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by

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This paper investigates the optimal acquisition strategy of a foreign investor, who wants to acquire one out of two local firms, under incomplete information. The response to acquisition offers is also a signal on firm productivity, affecting future competition. We identify a competition effect (firms compete for acquisition) and a revelation effect (firms reveal their productivities). These effects reduce the rejection profits and increase the acceptance probability. If the investor makes simultaneous offers, the revelation effect is a potential threat because a firm may signal low productivity, but may not be acquired. If, however, the investor makes offers sequentially, this threat does not exist, making sequential offers the optimal acquisition strategy.

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1 *Introduction*

In this paper, we ask the question how an investor should design an acquisition process under incomplete information when there is more than just one target firm. The investor is a foreign firm intending to enter a certain market. In order to enter the market, the investor has to acquire a local firm but the local firms' production costs are private information. The innovation of the paper is that the acquisition process may reveal some information about the rival-to-be which potentially improves the investor's competitive position in the marketplace because all firms update their beliefs about their rivals' production cost with any relevant information revealed during the acquisition process. We allow the investor to choose from several acquisition designs: make sequential offers to two local firms, or make either an identical offer or differentiated offers to two local firms simultaneously. Our main result is that making sequential offers is the optimal acquisition design because it balances competition between the targets and the threat of revealing information such that the foreign firm's profits cannot improve by any other setup.

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The empirical analysis of multinational entry to foreign markets has demonstrated that multinational firms enter foreign markets in many different ways; see, for example, Raff *et al.* (2012) for Japanese foreign direct investment. Firm acquisitions play an important role for cross-border activities of multinational firms, but information asymmetries seem to restrict the scope of these activities. For example, Shen and Reuer (2005) demonstrate that, *ceteris paribus*, private targets are less preferred compared to public firms because they offer less information on assets. So why does not the standard revelation mechanism of the principal-agent theory work in this setup? One reason is that a foreign firm is not restricted to making offers just to one target firm. In the case of multiple offers, however, the outcome of the acquisition process itself, in particular the information obtained from potential targets that are not acquired, has an effect on the post-acquisition market game. Thus, targets that have not been selected by an investor do not play a passive role, but the option that they *could* have been acquired changes the nature of the acquisition game substantially as we will demonstrate in this paper. The empirical significance of our analysis is obvious as cross-border mergers and acquisitions are quantitatively significant. According to the *United Nations Conference on Trade and Development*'s report (UNCTAD, 2006), in the period 1999-2001 and since 2005 more than six thousand cross-border mergers and acquisitions were undertaken annually. This number only includes successful ones; the total number of merger/acquisition *proposals*, in the same period, can be expected to be much larger because of a high rate of merger failures; see, for example, Banal-Estañol and Seldeslachts (2011).

In the existing literature on mergers and acquisitions, firms' acquisition strategies and bargaining processes are often simplified by either implicitly or explicitly assuming a single offer to a single target only, or by employing an exogenous bargaining process.[1] Most of the studies in the literature on mergers and acquisitions concentrate on firms' incentives to merge under complete information.[2] As for asymmetric information, Qiu and Zhou (2006) study international mergers such that local firms have better information on market demand than foreign firms do. They argue that this information asymmetry generates incentives for firms from different countries to merge. Banal-Estañol (2007) also finds that uncertainty may increase merger incentives and decrease free-riding ef-

[1] The literature on endogenous mergers includes alternative approaches such as simultaneous bidding as in Kamien and Zang (1990, 1991), sequential bidding as in Kamien and Zang (1993), and sequential voting on mergers as in Rodrigues (2001) and Zhou (2008).

[2] For instance, Salant *et al.* (1983) study the profitability of a merger of a subset of firms competing in quantities and find that firms have no incentive to merge unless the merger includes 80 per cent of all firms in the industry. Stigler (1950) also argues that firms may benefit from not participating in a merger when some other firms are merging. Hennessy (2000) replaces linear demand (assumed by Salant *et al.*, 1983) with convex demand and shows that merging firms benefit from the reduction in competition even when there are no cost efficiencies. By allowing for product differentiation and considering Bertrand competition, Deneckere and Davidson (1985) also show that mergers of any size are profitable. In a Cournot oligopoly, Farrell and Shapiro (1990) investigate necessary and sufficient conditions for horizontal mergers to raise price. Perry and Porter (1985) show that firms may have incentives to merge and there is no need to include 80 per cent of firms in the industry when efficiency gains are generated.

fects. Zhou (2008) studies endogenous mergers under cost uncertainty and shows that mergers occur if, and only if, uncertainty is large.

The purpose of this study is to make some progress by endogenizing the acquisition process further under incomplete information when there is more than just one target firm. For this purpose, we look upon acquisitions and not on mergers. While these terms are often used equivalently, we think that a merger is about combining complementary assets of two firms which negotiate on the merger terms on a level playing field. In that case, the degree of asset complementarity plays an important role. An acquisition of a firm is a complete takeover, and is by nature not an activity between equal partners. Thus, we understand an acquisition of a firm as an entry strategy and brownfield investment, and for this reason we abstract from combining complementary assets determining potential merger profitability. We assume that the investor can successfully carry over his technology to the acquired firm. The empirical background is that this assumption is consistent with the observation that full acquisitions are more likely if the acquirer's productivity is relatively large compared to the target firm (Raff *et al.*, 2009).

Our study is closely related to Hviid and Prendergast (1993). They examine the influence of a failing acquisition proposal on firms' *ex post* profitability. They consider a potential merger between two firms and assume that the firm making the proposal does not know the target firm's profitability. The proposal fails if the offer is less than the target firm's profit given rejection (that is, its profit if it rejects the offer and competes against the bidding firm). They show that an unsuccessful proposal may increase the target firm's profit. By rejecting the merger proposal, the target firm signals that it is a low-cost firm, and the bidder updates its beliefs and expects less profits.[3] In their study, the firm making a proposal has no choice except to make a single offer to the existing target firm because there is only one target by assumption.[4] In our paper, however, the foreign firm is a technology leader, faces two potential target firms and may choose from various acquisition strategies. Each acquisition strategy has important implications for both the foreign firm's proposal and the target firms' willingness to accept an offer, which we scrutinize in this paper.

Our model identifies two effects which play a role in this setup. Including one other firm creates a *competition effect* because the investor does not have to stay out of the market when the offer is rejected by a single firm. This reduces the rejection profits and increases the acceptance probability. Offers to two firms also create a *revelation effect*, such that rejection/acceptance of the offer conveys information about the firms' profitabilities, and changes firms' beliefs about the intensity of competition in the post-acquisition market. If offers are made sequentially, a rejected offer signals high pro-

[3]Dassiou and Holl (1996), however, consider Bertrand competition and allow for product differentiation, and show that information revealed by the target firm rejecting the proposal negatively affects not only the bidding firm, but the target firm as well.

[4]Assuming a single target and two asymmetrically informed bidders for the target, Povel and Singh (2006) study takeovers as bidding contests and scrutinize the target's optimal selling mechanism. Their model, however, does not consider downstream externalities in a post-acquisition market, so bidders' valuations are not endogenous.

ductivity, and low productivity types are acquired. If offers are made simultaneously, however, this effect implies a risk: there is a chance that both firms unilaterally accept the offer, but only one firm is acquired, in which case the non-acquired firm has revealed its relative weakness and will have to compete against the strong firm.

