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Abstract

We investigate loan price in mergers and acquisitions (M&As), using hand-matched loan information for a sample of 512 U.S. M&A transactions. We find the relative size of a deal constitutes a prominent determinant of the loan price measured by the all-in spread drawn (AISD). This result is robust to several specifications that address endogeneity concerns. Cross-sectional analyses show that aggravated credit risk and information uncertainty after M&A go some way towards explaining lenders' concerns over large relative deal size. Further analysis demonstrates higher AISD is associated with lower post-transaction performance, indicating loan price factors in the risk of poor post-transaction performance correctly.

Key words: loan price; mergers and acquisitions (M&As); relative deal size; post-acquisition performance.

JEL Codes: G34, G21.

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Abstract

We investigate loan price in mergers and acquisitions (M&As), using hand-matched loan information for a sample of 512 U.S. M&A transactions. We find the relative size of a deal constitutes a prominent determinant of the loan price measured by the all-in spread drawn (AISD). This result is robust to several specifications that address endogeneity concerns. Cross-sectional analyses show that aggravated credit risk and information uncertainty after M&A go some way towards explaining lenders' concerns over large relative deal size. Further analysis demonstrates higher AISD is associated with lower post-transaction performance, indicating loan price factors in the risk of poor post-transaction performance correctly.

Key words: loan price; risk; mergers and acquisitions (M&As); relative deal size; post-acquisition performance.

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1 Introduction

Loan pricing is a central issue in the banking literature. A variety of risks drive loan price,[1] including credit risk, market risk, and liquidity risk (Gatev and Strahan, 2009). In particular, extant literature has identified several risk-based factors that determine loan prices. These factors include moral hazard induced by the information asymmetry between the lead and participant banks in a loan syndication (Ivashina, 2009), lender-borrower previous lending relationship (Bharath, Dahiya, Saunders, and Srinivasan, 2011; Boot, 2000), previous syndication relationship between the lead and participant banks (Cai, 2010; Ivashina, 2009), the borrower's organizational structure (Aivazian, Qiu, and Rahaman, 2015), and the borrower's accounting quality (Bharath, Sunder, and Sunder, 2008). These studies emphasize the importance of borrower characteristics and the relations among lenders and borrowers in determining loan prices. The authors assume that loans are homogeneous across different purposes and the characteristics of individual investment projects do not matter. This assumption is understandable. Canonical textbook teaching maintains that firms arrange their debt financing against their overall assets in place and growth opportunities, and the cost of debt is determined at the firm level rather than the project level (Brealey, Myers, Allen, and Mohanty, 2012).[2]

Nonetheless, M&A transactions are arguably the largest and most complex type of corporate investments. They have a profound impact on both a company's growth opportunities and on the value of its existing assets. A sizable proportion of bank loans is made to finance mergers and acquisitions (M&As). For example, about 15% of the syndicated loans recorded in the Dealscan database are used for M&As from 1986 to 2003 (Bharath, Dahiya, Saunders, and Srinivasan, 2011). This is equivalent to an estimated total amount of 6.2 trillion dollars.[3] In the current study, we aim to examine two issues: (1)how certain M&A characteristics impact the loan price conditional on the use of loan finance, considering a M&A is a large and complex transaction that changes a firm profoundly; and (2) does the loan price factor in post-transaction performance correctly, considering loan price is supposed to summarize the risks associated with the borrower's business (Strahan, 1999)?

Previous literature suggests the size of a M&A deal relative to the bidder size (i.e., relative deal size) is associated with lenders' exposure to multiple merger-related risks (measured or unmeasured), such as credit quality, information uncertainty, and deal complexity. What

[1] Measured in the previous studies by the *All-In Spread Drawn (AISD)*. Please see Section 3.1 for detailed definition.

[2] In contrast, the cost of equity is estimated according to the security market line specific to a project.

[3] This amount is likely to be an underestimate, because, to calculate this amount, we multiply the average size of all syndicated loans by the number of syndicated loans for M&A. However, the loans for M&A are usually larger than those for other purposes.

concerns a lender the most is arguably the borrower's credit quality. Ghosh and Jain (2000) find acquirers increase leverage after acquisitions. Furfine and Rosen (2011) further posit that mergers increase the acquiring firms' default risk. While previous literature (Kim and McConnell, 1977; Lewellen, 1971) postulate mergers may benefit creditors by making debt safer (the co-insurance effect), Murray, Svec, and Wright (2017) find leverage increase after mergers make bondholders worse off. It is, therefore, expected that a lender's concern about credit quality grows as relative deal size increases. Larger deals also increase the difficulty of due diligence from both the acquirer's and the lender's perspective. It is more difficult to assess the value and risk of incremental cash flows from a larger deal. Hansen (1987), in his widely cited study, also postulates the acquirers are more concerned with uncertainties when the relative deal size is higher. In line with these arguments, Faccio and Masulis (2005) use the relative size as a proxy for information uncertainty related to a merger transaction. Furthermore, larger deals may be innately more complex. As Datta (1991) postulates, post-transaction integration involves substantial costs to the merging firms. These large deals are likely to involve more problems in ex-post integration and, therefore, greater cost to achieve the expected synergies in those years post acquisitions (Ahern, 2010; Shrivastava, 1986). Apart from these above-mentioned risks, Alexandridis, Fuller, Terhaar, and Travlos (2013) further argue that greater deal size also proxies for unobserved complications of a transaction, which negatively impacts the acquiring firm's shareholder value. It can be costly for lenders to trace and measure every single piece of risk underlying the relative size of a deal. It also involves great inaccuracy in forecasting. However, the relative size is readily available and easy to measure. Therefore, we hypothesize that banks factor in the relative deal size when negotiating loan price, as an aggregate and prominent signal of the underlying risks. A larger deal involves greater risks and has higher loan price.

We are not aware of another study that examines loan prices in the context of M&A transactions. The absence of prior analysis is probably due to the difficulty linking loan data to specific merger transactions. Indeed, we find there is no data readily available, and it has to be hand-matched. We design a rigorous procedure to link loan facilities from Dealscan to merger transactions from the SDC database (more details in Section 2.2). We collect data on 512 U.S. M&A transactions announced from 1994 to 2017 with loan financing information. Our analysis shows that relative deal size positively and significantly relates to the average AISD of loans, ceteris paribus. A one standard deviation increase in the relative deal size increases an average acquirer's AISD by 22.70 basis points. To ensure our results are robust to various endogeneity issues, we subject our analysis to various specifications,

including the Seemingly Unrelated Regressions (SUR), analyses at both the deal level and the facility level, and the Heckman two-stage self-selection-robust procedure. Our results persist in all these alternative specifications. Aside from the relative deal size, we also find that acquirer pre-transaction leverage and the change in leverage significantly increase the AISD. This result is consistent with the argument of Strahan (1999) that loan agreements tie the interest rate to key financial ratios such as leverage to mitigate adverse selection and moral hazard. The effect of the change in leverage is not robust in all our tests, however. In a set of cross-sectional analyses of possible channels, we find the positive relation between relative deal size and loan price to be more pronounced when a deal involves a greater decline in the acquirers' credit quality. We also find some evidence that the effect of relative deal size on loan price is stronger where information uncertainty increases after mergers. However, the results are sensitive to alternative measures. Deal complexity does not seem to have any significant moderating effect. These results suggest that lenders' increased exposure to credit risk is the most likely channel of the relative-deal-size effect, followed by information uncertainty. In all the tests, the independent effect of relative deal size remains significant despite the presence of various moderation effects, suggesting that the relative deal size captures other unmeasured merger-related risks as is argued by Alexandridis et al. (2013).

Previous literature also suggests that lenders have an information advantage that allows them to screen and monitor effectively (Bharadwaj and Shivdasani, 2003; Diamond, 1984). Strahan (1999) postulates that lenders use price to compensate themselves for taking the risks that are hard to contract on. He suggests that loan price is a sufficient statistic of the borrower's post-contract performance, which involves too many uncertainties for a complete contract (see Grossman and Hart, 1983; Hart, 2017; Hart and Moore, 1990, for the idea of contract incompleteness). Indeed, we find higher loan price is associated with significantly worse performance in the post-acquisition years. This finding is consistent for performance measures based on stock prices and those based on accounting information. Also, both event-time and calendar-time approaches yield similar results.

To understand why acquirers pursue loan financing in M&A deals, we also study the determinants of loan financing in these transactions. The previous literature suggests a comprehensive list of the firm- and transaction-level characteristics that influence a manager's preference for loan financing. We find that the prediction of loan-financing is broadly in line with the previous literature that highlights the relevance of risk, information asymmetry, and agency costs [4]

[4]To predict loan financing in general, previous literature has studied factors related to risks (e.g., Datta, 1991; Hansen, 1987; Roll, 1988; Shrivastava, 1986; Strahan, 1999), information asymmetry (e.g., Ahern, 2010; Alexandridis et al., 2013; Frank and

We contribute to two strands of literature. First, we examine the loan financing cost of merger transactions. Financing is a prime issue in M&A transactions, as important as valuation. The cost of loan financing impacts the potential of merger gains directly. Previous literature, however, focuses on the determinants or consequences of the means of payment (e.g., Faccio and Masulis (2005), among others). There are only a few papers that broach the financing issues of M&A transactions. Schlingemann (2004) finds that the sources of finance impact the cross-section of bidder announcement returns significantly. Martynova and Renneboog (2009) and Bharadwaj and Shivdasani (2003) find that the bidders using more debt to finance their cash offers can obtain higher gains. Martynova and Renneboog (2009) also examine the determinants of debt financing likelihood in a sample of European M&A transactions. Vladimirov (2015) analyzes how the cost and source of finance in cash offers impact acquisition premium and acquisition outcome when acquirers face financial frictions. Differing from these previous studies, we investigate how the characteristics of M&A deals determine the cost of loan financing. Our results show that the relative deal size is the primary factor that persistently impacts loan prices. This finding is in line with the view of Alexandridis et al. (2013) that deal size summarizes the observed and unobserved complexity of a transaction that impacts shareholder value negatively. Second, we contribute to the literature on loan pricing by demonstrating that the features of major corporate investment determine the loan price. Extant studies have emphasized the relationship between lenders and borrowers (Bharath et al., 2011; Boot, 2000), the relation among syndication partners (Ivashina, 2009), the borrower's organizational structure (Aivazian et al., 2015), and the accounting quality of the borrowing firms (Bharath et al., 2008). These studies treat loans by the same borrower as homogeneous across different purposes. We find that, for major corporate investments like M&As, the transaction characteristics also impact loan prices, after controlling all the determinants highlighted in the previous literature. In merger transactions, the risks associated with the scale of the transaction is a first-order concern. Third, we find evidence consistent with the view that loan price is a sufficient statistic for the borrower's post-acquisition performance (Strahan, 1999). This finding is in line with a broader literature that argues lenders have the information advantage required to screen and monitor borrowers (Bharadwaj and Shivdasani, 2003; Diamond, 1984).

We organize the remainder of this paper as follows. Section 2 describes the data sampling and collection procedure. Section 3 describes the variables and the econometric specification

Goyal, 2009; Hansen, 1987; Myers and Majluf, 1984; Officer, Poulsen, and Stegemoller, 2008; Rhodes-Kropf and Viswanathan, 2004), and agency issues (e.g., Harris and Raviv, 1988; Jensen, 1986; Safieddine and Titman, 1999; Shleifer and Vishny, 2003; Stulz, 1988; Zwiebel, 1996). Martynova and Renneboog (2009) conduct a novel analysis of loan-financing determinants in merger transactions. Faccio and Masulis (2005) offer a comprehensive study of means of payment for European mergers.

of our analysis. Section 4 reports and discusses our results. Section 5 concludes.

2 Data and Sample

2.1 Sample selection

We obtain an initial M&A sample from the SDC M&A database. We keep both completed and withdrawn deals announced in the U.S. during 1994 and 2017. The reason for choosing 1994 to begin with is that the SEC online filings of listed companies begin in 1994, allowing us to access 8-K filings to manually verify whether an M&A transaction is indeed funded by loans. In our sample, the acquiring firms are public, but the target firms can be public, private or subsidiary firms. This initial sample contains 20282 transactions. Additionally, the records of M&A deals should have non-missing values of the means of payment, announcement and effective dates, and transaction value. To identify the sample of loan-financed M&As, we impose several criteria. First, we drop those M&As deals where we cannot find the acquiring firm's GVKEY from Compustat. We need the GVKEY to retrieve data from Compustat and CRSP to calculate the necessary control variables based on acquirer characteristics. Second, we drop those M&A deals without any cash in the consideration because an acquiring firm does not need to borrow to fund a pure-stock transaction (we keep them for the Heckman procedure in Section 4.4 and the loan determinants analysis in Section 4.5, however). Third, we exclude transactions where the acquirers are in the utilities (SIC code 4900–4999) or financial industry(SIC code 6000–6999). Fourth, we keep those M&A deals indicated by SDC as being funded by borrowing, bridge loans, or lines of credit. After these criteria, we have 1312 M&A transactions potentially financed by loans. To confirm a transaction is indeed loan financed, we rely on 8-K filings. We retrieve 8-K documents filed between the deal announcement date and the third month after the deal effective date. We then search through all the retrieved 8-K filings to find out which 8-K files are about M&A transactions.

We retrieve the data on loan facilities from Thomson Reuters DealScan.[5] A loan contract (called a loan package in Dealscan), contains one or more loan facilities. The loan facilities within the same package may contain different prices and non-price terms, and their purposes may also differ. In a syndicated loan contract, the lender(s) may also be different across facilities. Dealscan provides information on a variety of loan terms, on the role of lenders

[5]Dealscan collects information on worldwide loan contracts. It covers up to three quarters of loans made in the U.S. Market (Carey and Hrycray, 1999). Dealscan gathers information of these loan contracts from SEC filings, other public documents (including 10-K, 10-Q forms, and registration statements), lenders, and proprietary sources.

(e.g., leading or participating banks in a syndicated loan), and on basic characteristics of borrowers.

2.2 Matching loan facilities to acquiring firms

We follow two steps to match Dealscan loan facilities to our sample of potentially loan-financed deals. The first step involves matching borrowers from Dealscan to our sample acquirers. The second step involves selecting the facilities used for a M&A transaction from all the facilities ever initiated by a borrower/acquirer.

Dealscan does not have a firm ID (e.g., GVKEY) that can be used to match the borrowers to the acquiring firms covered by SDC, or to the data provided by Compustat or CRSP. Chava and Roberts (2008) construct a Compustat-Dealscan linkage file covering the period from January 1983 to August 2017. We use this linkage file, together with the GVKEY-CUSIP link file from CRSP, to match borrowers to acquiring firms. Once this is done, for each acquiring firm, we have all the loan facilities it has ever taken. In the second step, from all the loan facilities ever taken by an acquiring firm, we find the loan facilities specifically used for a particular M&A transaction.

To do this, we read through the M&A-related 8-K filings selected earlier containing information about financing sources. The information on sources of finance are disclosed in sections titled "Item 1.01 Entry into a Material Definitive Agreement", "Item 2.01 Completion of Acquisition or Disposition of Assets", "Item 2.03 Creation of a Direct Financial Obligation or an Obligation under an Off-Balance Sheet Arrangement of a Registrant", and "Item 2 Acquisition or Disposition of Assets" (only before August 2004). The information contained therein became more and more detailed over time. This information we use to decide which loan and related facility (facilities) is used in a corresponding M&A transaction.

