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FLEXCLUSIVITY: EXCLUSIVE AGREEMENTS WITH COMPETITIVE FLEXIBILITY

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JEL Classification: D44, D82, D86, L22

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Flexclusivity:
Exclusive Agreements with Competitive Flexibility*

Philippe Choné† Laurent Linnemer†

September 3, 2025

Abstract

Sellers face a critical choice: run competitive auctions or strike exclusive deals with preferred buyers. Contrary to conventional wisdom that sellers should rely on open competition, we show that a powerful seller optimally commits to a sequential 'flexclusivity' arrangement –a strategic mix of exclusivity and competitive bidding. Under broad conditions, the seller chooses with positive probability to disregard alternative buyers entirely. We demonstrate, in a parsimonious model, that simple option contracts implement flexclusivity efficiently, increasing the expected joint profit of the contracting parties. When a preferred buyer declines the option, this credibly signals his weakness, allowing the seller to extract more rent from stronger buyers in subsequent auctions. The joint gain from such arrangements can represent as much as 75% of what vertical integration would achieve, without requiring commitment beyond the initial contracting stage.

Keywords: Selling mechanism, exclusivity, revenue-maximizing auction, option contract, vertical integration

JEL codes: D44, D82, D86, L22

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1 Introduction

Selling and procurement mechanisms often involve exclusive negotiations rather than competitive bidding. About half of large mergers close through exclusive negotiations rather than open contests, Aktas, de Bodt, and Roll (2010), Boone and Mulherin (2007). Similarly, a sizable share of private building contracts are awarded on a one-on-one basis rather than via tenders, Bajari, McMillan, and Tadelis (2009). This pattern sits uneasily with the "more rivals beats better bargaining" logic of Bulow and Klemperer (1996).

In this paper, we interpret these exclusivity phenomena as optimal responses to a trade-off between competition and information revelation. We show that powerful sellers, even though they are able to run revenue-maximizing auctions, engage in exclusive relationships with some preferred buyers, which lead them to disregard alternative buyers with positive probability. Foregoing competitive bidding is profitable for a seller because it allows her to refine her knowledge of the distribution of the preferred buyer's valuation. This improved knowledge, in turn, increases the opportunity cost of dealing with alternative buyers, and eventually allows the seller to extract more rent from those buyers should the market be opened up to competition.

To optimally solve the trade-off between learning the preferred buyer's valuation and involving competing buyers, the seller uses a sequential option-then-auction mechanism. She first offers the preferred buyer a purchase option. When his valuation is high, the preferred buyer exercises the option and the seller ends up disregarding alternative buyers completely. When his valuation is low, he rejects the option, and the seller invites alternative buyers to compete, knowing that the preferred buyer is a weak bidder. The seller can thus optimally exploit her ability to discriminate against weak bidders in a revenue-maximizing auction.

Two key features of flexclusivity arrangements are worth highlighting: (i) early contracting: the seller can approach the preferred buyer before his valuation is realized; (ii) no commitment beyond the bilateral stage: if the purchase option is declined, the seller maximizes her own revenue. With long-run commitment, the pair could fully elicit the preferred buyer's type and set type-contingent reserve prices, effectively replicating vertical integration and removing the very trade-off that makes flexclusivity interesting.[1]

Preview of main results. A simple purchase option is enough to implement the optimal deterministic policy, whereby the seller learns whether the preferred buyer's valuation is below or above a threshold. Richer stochastic contracts yield finer partitions of the support of the preferred buyer's valuation, hence more learning by the seller. Yet numerical simulations suggest that the profit gain generated by stochastic contracts is modest relative to deterministic purchase options. The latter achieve a large share of the vertical-integration gain. In our uniform-baseline calibration, a simple option already generates about three-quarters of the joint-profit gain that vertical integration would deliver.

Strictly speaking, flexclusivity prevails when the sale is sometimes exclusive and sometimes competitive, the two events occurring with positive complementary probabilities. With a single alternative buyer, this occurs in a broad region where the outside buyer is neither very weak nor very strong. The presence of several potential rivals does not eliminate exclusivity: the exclusive path continues to arise with positive frequency, declining —but not vanishing— as the number of rivals grows.

The welfare effects of flexclusivity are mixed. In the simplest setting, with symmetric valuations and without binding reserves, flexclusivity leads the good to be awarded too often to the preferred

[1]Moreover, agreeing with a preferred buyer to bias a later auction in his favor would trigger legal and reputational challenges.

buyer, with this misallocation effect translating into a welfare loss. By contrast, with binding reserves or asymmetric valuations, flexclusivity generates countervailing effects, which can make it welfare-enhancing.

In extensions, we show that if the seller can approach the buyers sequentially, she tends to partner with the strongest buyer. We also show that more commonality in the buyers' valuations pushes toward disregarding alternative buyers more often. Finally, making the seller less powerful, i.e., weakening her bargaining power vis-à-vis the buyers, reduces the probability that she deals with the preferred buyer under exclusivity (in the limiting case where the seller can only run a second-price auction, the purchase option becomes irrelevant).

Our findings align with empirical studies that document a recurring phenomenon in the business world: the frequent bypassing of competitive bidding practices and the stickiness of buyer-seller relationships. For instance, the *merger and acquisition literature* shows that a significant number of deals, sometimes referred to as "friendly deals" or "single bid contests," occur with no competition observed ex post.[2] Aktas, de Bodt, and Roll (2010) examine SEC filings from 1994 to 2007 and find that approximately half of the deals were secured without the involvement of a competitive process. Notably, their study's title, "Negotiations under the threat of an auction," precisely captures the timing structure we model in our flexclusivity framework. Their research estimates latent competition and anticipated auction costs, showing that latent competition increases the bid premium offered in negotiated deals. Boone and Mulherin (2007) found that nearly half of major U.S. corporate takeovers in the late 1990s were privately negotiated, often with just one buyer.

While empirical studies are sparser in non-financial markets due to data limitations, the *procurement literature* provides evidence that buyers often opt for exclusive negotiations with a supplier without formally soliciting offers from multiple contractors. In the private-sector nonresidential building construction projects in Northern California, Bajari, McMillan, and Tadelis (2009) observed that more than 43% of projects were awarded through one-on-one negotiations with suppliers, while the remainder followed some form of competitive bidding process.

Finally, the *trade literature* documents stickiness based on firm-to-firm relationship duration data, see Martin, Mejean, and Parenti (2023). These widespread empirical patterns strongly support our theoretical claim that flexclusivity mechanisms capture an essential dimension of actual market behavior.

Roadmap. We conclude the introduction with a brief review of related work. The remainder of the paper proceeds as follows. Section 2 introduces flexclusivity through an illustrative example that highlights its value and intuition. Section 3 lays out the formal environment with limited commitment and develops the option-based contracting stage; it characterizes when flexclusivity, pure exclusivity, or full competition is optimal, and extends the analysis to multiple potential buyers. Section 4 compares simple options to richer stochastic contracts and to the vertical-integration benchmark, quantifying the gap and showing that additional complexity delivers only modest gains. Section 5 studies welfare (symmetric vs. asymmetric supports; binding reserve prices), the role of bargaining weights and common values, and the seller's choice of partner. Section 6 concludes.

Related Literature: Methodologically, we work in the Incomplete-Information Industrial Organization tradition. For recent contributions in this strand of the literature, see, in particular, Loertscher and Marx (2019, 2022), Loertscher and Muir (2022), and Choné, Linnemer, and Vergé (2024).

[2] See the review in Betton, Eckbo, and Thorburn (2008).

A seminal precursor in this tradition is Aghion and Bolton (1987). Within a vertical-contracting context, a monopolistic *principal* enters an exclusive agreement with an incumbent partner and never commits to disregarding alternative offers. Instead, the incumbent pair uses the incumbent's realized type to influence competition from potential entrants via an optimal mechanism that extracts additional rents from rivals. In this sense, exclusivity in Aghion and Bolton serves to shape entry, not to forgo competition.[3]

Right of First Refusal (ROFR) settings share similarities with Aghion and Bolton. A Right of First Refusal is a contractual agreement that grants a preferred buyer the option to match any offer the seller receives from other potential buyers before the seller can accept that offer.[4] ROFR clauses distort competition and have been used to model vertical collusion (Arozamena and Weinschelbaum, 2009) and vertical integration (Hua, 2007; Loertscher and Riordan, 2019). They increase the joint profit of the seller and the preferred buyer at the expense of rivals (Choi, 2009). ROFR is, however, less profitable than the Aghion and Bolton mechanism because it functions similar to a secret reserve price, whereas the Aghion and Bolton mechanism acts as a public reserve price.

Particularly relevant to our work, Burguet and Perry (2009) demonstrate that vertical integration can be replicated with a contract even when the seller does not observe her partner's valuation.[5] In their optimal mechanism, the seller *always* involves alternative buyers in a competitive procedure. Payments in the auction are designed to both extract rents from other buyers and penalize the preferred buyer should he misreport his valuation, thereby ensuring incentive compatibility.

In contrast, we assume that the seller and the preferred buyer cannot commit beyond the bilateral contracting stage. After this initial stage, both parties act independently to maximize their own profits without any binding agreements. Critically, the preferred buyer is free to decline participation in the auction, which prevents the seller from imposing penalties for valuation misreporting. This narrower scope of contracting creates a fundamental tension between competition and information revelation that is absent in previous models. As we demonstrate, this tension leads to the optimality of our flexclusivity mechanism, where the seller sometimes chooses to completely forgo competition.

The seminal work of Bulow and Klemperer (1996), "Auctions Versus Negotiations," established that in a symmetric independent private value environment, a revenue-maximizing auction yields less profit to a seller than a standard auction with one additional bidder. This finding underscores the value of maximizing competition in auction settings. In subsequent work, Bulow and Klemperer (2009) compare sequential and simultaneous sales mechanisms, concluding that simultaneous auctions often generate higher revenue for sellers despite being potentially less efficient. This advantage stems from auctions' ability to attract more bidders, thereby increasing competition. Roberts and Sweeting (2013) and Gentry and Stroup (2019) extend this analysis by allowing bidders to receive valuation signals before making costly entry decisions, showing that sequential mechanisms can sometimes yield higher payoffs for both buyers and sellers. Our framework differs from these models in that we assume buyers face no uncertainty or entry costs. Instead, we introduce an ex ante contracting stage between the seller and a preferred buyer that occurs before valuations are known. Critically, we demonstrate that this arrangement creates a joint incentive to reduce the probability of an auction taking place —a finding that contrasts with the conventional wisdom favoring maximum competition.

[3]Formally, Aghion and Bolton study a buyer contracting with an incumbent seller; the mapping to our seller-buyer setting is without loss of generality.

[4]At an ex ante stage, the seller grants (possibly for a fee) a preferred buyer a right of first refusal. Ex post, all buyers privately learn their valuations and participate in an auction where the preferred buyer holds this right.

[5]See Burguet and Perry (2009), Section 4.

The theoretical and empirical literature on takeover mechanisms is extensive. Eckbo, Malenko, and Thorburn (2020) provide a comprehensive review of how auction theory has developed to explain strategic decisions in corporate takeovers, particularly focusing on deal initiation, toehold acquisition, bidding strategies, and payment methods. While this literature has demonstrated the value of competition in maximizing seller revenues —as in Bulow and Klemperer (1996, 2009)— our paper shows that a powerful seller may optimally commit to exclusive arrangements with a preferred buyer under broad conditions. This finding challenges the prevailing view that a seller should always maximize competitive participation in the bidding process.

Closer to our work, a recent finance literature studies the design and initiation of takeover contests. Chen and Wang (2023) develop a dynamic mechanism design model with costly entry in which the profit-maximizing procedure is either (i) a standard auction when entry costs are low or (ii) a two-stage process that starts with an exclusive offer and, when necessary, proceeds to an asymmetric auction when entry costs are moderate or high. Their exclusivity and deal protections (e.g., termination fees) are optimal because the first bidder, by entering, creates a positive informational externality that governs whether a second bidder finds it worthwhile to incur the entry cost. Our flexclusivity contracts also involve exclusivity and de facto favoritism toward one bidder, but for an entirely different reason: they serve as a screening device. Granting a call option lets the preferred bidder reveal part of his private valuation –by exercising or declining– so the seller can tailor the subsequent auction and extract additional surplus. No costly entry or deliberate information acquisition is required; the informational gain comes directly from the take-it-or-leave-it option decision.

In a related vein, Gorbenko and Malenko (2024) analyze the endogenous initiation of takeover auctions and show that when bidders' values have a substantial common component, an indication of interest by a bidder signals optimism, which disincentivizes bidders from initiating auctions. In contrast, when values are primarily private, both bidder and seller-initiated auctions can occur in equilibrium. While our paper shares with theirs the insight that ex ante identical bidders can become endogenously asymmetric in the game, our focus is on the optimal design of the selling mechanism by the target, rather than on which party initiates the process.

To explain the prevalence of non-competitive arrangements, prior literature has identified several mechanisms. One significant strand of research focuses on product complexity, where negotiations may better address quality dimensions while auctions reveal cost information. Goldberg (1977) provided an early contribution to this analysis, while Manelli and Vincent (1995) demonstrated that when quality concerns are sufficiently important, sequential take-it-or-leave-it offers can be optimal compared to auctions, even when reserve prices are available. Bajari and Tadelis (2001) further explored the tension between ex ante incentives and ex post transaction costs from costly renegotiation in complex procurement settings. Herweg and Schwarz (2018) study a procurement model with ex-post renegotiation and design choice. The constrained-optimal procedure is a price-only auction for a simple baseline design followed by renegotiation, and scoring auctions cannot improve on this. Herweg and Schmidt (2017) show that when renegotiation is inefficient or design improvements are important, bilateral negotiations can dominate price-only auctions, especially when the buyer's bargaining power is strong. Dworczak and Muir (2024) model property rights as type-dependent outside options and show that the optimal menu typically includes an option-to-own; a principal chooses the period-2 mechanism sequentially, creating hold-up/time-inconsistency frictions. Our flexclusivity contract echoes their option-to-own but in a multi-buyer sales environment with no moral-hazard issues.

Figueroa, Ganuza, and Hanazono (2025) study a procurement environment where running competition entails a transaction cost. They show the optimal policy is to make a take-it-or-leave-it offer to a local firm and, if rejected, run a competitive mechanism; with commitment, the second stage ignores the information revealed by the rejection, and when running the auction is costless, their mechanism reverts to “always auction.” By contrast, our setting features no primitive auction cost and no commitment beyond the bilateral stage; the first-stage option is informative and is then used to tilt the subsequent revenue-maximizing auction, which yields to forgo competitive bidding even when running an auction is costless.

Another approach emphasizes relational contracts, where long-term relationships build trust and reputation in environments with limited contract enforcement. Board (2011) examined a dynamic holdup game under complete information, showing how changing bargaining power affects contracting decisions. Under incomplete information, Calzolari and Spagnolo (2009, 2020) demonstrated that buyers optimally restrict the supplier pool to maintain quality incentives. Empirical studies by Corts and Singh (2004) on the drilling industry and Macchiavello and Morjaria (2015) on Kenyan rose exporters have provided support for the importance of relational contracts in practice.

Our approach differs fundamentally from these previous explanations. Rather than relying on product complexity, relationship-specific investments, or reputation effects, we demonstrate that the simple interaction of asymmetric information and limited commitment can generate optimal exclusivity arrangements. In a standard private values setting with no moral hazard concerns, we show that sellers may rationally forego competition through our flexclusivity mechanism.

Our findings also provide a novel explanation for the stickiness observed in buyer-seller relationships throughout the trade literature. Previous research on relationship persistence, as noted by Martin, Mejean, and Parenti (2023), has primarily focused on mechanisms such as relationship-specific investments, supplier search costs, market incompleteness, trust, and reputation.[6] In contrast, our model generates relationship persistence using only informational asymmetries and bargaining power-without requiring repeated interactions or relationship-specific investments. By symmetry, our results extend naturally to procurement settings where buyers hold significant bargaining power and suppliers face independent cost shocks in each period. In such environments, our model predicts that partial exclusivity agreements between a buyer and an incumbent supplier increase the probability of continued trading relationships, even in the absence of switching costs or relationship-specific investments. This mechanism offers a more parsimonious explanation for observed relationship persistence across diverse market settings.

2 The benefits of flexclusivity: an illustrative example

Before presenting our formal model, we introduce the concept of flexclusivity through a simple example. Flexclusivity represents a strategic middle ground between full exclusivity (where a seller commits to sell only to a preferred buyer) and full competition (where all potential buyers participate in an auction). This example illustrates how a seller and a preferred buyer can benefit from a partial exclusivity arrangement, where full competition occurs only when the preferred buyer’s valuation falls below a certain threshold.

Consider a seller S with an indivisible object facing two potential buyers: a preferred buyer B_0 and an alternative buyer B_1. Both buyers have valuations uniformly distributed between $[\underline{w}, \overline{w}]$. Under

[6] See Baker, Gibbons, and Murphy (2002), MacLeod (2007), and Malcomson (2012).

flexclusivity, there is a threshold x, such that:

- If B_0's valuation, w_0, exceeds x, B_0 purchases the item directly.[7]
- If w_0 is below x, the seller conducts a Myerson auction including both buyers.