The remainder of this paper is organized as follows. We introduce the model in Section 2. In Section 3, we scrutinize the case of sequential offers. In Section 4, we solve the model for the case of simultaneous offers. We conclude in Section 5. For convenience, we have relegated most proofs and technical details to the Appendix.

2 The model

We consider a market that is served by two firms, labeled 1 and 2. Consumers in this market have quasi-linear preferences which give rise to the inverse demand function $p = a - (q_1 + q_2)$, where p denotes the equilibrium price, and q_1 and q_2 are the respective outputs of the two firms. We assume $a > 2$, which guarantees that both firms always want to produce in equilibrium. The production costs are private information of the firms, and both firms draw their cost from the uniform distribution $F(c) = c$: production costs are distributed between 0 and unity. Firms compete by quantities à la Cournot.

A foreign firm, which is a technology leader in this industry, considers the acquisition of one of these firms in order to enter the market.[5] Similar as in Barros (1998) and Borek *et al.* (2004), this investor will use his technology after the acquisition, and we normalize the investor's production cost to zero which is common knowledge amongst all firms, making the investor technologically superior. Before we turn to acquisition strategies, we have to determine the optimal outputs and maximized profits in this market. To this end, we have to take into account that an acquisition proposal, either rejected or accepted, signals a certain range or even the exact cost of one or both competitors in this market. Consider firm 1 which maximizes its expected profit $\Pi_1 = (a - q_1 - E_1(q_2) - c_1)q_1$, where q_1 denotes firm 1's output and $E_1(q_2)$ is firm 1's expectation of firm 2's output. The first-order conditions imply optimal output levels:

$$q_1 = \frac{a - E_1(q_2) - c_1}{2}, \tag{1a}$$

$$q_2 = \frac{a - E_2(q_1) - c_2}{2}. \tag{1b}$$

[5]The model is set up such that the foreign firm is allowed to acquire only a single firm: local competition authorities would not permit the foreign firm to gain monopoly power. We could easily extend our model to other entry options like greenfield investment as long as the foreign investor has to choose between these options at the same time. In this case, the greenfield option would just add a participation constraint to our model with little difference for our results. Results would differ had the greenfield option still been available after having the negotiations with all target firms failed. However, any greenfield investment seems to require a long lead time, and empirical evidence on Japanese foreign direct investment suggests that decisions on acquisitions and greenfield investment are not made sequentially (Raff *et al.*, 2012).

Firm 1 does not know firm 2's cost, but it correctly anticipates the optimal behavior of the rival firm: $E_1E_2(q_1) = E_2(q_1)$ and $E_2E_1(q_2) = E_1(q_2)$.[6] Note that $E_2(c_1) = E_1(c_2) = 1/2$ only if no information has been revealed during the acquisition stage which should warrant a Bayesian update. Accordingly, firm 1 anticipates that

$$
\begin{aligned}
E_1(q_2) &= \frac{a - E_1E_2(q_1) - E_1(c_2)}{2} \\
&= \frac{a - \left(\dfrac{a - E_2E_1(q_2) - E_2(c_1)}{2}\right) - E_1(c_2)}{2}
\end{aligned}
$$

which leads to

$$
\begin{aligned}
E_2(q_1) &= \frac{a + E_1(c_2) - 2E_2(c_1)}{3}, && \text{(2a)} \\
E_1(q_2) &= \frac{a + E_2(c_1) - 2E_1(c_2)}{3}. && \text{(2b)}
\end{aligned}
$$

Substituting (2) back into (1) yields the optimal outputs as a function of firm-specific and expected costs which are given by

$$
\begin{aligned}
q_1 &= \frac{2a - E_2(c_1) + 2E_1(c_2) - 3c_1}{6}, && \text{(3a)} \\
q_2 &= \frac{2a - E_1(c_2) + 2E_2(c_1) - 3c_2}{6}. && \text{(3b)}
\end{aligned}
$$

Note that $a > 2$ guarantees that outputs are positive even if $E_{-i}(c_i) = c_i = 1$ and $E_i(c_{-i}) = 0$ where $i = \{1, 2\}$. Since the first-order conditions imply that $p - c_i = -p'q_i = q_i^2$, we can also derive the expected profits:

$$
\begin{aligned}
\Pi_1^* &= \left(\frac{2a - E_2(c_1) + 2E_1(c_2) - 3c_1}{6}\right)^2, && \text{(4a)} \\
\Pi_2^* &= \left(\frac{2a - E_1(c_2) + 2E_2(c_1) - 3c_2}{6}\right)^2. && \text{(4b)}
\end{aligned}
$$

In equation (4), Π_1^* and Π_2^* are, respectively, firm 1's and firm 2's expected profits in equilibrium; and c_1 and c_2 are, respectively, firm 1's and firm 2's realized production costs. As is clear from equation (4), a firm's expected profit is positively related to its expectation of its rival's cost and is negatively related to the rival firm's expectation of its own cost. Hence, if the rival firm reveals that it is a low-cost firm, the expected profit of the other firm decreases and its expected profit increases, *ceteris paribus*, as the other firm updates its beliefs. In what follows, we will scrutinize the optimal acquisition strategies of the investor.

[6] $E_iE_j(q_i)$, $i \neq j$, is firm i's anticipation of firm j's expectation of firm i's output, q_i.

3 *Sequential offers*

In case of sequential offers, without loss of generality, let the foreign firm pick firm 1 and make the first offer to this firm. Let ϕ_1 denote the foreign firm's offer. If firm 1 accepts this offer, it is acquired by the foreign firm, which will produce in this market with zero cost. Hence, firm 2 observes the acquisition and updates its beliefs about firm 1's cost: $E_2(c_1) = 0$. The foreign firm does not learn anything about firm 2's profitability: $E_1(c_2) = 1/2$. Accordingly, the expected profits are given by

$$\Pi_1^* = \left(\frac{2a+1}{6}\right)^2, \tag{5a}$$

$$\Pi_2^* = \left(\frac{2a-1/2-3c_2}{6}\right)^2. \tag{5b}$$

If firm 1 rejects the offer, the foreign firm makes another offer to the other firm which creates a *competition effect*, because there is a chance that the other firm accepts the investor's offer, and that the firm receiving and rejecting the first-stage offer competes against the stronger firm. This threat, which is possible only because another target firm exists, will lead to a decrease in the local firm's expected rejection profits. Let γ_1 denote the type of firm that is indifferent between acceptance and rejection of the first-stage offer ϕ_1. In equilibrium, all firms with a higher (lower) production cost than γ_1 will be shown to accept (reject) this offer. Consequently, if firm 1 rejects the offer, it will signal that it is a low-cost firm which will lead the foreign firm and firm 2 to update their beliefs such that $E_2(c_1) = \gamma_1/2$. Let ϕ_2 denote the offer that the foreign firm makes to firm 2 after its first offer ϕ_1 is rejected by firm 1. If firm 2 accepts ϕ_2, then firm 1 will have to compete against the foreign firm. Firm 1 observes the acquisition in this case and updates its beliefs such that $E_1(c_2) = 0$, leading to the expected profits:

$$\Pi_1^* = \left(\frac{2a-\frac{\gamma_1}{2}-3c_1}{6}\right)^2, \tag{6a}$$

$$\Pi_2^* = \left(\frac{2a+\gamma_1}{6}\right)^2. \tag{6b}$$

Note that Π_1^*, given by equation (6a), decreases with c_1, which confirms our sorting assumption that high (low)-cost firms accept (reject) the offer. There is of course also a possibility that firm 2 rejects the offer. Let γ_2 denote the type of firm that is indifferent between acceptance and rejection of the second-stage offer ϕ_2. If firm 2 rejects the offer, then no acquisition will take place. The two local firms will compete against each other. In this case, also firm 2 signals that it is a low-cost firm. Hence, firm 1 updates its beliefs: $E_1(c_2) = \gamma_2/2$. Accordingly, the expected profits are given by:

$$\Pi_1^* = \left(\frac{2a-\frac{\gamma_1}{2}+\gamma_2-3c_1}{6}\right)^2, \tag{7a}$$

$$\text{(7b)} \qquad \Pi_2^* = \left(\frac{2a - \frac{\gamma_2}{2} + \gamma_1 - 3c_2}{6} \right)^2 .$$

