c_I$.[25] That is, when the entrant is less efficient and earns no profit post entry, $\pi_E = 0$, condition (13) is incompatible with condition (12). Intuitively, when $c_E > c_I$, the buyer's choice of efforts exceeds the socially optimal level. To the extent that the incumbent and buyer can reach an agreement, the saving on costs $\hat{\psi}$ outweighs the loss of static welfare $\hat{e}(W^c - W^m)$. On the other hand, when $c_E < c_I$ and so $\pi_I = 0$ and $\pi_E > 0$, condition (13) is more likely to hold when $\pi_E = (c_I - c_E)Q^c$ is larger. Since $Q^c = D(c_I)$ is independent of c_E, this calls for a more efficient potential entrant, so that c_E is lower. We summarize the discussion in the following proposition, and provide an example.

Proposition 2

Suppose that the buyer can raise the probability of entry e at a cost $\psi(e)$. When condition (12) holds, the incumbent and buyer will sign an exclusive dealing contract.

Given condition (12), prohibiting exclusive dealing cannot raise social welfare for the case of $c_E \geq c_I$; and when $c_I > c_E$, banning exclusive dealing improves welfare if condition (13) holds, which is more likely for smaller c_E.

Example

We verify the result in Proposition 2 with specific function forms. Let $e_0 = 0$ and consider a quadratic cost function, $\psi(e) = e^2/(2k)$, where k is strictly positive and sufficiently small to guarantee an interior solution. The marginal cost is $\psi' = e/k$. By the first-order condition in expression (8), the buyer's optimal choice is $\hat{e} = k\,\Delta\, CS$, and the

[25] In fact, this is also true for the case of $c_E = c_I$.

optimal cost is $\hat{\psi} = \hat{e}^2/(2k) = [k(\Delta\, CS)^2]/2$. Given quadratic costs, condition (12) becomes

$$\frac{\Delta CS}{2} \geq \Delta\, CS - (\pi^m - \pi_I) \implies 2(\pi^m - \pi_I) \geq \Delta\, CS. \tag{14}$$

If $c_I \geq c_E$, then $\pi_I = 0$, and condition (14) becomes $2\pi^m \geq \Delta\, CS$. We further assume a linear demand function, which entails $Q^m = Q^c/2$ and $\Delta\, CS = (Q^m + Q^c)(p^m - c_I)/2$. Under these specifications, condition (14) is equivalent to

$$2\pi^m \geq \Delta\, CS \Leftrightarrow 2(p^m - c_I)Q^m \geq \frac{(Q^m+Q^c)}{2}(p^m - c_I) \Leftrightarrow 2Q^m \geq \frac{Q^m+Q^c}{2}, \tag{15}$$

which holds because $Q^m = Q^c/2$. For welfare, given quadratic cost, condition (13) becomes

$$k\, \Delta\, CS(\Delta\, CS - \pi^m + \pi_E) > \frac{k(\Delta CS)^2}{2} \implies \Delta\, CS + 2\pi_E > 2\pi^m, \tag{16}$$

which, under linear demand, is

$$\frac{Q^m+Q^c}{2}(p^m - c_I) + 2(c_I - c_E)Q^c > 2(p^m - c_I)Q^m. \tag{17}$$

Inserting $Q^c = 2Q^m$ into the condition, we obtain

$$\frac{3Q^m}{2}(p^m - c_I) + 4Q^m(c_I - c_E) > 2Q^m(p^m - c_I) \implies 8(c_I - c_E) > p^m - c_I. \tag{18}$$

Let the demand function be $D(p) = a - bp$, we then have $p^m = (a + bc_I)/(2b)$ and so $p^m - c_I = (a - bc_I)/(2b)$. (We require $c_I < (a/b)$ so that $D(c_I) > 0$, i.e., there is positive demand when the price is set at the incumbent's marginal cost.) Inserting these values into condition (18), we obtain

$$16(c_I - c_E) > \frac{a}{b} - c_I, \tag{19}$$

which requires a sufficiently small c_E.