We assume here that B_0 simply follows this cut-off rule. In the next section, we show that it is indeed the optimal behavior for B_0.

Two polar cases are of interest: if $x = \underline{w}$, S and B_0 deal together with certainty – a regime we call *full exclusivity*; if $x = \overline{w}$, S runs an auction with probability one, which we call the *full competition* regime. Assuming a flexclusivity relationship, we now study the optimal choice of x (before w_0 is known) by the pair $S - B_0$.

For a flexclusivity threshold x, the revenue maximizing auction takes place when the preferred buyer is weak, i.e., $w_0 \leq x$ while the competitor's valuation w_1 is uniformly distributed between $[\underline{w}, \overline{w}]$. We know from Myerson (1981) that the seller allocates the good to the buyer with the highest virtual valuation $w - (1 - F)/f$, provided that the valuation is positive. The virtual valuation of B_1 is: $w_1 - (\overline{w} - w_1) = 2w_1 - \overline{w}$.[8] The preferred buyer's valuation w_0 is uniformly distributed between $[\underline{w}, x]$. Therefore w_0 is distributed according to $\tilde{F}_0(w_0; x) = (w_0 - \underline{w})/(x - \underline{w})$, and the virtual valuation is $2w_0 - x$. It follows that B_1 wins the auction if

$$2w_1 - \overline{w} > 2w_0 - x \quad \text{or} \quad w_1 > w_0 + (\overline{w} - x)/2 \overset{\text{d}}{=} m_1(w_0; x).$$

Notice that for $x = \overline{w}$, this condition simplifies into $w_1 > w_0 = m_1(w_0; \overline{w})$, which, indeed, corresponds to the full competition case (given the symmetry of B_0 and B_1). Under strict flexclusivity, i.e. $\underline{w} < x < \overline{w}$, when B_1 wins the auction, he pays $m_1(w_0; x) > w_0$.

The seller and preferred buyer face a fundamental tradeoff when setting the flexclusivity threshold:

- A lower threshold x increases the price, m_1, that B_1 pays when winning the auction. This happens because B_0's truncated distribution signals to the seller that B_0 is a relatively weak bidder when an auction occurs, allowing the seller to extract more surplus from B_1.
- However, a lower threshold also means B_0 automatically gets the item more frequently (whenever $w_0 \geq x$), reducing the occasions when the seller can extract this additional surplus from B_1.

This creates a tension between the "intensity" of rent extraction (how much extra B_1 pays) and the "frequency" of rent extraction opportunities (how often auctions occur).

To see if flexclusivity is worth it, let $\Pi_{S0}(x)$ denote the expected joint payoff of S and B_0. With only two symmetric buyers, it is easy to check that the joint profit is the same under full exclusivity and full competition:

$$\Pi_{S0}(\underline{w}) = \Pi_{S0}(\overline{w}) = \int_{\underline{w}}^{\overline{w}} \int_{\underline{w}}^{\overline{w}} w_0 \frac{dw_1}{\overline{w} - \underline{w}} \frac{dw_0}{\overline{w} - \underline{w}} = \frac{\overline{w} + \underline{w}}{2}.$$

[7] From the $S - B_0$ pair perspective the price paid by B_0 to S is irrelevant.

[8] Virtual valuations are generally given by $w - (1 - F_1(w))/f_1(w)$. In the uniform case, with here $F_1(w) = (w - \underline{w})/(\overline{w} - \underline{w})$. All virtual valuations are positive provided that $\underline{w} \geq \overline{w}/2$. In this case, the seller does not use a binding reserve price.

Indeed when B_1 wins the auction, it pays w_0, which is the joint profit of S and B_0 under exclusivity. To determine the additional profit from flexclusivity, we subtract the base profit $\Pi_{S0}(\underline{w})$. Thus, the difference is calculated as follows:

$$\begin{aligned}\Pi_{S0}(x) - \Pi_{S0}(\underline{w}) &= \int_{\underline{w}}^{x} \int_{m_1(w_0;x)}^{\overline{w}} (m_1(w_0;x) - w_0) \frac{dw_1}{\overline{w}-\underline{w}} \frac{dw_0}{\overline{w}-\underline{w}} \\ &= \int_{\underline{w}}^{x} \int_{m_1(w_0;x)}^{\overline{w}} \frac{\overline{w}-x}{2} \frac{dw_1}{\overline{w}-\underline{w}} \frac{dw_0}{\overline{w}-\underline{w}}.\end{aligned} \tag{1}$$

As $\overline{w} - x > 0$, $\Pi_{S0}(x) - \Pi_{S0}(\underline{w}) > 0$, showing that any degree x, $\underline{w} < x < \overline{w}$, of flexclusivity is profitable. To find the most profitable degree we can further rearrange the gain from flexclusivity. Multiplying and dividing by $x - \underline{w}$ yields

$$\Pi_{S0}(x) - \Pi_{S0}(\underline{w}) = \frac{(\overline{w}-x)(x-\underline{w})}{2(\overline{w}-\underline{w})} \int_{\underline{w}}^{x} \int_{m_1(w_0;x)}^{\overline{w}} \frac{dw_1}{\overline{w}-\underline{w}} \frac{dw_0}{x-\underline{w}} = \frac{(\overline{w}-x)(x-\underline{w})}{4(\overline{w}-\underline{w})},$$

which emphasizes the contribution of the event "B_1 buys" to the joint profit of S and B_0. The above double integral represents the probability that B_1 wins the auction and is equal to 1/2 irrespective of x in the uniform case. Obviously $\Pi_{S0}(x)$ is maximized for

$$x^* = \frac{\overline{w}+\underline{w}}{2}.$$

In other words, the good is allocated directly to B_0 with probability 1/2. Otherwise, with the complementary probability, a competitive auction takes place: S runs an optimal auction using the information that $\underline{w} \le w_0 \le x^*$. In this auction, B_0 wins probability 1/2. Altogether, B_0 thus gets the good with probability 3/4. The joint profit with the optimal flexclusivity contract is

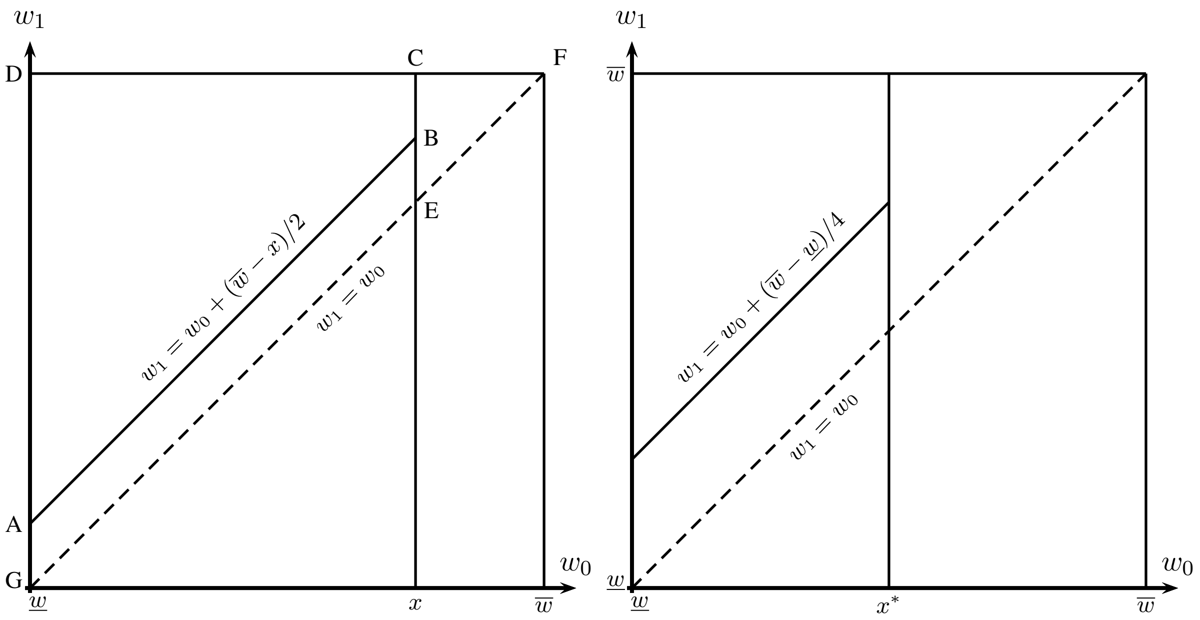
$$\Pi_{S0}(x^*) = \Pi_{S0}(\underline{w}) + \frac{\overline{w}-\underline{w}}{16} = \frac{\overline{w}+\underline{w}}{2} + \frac{\overline{w}-\underline{w}}{16}$$

In percentage terms, the flexclusivity contract allows to increase the joint profit compared to either full exclusivity or full competition, by $(\overline{w}-\underline{w})/(8(\overline{w}+\underline{w}))$, which, given the constraint $\overline{w} \le 2\underline{w}$, is maximum for $\overline{w} = 2\underline{w}$, and amounts to $1/24 \approx 4.17\%$.

Figure 1 illustrates how flexclusivity changes the allocation and pricing compared to full competition. The key insight is visible in the ABCD trapezoid: this represents scenarios where B_1 wins under both regimes, but under flexclusivity, B_1 pays more than under full competition. This "exploitation effect" is the source of the gain in joint profit. In the other regions where the allocation changes (namely, $ABEG$ and CEF), the reallocation has no impact on the joint profit of the contracting parties because B_1 would have paid exactly w_0 under full separation.

Table 1 quantifies the effects of flexclusivity compared to full separation, assuming $\underline{w} = \overline{w}/2$. The key result is that flexclusivity increases the sellers and preferred buyer' joint profit from 288 to 300 (a 4.2% increase) at the expense of the alternative buyer. The competitor's profit indeed falls by almost 60%. This dramatic profit loss mostly comes from the exploitation that occurs when the auction takes place, i.e., when the preferred buyer's valuation is low ($w_0 < x^*$).[9] In this region, the flexclusivity mechanism increases the joint profit by 10% (from 120 to 132). Finally, flexclusivity

[9] The loss from exclusion ($w_0 > x^*$) is comparatively modest.



(a) Revenue Maximizing Auction ex post for a given x

(b) Optimal flexclusivity threshold x^*

Figure 1: The effects of flexclusivity

causes the industry profit $W = \Pi_S + \Pi_0 + \Pi_1$ to fall from 320 to 313, a 2.2% loss. Hence the profit transfer significantly dominates the modest reduction in total industry profit due to misallocation.[10]

Table 1: Expected payoffs with and without flexclusivity

	Full Separation (FS)			Flexclusivity Change (%) relative to FS		
	$\Pi_S + \Pi_0$	Π_1	W	$\Delta(\Pi_S + \Pi_0)$	$\Delta\Pi_1$	ΔW
$w_0 < x^*$	120	28	148	10.0%	−53.6%	−2.0%
$w_0 > x^*$	168	4	172	0.0%	−100.0%	−2.3%
Total	288	32	320	4.2%	−59.4%	−2.2%

Notes: The buyers' valuations w_0 and w_1 are uniformly distributed on $[\overline{w}/2, \overline{w}]$. Reserve prices are not binding. Under Full Separation (FS), the seller runs a revenue-maximizing auction. Under flexclusivity, the optimal threshold x^* is $3\overline{w}/4$. All values in the first three columns are multiplied by $384/\overline{w}$ for readability.

Before introducing our general framework, we emphasize that the illustrative example ignores three important forces. First, competition is minimal here as the preferred buyer has a single competitor. With more competitors, the S-B_0 pair would lose profits in the areas ABEG and CEF of Figure 1 compared to full competition.[11] Weaker competition thus reduces the cost of not holding an auction. We explore

[10] Misallocation occurs when B_0 gets the good despite being weaker, $w_0 < w_1$. This happens both under exclusivity (when $x < w_0 < w_1$) and under the revenue-maximizing auction (when $w_0 < w_1 < m_1(w_0; x)$ and $w_0 < x$).

[11] This is because the winner pays more than w_0 unless B_0 has the second highest valuation.

the case of multiple competitors in Subsection 3.3. Second, the support of the valuations is such that the reserve prices in the revenue maximizing auction are not binding. In Subsection 5.1, we show that in general flexclusivity reduces the reserve price imposed by S to B_0 and therefore increases the probability of trade. Consequently, binding reserve prices make flexclusivity more attractive for the pair and may increase total welfare. Third, in the same subsection, we relax the assumption that the distributions of valuations are symmetric, and we show that asymmetry can make flexclusivity less attractive. Prior to that, we present a simple way to implement flexclusivity.

3 Optimal Option Contracts

A seller S and a preferred buyer B_0 are contemplating a future business opportunity. There are $n \geq 1$ alternative buyers $B_1, \ldots, B_n$. The buyers' valuations $w_0, w_1, \ldots, w_n$ are drawn from distributions F_j with supports $[\underline{w}_j, \overline{w}_j]$. We assume that the virtual valuation functions

$$\Psi_j(w) = w - \frac{1 - F_j(w)}{f_j(w)}$$

increase with w for $j = 0, \ldots, n$. The framework, which we express in terms of valuations. encompasses both the case where S is a seller as well as the procurement case where S wants to buy a fixed quantity –see Appendix A. These two cases can be viewed as extreme cases of more general business relationships where two firms work together to create a surplus.

The game unfolds as follows. There are two time periods. At time 1 ("ex ante"), S and B_0 can agree on a buying option with strike price p, i.e., S offers B_0 the right to purchase the item at price p. At time 2 ("ex post"), the buyers learn their valuations. The preferred buyer B_0 then decides whether to exercise the option. If he does, his profit is $w_0 - p$. If he does not, S runs an optimal auction à la Myerson (1981) involving all potential partners, including B_0. Importantly, once B_0 has declined to use the option, S and B_0 are no longer bound by a contract: S updates her beliefs about B_0's valuation and maximizes her own profit at the auction stage; B_0 participates freely to the mechanism proposed by S.

As there is no asymmetric information between S and B_0 ex ante, the contracting parties choose the strike price p to maximize the (expected) sum of their profits.[12] Ex post, a Bayesian equilibrium is characterised by the ex ante partner's decision to exercise the option and by the principal's belief regarding the probability distribution of B_0's types w_0 that are present in the auction. In equilibrium, decisions and beliefs are consistent: (i) B_0's decision is optimal given the belief of S; (ii) the belief of S respects the Bayes rule given B_0's decision.

3.1 Options contracts Implement Flexclusivity

In this section, we show that for any strike price there is a cutoff value x such that the preferred buyer exercises the option if and only if his valuation w_0 is greater than or equal to x. The buyer with $w_0 = x$ is indifferent between exercising the option and participating in the revenue-maximizing auction. In the former case, he gets $x - p$. In the latter case, the seller knows that B_0's valuation is truncated on

[12]We do not have to specify how they share the expected joint profit. If S has the upper hand in the ex ante negotiation, she would make a take-it-or-leave-it offer to B_0. However, one can also envision configurations where B_0 is the one with all the bargaining power, as well as any intermediary situations.

$[\underline{w}_0, x]$. Denoting by $U_0(w_0; x)$ the preferred buyer's utility in the auction, we write the indifference condition for buyer $w_0 = x$ as

$$x - p = U_0(x; x). \tag{2}$$

Our first result below shows that B and S_0 achieve any flexclusivity level x between $\underline{w}_0$ and $\overline{w}_0$ with a unique strike price p between $\underline{p}$ and $\bar{p}$, where $\underline{p} = \underline{w}_0$ and $\bar{p} = \overline{w}_0 - U_0(\overline{w}_0; \overline{w}_0)$, with $U_0(\overline{w}_0; \overline{w}_0)$ denoting the expected utility of the preferred buyer with highest valuation $\overline{w}_0$ under full competition (i.e., when $x = \overline{w}_0$).

