# Asset complementarity and optimality of one-to-one negotiations when selling firms

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**Abstract**

This paper explores the question of the optimality of negotiations with one invited bidder from the seller's point of view. We develop a simple model where synergies created in deals depend on the complementarity of assets between targets and bidders and differ across different bidders. The model shows that the target manager may optimally choose to sell the firm in a one-to-one private negotiation. The key feature of the model is that the target manager is able to divide potential bidders into groups according to their asset complementarity with the target firm and rank these groups by the value their members can create if combined with the target. The target manager is not able to distinguish among bidders within each group. Given small bidding cost per bidder paid by the target firm, it is optimal for the target manager to invite into auction only the group of bidders with the highest complementarity of assets. Empirical tests confirm two model predictions linking the ability of the target manager to differentiate among potential bidders according to asset complementarities with the target and (i) the number of bidders invited into the selling auction and (ii) the winning bidder's bargaining power.

**Keywords**: Mergers and acquisitions; selling process; asset complementarity; optimality; auctions
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# 1 Introduction

Mergers and acquisitions are among the largest and most important corporate events. From the seller's point of view, the key issue is the choice of the selling process (mechanism), which yields the maximum price. The dominant view in the literature is that, depending on certain conditions, either a simultaneous or a sequential auction is the optimal mechanism (see for example Bulow and Klemperer, 1996; Povel and Singh, 2006; Roberts and Sweeting, 2013). Intuitively, auctions enhance competition among bidders and yield higher average prices for the target shareholders. Empirical evidence, however, disputes this claim by showing that firms sold in one-to-one negotiations earn at least as high takeover premia as firms sold in auctions (Boone and Mulherin, 2007; Fidrmuc et al., 2012). Furthermore, the usual approach in modeling the selling process in the literature is that the target invites many bidders but some of them opt out and do not enter the bidding because the participation in the selling process is costly. However, empirical data show that a large fraction of target firms invite only one bidder into the selling process and complete the deal with this bidder in an one-to-one negotiation. No other bidders are involved in the selling process. Therefore, the question of why target firms choose to restrict the number of invited bidders to one and still gain higher premium, remains unanswered.

This paper aims to fill this gap in the literature. We consider a simple model with a target firm and at least two potential bidders. The key feature of our model is that the size of the synergy depends on the complementarity of the assets of the target and the bidder and it may differ across bidders. Also, the target manager is able to divide potential bidders into groups according to their asset complementarity with the target firm and rank these groups by the value their members can create if combined with the target firm. However, the target manager cannot identify which bidder from each group

can create the highest value (synergy). The number of bidders in each group depends on the distribution of complementarities. After inviting bidders into an auction, the target manager informs them about the target. Each of the invited bidders privately learns his own synergy with the target as well as the distribution of synergies between the target and the other potential bidders.[1] This information disclosure implies a small cost per bidder which is paid by the target firm.[2]

We show that the target manager optimally restricts the bidding competition when he/she is able to differentiate among potential bidders with respect to asset complementarities with the target. The target manager invites into the bidding process only the group of potential bidders with higher asset complementarities which result in higher synergies. The groups of potential bidders with lower asset complementarities are left out of the selling process because their participation will not affect the equilibrium price and their marginal benefit is zero. Thus, the positive marginal cost of inviting them into the auction due to information disclosure costs results in a reduction of the net benefit for the target manager.

The assumption that bidders with different complementarities can create different levels of synergies is supported in the literature (Hoberg and Phillips, 2010; Bena and Li, 2014). The literature also shows substantial heterogeneity in complementarities across M&A deals (Berkovitch and Khanna, 1990; Larkin and Lyandres, 2017), which supports our assumption that different bidders vary in their asset complementarity with a particular target. A key feature of our modeling approach is the assumption that the target manager has some information about the distribution of complementarities among po-

[1]That is, in our model, the bidders face no uncertainty about the size of the synergy and so the winner's curse problem does not arise.

[2]For simplicity, and in order to distinguish our model from existing ones, we assume that the participation cost of bidders is zero. So, in our model, limited competition is not driven by the bidders' participation cost and uncertainty about the synergy size.

tential bidders. He/she can differentiate among bidders and identify a group of bidders with higher asset complementarities. In our view, this assumption indeed reflects the information set of selling firms' managers. In general, firms are well informed about their business environment and about other firms that populate the space around them. As a consequence, the selling firm's perception of asset complementarities with potential bidders, the associated synergies and identities of the potential bidders should be reasonably precise.

The other key assumption of the model is that there is a (small) cost of information disclosure $c$ per bidder. We believe this assumption is reasonable and realistic. Previous literature argues that the information disclosure cost plays an important role during the selling process (Hansen, 2001; Boone and Mulherin, 2007). Selling firms guard the information about their products and markets tightly and avoid sharing this information with their competitors. The flow of information provision during the selling process where selling firms stage information provision as bidding becomes more serious and the degree of commitment rises illustrates that the information disclosure cost is an important consideration in the selling process and selling firms try to minimize the number of bidders who are informed. This is in line with our model assumption.

Our model that highlights the link between asset complementarities, synergies and the selling method has two novel empirical predictions. The first empirical prediction concerns differentiation among potential bidders and the number of bidders invited to participate in bidding. Our model predicts that full-scale auctions are associated with deals with many similar bidders who are all invited to participate in the selling process. The high similarity among bidders then also implies a low specific asset complementarity of the target with the winning bidder and low total synergy. In contrast, deals where target managers are able to differentiate among potential bidders are associated with restricted

bidding competition. The target manager invites only the group of potential bidders with higher asset complementarities, which results in a smaller number of bidders participating in the selling process, but higher complementarities and higher realized synergies. The second empirical prediction concerns a positive relationship between the differentiation among the potential bidders in asset complementarity with the target and the winning bidder's bargaining power. Higher differentiation in asset complementarity increases the probability that the gap in total synergy created by the winning bidder versus the second highest bidder is larger. Marginally, the winning bidder brings extra synergy and therefore has higher bargaining power.

We test these predictions on a sample of 503 deals involving US publicly listed target and acquiring firms over the period from 2005 to 2011 for which we are able to hand-collect data on the private selling process (as in Boone and Mulherin, 2007). Even though asset complementarities in takeovers can come from various sources, we focus on complementarities that arise due to similarities in firms' products. Asset complementarities based on product similarities are quantifiable and commonly used in recent M&A literature (Hoberg and Phillips, 2010; Larkin and Lyandres, 2017). As a first step, motivating our model, we show that the takeover premium is higher in one-to-one private negotiations and lower in competitive bidding sales with more than one bidder. Our tests also suggest that the takeover premium decreases with the number of bidders participating in the selling process. Similarly, the target dollar value created (from 40 trading days before the public announcement to the deal completion and scaled by the market capitalization of the target and acquirer together at completion) is larger for private negotiations and in deals with a smaller number of bidders. Finally, in line with the intuition of our model, overall synergy created in the deal (the target plus acquirer value created scaled by the combined market capitalization) is higher in private negotiations and when the number

of bidders is smaller.

The two model predictions are also confirmed in the data. Deals with acquirers who are more similar to other firms around them, our proxy for deals with low differentiation among potential bidders in asset complementarity, are associated with a higher number of bidders invited to the bidding process and less likely to end up as one-to-one private negotiations. In contrast, deals with more unique acquirers, that is deals with greater differentiation among potential bidders in asset complementarity, are associated with a smaller number of bidders invited and higher odds of private negotiations. Moreover, deals with acquirers who are more similar to other firms around them are associated with smaller acquirer bargaining power and lower total synergy.

