Reverse Break-up Fees and Antitrust Approval*

Albert H. Choi
University of Michigan Law School

Abraham L. Wickelgren
University of Texas Law School

November 2019

Abstract

The paper examines use of reverse break-up fees in mergers. By promising to pay a reverse break-up fee to the target in case the proposed merger does not get the necessary antitrust approval, the acquirer can signal to the target and the antitrust authority that the merger is more likely to be pro-competitive. A large reverse break-up fee can also function as a commitment device by the acquirer to spend more resources in case the merger is challenged by the antitrust authority. The paper examines the various conditions under which a reverse break-up fee can serve these two functions and also derives welfare and policy implications.

JEL Codes: TBD

1 Introduction

In 2017, two companies were in a hot pursuit of acquiring Fox: Disney and Comcast. Although Comcast's final offer was more than 15 percent higher than Disney's, Fox surprisingly turned down Comcast's offer and, instead, accepted Disney's. In its Securities and Exchange Commission (SEC) filing, Fox cited concerns over whether merging with Comcast would receive the requisite antitrust approval for its decision to turn down Comcast's offer. Making this statement more credible, Disney, in fact, offered Fox a $2.5 billion (reverse) break-up fee in the event that the deal did not pass antitrust scrutiny, while Comcast did not offer any. That is, Disney promised to pay Fox $2.5 billion in case the merger does not get antitrust approval while Comcast was not going to pay Fox anything. In the summer of 2018, the US Department of Justice approved the Disney-Fox deal after the merging parties agreed to divest Fox's regional sports networks.

Unlike target termination fees, which the target promises to pay in case the deal falls apart (for instance, because the target accepts a competing bid), reverse termination fees

*Preliminary and Incomplete. We thank seminar and conference participants at the Antitrust Economics Conference at Shandong University and the University of New South Wales Comments are welcome to alchoi@umich.edu and awickelgren@law.utexas.edu.

that the buyer promises to pay were somewhat less common.[1] The practice, however, attracted a substantial amount of controversy during the 2008–2010 financial crisis when a number of private equity (financial) buyers attempted to pull out of a signed deal, citing the difficulty of arranging necessary financing. See Davidoff (2009). Since then, the practice has gathered more attention, especially in cases, as in the Fox-Disney deal, where there is a substantial concern over whether the deal will be approved by the antitrust authority. According to Collins (2019), from 2015 through March 2019, for instance, about 12% of all the strategic negotiated deals had an antitrust reverse termination fee, with the fees ranging from a low of 0.1% to a high of 39.8% and a median of 4.4% of the transaction value. Among the deals that utilized an antitrust reverse termination fee, about 24% of the transactions were challenged by an antitrust authority.[2] As the Fox-Disney story indicates, what is much less appreciated is the role played by reverse breakup (termination) fees in assuaging target's concerns and also securing antitrust approval.

In this paper, we consider the effect of this type of reverse break-up (termination) fee as part of the strategic interaction between merging parties and the antitrust authorities.[3] The merging parties want to convince the antitrust authorities that the merger is pro-competitive, or, at least, that the government's probability of successfully blocking the merger is small enough to make attempting to do so is not worth the effort. A large reverse break-up fee can help in two ways. First, because this fee is more costly to the acquirer the more likely the merger is to be challenged, and the more likely a court is to find the merger anti-competitive, a large reverse break-up fee can be a credible signal that the acquirer believes the deal is pro-competitive. Second, a reverse break-up fee can also function as a commitment device. With a large break-up fee, in case the merger is challenged by the regulator ex post, the acquirer would be willing to spend more resources in fighting that challenge in court. This may make a challenge less appealing from the regulator's perspective.

The analysis will demonstrate that while the first effect likely helps the antitrust authorities more effectively decide which mergers to challenge, the second effect could end up deterring challenges that the authorities would otherwise like to make. That is, the

[1] Unlike target termination fees, which attempt to compensate a disappointed buyer when the target accepts a competing bid or the target boards recommends against the deal, reverse termination fees tend to be much more targeted to deal with antitrust or financing issues. Hence, if the deal is not subject to an antitrust approval or the buyer is using its own stock as consideration, there is little reason to include a reverse termination fee provision.

[2] According to Collins (2019), since January 1, 2015, 63 transactions were signed with an antitrust reverse termination fee. Among them, 48 (about 76%) were cleared without any antitrust challenge, 3 transactions (Staples/Office Depot, Aetna/Humana, and Anthem/Cigna) were terminated after the authority obtained a preliminary injunction against the deal, 1 transaction (Walgreens Boots/Rite Aid) was abandoned in the face of regulatory opposition, 10 transactions closed subject to a DOJ, FTC, or a Public Utilities Commission consent order, and 1 transaction (AT&T/Time Warner) defeated antitrust challenge.

[3] According to some practitioners, including a robust antitrust reverse termination fee, along with a strong covenant (promise) to secure antitrust approval, can alert the antitrust authority that the deal may be vulnerable to challenge. See Model Merger Agreement, Section 4.7 Commentary (2011).

first, signaling story can be welfare increasing while the second, commitment story can be welfare reducing. While it would be optimal (from the welfare perspective) that only the pro-competitive mergers would utilize a reverse break-up fee, the paper shows that such a (fully separating) equilibrium is not feasible. The reason is fairly straight-forward. Were only the pro-competitive mergers to use a reverse break-up fee and fully bypass any regulatory challenge, this provides a strong incentive to anti-competitive merges to mimic the pro-competitive types and also offer a reverse break-up fee. The paper shows that, under plausible conditions, the only possible equilibrium is either completely pooling or partially pooling (under which the anti-competitive type mixes between offering and not offering a reverse break-up fee).

After analyzing the possible equilibria, the paper goes on to examine the welfare implications so as to derive policy implications. Given that a complete separation is not possible, to maximize welfare, the regulator would want to (1) induce as much separation between the types as possible and also (2) induce the parties to use as small a reverse break-up fee as possible. The first allows the regulator to more effectively target anti-competitive mergers while the small reverse break-up fee allows the parties to minimize the litigation deadweight loss. The paper shows that these two objectives will often work in opposite directions, however. The reason is that the smaller the reverse break-up fee, the more likely that the anti-competitive mergers will use it so as to mimic the pro-competitive types. The analysis demonstrates that, from the welfare perspective, either a completely pooling equilibrium with zero reverse break-up fee or a partially separating equilibrium with lowest possible break-up fee would be most desirable. The paper then examines the conditions under which the first type (which would be tantamount to banning reverse break-up fees) would be better than the second type.

The paper is organized as follows. In section 2, we present a brief review of the existing literature. While there has been some work on target's promise to pay termination fees (also known as target break-up fees), there is very little literature on reverse break-up fees. As far as we know, this is the first paper that examines reverse termination fees using game theoretic analysis. Section 3 presents the basics of the model, along with some benchmark results, including the equilibrium when there is no information asymmetry among the target, the buyer, and the antitrust regulator. The benchmark results provide a useful guideline in deriving the results under asymmetric information. Section 4 presents the main analysis of the paper and shows how a reverse termination fee can be used as a signaling and a commitment device. Based on the equilibrium analysis, the section also presents some results on welfare and policy implications. The last section concludes with some discussion of caveats and of future research.

2 Related Literature

There is very little research on termination fees in mergers and acquisitions, and almost all of the existing research is empirical and focuses on the termination fee promised by the target corporation. Bates and Lemmon (2003) and Officer (2003) empirically show that target termination fees are more likely associated with a higher deal completion rate and a higher deal premium, suggesting that target termination fees are generally beneficial for the target shareholders and efficient for the takeover process. Similarly, Boone and Mulherin (2007), utilizing a novel dataset from the Securities and Exchange Commission (SEC) documents, show that target termination fees are positively related to the degree of takeover competition and do not truncate the bidding process. Consistent with such empirical findings, Che and Lewis (2007) theoretically examines how target termination fees (in contrast to target stock lockups) can induce the first bidder to participate in the auction and increase social welfare.