Proposition 1 (Ex post equilibrium)**.** *For any strike price p, there exists a unique Bayesian equilibrium ex post. The equilibrium is characterized by a threshold x such that the ex ante partner exercises the option if and only if w_0 is greater than or equal to x. The threshold x increases from $\underline{w}_0$ to $\overline{w}_0$ as p increases from $\underline{w}_0$ to $\overline{w}_0 - U_0(\overline{w}_0; \overline{w}_0)$.*

Proof. See Appendix B.1 □

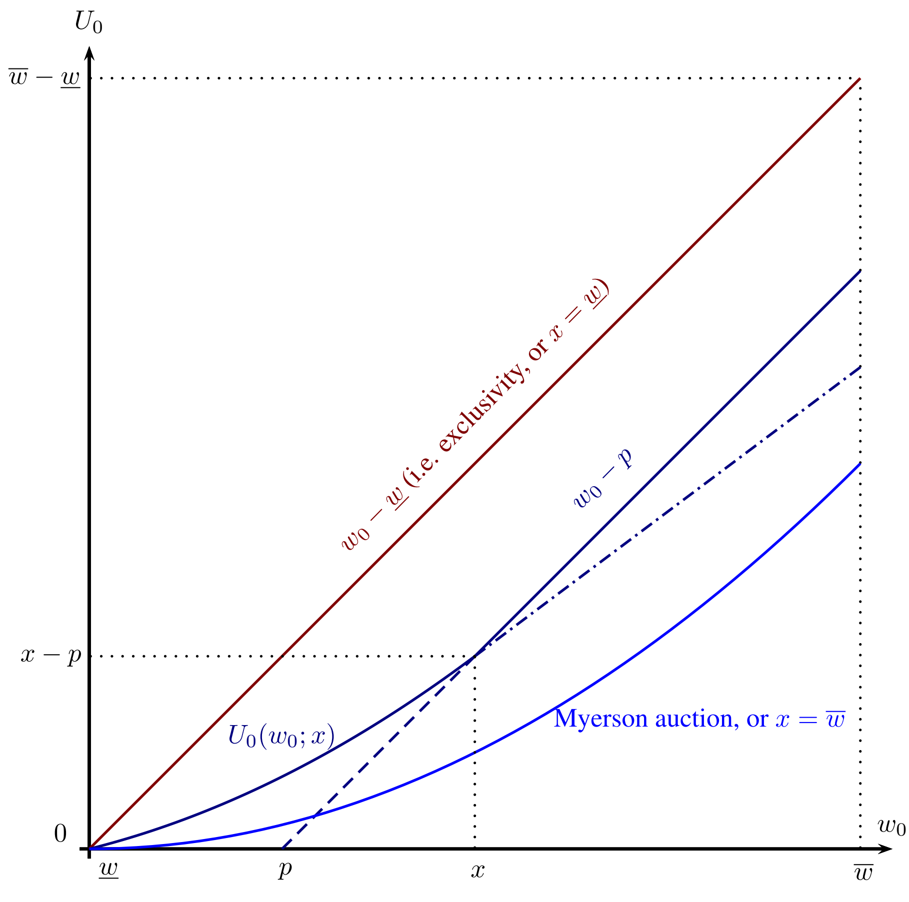


Figure 2: Preferred buyer's profit for valuation w_0, flexclusivity level x and strike price p

Figure 2 shows the preferred buyer's profit $\max(U_0(w_0; x), w_0 - p)$ as a function of his valuation w_0 in three regimes: full exclusivity ($x = \underline{w}$), full competition ($x = \overline{w}$), and flexclusivity (option with strike price p). Proposition 1 shows that there exists a one-to-one relationship between the strike price p and the flexclusivity level x. The ex ante partners can thus maximize their expected joint surplus by choosing that level. To enjoy full exclusivity ($x = \underline{w}_0$), S and B_0 choose the strike price $\underline{p} = \underline{w}_0$. If they want to implement full competition ($x = \overline{w}_0$), they choose $\bar{p} = \overline{w}_0 - U_0(\overline{w}_0; \overline{w}_0)$. They can implement any degree of flexclusivity by agreeing on the appropriate value of p between $\underline{p}$ and $\bar{p}$. A buyer option thus allows the ex ante partners to control the probability that the seller considers alternative buyers. We show in Section 3.2 that under broad conditions on supports of the surpluses, this probability is indeed below one in equilibrium.

3.2 Single alternative buyer

We now move beyond the illustrative example and study the case with one alternative buyer ($n = 1$). In this section, we characterize conditions under which the seller and preferred buyer optimally choose each of three possible regimes: (1) *flexclusivity*, where the auction occurs with probability strictly between zero and one; (2) *exclusivity*, where the auction never takes place; and (3) *full competition*, where the auction always occurs.

A key strength of our analysis is that these regimes can be characterized using only the supports of the valuation distributions, without requiring specific knowledge of their functional forms. The results hold for any distributions F_0 and F_1 as long as their virtual valuation functions Ψ_0 and Ψ_1 are strictly increasing.

The key economic insight is that the optimal regime depends on the relative strengths of the buyers, as determined by the boundaries of their possible valuations:

- When the preferred buyer is much stronger than the alternative buyer (specifically, when the alternative buyer's maximum valuation is below the preferred buyer's minimum valuation), exclusivity prevails (Proposition 3).
- When the alternative buyer is sufficiently stronger than the preferred buyer, full competition becomes optimal (Proposition 4).
- In intermediate cases, where the alternative buyer's maximum valuation falls between the preferred buyer's minimum and maximum valuations, flexclusivity emerges as the profit-maximizing arrangement - regardless of the specific probability distributions within these ranges (Propositions 2 and 4).

To maintain clarity, we focus on the empirically relevant case where reserve prices in the revenue-maximizing (Myerson) auction are not binding; we examine the impact of binding reserves separately in Section 5.1.

Posterior belief and auction mechanism. When B_0 does not exercise his option, the seller learns that $w_0 \leq x$ and updates her belief to a right-truncated distribution:

$$\tilde{F}_0(w_0; x) = \frac{F_0(w_0)}{F_0(x)}\,, \quad \text{for } w_0 \leq x\,.$$

The associated virtual valuation becomes:

$$\tilde{\Psi}_0(w_0; x) = w_0 - \frac{1 - \tilde{F}_0(w_0; x)}{\tilde{f}_0(w_0; x)} = w_0 - \frac{F_0(x) - F_0(w_0)}{f_0(w_0)},$$

which inherits monotonicity from Ψ_0. In the Myerson auction, bidder B_1 wins whenever $\Psi_1(w_1) \geq \tilde{\Psi}_0(w_0; x)$, paying the smallest valuation that satisfies this inequality:

$$m_1(w_0; x) = \inf\left\{ w_1 \geq \underline{w}_1 : \Psi_1(w_1) \geq 0 \text{ and } \Psi_1(w_1) \geq \tilde{\Psi}_0(w_0; x) \right\}, \tag{3}$$

The fundamental flexclusivity trade-off. The seller and preferred buyer face a critical trade-off when choosing the flexclusivity threshold x:

- *Price effect*: A lower threshold x increases the payment $m_1(w_0; x)$ that B_1 must make when winning the auction. This happens because a lower x creates a stronger negative signal about B_0's type, allowing the seller to extract more surplus from B_1.
- *Frequency effect*: A lower threshold reduces how often the auction occurs, limiting opportunities to extract this additional surplus from B_1.

Technically, lowering x shifts $\tilde{\Psi}_0(\cdot \mid x)$ downward, making $m_1(w_0; x)$ (weakly) decreasing in x. Conditional on $w_0 \leq x$, the joint profit of S and B_0 equals:

$$F_1(m_1)w_0 + [1 - F_1(m_1)]\, m_1 = w_0 + \Pi(m_1; w_0)$$

where

$$\Pi(m; w_0) = (m - w_0)\ [1 - F_1(m)] \tag{4}$$

represents the standard monopoly profit with unit cost w_0 and demand function $1 - F_1(m)$. We denote by $\Pi^*(w_0) = \max_m \Pi(m; w_0) = \Pi(m_1^*(w_0); w_0)$ the maximum monopoly profit for opportunity cost w_0, and by $m_1^*(w_0) = \Psi_1^{-1}(w_0)$ the monopoly price that achieves this maximum.

A crucial feature of our model is that once the auction stage is reached, the ex-ante partnership dissolves, and both the seller and preferred buyer act independently to maximize their individual interests. This creates a distortion in the auction mechanism relative to what would maximize their joint profit. The seller cannot implement the joint profit-maximizing price $m_1^*(w_0)$ for two reasons: (1) she doesn't know the precise value of w_0, only that it's below the threshold x, and (2) she must account for B_0's strategic incentives in the auction, giving him information rents. To understand the difference between $m_1(w_0; x)$ and $m_1^*(x)$, we compute for all $w_0 \leq x$

$$\begin{aligned}
\frac{\partial \Pi(m_1(w_0; x); w_0)}{\partial m} &= f_1(m_1(w_0; x)) \left[w_0 - m_1(w_0; x) + \frac{1 - F_1(m_1(w_0; x))}{f_1(m_1(w_0; x))} \right] \\
&= f_1(m_1(w_0; x))\ [w_0 - \Psi_1(m_1(w_0; x))] \\
&= f_1(m_1(w_0; x))\, \frac{F_0(x) - F_0(w_0)}{f_0(w_0)} > 0,
\end{aligned} \tag{5}$$

which, by concavity of the profit function $\Pi(.; w_0)$, gives

$$m_1(w_0; x) \leq m_1^*(w_0), \tag{6}$$

with equality if and only if $w_0 = x$. Only when $w_0 = x$ does the payment $m_1(w_0; x)$ equal the joint profit-maximizing price $m_1^*(w_0)$.

Ex-ante optimization. Taking expectations over w_0, the expected joint profit of S and B_0 is

$$\Pi_{S0} = \int_{\underline{w}_0}^{\overline{w}_0} w_0 \,\mathrm{d}F_0(w_0) + \int_{\underline{w}_0}^{x} \Pi(m_1(w_0; x); w_0)\, \mathrm{d}F_0(w_0). \tag{7}$$

A marginal increase in the threshold x affects the expected joint profit through two channels:

$$\frac{\mathrm{d}\,\Pi_{S0}}{\mathrm{d}x} = \Pi^*(x) f_0(x) + \int_{\underline{w}_0}^{x} \frac{\partial \Pi(m_1; w_0)}{\partial m}\, \frac{\partial m_1(w_0; x)}{\partial x}\, \mathrm{d}F_0(w_0). \tag{8}$$

The first term (positive) represents the marginal benefit of running the auction more frequently. The second term (negative) captures the decreased rent extraction from the alternative buyer due to weaker competitive pressure.

To analyze this trade-off, we derive the derivative of the Myerson payment with respect to x.[13] When $m_1(w_0;x) > \underline{w}_1$: we have $m_1(w_0;x) = \Psi_1^{-1}(\tilde{\Psi}_0(m_0;x))$ and

$$\frac{\partial m_1(w_0;x)}{\partial x} = -\frac{1}{\Psi_1'(m_1(w_0;x))}\frac{f_0(x)}{f_0(w_0)} \leq 0. \tag{9}$$

Otherwise, we have $m_1(w_0;x) = \underline{w}_1$, and this derivative is zero.

Lemma 1 gives the precise formula for how the expected joint profit varies with x:

Lemma 1. *Assume there is one alternative buyer ($n = 1$), reserve prices are not binding, and the Myerson payment is interior, i.e., $m_1(w_0;x) > \underline{w}_1$ for all $w_0 \in [\underline{w}_0, \overline{w}_0]$. Then the derivative of the partners' expected joint profit is*

$$\frac{\mathrm{d}\,\Pi_{S0}}{\mathrm{d}x} = f_0(x)\left\{\Pi^*(x) - \int_{\underline{w}_0}^{x} \frac{f_1(m_1(w_0;x))}{\Psi_1'(m_1(w_0;x))}\frac{F_0(x) - F_0(w_0)}{f_0(w_0)}\,\mathrm{d}w_0\right\}. \tag{10}$$

When does each regime emerge? We now present our three key results characterizing when flexclusivity, exclusivity, or full competition emerges as the optimal arrangement. Let x^* denote the optimal flexclusivity threshold chosen by the contracting parties to maximize their joint profit (7).

Proposition 2 (Flexclusivity). *If $\underline{w}_0 < \overline{w}_1 \leq \overline{w}_0$, the auction takes place with a probability strictly between zero and one. That is, $\underline{w}_0 < x^* < \overline{w}_0$.*

Proof. Suppose first that $\overline{w}_1 = \overline{w}_0$. Because $\Pi^*(\overline{w}_0) = 0$, it follows from Lemma 1 that the derivative of the expected joint profit is negative at $x = \overline{w}_0$. (Notice that $m_1(\overline{w}_1;\overline{w}_1) = \overline{w}_1 > \underline{w}_1$, hence m_1 remains above $\underline{w}_1$ in a neighborhood of $\overline{w}_1$. On that neighborhood, the derivative of m_1 is strictly negative.) The optimal exclusivity threshold x^* must therefore satisfy $x^* < \overline{w}_0$.

Next, suppose first that $\overline{w}_0 > \overline{w}_1$. For any $w_0 \in [\overline{w}_1, \overline{w}_0]$, the monopoly profit $\Pi^*(w_0)$ is zero, i.e., the alternative buyer is inefficient and no rent can be extracted from her. Because S_1 would never pay the good at a price higher than $\overline{w}_1$, the profit $\Pi(m_1(w_0;x);w_0)$ appearing in (7) is weakly negative and hence the expected joint profit is weakly decreasing in x on $[\overline{w}_1, \overline{w}_0]$. For the same reason as in the case $\overline{w}_1 = \overline{w}_0$ considered above, the derivative of the expected joint profit evaluated at $w_0 = \overline{w}_1$ is negative. The jointly optimal flexclusivity level thus satisfies: $x^* < \overline{w}_1 < \overline{w}_0$.

Finally, because $\overline{w}_1 > \underline{w}_0$, we have $\Pi^*(\underline{w}_0) > 0$ and hence the derivative of the expected joint profit is positive at $x = \underline{w}_0$. The optimal exclusivity threshold x^* must therefore satisfy $x^* > \underline{w}_0$. $\square$

Proposition 2 establishes our main result: when the alternative buyer's maximum valuation falls between the preferred buyer's minimum and maximum valuations, $\underline{w}_0 < \overline{w}_1 \leq \overline{w}_0$, flexclusivity is strictly optimal. The parties optimally choose a threshold that creates a positive probability of both exclusivity and competitive auction.

When the alternative buyer is sufficiently weak ($\overline{w}_1 \leq \underline{w}_0$), exclusivity is optimal.

[13] Recall that we assume away binding reserve prices and thus we ignore the condition $\Psi_1(w_1) \geq 0$ in (3).

Proposition 3 (Exclusivity)**.** *If $\Psi_0(\underline{w}_0) < \overline{w}_1 \leq \underline{w}_0$, then the ex ante contract makes sure the auction never takes place, i.e. $x^* = \underline{w}_0$, whereas B_1 would win with a positive probability under full-competition. If $\overline{w}_1 \leq \Psi_0(\underline{w}_0)$, then the ex ante contract is irrelevant because B_1 would never win under full competition.*

Proof. If $\overline{w}_1 \leq \underline{w}_0$, B_1 can nevertheless get the good in a regular Myerson auction (this occurs if $\Psi_0(\underline{w}_0) < \overline{w}_1$). Yet the auction never takes place if we allow for flexclusivity. When $\overline{w}_1 \leq \underline{w}_0$, we have $\Pi^*(x) = 0$ for all $x \in [\underline{w}_0, \overline{w}_0]$, implying that the expected joint profit decreases with x on the whole interval, hence $x^* = \underline{w}_0$. The ex ante partners remain exclusive with probability one. $\square$

Interestingly, this produces an efficient allocation, as B_0 is always the higher-value buyer. However, under full competition, the seller would still sometimes award the good to B_1 to extract more rent from B_0 –an inefficient distortion that our flexclusivity contract eliminates.

Finally, Proposition 4 shows that flexclusivity can remain optimal even when the alternative buyer has a higher maximum valuation than the preferred buyer. This occurs because the ex-ante gains from the strategic signaling effect can outweigh the potential losses from occasionally bypassing a stronger competitor.

Proposition 4 (Weak partner)**.** *The alternative buyer B_1 may be disregarded with positive probability even when $\overline{w}_1 > \overline{w}_0$.*

Proof. We offer a general method to construct examples with $x^* < \overline{w}_0 < \overline{w}_1$. Start from any distributions F_0 and F_1 such that $\overline{w}_0 = \overline{w}_1$. From Proposition 2, the corresponding optimal flexclusivity threshold satisfies $x^* < \overline{w}_0$. Then pick any $\hat{w}_0 \in (x^*, \overline{w}_0)$ and denote by $\hat{F}_0$ the distribution obtained by truncating F_0 on $[\underline{w}_0, \hat{w}_0]$. The expected joint profits (7) for the distributions F_0 and $\hat{F}_0$, seen as functions of x on the interval $[\underline{w}_0, \hat{w}_0]$, are proportional. Hence, they achieve their maximum on that interval at the same point, namely $x^* < \hat{w}_0$. We have thus constructed distributions $\hat{F}_0$ and F_1 with highest valuation $\hat{w}_0 < \overline{w}_1$ such that the optimal flexclusivity threshold is below $\hat{w}_0$, meaning that the auction takes place with probability strictly below one.

