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Loan Price in Mergers and Acquisitions

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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-drawn spread (AIDS). This result is robust to several specifications that address endogeneity concerns. Further analysis demonstrates higher AIDS is associated with lower post-transaction performance. We posit that deal size is a major concern for lenders because it involves greater information risk, greater business complexity, and more integration difficulties. Further, the loan price correctly factors in the risk of poor post-transaction performance.

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-drawn spread (AIDS). This result is robust to several specifications that address endogeneity concerns. Further analysis demonstrates higher AIDS is associated with lower post-transaction performance. We posit that deal size is a major concern for lenders because it involves greater information risk, greater business complexity, and more integration difficulties. Further, the loan price correctly factors in the risk of poor post-transaction performance.

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 price. 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 price. 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 an 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 multiple merger-related risks. Alexandridis, Fuller, Terhaar, and Travlos (2013) postulate that greater deal size proxies for the unobserved complexity of a

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

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

³This 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.

transaction which negatively impacts the acquiring firm’s shareholder value. Consequently, they find acquirers offer lower premium in larger deals. 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. In line with these arguments, [Faccio and Masulis \(2005\)](#) use the relative size as a measure of information asymmetry between the acquirer and the target. [Hansen \(1987\)](#), in his widely cited study, also postulates the acquirers are more concerned with deal uncertainties when the relative deal size is higher. [Datta \(1991\)](#) further postulates that post-transaction integration involves substantial costs to the merging firms. Indeed, larger deals involve more problems in ex-post integration and greater cost to achieve the expected synergies in those years post acquisitions ([Ahern, 2010](#); [Shrivastava, 1986](#)). It can be costly for lenders to trace and measure the risks underlying the relative size of a deal. It also involves great inaccuracy in the 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 price 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 AIDS of loans, *ceteris paribus*. A one standard deviation increase in the relative deal size increases an average acquirer’s AIDS 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 AIDS. 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.

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.

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 transaction, 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 price. 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 impact 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 statistics 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 procedure. Section 3 describes the variables and the econometric specification 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 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 Appendix II, 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.⁴ A loan contract

⁴Dealscan 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

(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 (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

(including 10-K, 10-Q forms, and registration statements), lenders, and proprietary sources.

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 beginning/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.

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-drawn Spread

We use the All-in-drawn spread (AIDS) from Dealscan to measure loan price. Dealscan defines AIDS 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, AIDS includes all monetary costs of a loan facility. A M&A transaction may be funded by several loan facilities, and we use the average AIDS across facilities for subsequent analysis. The arithmetic average AIDS and the weighted average AIDS (weighted by the amount of each facility) give the same qualitative results. For brevity, we only report the results based on the weighted average AIDS (henceforth AIDS for simplicity). The results based on the arithmetic average AIDS are available upon request.

B Relative deal size

We calculate the relative deal size as the ratio of 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. 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, Poulsen, and Stegemoller \(2008\)](#) 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 borders ([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 incompleteness 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 deal announcement. Firms with a higher leverage ratio are likely to have less cash to serve debt (Faccio and Masulis, 2005), potentially increasing loan price. 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 Z-score (Altman, 1968). The other is the borrower’s credit rating (Lim, Lee, Kausar, and Walker, 2014). We encode the acquiring firm’s S&P long-term credit ratings from 1 to 7 (1 = AAA, 2 = AA, ..., 6 = B or worse, 7 indicates firms without ratings) following Qian and Strahan (2007).

The third set of variables we control for relate 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 previously borrowed 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 facilities, 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.⁵ 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 price 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 may be statistically correlated). Moreover, according to [Wooldridge \(2013, p143 – 144\)](#), a SEM specification is most relevant when different equations represents 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.

⁵Dealscan only reports a maximum of two purposes of a loan facility.

In our SUR model, the dependent variables of three equations are AIDS, maturity, and a collateral dummy respectively. Both AIDS 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 ($i = 1, 2, 3$) 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.

$$\begin{cases} AIDS & = \mathbf{X}_1\boldsymbol{\alpha} + \epsilon_1 \\ Maturity & = \mathbf{X}_2\boldsymbol{\beta} + \epsilon_2 \\ Collateral & = \mathbf{X}_3\boldsymbol{\gamma} + \epsilon_3 \end{cases} \quad (1)$$

The vectors of independent variables are not entirely the same across equations.⁶ 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 AIDS equation, we include the acquiring firm’s ratio of EBITDA to sales,⁷ 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 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

⁶This 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.

⁷EBITDA denotes the Earnings Before Interest Tax Depreciation and Amortization.

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 a 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. There are 17 facilities that 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) AIDS and the arithmetic average AIDS have very similar sample statistics. The

mean of the arithmetic average AIDS (AIDS) 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 relation 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 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 total assets of the acquiring firms are tangible assets, and the current assets are about twice of current liabilities. The average credit rating score is 5.99, somewhere between A and A+. In terms of loan-contract characteristics, the average facility amount is 505 million dollars and average maturity is 54.31 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 under perform the CRSP value-weighted market index by 5% in the three years after transaction. The industry-adjusted ROA of an average acquirer is 4% before and 5% after the transaction.