If $c_I < c_E$, i.e., the potential entrant is the more efficient firm, then $\pi_I = (c_E - c_I)Q^c > 0$, where $Q^c = D(c_E)$. Together with a linear demand function, condition (14) becomes $2[(p^m - c_I)Q^m - (c_E - c_I)Q^c] \geq [(Q^m + Q^c)(p^m - c_E)/2]$, or, equivalently

$$(p^m - c_E)(3Q^m - Q^c) \geq 4(c_E - c_I)(Q^c - Q^m), \tag{20}$$

where $Q^c \in (Q^m, 2Q^m)$ for $c_E \in (c_I, p^m)$. Given a linear demand function $D(p) = a - bp$, we obtain $Q^m = (a - bc_I)/2$ and $Q^c = a - bc_E$. (To exert competitive pressure on the incumbent, we impose the requirement of $p^m = (a + bc_I)/(2b) > c_E$.) By $Q^c - Q^m = (a + bc_I - 2bc_E)/2 = b(p^m - c_E) > 0$, condition (20) is reduced to

$$3Q^m - Q^c = \frac{a-3bc_I+2bc_E}{2} \geq 4b(c_E - c_I) \quad \Longrightarrow \quad \frac{a}{b} + 5c_I \geq 6c_E, \tag{21}$$

which holds for a sufficient small c_E. For instance, if $c_E \to c_I^+$, then the condition becomes $(a/b) \geq c_I$; but if $c_E \to p^m$, then we have

$$6c_E \to 6p^m = 3\left(\frac{a}{b} + c_I\right) > \frac{a}{b} + 5c_I, \tag{22}$$

again, for $(a/b) > c_I$; hence condition (20) fails. (Since condition (13) cannot hold for the case of $c_E \geq c_I$, we omit the welfare analysis.)

4. Extensions

We now consider some variations of the basic model.

4.1 Price commitment in exclusive dealing

Here we allow the incumbent to commit to the future price p_I in the exclusive dealing contract. Intuitively, an expansion of the contracting space would assist contract negotiation; our result should hold in this extension.

A contract now consists of a pair (x, p_I). We restrict x to be non-negative so that the buyer cannot "bribe" or "subsidize" the incumbent to obtain a lower price, i.e., we rule out

two-part tariffs. We also maintain the assumption of no contract breach. By accepting exclusive dealing, gross of payment x, the buyer's consumer surplus becomes $CS(p_I)$ while the incumbent's payoff is $(p_I - c_I)D(p_I)$. The buyer is willing to accept the contract if

$$CS(p_I) + x \geq \hat{e}CS^c + (1-\hat{e})CS^m - \hat{\psi}, \tag{23}$$

and the incumbent is willing to offer if

$$(p_I - c_I)D(p_I) - x \geq \hat{e}\pi_I + (1-\hat{e})\pi^m. \tag{24}$$

Therefore, condition (12) is modified to

$$\hat{\psi} + CS(p_I) + (p_I - c_I)D(p_I) \geq \hat{e}(CS^c + \pi_I) + (1-\hat{e})(CS^m + \pi^m). \tag{25}$$

When the incumbent sets the transaction price at the monopoly price, $p_I = p^m$, we have $CS(p_I) + (p_I - c_I)D(p_I) = CS^m + \pi^m$ and the condition is identical to condition (12). In other words, condition (12) is a special case of this extension.

Even if condition (12) fails, there exists a price p_I that satisfies condition (25). To see this, let $S(p) \equiv CS(p) + (p - c_I)D(p)$ be joint surplus of the buyer and incumbent, as a function of the transaction price p between the two parties. For all $p \geq c_I$, i.e., as long as the incumbent does not sell at a loss, the function $S(p)$ is decreasing in p, with $S(p^m) = CS^m + \pi^m$.[26] If $c_I \geq c_E$, then $p^c = c_I$ and $\pi_I = 0$, with $CS^c + \pi_I = S(c_I)$. Fixing the effort level $\hat{e} \in (0,1)$ and cost $\hat{\psi} > 0$, condition (25) holds as long as there exists a price p_I such that $S(p_I) \geq \hat{e}S(c_I) + (1-\hat{e})S(p^m) \in \big(S(p^m), S(c_I)\big)$. And if $c_E > c_I$, then $p^c = c_E$ and $CS^c + \pi_I = S(c_E)$. Condition (25) holds when $S(p_I) \geq \hat{e}S(c_E) + (1-\hat{e})S(p^m) \in \big(S(p^m), S(c_E)\big)$ for some p_I. For both cases, we can find sufficiently low price $p_I \in (p^c, p^m)$ such that condition (25) is satisfied.