Assuming that the expected joint profit for F_0 is quasi-concave in x on $[\underline{w}_0, \overline{w}_0]$, it is easy to check that if in the above construction we pick $\hat{w}_0$ below x^* rather than above x^* then the expected joint profit for $\hat{F}_0$ achieves its maximum on $[\underline{w}_0, \hat{w}_0]$ at $\hat{w}_0$. In this case, the preferred buyer (whose valuation is distributed according to $\hat{F}_0$) is so weak relative to B_1 that the auction takes place with probability one. $\square$

Propositions 2, 3 and 4 do not depend on the expected joint profit Π_{S0} being quasi-concave in the flexclusivity threshold x. Strict quasi-concavity, however, is useful to characterize x^* as the unique value of x at which the profit derivative given by (10) is zero. Because $\Pi^*(x)$ and $m_1(w_0; x)$ decrease with x and $F_0(x)$ increases with x, a sufficient condition for quasi-concavity is that $f_1(w_1)/\Psi_1'(w_1)$ weakly decreases with w_1, which is true for the uniform and exponential distributions. In the appendix, we introduce a parametric family of distributions for which the virtual valuation Ψ_1 is linear and hence Ψ_1' is constant. This family is parameterized by $\theta < 2$ with $\Psi_1' = 2 - \theta$ and contains the uniform and exponential distributions as special cases (corresponding to $\theta = 0$ and $\theta = 1$ respectively). For $\theta > 0$, or $\Psi_1' < 2$, the sufficient condition is verified. In the appendix, we check numerically that the joint profit is quasi-concave in x for all $\theta < 2$. Below we illustrate all the above effects when the distributions of valuations are uniform.

Uniformly distributed valuations: Illustrating the three regimes To illustrate how our general results apply in practice, we examine the case where w_0 and w_1 are independently and uniformly distributed. This special case allows us to derive closed-form solutions for the optimal threshold and clearly visualize the boundaries between the three regimes.

As mentioned earlier, the ex ante objective function is quasi-concave in the flexclusivity threshold for this case. To rule out binding reserve prices, we assume that $\overline{w}_0 \leq 2\underline{w}_0$ and $\overline{w}_1 \leq 2\underline{w}_1$. Under these conditions, the optimal threshold is given by:[14]

$$x^* = \begin{cases} \min\left\{\frac{\underline{w}_0+\overline{w}_1}{2}, \overline{w}_0\right\} & \text{if } \overline{w}_1 > \underline{w}_0 \\ \underline{w}_0 & \text{otherwise.} \end{cases} \tag{11}$$

Figure 3 maps the three regimes identified in our propositions to different regions in the parameter space. The horizontal axis represents $\overline{w}_0$ (the preferred buyer's maximum valuation), which varies between $\underline{w}_0$ and $2\underline{w}_0$. The vertical axis represents $\overline{w}_1$ (the alternative buyer's maximum valuation), which can vary between 0 and $2\underline{w}_0$.

1. **Flexclusivity Region** ($\underline{w}_0 < \overline{w}_1 < \overline{w}_0$): This area demonstrates Proposition 2. Here, the optimal threshold $x^* = (\underline{w}_0 + \overline{w}_1)/2$ lies strictly between $\underline{w}_0$ and $\overline{w}_0$. The probability of holding an auction increases linearly from zero (when $\overline{w}_1 = \underline{w}_0$) to one-half (when $\overline{w}_1 = \overline{w}_0$).

2. **Exclusivity Region** ($\overline{w}_1 \leq \underline{w}_0$): Below the horizontal line $\overline{w}_1 = \underline{w}_0$, Proposition 3 applies. The alternative buyer is too weak for an auction to be profitable, leading to exclusivity ($x^* = \underline{w}_0$). In the hatched sub-region, this exclusivity is particularly notable because B_1 would have had a positive probability of winning under a standard Myerson auction due to the "weak bidder advantage."

3. **Weak Partner Region** ($\overline{w}_1 > \overline{w}_0$): Above the diagonal line $\overline{w}_1 = \overline{w}_0$, Proposition 4 applies. The alternative buyer is now stronger in terms of maximum valuation. When $\overline{w}_1$ is sufficiently high ($\overline{w}_1 > 2\overline{w}_0 - \underline{w}_0$), full competition prevails ($x^* = \overline{w}_0$). However, in the intermediate zone ($\overline{w}_0 < \overline{w}_1 < 2\overline{w}_0 - \underline{w}_0$), flexclusivity remains optimal despite B_1's advantage.

A notable property of the optimal flexclusivity threshold in this uniform case is its independence from $\overline{w}_0$ and $\underline{w}_1$ when flexclusivity occurs. For example, if we fix $\overline{w}_1 = \overline{w}_0$ and increase $\underline{w}_1$ from $\underline{w}_0$ to nearly $\overline{w}_0$ (making the alternative buyer progressively stronger through first-order stochastic dominance), the threshold remains fixed at $x^* = (\underline{w}_0 + \overline{w}_0)/2$.

This counterintuitive result highlights the fundamental trade-off in flexclusivity. Consider the limiting case where $\underline{w}_1 = \overline{w}_0 - \varepsilon$:

- Under full competition, B_1 almost always wins and pays w_0
- Under flexclusivity with threshold x, when $w_0 > x$, no auction occurs and the joint profit is w_0
- When $w_0 < x$, an auction occurs and B_1 wins but pays the higher price $w_0 + (\overline{w}_0 - x)/2$

[14] See Appendix B.4.

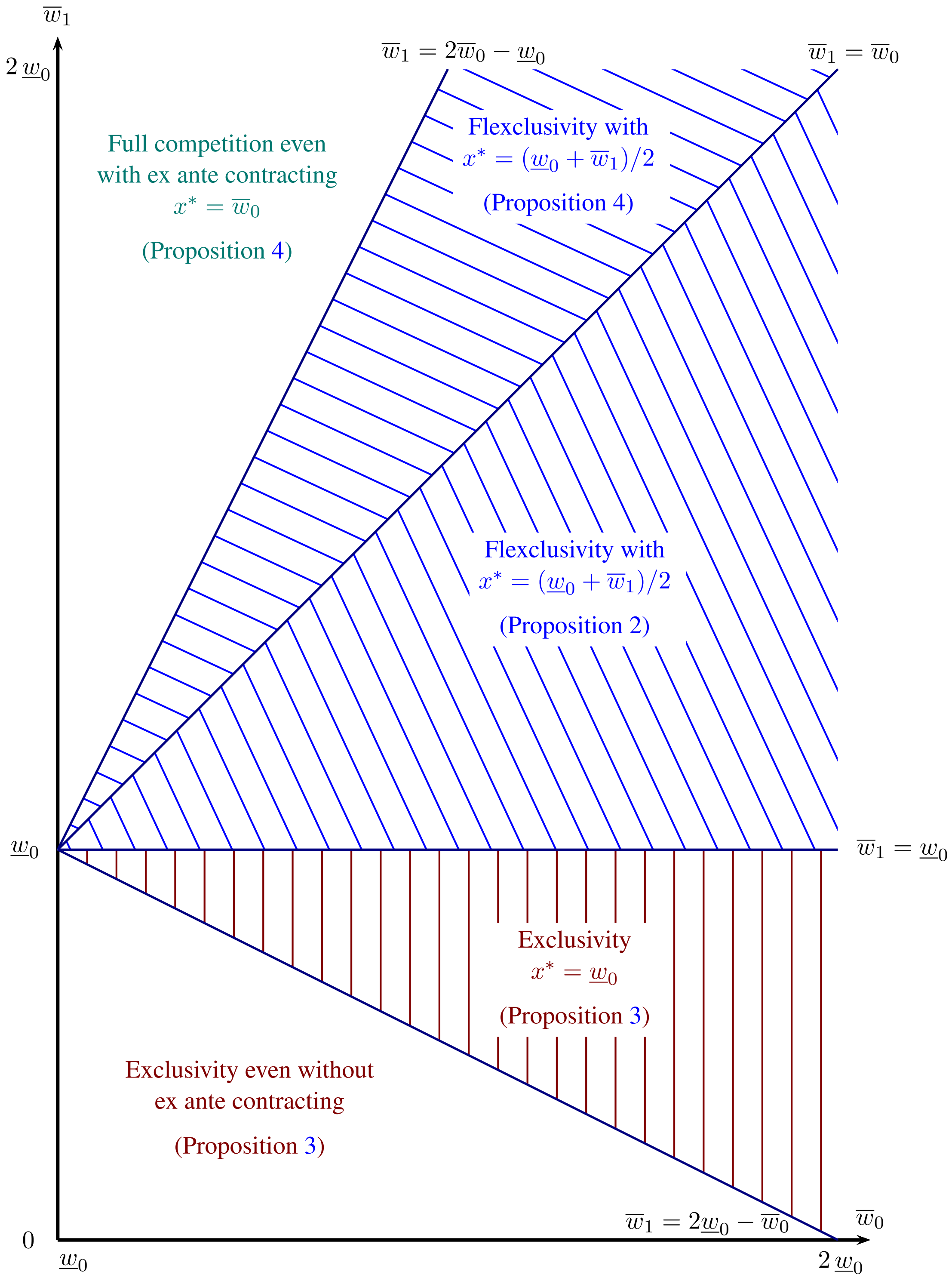


Figure 3: Illustration of Propositions 2, 3 and 4

3.3 Multiple alternative buyers

One might wonder whether our flexclusivity result hinges on facing a single competitor ($n = 1$). The symmetric benchmark $F_0 = F_1$ is instructive: there the expected joint profit of the seller and the ex ante partner is the same under both the Myerson auction and full exclusivity, yet –somewhat surprisingly– flexclusivity still yields a strict gain. That knife-edge case leaves open what happens when the Myerson auction already dominates exclusivity. We therefore extend the analysis to $n \geq 1$ symmetric alternative buyers. In this richer setting we establish a robust ranking: flexclusivity always dominates exclusivity, and under broad conditions it continues to outperform the revenue-maximizing Myerson auction as well.

The expected joint profit of the seller and the ex ante buyer is given by

$$\Pi_{S0} = \int_{\underline{w}_0}^{\overline{w}_0} w_0 \, \mathrm{d}F_0(w_0) + \int_{\underline{w}_0}^{x} [A(w_0; x) + B(w_0; x)] \, \mathrm{d}F_0(w_0), \tag{12}$$

where $A(w_0; x)$ and $B(w_0; x)$ respectively account for the cases

1. $\tilde{\Psi}_0(w_0) \leq \Psi_1(w_{(n-1)})$: two alternative buyers are stronger than the ex ante partner, so the winner pays $w_{(n-1)}$;
2. $\Psi_1(w_{(n-1)}) \leq \tilde{\Psi}_0(w_0; x) \leq \Psi_1(w_n)$: only one alternative buyer is stronger than the ex ante partner, so the winner pays $m_1(w_0; x)$.

Using the density of $w_{(n-1)}$, namely $n(n-1)F_1(w)^{n-2} f_1(w)(1 - F_1(w))$, we have

$$A(w_0; x) = \int_{m_1(w_0;x)}^{\overline{w}_1} (w - w_0) n(n-1) F_1(w)^{n-2} f_1(w)(1 - F_1(w)) \, \mathrm{d}w.$$

Using $\Pr(w_{(n)} \geq m_1 | w_{(n-1)} = w) = [1 - F_1(m_1)]/[1 - F_1(w)]$, we get

$$\begin{aligned} B(w_0; x) &= \int_{\underline{w}_1}^{m_1} (m_1 - w_0) \frac{1 - F_1(m_1)}{1 - F_1(w)} n(n-1) F_1(w)^{n-2} f_1(w)(1 - F_1(w)) \, \mathrm{d}w \\ &= n\Pi(m_1; w_0) F_1(m_1)^{n-1}, \end{aligned}$$

where $m_1 = m_1(w_0; x)$ is given by (4).

It follows that Proposition 2 generalizes with multiple alternative partners. The seller is willing to commit to ignore those partners with a positive probability.

Proposition 5. *Suppose there are $n \geq 1$ alternative buyers with iid valuations. Suppose furthermore that reserve prices are not binding. If $\overline{w}_1 \leq \overline{w}_0$ the auction takes place with probability strictly lower than one.*

Proof. See Appendix B.3. □

Example (cont'd) Suppose the valuations of all buyers are uniformly distributed and the reserve pricing are not binding. Then the probability that an auction takes place is reported in Table 2.

Figure 4 plots the expected joint profits of S and B_0 as functions of the exclusivity threshold x for $n = 1$ to 5. The top curve is for $n = 5$ and the bottom curve, for $n = 1$. The ex ante partners benefit from the presence of more potential competitors, and the larger n, the larger the probability the auction

Table 2: Equilibrium when buyer valuations are iid and uniformly distributed

Number of alternative buyers	1	2	3	4	5
Proba. auction takes place (in %)	50.00	60.47	69.46	75.71	79.92
Gain in expected joint profit (in %)	4.17	2.34	1.30	0.80	0.54

Notes: The buyers' valuations w_0 and w_1 are uniformly distributed on $[\overline{w}/2, \overline{w}]$. Reserve prices are not binding. Gains are relative to the Myerson revenue-maximizing auction (independent seller).

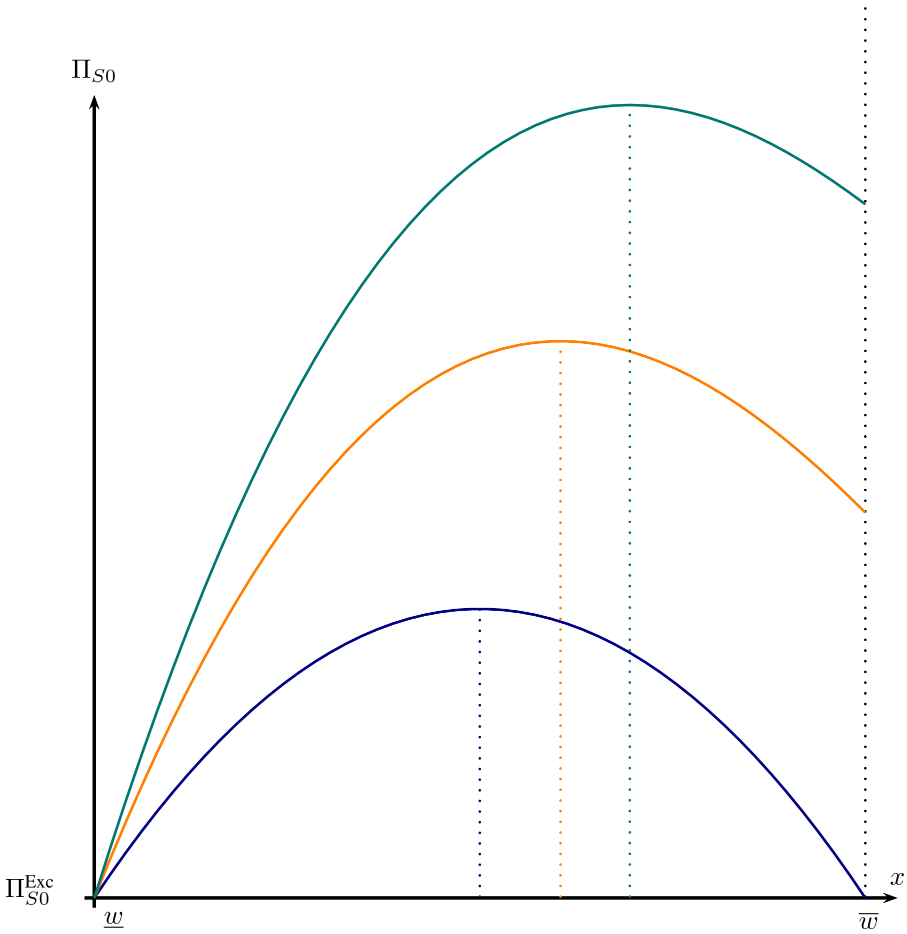


Figure 4: Expected joint profits for $n = 1$ (bottom curve) to 3 (top curve)

stage is reached. Yet, in the case of iid uniform distributions, even for $n = 5$ there is 20% chances that the deal is closed between S and B_0 without looking at the competition.

Finally, we examine the robustness of our results when reserve prices are binding.

4 Optimal Flexclusivity and Vertical Integration

In this section, we distinguish two environments according to whether the seller and her preferred buyer can commit beyond the initial bilateral contractual stage. That stage determines whether the preferred buyer is granted exclusivity with no consideration given to alternative buyers. If exclusivity is rejected and alternative buyers are considered, then

(i) under flexclusivity, the buyer and the seller become independent players and maximize their own payoff;

(ii) Under "vertical integration", the two contracting parties remain bound by a contract.

In Subsection 4.1, we explore more general flexclusivity contracts than the option contracts studied in Section 3. In Subsection 4.2, we show that the joint profit from vertical integration can be achieved by a long-term contract but not by a flexclusivity contract —hence the importance of long-term commitment. Yet, compared to full separation, flexclusivity contracts, and especially option contracts, can bring as much as 75% of what vertical integration would achieve, without requiring commitment beyond the initial contracting stage.

4.1 Optimal Flexclusivity Contracts: A First Pass

An option contract with flexclusivity threshold x is associated with a partition of the support of the preferred buyer's valuations into two sub-intervals, $[\underline{w}_0, x^*]$ and $[x^*, \overline{w}_0]$. If w_0 lies in the former sub-interval, the seller runs a revenue-maximizing auction; otherwise, she allocates the good to the preferred buyer with no consideration for alternative suppliers. It is natural to ask whether the contracting parties can improve upon this deterministic mechanism by using finer partitions and stochastic contracts. To simplify the analysis, we start with finite partitions and denote by $K \geq 2$ the number of sub-intervals.