Specifically, an 8-K file contains information on whether a deal is financed using new facilities (465 cases), existing facilities with amendment(208 cases), existing facilities without an amendment (119 cases), or a combination of these. Importantly, in most cases (634 cases), the 8-K file provides information on loan beginning date (or amendment date) which we use as the primary information for selecting Dealscan facilities. An 8-K file may also provide information on the lender, loan type, and amount, but not always. We use this information to facilitate our matching wherever possible. For amended existing loans, we use the amendment date to match because Dealscan records an amended facility as a "new" facility, and the amendment date is used as the beginning date for that facility. In the remaining cases where the loan begining/amendment dates are not disclosed in 8-K, we

require the loan beginning date recorded in Dealscan to reside within one calendar year before the deal effective date. A word of caution is in place here. The 10-K and 10-Q filings also provide some information on loans used in M&As, but the information therein isn't sufficiently specific and concrete. We note that using only the 10-K and 10-Q information mismatches a considerable number of loan facilities.

In the end, since we cannot always find corresponding loan information from Dealscan, we have 512 loan-funded M&A transactions and 995 loan facilities. This sample size is comparable to the samples used in previous studies (e.g., 155 cash tender offers in Bharadwaj and Shivdasani (2003) and 607 M&As with pre-merger debt financing (including both public and private debt) in Schlingemann (2004).)

3 Variables and Econometric Specification

3.1 Variables of interest for the loan-price regression analysis

A The All-in Spread Drawn

We use the All-in spread drawn (AISD) from Dealscan to measure loan prices. Dealscan defines AISD as "the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with an annual (or facility) fee paid to the bank group". In other words, AISD includes all monetary costs of a loan facility. A M&A transaction may be funded by several loan facilities, and we use the average AISD across facilities for subsequent analysis. The arithmetic average AISD and the weighted average AISD (weighted by the amount of each facility) give the same qualitative results. For brevity, we only report the results based on the weighted average AISD (henceforth AISD for simplicity). The results based on the arithmetic average AISD are available upon request.

B Relative deal size

We calculate the relative deal size as the ratio of the transaction value to the acquiring firm's market value of equity measured at the end of last fiscal year relative to deal announcement. We also use the ratio of the transaction value to the acquirer's book value of total assets at the end of the last fiscal year and obtain qualitatively the same results(unreported but available upon request).

3.2 Control variables for our loan-price regression analysis

We include several deal characteristics that potentially relate to various risks associated with a transaction. Our interests here are twofold: 1) to examine whether any of these variables capture risk-related effects on M&A loan price additional to that captured by the relative deal size and 2) to ensure the effect of relative deal size is robust to controlling for the effects of these variables. First, we use a dummy variable to indicate whether a M&A transaction is a diversifying deal (equals 1) or not (equals 0). We include this variable because Morck, Shleifer, and Vishny (1990) posit that a diversifying deal may reflect managerial motive and involves agency risk. Kim and McConnell (1977) and Lewellen (1971) posit, however, that merging firms with low cash-flow correlations may benefit creditors by making debt safer (the co-insurance effect). We define a deal as diversifying if the acquiring and the target firm are from two different 2-digit SIC code industries. Second, we control for the target's public status by adding two dummy variables: one dummy variable is 1 for public targets and 0 otherwise, and the other is 1 for subsidiary firms and 0 otherwise. These variables are included according to the previous literature. Specifically, Officer et al. (2008) postulate that private firms are more opaque than public firms and involve more valuation uncertainty. Fuller, Netter, and Stegemoller (2002) maintain that acquirers have less risk of overpaying private targets because of the private targets' liquidity demand. Further, Maksimovic and Phillips (2001) postulate that the acquisitions of company assets (including subsidiaries) enhance acquirer performance, which may, in turn, enhance loan quality. Third, we control for deal attitude by including a dummy variable for hostility (1 for hostile mergers and 0 otherwise), because target resistance either pushes up offer price in the interest of target shareholders or entrench the target management at the expense of shareholders (Baron, 1983; Schwert, 2000). Forth, an international setting is far more complex than a domestic one, and it is more difficult to coordinate actions and monitor managers across boarders (Denis, Denis, and Yost, 2002). We control for a cross-border M&As using a dummy variable (1 for cross-border mergers and 0 otherwise) accordingly. Fifth,Martynova and Renneboog (2009) posit that the choice of financing sources is related to a bidders' strategic preference for the means of payment. Therefore, we control for a dummy for stock payment (1 if the deal payment contains the bidder's stocks and 0 otherwise). Last, tender offers have a shorter duration and less competition from rival bidders; thus, have less risk of incompletion than negotiated offers. Meanwhile, tender offers lead to higher premium payment and more financial restrictions for the acquirers (Offenberg and Pirinsky, 2015). Tender offers also relate to better post-transaction performance (Agrawal and Jaffe, 2000; Agrawal, Jaffe, and

Mandelker, 1992). Thus, we further control for a tender offer dummy (1 for tender offers and 0 otherwise).

We also control for several acquiring/borrowing-firm characteristics. We control for the size of the borrowing firm because larger firms are in a better position to serve debt (Faccio and Masulis, 2005; Strahan, 1999). We measure size using the natural logarithm of the acquiring firm's total assets reported in the fiscal year ending before the deal announcement. Firms with a higher leverage ratio are likely to have less cash to serve debt (Faccio and Masulis, 2005), potentially increasing loan prices. We, therefore, control for the ratio of the sum of long-term debt and debt in current liabilities to book value of total assets, measured at the end of the fiscal year before deal announcement. A deal with greater relative size may lead to a greater increase in the acquiring firm's leverage. We, therefore, also control for the change in acquirer leverage in our regression analysis. Borrowing firms with more investment opportunities have a greater demand for bank loans (Martin and Santomero, 1997). Meanwhile, firms with more growth opportunities are more likely to under-invest when debt overhangs (Myers, 1977). Thus we control for the acquiring firm's market-to-book ratio of equity. Risk-averse lenders usually desire tangible assets because these assets provide better loan security (Faccio and Masulis, 2005) and are easier to value (Strahan, 1999) than intangible assets. Firms can also use tangible assets as collateral to reduce loan risk. Hence we control for the acquiring firm's asset tangibility ratio. We use two variables to control for the acquiring firms' bankruptcy risk (Scott and Smith, 1986). One is the Altman's Z-score (Altman, 1968). The other is the borrower's credit rating (Lim, Lee, Kausar, and Walker, 2014). We convert the acquiring firm's S&P long-term credit ratings into an index ranging from 1 to 7 (1 = AAA, 2 = AA, ..., 6 = B or worse, 7 indicates firms without ratings) following Qian and Strahan (2007). Previous literature also find that merger performance decreases when a firm makes successive transactions (Aktas, De Bodt, and Roll, 2009; Aktas, de Bodt, and Roll, 2011; Fuller et al., 2002), which may in turn influence loan price. We, therefore, include a dummy variable to indicate serial acquirers in our regressions.

The third set of variables we control for relates to loan contract characteristics for the M&A transactions. First, we control for the loan size by adding the natural logarithm of the average amount of loan facilities used for a transaction scaled by the sum of the combining firms' total assets. We do this because lenders are more cautious when lending in large amounts, as large loans reduce diversification and increase banking risk (Diamond, 1984). Second, lenders use financial covenants to protect themselves (Bradley and Roberts, 2015; Rajan and Winton, 1995). We then add a dummy variable to control for the effects of

financial covenants (1 for the inclusion of financial covenants in any of the facilities used for a M&A transaction and 0 otherwise). Third, we add a dummy variable for relationship lending, because Bharath et al. (2011) document that relationship lending lowers loan price by mitigating the information asymmetry between lenders and borrowers. This dummy variable is one if the acquiring firm has borrowed previously from the lender(s) in the three years before M&A announcement and 0 otherwise. Fourth, Ivashina (2009) finds syndicated loans involve additional risks due to the information asymmetry among the lead and the participant lender. Thus, we control for this effect by including a dummy variable that is one if one or more of the facilities used for a M&A transaction is from syndication of lenders and zero otherwise. Last, lenders use performance pricing terms to mitigate the risks of adverse selection and moral hazards (Asquith, Beatty, and Weber, 2005). We control for this effect using a dummy variable that is one if any of the facilities used for a M&A transaction contains performance pricing terms and 0 otherwise.

Last, since the default spread between the risky debt and the treasury securities may capture cyclical factors affecting default risk, we control for the default spread in our regressions.

3.3 Econometric specifications for the loan-price analysis

We use the seemingly unrelated regressions (SUR) model for our main analysis, based on the assumption that the loan price and non-price terms (i.e., maturity and the use of collateral) in a M&A transaction are likely to be influenced by unobserved common factors. For example, about half of the M&A transactions in our sample are funded by more than one loan facility, and some of these facilities are initiated for multiple purposes aside from funding M&A transactions. These alternative uses of some of these loan facilities are not all disclosed, but they may influence all loan terms.[6] The SUR model allows the error terms of the system of equations to be statistically correlated, capturing the correlations among loan terms due to unmeasured factors. The SUR specification is also used in Aivazian et al. (2015); Ge, Kim, and Song (2012). Some of the previous literature examines the determinants of loan price and non-price terms within the same loan facility, using the simultaneous equation model (SEM), assuming simultaneous and consistent mutual impacts on each other among loan terms (e.g., Aivazian et al., 2015; Bharath et al., 2011). Since we investigate loan prices at the M&A transaction level instead of the facility level, it is hard to argue the loan terms of one facility impact those terms in other facilities at the same time (although they

[6] Dealscan only reports a maximum of two purposes of a loan facility.

may be statistically correlated). Moreover, according to Wooldridge (2013, p143 – 144), an SEM specification is most relevant when different equations represent the decision process of different economic agents, and the outcome variables are determined in the equilibrium. However, the loan terms in our analysis are determined by the same pair of lender and borrower.

In our SUR model, the dependent variables of the three equations are AISD, maturity, and a collateral dummy respectively. Both AISD and maturity are averaged across the facilities for each deal. The collateral dummy is one if any facility used to fund a M&A transaction is secured by collateral and zero otherwise. The $\mathbf{X_i} \quad (i = 1, 2, 3)$ is the vector of independent variables for each equation. All dependent variables do not appear on the right-hand side of the equations, but ϵ_i can be correlated.

$$\begin{cases} AISD & = \mathbf{X_1}\boldsymbol{\alpha} + \boldsymbol{\epsilon_1} \\ Maturity & = \mathbf{X_2}\boldsymbol{\beta} + \boldsymbol{\epsilon_2} \\ Collateral & = \mathbf{X_3}\boldsymbol{\gamma} + \boldsymbol{\epsilon_3} \end{cases} \tag{1}$$

The vectors of independent variables are not entirely the same across equations.[7] The variables excluded from each equation (and appear in other equations) are broadly in line with Bharath et al. (2011) and Aivazian et al. (2015). In the AISD equation, we include the acquiring firm's ratio of EBITDA to sales,[8] current assets ratio, and the natural logarithm of interest coverage ratio, all measured before the M&A announcement. A higher EBITDA to sales ratio means higher profitability and predicts higher future cash flows and better loan quality. As is shown by Bharath et al. (2011) among others, higher profitability is associated with lower borrowing costs. A higher current asset ratio lowers loan price as it reduces liquidity risk and improves loan quality. In the previous literature (e.g. Bharath et al., 2011), however, these variables hardly bear on the choice of debt maturity directly. We, therefore, exclude them from the maturity equation. Profitability may be used to evaluate creditability in cash-flow based loans and may substitute for hard assets as collateral. We, therefore, include EBITDA/Sales in the collateral equation. Interest coverage ratio directly reflects the acquiring firm's ability to service interest payment and, therefore, is an important determinant of loan price. The interest coverage ratio's links to maturity and collateral, however, are not as obvious. Previous studies on debt maturity usually do not include

[7] This is for economic reasons which we discuss below. Econometric wise, the vectors are allowed to be the same, in which case the OLS estimator gives consistent estimation(see Wooldridge, 2010, p143–144). When we set the vectors to be the same as the OLS estimator, we obtain similar results. We use the Feasible General Least Square (FGLS) estimator for estimation.

[8] EBITDA denotes the Earnings Before Interest Tax Depreciation and Amortization.

interest coverage as a determinant (Barclay and Smith Jr, 1995; Huang and Shang, 2019)

In the maturity equation, we include the natural logarithm of acquiring firm's asset maturity as a unique determinant excluded from other equations. Hart and Moore (1994) postulate that the firm attempts to match its debt maturity to the economic life of the assets. Therefore, the firm's asset maturity affects the choice of maturity of debts but is unlikely to influence other loan terms. For the collateral equation, we add the industry mean of firm asset tangibility ratio as a unique determinant. The industry mean of firm tangibility ratio in each year is based on Bharath et al. (2011) who posit that borrowers in the industries with more tangible assets are more likely to be required to put up collateral. Meanwhile, the industry average asset tangibility is hardly of direct relevance for loan price and maturity choice. In each equation, we also control for the characteristics of the acquiring firms, those of the M&A transactions, those of the loan contracts, and industry and year effects. The unique variables included in each equation are most relevant for their corresponding loan terms and bear no obvious impact on other loan terms. Given the loan terms are contracted jointly for a loan facility, we cannot strictly rule out the relevance of these unique variables to other loan terms, which represents a possible caveat in the current SUR specification. In an unreported robustness check, we force the set of determinants to be the same across all three equations and used OLS for estimation. Our results do not change qualitatively. We include the detailed definitions of these control variables in the appendix at the end of this paper.

4 Empirical Analysis

4.1 Sample distribution and summary statistics

Table 1 presents the distribution of our sample along four dimensions. Panel A contains the distribution by announcement years. The peak years are from 1997 to 1999, when 141 transactions were announced (approximately 27% of our sample). The trough years are 2000 – 2003 and 2008 – 2011. Panel B reports that 86% of the acquiring firms made only one transaction in our sample, and 14% of the acquiring firms have multiple M&A transactions. Panel C list the number of M&A transactions by the number of loan facilities used. There are 235 transactions linked to only one facility (45.9% of the sample), and 153 transactions use two facilities (29.88% of the sample). The largest number of facilities used in one M&A transaction is five. Panel D shows that 71% of the loan facilities have their inception date between the M&A announcement date and effective date. Seventeen facilities begin on the

announcement date, and 288 (27%) begin before the announcement date. No facility begins after the effective date.

[Insert Table 1 Here]

Table 2 reports the summary statistics of the variables used in our analysis. The (weighted average) AISD and the arithmetic average AISD have very similar sample statistics. The mean of the arithmetic average AISD (AISD) is 194 (187) basis points higher than the London Interbank Offered Rate (LIBOR). The mean and median of the relative size ratio are 0.62 and 0.37 respectively. A quarter of M&As are funded by the lenders who have previous lending relationship with the acquiring firm. Around two-thirds of M&As in our sample contain performance pricing terms in their loan contracts. Thirty five percent of the transactions take place between two firms from different 2-digit SIC industries (the Diversify Deal Dummy), and fifty five percent of the target firms are publicly listed, while 16% of the targets are subsidiaries. Thirteen percent are cross-border M&As. Three percent are hostile deals. Tender offers contribute 26% to the sample.

Table 2 also presents the characteristics of acquiring firms and loan contracts. Acquiring firms in our sample, on average, are large or medium firms, with the mean value of total assets reaching 2314.35 million dollars. Acquiring firms' average leverage ratio is 0.26, indicating robust debt capacity. The average acquirer's Altman's Z-score is 4.88, reflecting low bankruptcy risks. On average, the market-to-book ratio is 3.50, and EBITDA is 19% of total sales, showing solid growth and profitability. 28% of the total assets of the acquiring firms are tangible assets, and the current assets are about twice current liabilities. The average credit rating index is 5.99, somewhat below the rating of BB. Twenty five percent of acquirers are serial acquirers according to the definition in Appendix I. In terms of loan-contract characteristics, the average facility amount is 505 million dollars and average maturity is 54.32 months. Sixty percent of the acquiring firms offer collateral to secure loans. And there are 77% of the M&A transactions are funded by loan facilities with financial covenants. Notably, almost all of the M&As are funded by syndicated loans, and this is because M&A transactions are often too large for a single bank to fund.