Our paper contributes to the literature concerning the optimality of the selling mechanism in mergers and acquisitions. In this sense, it is related to Berkovitch and Khanna (1991) who consider auctions and one-to-one negotiations separately. In their model, however, the bidder, rather than the target, chooses either negotiation with the target and a tender offer (interpreted as an auction). Bulow and Klemperer (2009) offer a model where the target optimally chooses between a simultaneous auction and a sequential sale mechanism and show that the target can obtain a higher price by using a simultaneous auction because this method attracts more bidders. Povel and Singh (2006) study a model where bidders differ with respect to the precision of the information they possess about the value of the target. Because the bidders with more noisy information are concerned about the winner's curse, the optimal selling mechanism involves the target communicating sequentially with the potential bidders starting with the one with the most precise information. Calcagno and Falconieri (2014) model the selling process as a bargaining game where the bidder starts with a one-to-one negotiation with target and if they cannot agree and the threat of a tender offer is not credible the target can organize an auction. They show that

auctions and one-to-one negotiations can result in the same selling price.

Our paper differs from these models in two key aspects. First, we assume that the complementarity between the assets of the target and the bidder, which determines the size of the synergy, differs across bidders. Importantly, the target manager is able to divide potential bidders into groups according to their asset complementarity with the target firm and rank these groups by the value their members can create if combined with the target firm. However, the target manager cannot identify which bidder from each group can create the highest value (synergy). The number of bidders in each group depends on the distribution of complementarities. The distribution of complementarities is a public knowledge. In our model, the target manager is the key decision maker and bidders play a passive role – they enter the bidding once invited and obtain all information necessary to determine optimal bidding strategies. Our model disregards the role of uncertainty concerning target valuation by individual potential bidders that drives the optimality of negotiations in Povel and Singh (2006) and Gentry and Stroup (2019). It focuses on the complementarity of assets between the target and acquirer as the main driver of the target's decision concerning the method of sale.

Second, we distinguish between potential and 'invited' bidders. Indeed, we perceive the group of potential bidders as containing all potential bidders that cannot grow in size. The number of invited bidders who will become informed depends on the distribution of bidder's asset complementarities with the target. Empirically, the number of invited bidders coincides with the number of bidders targets' financial advisors contact in the first stage of the selling process.

A recent paper by Gentry and Stroup (2019) considers uncertainty faced by potential bidders concerning their valuation of target firms as the driving force affecting offer prices in takeovers. Using structural estimation, they imply uncertainty in auctions and

then based on estimated model variables also compute offer prices in negotiations as a counterfactual selling mechanism. Their results suggest that prices in auctions and negotiations are comparable, but auctions produce higher prices in takeover markets with higher uncertainty.

Our model differs from Gentry and Stroup (2019) in three important features. First, the two models differ in who pays the entry/information cost.[3] We focus on the information disclosure cost incurred by the target, while Gentry and Stroup (2019) focus on the entry cost payed by bidders who conduct due diligence on the target to learn their valuations. In their model, the trade-off between the expected income from entering the auction and the entry cost determines whether a bidder decides to enter the auction or not. In our setup, the restriction on bidder participation is decided by the target and once invited into bidding, bidders do not have a reason to stay out as they learn their valuation of the target at no cost.

This modeling difference in entry/information cost has also implications for empirical patterns concerning the number of bidders invited and the number of bidders participating in auctions. Gentry and Stroup (2019) model bidders' trade-off of entering an auction and therefore relate to the empirically observed 'number of bidders signing confidentiality agreements.' In their model, the number of bidders invited into an auction is exogenous. Intuitively, the target should invite all potential bidders. In contrast, our model focusses on the target's trade-off of restricting the number of bidders who are invited into the auction – 'the number of bidders contacted' that does not cover all potential bidders. Importantly, our analysis reveals substantial variation in the number of bidders contacted across deals and in line with our model predictions, the number of bidders contacted is lower when the differentiation in asset complementarity is higher.

[3]This issue is closely related to the issue of who is the decision maker in the model.

Second, the two models differ in the treatment of deals with only one bidder invited to participate in the sale. In a substantial part of observed takeovers, the target negotiates with only one bidder and decides not to approach more potential bidders.[4] Our model covers this target's decision to limit invited bidders to only one bidder. The decision is driven by the target's knowledge of distribution of complementarities and by positive information disclosure cost per bidder. In contrast, the model in Gentry and Stroup (2019) ignores this decision. Also, their empirical analysis is restricted to deals with at least two invited bidders and ignores a substantial fraction of takeovers where targets decide to invite only one bidder. Their analysis considers sequential auctions as a counterfactual construction – they imply offer prices in negotiations based on estimated takeover market primitives in auctions. However, the link between negotiations involving only one invited bidder and sequential auctions is not straightforward.

The third differing feature concerns the split of the surplus between the target and the winning bidder in auctions versus negotiations. Our model predicts that higher differentiation in asset complementarity with the target firm is associated with higher bargaining power of the winning bidder. Winning bidders who are similar to other firms in the economy and other firms in their industry have smaller bargaining power because the second highest bidder is similar with a relatively high valuation. In contrast, high differentiation in complementarities is associated with larger gaps in valuation between the first and second highest bidder and therefore winning bidder's higher bargaining power. [Note that we do not show that auctions are associated with target's higher bargaining power.] Gentry and Stroup (2019) ) do not comment on the distribution of the surplus in the cross section of deals. They evaluate the winning bidder's bargaining power only in negotiations where

[4]In our sample, as many as 35% of all deals report only one contacted bidder. Boone and Mulherin (2007) who constrain their data set to larger deals report 49% of deals as having only one contacted bidder.

it is affected by deterrence bidding. They show that deterrence bidding decreases with uncertainty.

The rest of the paper is organized as follows. Section 2 introduces the model and provides testable predictions. Section 3 introduces our data. Section 4 presents our results and section 5 concludes.

# 2 Model

## 2.1 Setup

We consider a simple model with one target firm $T$ and $N \geq 2$ potential bidders. All firms are run by risk neutral managers. The present value of the additional cash flows generated by a merger (synergy) is denoted by $s$ and, by normalization, $s \in [0, 1]$. The size of the synergy depends, among other factors, on the complementarity of the assets of the target and the bidder. The extent of asset complementarity may differ across bidders. The manager of the target can divide potential bidders into groups according to their asset complementarity with the target firm and rank these groups by the value their members can create. However, the target manager cannot identify which bidder from each group can create the highest value (synergy). For simplicity, we assume that there are two groups of potential bidders denoted by $H$ (high asset complementarity) and L (low asset complementarity), respectively. A bidder $i$ of the $L$-group can create synergies $s_{iL} \in [0, x]$ and a bidder $i$ of the $H$-group can create synergies $s_{iH} \in (x, 1]$, where $0 < x < 1$.