As above, B_0 and S contract before the buyers' valuations are known and are discharged from any contractual obligation as soon as exclusivity is rejected and alternative buyer are considered. Events unfold as follows:

1. Initial bilateral contracting stage: B_0 and S may agree on
   - an increasing sequence $(x_k)_{k=0}^{K}$ with $x_0 = \underline{w}_0$ and $x_K = \overline{w}_0$;
   - a sequence of probabilities $(\pi_k)_{0 \leq k \leq K-1}$;
   - a corresponding sequence of price $(p_k)_{0 \leq k \leq K-1}$;
2. Nature determines costs;
3. Interim stage:
   - Communication: B_0 reports that w_0 belongs to the interval $I_k = (x_k; x_{k+1})$ for some k between 0 and $K-1$;
   - Application of the contract: with probability π_k, the good is sold to B_0 at price p_k, with no consideration for the alternative buyer;
4. End of contractual relationship between B_0 and S;

5. If no deal has been struck bilaterally, the market is open to competition. At this point, S and B_0 are independent players, free of any contractual obligation: S maximizes her profit independently and B_0 freely decides whether to participate in any auction organized by S.

In the option contract studied in Section 3, we have $K = 2$ and $x_0 = \underline{w}_0$, $x_1 = x^*$, $x_2 = \overline{w}_0$, where x^* is the flexclusivity threshold. The probability of exclusive allocation of the good to B_0 are $\pi_0 = 0$ in the bottom interval $I_0 = [\underline{w}_0, x)$ and $\pi_1 = 1$ in the top interval $I_1 = [x, \overline{w}_0]$, with p_1 being the exercise price of the option.

Assuming the good has not been allocated to B_0, S maximizes her profit knowing that $w_0 \in I_k$. We model the revenue-maximizing auction S as a direct mechanism $(\mathbf{Q}(\mathbf{w}; k), \mathbf{M}(\mathbf{w}; k))$, asking each participant j to report his type and allocating the good with $Q_j(\mathbf{w}; k)$ and payment $M_j(\mathbf{w}; k)$. If B_0 chooses to participate, his indirect utility is:

$$U_0(w_0; k) = \max_{\hat{w}_0 \in I_k} q_0(\hat{w}_0; k) w_0 - m_0(\hat{w}_0; k)$$

where $q_0(\hat{w}_0; k)$ and $m_0(\hat{w}_0; k)$ are the expected probability of winning and the expected payment conditional on w_0, the expectation being taken over the valuation of alternative buyer.

Interim incentive compatibility Suppose the preferred buyer of type w_0 announces $w_0 \in I_k$ at the communication stage and does not get the good interim. Then he has the option, but not the obligation, to participate in the subsequent auction with the alternative buyers. He will therefore earn $\max(0, U(w_0; k))$ at the auction stage. Hence, the indirect utility of the preferred buyer at the interim stage is

$$V_0(w_0) = \max_k \pi_k (w_0 - p_k) + (1 - \pi_k) \max(0, U_0(w_0; k)).$$

Proposition 6. *Incentive compatibility at the interim stage requires that the probabilities π_k of striking a private deal satisfy for $k = 0, \ldots, K - 2$:*

$$\pi_{k+1} - \pi_k \geq q_0(x_{k+1}; k)(1 - \pi_k), \tag{13}$$

where $q_0(x_{k+1}; k)$ is the probability that the buyer wins the good at the auction organized for $w_0 \in I_k = (x_k, x_{k+1})$ when his type is $w_0 = x_{k+1}$.

Intuitively, at each cutoff x_{k+1}, a buyer whose true value jumps from just below to just above that threshold secures two incremental benefits: i) Higher exclusivity probability: he is $\pi_{k+1} - \pi_k$ more likely to bypass the auction and secure the good at the strike price. ii) Auction surplus foregone: if he misreports downward, he would still enter the auction with probability $1 - \pi_k$ and win with interim probability $q_0(x_{k+1}; k)$.

Incentive compatibility demands that the bonus in exclusivity —left-hand side of (13)— at least matches the surplus he would give up by not entering the auction (right-hand side). Thus the condition of Proposition 6. A formal proof follows.

Proof. Consider two values $w_0 \in I_k$ and $w_0' \in I_{k+1}$, for the valuation of the preferred buyer. The following two incentive compatibility constraints should hold

$$\pi_k(w_0 - p_k) + (1 - \pi_k) U_0(w_0; k) \geq \pi_{k+1}(w_0 - p_{k+1}) + (1 - \pi_{k+1}) \max(0, U_0(w_0; k + 1)) \tag{14a}$$

$$\pi_{k+1}(w_0' - p_{k+1}) + (1 - \pi_{k+1}) U_0(w_0'; k + 1) \geq \pi_k(w_0' - p_k) + (1 - \pi_k) \max(0, U_0(w_0'; k)). \tag{14b}$$

Observe first that $U_0(w_0; k+1) < 0$. The reason is that B_0 cannot be better than reporting x_{k+1} in the auction, thus earning a negative profit, so if B_0 falsely reports $w_0 \in I_k$ he does not participate in the subsequent auction (should it take place). Second, because the lowest type has no rent in the auction, $U_0(w_0'; k+1)$ is arbitrarily small when w_0' arbitrarily close to x_{k+1}. In this circumstance, adding inequalities (14a) and (14b) yields

$$(\pi_{k+1} - \pi_k)(w_0' - w_0) \geq (1 - \pi_k)\,[U_0(w_0'; k) - U_0(w_0; k)].$$

If w_0' falsely reports $w_0' \in I_k$, we have seen in the proof of Proposition 1 that his optimal report is $\hat{w}_0 = x_{k+1}$ and that for this reason $U_0(w_0; k)$ is linear with slope $q_0(x_{k+1}; k)$ on I_{k+1}. For w_0 close to x_{k+1}, we have, by continuity of q_0: $U_0(w_0'; k) - U_0(w_0; k) \approx (w_0' - w_0) q_0(x_{k+1}; k)$. Dividing by $w_0' - w_0 > 0$ yields (13). □

The expected joint profit of the contracting parties is

$$\Pi_{S0} = \int_{\underline{w}_0}^{\overline{w}_0} w_0 \,\mathrm{d}F_0(w_0) + \sum_{k=0}^{K-1} (1 - \pi_k) \int_{x_k}^{x_{k+1}} \Pi(m_1(w_0; k); w_0)\,\mathrm{d}F(w_0), \tag{15}$$

where the profit function $\Pi(m; w_0)$ is given by (4) and the amount $m_1(w_0; k)$ paid by the alternative buyer is given by

$$m_1(w_0; k) = \Psi_1^{-1}(\tilde{\Psi}_0(w_0; k)),$$

with $\tilde{\Psi}_0(w_0; k)$ being the virtual valuation of B_0 in interval I_k. We can rewrite the incentive constraint (13) as[15]

$$1 - \pi_{k+1} \leq [1 - \pi_k]\,[1 - q_0(x_{k+1}; k)] \tag{16}$$

Because the expected joint profit (15) decreases with the probabilities π_k, the probability of exclusivity in the bottom interval is zero as in the option contract case ($\pi_0 = 0$) and all the incentive constraints (16) bind, which yields

$$1 - \pi_k = [1 - q_0(x_1; 0)]\,[1 - q_0(x_2; 1)]\ \ldots\ [1 - q_0(x_k; k-1)] \tag{17}$$

for $k = 1, \ldots, K-1$.[16]

Table 3 reports the expected gain of flexclusivity arrangements with partitions of size $K \in \{2, 3, 4\}$ when the buyers' valuations are uniformly distributed on $[12, 24]$. The results are obtained by maximizing the seller and preferred buyers' expected joint profit (15), where the probabilities π_k of disregarding alternative buyers are given by (17).

The expression (15) for the expected joint profit shows that the contracting parties have a direct interest in considering alternative buyers, which pushes towards low values for the probabilities π_k. On the other hand, refining the partition allows them to share information of w_0 and thus to exert more pressure on the competitor, i.e., to shift $m_1(w_0)$ upwards to $m_1^*(w_0)$. Yet each refinement creates a positive jump given by (13) —hence a tension between sharing information and considering alternative buyers. The numerical results presented above show that the trade-off results in fairly high probabilities π_k in a large part of the support of the preferred buyer's valuation w_0. For instance, for $K = 4$,

[15] Adding π_k to both sides of (13) and then subtracting the result from 1.

[16] With only one alternative buyer and with iid valuations, we may assume $\pi_{K-1} = 1$ as in the option contract case ($K = 2$). Indeed, in this case, the alternative buyer pays $m_1 = w_0$ when he wins the auction in the top interval I_{K-1}, hence $\Pi(m_1(w_0; K-1); w_0) = 0$. The value of π_{K-1} does not affect the expected joint profit (15).

Table 3: Expected joint profit under different contracting arrangements

Contractual environment	Gain in expected joint profit	
	In % of Myerson outcome	In % of gain from VI
Option contract	4.167	75%
Stochastic contract (three-part)	4.317	77.70%
Stochastic contract (four-part)	4.320	77.76%
Vertical integration	5.556	100%

Notes: Gains are relative to Full Separation (no flexclusivity contract). The second column reports the ratio $\text{Gain}/\text{Gain}^{\text{VI}}$. One alternative potential buyer. The buyers' valuations w_0 and w_1 are uniformly distributed on $[\overline{w}/2, \overline{w}]$. Reserve prices are not binding.
The threshold $x^* = x_1^*$ that partitions the support of w_0 are $x_1 = 18$ for the option contract ($K = 2$), which coincides with the optimal two-part stochastic contract. The optimal three-part contract has thresholds $(x_1^*, x_2^*) = (17.53, 20.76)$, with the probability if interim allocation being $\Pi^* = .87$ when w_0 belongs to the middle interval (x_1^*, x_2^*). The optimal four-part contract has thresholds $(x_1^*, x_2^*, x_3^*) = (17.51, 20.64, 22.32)$ with the interim probabilities being $\Pi^* = .73$ and $\pi_2^* = .96$.

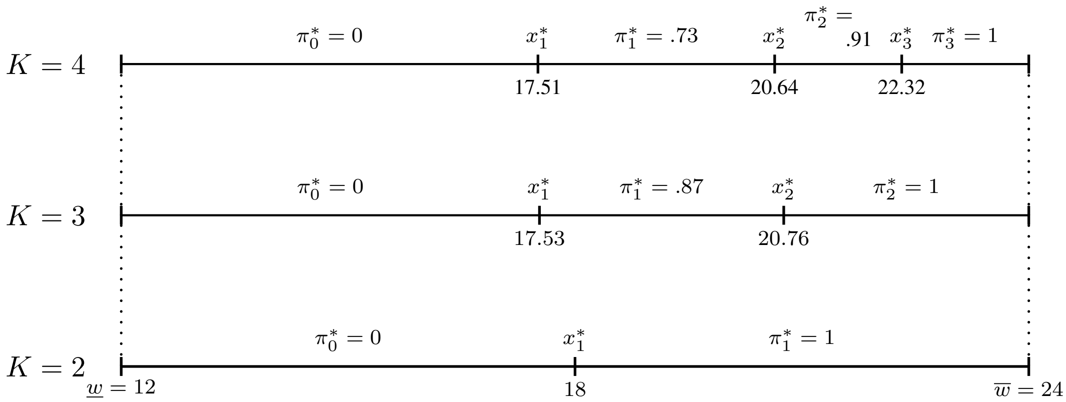


Figure 5: Exclusivity probability schedules for flexclusivity contracts with $K = 2, 3, 4$, as in Table 3.

the probability of disregarding alternative competitors is greater than .73 for all values of the preferred buyer's valuation w_0 above the median value.

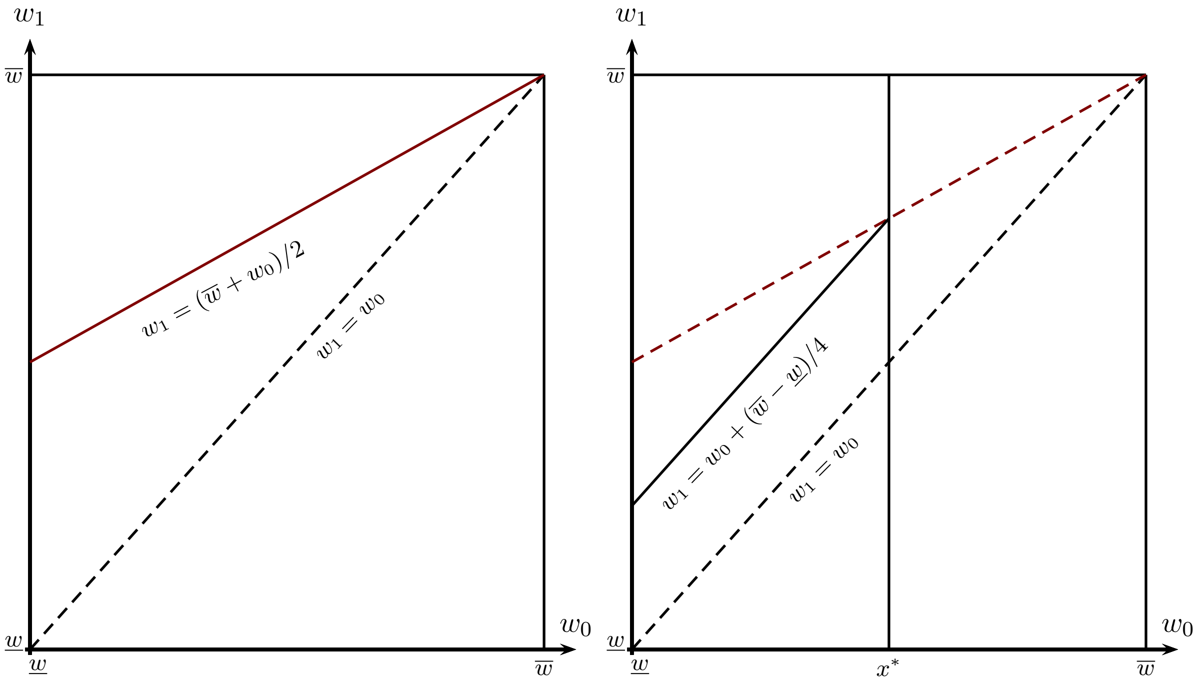
An always profitable refinement of a finite partition is the following. Starting from any finite partition ($K < \infty$), one can increase the expected joint profit (15) by cutting the last sub-interval into two sub-intervals (leaving all other sub-internals unchanged). A a consequence, no finite partition can be optimal. We leave a comprehensive study of optimal flexclusivity contracts for further research.[17] In practice, at least when the buyers' valuations are uniformly distributed, Table 3 shows that the incremental gain brought by refining the partition becomes negligible for relatively coarse partitions (the gain from $K = 3$ to $K = 4$ is less that .1%).

[17] The existence of an optimal flexclusivity contract, i.e., of a sequence $(x_k)_{k \geq 0}$ with $\lim_{k\to\infty} x_k = \overline{w}_0$ that maximizes the expected joint profit (15), where the probabilities π_k are given by (17), is an open question. Yet we know that such a contract (if it exists) must necessarily feature countably many intervals (because each interval (π_k, π_{k+1}) contains a distinct rational number). We conjecture that π_k must tend to 1 as k goes to infinity.

4.2 Vertical Integration

The maximal expected joint profit that S and B_0 can achieve together obtains under vertical integration. When S and B_0 maximize their joint profit, the informational asymmetry between S and B_0 about w_0 plays no role because that information extraction by S is costless, hence S imposes a reserve price $\Psi_i^{-1}(w_0)$ in the auction, see Appendix B.5.