Proposition 3

Suppose that the incumbent can commit to the price p_I paid by the buyer. For all

[26] S is different from social welfare W when $c_I \geq c_E$, so that $\pi_I = 0$ but $\pi_E \geq 0$. In this case $p^c = c_I$ and $S(p^c) = CS(p^c) = CS^c$, but π_E is included in social welfare W^c.

$\hat{e} \in (0,1)$, there exists $p_I \in (p^c, p^m)$ such that condition (25) holds and the buyer will sign an exclusive dealing contract.

In fact, the result holds even if there is no cost of facilitating entry, $\psi = 0$, and the probability of entry $e \in (0,1)$ is exogenous[27]. This is a general point in the literature that price commitment helps exclusive dealing[28].

4.2 Breach and expectation damages

Here we allow contract breach. After signing the exclusive dealing contract, the buyer has the option to breach the contract and trade with the potential entrant at stage 3, provided that the incumbent is compensated by the standard of expectation damages. By definition, expectation damages specify an amount that would put the victim of the breach "*in the position he would have enjoyed had the contract been carried out*" [29]. Given this damage measure, the incumbent will set its price at p^m (in the exclusive dealing contract or at the trading stage) and secure the monopoly profit π^m. The buyer either honors exclusive dealing and trades with the incumbent at a unit price p^m, which generates a payoff π^m for the incumbent, or breaches the contract and trade with the entrant, in which case the incumbent gets zero profit without compensation. After breach, by expectation damages the buyer has to pay π^m so that the incumbent gets the same payoff as if there were no breach[30].

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[27] If $e = 0$, there is no entry, the incumbent will offer $p_I = p^m$ and there is no need to sign an exclusive dealing contract. If $e = 1$, entry occurs for sure, and we are back to the Chicago setting. Only $p_I \le p^c$ will satisfy condition (25), accompanied by $\hat{\psi} = 0$. Hence, when $c_I \ge c_E$, the incumbent obtains exclusivity at a loss, $(p_I - c_I)D(p_I) \le 0$ for $p_I \le p^c = c_I$; and when $c_E > c_I$, the incumbent's payoff is also (weakly) smaller than not signing exclusive dealing, $(p_I - c_I)D(p_I) \le \pi_I = (c_E - c_I)D(c_E)$ for $p_I \le p^c = c_E$. The Chicago critique holds and the incumbent cannot use exclusive dealing to raise profit.

[28] *See*, for example, Zhijun Chen & Greg Shaffer, *supra* note 4, for a model of partial exclusion with probabilistic entry where price commitment is necessary to achieve exclusion.

[29] Steven Shavell, *Foundations of Economic Analysis of Law*, 1st ed., Harvard University Press, 343 (2004).

[30] For sure, to implement expectation damages, the court would need to possess both the demand data $D(\cdot)$ and cost data c_I to correctly compute the magnitude of monopoly profit π^m, whether p^m is specified in the exclusive dealing contract or not.

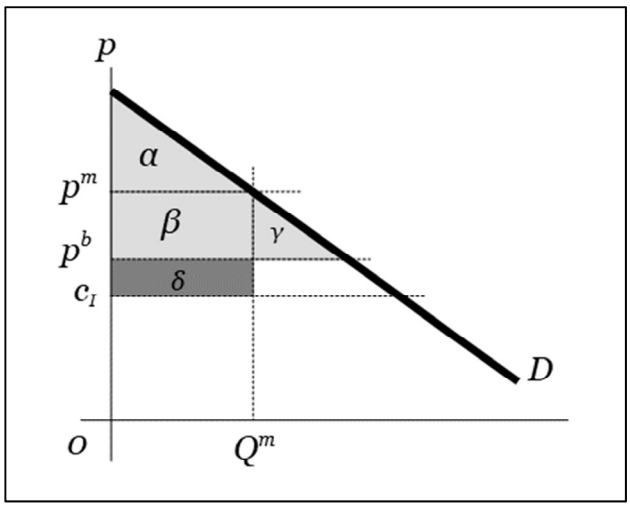

Figure 3 Breach of exclusive dealing

Suppose that the buyer has signed the exclusive dealing contract. After entry, the entrant can only induce breach and trade with the buyer by offering a sufficiently low price. Define p^b by (the superscript 'b' stands for breach)

$$CS(p^b) - \pi^m \equiv CS^m \quad \Longrightarrow \quad CS(p^b) = CS^m + \pi^m; \tag{26}$$

we have $p^b \in (c_I, p^m)$. In Figure 3, $CS^m + \pi^m$ is represented by the area $\alpha + \beta + \delta$ and $CS(p^b)$ by the area $\alpha + \beta + \gamma$; the price p^b can be found by equating the size of the area γ and δ.