On the reverse termination fee side, we are aware of no game theoretic examination of the topic. Afrasharipour (2010) and Quinn (2010) analyze reverse termination fees and suggest how they can be utilized to allocate risks (such as the failure to receive antitrust approval or to receiving necessary financing) between the buyer and the target. Quinn (2010), in particular, suggest that there is no a priori reason to set the reverse termination fee at the same level as the target termination fee and doing so may indicate inefficiency. Choi and Triantis (2010) examines how reverse termination fees can be used as a litigation-screening device so as to better provide beneficial, pre-closing investment incentive for the target. Mahmudi, Virandi, and Zhao (2015) analogizes reverse termination fee as a real option given to the buyer and empirically document that its presence is more likely to provide a higher joint gain for both the target and the buyer. Finally, Coates, Palia, and Wu (2018), using hand-collected reverse termination fee provisions, attempt to distinguish between "efficient" versus "inefficient" reverse termination fees, and empirically show, among others, that "inefficient" reverse termination fees are more likely to be associated with a lower merger announcement return for the bidder.

3 The Model

There are three (strategic) players and four periods with no time discount: $t \in \{0, 1, 2, 3\}$. The players consist of an acquirer corporation (A), a target corporation (T), and an antitrust regulator (R). At $t = 0$, the Nature decides whether the merger is pro-competitive (pc) or anti-competitive (ac) and the acquirer (A) privately observes the outcome. The ex ante probability that the merger is anti-competitive is $q \in (0, 1)$, and this is common knowledge among the three players. We will often call the pro-competitive acquirer (or merger) as the pc-type and the anti-competitive acquirer (or merger) as the ac-type: $i \in \{ac, pc\}$. At $t = 1$, A makes an offer of $k = (p, b) \in [0, p_{\max}] \times [0, b_{\max}]$ to the target (T) and T either accepts or rejects the offer. For now, we can assume that $p_{\max}$ and $b_{\max}$ are sufficiently large. The term p stands for the price that A will pay T if the merger is consummated, and b represents the reverse break-up fee that A will pay T if the merger gets blocked by R and does not close.[4] For now, we assume that the entire consideration is cash.[5]

After T accepts A's offer, at $t = 2$, T and A seek antitrust approval from the government regulator (R). After receiving the request, in addition to observing the terms of the merger agreement, R (costlessly) obtains a binary signal, $s \in \{s_h, s_l\}$, of whether the merger is anti-competitive (ac) or pro-competitive (pc). Let $\Pr\{s = s_h \mid ac\} = h_{ac}$ and $\Pr\{s = s_h \mid pc\} = h_{pc}$ be the probabilities of getting the high signal (s_h) if the merger is anti-competitive or pro-competitive, respectively, where $1 > h_{ac} > h_{pc} > 0$. Hence, R is more likely to observe s_h when the merger is anti-competitive. These probabilities are common knowledge. R then decides whether to challenge the merger in court. If R does not challenge the merger, the merger gets closed based on the terms of the agreement and the game ends.

If R challenges the merger at $t = 2$, the parties proceed to litigation in $t = 3$, and the court decides whether to let the challenge stand. In challenging the merger, R bears the cost of $\phi > 0$. The probability that the court blocks the merger depends on the merger type and the amount of resources that A and R spend on litigation. (We are assuming away any expenditure by T.) The probability is given by $\pi_{ac}(\psi)$ if the merger is anti-competitive and $\pi_{pc}(\psi)$ if the merger is pro-competitive. To simplify the analysis, for now, we assume that $\pi_{pc}(\psi) = 0$ for all $\psi \geq \psi_{pc} > 0$. That is, the pc-type never loses in court when it spends (at least) ψ_{pc}. For the ac-type, the probability depends continuously on the amount of resources the ac-type spends on litigation. More specifically, we assume: $1 > \pi_{ac}(\psi) > 0$, $\pi'_{ac}(\psi) < 0$, $\pi''_{ac}(\psi) > 0$. We later relax the assumption on the litigation spending by the pc-type.

In terms of the respective payoffs, A's (gross) payoff from the merger be given by u_i, where $i \in \{ac, pc\}$. For the pc-type, if R does not challenge the merger, A realizes $u_{pc} - p$. If R challenges the merger, the pc-type realizes $u_{pc} - p - \psi_{pc}$. We assume that $u_{pc} - p > \psi_{pc}$ so that it is always in pc-type's interest to fight the merger challenge and close the merger. With this assumption, T realizes p regardless of the merger challenge. For the ac-type merger, if R does not challenge the merger, A's payoff is $u_{ac} - p$ while T realizes p. On the other hand, if R challenges the merger, ac-type's expected payoff becomes:

$$(1 - \pi_{ac}(\psi))(u_{ac} - p) - \pi_{ac}(\psi)b - \psi$$

This implies that the ac-type's optimal level of litigation spending is a function of the contract: $\psi^*_{ac}(b, p)$. We assume that $\psi^*_{ac}(0, v) \geq \psi_{pc}$. Also, unless stated otherwise, we

[4] In addition to (or in lieu of) a reverse termination fee, a merger agreement will often include a regulatory approval covenant, under which the acquirer (and the target) are obligated to abide by some effort standard, such as "best efforts" or "commercially reasonable efforts," in securing the antitrust approval. We can assume that the acquirer's litigation expenditure is unobservable (and non-contractable) and shy away from modeling such standard-based obligation.

[5] We will later consider the effect of using A's stock as consideration.

assume that u_{ac} is sufficiently high so that the ac-type would want to fight the merger challenge. The expected payoff for T is

$$(1-\pi_{ac}(\psi))p-\pi_{ac}(\psi)(v+b)$$

where v ($< u_i$) stands for the T's stand-alone value. We assume that so long as T's expected value from accepting the offer is greater than or equal to v, T accepts the offer.

Finally, for the regulator's payoffs, if R decides not to challenge the merger, R's expected payoff is $(1-q_R)B-q_RL$. The term $q_R \in [0,1]$ stands for the regulator's posterior probability that the merger is anti-competitive.[6] (Similarly, we let the term q_T to stand for T's posterior probability, based on the offer, that the buyer is an ac-type.) The term B stands for the benefit that R receives by allowing pro-competitive merger to take place while L stands for the loss that the regulator suffers from allowing anti-competitive merger take place. (We can assume that $B \geq u_{pc}-v$ and $L \geq u_{ac}-v$, so that there could some additional social gain or loss compared to the private gain or loss.) On the other hand, if R decides to challenge the merger, R's expected payoff is given by:

$$(1-q_R)(B-z\psi_{pc})-q_R[(1-\pi_{ac}(\psi_{ac}))L+z\psi_{ac}]-\phi$$

Note that the regulator's payoff function allows for the possibility that the regulator also cares about A's litigation expenditure (ψ_i). How much R cares about A's litigation expenditure is controlled by $z \in [0,1]$.

3.1 Full Information Benchmark

Before we proceed to the main analysis, we first lay out some benchmark results. Suppose merger type is observed by all relevant parties: A, T, and R. If the merger is pro-competitive, the optimal strategy for the regulator is not to block the merger, so as to realize the benefit of B. In turn, both A and T know that the merger will be consummated for certain. To satisfy the T's reservation value, A will have to offer $p=v$. The acquirer and the target would be indifferent with respect to the reverse breakup fee (b) since they know that the target will never collect the fee. On the other hand, suppose the parties know that the merger is anti-competitive. If R were to not challenge the merger, R will realize $-L$. If R were to challenge the merger, R's expected payoff is $-[(1-\pi_{ac}(\psi_{ac}))L+z\psi_{ac}]-\phi$. Thus, R will challenge the merger if and only if it has a large enough probability of winning if it challenges. That is, it will challenge if and only if:

$$\pi_{ac}(\psi_{ac}) \geq \frac{z\psi_{ac}+\phi}{L} \tag{1}$$

Notice that, with the assumption on π_{ac}, the left-hand side is decreasing in ψ_{ac}, while the right hand side is increasing in ψ_{ac}. Thus, we start with the following definition.

[6] If R bases this only on its signal, then $q_R(s_h)=\frac{qh_{ac}}{qh_{ac}+(1-q)h_{pc}}$ and $q_R(s_l)=\frac{q(1-h_{ac})}{q(1-h_{ac})+(1-q)(1-h_{pc})}$.