Proposition 7. *If S and B_0 are vertically integrated, S runs a revenue-maximizing auction with reserve prices $\Psi_i^{-1}(w_0)$. The joint expected profit obtained under vertical integration cannot be achieved by a contract ending before the seller considers alternative buyers.*



(a) Vertical integration

(b) Optimal flexclusivity threshold x^*

Figure 6: Vertical Integration vs Flexclusivity

Proof. Imposing the reserve price w_0 in the auction requires that S perfectly knows w_0 at the end of the contractual period, i.e., that the contracting equilibrium is fully separating. But this is not incentive compatible. Take $w_0 < w_0'$. If w_0 mimics w_0', he would gain a negative payoff in the auction and therefore will not take part in it. If w_0' mimics w_0, he will report w_0 in the auction and earn $(w_0' - w_0)q_0(w_0; w_0)$ where $q_0(w_0; w_0) = \Pr(w_0 \geq \max_{j=1,\dots,n} \Psi_j(w_j) \,|w_0)$, hence the incentive constraints:

$$\begin{aligned}
\pi(w_0)(w_0 - p(w_0)) &\geq \pi(w_0')(w_0 - p(w_0')) \\
\pi(w_0')(w_0' - p(w_0')) &\geq \pi(w_0)(w_0' - p(w_0)) + (w_0' - w_0)q_0(w_0; w_0).
\end{aligned}$$

Adding up, we get

$$(\pi(w_0') - \pi(w_0))(w_0' - w_0) \geq (w_0' - w_0)q_0(w_0; w_0),$$

or $\pi(w_0') - \pi(w_0) \geq q_0(w_0; w_0)$. The interim probability π should jump at any point $w_0 \in [\underline{w}_0, \overline{w}_0]$, with the jump being positive and increasing in w_0, which is impossible. (As explained in Footnote 17, the number of jumps under a flexclusivity arrangement is countable, such a mechanism can be separating on no open interval.) □

Achieving the maximal joint profit implies for S and B_0 to fully share the information about w_0. This maximal joint profit can be obtained without integration by a contracting arrangement suggested in Burguet and Perry (2009), whereby S pays B_0 in return for the information about w_0 and the now-informed S runs a revenue-maximizing auction *to which B_0 is contractually forced to participate*. Hence this contract, which replicates vertical integration, requires S and B_0 to be contractually tied during the competitive phase when S interacts with the alternative buyers.[18]

Figure 6 illustrates the difference between flexclusivity and vertical integration. Table 3 shows the gain in expected joint profit from the option represents in this example 75% of what can be achieved by vertical integration. Flexclusivity arrangements can thus go a long way towards the full maximization of the parties' joint profit.

5 Extensions

In Subsection 5.1, we show that flexclusivity arrangements may increase welfare when reserves prices are binding and when the distributions of buyers' valuation are asymmetric. In Subsection 5.2, we show the seller's choice of the preferred buyer is aligned with industry profit, and tends to favor the strongest buyer. In Subsection 5.3 we show that commonality in buyer's valuations tends to increase the probability of disregarding competition. Finally in Subsection 5.4, we check that endowing the buyers with bargaining power vis-à-vis the seller weakens the exclusionary effect of flexclusivity arrangements.

To simplify the exposition, we hereafter restrict attention to deterministic mechanisms, i.e., to the option contracts studied in Section 3. Furthermore, we assume that there exists a single alternative buyer ($n = 1$) and that buyers' valuations are uniformly distributed.

5.1 Welfare Analysis

Total welfare, which in our context equals industry profit, is denoted by $W = \Pi_S + \Pi_0 + \Pi_1$. In the absence of any contractual arrangement, when the buyers' valuations are symmetric and reserve prices are not binding, a revenue-maximizing auction is equivalent to a second-price auction and yields the efficient allocation. Under such circumstances, agreeing on an option contract lowers welfare by allocating too often the market to the preferred buyer (recall Footnote 10). Table 1 reports a 2.2% welfare reduction when buyer valuations are independent and uniformly distributed. In the same setting, the welfare loss caused by vertical integration is 2.5%. Hence flexclusivity is almost as welfare-detrimental as vertical integration despite a much weaker commitment power of the contracting parties.

Asymmetric distributions In an asymmetric environment, the seller's market power, i.e., her ability to run a revenue-maximizing auction, distorts the allocation from efficiency. The ex ante option contract can reduce or amplify this distortion.

Lemma 2. *Assume w_0 and w_1 are uniformly distributed on $[\underline{w}, \overline{w}_0]$ and $[\underline{w}, \overline{w}_1]$, respectively. If $\overline{w}_0 < \overline{w}_1$, the revenue-maximizing auction is distorted in favor of B_0 and this distortion is exacerbated by the*

[18] Another implementation proposed by Hua (2007) consists in delegating the decision to the informed party: S would sell her the project to B_0 who could invite the competitors to participate in a tender. This requires buyer power to be transferable from S to B_0 — a very strong condition in practice.

option contract. On the other hand, if $\overline{w}_1 < \overline{w}_0$, the revenue-maximizing auction is distorted in favor of B_1 and this distortion can be reduced by the option contract.

Assume $\underline{w}_0 = \underline{w}_1 = \underline{w}$ and $\overline{w}_0 > \overline{w}_1$. Then it is readily confirmed that the first best (sell to the maximum of the two valuations) amounts, on expectation, to

$$W^* = \frac{\underline{w} + \overline{w}_0}{2} + \frac{(\overline{w}_1 - \underline{w})^2}{6(\overline{w}_0 - \underline{w})}$$

In the absence of contract, the expected welfare is

$$W_{\text{RMA}} = \frac{\underline{w} + \overline{w}_0}{2} + \frac{\overline{w}_1 - \frac{\underline{w} + \overline{w}_0}{2}}{4} + \frac{(\overline{w}_1 - \underline{w})^2}{24(\overline{w}_0 - \underline{w})} \tag{18}$$

Finally, when S and B_0 have a flexclusivity contract the expected welfare amounts to

$$W^0 = \frac{\underline{w} + \overline{w}_0}{2} + \frac{25(\overline{w}_1 - \underline{w})^2}{192(\overline{w}_0 - \underline{w})}, \tag{19}$$

where the superscript "0" indicates that the preferred buyer is B_0.

Figure 7 illustrates the second part of Lemma 2, where B_0 is the strong buyer, $\overline{w}_0 < \overline{w}_1$. When B_1 is very weak ($\overline{w}_1 < \widetilde{w_1}$), the bias in favor of B_1 in the revenue-maximizing auction is important and a flexclusivity contract between S and B_0 increases welfare relative to the no-contract benchmark by reducing that bias. By contrast, when B_1 is only slightly weaker than B_0 ($\overline{w}_1 > \widetilde{w_1}$), the bias is the RMA auction is not important and the option contract signed with B_0 creates a bias in favor of B_0 that reduces welfare, as is the case in the symmetric case considered at the beginning of this section.

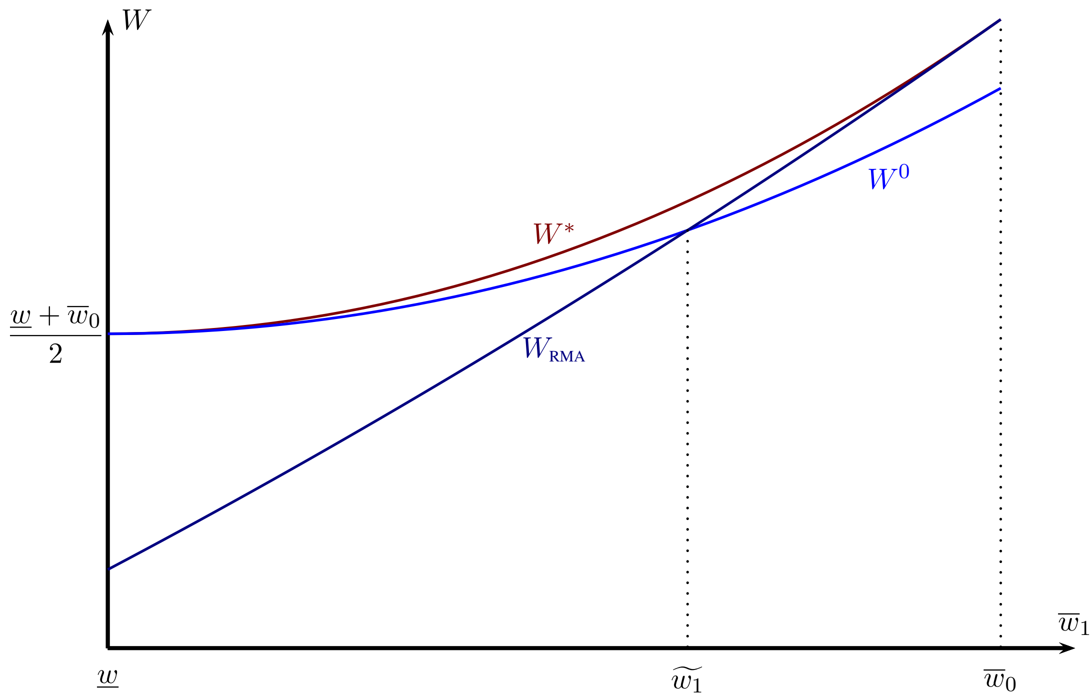


Figure 7: Total welfare: RMA, First Best, and option contracting with buyer B_0

Reserve prices Weakening the ex ante partner type leads to lower the reserve price for that buyer, hence a positive effect on the welfare.

Lemma 3. *The optimal option contract can increase welfare when reserve prices are binding.*

Proof. For symmetric uniform distributions over $[0, \overline{w}]$, the welfare is $W_{\text{RMA}} = 7\overline{w}/12$ for a revenue maximizing auction, whereas for the optimal option contract the welfare is $W = (343+13\sqrt{13})\overline{w}/648$, which is always larger. Both are lower than $2\overline{w}/3$, the welfare level in the first-best situation. □

The intuition behind Lemma 3 is that the reserve price is lowered for B_0, from $\overline{w}/2$ to $x/2$ in the case of uniformly distributed valuations. This generates a welfare gain as welfare increases from zero to w_0. This gain dominates the welfare losses $w_1 - w_0$ that are still present.

Table 4: Ex ante payoffs with reserve prices

	Full Separation (FS)			Flexclusivity Change (%) relative to FS		
	$\Pi_S + \Pi_0$	Π_1	W	$\Pi_S + \Pi_0$	Π_1	W
$w_0 < x^*$	75.3	37.7	113	40.2%	−19.6%	20.3%
$w_0 > x^*$	248.7	16.3	265	2.1%	-100.0%	−4.2%
Total	324	54	378	11%	−43.9%	3.2%

The buyers' valuations w_0 and w_1 are uniformly distributed on $[0, \overline{w}]$. The optimal flexclusivity level x^* is $(5 - \sqrt{13})\overline{w}/3 \approx 0.4648\overline{w}$.
Reserve prices are binding: $x^*/2$ for B_0 and $\overline{w}/2$ for B_1.
All quantities are multiplied by $648/\overline{w}$ for readability.

Table 4 shows that most of the gain for the contracting parties are realized when the auction takes place, i.e., when the preferred buyer is weak ($w_0 < x^*$). By contrast, most of the harm suffered by the independent buyer occurs when the auction does not take place, i.e., when the preferred buyer is strong ($w_0 > x^*$)

5.2 Choosing Preferred Buyer

Up to now the identity of the preferred buyer, B_0, has been taken as exogenous. Historical or circumstantial factors may indeed give a particular bidder privileged access to the seller, but –especially when potential buyers are asymmetric– the seller can decide whom to invite to the ex-ante contracting stage. We therefore endogenise the selection of the preferred partner: *which buyer should the seller approach first?*

We study a sequential contracting game in which the seller makes take-it-or-leave-it offers to the buyers one after another. Let the two prospective partners be B_0 and B_1. The game proceeds in three steps:

1. **Selection.** The seller approaches Buyer $i \in \{0, 1\}$ and offers her a flexclusivity contract.

2. **Acceptance.** Buyer i either accepts or rejects.

(a) If the contract is *accepted*, the mechanism unfolds as in Section 3.

(b) If the contract is *rejected*, the seller makes a flexclusivity offer to the remaining buyer $j \neq i$.

3. **Fallback.** If both buyers reject, a standard Myerson auction involving B_0, B_1 is conducted.

We proceed by backward induction. Suppose the seller first approaches B_0. If he declines, she will turn to B_1. Because flexclusivity is jointly profitable for the contracting pair (Proposition 2), the seller and B_1 will eventually agree on a contract that leaves B_1 a surplus slightly above his Myerson-auction payoff. Anticipating this, B_0 accepts the initial offer as soon as it yields more than his outside option –namely the expected profit he would receive when the seller partners with B_1. Formally, we let

- Π^0_{S0} (resp. Π^1_{S1}) denote the expected joint profit of the pair (S, B_0) (resp. the pair (S, B_1)) under their optimal flexclusivity contract;
- Π^1_0 (resp. Π^0_1) denote the expected profit of B_0 (resp. B_1) when the seller contracts with B_1 (resp. B_0).

All expectations are computed from the *ex-ante* standpoint, i.e. before valuations are realized. The seller prefers to approach B_0 first whenever

$$\Pi^0_{S0} - \Pi^1_0 \geq \Pi^1_{S1} - \Pi^0_1,$$

which can be rewritten as

$$\Pi^0_{S0} + \Pi^0_1 \geq \Pi^1_{S1} + \Pi^1_0.$$

It follows immediately that the seller's choice of the contracting partner is efficient:

Lemma 4. *The seller's choice of the contracting partner maximizes the total industry profit.*

To illustrate, we now assume that the buyers' valuations w_0 and w_1 are independently and uniformly distributed on $[\underline{w}, \overline{w}_0]$ and $[\underline{w}, \overline{w}_1]$ respectively, with $\overline{w}_0 \geq \overline{w}_1$. Thus B_0 is a "stronger" buyer than B_1. The flexclusivity thresholds when the seller partners with B_0 and with B_1 are respectively

$$x^0 = \frac{\underline{w} + \overline{w}_1}{2} \leq \overline{w}_0 \text{ and } x^1 = \min\left\{\left(\frac{\underline{w} + \overline{w}_0}{2}\right) ; \overline{w}_1\right\}.$$

Total welfare (or industry profit) when the preferred buyer is B_0 is given by

$$W^0 = \Pi^0_{S0} + \Pi^0_1 = \frac{\underline{w} + \overline{w}_0}{2} + \frac{25}{192}\frac{(\overline{w}_1 - \underline{w})^2}{\overline{w}_0 - \underline{w}}$$

exactly as in (19), while when the preferred buyer is B_1 it writes

$$W^1 = \Pi^1_{S1} + \Pi^1_0 = \begin{cases} W_{\text{RMA}} & \text{if } \overline{w}_1 \leq \frac{\underline{w}+\overline{w}_0}{2} \\ \dfrac{\underline{w} + \overline{w}_1}{2} + \dfrac{25}{192}\dfrac{(\overline{w}_0 - \underline{w})^2}{\overline{w}_1 - \underline{w}} & \text{otherwise,} \end{cases}$$

where W_{RMA} is given by (18), and the second line obtains from (19) by switching indices.

Proposition 8. *Assume there is one alternative buyer ($n = 1$) and the buyers' valuations w_0 and w_1 are independent and uniformly distributed $[\underline{w}, \overline{w}_0]$ and $[\underline{w}, \overline{w}_1]$, with $\overline{w}_0 > \overline{w}_1$. Then the seller contracts with B_0, the stronger buyer.*

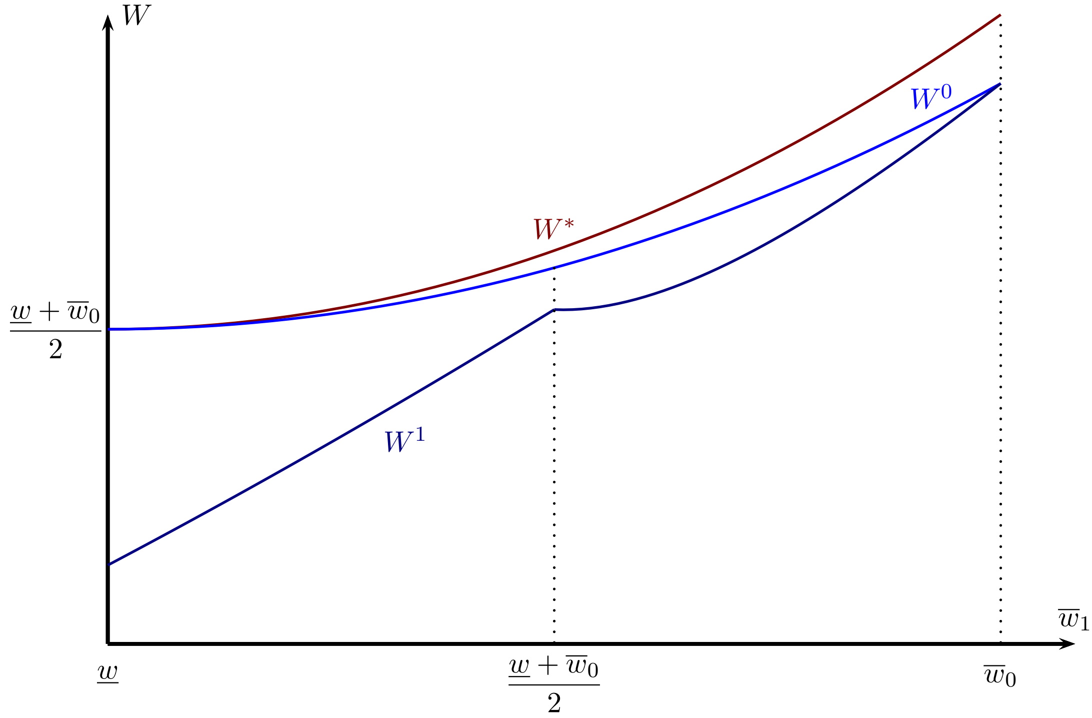


Figure 8: Total welfare with uniformly distributed buyers' valuations: First-best, option contract with strong buyer B_0, and option contract weak buyer B_1

As shown on Figure 8, the industry profit is higher when the seller contracts with B_0. Then, under the uniform distribution assumption, the seller chooses to contract with the strong buyer.