The target manager invites the potential bidders and informs them about the target. This information disclosure has a (small) cost $c$ per bidder. After being informed, each bidder $i$ learns the value he can create if he acquires the target $s_i$ (learns the exact value of $s$). However, the target manager only knows the range of values corresponding to each particular group of bidders ($s_L \in [0, x]$ or $s_H \in (x, 1]$). The number of bidders in each

group depends on the distribution of bidders with respect to their asset complementarity with the target. The restriction we impose on this distribution is that the H-group cannot include all bidders while the L-group can. The target and the potential bidders play the following game:

## 2.2 Game

The target and the potential bidders play the following game:

**Stage 1** The target manager decides which (group(s) of) bidders he will inform about the target.

**Stage 2** If, at Stage 1, two or more bidders are invited, the target manager organizes an auction (second-price or English auction) where the informed bidders are invited to participate. If, at Stage 1, only one bidder is invited, there is one-to-one negotiation.

**Stage 3** If, at Stage 2, there is one-to-one negotiation and there is no agreement, the target can organize an auction where he invites two or more bidders.

## 2.3 Solution

**Proposition**: If the $H$-group of bidders is not empty, the target manager will invite only bidders belonging to the $H$-group. If the $H$-group is empty, the target manager will invite all potential bidders. The equilibrium price equals the firm value under the bidder with the second highest synergy.

If the differentiation of bidders with respect to the asset complementarity with the target is large, the target manager can identify the group of bidders who can create the highest synergies (the $H$-group). In this case, he cannot increase the price he will receive by inviting more bidders as the bidders who do not belong to the H-group cannot create high synergies and so cannot overbid those of the H-group. Thus, in order to maximize his

net benefit (price minus the cost of informing bidders), the target manager informs only the group of bidders who can create the highest values. However, if the differentiation of bidders with respect to the asset complementarity with the target is limited, the target manager cannot identify such a group and so a larger number of bidders will most likely result in a higher price.

**Corollary 1**: If among the potential bidders there is differentiation in the asset complementarity with the target, the surplus created by the merger (synergy) is divided between the winning bidder and the target. The greater the difference in asset complementarity, and so the difference in the synergy, between the bidder with the highest synergy and the second one, the higher the part of the synergy which is retained by the winning bidder (because the larger the difference between the synergy and the equilibrium price).

**Corollary 2**: If there are no significant asset complementarities (or no differentiation among the bidders with respect to asset complementarity) all potential bidders are invited in the auction and the difference between the synergy and the equilibrium price is small (or even zero). Thus, a small fraction (or zero) of the surplus is retained by the winning bidder.

## 2.4 Empirical predictions

Based on the model, we draw the following empirical predictions:

**EP1:** The greater the differentiation among the potential bidders in asset complementarity with the target, the smaller the group of bidders participating in the auction.

**EP2:** The greater the differentiation among the potential bidders in asset complementarity with the target, the higher the fraction of the synergy retained by the winning bidder.

# 3 Data

The sample includes US M&A deals that were announced between January 2005 and December 2011 and are covered by the Security Database Corporation (SDC) in Thomson ONE Banker. We apply the following four selection criteria: (i) both the acquirers and targets are US publicly listed companies; (ii) the acquirers own 100% of targets' shares after the deal; (iii) acquirers have data in COMPUSTAT and CRSP concerning accounting and stock price data and are covered in the Hoberg and Phillips Data Library (HPDL)[5] and (iv) we can find information concerning the selling process from the 'background of the deal' section of DEFM14A, PREM14A, SC14D9, or S-4 filings at the EGDAR filing collection site provided by the SEC. We hand collect information concerning deal initiation, private date, selling mechanism, number of bidders contacted and the number of bidders signing confidentiality agreements. We identify 1376 deals in SDC, but are able to find SEC filings on EDGAR and accounting and stock return information on Compustat and CRSP only for 518 deals.[6] For each deal in our data set, from SEC filings we observe the number of bidders who were invited to participate in the selling process. We do not, however, have information on the identity of all bidders. The only bidder identified in the SEC filings is the final winning bidder – the acquirer.

Because asset complementarities in takeovers can come from various sources, they are difficult to quantify (Larkin and Lyandres, 2017). In this paper, we focus on one source of asset complementarities that is based on relatedness of firms in the product market space. Product market based complementarities as introduced by Hoberg and Phillips (2010) satisfy a basic important condition that they are increasing with takeover outcomes such

[5]The data comes from http://hobergphillips.tuck.dartmouth.edu and is explained in Hoberg and Phillips (2010) and Hoberg and Phillips (2016).

[6]The variables related to the stock prices from CRSP have still smaller coverage (down to 450 observations), but we do not limit the whole data set to CRSP variable availability as these variables are necessary only for some regressions.

as announcement abnormal returns, post-announcement profitability and new product introductions. They also exhibit other key advantages – they are quantifiable, widely accepted in the M&A literature and dynamic over time.

Table 1 shows our summary statistics. All variables are defined in Appendix A. The mean transaction value is USD2.5 billion, which is somewhat larger than an average transaction value of $1.5 billion in Malmendier et al. (2016) representing a recent broad sample of US public targets, but smaller than large deals in Fidrmuc et al. (2018). The transaction value is 29 percent of the acquirer's market value. Around one third of all deals are sold in one-to-one negotiations and target firms contact on average 14 bidders to enter the selling process. 15 percent of our deals involve pure stock payment and 33 percent are paid in a mixture of stock and cash. The average takeover premium is 35 percent relative to target stock price eight weeks before the public deal announcement, which is comparable to the literature. The mean average target dollar return, computed as the target dollar gain from eight weeks before the announcement up to the deal completion and scaled by the combined firm value at the completion, is 4 percent. So, the improvement in the target dollar value represents 4 percent of the combined target-acquirer firm value. The mean total synergy, again as a fraction of combined firm value is only 2 percent, which reflects the fact that a large fraction of acquirers experience a dollar loss. The mean target lambda is 26 percent, but for a reasonable interpretation of the number, one should restrict the sample to observations with positive total synergy. The mean given this restriction is 67 percent (not tabulated), which suggests that on average the target firms have relatively large bargaining power as they capture more than half of the total synergy. The mean for the target relative gain measure due to Ahern (2012) is 6 percent.

**- insert Table 1 about here -**

The mean acquirer total similarity is 1,133 and with the median of 325, it is very

skewed. On average, the acquirer has 156 peers in its TNIC-3 industry, but we can see that the variation in the number of peers is very high. The mean acquirer peer similarity in the TNIC-3 industry is 957, which is naturally lower than the total similarity. Given the average number of peers is 156, the mean pairwise similarity of the acquirer with other firms in its industry is 6.13. The pairwise similarity reflecting the closeness of target's and acquirer's product markets is 8.36, which shows that acquirers on average choose targets with a better fit. The last part of Table 1 shows acquirer and target control variables. The acquirers are larger, with higher value, leverage and profitability than the target firms.

# 4 Empirical results

## 4.1 Motivating the model

Table 2 confirms results from the literature that target firms that decide to sell themselves in a one-to-one private negotiation do not suffer smaller premium relatively to targets that sell themselves in a simultaneous auction (Boone and Mulherin, 2007; Fidrmuc et al., 2012). The coefficient estimate for one-to-one negotiations in the first column is positive and significant at the 10-percent level suggesting, indeed, that private negotiations are associated with higher rather than smaller premium. The second column shows that this relationship extends beyond the case when the target company negotiates with one bidder – the (natural logarithm of the) number of bidders who are invited into bidding is negatively correlated with the takeover premium received by the target shareholders. A smaller number of bidders contacted is associated with a higher premium. The two columns in specification 2 confirm similar correlations also for the target dollar returns during the announcement period scaled by the target-acquirer combined firm value at completion. Our model aims to explain this counterintuitive relationship between takeover premia and the target choice concerning how many bidders to invite into the selling

process.