This is a sequential Bayesian game, which we solve using backward induction. In the second stage, firm 2 knows γ_1 as it is signaled by firm 1, rejecting the initial offer ϕ_1. Hence, γ_1 is determined in the first stage and given in the second stage, denoted by $\overline{\gamma}_1$. In equilibrium, firm 2 accepts the offer ϕ_2 if its realized production cost c_2 is higher than the critical type γ_2 which is indifferent between acceptance and rejection of the offer (see equation (7b)) such that

$$\text{(8)} \qquad \phi_2\left(\gamma_2, \overline{\gamma}_1\right) = \left(\frac{2a - \frac{\gamma_2}{2} + \overline{\gamma}_1 - 3\gamma_2}{6} \right)^2 = \left(\frac{4a + 2\overline{\gamma}_1 - 7\gamma_2}{12} \right)^2 .$$

This indifference condition specifies the acquisition offer of the foreign firm in the second stage as a function of the critical type in the first stage $\overline{\gamma}_1$ and the critical type in the second stage γ_2. Clearly, ϕ_2 decreases with γ_2. This stage is just like a single offer with one exception: firm 1 has already revealed that it is a low-cost firm; the second stage can be reached if, and only if, firm 1 rejects the foreign firm's initial offer. The lower the cost range firm 1 signals - indicated by $\overline{\gamma}_1$ - the smaller the profit firm 2 expects in case of rejecting the offer, because the potential rival will be expected to be a stronger firm. If the foreign firm has made a completely exclusive offer in the first-stage such that any type would reject the offer ($\overline{\gamma}_1 = 1$), the second stage is, then, merely the single offer case, because there will be no *competition effect*, nor will there be any *revelation effect* that comes from the first stage. The revelation effect decreases the expected rejection profit. When negotiating with a firm, the investor benefits from a decrease in the firm's reservation price, making the offer and/or rejection rate smaller. Moreover, the optimal rejection rate in the second stage increases with a, because an increase in a indicates a larger profitability of the market which favors the firm's outside option.

We now turn to the first stage. Firm 1's expected profit in the case of accepting the offer is ϕ_1. If, however, firm 1 rejects the offer, its expected profit is equal to

$$\text{(9)} \qquad \gamma_2^* \left(\frac{2a - \frac{\gamma_1}{2} + \gamma_2^* - 3c_1}{6} \right)^2 + (1 - \gamma_2^*) \left(\frac{2a - \frac{\gamma_1}{2} - 3c_1}{6} \right)^2 ,$$

where γ_2^* is the optimal rejection rate in the second period. In expression (9), the first part is the outcome if the other firm rejects the offer, which is equal to its probability γ_2^* times the expected profit of firm 1 competing against the other local firm. Similarly, the second part is the outcome if the other firm accepts the offer, which is equal to its probability $(1 - \gamma_2^*)$ times the expected profit of firm 1 competing against the foreign firm. In equilibrium, firm 1 will accept (reject) the offer ϕ_1 if its realized production cost c_1 is more (less) than the critical type γ_1 for whom the expected acceptance profit

ϕ_1 must be equal to the expected rejection profit, given by expression (9), such that

$$\phi_1(\gamma_1) = \gamma_2^* \left(\frac{4a + 2\gamma_2^* - 7\gamma_1}{12}\right)^2 + (1-\gamma_2^*)\left(\frac{4a - 7\gamma_1}{12}\right)^2. \tag{10}$$

The RHS of (10) clearly shows that the competition effect decreases firm 1's reservation price, because firm 1 cannot make sure whether it will compete against the other local firm or against the investor unless it accepts the investor's offer: the expected rejection profit is, now, the weighted average of the expected profit in the case of competing against the other firm and the smaller expected profit in the case of competing against the lowest-cost investor. A direct implication of this is that the foreign firm can behave more aggressively - compared to the single offer case - by making sequential offers and effectively including the other firm in the game, in which case the foreign firm can benefit from both the revelation and the competition effect.

We are now ready to scrutinize the foreign firm's optimal acquisition policy in the case of sequential offers. Let $\Pi_0^{\gamma_1(\gamma_2^*)}$ denote the foreign firm's expected profit which is given by equation (11):

$$\begin{aligned} \Pi_0^{\gamma_1(\gamma_2^*)} &= (1-\gamma_1)\left(\left(\frac{2a+1}{6}\right)^2 - \phi_1(\gamma_1)\right) \\ &\quad + \gamma_1(1-\gamma_2^*)\left(\left(\frac{2a+\gamma_1}{6}\right)^2 - \left(\frac{4a+2\gamma_1-7\gamma_2^*}{12}\right)^2\right) \end{aligned} \tag{11}$$

where the first term is the expected first-period profit, and the second term is the expected second-period profit. It is, now, straightforward to show:

Lemma 1 *If the first-stage offer is rejected, it is not optimal to exclude the other firm, that is, the investor will make a second-stage offer which will be accepted by some type.*

Proof: See Appendix A.1.

The foreign firm will not use the single offer strategy, which is a special case of sequential offers, because it increases its expected profits by effectively including the two firms in the game.[7] The intuition is that the firm approached first knows that if it rejects the offer, the investor will approach the other firm which may accept the offer it will receive. This is a threat that reduces the first firm's reservation price (the competition effect). Moreover the first firm rejects only if it is a lower-cost firm, which will be anticipated by the second firm, and which will decrease the second firm's reservation price (the revelation effect).

Why does the investor not want to increase the acceptance probability to one such that it may enter with certainty, at least for the second stage? While the investor will operate with zero marginal cost after entry, the difference in costs to the local firms is

[7]The computations are available upon request.

not too large, and actually would be zero if it faced the most efficient type. Guaranteeing entry would warrant to make an offer such that any local firm, including the type that has the same cost as the investor, will accept. However, this offer would not leave any acquisition gain to the investor leading the investor to discriminate against very efficient local firms, although this strategy could imply that none of the firms may eventually accept an offer.

4 Simultaneous offers

In this section, we check whether the foreign firm can do better by making simultaneous offers. We first scrutinize the case that the foreign firm makes strictly different offers. Then we look at a specific case: the foreign firm makes the same offer to both firms. This section is of particular importance as it implies the possibility that both firms accept the foreign firm's offer(s), but only one firm is picked by the foreign firm while the other firm reveals some information about its profitability. The two cases are different because identical offers do not allow the foreign firm to distinguish between the two targets if both targets accept the offer. Acceptance or rejection of the two different offers, however, demonstrates a difference in expected firm productivity.

