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# Equity overvaluation, financing, and M&A payment method: Evidence from Japan

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## ABSTRACT

Based on debt capacity theory and pecking order theory, this paper examines the relationship between acquiror equity overvaluation and payment choice in mergers and acquisitions (M&A) in the Japanese market. Using a sample of 3340 M&A deals from 2006 to 2023, our analysis shows that equity overvaluation is positively associated with the use of cash payment. Mediation analysis provides further evidence that pre-transaction debt financing, especially long-term loans, partially mediates this relation, consistent with the existence of a debt financing-based channel in Japan's bank-oriented financial system. In subsequent analysis, we also provide evidence for the path validity of information asymmetry. Overall, we provide new evidence of a complementary mechanism through which misvaluation influences M&A payment method.

## 1. Introduction

Mergers and acquisitions (M&A) play a crucial role in resource allocation and value creation in society (Alexandridis et al., 2017). M&A payment methods have been a focal point of academic interest as a critical element of the transaction process (Di Giuli, 2013; Kanungo, 2021; Klitzka et al., 2022; Rhodes-Kropf & Viswanathan, 2004; Tsai et al., 2021; Yang et al., 2019). The choice of payment method not only has significant financial implications for the acquiring and target companies, it also offers opportunities to validate various theories in the field of corporate finance.

Cash payment and stock payment are two widely used methods of M&A payment. Previous studies have demonstrated the influence of market valuations on the choice of payment method (Di Giuli, 2013; Dong et al., 2006; Rhodes-Kropf & Viswanathan, 2004; Shleifer & Vishny, 2003). These studies suggest that acquirors seek to utilize their overvalued stock as a means of payment in order to acquire target companies at lower cost. It is generally believed that target companies should not accept stock offers when the acquiror's valuation is excessively high, yet evidence indicates that they sometimes do (Shleifer & Vishny, 2003). On the other hand, Eckbo et al. (2018) and Klitzka et al. (2022) articulate and test the rational payment design hypothesis, finding that overvalued acquirors are less likely to pay solely with

stock than acquirors that are not overvalued.

Whether acquirors utilize their overvalued equity to purchase target companies or for other purposes has been a topic of debate and conflicting results in the literature. In this paper we revisit this research question from a financing perspective. The market timing hypothesis posits that firms make external financing decisions based on the current state of the securities market, resorting to equity financing when stock prices are overvalued and repurchasing equity when stock prices are undervalued (Baker & Wurgler, 2002). Based on this hypothesis, Shleifer and Vishny (2003) argue that both the decision to acquire and the means of payment depend on market timing, with stock acquisitions tending to be conducted by overvalued bidders. Recent rational payment design studies emphasize that payment method also reflects information asymmetry and target-side adverse selection. On the other hand, equity overvaluation is also linked with another important factor in acquisitions: external financing. Dong et al. (2012) provide evidence that equity overvaluation can also lead to debt issuance, although not as often as equity issuance. Furthermore, based on debt capacity theory (Myers, 1977), Li et al. (2023) found that firms not only issue more stock during periods of positive market sentiment, but also issue more debt. Considering that the source of financing is a critical factor influencing the method of payment in acquisitions (Karampatsas et al., 2014; Martynova & Renneboog, 2009; Uysal, 2011; Vermaelen & Xu, 2014),

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we examine whether acquiror overvaluation may also affect payment choice through a financing-based channel. More specifically, we examine whether acquiror overvaluation may be associated with greater pre-transaction debt financing, especially long-term loans, which can make cash payment more attractive.

Japan's distinctive corporate governance and financing environment, including its bank-oriented financial system, offers a useful setting for examining this debt financing-based channel. Much of the existing evidence on stock market-driven acquisitions is based on market-oriented financial systems, where overvalued acquirors may have stronger incentives to use stock as acquisition currency (Rhodes-Kropf & Viswanathan, 2004; Shleifer & Vishny, 2003). The Japanese setting allows examination of whether the valuation–payment method relation also operates through access to debt financing, particularly bank loans and long-term debt. Two distinctive features of the Japanese financing environment make Japan an ideal setting for an investigation that complements the existing literature on misvaluation and M&A payment methods.

First, Japanese companies tend to have long-standing and deep relationships with banks. Unlike the market-based financial system in the U.S., Japan's financial system is bank-oriented (Peek & Rosengren, 2005). A key component of Japan's financial system is the “main bank system”, under which firms generally rely on one bank as their main financial partner; a firm's main bank meets most of the firm's banking needs, including acting as its primary source of capital (Hoshi & Kashyap, 2004). Under this system, banks have been the main source of corporate financing in Japan in the post-World War II era. In the 1980s and 1990s, Japanese banks and companies practiced extensive cross-shareholding. Although investor pressure and governance reforms have reduced cross-shareholding in recent years, banks still hold a significant proportion of the shares of firms they finance. Thus, banks not only act as major creditors but also as shareholders, maintaining long-term and close relationships with borrowing companies. In financing, this relationship reduces loan spreads as it mitigates conflicts of interest between shareholders and creditors as well as borrowers' risks (Wang & Wang, 2024). This relationship also enables main banks to exercise oversight and control over borrowing companies, mitigating agency problems associated with debt contracts (Hodder & Tschoegl, 1985). Although such oversight and control has been moderated with the development of the securities market, banks still play a crucial role in corporate governance. This may, to some extent, influence corporate financing decisions, making firms more likely to choose debt over issuing new equity when seeking external financing. This bank-oriented financing system differs institutionally from the more market-oriented U.S. and U.K. systems,<sup>1</sup> with the financing behavior of Japanese companies reflecting this institutional distinctiveness.

Second, Japan's lending rates have been low for an extended period (typically within the range of 1% to 2.5%, and consistently below 2% from 2010 to 2022),<sup>2</sup> providing companies with a relatively cheap financing option. This low-interest-rate environment encourages Japanese companies to rely more on debt financing than on issuing new equity to meet their capital needs. Seifert and Gonenc (2008), studying companies in the United States, United Kingdom, Germany, and Japan, found that the pecking order theory—that for financing, firms prefer to use internal funds first, followed by debt, and finally external equity as a last resort—holds only in Japan. Jarallah et al. (2019) reported similar findings: the financing behavior and patterns of Japanese non-financial Tokyo Stock Exchange-listed companies from 1991 to 2015 conform to the basic pecking order model, with internal financial deficits (cases in

which internal resources are insufficient to meet the firm's funding needs) driving external debt financing. Thus, the financing preferences of Japanese firms—that is, their prioritization of financing choices—reflects their institutional environment. Since changes in equity valuations also affect firms' debt financing (Li et al., 2023; Myers, 1977; Spiess & Affleck-Graves, 1999), we hypothesize, based on distinctive characteristics of Japanese corporate governance and the institutional environment, that the relationship between equity valuations and M&A payment methods changes due to Japanese firms' distinctive financing behavior.

Our study makes several key contributions. First, based on debt capacity theory and pecking order theory, this research expands the existing literature regarding equity overvaluation and M&A payment methods. Utilizing data from the Japanese market, we find that equity overvaluation is positively associated with cash M&A payments. Second, this research deepens understanding of the relationship between financing and M&A payment methods. Building on the existing literature, we explore the possibility that debt financing serves as a channel through which equity overvaluation affects M&A payment choice. Existing studies show that financial constraints, debt capacity, and access to borrowing are important determinants of whether acquirors use cash or stock in M&A transactions. Our evidence extends this line of research by linking acquiror valuation to pre-transaction debt financing and, in turn, to payment choice, thereby providing evidence for a debt financing-based channel as a new complementary mechanism that influences the choice of payment method. Third, our research provides practical insights into the unique financing behavior of Japanese firms. Given the distinct characteristics of the Japanese market, this means that our findings have significant implications for corporate finance practitioners and policymakers. Strong ties between Japanese companies and banks, along with persistently low lending rates, make the Japanese market unique. Fourth, our results point to a positive correlation between equity overvaluation and debt issuance, suggesting that overvalued firms not only rely on equity issuance, but also obtain funds through debt financing. These results are consistent with pecking order theory and debt capacity theory in the Japanese setting. They also provide new evidence for the relationship between relative valuation of equity and corporate financing (Dong et al., 2012; Li et al., 2023). Based on this, we identify a new, financing-based mechanism linking equity misvaluation and M&A payment method. Overall, these findings provide a new perspective for understanding how companies in global markets make strategic decisions in different financing environments. In these ways, our study not only contributes to the academic literature, but also offers guidance that can help policymakers and regulators assess market sentiment and economic health in countries like Japan.

## 2. Literature review and hypothesis development

Previous research reflects a strong interest in the choice of payment method agreed upon by acquirors and target companies in M&A transactions (Faccio & Masulis, 2005; Rhodes-Kropf & Viswanathan, 2004; Shleifer & Vishny, 2003; Tsai et al., 2021). This interest stems not only from the impact of payment method on both parties involved in a merger or acquisition, but also because the choice of payment method provides opportunities for empirical validation of various theories.

Previous studies have identified several determinants of payment method in mergers and acquisitions. Martin (1996) shows that acquiring firms with abundant available cash tend to use cash frequently as a payment method, while Faccio and Masulis (2005) find that bidders with limited funds are more likely to opt for stock-financed transactions. Financial leverage is also an influential factor, firms with higher leverage being less likely to use cash as a payment method (Uysal, 2011). Karampatas et al. (2014), examining the relationship between credit ratings and choice of payment method, conclude that firms with greater debt capacity are more likely to use cash payments. In a more recent study, de Bodt et al. (2022) show that financial constraints are a

<sup>1</sup> The U.S. and the U.K. have been classified as market-based systems while Japan and Germany have been classified as relationship-oriented or bank-based systems (Seifert & Gonenc, 2008).

<sup>2</sup> Lending interest rate data are from the Bank of Japan: <https://www.boj.or.jp/en/statistics/dl/loan/prime/prime.htm>

primary factor prompting acquirors to include stock payment in M&A transactions. Across these studies, a common theme emerges: firms with adequate funds or the ability to secure financing are more inclined to use cash payments in M&A transactions.

### 2.1. Equity overvaluation and M&A payment

One significant factor influencing corporate M&A decisions is the pricing efficiency of capital markets. Previous studies have noted that equity overvaluation has various impacts on acquisitions. [Baker and Wurgler \(2002\)](#), based on research showing that firms issue equity when stock prices are overvalued and repurchase shares when stock prices are undervalued, were among the first to propose the market timing theory, which holds that companies decide their financing strategies based on the current state of capital markets. [Shleifer and Vishny \(2003\)](#), investigating the relationship between M&A activity and stock market overvaluation, argue that rational acquirors take advantage of market inefficiencies by using overvalued stock to fund acquisitions. Similarly, [Dong et al. \(2006\)](#) and [Rhodes-Kropf et al. \(2005\)](#) found that acquirors use their overvalued stock as a means of payment in order to acquire undervalued target companies at a lower price. [Fu et al. \(2013\)](#) also show that using overvalued stock as payment for acquisitions can enhance the acquiring firm's performance and its shareholders' wealth. On the other hand, some recent studies have challenged these earlier arguments and findings. [Eckbo et al. \(2018\)](#) propose the rational payment design hypothesis, based on the finding that target companies are unlikely to naively accept overpriced shares from acquirors. [Klitzka et al. \(2022\)](#), studying 1155 M&A transactions undertaken by publicly traded U.S. acquirors from 2009 to 2016, provided evidence supporting the rational payment design hypothesis; they found that the overvaluation of acquiror equity does not significantly affect payment method, but that misvaluation metrics are positively correlated with the proportion of cash in M&A financing.

In previous research, equity overvaluation has also been linked to another corporate activity: financing. [Dong et al. \(2012\)](#) provided evidence that equity issuance and total financing increase with equity overvaluation. [Huang and Ritter \(2009\)](#) found that firms utilize equity financing to cover their financing deficits when the cost of equity capital is low. Financing method not only affects corporate capital structure, it also has a significant impact on corporate M&A decisions. According to the market timing hypothesis, equity overvaluation encourages firms to engage in equity financing, which allows them to secure more funds for M&A activities. Companies with access to financing sources are more likely to use cash for acquisition transactions ([Faccio & Masulis, 2005](#)); this applies not only to equity financing, but also to debt financing. According to debt capacity theory ([Myers, 1977](#)), a firm's ability to incur and repay debt determines its debt capacity. During periods of positive investor sentiment, when the value of new assets is high, a firm's debt capacity increases, thereby enhancing its ability to raise debt capital and adopt an aggressive leverage strategy ([Li et al., 2023](#)). Therefore, when equity is overvalued, the firm's newly acquired assets have a higher value; this causes the firm to overestimate future cash flows, and its debt capacity increases. Conversely, when equity is undervalued, the firm's asset value is low, the firm underestimates future cash flows, and its debt capacity decreases.