[Insert Table 2 Here]

4.2 Univariate analysis of loan price

Table 3 presents the univariate analysis on the (weighted average) AIDS. We examine how AIDS differs between sub-groups divided according to our variables of interest (i.e., the relative deal size) as well as several other M&A characteristics. The AIDS 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 AIDS of 228.36 basis points above LIBOR, whereas small transactions (relative deal size is less than the sample mean)

have an average AIDS of 166 basis points above LIBOR, indicating that larger transactions have higher loan price.

Table 3 also reports the differences in the AIDS between subsamples defined using a set of other M&As characteristics. We find the AIDS 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 AIDS between diversifying deals and non-diversifying deals. The AIDS is significantly different between the acquisitions of public targets and those of non-public targets. Public targets are associated with an average AIDS 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. Subsidiary target is associated with significantly lower AIDS than public and private targets (181.13 vs. 218.70), indicating it is less complex to acquire the assets of a subsidiary than to acquire the whole of a firm. Cross-border transactions have significantly lower average AIDS 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) AIDS 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 price 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 AIDS regression under column 1 is 0.164 and significant at the 1% level ($z = 5.28$), indicating a one standard deviation increase of the relative size ratio (i.e., 0.74) raises an average acquirer's AIDS 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 AIDS. The coefficient on the natural logarithm of the acquiring firm's total assets is significantly (at the 5% level or above) negative in the AIDS 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 $z = 7.51$) higher AIDS than those with lower leverage, consistent with what Faccio and Masulis (2005) find. The acquiring firms' market-to-book ratio is statistically insignificant. We further note that the tangibility ratio has a negative (-0.333) and significant (at the 5% level) coefficient in the AIDS equation, consistent with the idea that higher asset tangibility relates to better value certainty and debt quality (Faccio and Masulis, 2005; Strahan, 1999). Lower credit rating indicates greater default risk and, therefore, relates to higher AIDS. Indeed, in the AIDS equation, the credit rating score has a positive (0.069) and significant (at the 1% level) coefficient (recall we encode this score as an inverse measure of creditability). The Altman Z-score does not have a statistically significant coefficient in the AIDS equation. It is possible the credit rating score 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 AIDS equation. We notice that the change in leverage indeed significantly increases the loan price (the coefficient is 0.613 and significant at the 1% level ($z = 3.66$)). 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 loan. The coefficient on this variable, however, is statistically insignificant. It could be that the facility amount impact loan price through the change in leverage, and its effect is subsumed by the later effect.⁸

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 the effect of relationship lending weak.

⁸Fishman (1989) posits that the means of payment in an acquisition is significantly affected by the risk of deal incompleteness. Since the effectiveness of a loan is contingent upon the completion of a deal, it would be interesting to study how the risk of incompleteness impact loan price. Unfortunately, we only have seven withdrawn deals in our sample, which does not allow us to conduct a serious analysis.

The performance pricing dummy has a negative and marginally significant ($z = -1.81$) 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 has a significant impact. Such absence of effects indicates that these deal characteristics are of secondary concerns for the lenders compared to the relative deal value.

As is expected, the coefficient on $\ln(1 + \textit{interest coverage})$ is negative (-0.047) and significant at the 1% level ($z = 2.61$). The coefficient on $\textit{EBITDA}/\textit{Sales}$ is -0.396 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 (-0.012) 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 0.078 (significant at the 5% level) in the maturity regression under column 2, and an insignificant coefficient (0.045) 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]

4.4 Robustness tests

Apart from using 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 (0.105) and statistically significant at the 1% level. We find both maturity and collateral are positively and significantly (at the 1% level) related to AIDS. 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 column 2, 3, and 4, we report the estimates of the SUR model at the loan facility level. In the AIDS equation, the relative deal size has a coefficient of 0.122 which is statistically significant at the 1% level ($t = 6.30$). 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 level. We report the results in column 5. 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 Appendix II). The dependent variable of the second stage is the natural logarithm of the (weighted average) AIDS. 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 Wald tests indicate that the null hypothesis $\rho = 0$ cannot be rejected at the 10% level, suggesting self-selection is unlikely to affect our results. Consistently, the coefficient on the IMR is statistically insignificant ($t = 0.19$). The coefficient on the relative deal size is qualitatively the same as in our baseline SUR tests.

[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, they may impact the loan price. In particular, we include the target firm's Altman 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. 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 AIDS apart from the acquirer's pre-transaction stock-return volatility.

4.5 Loan price and post-acquisition performance

In Table 7, 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,

$$Post\ Performance_i = \alpha + \beta \ln(AIDS_i) + \mathbf{X}_i \eta + \epsilon_i \quad (2)$$

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

$$Post\ Performance_i = \alpha + \beta \ln(AIDS_i) + \gamma Pre\ Performance_i + \mathbf{X}_i \eta + \epsilon_i \quad (3)$$

, 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 AIDS 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*).⁹ 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 Table 7, we find the loan price variable $\ln(AIDS)$ have negative coefficients, and all coefficients are statistically significant at the 10% level or above. For example, in column 8, the coefficient on $\ln(AIDS)$ is -0.024 and significant at the 1% level, which suggests that a one-standard-deviation increase in AIDS leads to a 1.44 percentage point decrease in the combined firm's adjusted ROA in the three

⁹We get similar results when we measure performance over the 60 months post the deal completion.

years post-transaction. In a nut shell, the results that the loan price significantly predicts the combined firm's post-transaction indicate that lenders price the loan correctly on average. Broadly, these results are consistent with the view that lenders have information advantage about the borrowers as is postulated by [Diamond \(1984\)](#) and [Bharadwaj and Shivdasani \(2003\)](#).