For the case of different offers, note carefully that nothing stops the investor to pick the firm having received the higher offer even if the other firm having received the lower offer has unilaterally accepted the offer. As we discussed before, the investor may prefer to take a potentially strong rival out of the market in order to compete against a potentially weak rival. Our model will accommodate both options, but since we will show that sequential offers will dominate simultaneous offers, we do not have to scrutinize in which case the investor would want to acquire the potential low-cost or high-cost rival. All we need is that both local firms understand which firm will be acquired given a certain set of offers.

4.1 Different simultaneous offers

Let ϕ_1^s and ϕ_2^s denote the offers that the foreign firm simultaneously makes to firms 1 and 2, respectively, where $\phi_1^s \neq \phi_2^s$. Also let γ_1^s and γ_2^s denote the critical types: any firm of the type γ_1^s is indifferent between accepting and rejecting the offer ϕ_1^s; and any firm of the type γ_2^s is indifferent between accepting and rejecting the offer ϕ_2^s. All firms with a higher (lower) production cost than the critical type will accept (reject) the offer.

We may distinguish five different outcomes depending on the two firms' acceptance and rejection of the offers. On the first of these, both firms 1 and 2 may reject the offers ϕ_1^s and ϕ_2^s, respectively, which happens with probability $\gamma_1^s\gamma_2^s$; no acquisition takes place. In such a situation, both firms know that the other one has rejected the offer because it is a low-cost firm, $E_{-i}(c_i) = \gamma_i^s/2 < 1/2, i = \{1, 2\}$, leading to the expected profits:

$$\text{(12a)} \qquad \Pi_1^* = \left(\frac{2a - \frac{\gamma_1^s}{2} + \gamma_2^s - 3c_1}{6} \right)^2 ,$$

$$\text{(12b)} \qquad \Pi_2^* = \left(\frac{2a - \dfrac{\gamma_2^s}{2} + \gamma_1^s - 3c_2}{6} \right)^2 .$$

Another possible outcome is that only one firm accepts the offer it has received. This happens with probability $\gamma_i^s \left(1 - \gamma_{-i}^s\right)$, where the rejecting firm is denoted by i. In this case, the foreign firm acquires the firm accepting its offer. Firms update their beliefs about production costs such that $E_i\left(c_{-i}\right) = 0$ and $E_{-i}\left(c_i\right) = \gamma_i^s/2$. This leads to the expected profits given by

$$\text{(13a)} \qquad \Pi_1^* = \left(\frac{2a + \gamma_2^s}{6} \right)^2 ,$$

$$\text{(13b)} \qquad \Pi_2^* = \left(\frac{2a - \dfrac{\gamma_2^s}{2} - 3c_2}{6} \right)^2 ,$$

in case if firm 1 accepts ϕ_1^s and firm 2 rejects ϕ_2^s, or by

$$\text{(14a)} \qquad \Pi_1^* = \left(\frac{2a - \dfrac{\gamma_1^s}{2} - 3c_1}{6} \right)^2 ,$$

$$\text{(14b)} \qquad \Pi_2^* = \left(\frac{2a + \gamma_1^s}{6} \right)^2 ,$$

in case if firm 1 rejects ϕ_1^s and firm 2 accepts ϕ_2^s.

Finally, there is a possibility that each firm unilaterally accepts the offer it has received, which happens with probability $(1 - \gamma_1^s)(1 - \gamma_2^s)$, and in which case the foreign firm is free to acquire any firm. In this case, the *revelation effect* imposes a threat and is of particular concern for each firm. Denoting the non-acquired firm by i, firm i's unilateral acceptance of the offer will signal the foreign firm that it is a high-cost firm such that $E_{-i}\left(c_i\right) = \left(1 + \gamma_i^s\right)/2 > 1/2$, while firm i will learn that the rival firm will be of the lowest-cost type such that $E_i(c_{-i}) = 0$ due to the acquisition of the rival firm. The expected profits are given by

$$\text{(15a)} \qquad \Pi_1^* = \left(\frac{2a + 1 + \gamma_2^s}{6} \right)^2 ,$$

$$\text{(15b)} \qquad \Pi_2^* = \left(\frac{2a - \dfrac{1 + \gamma_2^s}{2} - 3c_2}{6} \right)^2 ,$$

in case if the foreign firm acquires firm 1, or by

$$\text{(16a)} \qquad \Pi_1^* = \left(\frac{2a - \dfrac{1 + \gamma_1^s}{2} - 3c_1}{6} \right)^2 ,$$

$$\text{(16b)} \qquad \Pi_2^* = \left(\frac{2a+1+\gamma_1^s}{6}\right)^2,$$

in case if the foreign firm acquires firm 2.

Without loss of generality, we assume that the foreign firm makes offers such that it acquires firm 1 in case if both firms accept unilaterally. As mentioned before, firm 1 does not have to be the firm receiving the lower offer. Consequently, firm 1's expected acceptance profit, denoted $\Pi_1^A(c_1)$, is exactly the compensation it has been offered: ϕ_1^s. Firm 2, however, gets the compensation that it has been offered, ϕ_2^s, only if firm 1 rejects the offer ϕ_1^s. So firm 2's expected acceptance profit, denoted Π_2^A, is equal to

$$\Pi_2^A(c_2) = \gamma_1^s\phi_2^s + (1-\gamma_1^s)\left(\frac{2a - \frac{1+\gamma_2^s}{2} - 3c_2}{6}\right)^2.$$

The first part is the outcome if the other firm rejects the offer: the probability firm 1 rejects ϕ_1^s times the compensation firm 2 has been offered. Similarly, the second part is the probability that firm 1 accepts the offer ϕ_1^s times the expected profit of firm 2, given firm 2 has revealed that it is a high-cost firm. It can be clearly seen from this expression that the *revelation effect* reduces firm 2's incentive to accept the investor's offer as it reduces the expected acceptance profits. On the contrary, firm 1's and firm 2's expected rejection profits, denoted Π_1^R and Π_2^R, respectively, are symmetric, such that

$$\begin{aligned}
\Pi_1^R(c_1) &= \gamma_2^s\left(\frac{2a - \frac{\gamma_1^s}{2} + \gamma_2^s - 3c_1}{6}\right)^2 + (1-\gamma_2^s)\left(\frac{2a - \frac{\gamma_1^s}{2} - 3c_1}{6}\right)^2, \\
\Pi_2^R(c_2) &= \gamma_1^s\left(\frac{2a - \frac{\gamma_2^s}{2} + \gamma_1^s - 3c_2}{6}\right)^2 + (1-\gamma_1^s)\left(\frac{2a - \frac{\gamma_2^s}{2} - 3c_2}{6}\right)^2.
\end{aligned}$$