Banks and securities firms in Japan often provide financing services to corporate entities using stocks and other marketable securities as collateral. This type of financing is commonly referred to as a securities-collateralized loan or a stock pledge loan. A typical example is the 500 billion Japanese yen securities-collateralized loan obtained by Softbank in 2020.<sup>3</sup> Securities-collateralized financing in Japan generally sets a

collateral valuation discount on the collateral to control risk. This means that the loan amount cannot exceed a certain percentage of the market value of the pledged stock. Therefore, the valuation of equity determines the upper limit of the company's debt financing using stock pledge loans.

When faced with the choice of debt or equity financing, acquirors have to weigh concerns about the dilution of corporate control that comes with issuing stock against the rising financial distress costs of issuing debt. Therefore, using cash is generally preferable if the company has sufficient debt capacity or liquid assets. [Faccio and Masulis \(2005\)](#) provide evidence that M&A transactions are more likely to be cash-financed when the acquiror has special access to bank borrowing. Further, cash payment allows bidders to avoid the substantial costs associated with obtaining shareholder approval for pre-emptive rights waivers and stock authorizations, as well as the higher regulatory costs of stock offers. Given that equity overvaluation enhances a firm's external financing capacity, we propose that it makes firms more inclined to use cash payments. Hence, Hypothesis 1 is as follows:

**H1.** When acquiror firms are overvalued, they are more likely to choose cash as the payment method in M&A.

While we argue that equity valuation plays an important role in the decision of M&A payment method, we do not assert that this impact is symmetrical. The argument that equity overvaluation significantly affects the payment method does not mean that equity undervaluation has a similar impact. Our argument is that overvalued equity gives companies greater external financing capacity, enabling them to raise more cash, and thereby increasing the probability of cash payment. On the other hand, undervaluation does not mean that they are necessarily more inclined to use stock payment; they may still rely on internal funds or debt financing. In the case of undervalued equity, the company's decision of payment method may be driven more by other factors, such as liquidity, capital structure, or transaction characteristics, than by valuation level. In other words, the impact of equity valuation on payment method occurs mainly in the case of equity overvaluation, while in the case of undervaluation, the impact of equity valuation is less significant.

### 2.2. Equity overvaluation, debt financing, and M&A payment

Previous discussions on equity valuation and debt financing have examined both lending banks and borrowing firms. The former perspective focuses on the lending conditions offered by banks. [Merton \(1974\)](#) was the first study to incorporate market capitalization into research on debt default risk, finding that for a given maturity date, the debt risk premium is a function of two variables, one of which is the ratio of the present value of the promised payment at the risk-free rate to the firm's current market value. [Gustafson \(2018\)](#) proposes the financing substitution hypothesis, which holds that access to the public securities market significantly reduces bank loan spreads; the reason is that the ability to issue securities increases a firm's bargaining power, enabling it to obtain loans from banks at a lower cost. This relates to corporate bargaining power, as increased market capitalization also provides firms with more financing options besides debt and greater bargaining power. Other studies on loan spread have incorporated market capitalization into their models, providing empirical evidence that loan spread decreases with market valuation ([B. Francis et al., 2012](#); [Hertzel & Officer, 2012](#); [Sikochi, 2020](#)). Japanese literature in this area mainly focuses on the use of collateral, particularly land collateral, to secure loans ([Gan, 2007](#); [Goyal & Yamada, 2004](#); [Ogawa & Suzuki, 2000](#); [Uchida, 2011](#)). Generally, the value of land held by firms in Japan is highly correlated with their market valuation. Therefore, such marketable collateral studies can, to some extent, explain the impact of changes in market value. [Goyal and Yamada \(2004\)](#), investigating Japanese firms' investment spending during Japan's asset price bubble (1986–1991), found that asset price shocks significantly affected firms reliant on bank loans. This indirectly illustrates the impact of market valuations on corporate

<sup>3</sup> In 2020, SoftBank Group obtained a two-year loan of 500 billion Japanese yen from 16 domestic and foreign financial institutions, using about one-third of its shares in SoftBank Corporation, its communications subsidiary, as collateral (about 953 million shares).

loan decisions. Gan (2007) provides similar evidence, revealing that bank loans are a crucial mechanism by which collateral value influences investment, with Japanese firms that experience greater losses in collateral value receiving lower bank credit lines.

On the other hand, discussions on this topic from the firm's perspective have largely focused on firms' own financing behavior and preferences. We employ the pecking order theory to consider the impact of equity overvaluation in the presence of varying sources and availability of financing. Originally proposed by Myers (1984), pecking order theory categorizes a company's financing sources into internal retained earnings, external debt, and external equity, and suggests that firms prioritize the use of internal resources first, debt second, and equity issuance last to meet their financing needs. In the presence of information asymmetry, where managers are aware of the firm's true value but shareholders or external investors are not, the issuance of new shares might lead investors to believe that the firm's stock is overvalued. Consequently, to avoid sending such a signal, which could depress stock prices, managers tend to avoid issuing new shares.<sup>4</sup> Instead, they prefer to finance new projects using retained earnings, as these funds do not face the problem of adverse selection. If internal resources are inadequate for project financing, managers will next resort to external debt rather than issuing new shares, due to the lesser signaling effect of debt.

Some previous Japanese studies have also focused on firms' preferences using the pecking order theory, arguing that firms with high growth opportunities prefer monitored debt, in which lending banks play a monitoring role. (In this strand of the literature, growth opportunities are typically proxied by market-to-book ratio, which can be interpreted to some extent as overvaluation.) An advantage of relationship-based financing, such as monitored debt, is that it can provide positive information for high-growth firms while preventing the disclosure of proprietary information to competitors (Campbell, 1979; Yosha, 1995). Several Japanese studies provide empirical evidence in support of this (Anderson & Makhija, 1999; Hosono, 2003; Wu et al., 2009). More importantly, there is empirical evidence that this financing preference remains unchanged even after equity financing is considered. Despite the increasing attractiveness of equity financing as market valuations rise, high-growth Japanese firms still choose bank loans as their primary financing method, positioning the issuing of new equity as an external financing option to deter bank rent extraction (Wu et al., 2009).

Considering the above, we argue that the effect of overvaluation on payment method can operate through two channels. One channel is based on the rational payment design hypothesis, described in Section 2.1, which holds that target companies are unlikely to naively accept overpriced shares as payment. The other channel, which is the main focus of this study, is the debt financing channel (see Fig. 1), which we state as Hypothesis 2:

**H2.** Debt financing of acquiror firms positively mediates the relationship between equity overvaluation and the use of cash payments in M&A.

### 3. Methodology

#### 3.1. Sample

We sourced Japanese M&A data from the Thomson Reuters SDC database, and financial and stock-related data on Japanese companies from Nikkei Financial Quest. We only consider completed deals (Di Giuli, 2013; Dutta et al., 2013; Ismail & Krause, 2010; Teti et al., 2022). We exclude incomplete deals from the sample because deal

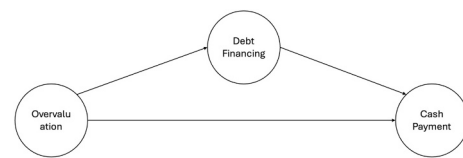


Fig. 1. Logical Diagram of the Pathway of Equity Overvaluation Impact.

withdrawals may be driven by factors unrelated to the financing mechanism examined in this study, such as regulatory or market-condition factors. The criteria for inclusion in the sample are as follows:

1. The acquisition is announced and completed between 2006 and 2023.
2. Acquiror firms are Japanese listed firms.
3. The deal value is at least 1 million JPY.
4. The SDC database reports the payment method of transactions: all cash, all stock, or a combination of cash and stock (including report of proportion of cash vs. stock).

After screening and the removal of financial acquiror firms and observations with missing data, we end up with a sample of 3340 transactions from 2006 to 2023. Table 1 provides an overview of M&A distribution by year and industry.

As seen in Panel A, 2007 was the peak year for M&A activity, accounting for 12.43% of total transactions (415 transactions), followed by 2008 and 2009, which accounted for 10.30% (344 transactions) and 9.70% (324 transactions) respectively. In the M&A deals in our sample, cash is the predominant payment method, comprising 79.49% of all transactions (2655 transactions), with stock payments representing 20.03% (669 transactions), and a mix of cash and stock only 0.48% (16 transactions).

Panel B shows that manufacturing is the sector with the most M&A transactions: 1222 transactions or 36.58% of the total. This is followed by the trade industry (774 transactions, 23.17%) and the transportation, information, and communication industry (709 transactions, 21.23%). Across industries, cash is the primary payment method used. For instance, the proportion of transactions using cash payment in the manufacturing sector, the trade sector, the transportation, information, and communication sector, and the fishery, agriculture & forestry sector are 79.13%, 75.84%, 81.66%, and 93.33%, respectively.

#### 3.2. Variables

##### 3.2.1. Equity overvaluation

To measure equity overvaluation, this study adopts the method proposed by Rhodes-Kropf et al. (2005). This method decomposes the market-to-book ratio of a stock into two parts: the ratio of market value to intrinsic value ( $M/V$ ), representing the level of mispricing, and the ratio of intrinsic value to book value ( $V/B$ ), representing the company's growth opportunities. The equation is as follows:

$$\frac{M}{B} = \frac{M}{V} \times \frac{V}{B}$$

After taking the logarithm of both sides, this equation becomes:

$$m - b = (m - v) + (v - b)$$

where  $m$  represents the market value of the stock,  $b$  represents the book value of the stock, and  $v$  represents the intrinsic value of the stock. Our primary goal here is to estimate the intrinsic value of the stock. In previous research, certain financial information, denoted as  $\theta$ , reflects the intrinsic value of the company, represented as  $v(\theta; \alpha)$ . In this context, the above equation can be expressed as:

$$m_{it} - b_{it} = [m_{it} - v_{it}(\theta_{it}, \alpha_{jt})] + [v_{it}(\theta_{it}, \alpha_{jt}) - v_{it}(\theta_{it}, \alpha_j)] + [v_{it}(\theta_{it}, \alpha_j) - b_{it}]$$

<sup>4</sup> Some previous studies indicate that stock payment is a sign of overvalued acquirors' equity, which subsequently leads to stock price corrections (Eckbo et al., 1990; Myers, 1984).