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 price in M&A transactions. We find that the relative deal size has a significant and robust positive effect on loan price. This positive effect is consistent with the notion that greater deal complexity and information risk 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.

Our study also demonstrates that the characteristics of major corporate investment projects can affect loan price 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 investment 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 impact loan price significantly.

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Table 1: Sample distribution

<i>Panel A: Distribution of M&A by years</i>		
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

<i>Panel B: Distribution of acquiring firms by the number of M&As they each make</i>		
# 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

<i>Panel C: Distribution of the M&As by the number of loan facilities used in each transaction</i>		
# 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

<i>Panel D: Distribution of loan facilities by the beginning date relative to M&A announcement</i>		
	# 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
<i>Loan price</i>								
AIDS	512	187.07	112.32	30.00	100.00	175.00	252.50	400.00
Arithmetic average AIDS	512	193.96	107.07	42.50	112.50	175.00	254.17	400.00
Ln(AIDS)	512	5.06	0.67	3.74	4.72	5.16	5.53	5.99
<i>Non-price loan terms</i>								
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
<i>Size of M&A transactions</i>								
Relative deal size	512	0.62	0.74	0.07	0.20	0.37	0.78	1.68
<i>Characteristics of M&As</i>								
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
<i>Characteristics of acquiring firms</i>								
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 score	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
Δ Leverage	512	0.10	0.14	-0.10	0.00	0.09	0.18	0.37
<i>Characteristics of loan contracts</i>								
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
Facility maturity	512	54.29	19.11	12.00	42.00	60.00	64.75	84.00
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
<i>Extra control variables</i>								
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
<i>Performance measures</i>								
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
ROA (Post-completion 3-year average)	418	0.02	0.06	-0.11	0.01	0.03	0.06	0.10
Adj. ROA (Post-completion 3-year average)	418	0.04	0.11	-0.12	-0.02	0.02	0.06	0.25
ROA (Pre-announcement 3-year average)	418	0.05	0.06	-0.06	0.02	0.05	0.08	0.15
Adj. ROA (Pre-announcement 3-year average)	418	0.05	0.11	-0.07	0.00	0.03	0.08	0.27

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 \geq sample mean			T	χ^2
	N	Mean	Median	N	Mean	Median		
<i>Size of the M&A transaction</i>								
Relative deal size	339	166.00	150.00	173	228.36	221.69	-5.92***	28.36***
<i>Characteristics of the M&As</i>								
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 AIDS 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 transaction level data

	Ln(AIDS)	Ln(Maturity)	Collateral
	(1)	(2)	(3)
<i>Size of M&A transactions</i>			
Relative deal size	0.164*** (5.28)	0.078** (2.29)	0.045 (1.59)
<i>Characteristics of M&A transactions</i>			
Stock payment dummy	0.010 (0.19)	0.051 (0.93)	0.071 (1.53)
Diversify deal	-0.044 (-1.00)	-0.044 (-0.90)	-0.032 (-0.79)
Public target deal	0.036 (0.63)	0.015 (0.23)	-0.012 (-0.22)
Subsidiary target deal	0.071 (1.09)	0.030 (0.42)	0.020 (0.34)
Cross-border deal	0.027 (0.45)	-0.054 (-0.83)	0.031 (0.56)
Hostile deal	-0.052 (-0.39)	0.329** (2.22)	0.019 (0.16)
Tender Offer	-0.030 (-0.50)	-0.151** (-2.26)	0.048 (0.87)
<i>Characteristics of acquiring firms</i>			
Ln(Total assets)	-0.139*** (-6.04)	0.054 (1.55)	-0.117*** (-5.52)
Market-to-Book Ratio	-0.008 (-1.24)	-0.008 (-1.18)	-0.002 (-0.33)
Tangibility ratio	-0.333** (-2.45)	-0.222 (-1.42)	-0.309** (-2.47)
Altman Z-Score	0.000 (0.03)	0.006 (0.92)	-0.005 (-0.82)
Credit rating score	0.069*** (3.23)	0.106*** (4.45)	0.064*** (3.24)
Leverage	1.116*** (7.25)	0.251 (1.55)	0.754*** (5.54)
Δ Leverage	0.613*** (3.66)	0.245 (1.33)	0.409*** (2.64)
<i>Characteristics of loan contracts</i>			