In each of the two expressions above, the first part is the probability that also the rival local firm rejects the foreign firm's offer times the respective expected profits, while the second part is the probability that the rival local firm accepts the foreign firm's offer times the expected profits in case of competing against the foreign firm. Unlike the case of sequential offers - in which only the firm receiving the first-stage offer is exposed to the competition effect - both firms are directly subject to the competition effect in this case. Differentiation of $\Pi_i^A(c_i)$ and $\Pi_i^R(c_i)$ w.r.t. c_i, $i = \{1, 2\}$, shows that

$$\begin{aligned}
&\text{(17a)} & \frac{d\Pi_1^A(c_1)}{dc_1} &= 0 > \\
& & \frac{d\Pi_1^R(c_1)}{dc_1} &= -\frac{1}{12}(4a - 6c_1 - \gamma_1^s + 2\gamma_2^s), \text{ and} \\
&\text{(17b)} & \frac{d\Pi_2^A(c_2)}{dc_2} &= -\frac{1-\gamma_1^s}{12}(4a - 6c_2 - \gamma_2^s - 1) >
\end{aligned}$$

$$\frac{d\Pi_2^R(c_2)}{dc_2} = -\frac{1}{12}(4a - 6c_2 - \gamma_2^s + 2\gamma_1^s).$$

Expression (17) confirms that firms with production costs lower (higher) than the respective critical type γ_i^s reject (accept) the compensation that they have been offered because, when the production cost increases, the expected acceptance profits decrease by less than the expected rejection profits. In equilibrium, the unilateral rejection rates (γ_i^s) are determined by the indifference conditions, $\Pi_i^A(\gamma_i^s) = \Pi_i^R(\gamma_i^s)$, $i = \{1, 2\}$:

$$\text{(18a)} \qquad \phi_1^s(\gamma_1^s, \gamma_2^s) = \gamma_2^s \left(\frac{4a + 2\gamma_2^s - 7\gamma_1^s}{12}\right)^2 + (1 - \gamma_2^s)\left(\frac{4a - 7\gamma_1^s}{12}\right)^2,$$

$$\text{(18b)} \qquad \phi_2^s(\gamma_1^s, \gamma_2^s) = \left(\frac{4a + 2\gamma_1^s - 7\gamma_2^s}{12}\right)^2 + \frac{(1 - \gamma_1^s)}{\gamma_1^s}\frac{(8a - 14\gamma_2^s - 1)}{144}.$$

The following remarks are in order. As is clear from equation (18), ϕ_i^s decreases with γ_i^s. ϕ_1, given by equation (10), and ϕ_1^s, given by equation (18a), are qualitatively equivalent. The reason is that firms are subject to similar effects: the competition effect and the revelation effect. On the contrary, comparing ϕ_2, given by equation (8), and ϕ_2^s, given by equation (18b), shows that, with sequential instead of simultaneous offers, the investor may acquire the same firm in the second stage with the same probability for a lower compensation. This is mainly due to the revelation effect decreasing expected acceptance profits which is not present in the case of sequential offers.

Although exclusion of a firm by making an offer which would be rejected by any type is still not optimal as in the case of sequential offers (see Appendix A.2),[8] we find:

PROPOSITION 1 *The foreign firm's expected profit with sequential offers is higher than that with different simultaneous offers.*

Proof: See Appendix A.3.

For this result, it is even immaterial whether the investor will go after the high-/low-cost firm in case that both target firms accept unilaterally. So why do sequential offers do better? In the sequential offers case, only one firm - the firm receiving the first-stage offer - is subject to the competition effect, whereas both firms are affected in the case of different simultaneous offers, which certainly does work in the investor's favor. On the contrary, by making different simultaneous offers, the investor reduces incentives of the firm receiving an offer to accept. The reason is that acceptance is unilateral and may not lead to acquisition, but to signaling the future rival that it is a high-cost firm. This creates a significant threat, which is not offset by the additional competition effect. It deteriorates the probability of acceptance as it decreases the expected acceptance profit. Thereby the investor's expected profits decrease. To complete the analysis, we next scrutinize the case of identical simultaneous offers.

[8]Not surprisingly, different simultaneous offers also yield higher expected profits than a single offer to only one firm. The computations are available upon request.

4.2 Identical simultaneous offers

Unlike the different simultaneous offers case, the foreign firm now offers both firms an identical compensation, and so there is a single critical type, denoted γ_s, which is indifferent between acceptance and rejection of the offer. All firms with a higher (lower) production cost than the critical type, γ_s, accept (reject) the offer. The main difference to different simultaneous offers is that the investor cannot distinguish firms in terms of their cost signals if both firms unilaterally accept the investor's offer. Thus, we assume that it will select one of them with equal probability.

As before, both firms may reject the offer in which case no acquisition will take place and both firms will know that the other one has rejected the offer because it is a low-cost firm: $E_{-i}(c_i) = \gamma_s/2 < 1/2$, leading to the expected profits as in equation (12) where we should replace γ_1^s and γ_2^s by γ_s. If one firm accepts and the other firm rejects the offer, all firms update their beliefs such that $E_i(c_{-i}) = 0$ and $E_{-i}(c_i) = \gamma_s/2$, where the rejecting firm is denoted by i. This leads to the expected profits as in either equation (13) or (14), such that γ_1^s and γ_2^s should be replaced by γ_s.

Finally, both firms may unilaterally accept the investor's offer, in which case the investor will determine which firm to acquire simply by tossing a coin. This outcome is a potential threat to each firm as it may not be the firm picked by the investor, and we can write the expected profits as in either equation (15) or (16), where, again, we should replace γ_1^s and γ_2^s by γ_s.

Let us consider firm 1; similar expressions hold for firm 2. If firm 1 accepts the offer, denoted ϕ_s, its expected acceptance profit, denoted Π_1^A, is equal to

$$\Pi_1^A(c_1) = \gamma_s\phi_s + (1-\gamma_s)\left(\frac{1}{2}\phi_s + \frac{1}{2}\left(\frac{2a - \frac{1+\gamma_s}{2} - 3c_1}{6}\right)^2\right).$$

The first part is the outcome if the other firm rejects the offer, which is equal to its probability γ_s times the acquisition price ϕ_s. If both firms accept the offer, which happens with probability $(1-\gamma_s)$, two outcomes are possible: either firm 1 is picked with probability 0.5 and firm 2 reveals that it is a high-cost firm, or firm 2 is picked with probability 0.5 and firm 1 reveals that it is a high-cost firm. Clearly, both firms are subject to the threat that neither of the firms can make sure that it will be acquired by the investor should it unilaterally accept the offer. However, this threat, due to the revelation effect, is now symmetric. If firm 1 rejects the offer, its expected rejection profit, denoted by Π_1^R, is equal to

$$\Pi_1^R(c_1) = \gamma_s\left(\frac{2a + \frac{\gamma_s}{2} - 3c_1}{6}\right)^2 + (1-\gamma_s)\left(\frac{2a - \frac{\gamma_s}{2} - 3c_1}{6}\right)^2.$$

The first part is the probability that also firm 2 rejects the offer times the respective expected profit. The second part is the probability that firm 2 accepts the offer times the expected profit of firm 1 competing against the investor. As in the case of different simultaneous offers, both firms' reservation prices decrease with both the competition and the revelation effect. Differentiation of $\Pi_1^A(c_1)$ and $\Pi_1^R(c_1)$ w.r.t. c_1 shows

$$
\begin{aligned}
\text{(19)} \qquad \frac{d\Pi_1^A(c_1)}{dc_1} &= -\frac{1-\gamma_s}{24}(4a - 6c_1 - \gamma_s - 1) > \\
\frac{d\Pi_1^R(c_1)}{dc_1} &= -\frac{1}{12}(4a - 6c_1 - \gamma_s(1 - 2\gamma_s)).
\end{aligned}
$$