**- insert Table 2 about here -**

A key intuition of our approach is that the target manager chooses to negotiate with a smaller number of bidders when the complementarities (and therefore synergies) in combining the target assets with a potential bidders are larger. The two regressions in specification 3 in Table 2 show, in line with our intuition, that the total synergy is larger in one-to-one negotiations and that a smaller number of bidders contacted is associated with a larger total synergy.

## 4.2 Empirical predictions

A key variable of our model is the point in the distribution of potential bidders' asset complementarities with the target where the target manager can identify a gap and split the population of bidders into the high versus low complementarity group. The corresponding synergy is $x$. By construction, $x$ depends completely on the distribution of potential bidders' complementarities with the target and in the model we do not impose any restrictions on the distribution. Empirically, $x$ is very hard to measure given we have only information about the winning bidder identity and the number of other bidders invited.[7] Nevertheless, we argue that if bidders are very similar to each other, the target manager is unable to identify a gap in the distribution and the group of invited bidders is then large. Naturally, the final winning bidder (the acquirer) is then also similar to other bidders and other firms in the economy even though he is the bidder with the highest complementarity with the target.

Using HPDL, we come up with three variables that should capture the *inability* of the target manager to differentiate among potential bidders concerning bidders' asset

[7]SEC filings conceal identity of the non-winning bidders.

complementarities with the target firm: (i) acquirer total similarity, which measures broad product market similarity of the acquirer to other firms in the economy, (ii) number of acquirer peers, which is the total number of firms in the acquirer TNIC-3 industry, and (iii) acquirer peer similarity, which focusses on the similarity of the acquirer to its peers in the TNIC-3 industry. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to the SIC three-digit coarseness.

Table 3 shows results for regressions testing the first empirical prediction (EP1) that suggests a negative relationship between the differentiation among the potential bidders in asset complementarity with the target and the number of bidders invited into the auction. In line with the prediction, we regress the logarithm of the number of bidders contacted by the target's financial advisor on the measures of bidder similarity. The expected sign for the coefficients is positive – the higher the similarity among potential bidders, the lower the ability to differentiate among potential bidders, which is predicted to be associated with a higher number of bidders invited into the auction. We for each bidder similarity measure, we include two specifications – with and without relative deal size.

**- insert Table 3 about here -**

Table 3 shows that all three coefficients for bidder similarity are positive and statistically significant. The higher the acquirer similarity to other firms in the economy or in its industry, the less is the target manager able to differentiate between potential bidders and, eventually, more bidders participate in the sale. All specifications include also a variable reflecting target-acquirer pairwise similarity, which should indicate better and more unique fit in assets for the merging pair. The results show that a more unique fit in assets of the wining bidder with the target is associated with a smaller number of bidders invited into the auction.

Table 4 extends EP1 further by testing the relationship between the bidder similarity measures and the probability of the target firms inviting only one bidder into the selling negotiation. EP1 suggests that an acquirer who is more similar to other firms is less likely to be invited into the selling process on its own. Table 4 shows that all the coefficients for bidder similarity are negative statistically significant at least at the five-percent level.

**- insert Table 4 about here -**

The second empirical prediction (EP2) concerns the division of the synergy created in the deal between the acquirer and the target. It suggests that the higher the differentiation among the potential bidders in asset complementarities with the target, the higher is the fraction of synergy retained by the winning bidder. To test this prediction, Panel A in Table 5 regresses the target's lambda, a measure of target's bargaining power, on the three bidder similarity measures. The target's lambda is defined as the target's part of the synergy (target's dollar value improvement from 8 weeks before the announcement to completion) scaled by the total synergy created (sum of target's and acquirer's dollar value improvement at completion). This is a proper measure of bargaining power between the target and acquirer, but the measure is distorted when the total synergy is negative (Ahern, 2012). Therefore, we restrict the regressions to only observations with positive total synergy, which results in a smaller number of observations in these specifications. Still, we can see a confirmation for EP2: all the bidder similarity variables have a positive and statistically significant coefficient. Higher similarity among acquirer's peers is associated with a higher fraction of synergy retained by the target. Or the other way round, acquirers who are more similar to other firms in the economy or in their industry manage to capture a smaller fraction of the total synergy.

**- insert Table 5 about here -**

Panel B uses an alternative measure of target bargaining power suggested by Ahern (2012) that takes the difference between the target's and acquirer's dollar value improvement from 8 weeks before the announcement to completion and scales it by the combined firm value at completion. Given the scaling by the combined firm value, this variable is not a true measure of bargaining power (of the division of value created), but we do not need to restrict the sample to observations with positive total synergy. The results in Panel B show positive and statistically significant coefficients for all three measures of bidder similarity, which means that they are in line with EP2.

Specifications in Panel C use the total synergy as the dependent variable and even though they do not test the bargaining power of the target or the acquirer, they give us a feeling for the main intuition of the model. The results show that higher similarity among bidders is associated with smaller synergy created in the deal. This is in line with the main building block of the model.

# 5 Conclusions

This paper explores an intriguing and unresolved question of the choice of the selling mechanism by target firms in mergers and acquisitions. Simple economic intuition and prior theoretical work suggest that more bidding competition during the selling process should result in higher takeover premia for the target firms. Our empirical results confirm suggestions in the literature that this is not case (Boone and Mulherin, 2007). Indeed, we show that the number of bidders invited into the bidding process is negatively associated with takeover premia and targets' dollar gains from the deals. In line with previous literature, we also show that the total synergy created is negatively correlated with the number of bidders invited into bidding.

As a contribution to the literature, we develop a simple model that rationalizes these

empirical patterns. We show that in a setting where synergies created in deals depend on the complementarity of assets between targets and bidders and differ across different bidders, the target manager may optimally choose to sell the firm in a one-to-one private negotiation. The key feature of the model is that the target manager is able to divide potential bidders into groups according to their asset complementarity with the target firm and rank these groups by the value their members can create if combined with the target. The target manager is not able to distinguish among bidders within each group. This setup is in a sharp contrast to other existing models in the literature that assume valuation uncertainty. We believe, our setup better reflects the information environment faced by target firms. As successfully managed firms are well informed about their business environment and about other firms that populate the space around them, they should be able to identify a subset of all potential bidders with higher complementarities and use this information when selling their firms.

Given a small bidding cost per bidder paid by the target firm, it is optimal for the target manager to invite into the auction only the group of bidders with the highest complementarity of assets. Thus, target managers use their information about potential bidders to restrict the number of bidders invited into the auction. In a limiting case, the target invites only one bidder and does not negotiate with any other party. Our model predicts that one-bidder negotiations are associated with higher differentiation in complementarities among potential bidders. Our empirical results confirm this prediction. We believe that by providing an explanation for why target managers optimally invite only one bidder into negotiations, this paper makes a unique contribution to the existing literature.