Regarding acquisition performance, we observe that acquirers underperform CRSP value-weighted market index by 5% in the three years after the transaction. The industry-adjusted ROA of an average acquirer is 7% before and 6% after the transaction.

[Insert Table 2 Here]

4.2 Univariate analysis of loan price

Table 3 presents the univariate analysis on the (weighted average) AISD. We examine how AISD differs between subgroups divided according to our variables of interest (i.e., the relative deal size) as well as several other M&A characteristics. The AISD is significantly (at the 1% level) higher for the transactions with larger relative size. Large transactions (with relative deal size greater than the sample mean) have an average AISD of 228.36 basis points above LIBOR, whereas small transactions (relative deal size is less than the sample mean) have an average AISD of 166 basis points above LIBOR, indicating that larger transactions have higher loan price.

Table 3 also reports the differences in the AISD between subsamples defined using a set of other M&As characteristics. We find the AISD is significantly (at the 1% level) higher for the deals where the consideration includes stock payment than those deals paid all by cash (mean values are 214.70 vs. 175.62 basis points above LIBOR), which suggests that stock payment is used for riskier deals. We find no significant difference in the AISD between diversifying deals and non-diversifying deals. The AISD is significantly different between the acquisitions of public targets and those of non-public targets. Public targets are associated with an average AISD about 32 basis points lower ($t = 3.25$), indicating the factors associated with a target's public status, e.g., information asymmetry (Officer et al., 2008) and the targets' liquidity demand (Fuller et al., 2002), potentially influence loan price. A subsidiary target is associated with significantly higher AISD than public and private targets (218.70 vs. 181.13), indicating lenders perceive it as less risky to acquire the assets of a subsidiary than to acquire the whole of a firm. Cross-border transactions have significantly lower average AISD than domestic transactions (163.18 basis points vs. 190.48; $t = 2.10$), which contradicts the prediction based on Denis et al. (2002). Hostile deals have significantly lower (at the 1% level) AISD than friendly ones (105.59 vs. 189.19 basis points above LIBOR). It is possible that hostile deals remove inefficient management, enhancing deal and loan quality. Tender offers have significantly lower loan prices than negotiated deals (152.91 basis points above LIBOR vs. 199.18; $t = 4.17$). The use of tender offer is a strong indication of an acquiring firm's favorable evaluation of the deal and the ease of completing the deal, which is likely to overweight the concerns of overpaying the target. In our subsequent multivariate analysis, we control for these effects.

[Insert Table 3 Here]

4.3 Multivariate analysis of loan price

We report the results of our SUR analysis in Table 4. The regressions are at the M&A deal level. The Breusch-Pagan χ^2 statistic at the bottom of the table is significant at the 1% level, rejecting the null hypothesis that error terms of the equations are uncorrelated. This result validates our use of the SUR model. The coefficient of the relative deal size ratio in the AISD regression under column 1 is 0.164 and significant at the 1% level($z = 5.40$), indicating a one standard deviation increase of the relative size ratio (i.e.,0.74) raises an average acquirer's AISD by 22.70 basis points. This result demonstrates that lenders are concerned about large transactions and their associated risks (Alexandridis et al., 2013; Datta, 1991; Faccio and Masulis, 2005; Hansen, 1987). It is also in line with the observation of Moeller, Schlingemann, and Stulz (2004) that acquiring firms receive lower gains from large deals, which in turn lower loan quality. This result is robust to the inclusion of industry and year effects.

Several acquiring firms' characteristics and loan-contract characteristics also exhibit significant effects on AISD. The coefficient on the natural logarithm of the acquiring firm's total assets is significantly (at the 1% level or above) negative in the AISD regression, consistent with the common observation that large firms have better debt capacity and loan quality. The acquiring firms with higher leverage have significantly (at the 1% level with $z = 6.89$) higher AISD than those with lower leverage, consistent with what Faccio and Masulis (2005) find. The acquiring firms' market-to-book ratio is statistically insignificant. The dummy variable for serial acquirers is statistically insignificant too. We further note that the tangibility ratio has a negative (-0.357) and significant (at the 5% level) coefficient in the AISD equation, consistent with the idea that higher asset tangibility relates to better value certainty and debt quality (Faccio and Masulis, 2005; Strahan, 1999). Poorer credit rating indicates greater default risk and, therefore, relates to higher AISD. Indeed, in the AISD equation, the credit rating index has a positive (0.070) and significant (at the 1% level) coefficient (recall we encode this score as an inverse measure of creditability). The Altman's Z-score does not have a statistically significant coefficient in the AISD equation. Possibly the credit rating index subsumes the effect of bankruptcy. A larger relative deal size may lead to more loan financing, which increases the acquiring firm's leverage from before to after the transaction. To rule out the possibility that the relative size effect is due to change in leverage, we explicitly control for the change in leverage in the AISD equation. We notice that the change in leverage indeed significantly increases the loan price (the coefficient is 0.611 and significant at the 1% level ($z = 2.69$). However, the relative deal size effect is not affected by the inclusion of the change in leverage. We also explicitly control for the amount

of loan facilities scaled by acquirer post-transaction total assets. This variable measures the change in acquirer leverage due to the use of loans. The coefficient on this variable, however, is statistically insignificant. It could be that the facility amount impact loan prices through the change in leverage, and its effect is subsumed by the later effect.[9]

The coefficient on relationship lending dummy is statistically insignificant, at odds with the finding of Ivashina and Kovner (2011). These results suggest M&A transactions considerably alter the risk profile of the acquiring firm, making weak the effect of relationship lending. The performance pricing dummy has a negative and marginally significant ($z = -1.67$) coefficient in all specifications. Further, we do not find the loan syndication to have a statistically significant coefficient.

Turning to the deal characteristics (namely the diversify deal dummy, the public target dummy, the subsidiary target dummy, the cross-border deal dummy, the hostile deal dummy, and the tender offer dummy), we do not find any of them have a significant impact. Such absence of effects indicates that these deal characteristics are of secondary concern for the lenders compared to the relative deal value.

As is expected, the coefficient on $ln(1 + interest\ coverage)$ is negative (-0.048) and significant at the 1% level ($z = -2.29$). The coefficient on $EBITDA/Sales$ is -0.368 and statistically significant at the 10% level, indicating higher acquirer profitability is associated with lower loan price. The coefficient on the *current ratio* has the expected negative sign (-0.014) but is statistically insignificant.

From columns 2 and 3, we note that the relative deal size has a significantly positive impact on the loan maturity but does not significantly impact the use of collateral (although the sign is as expected). In particular, the relative deal size has a coefficient of 0.080 (significant at the 5% level) in the maturity regression under Column 2, and an insignificant coefficient (0.044) in the collateral regression. Other control variables have coefficients largely as predicted. For example, a higher acquirer pre-transaction leverage ratio or a greater change in the ratio is associated with more frequent use of collateral.

[Insert Table 4 Here]

[9] Fishman (1989) posits that the means of payment in an acquisition is significantly affected by the risk of deal incompletion. Since the effectiveness of a loan is contingent upon the completion of a deal, it would be interesting to study how the risk of incompletion impact loan price. Unfortunately, we only have seven withdrawn deals in our sample, which does not allow us to conduct a serious analysis.

4.4 Robustness tests

Apart from using M&A deal-level data, we also use facility-level data to perform robustness checks. Here, we measure loan-contract characteristics for each facility. We report the results in Table 5. Column 1 contains OLS estimates, assuming maturity and collateral dummy are predetermined. The coefficient of the relative size ratio is positive (0.103) and statistically significant at the 1% level. We find both maturity and collateral are positively and significantly (at the 1% level) related to AISD. Loans with longer maturity usually involve greater risks, which pushes up the loan price. The interpretation of the positive association between collateral and loan price has two folds. On the one hand, collateral and higher loan price could be substitutes; on the other, lenders are more likely to ask for collateral to secure riskier loans. The coefficient on collateral reflects the net effect.

In columns 2, 3, and 4, we report the estimates of the SUR model at the loan facility level. In the AISD equation, the relative deal size has a coefficient of 0.119 which is statistically significant at the 1% level ($z = 4.11$). At the bottom of the table, the Breusch-Pagan χ^2 test statistic indicates significance at the 1% level, rejecting the null hypothesis that the error terms are uncorrelated across equations. This test further confirms that the SUR model is an appropriate specification in our context of analysis.

Since we include only the loan-financed M&A transactions in the sample for loan-price analysis, the self-selection issue (Heckman (1979)) may bias our estimates. Therefore, we use the Heckman (1979) self-selection model to test the robustness of our results, using data at the M&A deal level. We report the results in column 9. The execution of the Heckman (1979) model requires a two-step procedure. The first step is to estimate the probability of loan finance (reported in Model 1 of Table 7). The dependent variable of the second stage is the natural logarithm of the (weighted average) AISD. All other variables are identical to those in the baseline model except that we also include the Inverse Mills Ratio (IMR) obtained from the first stage. The coefficient on the IMR is statistically insignificant ($t = 0.67$), suggesting self-selection is unlikely to affect our results. The coefficient on the relative deal size is qualitatively the same as in our baseline SUR tests.

In columns 5 – 8, we include two additional variables to indicate the types of loan facilities, *Amendments of existing loans* to indicate a facility amended from existing loans and *Existing credit facility* to indicate existing credit facilities without any amendment. Acquirers also often use newly-contracted facilities for M&As whose effects are subsumed in the intercept term. In columns 5 and 6, we note that, while the amendments of existing loans have prices statistically indistinguishable from those of new loans, existing loans have significantly lower

prices than new loans. The coefficients on the dummy variable of *Existing credit facility* is −0.131 and −0.137 and statistically significant at the 5% and 10% levels, in columns 5 and 6 respectively. The lower price on existing loans could be because existing loans are contracted before the merger announcements and, therefore, would not have accounted for the merger uncertainties appropriately.

Some results on control variables change at the facility level, compared to the results at the M&A deal level reported in Table 4. The *Credit rating index* and *Tangibility ratio* no longer have significant effects on loan prices according to the OLS or Heckman estimates.[10] The magnitude of coefficients remains comparable to those estimated at the M&A deal level. These results suggest that the effects of *Credit rating index* and *Tangibility ratio* are either due to cross-M&A-deal variations or sensitive to the bias introduced by endogeneity issues such as self-selection and unobserved common factors among loan terms. The statistical significance of *Performance pricing term dummy* increases to the 1% level in the OLS and SUR specifications and to the 5% level in the Heckman specification. The magnitude of the coefficient also increases considerably to between −0.143 (in column 9) and −0.261 (in Column 1). *Diversify deal* now exhibits a significantly (at the 10% level or above) negative effect on loan prices at the facility level. Performance pricing terms force a borrower to share the lender's post-transaction risks by relating the interests charged on a facility to the borrower's financial performance(Asquith et al., 2005). Diversifying deals combine two firms with less perfectly correlated cash flows, which makes debt safer via co-insurance (Kim and McConnell, 1977; Lewellen, 1971).[11] The effects of *Performance pricing term dummy* and *Diversify deal* become salient at the facility level, possibly because the power of test is greater due to the increased sample size.

[Insert Table 5 Here]

In Table 6, we further control for several additional variables. Due to data availability, adding these variables reduces our sample size considerably. From a theoretical point of view, however, these variables may impact the loan price. In particular, we include the target firm's Altman's Z-score in Column 1 because the target default likelihood may impact loan price for the combined firm. In Column 2, we add the offer premium to the regression for the concern that overpayment to the target shareholders may harm post-transaction performance and reduce loan quality. On the other hand, a higher premium may indicate higher deal synergy, which improves loan quality. The effect of offer premium, therefore, is an empirical question.

[10] The *Credit rating index* and *Tangibility ratio* remain significant in the SUR specifications at the facility level.

[11] Worth noting is that the effect of *Diversify deal* becomes statistically insignificant under the Heckman specification, suggesting it is potentially subject to the self-selection bias.

In Column 3, we add the acquiring firm's pre-transaction stock return volatility to control for the inherited value uncertainty of the acquirer. In columns 4 and 5, we add the *E*-index (Bebchuk, Cohen, and Ferrell, 2008) and the CEO duality measure (Brickley, Coles, and Jarrell, 1997) to explicitly control for the quality of acquirer's corporate governance. We find that the effect of relative deal size persists in all the regressions. The additional variables discussed above has no significant effects on AISD apart from the acquirer's pre-transaction stock-return volatility.

4.5 Predicting the probability of loan financing in M&A transactions (also the first stage of the Heckman two-stage model)

To a certain extent, we write this section in a retrospective sense. It is important to understand why an acquirer prefers loan financing before studying how terms of the loan contracts depend on firm and deal characteristics. Also, in the first stage of the Heckman procedure reported in Table 5, we estimate the probability of loan financing using a probit model.

There is a rich set of theoretical and empirical work guiding our estimation. We are not the first one to empirically model the sources of finance in M&A transactions. Martynova and Renneboog (2009) study how companies choose among various financing sources in the European context, including debt. Martynova and Renneboog (2009) do not distinguish between public and private debt. In the current study, we focus on estimating the likelihood of (private) loan financing in M&A transactions.

We explain the rationale to include the following determinants and present the detailed results of these variables in Table 7 The first set of determinants are firm characteristics related to risk, information, or agency issues. The pecking order theory (Myers and Majluf, 1984) postulates that companies prefer internal funds to external ones because internal funds involve lower adverse selection costs. Therefore, whenever possible, an acquirer prefers to use internal funds. This implies that acquirer's internal cash flow scaled by the transaction value should negatively impact the use of loans. Previous literature has highlighted a firm's asset tangibility as a measure of debt capacity (Frank and Goyal, 2009). Tangible assets can be set aside as collaterals to secure loans, increasing the probability of loan financing. We, therefore, use the tangible assets in proportion to total assets as a measure of debt capacity. Martynova and Renneboog (2009) also use another variable as a proxy for debt capacity, which is calculated as (long-term debt + transaction value)/Total assets at the end of fiscal year prior to the announcement of the M&As. We include this variable in our regression too.

A strand of literature demonstrates that overvalued firms tend to use their stocks to acquire less overvalued targets(Rhodes-Kropf and Viswanathan, 2004; Shleifer and Vishny, 2003). We expect overvalued acquirers less likely to use loan when they can time the stock market. We measure the degree of overvaluation by the pre-acquisition acquire stock-price run-up. Moreover, the agency problem of debt overhang (Myers, 1977) also renders the lenders more reluctant to provide credit. A manager working for the best interest of shareholders may under-invest if a new project only makes the outstanding debt safer instead of benefiting the shareholders. Such a debt overhang problem is especially relevant for high-growth firms. Therefore, we use the market-to-book ratio of assets to measure the severity of the debt overhang problem. Strahan (1999) posits that lenders are less willing to supply credit when a potential borrower is riskier. To reflect this effect, we use the acquirer's pre-transaction market beta and the acquirer's age as proxies for firm risk. We expect these risk measures to harm the likelihood of loan financing. The acquiring firm's size may bear on the choice of loan finance too because larger firms often have access to a myriad of financing sources, for example, large firms usually have access to the bond market while small and medium-sized firms tend to rely on loan financing (Strahan, 1999). Consequently, we expect larger acquirers to rely less on loan financing. Meanwhile, larger firms usually have greater debt capacity, which may well increase the use of loans. Therefore, the effect of firm size has two folds. We use the amount of total assets to measure firm size. A strand of literature shows that managers can take more debt either to entrench themselves by making the firm more difficult to takeover (Harris and Raviv, 1988; Stulz, 1988; Zwiebel, 1996) or to commit themselves to good performance and make a takeover less attractive to potential bidders (because the marginal gain of replacing the current management will be reduced.) (Jensen and Meckling, 1976; Safieddine and Titman, 1999). Since the managerial intention is not observable, we use a high concentration ratio of institutional ownership to indicate a high degree of monitoring from outside shareholders. A higher concentration is associated with tighter monitoring by institutional investors because the investors would have less incentive to free-ride on each other's effort. If more debt commits managers to good performance, greater institutional ownership concentration should substitute for higher debt as the marginal improvement in firm value under higher debt would be low. Institutional shareholdings concentration, therefore, should negatively impact the loan likelihood. If more debt entrenches current management, managers will find it more difficult to increase debt for the entrenchment purpose under greater institutional ownership concentration. Therefore, regardless of the implications of a higher debt level, greater institutional ownership concentration relates to

less loan financing.