Definition 1 *Let ψ_{ac}^{**} be such that R will challenge an ac-type if and only if R believes that $\psi_{ac} \leq \psi_{ac}^{**}$.*

Given the parameters, when R knows that the ac-type will spend very large amount resources to litigate against R, i.e., $\psi_{ac} > \psi_{ac}^{**}$, the regulator will not challenge the merger. On the other hand, when R does challenge the merger, conditional on (p, b), A will choose ψ_{ac} to maximize $(1 - \pi_{ac}(\psi_{ac}))(u_{ac} - p) - \pi_{ac}(\psi_{ac})b - \psi_{ac}$. The first order condition is given by:

$$-\pi'_{ac}(\psi_{ac})(u_{ac} + b - p) = 1$$

The first order condition implicitly defines the optimal litigation expenditure: $\psi_{ac}^{*}(b, p)$. Because $\pi_{ac}^{''}(\psi) > 0$, conditional on any p, we know that $\frac{d\psi_{ac}}{db}\Big|_p > 0$. While the first order condition depends on both b and p, suppose we fix $p = v$. If $\lim_{b \to b_{\max}} \psi_{ac}(b, p = v) > \psi_{ac}^{**}$, then there exists a $b^{**} < b_{\max}$ such that R will challenge the merger if and only if $b \leq b^{**}$. The following Lemma describes the full information equilibrium.

Lemma 1 *Suppose, after Nature chooses A's type, its choice is observed by A, T, and R.*

1. *For the pc-type, in equilibrium, the pc-type offers a contract with $p = v$ and $b \in [0, b_{\max}]$, the target accepts, and the regulator does not challenge the merger.*
2. *For the ac-type, there are two possible equilibria.*
   (a) *If $\lim_{b \to b_{\max}} \psi_{ac}(b, p = v) > \psi_{ac}^{**}$, the ac-type offers $p = v$ and $b \in (b^{**}, b_{\max}]$, the target accepts, and the regulator does not challenge the merger.*
   (b) *If $\lim_{b \to b_{\max}} \psi_{ac}(b, p = v) \leq \psi_{ac}^{**}$, on the other hand, the ac-type offers $(p, b) = (v, 0)$, the target accepts, and the regulator challenges the merger.*

The Lemma demonstrates that, when all the parties are aware of the buyer-type, while the pc-type will not care about the reverse breakup fee, the ac-type will set $b = 0$ unless by choosing a large enough reverse breakup fee, it can commit to a level of litigation spending that will deter the regulator from challenging the merger, i.e., commit to spending more than ψ_{ac}^{**}. For the pc-type, the merging parties know that the merger will not be challenged by the regulator and the target will never collect the reverse breakup fee. The merging parties, therefore, do not care about the size of the reverse breakup fee. The ac-type acquirer makes an offer with $p = v$, the target accepts, and the merger always closes.

For the ac-type, because the target, in equilibrium, receives v in expectation, the acquirer becomes the de facto residual claimant and will simply want to maximize $(1 - \pi_{ac}(\psi_{ac}))(u_{ac} - v) - \psi_{ac}$ unless it can choose a $b > b^{**}$ to deter a challenge even when the regulator knows it is anti-competitive. If a merger challenge is inevitable, setting $b > 0$ will distort the acquirer's incentive by reducing p and leading to litigation spending that does not maximize the joint payoff of the acquirer and the target. To achieve optimal litigation incentive, the ac-type will set $b = 0$ and $p = v$.

4 Reverse Breakup Fee as Signaling and Commitment Device

Now, let's restore the assumption that after Nature decides on A's type at $t = 0$, only A gets to observe Nature's choice. Working back from $t = 3$, recall that, if R is challenging the merger, the pc-type spends $\psi_{pc} > 0$ and wins the challenge for sure. The ac-type, by comparison, chooses ψ_{ac} to maximize:

$$(1 - \pi_{ac}(\psi_{ac}))(u_{ac} - p) - \pi_{ac}(\psi_{ac})b - \psi_{ac} \tag{2}$$

The first order condition is:

$$-\pi'_{ac}(\psi_{ac})(u_{ac} + b - p) = 1 \tag{3}$$

As seen earlier, the first order condition implicitly defines the optimal litigation expenditure: $\psi^*_{ac}(b, p)$, where $\frac{\partial \psi^*_{ac}}{\partial b} > 0$ and $\frac{\partial \psi^*_{ac}}{\partial p} < 0$. On occasion, we will assume that $\pi_{ac}(\psi_{ac}) = 1 - \alpha\psi_{ac} + (\beta/2)(\psi_{ac})^2$. With this functional assumption, the optimum is given by: $\psi^*_{ac} = \frac{\alpha(u_{ac}-p+b)-1}{\beta(u_{ac}-p+b)}$ and $\pi_{ac}(\psi^*_{ac}) = \frac{1-(u_{ac}-p+b)^2(\alpha^2-2\beta))}{2\beta(u_{ac}-p+b)^2}$.

At $t = 2$, R's expected payoff from attempting to block the merger is:

$$(1 - q_R)(B - z\psi_{pc}) - q_R[(1 - \pi_{ac}(\psi^*_{ac}))L + z\psi^*_{ac}] - \phi \tag{4}$$

R's expected payoff from not blocking the merger is:

$$(1 - q_R)B - q_R L \tag{5}$$

Therefore, R will attempt to block the merger if and only if:

$$q_R(\pi_{ac}(\psi^*_{ac}(b, p))L - z\psi^*_{ac}(b, p)) - (1 - q_R)z\psi_{pc} - \phi \geq 0 \tag{6}$$

For convenience, if the regulator is indifferent, we assume that the regulator will challenge the merger.

We can rewrite the regulator's decision in terms of a critical posterior for challenging a merger:

$$q^*_R = \frac{z\psi_{pc} + \phi}{\pi_{ac}(\psi^*_{ac}(b, p))L - z(\psi^*_{ac}(b, p) - \psi_{pc})} \tag{7}$$

That is, for the regulator to challenge the merger, we need $q^*_R \geq 0$. If we make the functional assumption of $\pi_{ac}(\psi_{ac}) = 1 - \alpha\psi_{ac} + (\beta/2)(\psi_{ac})^2$, for instance, we get: $q^*_R =$

$\frac{2\beta(u_{ac}-p+b)^2(z\psi_{pc}+\phi)}{L[1-(u_{ac}-p+b)^2(\alpha^2-2\beta)]+2z(u_{ac}-p+b)(1-(u_{ac}-p+b)(\alpha-\beta\psi_{pc}))}$. The right hand side is strictly increasing in b and equals 1 at a finite b. As b rises, the ac-type devotes more resources in fighting the merger challenge, which, in turn, reduces R's expected return. With a higher b, therefore, R must be more certain that it is facing the ac-type to challenge the merger. R is indifferent to challenge a merger under a pooling equilibrium with a high signal.

Definition 2 *Suppose* $q_R = \frac{qh_{ac}}{qh_{ac}+(1-q)h_{pc}}$ *and let* $\bar{\psi}^*_{ac}$ *be implicitly defined by* $q_R(\pi_{ac}(\bar{\psi}^*_{ac})L - z\bar{\psi}^*_{ac}) - (1-q_R)z\psi_{pc} - \phi = 0$. *When both types offer the same contract* (p,b) *such that* $\psi^*_{ac}(b,p) = \bar{\psi}^*_{ac}$, *the regulator does not challenge the merger even after receiving the* s_h *signal.*

The basic idea behind $\bar{\psi}^*_{ac}$ is similar to that of ψ^{**}_{ac} defined earlier in the full information setting. When the regulator knew, for certain, that it is facing the ac-type, but the ac-type could commit to spending more than ψ^{**}_{ac} in litigation, the regulator did not challenge the merger. Under the asymmetric information setting, when both types offer (p,b) such that the ac-type commits to spending $\psi^*_{ac}(b,p) > \bar{\psi}^*_{ac}$, even after receiving the s_h signal, the regulator does not challenge the merger. Based on this, we have the following result.

Proposition 1 *Suppose that* $\psi^*_{ac}(b_{\max}, v) > \bar{\psi}^*_{ac}$. *Let* b^* *be implicitly defined by* $\psi^*_{ac}(b^*, v) = \bar{\psi}^*_{ac}$. *There always exists a pooling equilibrium where both types of acquirer choose* $b > b^*$, *R does not challenge the merger, and both types of merger close at* $p = v$.