**Table 1**  
Sample distribution by year and industry.

| Panel A. Distribution of M&A deals in Japan by year. |      |      |            |       |            |     |
|------------------------------------------------------|------|------|------------|-------|------------|-----|
| Year                                                 | N    | Cash | Percentage | Stock | Percentage | Mix |
| 2006                                                 | 315  | 226  | 71.75%     | 89    | 28.25%     | 0   |
| 2007                                                 | 415  | 341  | 82.17%     | 74    | 17.83%     | 0   |
| 2008                                                 | 344  | 288  | 83.72%     | 55    | 15.99%     | 1   |
| 2009                                                 | 324  | 263  | 81.17%     | 61    | 18.83%     | 0   |
| 2010                                                 | 274  | 211  | 77.01%     | 62    | 22.63%     | 1   |
| 2011                                                 | 222  | 173  | 77.93%     | 48    | 21.62%     | 1   |
| 2012                                                 | 260  | 223  | 85.77%     | 37    | 14.23%     | 0   |
| 2013                                                 | 234  | 183  | 78.21%     | 49    | 20.94%     | 2   |
| 2014                                                 | 217  | 168  | 77.42%     | 49    | 22.58%     | 0   |
| 2015                                                 | 172  | 125  | 72.67%     | 45    | 26.16%     | 2   |
| 2016                                                 | 89   | 74   | 83.15%     | 15    | 16.85%     | 0   |
| 2017                                                 | 75   | 61   | 81.33%     | 10    | 13.33%     | 4   |
| 2018                                                 | 81   | 58   | 71.60%     | 22    | 27.16%     | 1   |
| 2019                                                 | 76   | 64   | 84.21%     | 12    | 15.79%     | 0   |
| 2020                                                 | 43   | 38   | 88.37%     | 5     | 11.63%     | 0   |
| 2021                                                 | 71   | 52   | 73.24%     | 16    | 22.54%     | 3   |
| 2022                                                 | 59   | 51   | 86.44%     | 8     | 13.56%     | 0   |
| 2023                                                 | 69   | 56   | 81.16%     | 12    | 17.39%     | 1   |
| Total                                                | 3340 | 2655 | 79.49%     | 669   | 20.03%     | 16  |

| Panel B. Distribution of M&A deals in Japan by industry. |      |      |            |       |            |       |
|----------------------------------------------------------|------|------|------------|-------|------------|-------|
| Acquiror Industry                                        | N    | Cash | Percentage | Stock | Percentage | Other |
| Construction                                             | 100  | 63   | 63.00%     | 35    | 35.00%     | 2     |
| Electric Power & Gas                                     | 26   | 22   | 84.62%     | 4     | 15.38%     | 0     |
| Fishery, Agriculture & Forestry                          | 15   | 14   | 93.33%     | 1     | 6.67%      | 0     |
| Manufacturing                                            | 1222 | 967  | 79.13%     | 251   | 20.54%     | 4     |
| Real Estate                                              | 109  | 92   | 84.40%     | 17    | 15.60%     | 0     |
| Services                                                 | 385  | 331  | 85.97%     | 51    | 13.25%     | 3     |
| Trade                                                    | 774  | 587  | 75.84%     | 183   | 23.64%     | 4     |
| Transportation, Information & Communication              | 709  | 579  | 81.66%     | 127   | 17.91%     | 3     |
| Total                                                    | 3340 | 2655 | 79.49%     | 669   | 20.03%     | 16    |

**Table 1** presents the distribution of M&A deals in Japan by year and industry. It shows the number and percentage of deals for each year and each industry in our sample, and the distribution of payment methods.

**Table 2**  
Descriptive statistics.

|               | Total |        |        | All-cash |        | All-stock |        |
|---------------|-------|--------|--------|----------|--------|-----------|--------|
|               | N     | Mean   | SD     | Mean     | SD     | Mean      | SD     |
| Valuation     |       |        |        |          |        |           |        |
| OV(RRV)       | 3340  | 0.327  | 0.802  | 0.329    | 0.809  | 0.332     | 0.773  |
| OV(PB)        | 3340  | 1.696  | 1.336  | 1.744    | 1.378  | 1.506     | 1.151  |
| Debt Issuance |       |        |        |          |        |           |        |
| TLI           | 3340  | 6.466  | 4.084  | 6.408    | 4.097  | 6.729     | 4.034  |
| LTLI          | 3340  | 5.459  | 4.391  | 5.383    | 4.400  | 5.801     | 4.356  |
| STLI          | 3340  | 3.215  | 3.876  | 3.242    | 3.871  | 3.103     | 3.915  |
| Controls      |       |        |        |          |        |           |        |
| Scale         | 3340  | 0.043  | 0.114  | 0.037    | 0.079  | 0.065     | 0.198  |
| Share.Acq     | 3340  | 54.440 | 36.431 | 53.830   | 37.008 | 56.157    | 33.972 |
| FA(Ac)        | 3340  | 0.454  | 0.498  | 0.353    | 0.478  | 0.849     | 0.358  |
| FA(Ta)        | 3340  | 0.363  | 0.481  | 0.313    | 0.464  | 0.565     | 0.496  |
| Target listed | 3340  | 0.381  | 0.486  | 0.376    | 0.484  | 0.411     | 0.492  |
| Tangibility   | 3340  | 0.259  | 0.188  | 0.252    | 0.185  | 0.292     | 0.193  |
| REPS          | 3340  | 0.006  | 0.032  | 0.007    | 0.032  | 0.004     | 0.028  |
| RETA          | 3340  | 0.220  | 0.332  | 0.233    | 0.316  | 0.180     | 0.348  |
| ROCE          | 3340  | 0.099  | 0.120  | 0.105    | 0.121  | 0.078     | 0.110  |
| Leverage      | 3340  | 0.514  | 0.203  | 0.504    | 0.201  | 0.556     | 0.206  |
| Capex         | 3340  | 0.045  | 0.040  | 0.045    | 0.039  | 0.043     | 0.043  |
| Liquidity     | 3340  | −3.606 | 3.662  | −3.643   | 3.694  | −3.407    | 3.514  |
| TOPIX.Re      | 3340  | 0.153  | 5.415  | 0.150    | 5.438  | 0.166     | 5.327  |

**Table 2** presents the descriptive statistics of the major variables. All variables are defined in Appendix A.

The first term,  $[m_{it} - v_{it}(\varnothing_{it}, \alpha_{jt})]$ , represents the difference between market value and intrinsic value at time  $t$  in industry  $j$ , and is referred to as firm-specific mispricing. The second term,  $[v_{it}(\varnothing_{it}, \alpha_{jt}) - v_{it}(\varnothing_{it}, \alpha_j)]$ , is the ratio of the intrinsic value at time  $t$  to industry-level mispricing, and is called the time-series sector error. The third term,  $[v_{it}(\varnothing_{it}, \alpha_j) - b_{it}]$ , is used to measure a company's growth opportunities. These three terms

vary annually at the company level, involving valuation multiples that differ across industries and time periods.

A linear regression model is established to correlate the company's market value, book value, net income, and leverage ratio:

$$Ln(M_{it}) = \alpha_0 + \alpha_1 \ln(B_{it}) + \alpha_2 \ln(|NI_{it}|) + \alpha_3 I^* \ln(|NI_{it}|) + \alpha_4 I^* lev_{it} + \varepsilon_{it}$$

**Table 3**  
Correlation and multicollinearity analysis.

|               | OV(RRV)   | LTLI      | Scale     | Share.Acq | FA(Ac)    | FA(Ta)   | Target listed | Tangibility | REPS     | RETA      | ROCE     | Leverage | Capex    | Liquidity | TOPIX.Re |
|---------------|-----------|-----------|-----------|-----------|-----------|----------|---------------|-------------|----------|-----------|----------|----------|----------|-----------|----------|
| OV(RRV)       | 1         |           |           |           |           |          |               |             |          |           |          |          |          |           |          |
| LTLI          | 0.246***  | 1         |           |           |           |          |               |             |          |           |          |          |          |           |          |
| Scale         | -0.108*** | -0.177*** | 1         |           |           |          |               |             |          |           |          |          |          |           |          |
| Share.Acq     | -0.172*** | -0.170*** | 0.227***  | 1         |           |          |               |             |          |           |          |          |          |           |          |
| FA(Ac)        | 0.139***  | 0.113***  | 0.030**   | 0.030**   | 1         |          |               |             |          |           |          |          |          |           |          |
| FA(Ta)        | 0.118***  | 0.141***  | 0.113***  | 0.101***  | 0.51***   | 1        |               |             |          |           |          |          |          |           |          |
| Target listed | 0.170***  | 0.204***  | -0.016    | -0.446*** | 0.293***  | 0.355*** | 1             |             |          |           |          |          |          |           |          |
| Tangibility   | 0.136***  | 0.464***  | -0.132*** | -0.059*** | 0.153***  | 0.146*** | 0.098***      | 1           |          |           |          |          |          |           |          |
| REPS          | 0.0280    | -0.008    | -0.036**  | -0.042**  | -0.011    | -0.019   | 0.070***      | 0.070***    | 1        |           |          |          |          |           |          |
| RETA          | 0.114***  | -0.119*** | -0.065*** | -0.057*** | 0.063***  | 0.117*** | 0.112***      | 0.032*      | 0.098*** | 1         |          |          |          |           |          |
| ROCE          | 0.026     | -0.163*** | -0.010    | -0.029*   | -0.055*** | 0.014    | 0.046***      | -0.172***   | 0.093*** | 0.471***  | 1        |          |          |           |          |
| Leverage      | 0.069***  | 0.620***  | -0.124*** | -0.034**  | 0.059***  | 0.057*** | 0.033*        | 0.307***    | -0.011   | -0.312*** | 0.026    | 1        |          |           |          |
| Capex         | 0.074***  | 0.198***  | 0.070***  | 0.007     | -0.001    | 0.008    | 0.031*        | 0.326***    | 0.108*** | -0.016    | 0.049*** | 0.009    | 1        |           |          |
| Liquidity     | -0.045*** | -0.018    | 0.035**   | 0.005     | 0.030*    | 0        | -0.002        | -0.004      | -0.011   | 0.013     | -0.025   | -0.009   | 0.004    | 1         |          |
| TOPIX.Re      | 0.026     | 0.020     | 0.039**   | 0.024     | 0.067***  | 0.033*   | -0.024        | 0.011       | -0.023   | 0.021     | 0.015    | 0.004    | 0.281*** | 0.281***  | 1        |
| VIF           | 1.13      | 2.14      | 1.15      | 1.49      | 1.43      | 1.58     | 1.64          | 1.50        | 1.03     | 1.53      | 1.39     | 1.87     | 1.20     | 1.09      | 1.10     |

Table 3 presents the Pearson correlation analysis and Variance Inflation Factor (VIF) for each major variable. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

where  $M_{it}$  represents the market value of the firm,  $B_{it}$  is book value,  $NI_{it}$  is net income, and  $I$  is a dummy variable that takes the value 1 when net income is zero or negative and 0 otherwise.  $lev_{it}$  represents financial leverage; it is regressed by year and industry to obtain the coefficient.

Next, the annual average value of each regression coefficient is introduced into the following equation to obtain the internal value of the company:

$$Ln(V_{it}) = \alpha_0 + \alpha_1 \ln(B_{it}) + \alpha_2 \ln(|NI_{it}|) + \alpha_3 I^* \ln(|NI_{it}|) + \alpha_4 I^* lev_{it} + \varepsilon_{it}$$

The ratio  $Ln\left(\frac{M_{it}}{V_{it}}\right)$  from the year prior to M&A represents the level of equity overvaluation.

Furthermore, we use an additional valuation measure to ensure the robustness of the results. Following the previous literature (Ang & Cheng, 2006; Dong et al., 2006, 2012; Mohanram et al., 2020), we use P/B ratios to measure the relative valuation of acquiror firms. The P/B ratio assesses the premium the market places on the value of a company's equity. This metric provides a complementary perspective to the assets perspective, making valuation measurement more comprehensive. It can reduce the bias that can be introduced by a single valuation method.

### 3.2.2. Payment method

We consider two dependent variables in baseline analysis. In the probit model, the dependent variable is a dummy variable for cash payment, where the payment method is coded as 1 if the deal is financed only by cash and 0 otherwise. In the ordered probit model, the dependent variable takes a value of 1 if the deal is entirely stock-financed; 2 if it is mixed-financed; and 3 if it is entirely cash-financed.

To enhance the accuracy of the model, we also incorporate several other factors that may influence the choice of payment method in Japanese M&A transactions. These include the scale of transactions, percentage of shares acquired, one dummy variable each for involvement of the acquiror's and the target's financial advisor, the target firm's list status, the acquiror's retained earnings ratio from the prior year, the acquiror's return on capital employed ratio from the prior year, the acquiror's PPE to total asset ratio from the prior year, the proportion of shares held by the top ten shareholders of the acquiror firm, the leverage ratio from the prior year, the acquiror's capital expenditures to total asset ratio from the prior year, the monthly volatility index in the Japanese market,<sup>5</sup> and the monthly Tokyo Stock Price Index return. Definitions of all variables are provided in Appendix A.

### 3.3. Descriptive statistics

Table 2 shows the summary statistics for the main variables used in our study, including separate statistics for all-cash and all-stock payment. In cases using cash payment, the mean value of the proxy variable for equity overvaluation OV(RRV) is 0.329 with a standard deviation of 0.809, while in cases of stock payment, the mean is 0.332 with a standard deviation of 0.773. The mean acquisition percentage in cash payment cases is 53.830%, significantly lower than the 56.157% in stock payment cases; this indicates that the larger the proportion of target company shares acquired, the greater the likelihood that stock payment is used. Involvement of the acquiror's financial advisor also shows a significant difference between cash and stock payments: in cash payment cases, only 35.3% of transactions involved a financial advisor, compared to 84.9% in stock payment cases. Overall, these descriptive statistics reveal key factors and differences in acquiror firms' choice of payment method, providing valuable basic information for further

<sup>5</sup> We employ the Volatility Index Japan (VXJ) provided by Osaka University. The VXJ can be retrieved from the website of Osaka University: <https://www-mmds.sigmath.es.osaka-u.ac.jp/structure/activity/vxj.php>

empirical analysis.