5.3 Interdependent Buyer Valuations

Many real-world markets feature interdependent buyer valuations, where each buyer's valuation depends not only on their own private information but also on the information held by other buyers. This interdependence is particularly prominent in corporate takeovers, where both financial and strategic buyers may value a target based on common components such as market conditions, synergy potential, and future revenue streams. As demonstrated in recent work by Chen and Wang (2023) and Gorbenko and Malenko (2024), the structure of valuations –specifically, the balance between private and common components– significantly impacts market outcomes in M&A settings. In this section, we extend our flexclusivity framework to settings with interdependent valuations, showing how the degree of value commonality affects the optimal selling mechanism. We adopt a standard parametric model where each buyer's valuation is a weighted average of their own signal and others' signals

$$v_0 = \alpha\, w_0 + (1-\alpha)\, w_1 \;\text{ and }\; v_1 = \alpha\, w_1 + (1-\alpha)\, w_0, \tag{20}$$

with w_0 and w_1 being independently distributed with cdf F. The parameter $\alpha \in [.5; 1]$ controls the degree of commonality of the buyers valuations.

Still denoting the flexclusivity threshold by x, we suppose first that the Myerson auction takes place. We continue to model the auction with a mechanism $(\mathbf{Q}(\mathbf{w}; x, \alpha), \mathbf{M}(\mathbf{w}; x, \alpha))$. The preferred buyer's expected utility in the auction is

$$U_0(w_0; x, \alpha) = \max_{\hat{w}_0} \int_{w_1} \{[\alpha w_0 + (1-\alpha) w_1] Q_0(\hat{w}_0, w_1; x, \alpha) - M_0(\hat{w}_0, w_1; x, \alpha)\}\, \mathrm{d}F(w_1)$$

is convex in w_0, with $U_0'(w_0; x, \alpha) = \alpha q_0(w_0; x, \alpha)$, where $q_0(w_0; x, \alpha) = \int Q_0(w_0, w_1; x, \alpha)\, \mathrm{d}F(w_1)$. If B_0 deals exclusively with S, she gets $\alpha w_0 + (1-\alpha)Ew_1 - p$. Proposition 1 thus extends readily to interdependent values. In Appendix B.6, we check that the independent buyer B_1 wins the auction if and only if w_1 exceeds a threshold $\tilde{w}_1(w_0; x, \alpha)$ and we prove that $\tilde{w}_1$ decreases with α.

Lemma 5. *For any flexclusivity threshold x, it becomes more likely that the preferred buyer wins the auction (should it take place) as the degree of commonality increases, i.e., as α decreases from 1 to $1/2$.*

Because $\tilde{w}_1(x; x, \alpha)$ decreases with α, we see that $\tilde{w}_1(x; x, \alpha) > m_1^*(x)$ as soon as the degree of commonality is positive ($\alpha < 1$), so equation (6) is no longer true at $w_0 = x$. To illustrate, consider the case where F is the uniform distribution on $[\underline{w}, \overline{w}]$. Here we get

$$\tilde{w}_1(w_0; x, \alpha) = w_0 + \frac{\alpha}{3\alpha - 1}(\overline{w} - x). \tag{21}$$

For $\alpha = 1$ (private values), we get $\tilde{w}_1(x; x, 1) = m_1^*(x) = (\overline{w} + x)/2$. For $\alpha = 1/2$ (common values), we get $\tilde{w}_1(x; x, 1/2) = \overline{w} > m_1^*(x)$.

The seller' and preferred buyer's joint surplus is $(1-\alpha)w_0 + \alpha\tilde{w}_1$ when the good is allocated to the alternative buyer B_1 ($w_0 < x$ and $w_1 > \tilde{w}_1$) and $\alpha w_0 + (1-\alpha)w_1$ when it is allocated to B_0. It follows easily that the expected joint profit of the pair is

$$\Pi_{S0}(x, \alpha) = \alpha \left\{ \int_{\underline{w}}^{\overline{w}} w_0\, \mathrm{d}F(w_0) + \int_{\underline{w}}^{x} (\tilde{w}_1 - w_0)[1 - F(\tilde{w}_1)]\, \mathrm{d}F(w_0) \right\} \tag{22}$$

$$+(1-\alpha) \left\{ \int_{\underline{w}}^{\overline{w}} w_1\, \mathrm{d}F(w_1) - \int_{\underline{w}}^{x} \int_{\tilde{w}_1}^{\overline{w}} (w_1 - w_0)\, \mathrm{d}F(w_1)\, \mathrm{d}F(w_0) \right\}, \tag{23}$$

where $\tilde{w}_1 = \tilde{w}_1(w_0; x, \alpha)$. When valuations are uniformly distributed, simple algebra shows that the flexclusivity threshold that maximizes Π_{S0} is given by

$$x^*(\alpha) = \frac{\alpha\, \underline{w} + (2\alpha - 1)\, \overline{w}}{3\alpha - 1}, \tag{24}$$

which yields the following result.

Proposition 9. *Assume there is one alternative buyer ($n = 1$) and the buyers' valuations are given by (20), with w_0 and w_1 being independent and uniformly distributed.*

The probability that the seller disregards alternative buyers increases from $1/2$ to 1 as one moves from the private value model ($\alpha = 1$) to the common value model ($\alpha = 1/2$).

In other words, if we start from the private value model and gradually increase the degree of commonality (i.e., reduce α below 1), the relationship between the seller and her preferred buyer becomes more exclusive, with less consideration being given to alternative buyers.

5.4 Balancing Bargaining Power

We have assumed so far that if the ex ante partner does not exercise the option, the seller has all the bargaining power vis-à-vis the buyers. We now consider more balanced bargaining environments.

Following Loertscher and Marx (2019) and Loertscher and Marx (2022), we model the bargaining process with all buyers (should it take place) as the incentive-compatible mechanism that maximizes the weighted industry profit $\Pi_S + \mu\Pi_0 + \mu\Pi_1$, where the bargaining weights are one for the seller and

$\mu < 1$ for the buyers. It is worth noting that Bulow and Klemperer (1996) compares $(\mu = 0, n)$ and $(\mu = 1, n + 1)$. Here the comparative statics exercise on μ is independent n.

In this context, the virtual valuations $\Psi_1(w_1)$ and $\tilde{\Psi}_0(w_0; x)$ must be replaced with respectively

$$\Psi_1(w_1; \mu) = w_1 - (1 - \mu)\frac{1 - F_1(w_1)}{w_1} \quad \text{and} \quad \tilde{\Psi}_0(w_0; x, \mu) = w_0 - (1 - \mu)\frac{F_0(x) - F_0(w_0)}{f_0(w_0)},$$

and the payment $m_1(w_0; x, \mu)$ given by (3) must be changed accordingly. All the above analysis, including Proposition 1, carries over to that case. The important point is that $\tilde{\Psi}_0(w_0; x, \mu)$ decreases with x for any $\mu < 1$. Equation (9) becomes

$$\frac{\partial m_1(w_0; x)}{\partial x} = -(1 - \mu)\frac{1}{\Psi_1'(m_1(w_0; x))}\frac{f_0(x)}{f_0(w_0)} \leq 0. \tag{25}$$

The derivative of the ex ante partners' expected joint profit is changed as follows:

$$\frac{\mathrm{d}\,\Pi_{S0}}{\mathrm{d}x} = f_0(x)\left\{\Pi^*(x^*) - (1 - \mu)\int_{\underline{w}_0}^{x^*}\frac{f_1(m_1(w_0; x^*, \mu))}{\Psi_1'(m_1(w_0; x^*, \mu))}\frac{F_0(x^*) - F_0(w_0)}{f_0(w_0)}\,\mathrm{d}w_0\right\}, \tag{26}$$

which yields Proposition 2. When the valuations w_0 and w_1 are independently and uniformly distributed on $[\underline{w}_0, \overline{w}_0]$ and $[\underline{w}_1, \overline{w}_1]$, with $\underline{w}_0 < \overline{w}_1$, we check in Appendix B.4 that for $\mu \in [0, 1]$ the optimal flexclusivity threshold is given by

$$x^* = \frac{\underline{w}_0\sqrt{1 - \mu} + \overline{w}_1}{\sqrt{1 - \mu} + 1}, \tag{27}$$

provided that the solution is interior. Because the threshold increases with μ, exclusivity is more likely when the seller is more powerful. If the distributions are symmetric, the threshold increases from $(\underline{w} + \overline{w})/2$ to $\overline{w}$ as μ increases from 0 to 1. The case $\mu = 1$ corresponds to the second-price auction, a situation where weak and strong buyers are treated the exact same way. In this limiting case, the option contract generates no exclusivity at all, and is thus irrelevant.

In short, when the seller has less bargaining power vis-à-vis potential buyers, the optimal option contract signed with the preferred buyer leads her to consider alternative buyers with greater probability.

6 Conclusion

This paper has shown that it may be optimal for a powerful seller to deal exclusively with a preferred buyer and completely disregard alternative buyers. This result hinges on a single feature of the economic environment, namely the seller's ability to run a revenue-maximizing auction. We demonstrate that a seller endowed with such bargaining power maximizes profit by granting a preferred buyer an option contract that creates positive probabilities of both exclusivity and competitive auctions. We call "flexclusivity" selling mechanisms that optimally combines exclusive agreements with competitive flexibility.

Under flexclusivity arrangements, foregoing competition with some probability is profitable for a seller because it improves information revelation. In the simplest case of a buying option, the preferred buyer's decision to exercise or decline the option credibly signals his private valuation to the seller. The rejection of the option reveals that the preferred buyer is relatively weak, allowing the seller to optimally distort the subsequent auction in his favor and extract more rent from alternative buyers. Simple option contracts implement flexclusivity very efficiently, achieving up to 75% of the profit gain obtained if the seller and the preferred buyer merge. In contrast to vertical integration, however, flexclusivity does not require the seller and preferred buyer commit beyond the bilateral contracting stage.[19] Moreover, flexclusivity arrangements remain profitable if the number of potential buyers increases, if the buyer valuations are interdependent, and if bargaining power is balanced between the seller and the buyers.

With few exceptions, private companies have no legal obligation to rely on public auctions to sell their products. Flexclusivity mechanisms involve simple, bilateral, private contracts (such as buying options) between a seller and a buyer. Because revenue-maximizing auctions can be implemented in dominant strategy, such mechanisms are profitable whether or not alternative buyers are aware of the existence or detail of the seller and preferred buyer's arrangement.[20]

The above observation raises the question of whether courts should regard flexclusivity arrangements from an ex ante or ex post perspective. In the ex post situation where alternative buyers have not been invited to compete, some of them may for some reason discover that they are ready to grant the seller better conditions than those she has accepted from the preferred buyer. They may complain that they have been disregarded by the seller and argue that their exclusion is detrimental to the seller's shareholder value. Our analysis demonstrates that the latter point may well be valid ex post but not ex ante.[21] If courts base their evaluation solely on ex post outcomes, they would effectively prohibit some ex ante optimal flexclusivity arrangements, and may ultimately destroy shareholder value.

Flexclusivity mechanisms provide a simple rationale for widespread market phenomena that appear puzzling under standard auction theory, including the prevalence of exclusive deals in M&A and stickiness in commercial relationship or international trade. Rather than representing inefficient departures from optimal selling practices, these arrangements emerge as profit-maximizing responses to a fundamental trade-off between competition and information revelation.

[19] The limitation of commitment to the bilateral stage makes it impossible to replicate vertical integration, though.

[20] We thank Simon Loertscher for this important observation.

[21] Such a scenario is reminiscent of the Paramount's sale to Viacom discussed by Bulow and Klemperer (1996). An exclusive agreement between the parties had prompted legal challenges by QVC when it expressed interest in bidding. When QVC revealed its higher valuation, the arrangement appeared ex post at odds with profit maximization. The Delaware courts ultimately adopted an ex post perspective and favored competitive auctions over exclusive negotiations.

APPENDIX

A The role of S

Selling.– A monopolistic seller S has one unit of an indivisible good for sale. She can sell it to her current partner B_0 or to n potential competing buyers. The incumbent's valuation for the good is v_I while that of buyer i's is v_i. Assuming S has no cost, when the good is sold at price p_i to buyer i, the seller gets p_i and the buyer $v_i - p_i$. In terms of the common framework, buyer i provides utility $u_i = p_i$ to S, the total surplus is $w_i = v_i$ and the buyer profit $w_i - u_i = v_i - p_i$.

Procurement.– A monopolistic buyer S needs to procure a good in fixed quantity. She can source it from her incumbent supplier B_0 or from n other potential suppliers. Supplier B_0's production cost is denoted by c_i. When the buyer purchases from supplier i at price p_i, she earns $\theta - p_i$, while the supplier earns $p_i - c_i$. In terms of the common framework, the deal generates a total surplus $w_i = \theta - c_i$, the utility of S is $u_i = \theta - p_i$ and the profit of supplier i is, indeed, $w_i - u_i$.

B Proofs

B.1 Proof of Proposition 1

Suppose that S and B_0 have agreed ex ante on an option with strike price p.

First, we characterize an ex post equilibrium (assuming its existence). Suppose that the preferred partner has not exercised the option and denote by $\tilde{F}_0$ the belief of S regarding the distribution of w_0.

The principal runs a Myerson auction which we model as a direct mechanism $(\mathbf{M}(\hat{\mathbf{w}}; \tilde{F}_0), \mathbf{Q}(\hat{\mathbf{w}}; \tilde{F}_0))$, where $\hat{\mathbf{w}} = (\hat{w}_0, \dots, \hat{w}_n)$ is the vector of reports, $\mathbf{M} = (M_0, \dots, M_n)$ and $\mathbf{Q} = (Q_0, \dots, Q_n)$ denote the payments and the probabilities to award the contract. She expects that the announcement $\hat{w}_0$ made by B_0 belongs to the support of $\tilde{F}_0$. We assume that if B_0 announces $\hat{w}_0$ outside that support then she offers him the payment $\overline{w}_0$. Because this yields a zero utility to the preferred partner, his announcement $\hat{w}_0$ always belongs to support of $\tilde{F}_0$. The interim expected utility of B_0 is therefore

$$U_0(w_0; \tilde{F}_0) = \sup_{\hat{w}_0 \in \text{ supp } \tilde{F}_0} \mathbb{E}\left\{\left[w_0 - M_0(\hat{w}_0, w_1 \dots, w_n; \tilde{F}_0)\right] \; Q_0(\hat{w}_0, w_1 \dots, w_n; \tilde{F}_0) \,|\, w_0\right\}, \tag{B.1}$$

which is convex on $[\underline{w}_0; \overline{w}_0]$, with derivative

$$\frac{\mathrm{d}U_0}{\mathrm{d}w_0} = q_0(w_0; \tilde{F}_0) = \mathbb{E}\left(Q_0(w_0, \dots, w_n; \tilde{F}_0)|w_0\right)$$

being the probability $q_0(w_0; \tilde{F}_0)$ that B_0 is awarded the project. (By convexity, this probability weakly increases with w_0.)

The preferred partner B_0 exercises the option if and only if $w_0 - p \geq U_0(w_0; \tilde{F}_0)$. To avoid uninteresting complications, we assume that when indifferent he does exercise the option. Since $\mathrm{d}U_0/\mathrm{d}w_0 = q_0(w_0; \tilde{F}_0)$ lies between 0 and 1, the inequality is equivalent to w_0 being higher than some threshold x. We define x as the lowest value $w_0 \in [\underline{w}_0, \overline{w}_0]$ such that $w_0 - p \geq U_0(w_0; \tilde{F}_0)$.[22]

Accordingly, the principal's belief regarding the distribution of w_0 should the auction take place obtains by right-truncation of the initial distribution F_0: $\tilde{F}_0(w_0) = F_0(w_0)/F_0(x)$ for $w_0 \in [\underline{w}_0, x]$.

[22] By convention, we set $x = \overline{w}_0$ if $U_0(w_0; \tilde{F}_0)$ is greater than $w_0 - p$ on $[\underline{w}_0, \overline{w}_0]$.

We may therefore denote the interim utility as $U_0(w_0; x)$ instead of $U_0(w_0; \tilde{F}_0)$. If out of equilibrium the ex ante partner with $w_0 > x$ were to participate in the auction, he would choose his report $\hat{w}_0$ according to (B.1), where the support of $\tilde{F}_0$ is the interval $[\underline{w}_0, x]$. Because the preferred report is $\hat{w}_0 = x$ if $w_0 = x$, this is a fortiori true if $w_0 > x$. It follows that U_0 is linear on $[x, \overline{w}_0]$ with slope $q_0(x; x)$.