The Proposition shows that if the returns to litigation effort do not diminish sufficiently fast relative to the maximum the reverse break-up fee, the parties can always set the reverse break-up fee sufficiently high ($b \geq b^*$) so that the regulator would never find it attractive to challenge the merger. Similar to the case with full, symmetric information, the reason stems from the commitment effect of the fee. As the fee gets larger, the ac-type is committing to spend more resources in fighting the merger challenge; and when the size of the break-up fee is sufficiently high, the regulator would not want to challenge the merger. The pc-type does not want to face the merger challenge, either, since it will be forced to spend $\psi_{pc} > 0$. In equilibrium, both types will set $b > b^*$ and the merger will never be challenged. Hence, when $\psi^*_{ac}(b_{\max}, v) > \bar{\psi}^*_{ac}$, both types will be able to avoid merger challenge by setting $b > b^*$.

Now we will consider the case in which the maximum size of reverse break-up fee is such that $\psi^*_{ac}(b_{\max}, v) \leq \bar{\psi}^*_{ac}$. There are at least a few reasons for the size limitation. Foremost, the contract law penalty doctrine does not allow liquidated damages that are deemed "unreasonable."[7] Another is that, if the directors of A were to commit to paying

[7] There is some uncertainty as to whether a breakup fee should be considered as liquidated damages. Especially if the merger agreement obligates the buyer to put in "best efforts" in securing antitrust approval while allowing the target to collect the fee in case the approval has not been obtained and the deal falls apart, unless the target can successfully argue that the buyer breached its efforts covenant, it becomes more difficult to argue that a breach has occured and the termination fee constitutes liquidated damages.

a very large reverse break-up fee, they may be in breach of their fiduciary obligation to their shareholders under contract law. The third is that, especially if A and T operate in similar industries, A's payment of large reverse break-up fee may confer T a competitive advantage that A may not want to face.[8] Lastly, it may be that returns to litigation effort are such that even for a breakup fee that equals the maximum amount the company could pay in bankruptcy, the induced level of litigation effort would not make the regulator's probability of prevailing small enough to deter a challenge. In this case, although there is not a complete pooling equilibrium, the following Lemma shows that we cannot have a fully separating equilibrium, either.

Lemma 2 *Suppose $\psi^*_{ac}(b_{\max}, p) \leq \bar{\psi}^*_{ac}$. There does not exist a fully separating equilibrium.*

The basic insight for the Lemma is fairly clear. If there were a fully separating equilibrium where the *pc*-type offers a different contract from the *ac*-type, the regulator would not challenge the *pc*-type merger and this creates a profitable deviation opportunity for the *ac*-type. Hence, the equilibrium has to be either complete pooling (as in Proposition 2) or partial pooling. The type of equilibrium depends on a few conditions, in particular, whether the regulator would want to challenge the merger when both parties pool and set $b = 0$. Given that the regulator also receives a signal (s), there are two possibilities: (1) R challenges the merger only if R receives the high signal (s_h); and (2) R challenges the merger regardless of the signal it receives (s_h or s_l). We consider both cases in turn.

4.1 Case 1: With $b_{ac} = b_{pc} = 0$, R Challenges Merger Only When $s = s_h$

Let's first assume that when both types set $b = 0$, the regulator will challenge the merger only if the regulator receives the high signal (s_h). Recall that the amount of litigation spending (ψ_{ac}) by the *ac*-type increases as the reverse breakup fee (b) increases. Hence, even with $b = 0$, the regulator's benefit from the blocking the merger is sufficiently small so that it has to receive a positive signal to challenge the merger. Mathematically, we need:

$$\frac{qh_{ac}}{qh_{ac} + (1-q)h_{pc}} \geq q^*_R|_{b=0} > \frac{q(1-h_{ac})}{q(1-h_{ac}) + (1-q)(1-h_{pc})}$$

When we make the functional assumption of $\pi_{ac}(\psi_{ac}) = 1 - \alpha\psi_{ac} + (\beta/2)(\psi_{ac})^2$, we get: $q^*_R|_{b=0} = \frac{2\beta(u_{ac}-p)^2(z\psi_{pc}+\phi)}{L[1-(u_{ac}-p)^2(\alpha^2-2\beta)]+2z(u_{ac}-p)(1-(u_{ac}-p)(\alpha-\beta\psi_{pc}))}$.

[8]For instance, when AT&T's attempt to merge with T-Mobile was blocked by the US Department of Justice, AT&T had to pay about $4 billion in reverse break-up fees, which consisted of $3 billion cash and some wireless spectrum. This put T-Mobile at a significant competitive edge against other wireless carriers, including AT&T. See Troianovski (2011).

4.1.1 Equilibrium analysis

From Lemma 2, we know that, conditional on $\psi^*_{ac}(b_{\max}, p) \leq \bar{\psi}^*_{ac}$, a fully separating equilibrium is not possible. Also from the full information setting, we know that when the ac-type is known to the regulator, the ac-type would maximize its profit by setting $b = 0$. Hence, we consider two possible equilibria: (1) a complete pooling equilibrium where both types offer $b = \widetilde{b} \geq 0$ and (2) a partial pooling equilibrium, where the pc-type offers $b = \widetilde{b} > 0$ and the ac-type mixes between $b = 0$ and $b = \widetilde{b}$.

Intuitively, whether or not the partial pooling equilibrium will result depends on how fast the ac-type's expected profit decreases as b rises. Recall that, as b gets larger, the ac-type is committing to spend more resources in litigation and, assuming that regulatory challenge isn't completely deterred, the ac-type's profit will decrease. If the profit decreases sufficiently fast, then there will be a $\widehat{b}$ for which the ac-type does not want to mimic the pc-type. In this case, a partial pooling equilibrium is possible. On the other hand, if the ac-type's profit does not decrease rapidly with respect to b, then we end up with a pooling equilibrium for all b for which R will challenge the merger. The following proposition formalizes this.

Proposition 2 *Suppose that if both types were to set $b = 0$, the regulator challenges the merger only when $s = s_h$, and $\psi^*_{ac}(b_{\max}, p) \leq \bar{\psi}^*_{ac}$. There exists a $\widehat{b} \in (0, \infty)$, such that if the pc-type were to offer a contract with $b = \widehat{b}$, the ac-type is indifferent between offering $b = \widehat{b}$ or $b = 0$. The equilibrium is as follows:*

1. *If $\widehat{b} \geq b_{\max}$, both types offer $\widetilde{b} \in [0, b_{\max}]$.*
2. *If $\widehat{b} < b_{\max}$, either both types offer $\widetilde{b} \in [0, \widehat{b}]$ or the pc-type offers $\widetilde{b} \in (\widehat{b}, b_{\max}]$ and the ac-type mixes between 0 and $\widetilde{b}$.*

Recall that, under the full information setting, the pc-type was indifferent as to the break-up fee, whereas the ac-type preferred to set $b = 0$. Now, imagine that both types were to offer the same break-up fee of $b = 0$. Under the assumption, we know that the regulator will challenge the merger whenever it receives $s = s_h$. As b rises, while the pc-type's profit is fixed, the ac-type's profit decreases. The ac-type has two choices: either pool with the pc-type and continue to offer $b > 0$ or fully reveal itself by offering $b = 0$. So long as b is sufficiently small, however, it is in the ac-type's interest to pool with the pc-type. However, when the break-up fee reaches a certain threshold, i.e., $b > \widehat{b}$, it becomes more profitable for the ac-type to fully reveal itself by offering $b = 0$.

The proposition shows that if the maximal size of the breakup fee is small, that is $\widehat{b} \geq b_{\max}$, we only get a pooling equilibrium and breakup fees cannot produce any information. Given that $\widehat{b} \geq b_{\max}$, for any $b \leq b_{\max}$, the disproportionate cost of the breakup fee to the

ac-type is not big enough to justify revealing itself to be anti-competitive to the regulator (by choosing $b = 0$). Thus, we end up with a pooling equilibrium in which both types offer $\widetilde{b} \in [0, b_{\max}]$ and the regulator challenges both types of merger whenever it receives $s = s_h$. As shown in the prior section, of course, if the regulator's payoff from challenging decreases too quickly in the breakup fee, i.e., $\psi^*_{ac}(b_{\max}, v) > \bar{\psi}^*_{ac}$, then we also get pooling at a large breakup fee that deters all challenges.