We also employ correlation analysis to alleviate concerns about multicollinearity in the model. Specifically, we conduct correlation analysis on the main overvaluation variable OV (RRV), theoretically the most significant factor in loan increases, long-term loan increases, and all control variables. A larger absolute value of the correlation coefficient indicates a stronger relationship between two variables, meaning a higher correlation between them. The results are shown in Table 3. The correlation coefficients for almost all variables range from  $-0.5$  to  $0.5$  (with only two larger values:  $0.51$  and  $0.62$ ), which indicates satisfactory independence of the variables and low likelihood of a negative impact on regression analysis. We also calculate the Variance Inflation Factor (VIF), an indicator of the degree of multicollinearity in the regression analysis. These results are also shown in Table 3. The VIF values and the mean of the VIF for all variables are less than 3, indicating that covariance between the variables is not strong

## 4. Results

### 4.1. Acquiror equity overvaluation and payment methods

In this section, we examine the relationship between acquiror overvaluation and the use of cash payments in M&A. Table 4 presents the regression results for our four models.

The results show that the coefficients for the acquiror overvaluation

indicators are significantly positive at the 5% level, suggesting that acquiror overvaluation is positively associated with the use of cash payments in acquisitions; this supports Hypothesis 1.

Our study also provides additional evidence regarding the relationship between equity overvaluation and M&A payment method. In all models we include industry and year dummies to control for industry- and year-level influences that do not vary with individual transactions. Besides the overvaluation variables, some other variables also show a significant effect on payment method. Transaction scale shows a negative correlation with cash payments, implying that the acquirors are less likely to choose to pay in full cash when transaction size exceeds the acquiror's cash reserves or financing capacity. Retained earnings ratio from the previous year shows a significantly positive correlation with the use of cash payments in all models; this means that when a company's internal funds are higher, it is more inclined to pay with cash. These variables underscore the significance of financial capacity—the level of the acquiror firm's own funds plus its ability to obtain debt financing—in the decision-making process for payment method in M&A.

To address the concern that the baseline results may be driven by time-invariant acquiror characteristics, we re-estimate the relationship using specifications that exploit within-acquiror variation across multiple deals. Columns (1) and (2) of Table 5 report linear probability model estimates with acquiror and year fixed effects, with standard errors clustered at the acquiror level (Petersen, 2009). We adopt the linear probability specification rather than a fixed-effects probit to avoid the

**Table 4**  
Acquiror overvaluation and payment methods.

|                  | (1)                  | (2)                  | (3)                  | (4)                  |
|------------------|----------------------|----------------------|----------------------|----------------------|
|                  | Probit               | Probit               | OProbit              | OProbit              |
| OV(RRV)          | 0.093**<br>(0.038)   |                      | 0.090**<br>(0.038)   |                      |
| OV(PB)           |                      | 0.056**<br>(0.029)   |                      | 0.053*<br>(0.029)    |
| Scale            | −0.915***<br>(0.217) | −1.009***<br>(0.220) | −0.934***<br>(0.215) | −1.024***<br>(0.218) |
| Share Acquired   | 0.003***<br>(0.001)  | 0.003***<br>(0.001)  | 0.003***<br>(0.001)  | 0.003***<br>(0.001)  |
| FA(Acquiror)     | −1.454***<br>(0.070) | −1.434***<br>(0.069) | −1.443***<br>(0.070) | −1.423***<br>(0.069) |
| FA(Target)       | −0.198***<br>(0.065) | −0.192***<br>(0.065) | −0.206***<br>(0.065) | −0.200***<br>(0.065) |
| Target listed    | 0.489***<br>(0.074)  | 0.499***<br>(0.074)  | 0.474***<br>(0.074)  | 0.483***<br>(0.073)  |
| Tangibility      | −0.340*<br>(0.181)   | −0.259<br>(0.185)    | −0.340*<br>(0.180)   | −0.262<br>(0.183)    |
| REPS             | 2.134**<br>(0.955)   | 2.130**<br>(0.950)   | 2.185**<br>(0.963)   | 2.185**<br>(0.958)   |
| RETA             | 0.218**<br>(0.093)   | 0.286***<br>(0.096)  | 0.157*<br>(0.087)    | 0.220**<br>(0.088)   |
| ROCE             | 0.412<br>(0.311)     | 0.254<br>(0.301)     | 0.498<br>(0.313)     | 0.351<br>(0.299)     |
| Leverage         | −0.453***<br>(0.160) | −0.444***<br>(0.162) | −0.483***<br>(0.156) | −0.475***<br>(0.158) |
| Capex            | 1.651**<br>(0.832)   | 1.529*<br>(0.850)    | 1.570*<br>(0.831)    | 1.455*<br>(0.848)    |
| Market Liquidity | −0.003<br>(0.009)    | −0.004<br>(0.009)    | −0.006<br>(0.009)    | −0.006<br>(0.009)    |
| TOPIX Return     | 0.006<br>(0.006)     | 0.006<br>(0.006)     | 0.006<br>(0.006)     | 0.006<br>(0.006)     |
| Observations     | 3340                 | 3340                 | 3340                 | 3340                 |
| Industry         | Yes                  | Yes                  | Yes                  | Yes                  |
| Year             | Yes                  | Yes                  | Yes                  | Yes                  |
| Pseudo R-squared | 0.232                | 0.231                | 0.221                | 0.221                |

Table 4 presents the results for the impact of equity overvaluation on the use of cash payments. Columns 1 and 2 represent a probit model, in which the dependent variable is set to 1 if the transaction is paid solely in cash, and 0 otherwise. Columns 3 and 4 represent an ordered probit model, where the dependent variable is set to 1 if the transaction is paid solely with stock, 2 for mixed transactions, and 3 for transactions paid entirely in cash. All models include the explanatory variable and all control variables. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 5**

Robustness tests for firm-level heterogeneity.

|                           | (1)                  | (2)                  | (3)                  | (4)                  |
|---------------------------|----------------------|----------------------|----------------------|----------------------|
|                           | LPM                  | LPM                  | clogit               | clogit               |
| OV(RRV)                   | 0.033**<br>(0.014)   |                      | 0.250*<br>(0.138)    |                      |
| OV(PB)                    |                      | 0.027**<br>(0.012)   |                      | 0.354**<br>(0.152)   |
| Scale                     | −0.128<br>(0.118)    | −0.143<br>(0.118)    | −0.528<br>(0.752)    | −0.577<br>(0.751)    |
| Share Acquired            | 0.001***<br>(0.000)  | 0.001***<br>(0.000)  | 0.012***<br>(0.004)  | 0.012***<br>(0.004)  |
| FA(Acquiror)              | −0.312***<br>(0.024) | −0.309***<br>(0.024) | −2.862***<br>(0.271) | −2.832***<br>(0.271) |
| FA(Target)                | −0.092***<br>(0.020) | −0.094***<br>(0.020) | −0.847***<br>(0.207) | −0.858***<br>(0.207) |
| Target listed             | 0.104***<br>(0.027)  | 0.103***<br>(0.027)  | 0.915***<br>(0.250)  | 0.903***<br>(0.249)  |
| Tangibility               | −0.046<br>(0.210)    | −0.002<br>(0.210)    | 1.061<br>(2.035)     | 1.558<br>(2.160)     |
| REPS                      | 0.272<br>(0.290)     | 0.287<br>(0.308)     | 2.209<br>(4.020)     | 2.291<br>(4.472)     |
| RETA                      | 0.088<br>(0.057)     | 0.105*<br>(0.056)    | 0.751**<br>(0.355)   | 0.805**<br>(0.353)   |
| ROCE                      | 0.233<br>(0.155)     | 0.160<br>(0.157)     | 2.123<br>(1.560)     | 1.910<br>(1.460)     |
| Leverage                  | −0.314**<br>(0.122)  | −0.345***<br>(0.121) | −2.513**<br>(1.134)  | −2.881**<br>(1.166)  |
| Capex                     | 0.113<br>(0.341)     | 0.102<br>(0.327)     | −2.775<br>(3.717)    | −2.495<br>(3.583)    |
| Market Liquidity          | −0.003<br>(0.003)    | −0.003<br>(0.003)    | −0.039<br>(0.032)    | −0.040<br>(0.032)    |
| TOPIX Return              | 0.001<br>(0.002)     | 0.001<br>(0.002)     | 0.017<br>(0.018)     | 0.017<br>(0.018)     |
| Observations              | 2753                 | 2753                 | 1471                 | 1471                 |
| Firm                      | Yes                  | Yes                  | Yes                  | Yes                  |
| Year                      | Yes                  | Yes                  | Yes                  | Yes                  |
| Pseudo/Adjusted R-squared | 0.344                | 0.344                | 0.334                | 0.337                |

**Table 5** presents robustness tests addressing firm-level heterogeneity. The dependent variable is the cash payment dummy, which equals 1 if the transaction is paid solely in cash and 0 otherwise. Columns (1) and (2) report linear probability model (LPM) estimates with acquiror firm fixed effects and year fixed effects. Columns (3) and (4) report conditional fixed-effects logit estimates, which exploit within-acquiror variation in payment choice; acquiror firm fixed effects are conditioned out in these models. All models include the same control variables as in **Table 4**. All variables are defined in the Appendix A. Firm and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

incidental parameters problem (Neyman & Scott, 1948). The effective sample of 2753 deals comprises acquirors completing multiple deals; singleton acquirors do not contribute to within-firm identification. Columns (3) and (4) report Chamberlain (1980) conditional fixed-effects logit estimates, which identify parameters only from acquirors with within-firm variation in payment outcomes ( $N = 1471$  deals).

Across both specifications and both overvaluation measures, the coefficient on equity overvaluation remains positive and statistically significant—a result that is particularly notable in the conditional logit specifications given the substantial reduction in effective sample relative to the linear probability model (LPM). These within-acquiror results suggest that the documented relation reflects time-varying within-firm changes in overvaluation rather than persistent differences across acquirors. The evidence is consistent with the interpretation that the same acquiror is more likely to choose cash payment in years when its own equity is more overvalued than in other years.

This study also examines the impact of equity overvaluation on M&A payment methods in subsamples classified by the relative valuation of equity. When the acquiror firm is overvalued in the previous year (that is, when OV(RRV) is greater than 0 or OV(PB) is greater than 1), we group it into the overvalued sample, and group the others into the undervalued sample. **Table 6** gives the regression results of equity relative valuation on payment methods in different relative valuation subsamples.

The results of **Table 6** show that if the acquiror firm is overvalued

before the transaction, the coefficient of equity valuation (OV(RRV) or OV(PB)) and cash payment is positive and significant at the 5% level, as shown in columns (1), (3) (5) and (7). If the acquiror is not overvalued before the acquisition, the regression coefficient of equity valuation and cash payment is not significant, as shown in columns (2), (4), (6) and (8). This indicates that for companies with overvalued equity, the payment method decisions are more likely to be affected by the relative valuation of equity than they are for companies with non-overvalued equity. This also shows that when equity is undervalued, the relative valuation of equity has no effect on the payment method decision.

#### 4.2. Mediation analysis of the effect of overvaluation on M&A payment method

##### 4.2.1. Debt financing

We further explored the mechanism through which equity overvaluation affects cash payment by conducting a mediation analysis. This analysis allows us to examine whether the positive correlation between equity overvaluation and cash payments can be attributed to equity overvaluation facilitating a firm's debt issuance, which in turn increases the likelihood of choosing cash payment using the financing obtained from the debt issuance.

Since our dependent variable is a dummy variable (indicating whether the payment is all-cash), some methods commonly used in previous studies may not be fully applicable (such as the Sobel method).