By the definition of p^b, the buyer is indifferent between trading with the incumbent at a price p^m and trading with the entrant at a price p^b while paying π^m for contract breach. Since consumer surplus $CS(p)$ is decreasing in p, only for $p \le p^b$ will the buyer breach. For the entrant, the profit of selling at p^b is $(p^b - c_E)D(p^b)$, and only a sufficiently efficient entrant, with $c_E \le p^b$, will be able to induce contract breach. By $p^b > c_I$, the requirement always holds, and breach always occurs, when $c_E \le c_I$.[31] In this

[31] This is a general property of expectation damages: They induce (*ex post*) efficient contract breach. Even for $c_E > c_I$, as long as the entrant can profitably induce breach (i.e., $c_E \le p^b$), static welfare improves from W^m to $CS(p^b) - \pi^m + \pi^m + (p^b - c_E)D(p^b) = W^m + (p^b - c_E)D(p^b)$, although there is some distortion in production efficiency. The goods are not produced by the more efficient technology (with a lower cost c_I).

case, the entrant may be so efficient that p^b is higher than the monopoly price under the cost c_E, denoted by p_E^m.[32]

Given $c_E \leq p^b$, we consider two cases according to whether $p_E^m \gtrless p^b$. If $p_E^m \geq p^b$, which encompasses the case of $c_E \geq c_I$, post entry the entrant optimally sets the price at p^b to induce breach, and the buyer enjoys a net payoff $CS(p^b) - \pi^m = CS^m$, the same as no breach. Envisioning this development, after signing the exclusive dealing contract the buyer will not incur any cost, and the probability of entry remains at e_0. Whether there is entry, the buyer gets CS^m and the incumbent gets π^m. Therefore, the two parties will sign exclusive dealing if and only if condition (12) holds[33].

If $p_E^m < p^b$, which only occurs for $c_E < c_I$, post entry the entrant optimally sets its price at p_E^m, and the buyer gets $CS(p_E^m) - \pi^m > CS^m$ for $p_E^m < p^b$. Let $\overline{CS} \equiv CS(p_E^m) - \pi^m$. After signing the exclusive dealing contract, the buyer will choose a probability of entry $\bar{e}$ that solves

$$\bar{e} = \text{argmax}_e \; e\overline{CS} + (1-e)CS^m - \psi; \tag{27}$$

denote the cost $\psi(\bar{e})$ by $\bar{\psi}$. The buyer obtains an expected payoff (gross of the sign-up bonus) $\bar{e}\overline{CS} + (1-\bar{e})CS^m - \bar{\psi}$ under exclusive dealing, and is willing to sign the contract when

$$\bar{e}\overline{CS} + (1-\bar{e})CS^m - \bar{\psi} + x \geq \hat{e}CS^c + (1-\hat{e})CS^m - \hat{\psi} \tag{28}$$

$$\Longrightarrow \quad [\bar{e}(\overline{CS} - CS^m) - \bar{\psi}] + x \geq \hat{e} \vartriangle CS - \hat{\psi}. \tag{29}$$

For the incumbent, exclusive dealing generates a payoff (gross of payment x) π^m, whether there is breach or not. Its decision to offer exclusive dealing is still characterized by condition (10), with $\pi_I = 0$. Exclusive dealing is signed when

$$\hat{e}(\pi^m - \pi_I) \geq x \geq \hat{e} \vartriangle CS - \hat{\psi} - [\bar{e}(\overline{CS} - CS^m) - \bar{\psi}], \tag{30}$$

which requires

[32] That is, $p_E^m = \text{argmax}_p (p - c_E)D(p)$.