Expression (19) confirms that firms with a production cost lower (higher) than γ_s reject (accept) the offer because, when the production cost increases, the expected acceptance profits decrease by less than the expected rejection profits. In equilibrium, the unilateral rejection rate γ_s is determined by the indifference condition $\Pi_1^A(\gamma_s) = \Pi_1^R(\gamma_s)$:

$$
\text{(20)} \quad \frac{1+\gamma_s}{2}\phi_s + \frac{1-\gamma_s}{2}\left(\frac{4a-1-7\gamma_s}{12}\right)^2 = \gamma_s\left(\frac{4a-5\gamma_s}{12}\right)^2 + (1-\gamma_s)\left(\frac{4a-7\gamma_s}{12}\right)^2 \Rightarrow
$$

$$
(1+\gamma_s)\phi_s = 2\left(\gamma_s\left(\frac{4a-5\gamma_s}{12}\right)^2 + (1-\gamma_s)\left(\frac{4a-7\gamma_s}{12}\right)^2\right) - (1-\gamma_s)\left(\frac{4a-1-7\gamma_s}{12}\right)^2.
$$

The expected profit of the foreign firm takes into account three different outcomes: (i) both firms accept the offer ϕ_s, which happens with probability $(1-\gamma_s)^2$; (ii) one firm accepts and the other firm rejects the offer, which happens with probability $2\gamma_s(1-\gamma_s)$; and (iii) no firm accepts the offer, which happens with probability γ_s^2. In the first case, the foreign firm learns that the future rival is a high-cost type in the range between γ_s and 1. In the second case, it learns that the future rival is a low-cost type in the range between 0 and γ_s. In the last case, no offer is successful, so revealed information is irrelevant for the foreign firm as it stays out of the market. In this case, only the target firms will make use of the revealed information and update their beliefs before competing against each other. The foreign firm pays the acquisition price ϕ_s with probability $(1-\gamma_s)^2 + 2\gamma_s(1-\gamma_s) = (1-\gamma_s^2)$. Let $\Pi_0^{\gamma_s}$ denote the foreign firm's expected profit, which is given by:

$$
\begin{aligned}
\text{(21)} \quad \Pi_0^{\gamma_s}(\gamma_s) &= (1-\gamma_s)^2\left(\frac{2a+1+\gamma_s}{6}\right)^2 + 2\gamma_s(1-\gamma_s)\left(\frac{2a+\gamma_s}{6}\right)^2 - (1-\gamma_s^2)\phi_s \\
&= (1-\gamma_s)\left((1-\gamma_s)\left(\frac{2a+1+\gamma_s}{6}\right)^2 + 2\gamma_s\left(\frac{2a+\gamma_s}{6}\right)^2 - (1+\gamma_s)\phi_s\right),
\end{aligned}
$$

where $(1+\gamma_s)\phi_s$ is given by (20). We can write the first-order condition that should hold in equilibrium such that

$$
\text{(22)} \qquad \frac{\partial \Pi_0^{\gamma_s}(\gamma_s)}{\partial \gamma_s} = \frac{1}{36}(3+14a) - k\gamma_s = 0,
$$

where $k = (8a + 28 + \gamma_s(20a - 35 + 2\gamma_s))/24$. Comparing the investor's expected profits leads to

THEOREM 1 *The foreign firm's expected profit is highest with sequential offers. In case of simultaneous offers, its expected profit with different simultaneous offers is higher than that with identical simultaneous offers.*

Proof: See Appendices A.3 and A.4.

Neither complete exclusion nor complete inclusion of firms via trivial offers - such that any type would either reject or accept such offers - is optimal also in case of identical simultaneous offers (see Appendix A.2): effectively including the two firms in the game by making identical simultaneous offers substantially improves the probability of acceptance of the offer, and significantly decreases the expected cost of the acquisition of a firm. In case of identical simultaneous offers, however, the revelation effect imposes a threat for both firms, such that their acceptance of the offer does not necessarily lead to the acquisition of the firm. Due to the different quality of the revelation effect, firms' expected acceptance profits are no longer equal to the offer, but the weighted average of the offer and the smaller expected outside profits. Different simultaneous offers improve on the investor's expected profits because they allow the investor to learn the difference in cost types of the target firms, but they keep the threat of accepting unilaterally but not being acquired by the foreign firm which is not present when offers are sequential. The target firms are, thus, more inclined to reject simultaneous offers.

5 *Concluding remarks*

Our paper has made some progress on explaining a potential sequence of offers when a foreign investor wants to acquire a local firm, but has incomplete information about the targets' profitabilities. We could show that sequencing offers is better than making simultaneous offers. In both cases, acceptance or rejection of an offer has a revelation effect. Furthermore, both target firms compete for the investor in particular because they do not want to compete against the investor if the rival firm is acquired. Sequential offers do best because the revelation effect does not impose a counter-productive threat. An implicit assumption of our analysis has been that an investor could credibly commit to a certain policy. This may be regarded as most problematic in the case of a single offer to only one firm. That said, this strategy will never be used, and thus the credibility of the investor committed to talk to only one firm will never be tested. Therefore, our results indicate that there is no conflict between credibility and the best strategy. Furthermore, we have confined our analysis to a setup in which one active agent (the foreign investor) makes offers and two other agents (the targeted local firms) respond by acceptance or rejection of the investor's offer(s). Our analysis could be easily extended to the case where more than two firms are active, but maximally two of them qualify as a potential target. If there are more than two potential targets, the analysis gets much more complicated and analytically unsolvable, while having similar dynamics at work.

This paper has scrutinized the optimal acquisition strategies of an investor. An alternative setup could be that the investor runs an auction: both local firms submit their sale prices to the investor, and the investor commits to acquire the firm quoting a lower price.[9] While this seems to be a straightforward setup, several complications may arise. If bids revealed firms' realized costs, then the auction would reveal also the type of the non-acquired firm, and this would add an incentive to conceal the type. This incentive is strongest when the auction is not self-enforcing (when the investor's ex ante commitment to acquire the firm asking for a lower acquisition price is not credible ex post). As the outcome of the auction is important also for the post-auction market (the competition stage of the game), after having seen the quoted prices, the investor may decide to acquire the firm having quoted a higher price instead. The reason is that - once costs are known - it may be more profitable to take out a strong rival and to compete against a weak rival. The problem even arises in an environment of complete information. In this setup, the foreign firm can select which firm it would like to acquire. Suppose the market potential (proxied by a) is relatively small. In this case, it is in the investor's best interest to acquire the strong (low-cost) firm and to compete against the weak (high-cost) firm. If a is small, duopoly profits are small, and the profit difference between a low-cost and a high-cost firm is not significantly large. The investor has to compensate the acquired firm for the foregone profit, and in this case it pays off to eliminate a strong rival from future competition and to compete against a weak rival. In sufficiently large markets - a is large - the investor acquires the high-cost firm as it will be significantly cheaper. While the profitability of this option depends on the market potential in case of complete information, it has the implication that no pure-strategy, symmetric and fully-separating Nash equilibrium will exist in an auction setup with incomplete information.[10] Local firms will anticipate that this defection will improve the investor's competitive position in the post-auction market. Thus, we conclude that several complications arise in alternative setups which would deserve an own paper. This would also be true if we considered mergers instead of acquisitions because a potential asset complementarity will obviously lead to more ambiguity in partner selection.