Apart from firm characteristics, transaction characteristics may also influence the choice of loan financing. Larger transactions often rely on external financing more because internal cash is insufficient. Meanwhile, larger transactions involve greater risks and information asymmetry (Ahern, 2010; Alexandridis et al., 2013; Datta, 1991; Faccio and Masulis, 2005; Hansen, 1987; Shrivastava, 1986), which make it more difficult to issue public debt and public equity. Therefore, how relative deal size impacts the probability of loan financing is an empirical question. Acquiring a target in a different industry may involve more risks because of the lack of experience with the new business line. However, the diversification into a different industry may also reduce risk exposure to specific industries because cash flows are not perfectly correlated across industries (Roll, 1988). Therefore, how diversifying acquisitions impact loan finance is an empirical question. A cross-border deal often involves a high level of risk because of uncertainties associated with politics, policies, economics, and culture in a different country. Lenders are often reluctant to extend credits across country borders. Therefore, we expect cross-border deals to be less likely to use loan financing. The target firm's public status may also influence the likelihood of loan finance because private targets are more opaque than public ones and have greater informational risk (Officer et al., 2008). We add a dummy variable indicating a public target in our regression. Hostile deals are often related to the removal of inefficient managers while friendly deals related to strategic synergies. Their implications on performance are hardly distinguishable; however, according to Schwert (2000). We include a dummy variable indication hostile deals in our regression analysis but do not expect it to have a significant impact on loan finance. Previous literature also finds tender offers and subsidiary acquisitions are related to superior performance (Agrawal and Jaffe, 2000; Agrawal et al., 1992; Maksimovic and Phillips, 2001). Since better performance improves loan quality and encourages lending, we expect subsidiary targets and tender offers to be associated with a high likelihood of loan financing.

In Table 7, we report the estimates of the probability of loan financing (i.e.,the first stage results of the Heckman procedure in Table 5). In Column 1, we report the baseline specification. Consistent with the pecking order theory (Myers and Majluf, 1984), the coefficient on Cash flow/Transaction value is -0.068 and statistically significant at the 1% level. The greater the internal cash flow relative to transaction value, the less likely the acquirer borrowing externally. Unlike what Frank and Goyal (2009) posit, we don't find a significant coefficient ($z = 1.39$) on the asset tangibility ratio, although the sign is as predicted (0.289). The variable (long-term debt + transaction value)/total assets has a positive coefficient

(0.069) and significant at the 5% level, which suggests that an acquirer with greater debt capacity tends to use more loans to finance a transaction. Consistent with the market-timing hypothesis, the acquirer's pre-transaction stock price run-up has a negative and marginally significant coefficient (−0.234), suggesting overvalued acquirers rely more on external equity than loan. The acquirer's market-to-book ratio has a significantly (at the 1% level) negative coefficient (−0.070), consistent with the view under the debt overhang problem of Myers (1977) that high growth firms reduce loan financing to avoid the underinvestment problem. The acquirer pre-transaction market beta (Beta [−300, −60]) has a negative coefficient of −0.239 which is significant at the 1% level ($z = -3.61$), in line with the view that lenders are more reluctant to supply credit to risker firms Strahan (1999). The other risk measure, age, is insignificantly associated with raising loans. The coefficient on the acquiring firm's size (measured by $ln(TotalAssets)$) is significantly ($z = -2.96$) negative at −0.089. At first sight, this may be counter-intuitive because larger firms usually have greater debt capacity. A second thought, however, indicates large firms also have access to other sources of finance and are not solely dependent on loans (Strahan, 1999). The institutional ownership concentration negatively and significantly impacts the likelihood of loan financing. The coefficient is −1.478 and significant at the 1% level, indicating higher institutional ownership concentration either constraints the entrenchment effect of debt (Harris and Raviv, 1988; Stulz, 1988; Zwiebel, 1996) or substitute for the commitment effect of debt (Jensen, 1986; Safieddine and Titman, 1999).

Turning to the deal characteristics, we find the relative deal size has a significant positive effect on loan financing. The coefficient is 0.103 ($z = 2.52$), suggesting that, when internal cash is likely to be insufficient for large deals, the acquirers resort to external funds from loan financing. A deal that diversifies into another industry does not involve significantly different likelihood of loan financing. This can be due to the argument we made earlier that, although businesses in a new industry involve more uncertainties, the diversification effect (Roll, 1988) reduces risk simultaneously. The coefficient on the cross-border dummy is significantly ($z = -4.65$) negative at −0.263. This result suggests that although cross-border acquisitions may have some international diversification effect, what dominates is the higher risk involved in conducting business in a different country. Consequently, it is harder to obtain loans from lenders. The coefficient on the public target dummy is statistically insignificant, contrary to the view that public targets involve lower informational risk (Officer et al., 2008) which enhances loan financing. The coefficient on the hostile deal dummy is statistically insignificant at the conventional level, in line with the argument of Schwert

(2000) that hostile deals are indistinguishable from friendly ones in terms of value implication. The subsidiary-target dummy has a significantly ($z = 2.84$) positive coefficient of 0.224. The tender offer dummy has a coefficient of 0.781 and statistically significant at the 1% level ($z = 5.64$). This evidence is in line with the thought that asset acquisitions and tender offers are value-enhancing, which in turn enhances the acquirers' capability of access loan financing.

In Column 2, we add three additional variables, i.e., the *Altman's Z-score* for both the acquirer and the target firms, and the acquirer's *Credit rating index*. We find the acquirers' *Credit rating index* significantly (at the 5% level) increases the likelihood of loan financing. Neither the acquirer's nor the target's *Altman's Z-score* significantly relate to the likelihood of loan financing. In Columns 3 through 7, we include the variables *Premium 4 weeks prior to announcement date*, *Acquirer's 24-month return volatility prior to announcement date*, the *E-index* (Bebchuk et al., 2008), and the dummy for *Separated CEO and chair*, respectively. The availability of these variables is problematic, which leads to a substantial reduction in sample size. To preserve sample size, we include them alternatively. We note that the effects of the original variable in the baseline specification remain largely unchanged after the inclusion of these variables. The variable *Acquirer's 24-month return volatility before announcement date* has a significantly negative effect on the likelihood of loan financing, consistent with the lender's aversion to uncertainties. The other three variables do not have any significant relation with the loan-financing likelihood.

Altogether, we find the prediction of loan-financing probability is largely in line with the previous literature regarding information asymmetry and agency costs.

4.6 Cross-sectional analysis of the effect of relative deal size on loan prices

In this section, we examine how the positive effect of relative deal size on loan price varies according to measures of credit quality, information uncertainties, and deal complexity. We use an acquiring firm's leverage and Altman's Z-score (Altman, 1968) to measure the acquiring firm's credit quality. A positive (negative) change in leverage (the Altman's Z-score) measures a deterioration of credit quality. We then form interaction terms using relative deal size and the changes in these two measures (i.e., Δ*Leverage* and Δ *Altman's Z-score*) in Models 1 and 2 of Table 8, respectively. In Model 1, the interaction term between relative deal size and ΔLeverage has a positive and significant (at the 5% level) coefficient (0.276), showing a significantly stronger positive effect of relative deal size when credit quality decreases after the merger. Previous literature shows that mergers increase the acquiring

firm's leverage and default risk (e.g., Furfine and Rosen, 2011; Ghosh and Jain, 2000). Our finding is consistent with the conjecture that acquirers' aggravated credit risk after M&As, if any, promots lenders to ask for higher loan prices. In Model 2, we use Δ *Altman's Z-score* as an alternative measure of the change in acquiring firm's credit quality. The coefficient on the interaction term is negative (-0.026), which is as predicted because a higher Altman's Z-score measures a better credit quality. This coefficient is marginally significant at the 10% level.

In models 3 and 4, we use the number of analysts following the acquiring firm and the number of block institutional investors (holding 5% of the acquiring firm's shares outstanding or more) to proxy for the level of information uncertainty. As an effective information intermediary (e.g., Brennan, Jegadeesh, and Swaminathan, 1993; Elgers, Lo, and Pfeiffer, 2001; Gleason and Lee, 2003; Walther, 1997), financial analysts provide valuable information to facilitate a lender's risk assessment. Also, a greater shareholder base built on institutional ownership facilitates information production and lowers information uncertainty (Boone and White, 2015; Merton, 1987). Again, we measure the change in these two variables after the mergers (i.e., Δ *No. of analyst following* and Δ *No. of block institutional investors*). We find that an increase in the number of analysts diminishes the positive effect of relative deal size. The coefficient on the interaction term is -0.008 and marginally significant at the 10% level. Under a borrower's improved information environment, lenders can be less concerned about their exposure to information uncertainty, which weakens the positive effect of relative deal size on loan price. In Model 4, however, when we use Δ *No. of block institutional investors* to measure the change in a firm's information environment, we do not find that the interaction term significantly alters the effect of relative deal size.

In Models 5 and 6, we use two proxies of deal complexity, namely, the Herfindahl-Hirschman index based on a company's business-segment sales (HHI) and the number of analysts covering both the acquiring and the target firms (shared analyst coverage). A firm's business complexity increases with the level of diversity (i.e., low HHI; Cohen and Lou, 2012). Simpler transactions, therefore, involve a lesser decrease in the acquiring firm's HHI (i.e., lower ΔHHI of business segment sales). Regarding shared analyst coverage, because analysts tend to cover economically similar or related firms (Ali and Hirshleifer, 2020; Lee, Ma, and Wang, 2014), the merging firms are easier to integrate when they share more financial analysts. However, neither in Model 5 nor in Model 6, we find a significant coefficient on the interaction term between relative deal size and the measure of deal complexity. Notably, in Models 1 through 6, the relative deal size persistently has a significantly positive

effect on loan price.

In a nutshell, the results discussed in this section suggest that reduced credit quality is the most obvious channel underlying the effect of relative deal size, followed by information uncertainty. We fail to find any evidence showing that deal complexity is a likely explanation for the lenders' concern about a larger relative deal size. Since none of the interaction terms subsumes the independent effect of relative deal size on loan price, the positive effect of relative deal size must also represent other risk concerns that are not captured in our analysis. Further investigation can be rewarding in understanding the forces drive the effect of relative deal size.

4.7 Loan price and post-acquisition performance

Banks gain access to private information about borrowers in the screening and monitoring process (Bharadwaj and Shivdasani, 2003; Diamond, 1984; Rajan, 1992), which allows them to price loans more efficiently. Bank lending involves myriads of uncertainties and the terms of loan contracts are inevitably incomplete (Grossman and Hart, 1983; Hart, 2017; Hart and Moore, 1990). Strahan (1999) posits that lenders rely on loan prices to compensate for the risks that are hard to contract on. He suggests that loan prices can be a sufficient statistic of the borrower's post-contract performance. We, therefore, hypothesize that loan price is negatively related post-merger performance.

In Panel A of Table 9, we report our estimates on how loan price is associated with post-transaction performance. For the stock-market price performance, we estimate the following regression using OLS,

$$Post\ Performance_i = \alpha + \beta ln(AISD_i) + \mathbf{X_i}\eta + \epsilon_i \tag{2}$$

For the accounting-based performance measure (i.e., ROA), we follow the specification of Healy, Palepu, and Ruback (1992). Specifically,

$$Post\ Performance_i = \alpha + \beta ln(AISD_i) + \gamma Pre\ Performance_i + \mathbf{X_i}\eta + \epsilon_i \tag{3}$$

, where i indexes M&A transactions. *Post Performance* is the acquirer performance after the deal completion, and *Pre Performance* is the acquirer performance before the deal announcement. γ measures the extent to which an acquirer's pre-acquisition business persists after the transaction. β and η measure the effect of any explicitly specified variable on acquirer post-transaction performance. α measures the effect of the transaction on acquirer

performance aside from those explicitly controlled for. According to Strahan (1999), loan price summarizes any risks that cannot be addressed by other loan terms. If lenders on average price the loan correctly, the AISD should be a sufficient statistic for the combined firm's post-transaction performance. We, therefore, expect β to be significantly negative. We measure post-completion performance using four variables, namely, the combined firm's buy-and-hold return over the three years after deal completion (HPR36), the combined firm's buy-and-hold-abnormal return relative to the CRSP value-weighted market portfolio return (including distribution) (BHAR36) measured over the three years post-completion, the combined firm's return on assets (ROA), and the combined firm's ROA adjusted by industry median in each year (Adj. ROA).[12] The *ROAs* and adjusted *ROAs* are also measured over the three years before the deal announcement or after the deal completion. The $HPR36$ and $BHAR36$ are based on stock market data, and the ROA and $Adj.ROA$ are based on financial-statement data. In all the equations in Panel A of Table 9, we find the loan price variable $ln(AISD)$ have negative coefficients, and all coefficients are statistically significant at the 10% level or above. For example, in column 1, the coefficient on $ln(AISD)$ is -0.024 and significant at the 1% level, which suggests that a one-standard-deviation increase in AISD leads to a 1.44 percentage point decrease in the combined firm's ROA in the three years post-transaction.

The BHAR analysis above is based on event time. Events may cluster in time and the significance of long-run returns can be overstated because of cross-correlations among event firms' returns, as is pointed out by several previous studies (Fama, 1998; Kothari and Warner, 2007; Mitchell and Stafford, 2000). An alternative approach is to track the performance of an event portfolio in calendar time. Such a calendar-time approach weighs each time period equally and is more immune to the potential cross-correlation problem. We check the robustness of our results using the calendar time approach. In each calendar month between June 1994 and December 2019, we form a value-weighted portfolio of all the acquirers that have completed a M&A transaction in the previous 36 months. We then fit the monthly portfolio returns to asset-pricing models. Specifically, we estimate the following regression according to several commonly used asset-pricing models:

$$MR_t - R_{ft} = \alpha + \beta\, CMWAVG\text{-}AISD_t + \mathbf{F_t}\gamma + \epsilon_t \tag{4}$$

, where MR_t is the value-weighted monthly portfolio return. *CMWAVG-AISD* is the AISD averaged across the M&A deals contained in a calendar-time portfolio, value-weighted

[12] We get similar results when we measure performance over the 60 months post the deal completion.

using the *Facility amount* of each M&A transaction. R_f is the risk-free rate. $\mathbf{F}_t$ is a vector of factor returns commanded by a specific asset-pricing model. We adopt four asset pricing models for this analysis —the Carhart (1997) four-factor model, the Fama-French three-factor model (Fama and French, 1993), the Fama-French five-factor model (Fama and French, 2015), and the Q-factor model of Hou, Xue, and Zhang (2014).[13]

We report the results in Panel B of Table 9. Models 1, 3, 5, and 7 are estimated using OLS regressions. Since mergers may exhibit long-term performance, which may cause the event-portfolio returns to be correlated over time, we also estimate the regressions in Models 2, 4, 6, and 8 assuming a Generalized Autoregressive Conditional Heteroskedasticity process with autoregressive and moving-average of order 1 (GARCH (1, 1)). Consistent with the conjecture that loan prices correctly factor in post-merger performance, the coefficient on $CMWAVG\text{-}AISD$ is economically meaningful in all regressions, ranging from -0.430 to -0.655. The statistical significance of the OLS estimates on $CMWAVG\text{-}AISD$ are at the 10% level in three models and at the 5% level in one model. All the GARCH estimates are statistically significant at the 5% level.