At a Bayesian equilibrium, the buyer with type $w_0 = x$ is indifferent between exercising and not exercising the option. Given the strike price p, the threshold x defines a Bayesian equilibrium if and only if

$$x - p = U_0(x; x).$$

We now show that $x - U_0(x; x)$ increases in x. This is because for all $w_0 \leq x$ the following holds: (i) $w_0 - U_0(w_0; x)$ increases with w_0; and (ii) $U_0(w_0; x)$ decreases with x. To see (i), observe that the derivative of $w_0 - U_0(w_0; x)$ with respect to w_0 is $1 - q_0(w_0; x) \geq 0$. To see (ii), observe that in the Myerson auction, the virtual valuation of the preferred partner

$$\Psi_0(w_0; x) = w_0 - \frac{1 - \tilde{F}_0(w_0)}{\tilde{f}_0(w_0)} = w_0 - \frac{F_0(x) - F_0(w_0)}{f_0(w_0)}$$

decreases in x. It follows that the expected probability that B_0 wins the auction

$$q_0(w_0; x) = \Pr\left(\Psi_0(w_0; x) \geq \max_{j=1,\ldots,n} \Psi_j(w_j) \,|w_0\right)$$

and his interim utility

$$U_0(w_0; x) = \int_{\underline{w}_0}^{w_0} q_0(t; x)\,\mathrm{d}t$$

are continuous and decreasing in x.

When the flexclusivity level x increases from $\underline{w}_0$ to $\overline{w}_0$, the strike price p given by (2) increases from $\underline{p}$ to $\bar{p}$, with $\underline{p} = \underline{w}_0$ and $\bar{p} = \overline{w}_0 - U_0(\overline{w}_0; \overline{w}_0)$.

B.2 Proof of Lemma 1

Because $m_1(x; x) = \Psi_1^{-1}(x)$, we have $\Pi(m_1(x; x); x) = \Pi^*(x)$. Using (5) and (9), we can rewrite the derivative of the expected joint profit (8) with respect to the exclusivity threshold as

$$\frac{\mathrm{d}\,\Pi_{S0}}{\mathrm{d}x} = f_0(x)\left[\Pi^*(x) - \int_{\underline{w}_0}^{x} \frac{f_1(m_1(w_0; x))}{\Psi_1'(m_1(w_0; x))}\,\frac{F_0(x) - F_0(w_0)}{f_0(w_0)}\,\mathrm{d}w_0\right].$$

To show study the quasi-concavity of the expected profit with respect to x, we take the derivative of $\mathrm{d}\,\Pi_{S0}/\,\mathrm{d}x$ starting from (8).

$$\begin{aligned}
\frac{\mathrm{d}^2\,\Pi_{S0}}{\mathrm{d}x^2} &= \overbrace{(\Pi^*(x))'\,f_0(x)}^{<0} + \overbrace{\Pi^*(x)f_0'(x)}^{\leq 0 \text{ if } f_0'(x)\leq 0} \\
&+ \overbrace{\frac{\partial\Pi(m_1^*;x)}{\partial m}}^{=0}\frac{\partial m_1^*(x)}{\partial x}f_0(x) \\
&+ \int_{\underline{w}_0}^{x}\overbrace{\frac{\partial^2\Pi(m_1;w_0)}{\partial m^2}}^{<0}\left(\frac{\partial m_1(w_0;x)}{\partial x}\right)^2\mathrm{d}F_0(w_0) \\
&+ \int_{\underline{w}_0}^{x}\frac{\partial\Pi(m_1;w_0)}{\partial m}\overbrace{\frac{\partial^2 m_1(w_0;x)}{\partial x^2}}^{<0??}\mathrm{d}F_0(w_0)
\end{aligned}$$

B.3 Proof of Proposition 5

The proof of the proposition follows from Lemma B.1 below, and from observing that $K_1(\overline{w}_0) < 0$, $K_2(\overline{w}_0) = 0$, and $K_3(\overline{w}_0) < 0$.

Lemma B.1. *The derivative of the ex ante partners' expected joint profit is given by*

$$\frac{\mathrm{d}\,\Pi_{S0}}{\mathrm{d}x} = f_0(x)\left[K_1(x) + K_2(x) + K_3(x)\right], \tag{B.2}$$

with

$$K_1(x) = n(n-1)\int_{m_1^*(x)}^{\overline{w}_1}[w - w_0]\,F_1(w)^{n-2}f_1(w)(1-F_1(w))\,\mathrm{d}w$$

$$K_2(x) = n\Pi^*(x^*)F_1(m_1^*(x))^{n-1}$$

$$K_3(x) = -n\int_{\underline{w}_0}^{x^*}\frac{f_1(m_1)}{\Psi_1'(m_1)}\,\frac{F_0(x^*)-F_0(w_0)}{f_0(w_0)}F_1(m_1)^{n-1}\,\mathrm{d}w_0,$$

where $m_1 = m_1(w_0;x)$ and $m_1^*(x) = m_1(x;x) = \Psi_1^{-1}(x)$.

The first two terms represent the marginal variation in expected joint profit achieved by running the auction more frequently. More precisely, the first term $K_1(x)$ comes from the cases where the second highest valuation of the alternative suppliers is above $m_1^*(x)$. The second term $K_2(x)$ comes for the cases where the second highest valuation of the alternative suppliers is below $m_1^*(x)$ but the highest valuation is above $m_1^*(x)$. The last term $K_3(x)$ reflects the loss in profit due to reduced competitive pressure placed on the alternative buyer. The rent shifting effect of a change in x occurs only when $(n-1)$ alternative suppliers (to be chosen among n) have their valuation below m_1.

Proof. Differentiating (12) with respect to x yields

$$\frac{\mathrm{d}\,\Pi_{S0}}{\mathrm{d}x} = A(x;x)f_0(x) + B(x;x)f_0(x) + \int_{\underline{w}_0}^{x}\left[\frac{\partial A}{\partial x} + \frac{\partial B}{\partial x}\right]\mathrm{d}F_0(w_0).$$

Because the derivatives with respect to the lower bound of the integral in A and to the upper bound of the integral in B cancel out, we get from (5) and (9) that

$$\begin{aligned}\frac{\partial A}{\partial x}+\frac{\partial B}{\partial x} &= nF_1(m_1)^{n-1}\frac{\partial \Pi}{\partial m_1}\frac{\partial m_1}{\partial x}\\ &= -nF_1(m_1)^{n-1}\frac{f_1(m_1)}{\Psi_1'(m_1)}\frac{F_0(x^*)-F_0(w_0)}{f_0(w_0)}\frac{f_0(x)}{f_0(w_0)},\end{aligned}$$

which yields

$$\int_{\underline{w}_0}^{x}\left[\frac{\partial A(w_0;x)}{\partial x}+\frac{\partial B(w_0;x)}{\partial x}\right]\mathrm{d}F_0(w_0)=f_0(x)K_3(x).$$

Noticing that $K_1(x)=A(x,x)$ and $K_2(x)=B(x,x)$ achieves the proof of (B.2).

□

B.4 Uniform distributions with different supports

Suppose F_0 and F_1 are uniform. Then

- $F_i(w)=(w-\underline{w}_i)/(\overline{w}_i-\underline{w}_i)$ and $f_i=1/(\overline{w}_i-\underline{w}_i)$
- $\tilde{F}_0(w_0;x)=F_0(w_0)/F_0(x)=(w_0-\underline{w}_0)/(x-\underline{w}_0)$
- $\Psi_1=2w_1-\overline{w}_1$, $\Psi_1'=2$, and $\Psi_1^{-1}(y)=(y+\overline{w}_1)/2$
- $\tilde{\Psi}_0(w_0;x)=w_0-(1-\tilde{F}_0(w_0;x))/\tilde{f}_0(w_0;x)=2w_0-x$

therefore

$$m_1(w_0;x)=(2w_0-x+\overline{w}_1)/2$$

We also have

$$\Pi^*(w_0)=\max_m(m-w_0)(1-F_1(m))=\frac{1}{\overline{w}_1-\underline{w}_1}\max_m(m-w_0)(\overline{w}_1-m)=\frac{1}{4}\frac{(\overline{w}_1-w_0)^2}{\overline{w}_1-\underline{w}_1}$$

and the first-order condition is

$$\int_{\underline{w}_0}^{x}\frac{f_1(m_1(w_0;x))}{\Psi_1'(m_1(w_0;x))}\frac{F_0(x)-F_0(w_0)}{f_0(w_0)}\,\mathrm{d}w_0=\frac{1}{4}\frac{(x-\underline{w}_0)^2}{\overline{w}_1-\underline{w}_1}$$

substituting for the uniform distributions leads to

$$\int_{\underline{w}_0}^{x}\frac{(x-w_0)}{2(\overline{w}_1-\underline{w}_1)}\,\mathrm{d}w_0=\frac{(x-\underline{w}_0)^2}{4(\overline{w}_1-\underline{w}_1)}$$

Simplifying, the first-order condition reads

$$(x-\underline{w}_0)^2=(\overline{w}_1-x)^2 \tag{B.3}$$

which yields $x^*=\min\left\{\frac{\underline{w}_0+\overline{w}_1}{2},\overline{w}_0\right\}$ and therefore (**??**) and (11).

When the buyers have bargaining weighs $\mu\leq 1$, the first-order condition (B.3) is changed into

$$(1-\mu)(x-\underline{w}_0)^2=(\overline{w}_1-x)^2 \tag{B.4}$$

which yields (27).

$$F(w_0,\theta) = 1 - \left(\frac{\overline{w} - w_0}{\overline{w} - \underline{w}}\right)^{\frac{1}{1-\theta}};$$

and

$$m_1(w_0,x,\theta) = w_0 + \frac{(1-\theta)(\overline{w} - w_0)\left(\frac{\overline{w}-w_0}{\overline{w}-x}\right)^{\frac{1}{\theta-1}}}{2-\theta}$$

B.5 Vertical integration (Proposition 7)

Consider any direct mechanism $(q_i(w_i,w_{-i}), m_i(w_i,w_{-i}))$, where $q_i(w_i,w_{-i})$ is the probability that B_i gets the good and $m_i(w_i,w_{-i})$ is the associated payment. Below, $\mathbb{E}$ is the expectation against the distribution of $w_0, w_1, \ldots, w_n$ and $\mathbb{E}_{w_{-i}}$ is the expectation against the distribution of w_{-i} given w_i. The expected joint profit of the vertically integrated entity SB_0 is

$$\Pi_{S0} = \mathbb{E}\left[w_0 q_0 + \sum_{i=1}^{n} m_i q_i\right].$$

We now show that when the above joint surplus is maximized the contract is awarded to the buyer whose type achieves the maximum of w_0 and $\Psi_j(w_j)$. The expected profit of buyer B_i (conditional on his valuation w_i) is

$$U_i(w_i) = \max_{\hat{w}_i} \mathbb{E}_{w_{-i}}\left\{q_i(\hat{w}_i,w_{-i})\left[w_i - m_i(\hat{w}_i,w_{-i})\right]\right\}$$

By the envelope theorem, we have

$$U_i'(w_i) = \mathbb{E}_{w_{-i}} q_i(w_i,w_{-i}).$$

Substituting for m_i yields

$$\mathbb{E}_{w_{-i}}\left\{m_i(w_i,w_{-i})\, q_i(w_i,w_{-i})\right\} = \mathbb{E}_{w_{-i}}\left\{q_i(w_i,w_{-i})\, w_i\right\} - U_i(w_i).$$

By integration by parts, we get

$$\begin{aligned}
\mathbb{E}\, m_i q_i &= \int_{w_i} \mathbb{E}_{w_{-i}}(m_i q_i)\, \mathrm{d}F_i(w_i) = \mathbb{E}\,(q_i w_i) - \int U_i(w_i)\, \mathrm{d}F_i(w_i) \\
&= \mathbb{E}\,(q_i w_i) - \int \mathbb{E}_{w_{-i}} q_i(w_i,w_{-i})\, \frac{1-F_i(w_i)}{f_i(w_i)}\, \mathrm{d}F_i(w_i) \\
&= \mathbb{E}\, q_i\left[w_i - \frac{1-F_i(w_i)}{f_i(w_i)}\right] = \mathbb{E}\, \Psi_i(w_i) q_i.
\end{aligned}$$

Rewriting the expected joint profit of SB_0 yields

$$\Pi_{S0} = \mathbb{E}\left\{w_0 q_0 + \sum_{i=1}^{n} \Psi_i(w_i) q_i\right\}$$

It is therefore optimal for the pair that the contract goes to the buyer that achieves the maximum of w_0 and $\max \Psi_j(w_j)$, $j = 1, \ldots, n$.

The outcome is implemented under dominant strategies with the payments

$$m_0(w_{-0}) = \max_{j\geq 1} \Psi_j(w_j) \text{ and } m_j(w_{-j}) = \Psi_j^{-1}(\max(w_0, \max_{k\neq j, k\geq 1} \Psi_k(w_k))).$$

These payments do not depend on the agents' types. It follows easily that the mechanism induces truthful revelation.[23]

B.6 Interdependent values

Proof of Lemma 5 As in the private values case, the seller maximizes her revenue in the auction

$$\iint_{w_0\leq x} \left[\alpha w_0 + (1-\alpha)w_1 - \alpha\frac{1-\tilde{F}(w_0;x)}{\tilde{f}(w_0;x)}\right] Q_0(w_j, w_{-j}; x, \alpha)\, \mathrm{d}\tilde{F}(w_0;x)\, \mathrm{d}F(w_1)+$$
$$\iint_{w_0\leq x} \left[\alpha w_1 + (1-\alpha)w_1 - \alpha\frac{1-F(w_1)}{f(w_1)}\right] Q_1(w_j, w_{-j}; x, \alpha)\, \mathrm{d}\tilde{F}(w_0;x)\, \mathrm{d}F(w_1).$$

It follows that B_1 wins the auction if and only if

$$\alpha w_1 + (1-\alpha)w_1 - \alpha\frac{1-F(w_1)}{f(w_1)} \geq \alpha w_0 + (1-\alpha)w_1 - \alpha\frac{1-\tilde{F}(w_0;x)}{\tilde{f}(w_0;x)}$$

which can be rewritten as

$$\frac{2\alpha-1}{\alpha}w_1 - \frac{1-F(w_1)}{f(w_1)} \geq \frac{2\alpha-1}{\alpha}w_0 - \frac{F(x)-F(w_0)}{f(w_0)}. \tag{B.5}$$

Because $\alpha \geq 1/2$ and $(1-F)/f$ is non-increasing, the left-hand side of the above inequality is increasing in w_1, hence the inequality can be rewritten as $w_1 \geq \tilde{w}_1(w_0; x, \alpha)$, with $\tilde{w}_1 \geq w_0$ being increasing in w_0 and decreasing in x. Finally, because $(2\alpha-1)/\alpha$ increases in α and $\tilde{w}_1 \geq w_0$, the threshold $\tilde{w}_1(w_0; x, \alpha)$ decreases with α.

The payments are

$$M_0(w_0, w_1; x, \alpha) = [\alpha\tilde{w}_0(w_1; x) + (1-\alpha)w_1]\, Q_0(w_0, w_1; x, \alpha). \tag{B.6a}$$

$$M_1(w_0, w_1; x, \alpha) = [\alpha\tilde{w}_1(w_0; x, \alpha) + (1-\alpha)w_0]\, Q_1(w_0, w_1; x, \alpha), \tag{B.6b}$$

where $\tilde{w}_i(w_{-i}; x, \alpha)$ is the lowest value of $w_i \in [\underline{w}, \overline{w}]$ such that B_i wins the auction when B_{-i}'s valuation is w_{-i}. Payments depend on the buyers' private information only through the allocation mechanism. Irrespective of the other buyer's valuation w_{-i}, B_i has an incentive to report his type truthfully, i.e., $\hat{w}_i = w_i$, thus earning

$$\begin{aligned}\max_{\hat{w}_i}[\alpha w_i + (1-\alpha)w_{-i}]Q_i(\hat{w}_i, w_{-i}; x) - M_i(\hat{w}_i, w_{-i}; x) &= \alpha \max_{\hat{w}_i}(w_i - \tilde{w}_i(w_{-i}; x))\mathbb{1}_{\hat{w}_i > \tilde{w}_i(w_{-i};x)} \\ &= \alpha(w_i - \tilde{w}_i(w_{-i}; x))\mathbb{1}_{w_i > \tilde{w}_i(w_{-i};x)},\end{aligned}$$

where we have dropped the dependence of $(\mathbf{M}, \mathbf{Q})$ and $\tilde{w}_i$ in α for readability. In the uniform case, B_1

[23] The utility of agent j if she reports $\hat{w}_j$ can be written as $(w_j - m_j)\mathbb{1}_{\hat{w}_j \geq m_j}$, which is maximal for $\hat{w}_j = w_j$.

wins the auction when

$$\alpha(2w_1 - \overline{w}) + (1-\alpha)w_0 > \alpha(2w_0 - x) + (1-\alpha)w_1$$

which yields the threshold $\tilde{w}_1$ given by (21).

$\square$

Proof of Proposition 9 A few lines to prove (24) are enough.

$\square$

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