Appendix

A.1 Proof of Lemma 1

Let $\Pi_0^{\gamma_2}$ denote the foreign firm's expected profit in the second stage. It is a function of the critical type in the first stage, $\overline{\gamma}_1$, and the second-stage rejection rate, γ_2:

$$\Pi_0^{\gamma_2}(\gamma_2, \overline{\gamma}_1) = (1-\gamma_2)\left(\left(\frac{2a+\overline{\gamma}_1}{6}\right)^2 - \left(\frac{4a+2\overline{\gamma}_1-7\gamma_2}{12}\right)^2\right).$$

Note that $\Pi_0^{\gamma_2}(0,\cdot) = 0$. The first derivative is given by

$$\text{(A.1)} \qquad \frac{\partial \Pi_0^{\gamma_2}(\gamma_2,\cdot)}{\partial \gamma_2} = \frac{7}{144}\left(4\left(2a+\overline{\gamma}_1\right) - 2\left(7+8a+4\overline{\gamma}_1\right)\gamma_2 + 21\gamma_2^2\right),$$

[9]For the literature on negotiations versus auctions, see Bulow and Klemperer (1996).

[10]See Koska *et al.* (2014) for details. This result has some similarity with the ratchet effect. For the ratchet effect in a dynamic procurement model with adverse selection and moral hazard, see Laffont and Tirole (1988).

which leads us to

$$\left.\frac{\partial \Pi_0^{\gamma_2}(\gamma_2,\cdot)}{\partial \gamma_2}\right|_{\gamma_2=0} = \frac{7}{36}(2a+\overline{\gamma}_1) > 0,$$
$$\left.\frac{\partial \Pi_0^{\gamma_2}(\gamma_2,\cdot)}{\partial \gamma_2}\right|_{\gamma_2=1} = -\frac{7}{36}\left(2a+\overline{\gamma}_1-\frac{7}{4}\right) < 0$$

because $a > 2$. Thus, an optimal second-stage offer cannot be completely exclusive such that any type will reject the offer, nor can it be completely inclusive such that any type will accept the offer. From equation (A.1), we can derive a closed form solution for the optimal second-stage rejection rate γ_2^* which is a decreasing function of $\overline{\gamma}_1$: $\gamma_2^*(\overline{\gamma}_1) = \left(2\left(7+8a+4\overline{\gamma}_1\right) - \sqrt{-336\left(2a+\overline{\gamma}_1\right)+4\left(7+8a+4\overline{\gamma}_1\right)^2}\right)\Big/42.$ *Q.E.D.*

A.2 Completely exclusive/inclusive simultaneous offers

$\Pi_0^{\gamma_1^s,\gamma_2^s}$, the foreign firm's expected profit for different simultaneous offers, is given by

$$\text{(A.2)}\quad \Pi_0^{\gamma_1^s,\gamma_2^s}(\gamma_1^s,\gamma_2^s) = (1-\gamma_1^s)\left(\gamma_2^s\left(\frac{2a+\gamma_2^s}{6}\right)^2 + (1-\gamma_2^s)\left(\frac{2a+\gamma_2^s+1}{6}\right)^2 - \phi_1^s\right) + \gamma_1^s(1-\gamma_2^s)\left(\left(\frac{2a+\gamma_1^s}{6}\right)^2 - \phi_2^s\right),$$

where $\phi_i^s, i = \{1,2\}$, is given by equation (18), and $\Pi_0^{\gamma_1^s,\gamma_2^s}(\gamma_1^s=1,\gamma_2^s=0) = 0$. The FOCs that should simultaneously hold in equilibrium are given by equation (A.3):

$$\text{(A.3a)}\quad \frac{\partial \Pi_0^{\gamma_1^s,\gamma_2^s}(\gamma_1^s,\gamma_2^s)}{\partial \gamma_1^s} = \frac{1}{144}(48a-5-f_1+f_2) = 0,$$
$$\text{(A.3b)}\quad \frac{\partial \Pi_0^{\gamma_1^s,\gamma_2^s}(\gamma_1^s,\gamma_2^s)}{\partial \gamma_2^s} = \frac{1}{144}(8a+17+g_1-g_2) = 0,$$

where $f_1 = \gamma_1^s(112a+98-147\gamma_1^s)$ and $f_2 = \gamma_2^s(48a-17+56\gamma_1^s-\gamma_2^s(3+40a+112\gamma_1^s-53\gamma_2^s))$, and $g_1 = \gamma_1^s(48a-17+28\gamma_1^s)$ and $g_2 = \gamma_2^s(32a+36+\gamma_1^s(80a+6+112\gamma_1^s)+\gamma_2^s(12-159\gamma_1^s))$. Equation (A.3) also leads us to

$$\left.\frac{\partial \Pi_0^{\gamma_1^s,\gamma_2^s}(\gamma_1^s,\gamma_2^s)}{\partial \gamma_1^s}\right|_{\gamma_1^s=1} = -\frac{1}{144}(22(a-2)+ah_1-\gamma_2^s h_2) < 0,$$
$$\left.\frac{\partial \Pi_0^{\gamma_1^s,\gamma_2^s}(\gamma_1^s,\gamma_2^s)}{\partial \gamma_2^s}\right|_{\gamma_2^s=0} = \frac{1}{144}\left(17(1-\gamma_1^s)+8a(1+6\gamma_1^s)+28(\gamma_1^s)^2\right) > 0,$$

where $h_1 = (34-32\gamma_2^s(1-\gamma_2^s)+8(1-\gamma_2^s)^2) > 0$ for any $\gamma_2^s \in [0,1]$, and $h_2 = (39+53(\gamma_2^s)^2-115\gamma_2^s)$, which is positive at $\gamma_2^s < \widehat{\gamma_2^s}$, or negative at $\gamma_2^s > \widehat{\gamma_2^s}$. Moreover, $h_1 > h_2$

for any $\gamma_2^s \in [0,1]$ and $a > 2$. Thus, an optimal offer cannot be completely inclusive or exclusive. Similarly, for the case of identical offers, equation (22) leads us to

$$\left.\frac{\partial \Pi_0^{\gamma_s}(\gamma_s)}{\partial \gamma_s}\right|_{\gamma_s=0} = \frac{1}{36}(3+14a) > 0,$$
$$\left.\frac{\partial \Pi_0^{\gamma_s}(\gamma_s)}{\partial \gamma_s}\right|_{\gamma_s=1} = -\frac{7}{72}(8a-3) < 0,$$

because $a > 2$, so neither complete inclusion nor complete exclusion is optimal.