**Table 6**

Valuation effect of overvalued and undervalued firms.

|                  | Probit               |                      |                      |                      | OProbit              |                      |                      |                      |
|------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                  | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  | (7)                  | (8)                  |
|                  | OV                   | UV                   | OV                   | UV                   | OV                   | UV                   | OV                   | UV                   |
| OV(RRV)          | 0.186***<br>(0.068)  | 0.086<br>(0.157)     |                      |                      | 0.189***<br>(0.068)  | 0.110<br>(0.156)     |                      |                      |
| OV(PB)           |                      |                      | 0.076**<br>(0.034)   | 0.407<br>(0.308)     |                      |                      | 0.070**<br>(0.034)   | 0.416<br>(0.308)     |
| Scale            | −0.474<br>(0.311)    | −1.896***<br>(0.448) | −0.905***<br>(0.276) | −1.516***<br>(0.471) | −0.472<br>(0.311)    | −1.980***<br>(0.456) | −0.928***<br>(0.272) | −1.540***<br>(0.477) |
| Share Acquired   | 0.002*<br>(0.001)    | 0.005***<br>(0.002)  | 0.001<br>(0.001)     | 0.007***<br>(0.002)  | 0.002*<br>(0.001)    | 0.005***<br>(0.002)  | 0.001<br>(0.001)     | 0.007***<br>(0.002)  |
| FA(Acquiror)     | −1.393***<br>(0.089) | −1.641***<br>(0.123) | −1.396***<br>(0.091) | −1.616***<br>(0.116) | −1.388***<br>(0.089) | −1.625***<br>(0.121) | −1.381***<br>(0.091) | −1.620***<br>(0.114) |
| FA(Target)       | −0.296***<br>(0.077) | −0.059<br>(0.133)    | −0.168**<br>(0.085)  | −0.312***<br>(0.111) | −0.300***<br>(0.077) | −0.079<br>(0.129)    | −0.178**<br>(0.085)  | −0.316***<br>(0.108) |
| Target listed    | 0.568***<br>(0.086)  | 0.324**<br>(0.150)   | 0.518***<br>(0.096)  | 0.488***<br>(0.122)  | 0.562***<br>(0.086)  | 0.282*<br>(0.149)    | 0.498***<br>(0.096)  | 0.478***<br>(0.121)  |
| Tangibility      | −0.211<br>(0.226)    | −0.731**<br>(0.358)  | −0.221<br>(0.232)    | −0.171<br>(0.330)    | −0.230<br>(0.225)    | −0.722**<br>(0.354)  | −0.226<br>(0.229)    | −0.194<br>(0.331)    |
| REPS             | 1.665<br>(1.117)     | 1.550<br>(1.550)     | 2.277**<br>(1.091)   | 1.064<br>(1.514)     | 1.654<br>(1.116)     | 1.633<br>(1.563)     | 2.320**<br>(1.099)   | 1.009<br>(1.513)     |
| RETA             | 0.311**<br>(0.151)   | 0.157<br>(0.122)     | 0.312***<br>(0.104)  | 0.244<br>(0.284)     | 0.311**<br>(0.151)   | 0.078<br>(0.113)     | 0.250***<br>(0.094)  | 0.257<br>(0.285)     |
| ROCE             | 1.116*<br>(0.607)    | 0.442<br>(0.364)     | 0.052<br>(0.314)     | 0.940<br>(0.995)     | 1.123*<br>(0.609)    | 0.580<br>(0.368)     | 0.153<br>(0.309)     | 1.009<br>(0.995)     |
| Leverage         | −0.394*<br>(0.212)   | −0.647**<br>(0.273)  | −0.791***<br>(0.205) | 0.035<br>(0.328)     | −0.385*<br>(0.211)   | −0.677**<br>(0.266)  | −0.815***<br>(0.199) | 0.062<br>(0.327)     |
| Capex            | 3.365***<br>(1.141)  | 0.508<br>(1.325)     | 1.426<br>(1.067)     | 2.464<br>(1.699)     | 3.335***<br>(1.140)  | 0.387<br>(1.332)     | 1.345<br>(1.066)     | 2.441<br>(1.710)     |
| Market Liquidity | −0.017<br>(0.011)    | 0.025<br>(0.019)     | −0.022*<br>(0.012)   | 0.019<br>(0.015)     | −0.018<br>(0.011)    | 0.022<br>(0.018)     | −0.025**<br>(0.012)  | 0.018<br>(0.015)     |
| TOPIX Return     | 0.005<br>(0.007)     | 0.012<br>(0.010)     | 0.010<br>(0.008)     | −0.001<br>(0.009)    | 0.005<br>(0.007)     | 0.012<br>(0.010)     | 0.010<br>(0.008)     | −0.000<br>(0.009)    |
| Observations     | 2172                 | 1162                 | 2073                 | 1261                 | 2172                 | 1168                 | 2073                 | 1267                 |
| Industry         | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Year             | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Pseudo R-squared | 0.230                | 0.306                | 0.246                | 0.256                | 0.226                | 0.283                | 0.232                | 0.252                |

Table 6 presents the results for the impact of equity overvaluation on the use of cash payments for overvalued and undervalued firms, separately. Columns 1, 3, 5 and 7 represent the results for overvalued firms. Columns 2, 4, 6 and 8 represent the results for undervalued firms. All models include the same control variables as in Table 4. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

We applied the Karlson-Holm-Breen (KHB) method in Stata (Karlson et al., 2012). This mediation analysis method decomposes the overall effect of the variable into direct effect and indirect effect (Breen et al., 2013), and can be used in the probit model. Direct effect refers to the relationship between equity overvaluation and cash payment net of debt financing. Indirect effect refers to the part of relationship that is channeled through debt financing.

We collected the debt issuance data from Nikkei Financial Quest. To address concern that the contemporaneous (year *t*) loan growth may reflect deal financing itself rather than the pre-deal accumulation of debt capacity, we also measure the mediator before the acquisition date, that is, the increase in loans in year *t*-1, which precedes the deal announcement. We further decompose total loan increase into long-term loan increase and short-term loan increase, based on the institutional feature that long-term debt is the primary financing method for cash-funded acquisitions in Japan, whereas short-term debt is typically used for working capital purposes. This decomposition serves both as a mechanism specificity test, and as evidence regarding the maturity-specific financing channel through which equity overvaluation operates. Table 7 presents the KHB mediation results.

Table 7 reports the KHB mediation results across three panels. Panel A measures loan increases in year *t* (the transaction year). Panel B measures loan increases in year *t*-1 (strictly before the deal). Panel C further strengthens the temporal identification by placing the explanatory variable in year *t*-2, the mediator in year *t*-1, and the outcome in year *t*, ensuring that all three components of the mediation chain are

observed at strictly different points in time. This temporal separation mitigates the possibility that the documented indirect effect reflects mechanical contamination from deal-year financing.

In Panel A, the indirect effect of OV(RRV) operating through the increase in total loans (column 1) is 0.015, which is significant at the 5% level, indicating that the debt financing channel accounts for the overvaluation–cash payment relationship. In Panel B, the indirect effect of OV(RRV) through total loans at *t*-1 (column 4) is 0.016, which is also significant at the 5% level. In Panel C, where OV(RRV) is measured at *t*-2 to establish strict pre-deal sequencing, the indirect effect through total loan increases (column 7) remains 0.010 ( $p < 0.05$ ), with the total effect of 0.104 also strongly significant. Therefore, Hypothesis 2 is supported, indicating that debt financing is an important channel linking acquiror overvaluation to cash payment in Japanese M&A.

The mechanism specificity test in columns (2) and (3) of Panel A, and the corresponding columns of Panels B and C, decomposes total loan growth into long-term and short-term components. Across all three panels, the indirect effect operates exclusively through long-term loan increases (columns (2), (5), and (8) across Panels A, B and C, all significant at the 5% level), while the indirect effect through short-term loan growth is statistically indistinguishable from zero (columns (3), (6), and (9) across Panels A, B and C, all insignificant). This pattern provides evidence that the financing channel operates specifically through long-term loan increases, rather than through short-term loans.

**Table 7**

Results of mediation analysis.

| Panel A. Overvaluation (RRV) in year t-1 and Loan increases in year t   |            |             |             |
|-------------------------------------------------------------------------|------------|-------------|-------------|
| Variables                                                               | (1)<br>TLI | (2)<br>LTLI | (3)<br>STLI |
| Total Effect                                                            | 0.092**    | 0.091**     | 0.091**     |
| Direct Effect                                                           | 0.076**    | 0.075*      | 0.089**     |
| Indirect Effect                                                         | 0.016***   | 0.016**     | 0.002       |
| N                                                                       | 3339       | 3340        | 3336        |
| Panel B. Overvaluation (RRV) in year t-1 and Loan increases in year t-1 |            |             |             |
| Variables                                                               | (4)<br>TLI | (5)<br>LTLI | (6)<br>STLI |
| Total Effect                                                            | 0.092**    | 0.091**     | 0.093**     |
| Direct Effect                                                           | 0.076*     | 0.073*      | 0.093**     |
| Indirect Effect                                                         | 0.016**    | 0.017**     | 0.0005      |
| N                                                                       | 3340       | 3340        | 3340        |
| Panel C. Overvaluation (RRV) in year t-2 and Loan increases in year t-1 |            |             |             |
| Variables                                                               | (7)<br>TLI | (8)<br>LTLI | (9)<br>STLI |
| Total Effect                                                            | 0.105***   | 0.105***    | 0.105***    |
| Direct Effect                                                           | 0.094**    | 0.093**     | 0.105***    |
| Indirect Effect                                                         | 0.011**    | 0.012**     | −0.000      |
| N                                                                       | 3326       | 3326        | 3326        |

**Table 7** reports mediation analysis using the KHB method. Panels A and B show the mediation effect of loan increases (year t and t-1) on the overvaluation–cash payment relationship, using OV(RRV) at year t-1 as the explanatory variable. Panel C further establishes strict pre-deal temporal sequencing by placing the main explanatory variable OV(RRV) in year t-2, with the mediator measured in year t-1 and the outcome (cash payment) in year t. The mediation variables across all three panels are the logarithm of increases in loans (total loans, long-term loans, and short-term loans). We include the same control variables used in **Table 4**. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

#### 4.2.2. Causal mediation framework

To complement the KHB decomposition, we conduct causal mediation analysis (Imai et al., 2010), which provides ACME (average causal mediation effect) and ADE (average direct effect) estimates with a probit framework appropriate for binary outcomes (Fu et al., 2022; Pitthan & De Witte, 2025). **Table 8** reports the results across three panels, with the same panel structure as **Table 7**: Panel A uses OV(RRV) at t-1 and loan increases at t, Panel B uses OV(RRV) at t-1 and loan increases at t-1, and Panel C uses OV(RRV) at t-2 and loan increases at t-1.

Across all three panels, the ACME through total loan growth and long-term loan growth is highly statistically significant. In Panel A, the ACME through total loans (column 1) is 0.003 ( $p < 0.01$ ), accounting for 15.9% of the total effect; through long-term loans (column 2), the ACME is 0.003 ( $p < 0.05$ ), accounting for 16.1% of the total effect. In Panel C, where the explanatory variable is placed at t-2 to establish strict pre-deal sequencing, the ACME through long-term loan growth (column 8) remains 0.002 ( $p < 0.05$ ), accounting for 10.0% of the total effect. Consistent with the KHB decomposition in **Table 7**, the ACME through short-term loan growth is statistically indistinguishable from zero across all three panels, confirming the mechanism specificity by debt maturity. These causal mediation results are consistent with the KHB findings and provide supplementary evidence supporting Hypothesis 2.

#### 4.3. Internal and external influences on corporate financing behavior

##### 4.3.1. Bank–firm connectedness and debt financing

We next examine whether the overvaluation–loan growth relationship varies with observable bank–firm connectedness. We use three bank-shareholding based measures. These variables are not intended to identify a single mechanism. Rather, they serve as broad proxies for observable bank–firm ties.