Facility amount/total assets	0.105 (1.47)	-0.059 (-0.75)	0.017 (0.25)
Financial covenant dummy	0.061 (1.08)	0.031 (0.50)	0.201*** (3.82)
Performance pricing terms dummy	-0.101* (-1.96)	0.195*** (3.44)	0.115** (2.41)
Syndicated facility dummy	0.009 (0.08)	0.448*** (3.58)	-0.062 (-0.59)
Relationship lending dummy	-0.009 (-0.19)	0.025 (0.47)	0.043 (0.97)
<i>Extra control variables</i>			
EBITDA/Sales	-0.396* (-1.91)		-0.278 (-1.48)
Current ratio	-0.012 (-0.74)		
Ln(1 + Interest coverage)	-0.047*** (-2.61)		
Market-wide default spread	-2.547 (-0.38)	-14.409** (-1.96)	-17.979*** (-2.92)
Ln(Total assets maturity)		-0.032 (-1.28)	
Industry level average of tangibility			0.875 (1.16)
Constant	5.335*** (12.61)	2.385*** (5.18)	0.819 (1.39)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Breusch-Pagan χ^2		165.99	
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 for at the 2-digit SIC level, and year fixed effects are included according to the year of M&A announcement. ***, ** and * indicate the significance at 0.01, 0.05 and 0.1 level, respectively.

Table 5: Robustness tests

	OLS		SUR		Heckman
	(1)	(2)	(3)	(4)	(5)
	Ln(AIDS)	Ln(AIDS)	Ln(Maturity)	Collateral	Ln(AIDS)
<i>Non-price loan terms</i>					
Ln(Maturity)	0.080*** (2.79)				0.095* (1.77)
Collateral	0.405*** (9.11)				0.447*** (8.73)
<i>Size of M&A transactions</i>					
Relative deal size	0.105*** (4.15)	0.122*** (6.30)	0.051* (1.90)	0.032* (1.81)	0.124*** (3.65)
<i>Characteristics of M&A transactions</i>					
Stock payment dummy	-0.014 (-0.33)	0.025 (0.69)	0.023 (0.46)	0.089*** (2.72)	-0.008 (-0.19)
Diversify deal	-0.074** (-1.99)	-0.091*** (-2.81)	-0.066 (-1.48)	-0.025 (-0.87)	-0.052 (-1.30)
Public target	0.030 (0.56)	0.032 (0.74)	0.025 (0.42)	-0.005 (-0.13)	0.046 (0.82)
Subsidiary target	0.048 (0.84)	0.058 (1.19)	0.004 (0.06)	0.024 (0.55)	0.080 (1.12)
Cross-border deal	0.087* (1.71)	0.099** (2.26)	-0.013 (-0.21)	0.031 (0.79)	-0.004 (-0.07)
Hostile deal	-0.226 (-1.51)	-0.192* (-1.96)	0.120 (0.89)	0.036 (0.40)	-0.130 (-0.81)
Tender offer	-0.063 (-1.02)	-0.072 (-1.64)	-0.174*** (-2.88)	0.008 (0.19)	-0.026 (-0.25)
<i>Characteristics of acquiring firms</i>					
Ln(Total assets)	-0.090*** (-4.40)	-0.122*** (-7.34)	0.059* (1.86)	-0.085*** (-5.68)	-0.103*** (-4.05)
Market-to-book ratio	-0.002 (-0.45)	-0.001 (-0.36)	-0.001 (-0.26)	0.001 (0.42)	-0.012 (-0.57)
Tangibility ratio	-0.078 (-0.73)	-0.240** (-2.40)	-0.244* (-1.68)	-0.349*** (-3.88)	-0.227 (-1.58)
Altman Z-Score	0.005 (0.86)	0.002 (0.49)	0.005 (0.88)	-0.007 (-1.59)	0.001 (0.18)
Credit rating score	0.020 (0.90)	0.065*** (4.20)	0.128*** (5.93)	0.088*** (6.25)	0.014 (0.63)
Leverage	0.661***	0.957***	0.298**	0.667***	0.677***

	(4.68)	(8.88)	(2.11)	(7.10)	(4.06)
Δ Leverage	0.582***	0.785***	0.320**	0.440***	0.358**
	(3.66)	(6.65)	(1.98)	(4.12)	(2.18)
<i>Characteristics of loan contracts</i>					
Facility amount/total assets	0.027	0.044	0.017	0.038	0.063
	(0.61)	(1.00)	(0.28)	(0.95)	(0.95)
Financial covenant dummy	-0.060	0.061	0.067	0.286***	-0.017
	(-1.22)	(1.53)	(1.22)	(7.94)	(-0.31)
Performance pricing terms dummy	-0.259***	-0.226***	0.161***	0.054*	-0.160***
	(-6.67)	(-6.79)	(3.51)	(1.78)	(-3.31)
Syndicated facility dummy	0.125	0.139*	0.324***	-0.036	0.034
	(1.47)	(1.95)	(3.31)	(-0.56)	(0.33)
Relationship lending dummy	-0.050	-0.019	0.086*	0.059*	-0.013
	(-1.06)	(-0.54)	(1.72)	(1.79)	(-0.26)
<i>Extra control variables</i>					
EBITDA/Sales	-0.455**	-0.483***		-0.059	-0.357
	(-2.21)	(-3.09)		(-0.42)	(-1.40)
Current ratio	-0.023	-0.023*			-0.017
	(-1.35)	(-1.82)			(-0.91)
Ln(1 + Interest coverage)	-0.064***	-0.064***			-0.045**
	(-3.39)	(-4.43)			(-2.16)
Market-wide default spread	6.121	-0.658	-10.025	-14.990***	8.831
	(0.95)	(-0.14)	(-1.55)	(-3.51)	(1.29)
Ln(Total assets maturity)			-0.024		
			(-1.07)		
Industry level average of tangibility				1.213**	
				(2.17)	
Inverse Mill's ratio					0.033
					(0.19)
Constant	4.641***	5.542***	2.536***	0.022	4.602***
	(15.28)	(18.76)	(6.30)	(0.05)	(8.57)
Industry	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.63				
Breusch-Pagan χ^2			244.15		
ρ					0.20
Sig. of ρ					0.65
N of facilities	995		995		
N of loan funded M&As					445
N of all M&As					6632