# Appendix A Variable definitions

The table uses the following abbreviations: HPDL for Hoberg-Phillips Data Library and HC for hand collection.

| Variable | Definition | Source |
|---|---|---|
| **Asset complementarity measures** | | |
| Acquirer total similarity | A global measure of similarity defined as the sum of the pairwise similarities between the acquirer and all other firms in HPDL in the given year. The pairwise similarity is a number between zero and hundred. Based on Hoberg and Phillips (2016). | HPDL |
| Number of acquirer peers | The number of firms in the acquirer's TNIC-3 industry. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to SIC three-digit coarseness. | HPDL |
| Acquirer peer similarity | The sum of pairwise similarity scores for the acquirer with all its peers in the same TNIC-3 industry. The pairwise similarity is a number between zero and hundred. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to SIC three-digit coarseness. | HPDL |
| Acquirer-target pairwise similarity | The similarity score for the acquirer-target pair at the TNIC-3 level. It is a number between zero and hundred. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to SIC three-digit coarseness. | HPDL |
| **Deal characteristics** | | |
| Transaction value | Total value paid by the acquirer less fees and expenses in USD millions. | SDC |
| Relative size | Transaction value as a fraction of acquirer market capitalization shortly before the completion. | SDC, CRSP |
| One-to-one negotiation | Dummy variable equal to 1 in case the target negotiates only with one bidder during the private selling process before public announcement of the deal and 0 otherwise. | HC |
| Stock payment | Dummy variable equal to 1 in case the acquirer offers merged firm's shares as a payment consideration and 0 otherwise. | SDC |
| Mixed payment | Dummy variable equal to 1 in case the acquirer offers a mixture of cash and merged firm's shares as a payment consideration and 0 otherwise. | SDC |
| Bidders contacted | The number potential bidders invited to the selling process. | HC |
| Premium | The final offer price relative to the stock price eight weeks before the SDC announcement date in percentage points. | SDC |

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| Variable | Definition | Source |
|---|---|---|
| Target dollar return | The target's dollar gain from eight weeks before the announcement up to the completion, scaled by the combined firm value (weighted average) at the completion of the deal. | SDC, CRSP |
| Total synergy | The sum of target's and acquirer's dollar gain from eight weeks before the announcement up to the completion, scaled by the combined firm value (weighted average) at the completion of the deal. | SDC, CRSP |
| Target lambda | The ratio of target part of synergy to total synergy. This measure is well defined only conditional on total synergy being positive. | SDC, CRSP |
| Target relative gain | The difference between the target's and acquirer's dollar gain from eight weeks before the announcement up to the completion, scaled by the combined firm value (weighted average) at the completion of the deal. Due to Ahern (2012). | SDC, CRSP |
| **Control variables** | | |
| Acquirer (target) total assets | Acquirer's (target's) book value of total assets in USD millions one fiscal year before the beginning of the event or control periods, in the analysis used as a natural logarithm. | Compustat |
| Acquirer (target) market capitalization | Acquirer's (target's) stock price times shares outstanding 1 fiscal year before the beginning of the event or control periods; in the analysis used as a natural logarithm. | CRSP |
| Acquirer (target) book to market ratio | Acquirer's (target's) book value of equity over market capitalization one fiscal year before the beginning of the event or control periods. | Compustat |
| Acquirer (target) leverage | Acquirer's (target's) long-term debt divided by total assets one fiscal year before the beginning of the event or control periods. | Compustat |
| Acquirer (target) profitability | Acquirer's (target's) earnings before interest, taxes, depreciation and amortization divided by total assets one fiscal year before the beginning of the event or control periods. | Compustat |

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**Table 1.** Summary statistics

This table presents summary statistics for all deals in our sample. All variables are defined in Appendix A and winsorized at the $1^{st}$ and $99^{th}$ percentiles. The units for total assets and market capitalization are USD millions.

| | (1) #obs | (2) mean | (3) st.dev. | (4) Q1 | (5) median | (6) Q3 |
|---|---|---|---|---|---|---|
| *Deal characteristics* | | | | | | |
| Transaction value (USD millions) | 514 | 2,521 | 7,501 | 142 | 456 | 1,657 |
| Relative size | 485 | 0.287 | 0.394 | 0.033 | 0.118 | 0.390 |
| One-to-one negotiation | 518 | 0.330 | 0.471 | 0 | 0 | 1 |
| Bidders contacted | 518 | 14 | 27 | 1 | 3 | 13 |
| Stock payment | 518 | 0.151 | 0.358 | 0 | 0 | 0 |
| Mix payment | 518 | 0.326 | 0.469 | 0 | 0 | 1 |
| Premium | 467 | 0.354 | 0.499 | 0.166 | 0.333 | 0.535 |
| Target dollar return | 450 | 0.041 | 0.074 | 0.002 | 0.013 | 0.058 |
| Total synergy | 450 | 0.020 | 0.142 | -0.053 | 0.017 | 0.096 |
| Target lambda | 499 | 0.260 | 1.077 | -0.024 | 0.054 | 0.624 |
| Target relative gain | 450 | 0.061 | 0.145 | -0.021 | 0.040 | 0.116 |
| *Asset complementarity measures* | | | | | | |
| Acquirer total similarity | 517 | 1,133 | 1,731 | 166 | 325 | 869 |
| Number of acquirer peers | 518 | 156 | 168 | 31 | 92 | 213 |
| Acquirer peer similarity | 518 | 957 | 1,642 | 56 | 198 | 709 |
| Acq.-target pairwise similarity | 518 | 8.355 | 9.668 | 0.630 | 5.840 | 11.990 |
| *Control variables* | | | | | | |
| Acquirer total assets (USD millions) | 518 | 26,733 | 64,464 | 1,092 | 4,185 | 22,563 |
| Target total assets (USD millions) | 518 | 2,545 | 6,669 | 124 | 432 | 1,540 |
| Acquirer market cap. (USD millions) | 518 | 22,377 | 40,989 | 845 | 3,245 | 20,647 |
| Target market cap. (USD millions) | 518 | 1,411 | 3,323 | 103 | 292 | 1,042 |
| Acq. book-to-market ratio | 518 | 0.468 | 0.308 | 0.256 | 0.443 | 0.613 |
| Target book-to-market ratio | 518 | 0.534 | 0.586 | 0.279 | 0.453 | 0.724 |
| Acq. leverage | 518 | 0.154 | 0.153 | 0.031 | 0.122 | 0.217 |
| Target leverage | 518 | 0.145 | 0.186 | 0.000 | 0.066 | 0.229 |
| Acq. profitability | 518 | 0.099 | 0.115 | 0.027 | 0.101 | 0.169 |
| Target profitability | 518 | 0.028 | 0.180 | 0.006 | 0.047 | 0.127 |

**Table 2.** Competition in bidding: takeover premium and synergies

This table reports regression results with four different measures of takeover outcomes (takeover premium, target's part of synergy, total synergy and acquirer's part of synergy) as the dependent variable. All specifications include year and industry fixed effects. All variables are defined in Appendix A and are winsorized at the $1^{\text{th}}$ and $99^{\text{th}}$ percentiles. $^{a}$, $^{b}$ and $^{c}$ indicate significance at the one-, five- and ten-percent levels