In a nutshell, the results that the loan price significantly predicts the combined firm's post-transaction indicate that lenders price loans correctly on average. Broadly, these results are consistent with the view that lenders have private information about the borrowers as is maintained by Bharadwaj and Shivdasani (2003), Diamond (1984) and Rajan (1992).

5 Conclusive Remarks

Financing cost is a primary consideration in M&A transactions because it impacts M&A gains directly. Previous literature has studied the determinants of debt financing likelihood in M&As (Martynova and Renneboog, 2009) and how the use of debt financing impacts M&A performance (Bharadwaj and Shivdasani, 2003; Schlingemann, 2004). In this paper, we specifically study loan prices in M&A transactions. We find that the relative deal size has a significant and robust positive effect on loan prices. This positive effect is consistent with the notion that greater deal complexity and information risks are associated with large transactions (e.g., Alexandridis et al., 2013; Datta, 1991; Faccio and Masulis, 2005; Hansen, 1987). We also find higher loan price is associated with poorer post-transaction performance, which demonstrates that the loan price correctly incorporates the information on the quality of acquisitions.

[13] We thank Professor Lu Zhang for sharing the Q-factor returns with us. The Q-factor returns are updated to December 2018 at the time this manuscript was finalized for submission.

Our study also demonstrates that the characteristics of major corporate investment projects can affect loan prices significantly. We are not aware of another study from the extant literature that examines loan price or non-price terms in the context of major corporate investments such as M&A transactions. Previous studies have emphasized the importance of relationship lending, relationship syndication, borrowers' organizational structure, and accounting quality in determining loan prices (Aivazian et al., 2015; Bharath et al., 2011; Boot, 2000; Ivashina, 2009; Ivashina and Kovner, 2011, among others). These studies assume the funded projects are homogeneous. We contribute to the literature by showing that the variation in the characteristics of large corporate investments impacts loan prices significantly.

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Table 1: Sample distribution

Panel A: Distribution of M&A by years

Announcement Year	# of M&As	Percent%
1994	8	1.56
1995	31	6.05
1996	26	5.08
1997	51	9.96
1998	53	10.35
1999	37	7.23
2000	11	2.15
2001	17	3.32
2002	13	2.54
2003	12	2.34
2004	15	2.93
2005	17	3.32
2006	21	4.10
2007	27	5.27
2008	19	3.71
2009	3	0.59
2010	9	1.76
2011	16	3.13
2012	23	4.49
2013	15	2.93
2014	22	4.30
2015	35	6.84
2016	29	5.66
2017	2	0.39
Total	512	100.00

Panel B: Distribution of acquring firms by the number of M&As they each make

# of M&As done by an acquirer	# of firms	Percent%
1	377	86.07
2	50	11.42
3	9	2.05
4	2	0.46
Total	438	100.00

Panel C: Distribution of the M&As by the number of loan facilities used in each transaction

# of facilities used for one M&A	# of M&As	Percent%
1	235	45.90
2	153	29.88
3	68	13.28
4	20	3.91
5	34	7.03
Total	512	100.00

Panel D: Distribution of loan facilities by the beginning date relative to M&A announcement

	# of facilities	Percent%
Ann. date before facility beginning date	735	71.12
Ann. date and facility beginning date are same	17	1.61
Ann. date after facility beginning date	243	27.27
Total	995	100.00

This table reports the distribution of our loan funded M&A sample. *Panel A* shows the distribution by year of announcement of a M&A. *Panel B* tabulates the number of M&A transactions made by an acquiring firm. *Panel C* reports the distribution by the number of loan facilities used in a M&A transaction. *Panel D* shows the distribution by loan beginning date relative to M&A announcement date.

Table 2: Summary statistics

	# of M&As	Mean	S.D.	p5	p25	Median	p75	p95
Loan price								
AISD	512	187.07	112.32	30.00	100.00	175.00	252.50	400.00
Arithmetic average AISD	512	193.96	107.07	42.50	112.50	175.00	254.17	400.00
Ln(AISD)	512	5.06	0.67	3.74	4.72	5.16	5.53	5.99
Non-price loan terms								
Maturity	512	54.32	19.20	12.00	42.00	60.00	64.75	84.00
Ln(Maturity)	512	3.89	0.53	2.48	3.74	4.09	4.17	4.43
Collateral	512	0.60	0.49	0.00	0.00	1.00	1.00	1.00
Size of M&A transactions								
Relative deal size	512	0.62	0.74	0.07	0.20	0.37	0.78	1.68
Characteristics of M&As								
Stock payment dummy	512	0.29	0.46	0.00	0.00	0.00	1.00	1.00
Diversify deal	512	0.35	0.48	0.00	0.00	0.00	1.00	1.00
Public target deal	512	0.55	0.50	0.00	0.00	1.00	1.00	1.00
Subsidiary target deal	512	0.16	0.37	0.00	0.00	0.00	0.00	1.00
Cross-border deal	512	0.13	0.33	0.00	0.00	0.00	0.00	1.00
Hostile deal	512	0.03	0.16	0.00	0.00	0.00	0.00	0.00
Tender Offer	512	0.26	0.44	0.00	0.00	0.00	1.00	1.00
Characteristics of acquiring firms								
Total assets	512	2314.35	4413.69	50.46	234.88	713.92	2214.40	10167.00
Ln(Total assets)	512	6.57	1.62	3.92	5.46	6.57	7.70	9.23
Market-to-Book Ratio	512	3.50	3.76	1.02	1.56	2.47	3.86	8.86
Tangibility ratio	512	0.28	0.23	0.04	0.10	0.20	0.40	0.79
Altman Z-Score	512	4.88	4.18	1.20	2.66	3.79	5.54	12.60
Credit rating index	512	5.99	1.34	3.00	5.00	7.00	7.00	7.00
Leverage	512	0.26	0.20	0.01	0.09	0.23	0.36	0.63
ΔLeverage	512	0.10	0.14	-0.10	0.00	0.09	0.18	0.37
Serial acquirer dummy	512	0.25	0.43	0.00	0.00	0.00	0.50	1.00
Characteristics of loan contracts								
Facility amount	512	504.62	776.17	15.00	88.75	222.50	550.00	2000.00
Facility amount/total assets	512	0.42	0.37	0.07	0.19	0.31	0.56	1.16
Financial covenant dummy	512	0.77	0.42	0.00	1.00	1.00	1.00	1.00
Performance pricing terms dummy	512	0.68	0.47	0.00	0.00	1.00	1.00	1.00
Syndicated facility dummy	512	0.96	0.18	1.00	1.00	1.00	1.00	1.00

Relationship lending dummy	512	0.25	0.43	0.00	0.00	0.00	0.50	1.00
Extra control variables								
EBITDA/Sales	512	0.19	0.14	0.04	0.09	0.15	0.23	0.49
Current ratio	512	2.22	1.38	0.69	1.35	1.91	2.69	4.69
Ln(1 + Interest coverage)	512	2.40	1.35	0.77	1.51	2.14	2.88	5.38
Total assets maturity	512	3555.76	14477.36	21.47	97.31	338.29	1417.90	12009.62
Ln(Total assets maturity)	512	5.92	1.91	3.07	4.58	5.82	7.13	9.39
Market-wide default spread	512	0.02	0.01	0.02	0.02	0.02	0.03	0.03
Industry level average of tangibility	512	0.29	0.18	0.11	0.16	0.22	0.37	0.67
Target's Altman Z-Score	213	4.60	3.88	0.87	2.51	3.66	5.43	11.22
Offer premium	226	1.25	0.40	0.56	1.01	1.22	1.47	1.85
Acquirer's ex ante stock return volatility	450	0.11	0.05	0.05	0.08	0.10	0.13	0.21
E-index	198	2.95	1.22	1.00	2.00	3.00	4.00	5.00
Separated CEO and chair	344	0.49	0.50	0.00	0.00	0.00	1.00	1.00
Cross-sectional variables								
ΔAltman Z-score	431	−2.08	4.21	−7.58	−2.28	−0.98	−0.20	0.76
ΔNo. of analyst following	512	−0.26	2.93	−4.33	−1.00	0.00	1.00	3.33
ΔNo. of blockholder institutional investors	443	−0.18	1.41	−2.50	−1.00	0.00	0.75	2.00
ΔHHI of business segment sales	277	−0.06	0.31	−0.68	−0.10	−0.00	0.03	0.39
No. of shared analysts	226	3.22	4.30	0.00	0.00	1.00	5.00	12.00
Ln(1 + No. of shared analysts)	226	0.99	0.93	0.00	0.00	0.69	1.79	2.56
Performance measures								
ROA (Post-completion 3-year average)	460	0.12	0.08	0.03	0.09	0.12	0.15	0.22
Adj. ROA (Post-completion 3-year average)	460	0.06	0.13	−0.07	−0.00	0.04	0.09	0.30
ROA (Pre-announcement 3-year average)	460	0.14	0.20	0.04	0.10	0.15	0.19	0.30
Adj. ROA (Pre-announcement 3-year average)	460	0.07	0.22	−0.06	0.01	0.05	0.11	0.32
HPR36	391	1.29	0.96	0.16	0.67	1.08	1.66	3.04
BHAR36	391	−0.05	0.92	−1.11	−0.63	−0.23	0.26	1.68
$MR_t - R_f$	307	0.01	0.05	−0.07	−0.01	0.02	0.04	0.10

This table reports the summary statistics of variables used in our analysis. p5, p25, p75, and p95 denote the 5th, 25th, 75th, and 95th percentile, respectively. The variables are defined in the appendix.

Table 3: Univariate analysis

	Dummy variable=0/ Continuous variable < sample mean			Dummy variable=1/ Continuous variable ≥ sample mean				
	N	Mean	Median	N	Mean	Median	T	χ^2
Size of the M&A transaction								
Relative deal size	339	166.00	150.00	173	228.36	221.69	−5.92***	28.36***
Characteristics of the M&As								
Stock payment dummy	362	175.62	154.52	150	214.70	200.00	−3.43***	3.84*
Diversify deal	334	187.36	175 .00	178	186.53	175.00	0.08	0.58
Public target deal	228	204.87	200.00	284	172.77	150.00	3.25***	16.7***
Subsidiary target deal	431	181.13	156.19	81	218.70	221.02	−2.84***	5.90**
Cross-border deal	448	190.48	175.00	64	163.18	150.00	2.10**	4.74**
Hostile deal	499	189.19	175.00	13	105.59	75.00	3.06***	2.01
Tender offer	378	199.18	185.77	134	152.91	125.00	4.17***	9.80***

This table presents the mean and median equality tests of AISD for the subsamples divided according to the relative deal size and other M&A characteristics respectively. The T statistics is to test the equality of mean, and the χ^2 is to test the equality of median. ***, **, and * indicate the significance at the 0.01, 0.05 and 0.1 level, respectively.

Table 4: Baseline: SUR using M&A deal-level data

	Ln(AISD)	Ln(Maturity)	Collateral
Size of M&A transactions			
Relative deal size	0.164^{***}	0.080^{**}	0.044
	(5.40)	(2.10)	(1.55)
Characteristics of M&As			
Stock payment dummy	0.008	0.050	0.072^{*}
	(0.21)	(1.18)	(1.85)
Diversify deal	−0.042	−0.046	−0.032
	(−0.78)	(−0.78)	(−0.92)
Public target deal	0.033	0.015	−0.019
	(0.46)	(0.23)	(−0.28)
Subsidiary target deal	0.077	0.023	0.033
	(0.93)	(0.37)	(0.49)
Cross-border deal	0.029	−0.054	0.043
	(0.62)	(−0.71)	(0.80)
Hostile deal	−0.046	0.323^{***}	0.025
	(−0.42)	(2.79)	(0.33)
Tender offer	−0.027	-0.155^{**}	0.055
	(−0.45)	(−2.53)	(0.82)
Characteristics of acquiring firms			
Ln(Total assets)	-0.134^{***}	0.050	-0.108^{***}
	(−4.79)	(1.31)	(−3.48)
Market-to-Book Ratio	−0.008	−0.008	−0.002
	(−1.09)	(−1.06)	(−0.26)
Tangibility ratio	-0.357^{**}	-0.204^{*}	-0.336^{***}
	(−2.42)	(−1.83)	(−3.28)
Altman Z-Score	0.000	0.006	−0.005
	(0.05)	(0.84)	(−0.86)
Credit rating index	0.070^{***}	0.105^{***}	0.067^{**}
	(3.81)	(3.62)	(2.55)
Leverage	1.124^{***}	0.241	0.780^{***}
	(6.89)	(1.15)	(4.85)
ΔLeverage	0.611^{***}	0.244	0.417^{***}
	(2.69)	(0.92)	(2.64)
Serial acquirer dummy	−0.056	0.049	−0.054
	(−1.08)	(0.75)	(−1.44)
Characteristics of loan contracts			
Facility amount/total assets	0.118^{*}	−0.068	0.017
	(1.96)	(−0.67)	(0.32)
Financial covenant dummy	0.066	0.025	0.195^{***}

	(0.88)	(0.26)	(3.25)
Performance pricing terms dummy	-0.098^{*}	0.195^{**}	0.121^{***}
	(-1.67)	(2.37)	(2.86)
Syndicated facility dummy	0.000	0.457^{***}	-0.067
	(0.00)	(2.79)	(-0.81)
Relationship lending dummy	-0.002	0.019	0.045
	(-0.04)	(0.30)	(1.00)
Extra control variables			
EBITDA/Sales	-0.368^{*}		-0.242
	(-1.85)		(-1.62)
Current ratio	-0.014		
	(-0.85)		
Ln(1 + Interest coverage)	-0.048^{**}		
	(-2.29)		
Market-wide default spread	-2.196	-14.805^{**}	-18.001^{***}
	(-0.28)	(-2.51)	(-3.19)
Ln(Total assets maturity)		-0.032	
		(-1.47)	
Industry level average of tangibility			0.726
			(1.07)
Constant	5.297^{***}	2.423^{***}	0.815
	(12.91)	(6.13)	(1.32)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Breusch-Pagan χ^2		168.82	
N		512	

This table reports the results of seemingly unrelated regression (SUR) model, using M&A transaction level data. z statistics are listed in parentheses. Industry fixed effects are controlled at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcement. Standard errors are adjusted for clustering in each year. ***, **, and * indicate the significance at 0.01, 0.05, and 0.1 level, respectively.