If $\widehat{b} < b_{\max}$, however, then some signaling is possible, although we can never have a fully revealing equilibrium. In the partial pooling equilibrium, the pc-type offers an intermediate breakup fee, $\widetilde{b} \in (\widehat{b}, b_{\max}]$ while the ac-type mixes between $b = 0$ and $b = \widetilde{b}$. In this partial pooling equilibrium, the regulator will challenge the merger for certain (regardless of the signal) if it observes $b = 0$ because it knows for sure the merger is anti-competitive. If it observes the $b = \widetilde{b}$ contract, on the other hand, the regulator will never challenge after observing $s = s_l$ and will challenge with a positive probability if $s = s_h$. The next result explores the partial pooling equilibrium in more detail.

Corollary 1 *Suppose $\widehat{b} < b_{\max}$ so that a partial pooling equilibrium is possible. Suppose the pc-type offers $b = \widetilde{b} \in [0, b_{\max}]$. The probability that the ac-type also offers $b = \widetilde{b}$ drops discontinuously from one when $\widetilde{b} = \widehat{b}$ and then increases as $\widetilde{b}$ increases above $\hat{b}$. Conditional on $s = s_h$, the probability that R challenges the merger is one at $\hat{b}$ and is decreasing in $\widetilde{b}$. Under the Intuitive Criterion, the unique equilibrium if $\widehat{b} < b_{\max}$ is a breakup fee of $b = b_{\max}$.*

The corollary shows, foremost, and not surprisingly, that as the reverse breakup fee gets bigger, the regulator challenges less frequently. It also shows, somewhat more surprisingly, that the anti-competitive acquirer's behavior is discontinuous in the size of the reverse breakup fee. As seen earlier, for low breakup fees ($b < \widehat{b}$), the ac-type always pools. Then, when the breakup fee reaches $\widehat{b}$, its probability of pooling drops discontinuously, but then it rises gradually as the breakup fee increases further. Because the pro-competitive acquirer wins any challenge and never pays the breakup fee, its best contract is the one that minimizes the probability of a regulatory challenge. Thus, the pro-competitive acquirer will prefer the largest breakup fee possible. This suggests that the most plausible equilibrium is at a breakup fee of $b = b_{\max}$.

4.1.2 Regulator Welfare Analysis

Before we move to the next section, let's examine whether there is any rationale for regulating the use of breakup fees. To do this, we will analyze the case in which the regulator's preferences reflect social welfare. If the regulator has $z = 1$, this clearly reflects a total surplus criterion. For $z < 1$, one might argue that the regulator does not sufficiently value the acquirer's litigation costs. Nonetheless, when analyzing the partial pooling equilibrium, we can harness the regulator's indifference condition if we use the regulator's preferences for social welfare which facilitates the analysis a great deal.

Notice that the worst equilibrium for regulator welfare is when $b > b^*$ because, in that case, the regulator never challenges the merger. Since this option is available to the regulator in any other equilibrium (generating the same regulator payoff of $(1-q)B-qL$) and yet it chooses to challenge with a positive probability, we know that any other equilibrium must generate a greater welfare. Among the pooling equilibria, the best for the regulator is when both types set $b = 0$, since this minimizes litigation costs and maximizes the regulator's probability of blocking an anti-competitive merger. In a partial pooling equilibrium, the regulator's welfare is zero by construction when the ac-type pools (the regulator is indifferent to challenging the proposed merger or not) and positive when the ac-type separates. Thus, welfare is largest when the probability that the ac-type separates is the largest. This occurs at $b = \hat{b}$. Thus, we have established the following result.

Lemma 3 *Regulator's payoff is maximized either at the complete pooling equilibrium with no breakup fee ($b = 0$) or at the smallest possible breakup fee that indues a partial pooling equilibrium ($b = \hat{b}$).*

Finally, let's examine which type of equilibrium (a complete pooling equilibrium with $b = 0$ versus a partial pooling equilibrium with $b = \hat{b}$) will maximize the regulator's payoffs. Unfortunately, given the general functional assumptions we have made so far, the analysis is somewhat involved. Foremost, in a complete pooling equilibrium with $b = 0$, the regulator's welfare gain from challenging the merger (when it observes $s = s_h$) is:

$$qh_{ac}(\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v) - \phi) - (1-q)h_{pc}(z\psi_{pc} + \phi) \tag{8}$$

Second, in a partial pooling equilibrium at $b = \hat{b}$, the regulator's gain from challenging the merger occurs only from challenging the merger when the ac-type chooses the zero breakup fee contract. This is given by:

$$q(1-\lambda)(\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v) - \phi) \tag{9}$$

Thus, the net gain in welfare from the full pooling equilibrium relative to the partial pooling equilibrium is given by:

$$q(h_{ac} - (1-\lambda))(\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v) - \phi) - (1-q)h_{pc}(z\psi_{pc} + \phi) \tag{10}$$

The first term is reflects the difference in the benefit from how frequently the regulator challenges an anti-competitive merger with a zero breakup fee under each equilibrium, either whenever it receives a high signal under the pooling equilibrium or whenever the ac-type separates under the partial pooling equilibrium. The second term is the added litigation costs from challenging pro-competitive mergers when they generate a high signal under the pooling equilibrium. The next result describes some properties of this welfare comparison between the two types of equilibrium. To reduce notation, we will focus on the case in which the *pc*-type's litigation costs are roughly the same as the optimal level of litigation spending for the *ac*-type without a breakup fee.

Proposition 3 *Suppose $\psi_{pc} \approx \psi^*_{ac}(0, v)$. The net gain in welfare from the full pooling equilibrium relative to the partial pooling equilibrium is decreasing in L.*

1. *For L close to the smallest level that justifies challenging a merger with a high signal in a complete pooling equilibrium at $\hat{b}$ or as $h_{ac} \to 1$ (the signal never misidentifies anti-competitive mergers), the complete pooling equilibrium maximizes regulator welfare.*
2. *For L close to the maximal level that justifies not challenging with a low signal in a complete pooling equilibrium at $b = 0$, the partial pooling equilibrium may or may not maximize regulator welfare. The partial pooling always maximizes regulator welfare as $h_{pc} \to 0$ (the signal never misidentifies pro-competitive mergers).*

This proposition shows that either the complete pooling equilibrium or the partial pooling equilibrium could maximize regulator welfare. The complete pooling equilibrium is relatively better for the regulator if the loss from anti-competitive mergers (L) is fairly small (though, still large enough to warrant challenging with a high signal and complete pooling). When this loss is close to the level in which the regulator would want to challenge with a low signal and no breakup fee, the partial pooling equilibrium is better for regulator welfare under many parameter values, but there are parameter values in which even for this maximal L (under our assumptions) the complete pooling equilibrium is better for the regulator. Intuitively, the information provided by the partial pooling equilibrium is more valuable the larger the loss from anti-competitive mergers. Similarly, this information is very valuable if the regulator rarely misidentifies pro-competitive mergers because then the regulator has little to loose from challenging mergers with a high signal even under partial pooling. On the other hand, if the regulator rarely misses anti-competitive mergers, then there is little benefit to the information provided when the anti-competitive type separates under the partial pooling equilibrium.

4.2 Case 2: With $b_{ac} = b_{pc} = 0$, R Always Challenges the Merger (To be Completed)

Suppose when both types set $b = 0$, the regulator always challenges the merger, i.e., even when $s = s_l$. Suppose both parties pool at $b \geq 0$. The target will accept the offer if and only if $q((1 - \pi_{ac}(\psi_{ac}))p + \pi_{ac}(\psi_{ac})(v + b)) + (1 - q)p = v$, which becomes $q\pi_{ac}(\psi_{ac})(b + v) + (1 - q\pi_{ac}(\psi_{ac}))p = v$. This implies that $p = v - \frac{q\pi_{ac}(\psi_{ac})}{1-q\pi_{ac}(\psi_{ac})}b$. As b rises, the *pc*-type's expected profits rise (since p is getting smaller) while the ac-type's expected profits fall. When b is sufficiently large, the regulator's incentive changes: with $b \geq b'$, the regulator will challenge the merger only if it receives $s = s_h$. If the pc-type were to offer $\widetilde{b} \in [0, b']$, we should get a partial pooling equilibrium. The ac-type's expected profit at $b = b'$ may be larger or smaller than that at $b = 0$. As b rises beyond b', the ac-type's expected profits fall while the pc-type's expected profits rise. We eventually get to $b = b^*$, where the regulator does not challenge the merger regardless of the signal, at which point, both types' expected profits move to $u_i - v$.]