Several interpretations are possible. First, bank shareholding may

**Table 8**

Causal mediation effects.

| Panel A. Overvaluation (RRV) in year t-1 and Loan increases in year t   |            |             |             |
|-------------------------------------------------------------------------|------------|-------------|-------------|
| Variables                                                               | (1)<br>TLI | (2)<br>LTLI | (3)<br>STLI |
| ACME                                                                    | 0.003***   | 0.003**     | 0.0003      |
| ADE                                                                     | 0.016*     | 0.016*      | 0.019**     |
| Total Effect                                                            | 0.019**    | 0.019**     | 0.019**     |
| % of total effect mediated                                              | 15.9       | 16.1        | 1.7         |
| Panel B. Overvaluation (RRV) in year t-1 and Loan increases in year t-1 |            |             |             |
| Variables                                                               | (4)<br>TLI | (5)<br>LTLI | (6)<br>STLI |
| ACME                                                                    | 0.003**    | 0.003**     | 0.0001      |
| ADE                                                                     | 0.016**    | 0.016*      | 0.019**     |
| Total Effect                                                            | 0.020**    | 0.019**     | 0.019***    |
| % of total effect mediated                                              | 15.1       | 17.5        | 0.4         |
| Panel C. Overvaluation (RRV) in year t-2 and Loan increases in year t-1 |            |             |             |
| Variables                                                               | (7)<br>TLI | (8)<br>LTLI | (9)<br>STLI |
| ACME                                                                    | 0.002**    | 0.002**     | −0.0001     |
| ADE                                                                     | 0.019**    | 0.019***    | 0.022***    |
| Total Effect                                                            | 0.021***   | 0.022***    | 0.022***    |
| % of total effect mediated                                              | 9.4        | 10.0        | −0.0009     |

**Table 8** reports causal mediation analysis estimates of the relation between overvaluation and cash payment. Panel A and B examine the mediation effect of loan increases (year t and t-1) on the overvaluation–cash payment relationship, using OV(RRV) at year t-1 as the explanatory variable. Panel C further establishes strict pre-deal temporal sequencing by placing the main explanatory variable OV(RRV) in year t-2, with the mediator measured in year t-1 and the outcome (cash payment) in year t. The mediation variables across all three panels are the logarithm of increases in loans (total loans, long-term loans, and short-term loans). We include the same control variables used in **Table 4**. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

reflect closer relationship lending or information sharing between banks and borrowing firms. Second, overlapping equity and lending relationships may reduce shareholder–creditor conflict or align incentives between banks and borrowers, which facilitates access to debt financing. This interpretation is consistent with prior evidence that overlapping equity and debt claims or cross-holdings between borrowers' shareholders and lenders are associated with lower loan spreads (Jiang et al., 2010; Wang & Wang, 2024). Third, in the Japanese setting, bank shareholding may also reflect monitoring, main-bank governance, cross-shareholding networks, or keiretsu affiliation. Finally, these variables may capture borrower quality, firm visibility, or systemic importance, because banks may be more likely to hold shares in firms that have already been deemed creditworthy or strategically important. Therefore, we interpret the bank-shareholding based variables as broad proxies for bank-firm connectedness rather than as clean measures of a single relationship-lending or bank-governance mechanism.

We collected data on banks among the top ten shareholders of acquiror firms from Nikkei Financial Quest. We first calculated the proportion of banks among the top ten shareholders to capture the extent of observable bank presence in the shareholder structure. We then calculated the total percentage of shares held by all banks among the top ten shareholders. In addition, we obtained data on the percentage of shares held by the firm's main bank from the Nikkei NEEDS CGES (Corporate Governance Evaluation System) database. Since not all firms report main-bank information and there is no uniform official definition of a main bank, the sample size for the main-bank specification is smaller. We therefore interpret the main bank results cautiously.

A positive interaction between acquiror overvaluation and these bank-shareholding variables would be consistent with the view that the financing channel is more pronounced among firms with stronger observable bank-firm ties. However, because these variables may

**Table 9**

Bank–firm connectedness and debt financing.

|                           | (1)                 | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                 | (8)                 | (9)               |
|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------------|
|                           | TLI                 | LTLI                | STLI                | TLI                 | LTLI                | STLI                | TLI                 | LTLI                | STLI              |
| OV(RRV)                   | 0.374***<br>(0.107) | 0.419***<br>(0.113) | 0.069<br>(0.144)    | 0.447***<br>(0.097) | 0.449***<br>(0.102) | −0.044<br>(0.131)   | 0.756***<br>(0.219) | 1.082***<br>(0.243) | 0.215<br>(0.321)  |
| Bnk_Top10                 | 0.034***<br>(0.004) | 0.030***<br>(0.004) | 0.018***<br>(0.005) |                     |                     |                     |                     |                     |                   |
| OV(RRV) × Bnk_Top10       | 0.007**<br>(0.003)  | 0.008**<br>(0.004)  | −0.000<br>(0.005)   |                     |                     |                     |                     |                     |                   |
| Bnk_SHper_Top10           |                     |                     |                     | 0.093***<br>(0.009) | 0.087***<br>(0.009) | 0.050***<br>(0.012) |                     |                     |                   |
| OV(RRV) × Bnk_SHper_Top10 |                     |                     |                     | 0.013<br>(0.009)    | 0.022**<br>(0.009)  | 0.012<br>(0.012)    |                     |                     |                   |
| MainBnk_SHper             |                     |                     |                     |                     |                     |                     | −0.059<br>(0.063)   | −0.076<br>(0.070)   | 0.015<br>(0.093)  |
| OV(RRV) × MainBnk_SHper   |                     |                     |                     |                     |                     |                     | 0.006<br>(0.073)    | −0.104<br>(0.080)   | −0.051<br>(0.106) |
| Observations              | 3236                | 3236                | 3236                | 3236                | 3236                | 3236                | 1389                | 1389                | 1389              |
| Controls                  | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes               |
| Industry                  | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes               |
| Year                      | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | Yes               |
| Adjusted R-squared        | 0.540               | 0.562               | 0.092               | 0.545               | 0.568               | 0.095               | 0.532               | 0.532               | 0.107             |

Table 9 shows the impact of bank–firm connectedness on firms' debt financing behavior when its equity is overvalued. The bank-related variables considered include the proportion of banks among the top ten shareholders, their shareholding percentage, and the shareholding percentage of the Main Bank in the CGES database. All models include the same control variables as in Table 4. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 10**

Macro events and debt financing.

|                      | (1)                 | (2)                 | (3)               | (4)                 | (5)                 | (6)               |
|----------------------|---------------------|---------------------|-------------------|---------------------|---------------------|-------------------|
|                      | TLI                 | LTLI                | STLI              | TLI                 | LTLI                | STLI              |
| OV(RRV)              | 0.689***<br>(0.065) | 0.761***<br>(0.069) | 0.129<br>(0.085)  | 0.714***<br>(0.079) | 0.740***<br>(0.082) | 0.142<br>(0.102)  |
| OV(RRV) × COVID      | −0.776**<br>(0.340) | −0.612<br>(0.379)   | −0.578<br>(0.435) |                     |                     |                   |
| OV(RRV) × Fin Crisis |                     |                     |                   | −0.149<br>(0.128)   | −0.003<br>(0.140)   | −0.097<br>(0.170) |
| Observations         | 3340                | 3340                | 3340              | 3340                | 3340                | 3340              |
| Controls             | Yes                 | Yes                 | Yes               | Yes                 | Yes                 | Yes               |
| Industry             | Yes                 | Yes                 | Yes               | Yes                 | Yes                 | Yes               |
| Year                 | Yes                 | Yes                 | Yes               | Yes                 | Yes                 | Yes               |
| Adjusted R-squared   | 0.519               | 0.544               | 0.090             | 0.518               | 0.544               | 0.089             |

Table 10 presents the results for the impact of overvaluation on debt financing behavior in the presence of macro external events. The macro events considered are the Covid-19 pandemic (Covid) and the global financial crisis (FC). All models include the same control variables as in Table 4. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

capture several overlapping institutional features of Japanese corporate finance, we interpret the results as suggestive heterogeneity evidence. Table 9 shows the results of the regression analysis.

Table 9 shows that several interaction terms between acquirer overvaluation and the bank-shareholding variables are positive and statistically significant mainly for total loan increases and long-term loan increases (column 1, 2 and 5). This pattern suggests that the positive association between overvaluation and loan increases is stronger among firms with greater observable bank–firm connectedness. The evidence is strongest for the proportion and aggregate shareholding percentage of banks among the top ten shareholders. By contrast, the main-bank shareholding specification provides weaker evidence, partly because of the smaller sample size and the difficulty of identifying a uniform main-bank relation from the available data. The evidence for short-term loan increases is also weaker and less consistent. Overall, we interpret these findings as suggestive heterogeneity evidence.

#### 4.3.2. Macro event impact

To mitigate concerns about the impact of major events on corporate financing behavior in our sample, we estimate interaction models using indicators for the global financial crisis and the Covid-19 pandemic: We define 2020 and 2021 as years affected by Covid-19, and 2007, 2008,

and 2009 as years affected by the global financial crisis.

The results are shown in Table 10. The interaction term between OV (RRV) and Covid-19 is negative and statistically significant for total loan increases, suggesting that the relationship between overvalued equity and debt financing was weaker during the Covid-19 period. However, the interaction terms are not statistically significant for long-term or short-term loan increases. The interaction terms between OV(RRV) and the financial-crisis indicator are statistically insignificant across all three loan measures. Therefore, we infer that including the periods of major events in the sample does not materially affect corporate financing behavior and therefore does not bias our main results.

#### 4.4. Information asymmetry

Following Eckbo et al. (2018), we examine whether rational-payment-design considerations are relevant in Japan—that is, whether information asymmetry between the M&A parties is a critical factor in the relationship between equity overvaluation and cash payment choice. We first apply the method of Klitzka et al. (2022), using the absolute value of the relative valuation index (OV(RRV) and OV(PB)) to represent the valuation uncertainty of the company. Based on Klitzka et al., we surmise that under conditions of information asymmetry, when the

**Table 11**  
Valuation uncertainty and cash payment.

|                  | (1)                  | (2)                  | (3)                  | (4)                  |
|------------------|----------------------|----------------------|----------------------|----------------------|
|                  | Probit               | OProbit              | Probit               | OProbit              |
| RRV_abs          | 0.147**<br>(0.058)   | 0.145**<br>(0.058)   |                      |                      |
| PB_abs           |                      |                      | 0.119<br>(0.074)     | 0.111<br>(0.074)     |
| Scale            | −0.966***<br>(0.219) | −0.982***<br>(0.217) | −0.994***<br>(0.219) | −1.009***<br>(0.217) |
| Share Acquired   | 0.003***<br>(0.001)  | 0.003***<br>(0.001)  | 0.003***<br>(0.001)  | 0.003***<br>(0.001)  |
| FA(Acquiror)     | −1.440***<br>(0.069) | −1.430***<br>(0.069) | −1.432***<br>(0.069) | −1.422***<br>(0.069) |
| FA(Target)       | −0.190***<br>(0.065) | −0.198***<br>(0.065) | −0.189***<br>(0.065) | −0.198***<br>(0.065) |
| Target listed    | 0.490***<br>(0.074)  | 0.474***<br>(0.074)  | 0.498***<br>(0.074)  | 0.482***<br>(0.073)  |
| Tangibility      | −0.316*<br>(0.180)   | −0.316*<br>(0.179)   | −0.283<br>(0.182)    | −0.286<br>(0.181)    |
| REPS             | 2.082**<br>(0.970)   | 2.136**<br>(0.978)   | 2.135**<br>(0.954)   | 2.189**<br>(0.963)   |
| RETA             | 0.253***<br>(0.092)  | 0.190**<br>(0.086)   | 0.270***<br>(0.094)  | 0.205**<br>(0.088)   |
| ROCE             | 0.489<br>(0.318)     | 0.573*<br>(0.320)    | 0.326<br>(0.302)     | 0.417<br>(0.302)     |
| Leverage         | −0.453***<br>(0.160) | −0.484***<br>(0.157) | −0.431***<br>(0.160) | −0.462***<br>(0.157) |
| Capex            | 1.701**<br>(0.833)   | 1.618*<br>(0.832)    | 1.643*<br>(0.845)    | 1.564*<br>(0.843)    |
| Market Liquidity | −0.004<br>(0.009)    | −0.006<br>(0.009)    | −0.004<br>(0.009)    | −0.006<br>(0.009)    |
| TOPIX Return     | 0.006<br>(0.006)     | 0.006<br>(0.006)     | 0.006<br>(0.006)     | 0.006<br>(0.006)     |
| Observations     | 3340                 | 3340                 | 3340                 | 3340                 |
| Industry         | Yes                  | Yes                  | Yes                  | Yes                  |
| Year             | Yes                  | Yes                  | Yes                  | Yes                  |
| Pseudo R-squared | 0.232                | 0.221                | 0.231                | 0.220                |