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| | Premium | | Target dollar return | | Total synergy | |
| Constant | 0.141 | $0.329^{b}$ | -0.041 | -0.002 | $-0.156^{b}$ | -0.096 |
| | 0.153 | 0.162 | 0.034 | 0.031 | 0.072 | 0.074 |
| One-to-one negotiation | $0.071^{c}$ | | $0.015^{b}$ | | $0.034^{b}$ | |
| | 0.038 | | 0.006 | | 0.014 | |
| Bidders contacted | | $-0.055^{b}$ | | $-0.011^{a}$ | | $-0.016^{a}$ |
| | | 0.021 | | 0.002 | | 0.006 |
| Stock payment | $-0.121^{c}$ | $-0.143^{c}$ | -0.013 | $-0.017^{c}$ | -0.002 | -0.006 |
| | 0.072 | 0.073 | 0.01 | 0.01 | 0.029 | 0.029 |
| Mix payment | 0.03 | 0.008 | -0.003 | -0.007 | 0.017 | 0.013 |
| | 0.051 | 0.052 | 0.009 | 0.009 | 0.019 | 0.02 |
| Acquirer total assets | 0.017 | 0.011 | -0.003 | $-0.004^{b}$ | -0.005 | -0.007 |
| | 0.012 | 0.012 | 0.002 | 0.002 | 0.004 | 0.004 |
| Relative size | $-0.121^{c}$ | $-0.126^{b}$ | $0.107^{a}$ | $0.106^{a}$ | $0.096^{a}$ | $0.096^{a}$ |
| | 0.064 | 0.063 | 0.016 | 0.016 | 0.027 | 0.027 |
| Acq. book-to-market ratio | 0.023 | 0.027 | 0.013 | 0.012 | 0.015 | 0.013 |
| | 0.092 | 0.092 | 0.016 | 0.015 | 0.031 | 0.031 |
| Target book-to-market ratio | 0.042 | 0.049 | $0.014^{b}$ | $0.016^{b}$ | 0.013 | 0.016 |
| | 0.053 | 0.054 | 0.007 | 0.007 | 0.016 | 0.016 |
| Acq. leverage | 0.141 | 0.15 | -0.013 | -0.011 | 0.089 | 0.093 |
| | 0.171 | 0.176 | 0.021 | 0.022 | 0.064 | 0.064 |
| Target leverage | 0.015 | 0.031 | 0.014 | 0.018 | 0.026 | 0.032 |
| | 0.142 | 0.143 | 0.02 | 0.02 | 0.038 | 0.037 |
| Acq. profitability | 0.22 | 0.233 | -0.025 | -0.027 | -0.029 | -0.034 |
| | 0.305 | 0.293 | 0.027 | 0.027 | 0.106 | 0.102 |
| Target profitability | $-0.298^{c}$ | $-0.345^{b}$ | 0.023 | 0.012 | $0.086^{b}$ | $0.074^{c}$ |
| | 0.173 | 0.173 | 0.02 | 0.019 | 0.041 | 0.041 |
| Adjusted $R^2$ | 0.099 | 0.11 | 0.452 | 0.472 | 0.172 | 0.175 |
| Number of observations | 458 | 458 | 460 | 460 | 460 | 460 |

**Table 3.** Number of bidders in the selling process

This table shows regression results with the log of the number of bidders contacted as the dependent variable. All specifications include time and industry fixed effects. All variables are defined in Appendix A and winsorized at the 1$^{\text{th}}$ and 99$^{\text{th}}$ percentiles. $^{a}$, $^{b}$ and $^{c}$ indicate significance at the one-, five- and ten-percent levels.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Constant | 3.185$^{a}$ | 3.205$^{a}$ | 3.278$^{a}$ | 3.278$^{a}$ | 3.246$^{a}$ | 3.264$^{a}$ |
| | 0.575 | 0.553 | 0.577 | 0.552 | 0.576 | 0.551 |
| Acquirer total similarity | 0.089$^{b}$ | 0.093$^{b}$ | | | | |
| | 0.043 | 0.043 | | | | |
| Number of acquirer peers | | | 0.125$^{a}$ | 0.114$^{b}$ | | |
| | | | 0.047 | 0.048 | | |
| Acquirer peer similarity | | | | | 1.006$^{b}$ | 0.857$^{c}$ |
| | | | | | 0.445 | 0.441 |
| Acq.-target pairwise similarity | -2.073$^{a}$ | -1.960$^{a}$ | -2.262$^{a}$ | -2.044$^{a}$ | -2.199$^{a}$ | -2.001$^{a}$ |
| | 0.49 | 0.501 | 0.514 | 0.53 | 0.504 | 0.523 |
| Stock payment | -0.511$^{a}$ | -0.341$^{b}$ | -0.555$^{a}$ | -0.390$^{b}$ | -0.525$^{a}$ | -0.365$^{b}$ |
| | 0.172 | 0.171 | 0.171 | 0.171 | 0.172 | 0.172 |
| Mix payment | -0.452$^{a}$ | -0.373$^{a}$ | -0.507$^{a}$ | -0.428$^{a}$ | -0.473$^{a}$ | -0.403$^{a}$ |
| | 0.14 | 0.143 | 0.142 | 0.146 | 0.14 | 0.143 |
| Acquirer total assets | -0.171$^{a}$ | -0.095$^{a}$ | -0.180$^{a}$ | -0.101$^{a}$ | -0.173$^{a}$ | -0.096$^{a}$ |
| | 0.03 | 0.035 | 0.03 | 0.035 | 0.03 | 0.035 |
| Relative size | -0.338$^{b}$ | | -0.349$^{b}$ | | -0.358$^{b}$ | |
| | 0.168 | | 0.168 | | 0.167 | |
| Target total assets | | -0.145$^{a}$ | | -0.142$^{a}$ | | -0.141$^{a}$ |
| | | 0.043 | | 0.043 | | 0.043 |
| Acq. book-to-market ratio | 0.283 | 0.05 | 0.256 | 0.018 | 0.276 | 0.032 |
| | 0.245 | 0.202 | 0.244 | 0.203 | 0.245 | 0.202 |
| Target book-to-market ratio | 0.187 | 0.124 | 0.174 | 0.112 | 0.162 | 0.103 |
| | 0.117 | 0.102 | 0.115 | 0.102 | 0.115 | 0.102 |
| Acq. leverage | 0.408 | -0.175 | 0.381 | -0.216 | 0.363 | -0.259 |
| | 0.414 | 0.397 | 0.413 | 0.397 | 0.413 | 0.399 |
| Target leverage | 0.283 | 0.651$^{c}$ | 0.34 | 0.675$^{b}$ | 0.328 | 0.667$^{b}$ |
| | 0.334 | 0.331 | 0.335 | 0.334 | 0.333 | 0.332 |
| Acq. profitability | 0.923 | 0.517 | 0.965 | 0.538 | 0.925 | 0.451 |
| | 0.605 | 0.627 | 0.603 | 0.623 | 0.605 | 0.63 |
| Target profitability | -1.406$^{a}$ | -0.971$^{b}$ | -1.320$^{a}$ | -0.911$^{b}$ | -1.360$^{a}$ | -0.962$^{b}$ |
| | 0.367 | 0.383 | 0.365 | 0.383 | 0.366 | 0.384 |
| Adjusted $R^2$ | 0.128 | 0.148 | 0.129 | 0.146 | 0.126 | 0.144 |
| Number of observations | 484 | 517 | 485 | 518 | 485 | 518 |