5 Conclusion

Reverse termination fees are becoming fairly common in large corporate acquisitions. While antitrust practitioners have wondered about their effect on antitrust merger review, there has been no economic analysis of this effect to date. In this paper, we develop a game-theoretic model of the use of reverse termination fees by an acquirer with private information about the competitive effects of the proposed merger. The acquirer uses the size of the reverse termination fee to signal its type, both to the target and to the antitrust regulator, and also to commit to litigate any merger challenge very aggressively. We show, however, that there is no completely separating equilibrium. Instead, there are complete pooling equilibria for either very large breakup fees (if there exist large enough breakup fees that would deter any antitrust challenge due to the implied very aggressive litigation posture of the acquirer) or very low breakup fees (for which it isn't costly enough for the anti-competitive target to identify itself). For intermediate breakup fees, there is a partial pooling equilibrium in which sometimes the anti-competitive type separates and offers a zero (or purely compensatory) breakup fees.

Under the intuitive criterion, the equilibrium that survives is the one with the largest possible breakup fee. We show that this breakup fee exceeds that which maximizes regulator welfare. While the regulator could benefit from the separation that occurs in the partial pooling equilibrium, the best partial pooling equilibrium from the regulator's perspective is that which occurs at the lowest possible breakup fee that generates some separation (as this is the equilibrium with maximal separation). Thus, whether the regulator prefers pooling at the lowest breakup fee or partial separation at the lowest breakup fee consistent with such separation, the equilibrium breakup fee will be too high. This suggests that there might be reason for antitrust authorities to regulate breakup fees or for courts to apply the penalty doctrine to limit breakup fees that are clearly way above the compensatory level.

Our model has several important simplifying assumptions. Most importantly, we do not allow renegotiation of the breakup fee after the regulator decides to challenge the merger (at that point, any breakup fee is bilaterally inefficient for the acquirer and the target). We have three main justifications for this assumption. First, we rarely, if ever, see such renegotiation in practice. Because we are trying to model an important, real world, phenomenon, this suggests that precluding renegotiation makes sense. Second, asymmetric information may impede efficient renegotiation. The pro-competitive acquirer is willing to pay much less (in the model, where it wins with probability one, nothing at all) to remove the breakup fee than the anti-competitive one. This asymmetric information will impede renegotiation with some probability. Third, in reality the regulator's decision is never really final until it has spent most of it's litigation costs (at which point the acquirer probably has as well). Thus, there will be reluctance to renegotiate a high breakup fee because it will reduce the probability that the regulator will drop the suit.

Our assumption of a binary signal for the regulator is necessary for tractability, but it isn't without loss of generality. With a continuous signal, in the partial pooling equilibrium the regulator would not mix between challenging or not but, instead, would just increase its threshold level of the signal to challenge. The effect on the probability of the anti-competitive type pooling is ambiguous, but the most important effect is that this would make it much harder to have a pooling equilibrium without any challenges if the largest value of the signal was extremely accurate. Our assumption that the pro-competitive type always wins at trial was also made for tractability, but it probably weakens our results about the problematic effect of breakup fees. If the pro-competitive type sometimes lost at trial, this would make challenging less attractive to the regulator and thus make it easier to have a no challenge pooling equilibrium. Lastly, our assumption of fixed litigation costs for the regulator and pro-competitive acquirer likely don't affect the results too much. Litigation spending are typically strategic complements for one party and strategic substitutes for the other. If they are strategic substitutes for the regulator, our results would probably be magnified. If they were strategic complements, they would be diminished, but still remain. If the pro-competitive type could adjust its litigation spending, this would magnify the commitment benefit of large breakup fees to the acquirer.

Appendix: Proofs

Proof of Lemma 1. When the merger is pro-competitive is obvious, R will not challenge it for certain (and realize B). Given that the merger will always close, the breakup fee becomes irrelevant and T will need to receive $p \geq v$ to accept the offer. In equilibrium, A will offer $p = v$ and $b \in [0, \infty)$.

Now, consider the case where the merger is anti-competitive. If the $\lim_{b \to b_{\max}} \psi_{ac} > \psi_{ac}^{**}$, then any offer that includes $b > b^{**}$ will not be challenged, so T will always receive p and never b. As a result, T accepts any offer of $p = v$ and $b > b^{**}$ and A can do no better than this.

If the $\lim_{b \to b_{\max}} \psi_{ac} \leq \psi_{ac}^{**}$, then R challenges any feasible merger contract. A chooses ψ_{ac} to maximize $(1 - \pi_{ac}(\psi_{ac}))(u_{ac} - p) - \pi_{ac}(\psi_{ac})b - \psi_{ac}$. The first order condition is given by:

$$-\pi'_{ac}(\psi_{ac})(u_{ac} + b - p) = 1$$

Given that, in order to satisfy T's reservation value, at $t = 1$, A has to offer (p, b) such that $(1 - \pi_{ac}(\hat{\psi}_{ac})p + \pi_{ac}(\hat{\psi}_{ac})(b + v) = v$, where $\hat{\psi}_{ac}$ is the value of ψ_{ac} which T expects A to choose. From this we get

$$p = v - \frac{\pi_{ac}(\hat{\psi}_{ac})b}{(1 - \pi_{ac}(\hat{\psi}_{ac}))}$$

When we use this expression, A's expected profit becomes

$$(1 - \pi_{ac}(\hat{\psi}_{ac}))(u_{ac} - v) - \hat{\psi}_{ac}$$

Because the expected litigation effort is determined by the breakup fee, A can effectively choose $\hat{\psi}_{ac}$ through it's choice of b. When we maximize this with respect to $\hat{\psi}_{ac}$, we get $-\pi'_{ac}(\hat{\psi}_{ac})(u_{ac} - v) = 1$. Thus, the contract of $(v, 0)$ will induce $\psi_{ac} = \hat{\psi}_{ac}$ that satisfies $-\pi'_{ac}(\psi_{ac})(u_{ac} - v) = 1$ and provides T exactly its reservation value, making it the profit-maximizing contract for A in this case. ■

Proof of Proposition 1. Suppose both types of acquirers offer the same (p, b) and the target accepts. Given that the contract is not revealing, when the regulator receives the signal s_h or s_l, the regulator's posterior probability is updated as: $q_R(s_h) = \frac{qh_{ac}}{qh_{ac}+(1-q)h_{pc}}$ and $q_R(s_l) = \frac{q(1-h_{ac})}{q(1-h_{ac})+(1-q)(1-h_{pc})}$, where $q_R(s_h) > q_R(s_l)$.

From above, we know that as b rises, q_R^* also rises, and (3) along with $\psi_{ac}^*(b_{\max}, p) > \bar{\psi}_{ac}^*$ means that there exists a b^*such that $\psi_{ac}^*(b^*, p) = \bar{\psi}_{ac}^*$. Thus, $q_R^*|_{b^*} = q_R(s_h)$. Hence, when both types of acquirer offer $b > b^*$, R will not challenge the merger even after receiving $s = s_h$. Since the merger will not be challenged for certain, the acquirer can get $p = v$ and the target will accept. ■

Proof of Lemma 2. In a fully separating equilibrium, R will not challenge the pc-type and will challenge the ac-type with probability one since $\psi^*_{ac}(b_{\max}, p) \leq \bar{\psi}^*_{ac}$. Because $u_{pc} > v + \psi_{pc}$, we know that the pc-type's offer must be accepted in equilibrium. If this equilibrium exists, denote the two merger contracts as (p_i, b_i), $i \in \{ac, pc\}$. The ac-type is better off with its contract if and only if:

$$(1 - \pi_{ac}(\psi^*_{ac}))(u_{ac} - p_{ac}) - \pi_{ac}(\psi^*_{ac})b_{ac} - \psi^*_{ac} \geq u_{ac} - p_{pc}$$
$$p_{pc} \geq \pi_{ac}(\psi^*_{ac})(u_{ac} + b_{ac}) + (1 - \pi_{ac}(\psi^*_{ac}))p_{ac} + \psi^*_{ac} \quad (11)$$

This means that the pc -type's payoff from it's contract can be written as:

$$u_{pc} - p_{pc} \leq u_{pc} - p_{ac} - \psi_{pc} - \pi_{ac}(\psi^*_{ac})(u_{ac} - p_{ac} + b_{ac}) - (\psi^*_{ac} - \psi_{pc}) < u_{pc} - p_{ac} - \psi_{pc} \quad (12)$$

The first inequality follows from (11). The second one follows because given that R will challenge the ac-contract with probability one, there is no reason for A to give any surplus to T.