This table reports the results of robustness tests. Column (1) reports the estimates of OLS, and (2) to (4) report the estimates of SUR modes, using loan facility level data. Column (5) reports the estimates of second-stage in Heckman self-selection model, where first-stage regression estimates are reported in Table [A1](#). 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. ***, ** and * indicate the significance at 0.01, 0.05 and 0.1 level, respectively.

Table 6: Tests with additional control variables

	(1)		(2)		(3)		(4)		(5)	
	OLS	SUR	OLS	SUR	OLS	SUR	OLS	SUR	OLS	SUR
<i>Non-price loan terms</i>										
Ln(Maturity)	0.168**		0.172**		0.084		0.160		0.075	
	(2.12)		(2.13)		(1.50)		(1.53)		(1.27)	
Collateral	0.482***		0.508***		0.429***		0.460***		0.419***	
	(5.23)		(5.88)		(8.22)		(4.79)		(6.58)	
<i>Size of M&A transactions</i>										
Relative deal size	0.186***	0.262***	0.170***	0.219***	0.131***	0.166***	0.310***	0.397***	0.186***	0.226***
	(3.70)	(4.57)	(4.05)	(4.30)	(4.28)	(5.06)	(2.77)	(4.08)	(4.51)	(5.07)
<i>Additionally controlled variables</i>										
Target's Altman Z-Score	-0.006	-0.008								
	(-0.53)	(-1.05)								
Offer premium			-0.015	-0.026						
			(-0.13)	(-0.28)						
Acquirer's ex ante stock return volatility					1.451***	1.844***				
					(2.99)	(3.74)				
E-Index							-0.041	-0.000		
							(-1.08)	(-0.01)		
Separated CEO and chair									0.011	0.035
									(0.18)	(0.72)
<i>Characteristics of M&A transactions</i>										
Stock payment dummy	-0.053	-0.099	-0.029	-0.051	-0.021	-0.004	-0.082	-0.004	-0.087	-0.046
	(-0.63)	(-1.10)	(-0.39)	(-0.59)	(-0.41)	(-0.08)	(-0.87)	(-0.05)	(-1.30)	(-0.74)
Diversify deal	-0.099	-0.192**	-0.095	-0.207***	-0.066	-0.073	0.037	0.026	-0.029	-0.037
	(-1.10)	(-2.54)	(-1.04)	(-2.79)	(-1.52)	(-1.57)	(0.48)	(0.36)	(-0.54)	(-0.70)
Public target deal			-0.323	-0.679*	0.018	0.038	-0.047	-0.052	0.056	0.073
			(-1.53)	(-1.66)	(0.30)	(0.64)	(-0.41)	(-0.59)	(0.63)	(1.03)
Subsidiary target deal			0.000	0.000	0.078	0.108	0.134	0.062	0.047	0.060
			(.)	(.)	(1.16)	(1.57)	(1.04)	(0.56)	(0.55)	(0.74)
Cross-border deal	0.287	1.006	0.206	0.935	-0.001	-0.013	-0.168	-0.083	0.068	0.107*
	(0.59)	(1.58)	(0.44)	(1.47)	(-0.03)	(-0.20)	(-1.56)	(-0.86)	(1.02)	(1.69)
Hostile deal	0.021	0.068	-0.022	0.018	-0.191	-0.035	-0.439	-0.519*	-0.128	-0.064
	(0.11)	(0.37)	(-0.11)	(0.10)	(-1.18)	(-0.24)	(-1.18)	(-1.75)	(-0.76)	(-0.42)
Tender Offer	0.060	0.139	0.050	0.127	-0.017	-0.024	-0.061	-0.035	-0.083	-0.083