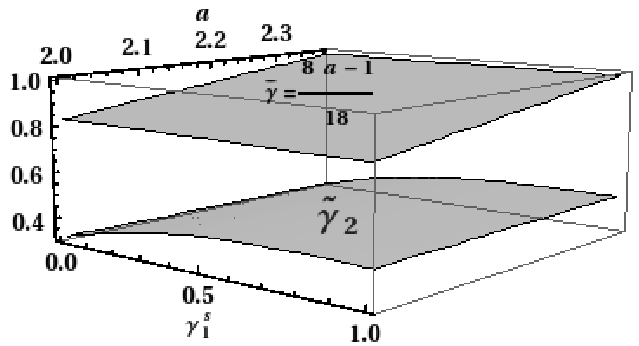
A.3 Proof of Proposition 1

Let $\widetilde{\gamma}_1$ and $\widetilde{\gamma}_2$ denote the optimal rejection rates in the case of different simultaneous offers: $\gamma_1^s = \widetilde{\gamma}_1$ and $\gamma_2^s = \widetilde{\gamma}_2$. Now impose that the investor makes offers in the sequential offers case such that $\gamma_1 = \widetilde{\gamma}_1$ and $\gamma_2 = \widetilde{\gamma}_2$ (i.e., the investor employs the optimal rejection rates for the different simultaneous offers case and determines how much compensation to offer to each firm in the sequential offers case which is obviously not necessarily optimal). We now demonstrate that the investor is already better off by using the optimal rejection rates for the case of different simultaneous offers when making sequential offers. More formally, we replace γ_1^s and γ_1 with $\widetilde{\gamma}_1$, and γ_2^s and γ_2^* with $\widetilde{\gamma}_2$ in equations (11) and (A.2), and compare the two equations which shows that

$$\Pi_0^{\gamma_1(\gamma_2)}(\widetilde{\gamma}_1,\widetilde{\gamma}_2) - \Pi_0^{\gamma_1^s,\gamma_2^s}(\widetilde{\gamma}_1,\widetilde{\gamma}_2) = \frac{(1-\widetilde{\gamma}_1)(1-\widetilde{\gamma}_2)}{144}(8a-18\widetilde{\gamma}_2-1).$$

$\Pi_0^{\gamma_1(\gamma_2)}(\widetilde{\gamma}_1,\widetilde{\gamma}_2) > \Pi_0^{\gamma_1^s,\gamma_2^s}(\widetilde{\gamma}_1,\widetilde{\gamma}_2)$ if $(8a-18\widetilde{\gamma}_2-1) > 0$. Given $a > 2$, $(8a-18\widetilde{\gamma}_2-1) > 0$ at $a \geq 19/8$. As for $a < 19/8$, $(8a-18\widetilde{\gamma}_2-1) > 0$ only if $\widetilde{\gamma}_2 < (8a-1)/18$.

Figure A1
Sequential versus different simultaneous offers



To demonstrate that, we derive the reaction functions determining the optimal rejection rate, $\gamma_2^{s*}(\gamma_1^s)$, from equation (A.3), and compare it with $\overline{\gamma} \equiv (8a-1)/18$, represented by $\overline{\gamma}$ for $2 < a < 19/8$. Since (A.3) determines the optimal simultaneous offers as a function of a only, it is sufficient to show that $\widetilde{\gamma}_2 < \overline{\gamma}$ for all $a \in [2, 19/8]$. Figure A1 shows the behavior of γ_2^{s*} and $\overline{\gamma}$ in this range which completes our proof such that $\widetilde{\gamma}_2 < (8a-1)/18$, that is, $\Pi_0^{\gamma_1(\gamma_2)}(\widetilde{\gamma}_1, \widetilde{\gamma}_2) > \Pi_0^{\gamma_1^s, \gamma_2^s}(\widetilde{\gamma}_1, \widetilde{\gamma}_2)$. Hence, a foreign firm can always do better by making sequential offers than by making different simultaneous offers. *Q.E.D.*

A.4 Proof of Theorem 1

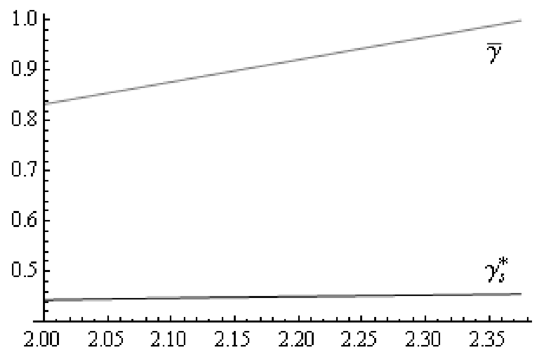
Sequential offers vs identical simultaneous offers

Let $\widetilde{\gamma}$ denote the optimal rejection rate in identical simultaneous offers: $\gamma_s = \widetilde{\gamma}$. Now impose that the investor makes sequential offers such that $\gamma_1 = \gamma_2 = \widetilde{\gamma}$ (i.e., the investor employs the optimal rejection rate for the identical simultaneous offers case and determines how much compensation to offer to each firm in the sequential offers case which is obviously not necessarily optimal). We now demonstrate that the investor is already better off by using the optimal rejection rate for the case of identical simultaneous offers when making sequential offers. More formally, we replace γ_s, and γ_1 and γ_2^* with $\widetilde{\gamma}$ in equations (21) and (11), respectively, and compare the two equations which shows

$$\Pi_0^{\gamma_1(\gamma_2)}(\widetilde{\gamma}) - \Pi_0^{\gamma_s}(\widetilde{\gamma}) = \frac{(1-\widetilde{\gamma})^2}{144}(8a - 18\widetilde{\gamma} - 1).$$

$\Pi_0^{\gamma_1(\gamma_2)}(\widetilde{\gamma}) > \Pi_0^{\gamma_s}(\widetilde{\gamma})$ if $(8a - 18\widetilde{\gamma} - 1) > 0$. Given $a > 2$, $(8a - 18\widetilde{\gamma} - 1) > 0$ at $a \geq 19/8$. As for $a < 19/8$, $(8a - 18\widetilde{\gamma} - 1) > 0$ only if $\widetilde{\gamma} < \overline{\gamma} = (8a-1)/18$. Since (22) determines the optimal simultaneous offers as a function of a only, it is sufficient to show that $\gamma_s^* < \overline{\gamma}$ for all $a \in [2, 19/8]$. Figure A2 shows the behavior of γ_s^* and $\overline{\gamma}$ in this range which completes our proof such that $\widetilde{\gamma} < (8a-1)/18$, that is, $\Pi_0^{\gamma_1(\gamma_2)}(\widetilde{\gamma}) > \Pi_0^{\gamma_s}(\widetilde{\gamma})$.

Figure A2
Behavior of γ_s^*



Hence, a foreign firm can always do better by making sequential offers than by making identical simultaneous offers. *Q.E.D.*

Different vs identical simultaneous offers

Let $\widetilde{\gamma}$ denote the optimal rejection rate in the case of identical simultaneous offers: $\gamma_s = \widetilde{\gamma}$. As before, we impose that the investor makes offers in the different simultaneous offers case such that $\gamma_1^s = \widetilde{\gamma} + \epsilon, \gamma_2^s = \widetilde{\gamma} - \epsilon$ with $\epsilon \approx 0$ (i.e., the investor employs the optimal rejection rate for the case of identical simultaneous offers except for the small - and negligible - variation of ϵ and determines how much compensation to offer to each firm in the case of different simultaneous offers, which is obviously not necessarily the optimal one). We now demonstrate that the investor is already better off by using rejection rates that are in ϵ–neighborhood of the optimal rejection rate for the case of identical simultaneous offers when making different simultaneous offers which shows that $\Pi_0^{\gamma_1^s,\gamma_2^s}(\widetilde{\gamma}) - \Pi_0^{\gamma_s}(\widetilde{\gamma}) = 0$. This completes the proof as it confirms that different simultaneous offers perform at least as good as identical simultaneous offers. *Q.E.D.*

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