Table 5: Robustness tests: facility-level analysis and M&A deal-level Heckman procedure

	OLS	SUR			OLS	SUR			Heckman
	(1) Ln(AISD)	(2) Ln(AISD)	(3) Ln(Maturity)	(4) Collateral	(5) Ln(AISD)	(6) Ln(AISD)	(7) Ln(Maturity)	(8) Collateral	(9) Ln(AISD)
Non-price loan terms									
Ln(Maturity)	0.082***				0.068**				0.089
	(2.83)				(2.06)				(0.99)
Collateral dummy	0.399***				0.405***				0.448***
	(8.92)				(7.84)				(7.86)
Size of M&A transactions									
Relative deal size	0.103***	0.119***	0.054*	0.030	0.132***	0.165***	0.098**	0.066**	0.109**
	(4.07)	(4.11)	(1.81)	(1.26)	(4.64)	(5.37)	(2.43)	(2.31)	(2.27)
Characteristics of M&As									
Stock payment dummy	−0.011	0.028	0.016	0.094**	0.011	0.046	0.075	0.070	0.008
	(−0.26)	(0.60)	(0.30)	(2.11)	(0.24)	(0.91)	(1.20)	(1.44)	(0.16)
Diversify deal	−0.074**	−0.090**	−0.072	−0.021	−0.060	−0.075*	−0.124**	−0.015	−0.077
	(−1.99)	(−2.27)	(−1.64)	(−0.57)	(−1.46)	(−1.78)	(−2.33)	(−0.35)	(−1.14)
Public target deal	0.029	0.031	0.018	−0.002	0.026	0.060	0.017	0.079	0.077
	(0.53)	(0.55)	(0.35)	(−0.04)	(0.43)	(1.01)	(0.28)	(1.41)	(0.99)
Subsidiary target deal	0.051	0.063	−0.009	0.034	0.082	0.144**	0.039	0.147**	0.102
	(0.88)	(1.01)	(−0.14)	(0.54)	(1.26)	(2.16)	(0.54)	(2.23)	(0.98)
Cross-border deal	0.084	0.097*	−0.013	0.033	0.075	0.085	0.014	0.023	−0.054
	(1.65)	(1.67)	(−0.21)	(0.58)	(1.34)	(1.45)	(0.22)	(0.39)	(−0.85)
Hostile deal	−0.223	−0.188	0.114	0.042	−0.041	0.025	0.456***	0.071	−0.123
	(−1.46)	(−1.22)	(0.75)	(0.42)	(−0.22)	(0.15)	(2.83)	(0.64)	(−0.62)
Tender Offer	−0.062	−0.070	−0.179***	0.012	−0.037	−0.041	−0.180***	0.019	−0.028
	(−1.00)	(−1.09)	(−2.97)	(0.22)	(−0.60)	(−0.61)	(−2.69)	(0.31)	(−0.25)
Characteristics of acquiring firms									
ln(Total assets)	−0.087***	−0.118***	0.054	−0.083***	−0.085***	−0.121***	0.060	−0.096***	−0.107**
	(−4.27)	(−5.77)	(1.49)	(−3.72)	(−3.66)	(−5.24)	(1.24)	(−4.21)	(−2.76)
Market-to-Book Ratio	−0.002	−0.002	−0.002	0.002	−0.007	−0.005	0.002	0.004	0.005
	(−0.55)	(−0.35)	(−0.22)	(0.29)	(−1.32)	(−0.78)	(0.18)	(0.63)	(0.17)
Tangibility ratio	−0.093	−0.260**	−0.228	−0.369***	−0.192	−0.370**	−0.282	−0.402***	−0.303
	(−0.86)	(−2.20)	(−1.53)	(−3.31)	(−1.34)	(−2.39)	(−1.52)	(−2.90)	(−1.65)
Altman Z-Score	0.005	0.003	0.005	−0.007	0.006	0.004	0.002	−0.005	−0.005
	(0.90)	(0.42)	(0.89)	(−1.24)	(0.94)	(0.63)	(0.23)	(−0.82)	(−0.44)
Credit rating index	0.021	0.065***	0.126***	0.085***	0.007	0.052**	0.136***	0.089***	0.035
	(0.95)	(2.77)	(5.54)	(4.35)	(0.29)	(2.08)	(5.22)	(4.27)	(1.27)
Leverage	0.672***	0.965***	0.290*	0.670***	0.675***	0.881***	0.073	0.500***	0.651***
	(4.76)	(6.43)	(1.68)	(5.60)	(4.19)	(5.09)	(0.35)	(3.41)	(2.90)
ΔLeverage	0.578***	0.783***	0.309	0.454***	0.375**	0.533***	0.376*	0.330**	0.422*
	(3.67)	(4.63)	(1.62)	(3.20)	(2.12)	(2.84)	(1.66)	(2.19)	(2.04)
Serial acquirer dummy	−0.035	−0.051	0.035	−0.049	−0.044	−0.057	0.018	−0.036	−0.011
	(−0.75)	(−1.02)	(0.73)	(−1.20)	(−0.83)	(−1.02)	(0.29)	(−0.75)	(−0.16)
Characteristics of loan contracts									
Facility amount/total assets	0.031	0.050	0.002	0.046	0.011	0.010	−0.020	−0.000	0.096
	(0.72)	(1.12)	(0.02)	(1.06)	(0.22)	(0.19)	(−0.23)	(−0.01)	(1.22)

Financial covenant dummy	−0.053	0.067	0.070	0.284***	−0.046	0.077	0.135*	0.279***	−0.007
	(−1.07)	(1.28)	(1.13)	(5.98)	(−0.86)	(1.42)	(1.95)	(5.36)	(−0.10)
Performance pricing term dummy	−0.261***	−0.228***	0.152***	0.056	−0.255***	−0.231***	0.161***	0.035	−0.143*
	(−6.71)	(−5.62)	(2.90)	(1.61)	(−5.80)	(−5.13)	(2.91)	(0.96)	(−2.00)
Syndicated loan dummy	0.126	0.138*	0.310**	−0.039	0.088	0.151*	0.433***	0.079	−0.106
	(1.47)	(1.72)	(2.16)	(−0.46)	(0.92)	(1.76)	(2.62)	(0.84)	(−0.63)
Relationship lending dummy	−0.048	−0.015	0.083	0.067	−0.016	0.003	0.021	0.046	−0.001
	(−1.01)	(−0.28)	(1.52)	(1.56)	(−0.31)	(0.05)	(0.31)	(0.95)	(−0.02)
Extra control variables									
EBITDA/Sales	−0.448**	−0.471**		−0.049	−0.536**	−0.612***		−0.168	−0.417*
	(−2.15)	(−2.21)		(−0.30)	(−2.42)	(−2.72)		(−0.89)	(−1.81)
Current ratio	−0.024	−0.025			−0.027	−0.027			−0.033**
	(−1.40)	(−1.50)			(−1.46)	(−1.57)			(−2.24)
Ln(1 + Interest coverage)	−0.064***	−0.063***			−0.055***	−0.055***			−0.067*
	(−3.39)	(−3.56)			(−2.64)	(−2.83)			(−2.09)
Market-wide default spread	6.400	−0.192	−10.293*	−14.619***	7.694	0.156	−18.991***	−15.708**	8.502
	(0.99)	(−0.03)	(−1.74)	(−2.61)	(1.06)	(0.02)	(−2.90)	(−2.51)	(0.76)
Ln(Total assets maturity)			−0.025				−0.018		
			(−1.06)				(−0.62)		
Industry-year level mean of tangibility				1.197*				0.827	
				(1.66)				(1.01)	
Inverse Mill's ratio									0.093
									(0.67)
Types of loan facilities									
Amendment of existing loans					−0.034	−0.021	0.076	0.021	
					(−0.71)	(−0.42)	(1.24)	(0.42)	
Existing credit facility					−0.131**	−0.137*	0.094	−0.032	
					(−2.05)	(−1.95)	(1.24)	(−0.57)	
Constant	4.606***	5.521***	2.605***	0.028	4.616***	5.387***	1.869***	0.204	4.880***
	(15.11)	(13.75)	(4.69)	(0.05)	(12.78)	(11.76)	(3.35)	(0.32)	(8.65)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.63				0.62				
Breusch-Pagan χ^2			241.38				205.91		
N of loan facilities	995		995		768		768		
N of loan funded M&As									405
N of all M&As									6502

This table reports the results of robustness tests. Column (1) and (3) report OLS estimates. t statistics are listed in the parentheses of OLS estimates. Column (2) to (4) and Column (6) to (8) report SUR estimates. z statistics are listed in the parentheses of SUR estimates. Column (9) reports the second-step estimates of Heckman self-selection model. t statistics are listed in the parentheses.The first-step specification and results of Heckman self-selection model are reported in Table 7. Industry fixed effects are controlled for at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcement. Columns (1) to (8) are estimated on the facility-level data and Column (9) on the M&A deal-level data. Standard errors are adjusted for clustering in each M&A deal for Columns (1) to (8), and for clustering in each year for Column (9). ***, **, and * indicate the significance at 0.01, 0.05, and 0.1 level, respectively.

Table 6: Additional control variables

	(1)		(2)		(3)		(4)		(5)	
	OLS	SUR	OLS	SUR	OLS	SUR	OLS	SUR	OLS	SUR
Non-price loan terms										
Ln(Maturity)	0.167*		0.172**		0.079		0.165		0.084	
	(1.98)		(2.16)		(1.05)		(1.48)		(1.14)	
Collateral	0.480***		0.503***		0.438***		0.464***		0.423***	
	(4.00)		(4.27)		(8.01)		(6.69)		(6.37)	
Size of M&As										
Relative deal size	0.185***	0.259***	0.171***	0.219***	0.130***	0.165***	0.306**	0.399***	0.182***	0.223***
	(3.69)	(5.58)	(4.28)	(4.37)	(5.10)	(5.68)	(2.75)	(4.05)	(4.86)	(5.17)
Additionally controlled variables										
Target's Altman Z-Score	−0.006	−0.009								
	(−0.64)	(−1.26)								
Offer premium			−0.009	−0.009						
			(−0.08)	(−0.08)						
Acquirer's ex ante stock return volatility					1.390***	1.858***				
					(3.50)	(4.88)				
E-Index							−0.043	−0.002		
							(−0.95)	(−0.04)		
Separated CEO and chair									0.003	0.033
									(0.04)	(0.54)
Characteristics of M&As										
Stock payment dummy	−0.053	−0.096	−0.029	−0.048	−0.021	−0.005	−0.084	−0.005	−0.094*	−0.047
	(−0.80)	(−1.59)	(−0.49)	(−0.79)	(−0.46)	(−0.13)	(−1.01)	(−0.05)	(−2.04)	(−0.90)
Diversify deal	−0.097	−0.185**	−0.094	−0.198***	−0.064	−0.073	0.035	0.027	−0.026	−0.037
	(−1.69)	(−2.51)	(−1.55)	(−2.63)	(−1.08)	(−1.27)	(0.44)	(0.43)	(−0.30)	(−0.53)
Public target deal			−0.317	−0.651***	0.021	0.034	−0.057	−0.061	0.050	0.068
			(−1.57)	(−5.35)	(0.28)	(0.49)	(−0.44)	(−0.57)	(0.57)	(0.94)
Subsidiary target deal			0.000	0.000	0.073	0.112	0.147	0.071	0.043	0.064
			(.)	(.)	(0.90)	(1.29)	(1.10)	(0.56)	(0.45)	(0.67)
Cross-border deal	0.289	0.999***	0.208	0.923***	−0.010	−0.010	−0.164	−0.082	0.059	0.106
	(0.64)	(2.75)	(0.49)	(2.88)	(−0.16)	(−0.17)	(−1.20)	(−0.88)	(0.68)	(1.53)
Hostile deal	0.023	0.073	−0.018	0.031	−0.186	−0.030	−0.448**	−0.523***	−0.133	−0.069
	(0.21)	(0.81)	(−0.14)	(0.27)	(−1.29)	(−0.26)	(−2.72)	(−3.65)	(−0.63)	(−0.36)
Tender Offer	0.063	0.146*	0.052	0.134	−0.020	−0.022	−0.054	−0.029	−0.078	−0.082
	(0.75)	(1.77)	(0.68)	(1.54)	(−0.29)	(−0.35)	(−0.38)	(−0.25)	(−0.83)	(−0.99)
Characteristics of acquiring firms										
Ln(Total assets)	−0.123***	−0.157***	−0.118***	−0.159***	−0.056*	−0.096***	−0.016	−0.113*	−0.067*	−0.138***
	(−3.18)	(−3.48)	(−2.96)	(−3.52)	(−1.91)	(−3.11)	(−0.24)	(−1.92)	(−1.75)	(−4.12)
Market-to-Book Ratio	−0.005	−0.005	−0.004	−0.009	−0.004	−0.010	−0.016	−0.028***	−0.016	−0.020
	(−0.35)	(−0.37)	(−0.31)	(−0.69)	(−0.45)	(−1.23)	(−0.73)	(−2.75)	(−1.28)	(−1.36)
Tangibility ratio	−0.386	−0.660***	−0.423	−0.762***	−0.210	−0.376**	0.040	−0.148	−0.407	−0.534**
	(−1.27)	(−2.96)	(−1.42)	(−3.07)	(−1.29)	(−2.40)	(0.08)	(−0.37)	(−1.61)	(−2.40)
Altman Z-Score	−0.012	−0.009	−0.015	−0.012	−0.001	−0.001	−0.000	0.004	0.009	0.012*
	(−0.91)	(−0.63)	(−1.18)	(−0.96)	(−0.17)	(−0.17)	(−0.02)	(0.30)	(1.16)	(1.92)

Credit rating index	0.008	0.059**	0.004	0.045*	0.033	0.080***	0.047	0.091*	0.026	0.058**
	(0.35)	(2.48)	(0.16)	(1.77)	(1.41)	(3.94)	(0.92)	(1.77)	(0.76)	(2.17)
Leverage	0.707	1.273***	0.690*	1.250***	0.527***	0.880***	0.827**	1.273***	0.965***	1.450***
	(1.67)	(3.76)	(1.72)	(4.01)	(3.14)	(4.63)	(2.21)	(4.86)	(4.32)	(6.87)
ΔLeverage	0.489	0.503	0.453	0.500	0.325	0.455**	0.119	0.283	0.619**	0.890***
	(1.15)	(1.62)	(1.14)	(1.60)	(1.45)	(2.23)	(0.21)	(0.67)	(2.19)	(3.45)
Serial acquirer dummy	−0.027	−0.070	−0.027	−0.090	−0.009	−0.037	−0.071	−0.048	−0.078	−0.049
	(−0.24)	(−0.79)	(−0.26)	(−1.04)	(−0.20)	(−0.72)	(−0.61)	(−0.56)	(−0.92)	(−0.60)
Characteristics of loan contracts										
Facility amount/total assets	0.068	0.109	0.051	0.091	0.053	0.080	0.129	0.233	0.121	0.113
	(0.72)	(1.11)	(0.60)	(0.96)	(0.87)	(1.35)	(0.94)	(1.61)	(1.13)	(1.30)
Financial covenant dummy	−0.005	0.097	−0.048	0.041	−0.066	0.054	0.077	0.119	−0.067	−0.019
	(−0.05)	(0.81)	(−0.47)	(0.41)	(−1.09)	(0.72)	(0.92)	(1.24)	(−0.88)	(−0.26)
Performance pricing terms dummy	−0.284**	−0.118	−0.275**	−0.118	−0.139**	−0.089	−0.165*	−0.112	−0.139**	−0.061
	(−2.08)	(−1.19)	(−2.18)	(−1.35)	(−2.27)	(−1.33)	(−1.80)	(−1.31)	(−2.12)	(−1.09)
Syndicated facility dummy	−0.175	0.021	−0.170	−0.005	0.048	0.023	−0.311	−0.183	−0.083	−0.053
	(−1.01)	(0.11)	(−1.07)	(−0.03)	(0.31)	(0.19)	(−1.11)	(−0.76)	(−0.47)	(−0.31)
Relationship lending dummy	−0.043	−0.139*	−0.047	−0.134	−0.006	0.010	−0.029	−0.044	−0.002	0.034
	(−0.43)	(−1.87)	(−0.48)	(−1.51)	(−0.12)	(0.19)	(−0.30)	(−0.54)	(−0.04)	(0.67)
Extra control variables										
EBITDA/Sales	−0.045	−0.237	−0.126	−0.315	−0.334	−0.394*	0.111	−0.376	−0.143	−0.390
	(−0.12)	(−0.76)	(−0.33)	(−1.09)	(−1.34)	(−1.86)	(0.24)	(−1.14)	(−0.41)	(−1.19)
Current ratio	−0.024	−0.024	−0.025	−0.024	−0.013	−0.011	−0.064	−0.066	−0.016	−0.017
	(−0.74)	(−0.93)	(−0.84)	(−1.03)	(−0.71)	(−0.78)	(−1.06)	(−1.60)	(−0.54)	(−0.66)
Ln(1 + Interest coverage)	−0.035	−0.032	−0.022	−0.020	−0.058**	−0.057**	0.019	0.012	−0.043	−0.043
	(−0.81)	(−1.03)	(−0.47)	(−0.56)	(−2.24)	(−2.35)	(0.36)	(0.28)	(−1.37)	(−1.61)
Market-wide default spread	9.205	−0.474	8.336	−3.226	3.713	−4.113	7.880	3.065	17.058	9.240
	(0.72)	(−0.04)	(0.63)	(−0.22)	(0.38)	(−0.42)	(0.49)	(0.22)	(1.43)	(1.00)
Constant	4.359***	5.402***	4.706***	6.289***	4.145***	4.798***	3.254***	3.859***	3.958***	5.162***
	(8.16)	(8.43)	(10.13)	(8.95)	(11.79)	(10.73)	(3.08)	(3.46)	(9.56)	(9.60)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.69		0.70		0.66		0.64		0.69	
Breusch-Pagan χ^2		97.44		104.72		151.29		72.72		72.72
N	213	213	226	226	450	450	198	198	344	344

This table reports the estimates of both OLS and SUR model in terms of additionally controlled variables of interest, using M&A deal-level data. The dependent variable in all columns is the natural logarithm of AISD. The sample size varies because of the data availability in calculating the additional control variables. Industry fixed effects are controlled at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcement. t and z statistics are listed in the parentheses for OLS and SUR estimates, respectively. Standard errors are adjusted for clustering in each year. ***, **, and * indicate the significance at 0.01, 0.05, and 0.1 level, respectively.