Table 11 presents the results for the impact of absolute value of equity overvaluation on the use of cash payments. Columns 1 and 3 represent a probit model, in which the dependent variable is set to 1 if the transaction is paid solely in cash, and 0 otherwise. Columns 2 and 4 represent an ordered probit model, where the dependent variable is set to 1 if the transaction is paid solely with stock, 2 for mixed transactions, and 3 for transactions paid entirely in cash. All models include the same control variables as in Table 4. All variables are defined in the Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

acquiror company has higher valuation uncertainty, the risk of accepting stock as payment is higher. Table 11 shows that the coefficients of valuation uncertainty are all positive, indicating that valuation uncertainty is positively associated with cash payment. In columns (1) and

**Table 12**  
Results of mediation analysis (discretionary accruals).

|                           | Overvaluation (RRV) in year t-1 |         | Overvaluation (RRV) in year t-2 |          |
|---------------------------|---------------------------------|---------|---------------------------------|----------|
|                           | (1)                             | (2)     | (3)                             | (4)      |
| Mediating variable (Debt) | LTLI                            | LTLI    | LTLI                            | LTLI     |
| Mediating variable (DACC) | MFLOS                           | MJones  | MFLOS                           | MJones   |
| Total Effect              | 0.090**                         | 0.091** | 0.103***                        | 0.105*** |
| Direct Effect             | 0.073*                          | 0.073*  | 0.095**                         | 0.093**  |
| Indirect Effect           | 0.017**                         | 0.017** | 0.008                           | 0.011**  |
| % mediated (Debt)         | 16.63                           | 19.00   | 9.84                            | 11.31    |
| % mediated (DACC)         | 2.52                            | 0.17    | −2.06                           | −0.20    |
| N                         | 3340                            | 3340    | 3326                            | 3326     |

Table 12 reports multiple-mediator KHB decomposition estimates comparing the relative contribution of the debt-financing channel and the information-asymmetry channel to the mediation of equity overvaluation's effect on cash payment. The explanatory variable is overvaluation measured by the Rhodes-Kropf et al. (2005) firm-specific component (OV(RRV)) in year t-1 in columns (1) and (2), and in year t-2 in columns (3) and (4). The decomposition includes two mediators simultaneously. The first one is the increase in long-term loans in year t-1 (LTLI), proxying the debt-financing channel, and second one is discretionary accruals in year t-1 (DACC), proxying the information-asymmetry channel. Two alternative DACC measures are reported, MFLOS and MJones. “% mediated (Debt)” and “% mediated (DACC)” report each mediator's contribution as a percentage of the total effect.

(2), the coefficients of the absolute values of OV(RRV) are significant at the 5% level. This result supports the rational payment design hypothesis. When valuation uncertainty is high, cash payment allows both parties to reduce the risks associated with non-public information.

To provide a clearer comparison of the two channels, we further conduct mediation effect analysis, using discretionary accruals (DACC) as a proxy for information asymmetry to test whether information asymmetry plays a key role in the relationship between Japanese companies' equity overvaluation and M&A payment decisions. We use DACC as the information asymmetry mediator because the absolute value of the relative valuation index is mechanically derived from the overvaluation measure itself and therefore cannot serve as a mediator that is conceptually distinct from the explanatory variable. DACC instead captures overvaluation-induced information asymmetry through an independent accounting-based channel, making it suitable for a joint multi-mediator comparison with the debt-financing channel.

Theoretically, DACC reflects the information that management conveys to the market through the manipulation of financial reports, as opposed to actual financial information, thereby increasing information asymmetry. Moreover, managers of overvalued companies are likely to use earnings management to deceive the market into believing that management will create the value expected by market participants (Badertscher, 2011; Chi & Gupta, 2009; Jensen, 2005; Marciukaityte & Varma, 2008). The DACC measure thus captures information asymmetry plausibly induced by overvaluation.

Based on previous studies (Dai et al., 2017; J. Francis et al., 2005; McNichols, 2002), we construct two alternative DACC measures: the modified Jones model (MJones) of Dechow et al. (1995), and the modified Jones model with lagged operating status (MFLOS) of Francis et al. (2005), using the following two formulas.

$$TA_{i,t} = \varphi_0 + \varphi_1 (\Delta REV_{i,t} - \Delta REC_{i,t}) + \varphi_2 PPE_{i,t} + \varepsilon_{i,t}$$

where  $TA_{i,t}$  is total accruals, equal to  $(\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STD_{i,t} - DEP_{i,t}) / (A_{i,t-1})$ .  $\Delta CA_{i,t}$  is the change in current assets.  $\Delta CL_{i,t}$  is the change in current liabilities.  $\Delta Cash_{i,t}$  is the change in cash and cash equivalents.  $\Delta STD_{i,t}$  is the change in debt included in current liabilities.  $DEP_{i,t}$  is depreciation and amortization expenses.  $A_{i,t-1}$  is lagged total assets.  $\Delta REV_{i,t}$  is the change in revenues scaled by  $A_{i,t-1}$ .  $\Delta REC_{i,t}$  is the change in net receivables scaled by  $A_{i,t-1}$ .  $PPE_{i,t}$  is gross property, plant, and equipment scaled by  $A_{i,t-1}$ . We calculate the residual from the above model for each industry each year as discretionary accruals DACC (MJones).

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \varepsilon_{i,t}$$

where  $TCA_{i,t}$  is total current accruals, equal to  $(\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STD_{i,t}) / (A_{i,t-1})$ .  $\Delta CA_{i,t}$  is the change in current assets.  $\Delta CL_{i,t}$

**Table 13**  
Propensity score matching.

| Panel A: Balance check                                                    |                      |                      |       |         |
|---------------------------------------------------------------------------|----------------------|----------------------|-------|---------|
| Variables                                                                 | Treatment group      | Control group        | %bias | p-value |
| Scale                                                                     | 0.051                | 0.049                | 1.9   | 0.653   |
| Share Acquired                                                            | 56.509               | 57.481               | -2.7  | 0.614   |
| FA(Acquiror)                                                              | 0.831                | 0.833                | -0.4  | 0.940   |
| FA(Target)                                                                | 0.576                | 0.558                | 3.6   | 0.531   |
| Target listed                                                             | 0.408                | 0.432                | -4.9  | 0.391   |
| Tangibility                                                               | 0.285                | 0.287                | -0.6  | 0.910   |
| REPS                                                                      | 0.002                | 0.005                | -7.7  | 0.103   |
| RETA                                                                      | 0.202                | 0.215                | -3.7  | 0.430   |
| ROCE                                                                      | 0.086                | 0.088                | -1.7  | 0.761   |
| Leverage                                                                  | 0.559                | 0.545                | 7.0   | 0.203   |
| Capex                                                                     | 0.042                | 0.043                | -2.9  | 0.555   |
| Market Liquidity                                                          | -3.549               | -3.533               | -0.4  | 0.938   |
| TOPIX Return                                                              | 0.468                | 0.235                | 4.3   | 0.437   |
| Panel B: Regression results of equity overvaluation on M&A payment (PSM). |                      |                      |       |         |
|                                                                           | (1)                  | (2)                  |       |         |
|                                                                           | Cash Payment         | Cash Payment         |       |         |
| OV(RRV)                                                                   | 0.123**<br>(0.050)   |                      |       |         |
| OV(PB)                                                                    |                      | 0.076**<br>(0.036)   |       |         |
| Constant                                                                  | -0.911***<br>(0.281) | -1.064***<br>(0.283) |       |         |
| Controls                                                                  | Yes                  | Yes                  |       |         |
| Industry                                                                  | Yes                  | Yes                  |       |         |
| Year                                                                      | Yes                  | Yes                  |       |         |
| N                                                                         | 1254                 | 1254                 |       |         |
| Pseudo R-squared                                                          | 0.048                | 0.047                |       |         |

Table 13 shows the results of propensity score matching (PSM) for both overvaluation variables. Panel A presents the balance test results using the PSM sample 1:1 nearest neighbor matching method on selected variables. Panel B presents the results using a PSM sample. We include the same control variables used in Table 4. All variables are defined in Appendix A. Industry and year fixed effects are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

is the change in current liabilities.  $\Delta Cash_{it}$  is the change in cash and cash equivalents.  $\Delta STD_{it}$  is the change in debt included in current liabilities.  $A_{it-1}$  is lagged total assets.  $CFO_{it-1}$ ,  $CFO_{it}$  and  $CFO_{it+1}$  are the cash flows from operations for year t-1, year t and year t + 1, respectively, which are scaled by  $A_{it-1}$ .  $\Delta REV_{it}$  is the change in revenues scaled by  $A_{it-1}$ .  $PPE_{it}$  is gross property, plant, and equipment scaled by  $A_{it-1}$ . We calculate the residual from the above model for each industry each year as discretionary accruals DACC (MFLOS).

We conduct a multi-mediator KHB decomposition that simultaneously includes long-term loan growth (LTLI) in year t-1 and discretionary accruals (DACC) in year t-1 as mediators of equity overvaluation's effect on cash payment. The disentangle option of the KHB Stata command (Karlson et al., 2012) decomposes the combined indirect effect into each mediator's individual contribution as a percentage of the total effect. We employ both timing specifications: OV (RRV) at year t-1, and OV(RRV) at year t-2.

The results suggest that rational payment design considerations and the financing channel are not mutually exclusive. They both operate in our Japanese sample, but play empirically distinct roles. The former, through valuation uncertainty, independently predicts cash payment, consistent with the theoretical predictions of Klitzka et al. (2022) and Eckbo et al. (2018). The latter, through pre-deal long-term debt financing, mediates the directional effect of equity overvaluation on cash payment.

#### 4.5. Propensity score matching

To mitigate the concern that our results might be driven by differences between firms that pay with cash and firms that pay with stock,

this study also employs the Propensity Score Matching (PSM) technique. We calculate propensity scores using deal-level, firm-level, and market-level variables. Subsequently, we perform 1:1 nearest neighbor matching. Panel A of Table 13 reports the differences in various variables based on the 1:1 nearest neighbor matching approach. As shown in the table, after propensity score matching, the p-values for the variables in the matched sample are not significant, indicating effective matching and passing the balance test. In the results, the coefficients for the two measures of equity overvaluation on cash payments are 0.123 and 0.076, respectively, and are statistically significant at the 5% level. This indicates that the higher the degree of equity overvaluation, the greater the likelihood of a firm opting for cash acquisitions. The empirical outcomes from the PSM test further reinforce our baseline results. This confirms that our results are not driven by structural differences between cash-paying and stock-paying firms in the original, unbalanced sample.

By implementing the PSM approach, we alleviate concerns about structural imbalance between firms choosing different payment methods. The fact that our main results remain consistent and significant even within the balanced matched sample serves as strong evidence that the observed relationship between equity overvaluation and payment method is not driven by systematic differences in firm characteristics. In other words, after eliminating observable structural differences through matching, the persistent effect of overvaluation supports the validity of our interpretation. We believe this strengthens the internal validity of our analysis and reinforces the robustness of our conclusions.

## 5. Conclusion

We examined the relationship between acquiror equity overvaluation and M&A payment choice in the Japanese market. Our sample consisted of 3340 M&A deals from 2006 to 2023, and the analysis results indicate a significant positive effect of equity overvaluation on the use of cash payments. This relationship remains robust after we use different models and control for deal-level characteristics, firm-level characteristics, and industry and year dummies. We further clarify the relationship between equity overvaluation and cash payments through mediation analysis, demonstrating that debt issuance (long-term loans) is an important mechanism through which overvaluation influences M&A payment method. Overvaluation of the acquiror's equity enhances the firm's ability to employ debt financing, thereby increasing the likelihood of the use of cash payments. These results also validate, to some extent, the applicability of the pecking order theory in Japan. In subsequent analyses, we include information asymmetry due to uncertainty in mediation analysis to verify the validity of the rational payment design in our sample. We find that valuation uncertainty independently predicts cash payment, consistent with the rational payment design framework of prior literature (Eckbo et al., 2018; Klitzka et al., 2022). When we benchmark the debt-financing channel against the information-asymmetry channel in a unified multiple-mediator decomposition, we find that the latter mainly operates as a complementary mechanism through valuation uncertainty in our sample. The robustness of our results persists across alternative measures of equity overvaluation, strict pre-deal temporal sequencing, and various endogeneity checks including acquiror fixed effects, propensity score matching, and supplementary instrumental variable estimates.