[33] A different allocation ensues, however. After signing and then breaching exclusive dealing, social welfare is higher than when no breach. *See supra* note 31.

$$\hat{\psi} + [\bar{e}(\overline{CS} - CS^m) - \bar{\psi}] \geq \hat{e}(\Delta\, CS - \pi^m + \pi_I), \tag{31}$$

where $\bar{e}(\overline{CS} - CS^m) - \bar{\psi} > 0$ (see the proof of Proposition 4). Allowing breach under expectation damages facilitates exclusive dealing. Intuitively, expectation damages allow the buyer to tap into the significant efficiency of the potential entrant without hurting the incumbent. Even after signing exclusive dealing, comparing with no breach, the buyer's payoff improves from CS^m to $\bar{e}\overline{CS} + (1 - \bar{e})CS^m - \bar{\psi}$. Hence, the buyer's reservation price of giving up exclusivity decreases.

Proposition 4

When a contract can be breached by paying expectation damages, the condition to sign an exclusive dealing contract is still condition (12) when $p_E^m \geq p^b$*, and relaxed to condition (31) when* $p_E^m < p^b$.

Proof. Since $\bar{e}$ is the optimal solution and $\bar{e} > e_0 \geq 0$, $\overline{CS} > CS^m$, a straightforward application of revealed preference argument gives

$$\bar{e}\overline{CS} + (1 - \bar{e})CS^m - \bar{\psi} > e_0\overline{CS} + (1 - e_0)CS^m - \psi(e_0) \geq CS^m, \tag{31}$$

where $\psi(e_0) = 0$. We then obtain $\bar{e}(\overline{CS} - CS^m) > \bar{\psi}$.

4.3 Competing buyers

The final extension concerns competing buyers, who are retailers offering substitutable products[34]. In this context, the literature exhibits disagreements regarding the validity of Chicago critique and competitive effects of exclusive dealing. Among others, Fumagalli and Motta (2006) obtain a result in line with the Chicago thinking, i.e., the incumbent cannot profitably obtain exclusivity from retailers; Simpson and Wickelgren (2007) as well as Abito and Wright (2008) point out that the result of Fumagalli and Motta (2006) is not robust to breach with expectation damages and the retailing competition

[34] *See* Christodoulos Stefanadis, "Selective Contracts, Foreclosure, and the Chicago School View," *41(2) Journal of Law and Economics*, 429-450 (1998); Jong-Say Yong, "Exclusionary Vertical Contracts and Product Market Competition," *72(3) Journal of Business*, 385-406 (1999); also *see supra* note 16.

environment, respectively; Kitamura (2010) further shows that a second, less efficient potential entrant constrains the incumbent's ability to sign exclusive dealing; and Gratz and Reisinger (2013) argue that for mild product differentiation at the retail level, exclusive dealing actually is pro-competitive if it can be breached with expectation damages.

Here we do not intend to solve the debate; instead, we examine how buyer initiatives affect the two opposite results of Fumagalli and Motta (2006) and Abito and Wright (2008). For simplicity, suppose that two retailers, R_1 and R_2, buy identical products from the incumbent or potential entrant, and then resell to the same group of final consumers with demand $D(p)$; see Figure 4. Retailers have the same cost function $\psi(\cdot)$ of facilitating entry, and the probability of entry, denoted by $\boldsymbol{e} \in [e_0, 1]$, is a function of individual efforts e_1 and e_2. We assume that $\boldsymbol{e}(e_1, e_2)$ is weakly increasing in e_1 and e_2, with $\boldsymbol{e}(e_1, e_0) = e_1$ and $\boldsymbol{e}(e_0, e_2) = e_2$. That is, if one retailer does not exert any effort, then the entry probability depends solely on the effort level of the other retailer. The only variable costs of retailers are wholesale payments to upstream suppliers.

To accommodate retail competition, we replace stage 3 by stage 3' in the timing:

- At stage 1, the contracting stage, the incumbent offers exclusive dealing contracts to retailers.
- At stage 2, retailer R_i exerts an effort $e_i \in [e_0, 1]$ at a cost $\psi(e_i)$ to help entry, $i \in \{1,2\}$. The potential entrant enters with probability $\boldsymbol{e}(e_1, e_2)$.
- At stage 3', competition stage, retailers decide from which suppliers to obtain the product according to upstream competition and exclusive dealing obligations, and then engage in Bertrand competition at the retail market.