Table 7: Determinants of loan financing for M&As

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cash flow/transaction value	−0.068***	−0.065***	−0.061**	−0.055***	−0.068***	−0.056***	−0.060***
	(−7.04)	(−7.24)	(−2.56)	(−2.79)	(−7.22)	(−4.89)	(−5.95)
Tangibility ratio	0.289	0.328	0.325	0.465	0.305	0.316	0.109
	(1.39)	(1.45)	(1.20)	(1.43)	(1.35)	(0.76)	(0.44)
(Long-term debt + transaction value)/total assets	0.069**	0.069**	−0.002	0.041	0.070**	0.301***	0.076
	(2.16)	(2.06)	(−0.04)	(0.73)	(2.11)	(4.07)	(1.16)
Run-up	−0.234*	−0.277**	−0.593	−0.277	−0.317**	−0.976***	−0.410**
	(−1.78)	(−2.20)	(−1.64)	(−1.09)	(−2.30)	(−3.59)	(−2.21)
Market-to-book ratio	−0.070***	−0.066***	−0.097***	−0.095***	−0.067***	−0.013	−0.058**
	(−3.83)	(−2.92)	(−4.87)	(−4.53)	(−2.69)	(−0.32)	(−2.35)
Beta [−300, −60]	−0.239***	−0.206***	−0.174	−0.162	−0.078	−0.186**	−0.247***
	(−3.61)	(−3.15)	(−1.32)	(−1.40)	(−1.22)	(−2.05)	(−3.47)
Acquirer's age	0.003	0.004	0.001	0.002	0.003	0.000	0.002
	(1.03)	(1.48)	(0.23)	(0.33)	(0.98)	(0.10)	(0.66)
Ln(Total assets)	−0.089***	−0.064*	−0.122*	−0.108**	−0.113***	−0.226***	−0.172***
	(−2.96)	(−1.90)	(−1.84)	(−2.25)	(−3.41)	(−4.20)	(−4.11)
HHI of institutional investor ownership	−1.478***	−1.401***	−1.830***	−1.677**	−1.196***	−1.136	−0.744
	(−5.51)	(−4.83)	(−2.73)	(−2.32)	(−4.53)	(−1.52)	(−1.37)
Relative deal size	0.103**	0.105**	0.200***	0.106**	0.121***	0.253*	0.259***
	(2.52)	(2.37)	(2.66)	(1.97)	(2.59)	(1.77)	(3.27)
Diversify deal	−0.094	−0.083	−0.111	−0.121	−0.066	−0.088	−0.053
	(−1.37)	(−1.22)	(−1.28)	(−1.47)	(−0.89)	(−0.78)	(−0.70)
Cross-border deal	−0.263***	−0.308***	0.613	−0.232**	−0.338***	−0.144	−0.221***
	(−4.65)	(−4.91)	(0.73)	(−2.19)	(−4.99)	(−1.21)	(−3.01)
Public target	0.015	0.028	0.000	1.843***	0.012	0.179	0.125
	(0.17)	(0.29)	(.)	(6.86)	(0.12)	(1.08)	(1.10)
Subsidiary target	0.224***	0.221***	0.000	2.930***	0.202**	−0.085	0.232**
	(2.84)	(2.81)	(.)	(5.37)	(2.51)	(−0.64)	(1.98)
Hostile deal	−0.229*	−0.209	−0.405	−0.369*	−0.293**	−0.242	−0.226
	(−1.75)	(−1.39)	(−1.64)	(−1.91)	(−2.36)	(−0.85)	(−1.38)
Tender offer	0.781***	0.820***	0.915***	0.808***	0.810***	0.363*	0.782***
	(5.64)	(6.00)	(5.53)	(5.16)	(5.88)	(1.73)	(5.29)
Altman Z-score		0.003	0.011***	0.008***	0.002	−0.007	0.001
		(0.91)	(2.95)	(2.79)	(0.47)	(−0.71)	(0.19)
Credit rating index		0.070***	0.008	0.048	0.066***	−0.029	0.009

	(3.14)	(0.15)	(1.31)	(2.60)	(−0.77)	(0.37)
Target's Altman Z-score		−0.003				
		(−0.55)				
Premium 4 weeks prior to announcement date			0.000			
			(0.66)			
Acquirer's 24-month return volatility prior to ann. date				−3.278***		
				(−3.56)		
E-index					0.050	
					(1.52)	
Separated CEO and chair						0.095
						(1.20)
Constant	−1.140***	−1.707***	−0.345	−2.752***	−1.105***	0.901	−0.424
	(−5.08)	(−5.18)	(−0.45)	(−4.50)	(−3.07)	(1.48)	(−0.85)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	0.17	0.17	0.24	0.22	0.18	0.22	0.20
N of loan funded M&As	444	403	160	201	392	174	291
N of all M&As	6502	5624	1700	2165	5456	1844	3704

This table reports the results of probit model estimates of the determinants of using loan to fund M&As. The dependent variables are dummy variables that equal 1 if a M&A transaction is funded by loans and 0 otherwise. The sample size reduction of loan funded M&As is due to the data availability in calculating regressors. Industry fixed effects are controlled for at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcements. z statistics are listed in parentheses. Standard errors are adjusted for clustering in each year. ***, **, and * indicate the significance level at 0.01, 0.05, and 0.1, respectively.

Table 8: Cross-sectional analysis

	(1) Ln(AISD)	(2) Ln(AISD)	(3) Ln(AISD)	(4) Ln(AISD)	(5) Ln(AISD)	(6) Ln(AISD)
Relative deal size	0.124***	0.128***	0.131***	0.141***	0.171**	0.157***
	(5.17)	(3.40)	(5.93)	(5.11)	(2.34)	(3.16)
Relative deal size×ΔLeverage	0.276**					
	(2.29)					
ΔAltman Z-score		−0.017				
		(−1.25)				
Relative deal size×ΔAltman Z-score		−0.026*				
		(−1.73)				
ΔNo. of analyst following			0.005			
			(0.47)			
Relative deal size×ΔNo. of analyst following			−0.008*			
			(−1.82)			
ΔNo. of blockholder institutional investors				−0.017		
				(−0.81)		
Relative deal size×ΔNo. of blockholder institutional investors				−0.004		
				(−0.31)		
ΔHHI of business segment sales					−0.056	
					(−0.32)	
Relative deal size×ΔHHI of business segment sales					0.097	
					(0.60)	
Ln(No. of shared analysts)						0.071
						(1.24)
Relative deal size×Ln(No. of shared analysts)						−0.006
						(−0.17)
Non-price loan terms						
Ln(Maturity)	0.100	0.096	0.097	0.093	0.183**	0.215**
	(1.23)	(1.12)	(1.19)	(1.21)	(2.12)	(2.13)
Collateral	0.454***	0.448***	0.459***	0.442***	0.443***	0.502***
	(8.29)	(7.42)	(8.47)	(8.27)	(5.15)	(5.00)
Characteristics of M&As						
Stock payment dummy	−0.034	−0.068	−0.036	−0.016	−0.066	−0.075
	(−0.88)	(−1.51)	(−0.83)	(−0.31)	(−0.83)	(−0.94)
Diversify deal	−0.027	−0.030	−0.029	−0.043	−0.031	−0.063
	(−0.46)	(−0.45)	(−0.47)	(−0.63)	(−0.46)	(−0.51)

Public target deal	0.058	0.084	0.059	0.072	0.217*	0.000
	(0.85)	(1.24)	(0.86)	(1.14)	(1.94)	(.)
Subsidiary target deal	0.052	0.035	0.059	0.063	0.158	0.000
	(0.64)	(0.36)	(0.73)	(0.68)	(1.32)	(.)
Cross-border deal	0.007	0.030	0.007	0.014	−0.058	0.137
	(0.11)	(0.43)	(0.10)	(0.21)	(−0.60)	(0.37)
Hostile deal	−0.062	−0.121	−0.066	−0.082	−0.214	0.134
	(−0.61)	(−0.77)	(−0.63)	(−0.54)	(−1.14)	(0.92)
Tender Offer	−0.074	−0.095	−0.068	−0.082	−0.092	−0.052
	(−1.09)	(−1.21)	(−0.97)	(−0.98)	(−0.92)	(−0.50)
Characteristics of acquiring firms						
Ln(Total assets)	−0.087**	−0.099***	−0.092**	−0.082*	−0.091**	−0.148**
	(−2.76)	(−2.91)	(−2.69)	(−2.02)	(−2.18)	(−2.74)
Market-to-Book Ratio	−0.005	−0.004	−0.007	−0.008	−0.002	−0.001
	(−0.86)	(−0.49)	(−1.21)	(−1.13)	(−0.21)	(−0.08)
Tangibility ratio	−0.108	−0.190	−0.125	−0.228	−0.201	−0.347
	(−0.75)	(−1.08)	(−0.86)	(−1.35)	(−1.03)	(−1.27)
Altman Z-Score	0.002	−0.020	0.001	−0.003	−0.001	−0.016
	(0.28)	(−1.37)	(0.22)	(−0.45)	(−0.06)	(−1.29)
Credit rating index	0.037*	0.020	0.031	0.041*	0.037	0.026
	(1.79)	(0.90)	(1.52)	(1.96)	(1.07)	(0.71)
Leverage	0.752***	0.678**	0.746***	0.803***	0.492	0.558*
	(4.35)	(2.29)	(4.16)	(4.03)	(1.61)	(1.73)
ΔLeverage	0.205	0.347	0.413*	0.518**	0.223	0.626
	(0.75)	(1.50)	(1.92)	(2.16)	(0.71)	(1.55)
Serial acquirer dummy	−0.018	−0.027	−0.020	−0.029	−0.047	0.012
	(−0.27)	(−0.39)	(−0.32)	(−0.41)	(−0.61)	(0.13)
Characteristics of loan contracts						
Facility amount/total assets	0.109**	−0.010	0.108**	0.055	0.223	0.038
	(2.09)	(−0.13)	(2.12)	(0.89)	(1.50)	(0.40)
Financial covenant dummy	−0.017	−0.001	−0.013	−0.032	−0.119	−0.045
	(−0.28)	(−0.01)	(−0.21)	(−0.49)	(−1.30)	(−0.42)
Performance pricing terms dummy	−0.174***	−0.203***	−0.182***	−0.192***	−0.159	−0.318***
	(−3.16)	(−2.92)	(−3.32)	(−3.04)	(−1.47)	(−2.83)
Syndicated facility dummy	−0.015	0.001	−0.010	−0.013	−0.118	−0.198
	(−0.09)	(0.00)	(−0.06)	(−0.07)	(−0.58)	(−1.13)
Relationship lending dummy	−0.018	−0.038	−0.022	−0.024	0.048	−0.026
	(−0.43)	(−0.70)	(−0.51)	(−0.47)	(0.80)	(−0.27)
Extra control variables						

EBITDA/Sales	-0.341^{**}	-0.098	-0.297^{*}	-0.229	-0.717	-0.022
	(-2.13)	(-0.39)	(-1.81)	(-1.08)	(-1.69)	(-0.06)
Current ratio	-0.011	-0.012	-0.013	-0.014	-0.007	-0.024
	(-0.64)	(-0.75)	(-0.77)	(-0.78)	(-0.27)	(-0.63)
Ln(1 + Interest coverage)	-0.046^{*}	-0.053^{*}	-0.048^{*}	-0.043	-0.066^{*}	-0.045
	(-1.98)	(-1.97)	(-2.01)	(-1.53)	(-1.76)	(-1.01)
Market-wide default spread	7.873	11.503	7.486	2.328	15.840	13.310
	(0.94)	(1.42)	(0.90)	(0.26)	(1.16)	(0.86)
Constant	4.064^{***}	4.255^{***}	4.141^{***}	4.141^{***}	3.830^{***}	4.264^{***}
	(9.39)	(10.17)	(9.41)	(8.94)	(7.20)	(4.80)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.65	0.64	0.65	0.64	0.66	0.70
N	512	431	512	443	277	226

This table reports the results of OLS estimates of the cross-sectional analysis, using M&A deal-level data. The dependent variable in all columns is the natural logarithm of AISD. The sample size varies because of the data availability in calculating the cross-sectional variables. Industry fixed effects are controlled at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcement. t statistics are listed in the parentheses. Standard errors are adjusted for clustering in each year. ***, **, and * indicate the significance at 0.01, 0.05, and 0.1 level, respectively.