**Table 4.** Private negotiations: logit regressions

This table shows results for logistic regressions with the dependent variable set to one in one-to-one private negotiations as zero otherwise. All specifications include year and industry fixed effects. All variables are defined in Appendix A and winsorized at the $1^{\text{th}}$ and $99^{\text{th}}$ percentiles. $^{a}$, $^{b}$ and $^{c}$ indicate significance at the one-, five- and ten-percent levels.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Constant | -1.778$^{b}$ | -2.125$^{a}$ | -1.889$^{a}$ | -2.227$^{a}$ | -1.909$^{a}$ | -2.273$^{a}$ |
| | 0.737 | 0.709 | 0.732 | 0.707 | 0.731 | 0.707 |
| Acquirer total similarity | -0.208$^{b}$ | -0.215$^{a}$ | | | | |
| | 0.09 | 0.083 | | | | |
| Number of acquirer peers | | | -0.247$^{a}$ | -0.227$^{b}$ | | |
| | | | 0.093 | 0.091 | | |
| Acquirer peer similarity | | | | | -2.738$^{a}$ | -2.621$^{a}$ |
| | | | | | 0.981 | 0.924 |
| Acq.-target pairwise similarity | 3.716$^{a}$ | 3.130$^{a}$ | 3.906$^{a}$ | 3.134$^{a}$ | 4.208$^{a}$ | 3.528$^{a}$ |
| | 1.25 | 1.203 | 1.243 | 1.207 | 1.273 | 1.232 |
| Stock payment | 0.434 | 0.29 | 0.535 | 0.405 | 0.472 | 0.367 |
| | 0.353 | 0.351 | 0.354 | 0.35 | 0.353 | 0.349 |
| Mix payment | 0.118 | 0.049 | 0.239 | 0.172 | 0.181 | 0.153 |
| | 0.297 | 0.294 | 0.302 | 0.297 | 0.294 | 0.291 |
| Acquirer total assets | 0.184$^{a}$ | 0.021 | 0.200$^{a}$ | 0.032 | 0.191$^{a}$ | 0.031 |
| | 0.06 | 0.07 | 0.061 | 0.07 | 0.06 | 0.07 |
| Relative size | 0.704$^{b}$ | | 0.741$^{b}$ | | 0.757$^{b}$ | |
| | 0.341 | | 0.349 | | 0.347 | |
| Target total assets | | 0.285$^{a}$ | | 0.279$^{a}$ | | 0.271$^{a}$ |
| | | 0.093 | | 0.093 | | 0.092 |
| Acq. book-to-market ratio | -0.68 | -0.32 | -0.613 | -0.244 | -0.678 | -0.295 |
| | 0.501 | 0.435 | 0.501 | 0.44 | 0.497 | 0.428 |
| Target book-to-market ratio | -0.301 | -0.168 | -0.241 | -0.12 | -0.221 | -0.1 |
| | 0.24 | 0.23 | 0.23 | 0.228 | 0.232 | 0.225 |
| Acq. leverage | 0.299 | 0.757 | 0.397 | 0.887 | 0.404 | 0.907 |
| | 0.796 | 0.698 | 0.801 | 0.708 | 0.789 | 0.699 |
| Target leverage | -0.133 | -0.549 | -0.275 | -0.617 | -0.298 | -0.643 |
| | 0.629 | 0.611 | 0.637 | 0.623 | 0.627 | 0.611 |
| Acq. profitability | -1.549 | -1.67 | -1.64 | -1.676 | -1.635 | -1.639 |
| | 1.219 | 1.171 | 1.24 | 1.184 | 1.222 | 1.161 |
| Target profitability | 1.529$^{c}$ | 1.026 | 1.329 | 0.895 | 1.366$^{c}$ | 0.974 |
| | 0.831 | 0.86 | 0.825 | 0.864 | 0.82 | 0.858 |
| Chi$^{2}$ | 49.588 | 51.373 | 51.405 | 51.667 | 51.293 | 53.302 |
| Number of observations | 481 | 513 | 485 | 518 | 485 | 518 |

**Table 5.** Division of synergies

This table reports regression results showing the effect of acquirer similarity on the division of surplus between the target and acquiring companies. All specifications include year and industry fixed effects. All variables are defined in Appendix A and are winsorized at the 1$^{\text{th}}$ and 99$^{\text{th}}$ percentiles. $^{a}$, $^{b}$ and $^{c}$ indicate significance at the one-, five- and ten-percent levels

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *Panel A: Target lambda (positive total synergy)* | | | | | | |
| Constant | 2.425$^{c}$ | 2.097$^{b}$ | 2.504$^{c}$ | 2.155$^{b}$ | 2.428$^{c}$ | 2.103$^{b}$ |
| | 1.379 | 1.021 | 1.369 | 1.018 | 1.376 | 1.017 |
| Acquirer total similarity | 0.142$^{b}$ | 0.116$^{b}$ | | | | |
| | 0.058 | 0.057 | | | | |
| Number of acquirer peers | | | 0.124$^{b}$ | 0.097$^{c}$ | | |
| | | | 0.061 | 0.056 | | |
| Acquirer peer similarity | | | | | 1.418$^{b}$ | 1.170$^{b}$ |
| | | | | | 0.618 | 0.58 |
| Acq.-target pairwise similarity | -0.058 | -0.229 | -0.128 | -0.251 | -0.193 | -0.342 |
| | 0.684 | 0.646 | 0.711 | 0.651 | 0.695 | 0.641 |
| Stock payment | -0.286 | -0.321$^{c}$ | -0.341$^{c}$ | -0.371$^{b}$ | -0.294 | -0.344$^{b}$ |
| | 0.182 | 0.164 | 0.19 | 0.17 | 0.182 | 0.166 |
| Mix payment | 0.008 | -0.012 | -0.033 | -0.042 | -0.002 | -0.031 |
| | 0.192 | 0.18 | 0.202 | 0.185 | 0.195 | 0.181 |
| Acquirer total assets | -0.078$^{a}$ | -0.169$^{a}$ | -0.084$^{a}$ | -0.174$^{a}$ | -0.077$^{a}$ | -0.169$^{a}$ |
| | 0.027 | 0.033 | 0.028 | 0.032 | 0.027 | 0.033 |
| Relative size | 0.409$^{b}$ | | 0.396$^{b}$ | | 0.386$^{b}$ | |
| | 0.171 | | 0.169 | | 0.169 | |
| Target total assets | | 0.136$^{b}$ | | 0.140$^{a}$ | | 0.141$^{a}$ |
| | | 0.053 | | 0.053 | | 0.052 |
| Acq. book-to-market ratio | 0.512 | 0.501 | 0.476 | 0.467 | 0.517 | 0.5 |
| | 0.371 | 0.323 | 0.378 | 0.326 | 0.376 | 0.325 |
| Target book-to-market ratio | 0.082 | 0 | 0.084 | 0.007 | 0.068 | -0.01 |
| | 0.167 | 0.156 | 0.156 | 0.151 | 0.156 | 0.15 |
| Acq. leverage | 0.2 | 0.195 | 0.149 | 0.15 | 0.172 | 0.175 |
| | 0.447 | 0.384 | 0.439 | 0.373 | 0.434 | 0.371 |
| Target leverage | 0.051 | -0.029 | 0.063 | -0.045 | 0.082 | -0.035 |
| | 0.341 | 0.331 | 0.328 | 0.324 | 0.329 | 0.324 |
| Acq. profitability | 0.802 | 0.751 | 0.707 | 0.669 | 0.777 | 0.717 |
| | 0.609 | 0.582 | 0.617 | 0.585 | 0.612 | 0.582 |
| Target profitability | -0.007 | -0.084 | 0.08 | -0.052 | 0.04 | -0.088 |
| | 0.44 | 0.437 | 0.415 | 0.432 | 0.414 | 0.425 |
| Adjusted $R^2$ | 0.125 | 0.123 | 0.115 | 0.117 | 0.12 | 0.122 |
| Number of observations | 268 | 284 | 269 | 285 | 269 | 285 |
| *Panel B: Target relative gain* | | | | | | |
| Constant | 0.068 | 0.128$^{c}$ | 0.077 | 0.136$^{b}$ | 0.076 | 0.134$^{c}$ |
| | 0.071 | 0.068 | 0.071 | 0.069 | 0.07 | 0.068 |
| Acquirer total similarity | 0.012$^{b}$ | 0.012$^{b}$ | | | | |
| | 0.006 | 0.006 | | | | |
| Number of acquirer peers | | | 0.016$^{b}$ | 0.015$^{b}$ | | |
| | | | 0.006 | 0.007 | | |