Holding T's surplus constant at zero, an increase in b and a decrease in p both increase ψ^*_{ac}. So, since $\psi^*_{ac}(0, v) \geq \psi_{pc}$, we know that $\psi^*_{ac}(b, p) > \psi_{pc}$. Furthermore, since $u_{ac} > v$, we know that $u_{ac} - p_{ac} + b_{ac} > 0$. Thus, if the ac-type is better off with its separating contract, then the pc-type is also better off with the ac contract, establishing a profitable deviation. ■

Proof of Proposition 2. Suppose the pc-type offers a contract with $b > 0$ and the ac-type were to mimic. In case the regulator to challenge the merger, the ac-type chooses ψ_{ac} to maximize:

$$(1 - \pi_{ac}(\psi_{ac}))(u_{ac} - p) - \pi_{ac}(\psi_{ac})b - \psi_{ac}$$

which produces the first order condition of

$$-\pi'_{ac}(\psi_{ac})(u_{ac} + b - p) = 1$$

The target will accept the offer if $q(h_{ac}((1 - \pi_{ac}(\psi_{ac})p + \pi_{ac}(\psi_{ac})(v + b)) + (1 - h_{ac})p) + (1 - q)p = v$, which becomes $qh_{ac}\pi_{ac}(\psi_{ac})(b + v) + (1 - qh_{ac}\pi_{ac}(\psi_{ac}))p = v$. This implies that

$$p = v - \frac{qh_{ac}\pi_{ac}(\psi_{ac})}{(1 - qh_{ac}\pi_{ac}(\psi_{ac}))}b$$

The ac-type's expected profit from pooling with the pc-type, assuming R challenges with probability one (when it observes $s = s_h$), is given by:

$$(1 - h_{ac}\pi_{ac}(\psi_{ac}))(u_{ac} - p) - h_{ac}\pi_{ac}(\psi_{ac})b - h_{ac}\psi_{ac}$$
$$= (1 - h_{ac}\pi_{ac}(\psi_{ac}))(u_{ac} - v) - \frac{(1 - q)h_{ac}\pi_{ac}(\psi_{ac})}{1 - qh_{ac}\pi_{ac}(\psi_{ac})}b - h_{ac}\psi_{ac}$$

If the ac-type were to deviate and offer $b = 0$, since the regulator knows that this is the ac-type, the merger will be challenged for certain (regardless of s). The ac-type's expected profit from setting $b = 0$ is:

$$(1 - \pi_{ac}(\psi_{ac}))(u_{ac} - v) - \psi_{ac}$$

Note that the ac-type's profit from pooling with the pc-type, when $b \approx 0$, is strictly higher than $(1-\pi_{ac}(\psi_{ac}))(u_{ac}-v)-\psi_{ac}$. Furthermore, as b rises, the ac-type's pooling profit continuously decreases ($\pi_{ac}(\psi_{ac}) > 0$ because $\psi^*_{ac}(b_{\max}, p) \leq \bar{\psi}^*_{ac}$). Therefore, if R challenges with probability one (when it observes $s = s_h$), there exists a $\widehat{b} > 0$ such that if $b = \widehat{b}$ the ac-type is indifferent between pooling with the pc-type or separating by offering $b = 0$.

Now, we consider two cases: (1) $\widehat{b} \geq b_{\max}$ and (2) $\widehat{b} < b_{\max}$. First, suppose $\widehat{b} \geq b_{\max}$. In this case, whenever the pc-type were to offer any $\widetilde{b} \in [0, b_{\max}]$, the ac-type strictly prefers offering $\widetilde{b}$ rather than offering $b = 0$. In equilibrium, therefore, both types will pool and offer $\widetilde{b} \in [0, \bar{b}]$. For the off-the-equilibrium beliefs, the regulator believes that any contract with $b \neq \widetilde{b}$ is being offered by the ac-type and challenges the merger for certain. With the pooling equilibrium, the equilibrium price is given by:

$$qh_{ac}\pi_{ac}(\psi_{ac})(\widetilde{b} + v) + (1 - qh_{ac}\pi_{ac}(\psi_{ac}))p = v$$

Second, suppose $\widehat{b} < \bar{b}$. If the pc-type were to offer $\widetilde{b} \leq \widehat{b}$, as in the previous case, the ac-type would strictly prefer to pool with the pc-type and the equilibrium is the same as in the previous case. On the other hand, suppose the pc-type were to offer $\widetilde{b} > \widehat{b}$. Now, the ac-type would rather offer $b = 0$ unless the regulator never challenges the contract with $\widetilde{b}$. However, per Lemma 2, we know that such a full separation is not possible. Therefore, the ac-type will mix between offering $b = \widetilde{b}$ and $b = 0$; and the regulator challenges the contract with $b = \widetilde{b}$ with a positive probability. ■

Proof of Corollary 1. Suppose the ac-type offers $b = \widetilde{b}$ with probability $\lambda \in (0, 1)$ and the regulator challenges the contract with $b = \widetilde{b}$ with probability $\mu \in (0, 1)$. Given that the ac-type is offering $b = \widetilde{b}$ with probability $\lambda \in (0, 1)$, when the regulator observes $b = \widetilde{b}$ and $s = s_h$, the regulator's posterior probability that it is facing the ac-type is:

$$q_R(\lambda) = \frac{q\lambda h_{ac}}{q\lambda h_{ac} + (1 - q)h_{pc}}$$

To make the regulator indifferent between challenging and not challenging, we need:

$$(1 - q_R(\lambda))B - q_R(\lambda)L = q_R(\lambda)(\pi_{ac}(\psi^*_{ac}(\widetilde{b}))L - z\psi^*_{ac}(\widetilde{b})) - (1 - q_R(\lambda))z\psi_{pc} - \phi$$

Holding everything else constant, the right hand side of the equality decreases as $\widetilde{b}$ rises. At $\widetilde{b} < \hat{b}$, we know that the ac-type always offers the $\widetilde{b}$ contract. We also know that at $b^* >> \hat{b}$, R is indifferent to challenging if the ac-type always pools. Therefore, the probability of pooling at $\hat{b}$ must be discretely less than one to induce indifference. Furthermore, as $\widetilde{b}$ increases, to restore equality in (**??**) we need λ to increase: the ac-type becomes more likely to offer $\widetilde{b}$.

Now, to make the ac-type indifferent between offering $b = 0$ and $b = \widetilde{b}$, we need:

$$(1 - \pi_{ac}(\psi_{ac}(0)))(u_{ac} - v) - \psi_{ac}(0) \\ = (1 - h_{ac}\mu\pi_{ac}(\psi_{ac}(\widetilde{b})))(u_{ac} - p) - h_{ac}\mu\pi_{ac}(\psi_{ac}(\widetilde{b}))\widetilde{b} - \mu h_{ac}\psi_{ac}(\widetilde{b})$$

We know that the right hand side of the equality is decreasing in $\widetilde{b}$. Hence, as $\widetilde{b}$ rises, to restore equality, μ must decrease: the regulator has to challenge less often. In sum, as $\widetilde{b}$ rises, λ will increase (i.e., the ac-type is more likely to offer $b = \widetilde{b}$) while μ decreases (i.e., R is less likely to challenge the merger after observing $s = s_h$).