Table 9: Loan prices and acquirers' performance

Panel A: Loan price and operating performance and stock return performance

	(1) ROA	(2) ROA	(3) Adj. ROA	(4) Adj. ROA	(5) HPR36	(6) HPR36	(7) BHAR36	(8) BHAR36
Ln(AISD)	-0.024^{***}	-0.023^{**}	-0.022^{**}	-0.022^{**}	-0.202^{**}	-0.263^{**}	-0.189^{**}	-0.236^{**}
	(-3.62)	(-2.40)	(-2.75)	(-2.09)	(-2.39)	(-2.42)	(-2.37)	(-2.20)
Relative deal size		-0.007		-0.010		-0.025		-0.052
		(-0.85)		(-1.14)		(-0.28)		(-0.54)
Stock payment dummy		-0.004		0.001		-0.234		-0.195
		(-0.35)		(0.08)		(-1.63)		(-1.40)
Diversify deal		-0.009		-0.009		-0.193		-0.182
		(-0.92)		(-0.65)		(-1.48)		(-1.39)
Public target deal		-0.006		-0.013		-0.058		-0.079
		(-0.31)		(-0.64)		(-0.49)		(-0.67)
Subsidiary target deal		0.016^{*}		0.013		-0.077		-0.108
		(1.83)		(0.99)		(-0.40)		(-0.57)
Cross-border deal		-0.020^{**}		-0.021		-0.205		-0.170
		(-2.50)		(-1.53)		(-1.27)		(-1.11)
Hostile deal		0.002		0.008		0.017		-0.045
		(0.16)		(0.28)		(0.08)		(-0.25)
Tender Offer		0.007		0.004		-0.131		-0.126
		(0.58)		(0.30)		(-0.89)		(-0.88)
Ln(Total assets)		-0.001		-0.002		-0.063		-0.060
		(-0.13)		(-0.42)		(-1.25)		(-1.15)
Market-to-Book Ratio		0.003^{***}		0.004^{***}		-0.024^{*}		-0.022
		(2.99)		(3.51)		(-1.77)		(-1.45)
ROA (Pre-complettion 3-year average)	0.083^{**}	0.086^{***}						
	(2.58)	(3.04)						
Adj. ROA (Pre-complettion 3-year average)			0.139	0.139^{*}				
			(1.68)	(1.88)				
Constant	0.274^{***}	0.281^{***}	0.199^{***}	0.230^{***}	3.477^{***}	4.517^{***}	1.720^{***}	2.707^{***}
	(7.57)	(5.00)	(4.97)	(3.82)	(7.46)	(6.71)	(3.78)	(4.04)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.04	0.05	0.45	0.46	0.11	0.13	0.05	0.07
N	460	460	460	460	391	391	391	391

This panel reports the results of loan price and firms' post-merger performance. *ROA* is the average of cashflow based returns on assets of subsequent 3 years of the completion of the M&As. *Adj. ROA* is the average of the adjusted cashflow based returns on assets of subsequent 3 years of the completion of the M&As. Adjusted ROA is the difference between the ROA and industry-year median of ROA (self excludes). *HPR36* is holding period return (HPR) in subsequent 36 months of the completiton of the M&As. *BHAR36* is buy and hold abnormal return (BHAR) in subsequent 36 months of the completiton of the M&As. We also estimate the regressions on HPR and BHAR in subsequent 12, 24, 48, 60 months, respectively. The results are qualitatively same. Industry fixed effects are controlled at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcement. t statistics are listed in the parentheses. Standard errors are adjusted for clustering in each year. ***, **, and * indicate the significance at 0.01, 0.05, and 0.1 level, respectively.

Panel B: Calendar-time portfolio analysis

	(1) $MR_t - R_f$	(2) $MR_t - R_f$	(3) $MR_t - R_f$	(4) $MR_t - R_f$	(5) $MR_t - R_f$	(6) $MR_t - R_f$	(7) $MR_t - R_f$	(8) $MR_t - R_f$
CMWAVG-AISD	-0.505^{*}	-0.446^{**}	-0.511^{*}	-0.430^{**}	-0.492^{*}	-0.437^{**}	-0.655^{**}	-0.542^{***}
	(-1.85)	(-2.23)	(-1.87)	(-2.15)	(-1.84)	(-2.17)	(-2.40)	(-2.82)
$R_{mt} - R_{ft}$	0.988^{***}	0.962^{***}	0.968^{***}	0.974^{***}	1.050^{***}	0.971^{***}	1.019^{***}	1.007^{***}
	(22.91)	(25.91)	(21.15)	(24.99)	(21.01)	(24.08)	(20.23)	(24.25)
SMB_t	0.087	0.087^{*}	0.093	0.090^{*}	0.213^{***}	0.117^{**}		
	(1.48)	(1.81)	(1.58)	(1.86)	(3.23)	(2.13)		
HML_t	0.119^{*}	-0.044	0.098	-0.025	0.072	-0.036		
	(1.94)	(-0.86)	(1.55)	(-0.44)	(0.86)	(-0.52)		
UMD_t			-0.051	0.041				
			(-1.30)	(1.10)				
RMW_t					0.347^{***}	0.080		
					(3.74)	(1.03)		
CMA_t					-0.077	-0.019		
					(-0.64)	(-0.17)		
HXZ: ME_t							0.073	0.078
							(1.21)	(1.51)
HXZ: IA_t							-0.003	-0.100
							(-0.03)	(-1.21)
HXZ: ROE_t							0.088	0.068
							(1.12)	(1.10)
α	0.015^{***}	0.015^{***}	0.016^{***}	0.014^{***}	0.013^{***}	0.014^{***}	0.019^{***}	0.017^{***}
	(3.35)	(3.74)	(3.44)	(3.53)	(3.00)	(3.63)	(4.19)	(4.50)
ARCH								
L.arch		0.158^{***}		0.157^{***}		0.151^{***}		0.140^{***}
		(3.24)		(3.22)		(3.13)		(3.07)
L.garch		0.838^{***}		0.839^{***}		0.842^{***}		0.857^{***}
		(19.04)		(18.99)		(18.70)		(20.34)
Constant		0.000		0.000		0.000		0.000
		(1.25)		(1.21)		(1.25)		(1.03)
Adj. R^2	0.65		0.65		0.66		0.66	
Wald χ^2		732.63^{***}		742.47^{***}		722.27^{***}		765.34^{***}
N	307	307	307	307	307	307	295	295

This panel reports the results of calendar-time portfolio-return analysis in the long term, using four asset pricing models. Column (1), (3), (5), (7) report OLS estimates, and Column (2), (4), (6), (8) report GARCH(1, 1) estimates. In each month, we form portfolios using the acquirers that have completed an M&A transaction in the previous 36 months. MR_t is the value-weighted average monthly return on the acquirers contained in the calendar-time portfolio. *CMWAVG-AISD* is the AISD averaged across the M&A deals contained in a calendar-time portfolio, value-weighted using the *Facility amount* of each M&A transaction. R_{mt} is the market return in month t and r_{ft} is the risk-free return. SMB_t is the return difference between small and big stocks of the Fama-French 3-factor model (Fama and French, 1993). HML_t is the return difference between value and growth stocks of the Fama-French 3-factor model. UMD_t is the Carhart momentum factor (Carhart, 1997). RMW_t (CMA_t) is the return difference between robust- (conservative-) and weak-profitability (aggressive-investment) stocks (Fama and French, 2015). Hou, Xue, and Zhang (2015) formulate a Q-factor model. Specifically, ME_t is the return difference between small and big stocks. ROE_t (IA_t)is the return difference between high- (low-) and low-profitability (high-investments) stocks. t and z statistics are listed in parentheses for OLS and GARCH estimates, respectively. ***, **, and * indicate the significance at 0.01, 0.05, and 0.01, respectively.

Appendix

Appendix I, Variable Definitions

Variable	Definition
Loan price	
AISD	All-in spread drawn (in basis points). Dealscan defines the spread as "the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with an annual (or facility) fee paid to the bank group". In M&A transaction level data, if a M&A is funded by multiple loan facilities, we takes the average of AISD across the facilities, weighted by the amount of each facility. "AISD" refers to the "weighted average of AISD". "Arithmatic average AISD" refers to the arithmatic average of AISD.
Ln(AISD)	The natural logarithm of AISD.
CMWAVG-AISD	*CMWAVG-AISD* is the AISD averaged across the M&A deals contained in a calendar-time portfolio, value-weighted using the *Facility amount* of each M&A transaction.
Non-price loan terms	
Maturity	The number of months of a loan facility's maturity. In M&A transaction level data, if a M&A is funded by multiple loan facilities, we take the average value of the maturities.
Ln(Maturity)	The natural logarithm of Maturity.
Collateral	A dummy variable equals 1 when a facility used for a M&A is required to provide collateral, 0 otherwise. In M&A transaction level data, if a M&A is funded by multiple loan facilities, the dummy equals 1 as long as one of the facilities is required to provide collateral, 0 otherwise.
Size of M&A transactions	
Relative deal size	The ratio of M&A transaction value to an acquiring firm's market value of equity at the end of the fiscal year before M&A announcement.
Characteristics of M&A transactions	
Stock payment dummy	A dummy variable equals 1 if the M&A consideration contains the acquirer's stocks.
Diversify deal	A dummy variable equals 1 if an acquiring firm and the target firm have different 2-digit SIC, 0 otherwise.
Public target deal	A dummy variable equals 1 to indicate the M&A with publicly-listed target firm, 0 otherwise.
Subsidiary target deal	A dummy variable equals 1 to indicate the M&A with subsidiary target firm, 0 otherwise.
Cross-border deal	A dummy variable equals 1 if an acquiring firm and the target firm are from different countries, 0 otherwise.
Hostile deal	A dummy variable equals 1 to indicate a hostile transaction, 0 otherwise.
Tender offer	A dummy variable equals 1 if the transaction is a tender offer, 0 otherwise.
Characteristics of acquiring firms	

Total assets	An acquiring firm's book value of total assets at the end of fiscal year prior to the announcement of the M&A (in million dollars).
Ln(Total assets)	The natural logarithm of total assets.
Market-to-book ratio	An acquiring firm's ratio of the sum of market value of equity and the book value of liabilities to book value of total assets at the end of fiscal year prior to the announcement of the M&A.
Tangibility ratio	An acquiring firm's ratio of PPE to total assets at the end of fiscal year prior to the announcement of the M&A.
Altman's Z-Score	An acquiring firm's Altman's Z-Score at the end of fiscal year prior to the announcement of the M&A. Altman's Z-Score = 1.2 × working capital/total assets + 1.4 × (retained earnings/total assets) + 3.3 × (earnings before interest and tax/total assets) + 0.6 × (market value of equity/total liabilities) + 1.0 × (sales/total assets).
Credit rating index	An index ranging from 1 to 7, representing AAA (1), AA (2), A (3), BBB (4), BB (5), below BB (6) and no rating (7), respectively.
Leverage	An acquiring firm's ratio of the sum of long-term debt and debt in current liabilities to the book value of total assets at the end of fiscal year prior to the announcement of the M&A.
ΔLeverage	The difference in acquring-firm leverage between the the end of fiscal year before the M&A announcement and the end of fiscal year after the M&A announcement.
Serial acquirer dummy	A dummy variable equals 1 if an acquiring firm has M&As in 2 years prior to the current deal announcement year (Aktas et al., 2009).
Characteristics of loan contracts	
Facility amount	The loan-facility amount in millions of dollars. In the M&A transaction level data, if a M&A is funded by multiple loan facilities, it takes the average value of the amount of facilities.
Ln(Facility amount)	The natural logarithm of facility amount.
Facility amount/total assets	The ratio of loan facility amount to the acquring firm's total assets at the end of fiscal year prior to the announcement of the M&A.
Financial covenant dummy	A dummy variable equals 1 if a loan facility includes financial covenants, 0 otherwise. In M&A transaction level data, if a M&A is funded by multiple loan facilities, it takes 1 as long as one of the loan facilities includes financial covenants, 0 otherwise.
Performance pricing terms dummy	A dummy variable equals 1 if a loan facility includes performance pricing terms, 0 otherwise. In M&A transaction level data, if a M&A is funded by multiple loan facilities, it takes 1 as long as one of the loan facilities includes performance pricing terms, 0 otherwise.
Syndicated facility dummy	A dummy variable equals 1 if a loan facility is funded by a syndication of lenders. In M&A transaction level data, if a M&A is funded by multiple loan facilities, it takes 1 as long as one of the loan facilities is syndicated loan, 0 otherwise.
Relationship lending dummy	A dummy variable equals the value of 1 if an acquiring firm has previously borrowed from the leader lender over the last three years before the M&A announcement, 0 otherwise. In M&A transaction level data, if a M&A is funded by multiple loan facilities, it takes 1 as long as one of the loan facilities is relationship lending, 0 otherwise.

Extra control variables

EBITDA/Sales	An acquiring firm's ratio of EBITDA to sales at the end of fiscal year before the announcement of the M&A.
Current ratio	An acquiring firm's ratio of cash and other assets that are expected to be realized in the next 12 months or used in the production of revenue to total current liabilities at the end of fiscal year before the announcement of the M&A.
Ln(1 + Interest coverage)	The natural logarithm of (1 + EBITDA/interest expenses) of an acquiring firm at the end of fiscal year before the announcement of the M&A.
Total assets maturity	The weighted average of maturity of current assets and Net PPE. Total assets maturity = current assets/(current assets + net PPE) × current assets/cost of goods sold + net PPE/(current assets + net PPE) × net PPE/Depreciation.
Ln(Total assets maturity)	The natural logarithm of total assets maturity.
Market-wide default spread	Moody's Seasoned Baa Corporate Bond Yield relative to the yield on the 10-Year Treasury Constant Maturity one month before the M&A announcement.
Industry level average of tangibility	The average of tangibility ratio of an acquiring firm's 2-digit SIC code industry in a year.
Target's Altman's Z-Score	Target firm's Altman's Z-Score at the end of fiscal year before the announcement of the M&A.
Offer premium	The ratio of transaction value to the sum of market value (4 weeks before acquisition announcement) and total liability of the target firm.
Acquirer's ex ante stock volatility	An acquiring firm's 24-month monthly return volatility before the announcement of the M&A.
E-index	An acquiring firm's *E*-index prior to the announcement of the M&A(Bebchuk et al., 2008).
Separated CEO and chair	A dummy variable equals 1 if the CEO of an acquiring firm is not the board chair at the moment of M&A announcement, 0 otherwise.

Determinants of using loans

Cash flow/transaction value	The ratio of the sum of cash flow from operating, investment, and financing at the end of fiscal year prior to the announcement of the M&A to the M&A transaction value.
(Long-term debt + transaction value)/Total assets	An acquiring firm's ratio of the sum of the long-term debt and M&A transaction value to its total assets at the end of fiscal year prior to the announcement of the M&A.
Run-up	The cumulative daily abnormal returns of an acquiring firm over the window [−60, −20] preceding the M&A announcement day. Daily abnormal returns are computed as the difference between the realized returns and the market model benchmark returns. Market return is the CRSP value-weighted market portfolio return (include dividends).
Beta[−300, −60]	The equity beta of an acquiring firm, estimated using the market model over the period from 300 to 60 days before the M&A announcement. Market return is the CRSP value-weighted market portfolio return (include dividends).
Acquirer's age	The age of an acquiring firm at the M&A announcement year, computed as the difference between the announcement year and the first year of occurrence in Compustat.

HHI of institutional investor ownership	The Herfindahl-Hirschman Index of institutional ownership retrieved from Thomson Reuters Database.
ΔAltman's Z-score	The difference in Altman's Z-score of an acquiring firm between the year before M&A announcement and the year after the deal completion.
ΔNo. of analyst following	The difference in the 6-month average number of analyst following an acquiring firms between the periods before and after deal announcement.
ΔNo of blockholder inst investor	The difference in the number of blochholder institutional investors holding an acquiring firm between the year before M&A announcement and the year after the deal completion.
ΔHHI of business segment sales	The difference in an acquiring firm's Herfindahl-Hirschman index of sales from disclosed business segments between the year before M&A announcement and the year after the deal completion.
No. of shared analysts	The number of analyst following both an acquiring firm and the target at the year of M&A announcement.
Ln(1 + No. of shared analysts)	The natural logarithm of 1 + No. of shared analysts.
Performance measures	
ROA	An acquiring firm's cash flow based return on assets, calculated as the ratio of the operating income before depreciation to total assets.
$Adj.ROA$	An acquiring firm's cash flow based return on assets, adjusted by the median ROA of the peer firms in the same 2-digit SIC in a year (excluding the firm in question).
HPR36	The holding period return (HPR) in the subsequent 36 months of the completiton of M&As.
BHAR36	The buy-and-hold abnormal return (BHAR) in the 36 months following the M&As completion, calculated as the difference between the compounded acquiring-firm stock returns and the compounded returns of the CRSP value-weighted market portfolio (includes distributions).
MR_t	The value-weighted monthly return across the acquirers contained in the calendar portfolio formed in month t.