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| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Acquirer peer similarity | | | | | 0.149$^{b}$ | 0.151$^{b}$ |
| | | | | | 0.059 | 0.062 |
| Acq.-target pairwise similarity | -0.147$^{c}$ | -0.176$^{b}$ | -0.171$^{b}$ | -0.198$^{b}$ | -0.170$^{b}$ | -0.201$^{b}$ |
| | 0.079 | 0.083 | 0.082 | 0.085 | 0.081 | 0.086 |
| Stock payment | -0.031 | -0.032 | -0.038 | -0.039 | -0.034 | -0.035 |
| | 0.025 | 0.024 | 0.025 | 0.024 | 0.025 | 0.024 |
| Mix payment | -0.029 | -0.016 | -0.036$^{c}$ | -0.022 | -0.033$^{c}$ | -0.02 |
| | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Acquirer total assets | 0.001 | -0.015$^{a}$ | 0 | -0.017$^{a}$ | 0 | -0.016$^{a}$ |
| | 0.004 | 0.006 | 0.004 | 0.006 | 0.004 | 0.006 |
| Relative size | 0.130$^{a}$ | | 0.131$^{a}$ | | 0.130$^{a}$ | |
| | 0.026 | | 0.026 | | 0.026 | |
| Target total assets | | 0.020$^{a}$ | | 0.021$^{a}$ | | 0.021$^{a}$ |
| | | 0.006 | | 0.006 | | 0.006 |
| Acq. book-to-market ratio | -0.004 | 0.015 | -0.008 | 0.012 | -0.004 | 0.015 |
| | 0.033 | 0.034 | 0.033 | 0.034 | 0.033 | 0.034 |
| Target book-to-market ratio | 0.025 | 0.029 | 0.026 | 0.031 | 0.024 | 0.029 |
| | 0.02 | 0.02 | 0.019 | 0.019 | 0.019 | 0.019 |
| Acq. leverage | -0.105$^{c}$ | -0.062 | -0.104$^{c}$ | -0.058 | -0.104$^{c}$ | -0.058 |
| | 0.058 | 0.057 | 0.058 | 0.057 | 0.058 | 0.057 |
| Target leverage | 0.012 | 0.002 | 0.016 | 0.002 | 0.015 | 0.002 |
| | 0.044 | 0.047 | 0.044 | 0.047 | 0.043 | 0.046 |
| Acq. profitability | -0.017 | -0.087 | -0.012 | -0.084 | -0.012 | -0.081 |
| | 0.108 | 0.123 | 0.107 | 0.122 | 0.107 | 0.122 |
| Target profitability | -0.057 | -0.059 | -0.049 | -0.054 | -0.054 | -0.059 |
| | 0.045 | 0.043 | 0.045 | 0.043 | 0.045 | 0.043 |
| Adjusted $R^2$ | 0.13 | 0.08 | 0.133 | 0.083 | 0.133 | 0.084 |
| Number of observations | 445 | 449 | 446 | 450 | 446 | 450 |
| | *Panel C: Total synergy* | | | | | |
| Constant | -0.027 | -0.003 | -0.042 | -0.017 | -0.042 | -0.017 |
| | 0.049 | 0.049 | 0.049 | 0.049 | 0.048 | 0.048 |
| Acquirer total similarity | -0.011$^{b}$ | -0.013$^{a}$ | | | | |
| | 0.005 | 0.005 | | | | |
| Number of acquirer peers | | | -0.008 | -0.011$^{c}$ | | |
| | | | 0.006 | 0.006 | | |
| Acquirer peer similarity | | | | | -0.090$^{c}$ | -0.116$^{b}$ |
| | | | | | 0.051 | 0.052 |
| Acq.-target pairwise similarity | 0.210$^{b}$ | 0.201$^{b}$ | 0.197$^{b}$ | 0.193$^{b}$ | 0.205$^{b}$ | 0.198$^{b}$ |
| | 0.082 | 0.084 | 0.085 | 0.087 | 0.085 | 0.086 |
| Stock payment | -0.009 | 0.001 | -0.006 | 0.008 | -0.008 | 0.005 |
| | 0.029 | 0.029 | 0.029 | 0.029 | 0.029 | 0.029 |
| Mix payment | 0.023 | 0.041$^{b}$ | 0.026 | 0.047$^{b}$ | 0.025 | 0.045$^{b}$ |
| | 0.019 | 0.019 | 0.019 | 0.02 | 0.019 | 0.019 |
| Acquirer total assets | -0.004 | -0.013$^{a}$ | -0.004 | -0.013$^{a}$ | -0.004 | -0.013$^{a}$ |
| | 0.004 | 0.005 | 0.004 | 0.005 | 0.004 | 0.005 |
| Relative size | 0.092$^{a}$ | | 0.095$^{a}$ | | 0.096$^{a}$ | |
| | 0.029 | | 0.029 | | 0.029 | |

*continued on next page*

*continued from previous page*

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Target total assets | | 0.010$^{c}$ | | 0.010$^{c}$ | | 0.009$^{c}$ |
| | | 0.006 | | 0.006 | | 0.006 |
| Acq. book-to-market ratio | 0.009 | 0.013 | 0.013 | 0.019 | 0.011 | 0.016 |
| | 0.031 | 0.032 | 0.031 | 0.033 | 0.031 | 0.032 |
| Target book-to-market ratio | 0.011 | 0.008 | 0.014 | 0.011 | 0.015 | 0.012 |
| | 0.017 | 0.018 | 0.016 | 0.018 | 0.016 | 0.017 |
| Acq. leverage | 0.061 | 0.093 | 0.072 | 0.108$^{c}$ | 0.071 | 0.108$^{c}$ |
| | 0.066 | 0.064 | 0.067 | 0.065 | 0.066 | 0.065 |
| Target leverage | 0.032 | 0.037 | 0.031 | 0.035 | 0.03 | 0.036 |
| | 0.04 | 0.042 | 0.04 | 0.043 | 0.039 | 0.042 |
| Acq. profitability | -0.037 | 0.007 | -0.027 | 0.015 | -0.031 | 0.013 |
| | 0.107 | 0.109 | 0.109 | 0.111 | 0.107 | 0.109 |
| Target profitability | 0.116$^{a}$ | 0.134$^{a}$ | 0.109$^{a}$ | 0.127$^{a}$ | 0.110$^{a}$ | 0.130$^{a}$ |
| | 0.038 | 0.042 | 0.038 | 0.042 | 0.038 | 0.042 |
| Adjusted $R^2$ | 0.173 | 0.131 | 0.173 | 0.127 | 0.174 | 0.128 |
| Number of observations | 445 | 449 | 446 | 450 | 446 | 450 |