	(0.52)	(1.62)	(0.45)	(1.51)	(-0.26)	(-0.39)	(-0.48)	(-0.35)	(-1.04)	(-1.21)
<i>Characteristics of acquiring firms</i>										
Ln(Total assets)	-0.125***	-0.163***	-0.120***	-0.168***	-0.055**	-0.100***	-0.017	-0.111**	-0.070*	-0.142***
	(-3.05)	(-4.44)	(-2.96)	(-4.66)	(-2.03)	(-4.03)	(-0.26)	(-2.33)	(-1.87)	(-4.60)
Market-to-Book Ratio	-0.004	-0.004	-0.003	-0.008	-0.003	-0.009	-0.014	-0.026*	-0.015	-0.019**
	(-0.33)	(-0.39)	(-0.32)	(-0.90)	(-0.47)	(-1.32)	(-0.96)	(-1.88)	(-1.26)	(-2.33)
Tangibility ratio	-0.372	-0.625***	-0.415	-0.738***	-0.213	-0.354**	0.116	-0.100	-0.360*	-0.491***
	(-1.42)	(-2.59)	(-1.64)	(-3.13)	(-1.48)	(-2.34)	(0.32)	(-0.32)	(-1.78)	(-2.61)
Altman Z-Score	-0.012	-0.009	-0.015	-0.012	-0.001	-0.001	0.000	0.004	0.009	0.013
	(-0.88)	(-0.77)	(-1.14)	(-1.08)	(-0.18)	(-0.17)	(0.01)	(0.40)	(0.98)	(1.48)
Credit rating score	0.008	0.058*	0.003	0.042	0.034	0.079***	0.049	0.093***	0.029	0.057**
	(0.22)	(1.76)	(0.08)	(1.30)	(1.37)	(3.56)	(1.16)	(2.65)	(0.99)	(2.35)
Leverage	0.702**	1.256***	0.680**	1.216***	0.539***	0.861***	0.787**	1.241***	0.968***	1.436***
	(2.31)	(4.90)	(2.41)	(4.89)	(2.87)	(4.96)	(2.11)	(3.97)	(3.65)	(6.45)
Δ Leverage	0.492	0.507*	0.458	0.514**	0.332	0.460**	0.180	0.334	0.655***	0.901***
	(1.61)	(1.91)	(1.55)	(1.99)	(1.65)	(2.42)	(0.46)	(1.14)	(2.72)	(4.26)
<i>Characteristics of loan contracts</i>										
Facility amount/total assets	0.063	0.099	0.045	0.075	0.039	0.066	0.119	0.229	0.112	0.116
	(0.60)	(0.96)	(0.46)	(0.75)	(0.52)	(0.89)	(0.61)	(1.53)	(1.21)	(1.33)
Financial covenant dummy	-0.011	0.084	-0.054	0.023	-0.073	0.053	0.072	0.112	-0.081	-0.023
	(-0.10)	(0.92)	(-0.51)	(0.27)	(-1.23)	(0.91)	(0.74)	(1.28)	(-1.26)	(-0.35)
Performance pricing terms dummy	-0.284***	-0.115	-0.275***	-0.117	-0.136**	-0.092*	-0.164*	-0.108	-0.137**	-0.063
	(-2.74)	(-1.41)	(-2.87)	(-1.48)	(-2.54)	(-1.69)	(-1.67)	(-1.27)	(-2.24)	(-1.05)
Syndicated facility dummy	-0.172	0.031	-0.165	0.010	0.050	0.029	-0.313	-0.188	-0.080	-0.057
	(-0.80)	(0.15)	(-0.88)	(0.06)	(0.42)	(0.24)	(-1.08)	(-0.77)	(-0.48)	(-0.34)
Relationship lending dummy	-0.046	-0.147*	-0.050	-0.144**	-0.010	0.006	-0.038	-0.051	-0.011	0.031
	(-0.49)	(-1.94)	(-0.57)	(-2.01)	(-0.18)	(0.12)	(-0.37)	(-0.68)	(-0.18)	(0.54)
<i>Extra control variables</i>										
EBITDA/Sales	-0.045	-0.234	-0.119	-0.289	-0.327	-0.414*	0.018	-0.483	-0.194	-0.441
	(-0.08)	(-0.64)	(-0.25)	(-0.80)	(-1.20)	(-1.88)	(0.04)	(-1.20)	(-0.61)	(-1.64)
Current ratio	-0.024	-0.023	-0.024	-0.023	-0.012	-0.010	-0.061	-0.062**	-0.013	-0.014
	(-0.61)	(-0.92)	(-0.63)	(-0.94)	(-0.58)	(-0.56)	(-1.22)	(-2.03)	(-0.56)	(-0.65)
Ln(1 + Interest coverage)	-0.034	-0.031	-0.020	-0.018	-0.058**	-0.056***	0.015	0.006	-0.043	-0.043**
	(-0.93)	(-1.01)	(-0.54)	(-0.60)	(-2.33)	(-2.84)	(0.33)	(0.20)	(-1.51)	(-1.93)
Market-wide default spread	9.318	-0.059	8.326	-3.079	3.331	-4.025	7.478	2.991	16.831*	9.676
	(0.69)	(-0.01)	(0.62)	(-0.30)	(0.40)	(-0.57)	(0.50)	(0.32)	(1.71)	(1.23)
Constant	4.360***	5.393***	4.732***	6.359***	4.113***	4.834***	3.242***	4.746***	3.971***	5.162***
	(5.83)	(7.29)	(6.22)	(7.62)	(10.25)	(10.90)	(3.54)	(5.08)	(7.86)	(10.27)

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		0.65		0.64		0.69	
Breusch-Pagan χ^2		98.52		106.35		148.58		71.19		100.46
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 interests, using M&A transaction level data. The dependent variable in all columns is the natural logarithm of AIDS. The sample size varies because of the data availability in calculating the additional control variables. 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. ***, ** and * indicate the significance at 0.01, 0.05 and 0.1 level, respectively.