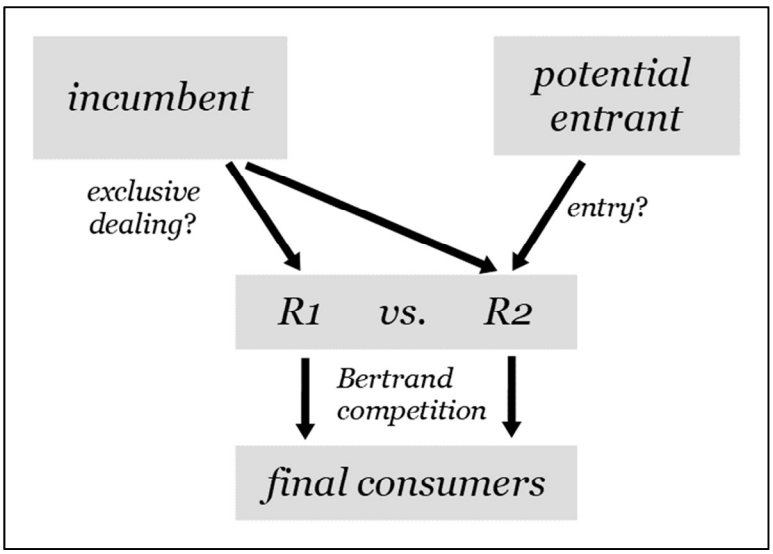

Figure 4 Exclusive dealing and competing retailers

To highlight our point, we only consider the case of $c_E < c_I$ in this extension and assume no contract breach, as in Fumagalli and Motta (2006) and Abito and Wright (2008). Both the incumbent and potential entrant only offer linear pricing contracts[35], and the incumbent's exclusive dealing contracts, which still consist of only sign-up bonus, are further restricted to be public, simultaneous, and non-discriminatory.

As Fumagalli and Motta (2006) observe, homogeneous products imply that the entrant only needs one retailing outlet to reach final consumers. Therefore, to exclude entry, the incumbent needs to secure exclusivity from both retailers. The difference between Fumagalli and Motta (2006) and Abito and Wright (2008) concerns a detail of downstream competition. Fumagalli and Motta (2006) assume that a retailer needs to incur a small, but strictly positive cost of operation, and so will remain active only when expecting a strictly positive profit. By contrast, there is no such cost in the analysis of Abito and Wright (2008); hence a retailer facing a higher wholesale price will not exit even if it cannot sell anything, but remains in the retail market and exerts competitive

[35] Both Fumagalli & Motta (2006), as well as Abito & Wright (2008), consider the extension of two-part tariffs. Professor Wright corrected the analysis of two-part tariffs in Fumagalli & Motta (2006); *see* Julian Wright, "Exclusive Dealing and Entry, When Buyers Compete: Comment," *99(3) American Economic Review*, 1070-1081 (2009).

pressure on the rival.

Abito and Wright (2008) argue that the incumbent can obtain exclusivity from both retailers at almost no cost. To see this, suppose that, say, R_2 has signed the exclusive dealing contract and consider R_1's incentive to sign. If R_1 also signs, then by the assumption of no breach both retailers can only trade with the incumbent, whether the potential entrant enters or not. At stage 3', the incumbent will optimally set the wholesale price at p^m, the monopoly price under marginal cost c_I. Bertrand competition then compels retailers to set the retail price at p^m, divide the market quantity $D(p^m)$ between them, and obtain zero profit[36]. The incumbent obtains the whole monopoly profit π^m.

Suppose that R_1 does not sign the exclusive dealing contract (i.e., it is a free agent), and the potential entrant enters the market. In this subgame, the incumbent and entrant will compete for R_1. Since the incumbent will not sell at a loss, the minimal wholesale price it could charge (to R_1 as well as R_2) is c_I. By the assumption that the more efficient firm obtains all transactions at the same price, the entrant can sell to R_2 at a price c_I. We then have two competing vertical structures: the incumbent sells to R_2 and entrant sells to R_1, both with wholesale price c_I. Price competition at the downstream market then generates an equilibrium price c_I, with a profit for $(c_I - c_E)D(c_I)$ for the entrant and no profit for R_1 (as well as R_2). Since R_1 does not benefit from not signing the exclusive dealing contract, Abito and Wright (2008) conclude that a small amount of bonus will allow the incumbent to achieve exclusivity[37].

The same logic, i.e., not signing exclusive dealing gives R_1 no profit whether there is entry or not, implies that R_1 will not incur any cost to facilitate entry, and the incumbent can still obtain exclusivity at (almost) no cost. The insight of Abito and Wright (2008) carries over to the setting with buyer initiatives.