Finally, because the pc-type's payoff is strictly decreasing in the probability of R challenging the merger and is independent of b (because it never loses a challenge), the only partial pooling equilibrium that survives the intuitive criterion for $b^* > b_{\max}$ is $b = b_{\max}$. ■

Proof of Proposition 3. Using (**??**) to solve for λ under the $\hat{b}$ partial pooling equilibrium and substituting this into (10) gives the following expression for the welfare difference:

$$(1-q)h_{pc}(z\psi^*_{ac}(0,v) + \phi)\left(\frac{\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v) - \phi}{h_{ac}(\pi_{ac}(\psi^*_{ac}(\hat{b},p))L - z\psi^*_{ac}(\hat{b},p) - \phi)} - 1\right) \\ - q(1-h_{ac})(\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v) - \phi) \quad (13)$$

Taking the derivative of (13) with respect to L gives:

$$-\frac{(z\psi^*_{ac}(\hat{b},v) + \phi)\pi_{ac}(\psi^*_{ac}(0,v)) - (z\psi^*_{ac}(0,v) + \phi)\pi_{ac}(\psi^*_{ac}(\hat{b},p))}{h_{av}(\pi_{ac}(\psi^*_{ac}(\hat{b},p))L - z\psi^*_{ac}(\hat{b},p) - \phi)^2} \times \\ (1-q)h_{pc}(z\psi^*_{ac}(0,v) + \phi) - q(1-h_{ac})\pi_{ac}\psi^*_{ac}(0,v)) < 0 \quad (14)$$

Evaluating (13) at $h_{ac} = 1$ gives:

$$(1-q)h_{pc}(z\psi^*_{ac}(0,v) + \phi)\left(\frac{\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v) - \phi}{h_{ac}(\pi_{ac}(\psi^*_{ac}(\hat{b},p))L - z\psi^*_{ac}(\hat{b},p) - \phi)} - 1\right) > 0 \quad (15)$$

Because R challenges if there is complete pooling at $\hat{b}$ and $s = s_h$, we know that:

$$(z\psi^*_{ac}(0,v) + \phi)(h_{ac}q + h_{pc}(1-q)) + (\psi^*_{ac}(\hat{b},p)) \\ - \psi^*_{ac}(0,v))qzh_{ac} - qh_{ac}\pi_{ac}(\psi^*_{ac}(\hat{b},p))L \leq 0 \quad (16)$$

This implies that:

$$L \geq \frac{(z\psi^*_{ac}(0,v)+\phi)(h_{ac}q+h_{pc}(1-q))+(\psi^*_{ac}(\hat{b},p))-\psi^*_{ac}(0,v))qzh_{ac}}{qh_{ac}\pi_{ac}(\psi^*_{ac}(\hat{b},p))} \tag{17}$$

Evaluating (13) at this L gives:

$$\frac{\left\{\begin{array}{c} (h_{ac}q+h_{pc}(1-q))(z\psi^*_{ac}(0,v)+\phi)[\pi_{ac}(\psi^*_{ac}(0,v))-\pi_{ac}(\psi^*_{ac}(\hat{b},p))] \\ +(\psi^*_{ac}(\hat{b},p))-\psi^*_{ac}(0,v))qzh_{ac}\pi_{ac}(\psi^*_{ac}(0,v)) \end{array}\right\}}{\pi_{ac}(\psi^*_{ac}(\hat{b},p))} > 0 \tag{18}$$

Evaluating (13) at $h_{pc}=0$ gives:

$$-q(1-h_{ac})(\pi_{ac}(\psi^*_{ac}(0,v))L - z\psi^*_{ac}(0,v)-\phi) < 0 \tag{19}$$

Because R does not challenge if there is complete pooling at $b=0$ and $s=s_l$, we know that:

$$(z\psi^*_{ac}(0,v)+\phi)((1-h_{ac})q+(1-h_{pc})(1-q)) - q(1-h_{ac})\pi_{ac}(\psi^*_{ac}(0,v))L \geq 0 \tag{20}$$

This implies that:

$$L \leq \frac{(z\psi^*_{ac}(0,v)+\phi)((1-h_{ac})q+(1-h_{pc})(1-q))}{q(1-h_{ac})\pi_{ac}(\psi^*_{ac}(0,v))} \tag{21}$$

Evaluating (13) at this L gives:

$$\frac{\left\{\begin{array}{c} (1-q)(1-h_{pc})(z\psi^*_{ac}(0,v)+\phi)[h_{pc}\pi_{ac}(\psi^*_{ac}(0,v))-h_{ac}\pi_{ac}(\psi^*_{ac}(\hat{b},p))] \\ +qh_{ac}(1-h_{ac})[(z\psi^*_{ac}(0,v)+\phi)\pi_{ac}(\psi^*_{ac}(0,v))-z\psi^*_{ac}(0,v)+\phi)\pi_{ac}(\psi^*_{ac}(\hat{b},p))] \end{array}\right\}}{\left\{\begin{array}{c} (1-q)(1-h_{pc})(z\psi^*_{ac}(0,v)+\phi)\pi_{ac}(\psi^*_{ac}(\hat{b},p)) \\ -q(1-h_{ac})[z\psi^*_{ac}(\hat{b},p)+\phi)\pi_{ac}(\psi^*_{ac}(0,v))-(z\psi^*_{ac}(0,v)+\phi)\pi_{ac}(\psi^*_{ac}(\hat{b},p)] \end{array}\right\}} \tag{22}$$

The denominator is positive if the signal is very accurate or the fraction of pro-competitive types is high. It is negative if A puts in much more litigation effort under the $\hat{b}$ contract and as a result the probability that R wins with that contract is much lower. The second line of the numerator is positive. The first line could be positive or negative. If the denominator is negative, however, then the numerator must be positive, making the whole expression negative. If the denominator is just barely positive, the numerator will remain positive, making the expression positive. But, as the denominator gets more positive, the numerator becomes negative, making the entire expression negative again. Thus, while partial pooling is better for large L if the denominator is negative or large and positive, complete pooling will be better for any L if the denominator is positive and small. ■

References

[1] ABA Mergers and Acquisitions Committee. 2011. *The Model Merger Agreement*. American Bar Association Press.

[2] Afsharipour, Afra. 2010. "Transforming the Allocation of Deal Risk Through Reverse Termination Fees." *Vanderbilt Law Review* 63:1161–1240.

[3] Bates, Thomas W., and Michael L. Lemmon. 2003. "Breaking Up is Hard to Do? An Analysis of Termination Fee Provisions and Merger Outcomes." *Journal of Financial Economics* 69:469–504.

[4] Boone, Audra L., and J. Harold Mulherin. 2007. "Do Termination Provisions Truncate the Takeover Bidding Process?" *Review of Financial Studies* 20:461–489.

[5] Che, Yeon-Koo, and Tracy Lewis. 2007. "The Role of Lockups in Takeover Contests." *RAND Journal of Economics* 38:648–669.

[6] Choi, Albert H., and George Triantis. 2010. "Strategic Vagueness in Contract Design: The Case of Corporate Acquisitions." *Yale Law Journal* 119:848–924.

[7] Coates, John C., Darius Palia, and Ge Wu. 2018. "Reverse Termination Fees in M&A." Working Paper.

[8] Collins, Dale. 2019. "Antitrust Reverse Termination Fees—2019 Q1 Update." available at: https://www.antitrustunpacked.com.

[9] Davidoff, Steven M. 2009. "The Failure of Private Equity." *Southern California Law Review* 82:481–545.

[10] Mahmudi, Hamed, Aazam Virani, and Xiaofei Zhao. 2015. "When a Buyer Gets Cold Feet: What Is the Value of Bidder Termination Provision in a Takeover?" Working Paper.

[11] Officer, Micah S. 2003. "Termination Fees in Mergers and Acquisitions." *Journal of Financial Economics* 69:431–467.

[12] Quinn, Brian JM. 2010. "Optionality in Merger Agreements." *Delaware Journal of Corporate Law* 35:789–828.

[13] Ramachandran, Shalini, and Ben Fritz. 2018. "Fox Rejected Higher Comcast Bid Due to Antitrust Concerns," *Wall Street Journal*, April 18, 2018.

[14] Troianovski, Anton. 2011. "AT&T Hangs Up on T-Mobile," *Wall Street Journal*, December 20, 2011.