Table 7: Loan price and acquisition performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	HPR36	HPR36	BHAR36	BHAR36	ROA	Adj. ROA	ROA	Adj. ROA
Ln(AIDS)	-0.197** (-2.46)	-0.190** (-2.14)	-0.185** (-2.34)	-0.168* (-1.91)	-0.029*** (-4.39)	-0.021*** (-2.91)	-0.028*** (-3.74)	-0.024*** (-2.75)
Relative deal size		-0.037 (-0.45)		-0.062 (-0.73)			-0.003 (-0.44)	0.004 (0.65)
Stock payment dummy		-0.255** (-2.02)		-0.214* (-1.71)			0.006 (0.68)	0.008 (0.79)
Diversify deal		-0.181 (-1.65)		-0.172 (-1.59)			-0.001 (-0.18)	-0.001 (-0.10)
Public target deal		-0.118 (-0.90)		-0.136 (-1.05)			-0.007 (-0.76)	-0.017 (-1.43)
Subsidiary target deal		-0.106 (-0.55)		-0.136 (-0.70)			0.001 (0.13)	-0.004 (-0.34)
Cross-border deal		-0.242 (-1.63)		-0.204 (-1.32)			-0.008 (-1.06)	-0.008 (-0.88)
Hostile deal		-0.029 (-0.14)		-0.090 (-0.42)			-0.001 (-0.08)	0.003 (0.14)
Tender Offer		-0.177 (-1.04)		-0.167 (-0.98)			-0.001 (-0.07)	0.008 (0.61)
ROA (Pre-announcement 3-year average)					0.181*** (2.82)		0.187*** (2.77)	
Adj. ROA (Pre-completion 3-year average)						0.500*** (8.16)		0.508*** (8.24)
Constant	3.456*** (4.65)	3.832*** (5.12)	1.704** (2.34)	2.066*** (2.85)	0.153*** (4.61)	0.103*** (2.74)	0.160*** (4.58)	0.118*** (2.85)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.11	0.12	0.05	0.06	0.15	0.58	0.14	0.58
N	391	391	391	391	418	418	418	418

This table reports the OLS estimates of the regressions of ex post performance measures on loan price. *HPR36* is the holding period return (HPR) measured in the 36 months subsequent to the completion of the M&As. *BHAR36* is buy-and-hold abnormal return (BHAR) measured in the 36 months subsequent to the completion of the M&As (the estimates from the regressions of HPR and BHAR in the subsequent 60 months are qualitatively the same, not reported but available upon request). Dependent variables *ROA* in column (5) and (7) is the *ROA* averaged over the 3 years subsequent to the deal completion. *Adj. ROA* in column(6) and (8) is the industry-adjusted *ROA* averaged over the three years subsequent to the deal completion. The sample size varies because of data availability in calculating the performance measures. 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. Standard errors are corrected by clustering at the acquirer level. ***, ** and * indicate the significance at 0.01, 0.05 and 0.1 level, respectively.

Appendix

Appendix I, Variable Definition

Variable	Definition
<i>Loan price</i>	
AIDS	All-in-drawn spread. 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, it takes the weighted average value of AIDS of the facilities, weighted by each facility amount. ”AIDS” refer to the ”weighted average of AIDS”. ”arithmetic average AIDS” for arithmetic average.
Ln(AIDS)	The natural logarithm of AIDS.
<i>Non-price loan terms</i>	
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.
<i>Size of M&A transactions</i>	
Relative deal size	The ratio of M&A transaction value to the acquiring firm’s market value of equity at the end of the fiscal year before M&A announcement.
<i>Characteristics of M&A transactions</i>	
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 publicly-listed target firm, 0 otherwise.
Subsidiary target deal	A dummy variable equals 1 to indicate the 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 the hostile transaction, 0 otherwise.
Tender offer	A dummy variable equals 1 if the transaction is a tender offer, 0 otherwise.
<i>Characteristics of acquiring firms</i>	
Total assets	The 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	Acquiring firm's ratio of PPE to total assets at the end of fiscal year prior to the announcement of the M&A.
Altman Z-Score	Acquiring firm's Altman Z-Score at the end of fiscal year prior to the announcement of the M&A. Altman Z-Score = $1.2 \times \text{working capital}/\text{total assets} + 1.4 \times (\text{retained earnings}/\text{total assets}) + 3.3 \times (\text{earnings before interest and tax}/\text{total assets}) + 0.6 \times (\text{market value of equity}/\text{total liabilities}) + 1.0 \times (\text{sales}/\text{total assets})$.
Credit rating score	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	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.
Δ Leverage	The difference of leverages between the value at the end of fiscal year prior to the M&A announcement and at the end of fiscal year after the M&A announcement.