Now, suppose that being active at the downstream market requires a small, but

[36] With linear pricing, even with exclusivity, the incumbent would want to keep two retailers competing at the downstream market in order to avoid double marginalization.

[37] Alternatively, the entrant can undercut and sell to R_1 at a price of $c_I - \varepsilon$, with $\varepsilon \to 0^+$. R_1 then obtains strictly positive, but very small profit. Facing R_2, whose wholesale price is c_I, R_1 can set its retail price p_1 at $p_1 \in (c_I - \varepsilon, c_I)$ and obtains a profit $[p_1 - (c_I - \varepsilon)]D(p_1)$, which is strictly positive but smaller than $\varepsilon D(p_1)$. And the incumbent can induce R_1 to sign exclusive dealing with a bonus strictly higher than $\varepsilon D(p_1)$, which is close to zero as $\varepsilon \to 0^+$.

strictly positive fixed cost (Fumagalli and Motta, 2006). Different from the previous case, here if R_2 has signed exclusive dealing but R_1 remains a free agent, post entry R_2 won't be able to compete with R_1 and so will not pay the fixed operation cost. Without competition, R_1 is able to charge p^m and obtain the monopoly profit $\pi^m = (p^m - c_I)D(p^m)$. (The entrant still sells to R_1 at the unit wholesale price c_I because of the competition with the incumbent at the wholesale market.) And if there is no entry, Fumagalli and Motta (2006) show that there is a mixed-strategy equilibrium where the two retailers remain active with a probability. In equilibrium, retailers always earn zero profit, and the incumbent's profit approaches π^m as the fixed cost of operation approaches zero.

In this case, R_1, the only free, non-signing retailer, will incur some cost to facilitate entry. By contrast, the only signing retailer, R_2, obtains zero profit whether entry occurs or not, and so will not spend any effort. The probability of entry is determined by R_1's effort, $\boldsymbol{e} = e_1$ for $e_2 = e_0$. The optimal entry probability for R_1, denoted by $\hat{e}^r$ (the superscript 'r' stands for 'retail'), approximates the solution to the program $e_1\pi^m + (1 - e_1) \cdot 0 - \psi(e_1)$ when the fixed operation cost approaches zero. Denote $\psi(\hat{e}^r)$ as $\hat{\psi}^r$, and consider the limiting case where the fixed operation cost converges to zero. R_1 is willing to sign exclusive dealing when

$$0 + x_1 \geq \hat{e}^r\pi^m - \hat{\psi}^r, \tag{32}$$

where x_1 is the sign-up bonus offered to R_1. The incumbent is willing to pay x_1 for exclusivity if

$$\pi^m - x_1 \geq \hat{e}^r \cdot 0 + (1 - \hat{e}^r)\pi^m \quad \Longrightarrow \quad x_1 \leq \hat{e}^r\pi^m. \tag{33}$$

Combining the two conditions, as long as $\hat{\psi}^r > 0$, the incumbent can sign up R_1 for exclusivity. Paying the amount $\hat{e}^r\pi^m - \hat{\psi}^r$ to both R_1 and R_2, the incumbent's net payoff is

$$\pi^m - 2\left(\hat{e}^r\pi^m - \hat{\psi}^r\right) = (1 - 2\hat{e}^r)\pi^m + 2\hat{\psi}^r, \tag{34}$$

which is positive if $\hat{e}^r \leq 1/2$. And if the incumbent does not intend to sign any exclusive dealing contract, the payoff is $e_0 \cdot 0 + (1 - e_0)\pi^m$, where e_0 is the entry probability

absent exclusive dealing, for both retailers (neither is constrained by exclusive dealing) also obtain zero profit after entry and so won't exert any effort (Fumagalli and Motta, 2006). The incumbent will optimally offer exclusive dealing to both retailers when

$$(1-2\hat{e}^r)\pi^m + 2\hat{\psi}^r \geq (1-e_0)\pi^m \Longrightarrow 2\hat{\psi}^r \geq (2\hat{e}^r - e_0)\pi^m. \quad (35)$$

The "no exclusive dealing" result obtained by Fumagalli and Motta (2006) is a special case of $\hat{\psi}^r = 0$ and $e_0 = 1 = \hat{e}^r$, whereby condition (36) must fail. Condition (36) also fails when entry occurs with an exogenous probability and $\psi = 0$. Again, with competing buyers the costly efforts to facilitate entry is also a necessary component for exclusivity.