Characteristics of loan contracts

Facility amount	The value of a loan facility amount in million dollars. In 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 acquiring firm's total assets at the end of fiscal year prior to the announcement of the M&A.
Financial covenants dummy	A dummy variable equals 1 if the 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 the 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 the 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 1 if the 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	Acquiring firm's ratio of EBITDA to sales at the end of fiscal year prior to the announcement of the M&A.
Current ratio	Acquiring firm's ratio of cash and other assets that are expected to be realized in next 12 months or used in the production of revenue to total current liabilities at the end of fiscal year prior to the announcement of the M&A.
Ln(Interest coverage)	The natural logarithm of $(1 + \text{EBITDA}/\text{interest expenses})$ of the acquiring firm at the end of fiscal year prior to the announcement of the M&A.

Total assets maturity	The weighted average of maturity of current assets and Net PPE. Total assets maturity = $\text{current assets}/(\text{current assets} + \text{net PPE}) \times \text{current assets}/\text{cost of goods sold} + \text{net PPE}/(\text{current assets} + \text{net PPE}) \times \text{net PPE}/\text{Depreciation}$.
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 10-Year Treasury Constant Maturity one month before the M&A announcement.
Industry level average of tangibility	The average of tangibility ratio in an acquiring firm's 2-digit SIC level industry in a year.
Target's Altman Z-Score	Target firm's Altman Z-Score at the end of fiscal year prior to the announcement of the M&A.
Offer premium	The ratio of transaction value to the sum of market value (6 weeks before acquisition announcement) and total liability of the target firm.
Acquirer's ex ante stock volatility	Acquiring firm's 24-month monthly return volatility prior to the announcement of the M&A.
<i>E</i> -index	Acquiring firm's <i>E</i> -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 the 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	The acquiring firm's ratio of the sum of the long-term debt and M&A transaction value to the 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, and 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 the 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.

Performance measures

HPR36	The holding period return (HPR) in subsequent 36 months of the completion of the M&As.
BHAR36	Buy-and-hold abnormal return (BHAR) in subsequent 36 months of the completion of the M&As, calculated as the difference between the monthly HPR of the acquiring firm stock and the monthly HPR of CRSP value-weighted market portfolio return (includes distributions).

ROA

Acquiring firm's return on assets, calculated as the ratio of the net income to total assets.

Adj.ROA

Acquiring firm's 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).

Appendix II, Predicting the probability of loan financing in M&A transactions (Heckman first stage)

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 A1. 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 loan. 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 $(\text{long-term debt} + \text{transaction value}) / \text{Total assets at the end of fiscal year prior to the announcement of the M\&As}$. 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 loan. 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 others 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 share holdings 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 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 A1, we report the estimates of the probability of loan financing (i.e., the first stage results of the Heckman procedure in Table 5). 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 ($z = 1.44$) 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 under investment problem. The acquirer pre-transaction market beta (Beta $[-300, -60]$) has a negative coefficient of -0.239 which is significant at the 1% level ($z = -4.66$), in line with the view that lenders are more reluctant to supply credit to riskier firms Strahan (1999). The other risk measure, age, is insignificantly associated with raising loans. The coefficient on the acquiring firm’s size (measured by $\ln(\text{TotalAssets})$) is significantly ($z = -4.19$) 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 ($z = 2.29$), suggesting that, when internal cash is likely to be insufficient for large deals, the acquirers resort to external fund 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 ($z = -3.34$) 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 involves lower informational risk (Officer et al., 2008) which enhances loan financing. The coefficient on the hostile deal dummy is statistically insignificant, 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 ($z = 2.67$) positive coefficient of 0.224 . The tender offer dummy has a coefficient of 0.781 and statistically significant at the 1% level ($z = 9.63$). These evidence are 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.

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

Table A1: Predicting the probability of loan financing in M&A transactions (Heckman first stage)

	Loan funded or not
Cash flow/transaction value	-0.068*** (-5.97)
Tangibility ratio	0.289 (1.44)
(Long-term debt + transaction value)/total assets	0.069** (2.45)
Run-up	-0.234* (-1.74)
Market-to-book ratio	-0.070*** (-3.47)
Beta [-300, -60]	-0.239*** (-4.66)
Acquirer's age	0.003 (1.20)
Ln(Total assets)	-0.089*** (-4.19)
HHI of institutional investor ownership	-1.478*** (-5.01)
Relative deal size	0.103** (2.29)
Diversify deal	-0.094 (-1.57)
Cross-border deal	-0.263*** (-3.34)
Public target	0.015 (0.23)
Subsidiary target	0.224*** (2.67)
Hostile deal	-0.229 (-1.23)
Tender offer	0.781*** (9.63)
Constant	-1.140*** (-3.54)
Industry	Yes
Year	Yes
Wald χ^2	552***
N of all M&As	6502

This table reports the results of probit model regarding the likelihood of loan financing. The sample size reduction of loan funded M&As is due to the data availability in calculating regressors. Z statistics are reported in the parentheses. Industry fixed effects are controlled for at 2-digit SIC level. Standard errors are corrected by clustering at acquirer level. ***, **, and * indicate the significance level at 0.01, 0.05, and 0.1 level, respectively.