Proposition 5

Suppose that buyers are competing retailers. If there is no fixed cost of operation at the downstream market (as in Abito and Wright (2008)), the incumbent can achieve exclusivity at (almost) no cost. If there is a strictly positive, but arbitrary small fixed cost of operation (as in Fumagalli and Motta (2006)), then exclusivity is feasible when condition (36) holds.

5. Concluding Remarks

In this paper, we found that costly buyer initiatives can invalidate the conclusion of the Chicago School, and enable an incumbent monopolist to use exclusive dealing for exclusionary purposes. We also examine the robustness of our results in different aspects. In particular, we show that when buyers compete, the exclusion outcome of Abito and Wright (2008) holds, but the no exclusion outcome of Fumagalli and Motta (2006) may fail, in their respective setting. This is consistent with the general message of the paper that buyer's costly efforts tend to assist exclusive dealing.

Although our welfare analysis does not produce a clear-cut result, our analysis is consistent with the consideration of relative efficiency in exclusive dealing cases, such as

the employment of the "As Efficient Competitor (AEC)" test[38]. By our Proposition 2, because the buyer's efforts exceed the socially optimal level when the entrant is less efficient, prohibiting exclusive dealing may improve welfare only when the entrant is more efficient than the incumbent. To the extent that information about the relative efficiency between the entrant and incumbent is available with sufficient precision, the court or competition authority can use the relative efficiency as a screening device, namely, rejecting exclusive dealing challenges when the entrant is less efficient, and concentrating on cases when the entrant is more efficient than the incumbent.

Given the importance of supplier competition in supply chain management, and in light of the development of the exclusive dealing literature, it would be important to further assess the impact of buyer initiatives on exclusive dealing in alternative environments other than those we've analyzed in section 4. Among others, one might want to generalize the analysis to include two-part tariffs offered to competing buyers, product differentiation (production differentiation at the upstream market[39] or vertical differentiation[40]), and relationship-specific investments[41]. It might also be interesting to expand the buyer's strategic choice in the supplier selection process, e.g., to examine the buyer's incentive to select which type of potential entrants to facilitate entry, or even the possibility of entering the upstream segment itself, via vertical integration or other means. A deeper understanding of exclusive dealing along these directions, we believe, will help us better evaluate its competitive effects and devise proper antitrust policies.

[38] In the *Intel* case, *supra* note 2, the ECJ remanded the case to the General Court for its ignorance of the AEC test performed by the European Commission, but disputed by Intel (ECLI:EU:C:2017:632, paragraph 141-144).
[39] Julian Wright, "Naked Exclusion and the Anticompetitive Accommodation of Entry," *98(1) Economic Letters*, 107-112 (2008).
[40] Cédric Argento, "Exclusive Quality," *58(3) Journal of Industrial Economics*, 690-715 (2010).
[41] Kathryn Spier & Michael Whinston, *supra* note 11; Chiara Fumagalli et al., *supra* note 11.

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獨家交易與供應商管理

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摘要

本文引入買家的供應商管理決策，考慮若買家可以輔助潛在供應商進入市場，對於既存獨占供應商使用獨家交易排除競爭的影響。本文發現，當潛在競爭者進入市場的機率為外生給定，芝加哥學派的結論成立：既存獨占廠商無法以獨家交易排除進入。但是當買家可以耗費成本協助潛在競爭者、提高其進入市場與獨占廠商競爭的機率時，則獨占廠商有可能簽下獨家交易契約、排除進入，以維持其獨占地位。由於買家協助潛在競爭者的誘因未必符合社會最適，通盤禁止獨家交易可能使買家花費過多成本協助競爭者進入市場，因而降低整體社會福利。但是當潛在競爭者較為無效率時，買家傾向付出高於社會最適的成本輔助進入。本文建議競爭主管機關可以使用相對效率作為篩選機制（the screening device）：若競爭者較獨占廠商無效率時，則停止調查；若競爭者較獨占廠商有效率時，則進一步探究獨家交易的競爭效果。

關鍵字：芝加哥批評、獨家交易、市場封鎖、進入市場、供應商管理

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