Our research findings can be summarized as follows: We identify an indirect debt-financing channel through which equity overvaluation drives cash payment in Japanese M&A. Pre-deal overvaluation enhances acquirors' effective debt capacity, which is then drawn upon at the time of the acquisition to finance cash payment. We do not interpret our findings as overturning the market timing theory of M&A or the rational payment design framework. Rather, our findings complement the frameworks by identifying the institutional contingency of their empirical outcomes. The relative weights of payment with stock, debt capacity, and the information asymmetry channel are influenced by the

institutional context, with Japan's bank-based financial system amplifying the debt-capacity channel relative to its influence in the U.S. setting on which the canonical literature is built.

Our study on the Japanese market contributes to discussion on equity overvaluation and M&A, offering both theoretical and empirical evidence of how equity overvaluation can lead to cash payments from a financing perspective. The research also provides new empirical evidence regarding the relationship between equity overvaluation and debt financing; this provides theoretical insights for other countries, where different institutional environments may affect the influence of overvaluation on payment method in different ways. Understanding the relationship between equity overvaluation and M&A payment methods

can help policymakers and regulators to better assess the health of the market. For example, a high proportion of cash payments may reflect the market's confidence in firm valuations or firms' expectations of future cash flow stability. Thus, monitoring changes in M&A payment methods can serve as an indicator of market sentiment and economic health.

#### CRediT authorship contribution statement

**Yunxiao Hu:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Kenji Kutsuna:** Conceptualization, Funding acquisition, Investigation, Validation, Writing – original draft, Writing – review & editing, Supervision.

#### Appendix A. Variable definitions

| Variable                           | Definition                                                                                                                                                      |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Dependent Variable</b>          |                                                                                                                                                                 |
| Cash Payment Dummy                 | Dummy variable equal to 1 if the payment method is “Cash Only”, and 0 otherwise.                                                                                |
| Ordered Cash Payment Variable      | Takes value of 1 if the deal is entirely stock-financed; 2 if it is mixed-financed; and 3 if it is entirely cash-financed.                                      |
| <b>Independent Variable</b>        |                                                                                                                                                                 |
| OV(RRV)                            | Based on Rhodes-Kropf's research, this is the logarithm of the ratio of the company's market value to its intrinsic value in the year prior to the acquisition. |
| OV(PB)                             | The price-to-book ratio in the year prior to the acquisition, defined as the market value of equity divided by the book value of equity.                        |
| <b>Mediation Variables</b>         |                                                                                                                                                                 |
| TLI                                | Logarithm of the increase in the amount of acquiror firm loans.                                                                                                 |
| LTLI                               | Logarithm of the increase in the amount of acquiror firm long-term loans.                                                                                       |
| STLI                               | Logarithm of the increase in the amount of acquiror firm short-term loans.                                                                                      |
| DACC                               | Discretionary accruals of acquiror firm.                                                                                                                        |
| <b>Bank Shareholding Variables</b> |                                                                                                                                                                 |
| Bnk_Top10                          | The proportion of banks among the firm's top ten shareholders in year t-1                                                                                       |
| Bnk_SHper_Top10                    | The total percentage of shares held by banks among the firms top ten shareholders in year t-1                                                                   |
| MainBnk_SHper                      | The percentage of shares held by the firm's main bank in year t-1 (sourced from CGES)                                                                           |
| <b>Control Variables</b>           |                                                                                                                                                                 |
| Scale                              | Deal value divided by total assets.                                                                                                                             |
| Share Acquired                     | Percentage of shares acquired in the transaction.                                                                                                               |
| FA(Acquiror)                       | Dummy variable equal to 1 if the acquiring firm has a financial advisor for the transaction, and 0 otherwise.                                                   |
| FA(Target)                         | Dummy variable equal to 1 if the target firm has a financial advisor for the transaction, and 0 otherwise.                                                      |
| Target listed                      | Dummy variable equal to 1 if the target firm is a public firm, and 0 otherwise.                                                                                 |
| Tangibility                        | Property, plant, and equipment (PP&E) divided by total assets in year t-1.                                                                                      |
| REPS                               | Retained earnings divided by number of shares in year t-1.                                                                                                      |
| RETA                               | Retained earnings divided by total assets in year t-1.                                                                                                          |
| ROCE                               | Return on capital employed ratio in year t-1.                                                                                                                   |
| Leverage                           | Leverage ratio in year t-1.                                                                                                                                     |
| Capex                              | Capital expenditures to total assets ratio in year t-1.                                                                                                         |
| Market Liquidity                   | Monthly volatility index in the Japanese market.                                                                                                                |
| TOPIX Return                       | Monthly Tokyo Stock Price Index return.                                                                                                                         |

This table contains definitions for the variables employed in this study.

#### Appendix B. Supplementary instrumental variable estimates

As a supplementary identification check, we also estimate two-stage instrumental variable specifications using the industry-mean equity overvaluation two years prior to the acquisition as the instrument for firm-level overvaluation in the year before the deal. Since industry-level valuation conditions can plausibly affect M&A payment outcomes through several channels independent of firm-level overvaluation (including merger-wave dynamics, industry-wide financing conditions, and prevailing industry payment norms), we present the IV estimates in this appendix as supplementary evidence regarding directional consistency rather than as a source of clean causal identification.

Table B1 reports the two-stage IV estimates. The first stage shows that the instrument is significantly positively correlated with firm-level equity overvaluation in the year before the deal (F-statistic is equal to 14.18 for OV(RRV) and 50.14 for OV(PB)), suggesting that the instrument is not weak. In the second stage, the coefficients on instrumented OV(RRV) and OV(PB) remain positive and statistically significant, consistent in sign with the baseline results in Table 4. We interpret these IV estimates as providing sign-and-significance evidence consistent with our baseline findings.

**Table B1**  
Supplementary instrumental variable estimates.

|          | (1)                 | (2)                 | (3)                 | (4)                |
|----------|---------------------|---------------------|---------------------|--------------------|
|          | First Stage         | Second Stage        | First Stage         | Second Stage       |
| IV_RRV   | 0.896***<br>(0.238) |                     |                     |                    |
| OV(RRV)  |                     | 1.350**<br>(0.625)  |                     |                    |
| IV_PB    |                     |                     | 1.222***<br>(0.172) |                    |
| OV(PB)   |                     |                     |                     | 0.498**<br>(0.204) |
| Constant | −0.291**<br>(0.123) | 0.933***<br>(0.180) | 0.228<br>(0.292)    | −0.033<br>(0.465)  |
| Controls | Yes                 | Yes                 | Yes                 | Yes                |
| Industry | Yes                 | Yes                 | Yes                 | Yes                |
| Year     | Yes                 | Yes                 | Yes                 | Yes                |
| N        | 3340                | 3340                | 3340                | 3340               |
| AR       |                     | 6.52**              |                     | 6.58**             |
| Wald     |                     | 4.67**              |                     | 5.98**             |

**Table B1** represents the supplementary analysis based on the instrumental variable (IV) approach using industry mean value of overvaluation two years prior to the acquisition as the instrument. We include the same control variables used in **Table 4**. All variables are defined in Appendix A. Industry and year dummies are included in all regressions. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Data availability

Data will be made available on request.

## References

- Alexandridis, G., Antypas, N., & Travlos, N. (2017). Value creation from M&As: New evidence. *Journal of Corporate Finance*, 45, 632–650. <https://doi.org/10.1016/j.jcorpfin.2017.05.010>
- Anderson, C. W., & Makhija, A. K. (1999). Deregulation, disintermediation, and agency costs of debt: Evidence from Japan. *Journal of Financial Economics*, 51(2), 309–339. [https://doi.org/10.1016/S0304-405X\(98\)00054-3](https://doi.org/10.1016/S0304-405X(98)00054-3)
- Ang, J. S., & Cheng, Y. (2006). Direct evidence on the market-driven acquisition theory. *Journal of Financial Research*, 29(2), 199–216. <https://doi.org/10.1111/j.1475-6803.2006.00174.x>
- Badertscher, B. A. (2011). Overvaluation and the choice of alternative earnings management mechanisms. *The Accounting Review*, 86(5), 1491–1518. <https://doi.org/10.2308/accr-10092>
- Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance*, 57(1), 1–32. <https://doi.org/10.1111/1540-6261.00414>
- de Bodt, E., Cousin, J.-G., & Officer, M. S. (2022). Financial constraints, ownership dilution, and the method of payment in M&A transactions. *Journal of Corporate Finance*, 75, Article 102250. <https://doi.org/10.1016/j.jcorpfin.2022.102250>
- Breen, R., Karlson, K. B., & Holm, A. (2013). Total, direct, and indirect effects in logit and Probit models. *Sociological Methods & Research*, 42(2), 164–191. <https://doi.org/10.1177/0049124113494572>
- Campbell, T. S. (1979). Optimal investment financing decisions and the value of confidentiality. *Journal of Financial and Quantitative Analysis*, 14(5), 913–924. <https://doi.org/10.2307/2330297>
- Chamberlain, G. (1980). Analysis of covariance with qualitative data. *The Review of Economic Studies*, 47(1), 225–238. <https://doi.org/10.2307/2297110>
- Chi, J.(D.), & Gupta, M. (2009). Overvaluation and earnings management. *Journal of Banking & Finance*, 33(9), 1652–1663. <https://doi.org/10.1016/j.jbankfin.2009.03.014>
- Dai, L., Dharwadkar, R., Shi, L., & Zhang, B. (2017). The governance transfer of blockholders: Evidence from block acquisitions and earnings management around the world. *Journal of Corporate Finance*, 45, 586–607. <https://doi.org/10.1016/j.jcorpfin.2017.06.004>
- Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *The Accounting Review*, 70(2), 193–225.
- Di Giuli, A. (2013). The effect of stock misvaluation and investment opportunities on the method of payment in mergers. *Journal of Corporate Finance*, 21, 196–215. <https://doi.org/10.1016/j.jcorpfin.2013.02.002>
- Dong, M., Hirshleifer, D., Richardson, S., & Teoh, S. H. (2006). Does investor Misvaluation drive the takeover market? *The Journal of Finance*, 61(2), 725–762. <https://doi.org/10.1111/j.1540-6261.2006.00853.x>
- Dong, M., Hirshleifer, D., & Teoh, S. H. (2012). Overvalued equity and financing decisions. *Review of Financial Studies*, 25(12), 3645–3683. <https://doi.org/10.1093/rfs/rhs112>
- Dutta, S., Saadi, S., & Zhu, P. (2013). Does payment method matter in cross-border acquisitions? *International Review of Economics & Finance*, 25, 91–107. <https://doi.org/10.1016/j.iref.2012.06.005>
- Eckbo, B. E., Giammarino, R. M., & Heinkel, R. L. (1990). Asymmetric information and the medium of exchange in takeovers: Theory and tests. *The Review of Financial Studies*, 3(4), 651–675. <https://doi.org/10.1093/rfs/3.4.651>
- Eckbo, B. E., Makaew, T., & Thorburn, K. S. (2018). Are stock-financed takeovers opportunistic? *Journal of Financial Economics*, 128(3), 443–465. <https://doi.org/10.1016/j.jfineco.2018.03.006>
- Faccio, M., & Masulis, R. W. (2005). The choice of payment method in European mergers and acquisitions. *The Journal of Finance*, 60(3), 1345–1388. <https://doi.org/10.1111/j.1540-6261.2005.00764.x>
- Francis, B., Hasan, I., Koetter, M., & Wu, Q. (2012). Corporate boards and Bank loan contracting. *Journal of Financial Research*, 35(4), 521–552. <https://doi.org/10.1111/j.1475-6803.2012.01327.x>
- Francis, J., LaFond, R., Olsson, P., & Schipper, K. (2005). The market pricing of accruals quality. *Journal of Accounting and Economics*, 39(2), 295–327. <https://doi.org/10.1016/j.jaccoco.2004.06.003>
- Fu, F., Lin, L., & Officer, M. S. (2013). Acquisitions driven by stock overvaluation: Are they good deals? *Journal of Financial Economics*, 109(1), 24–39. <https://doi.org/10.1016/j.jfineco.2013.02.013>
- Fu, T., Yang, S., & Jian, Z. (2022). Government support for environmental regulation: Evidence from China. *International Review of Financial Analysis*, 83, Article 102135. <https://doi.org/10.1016/j.irfa.2022.102135>
- Gan, J. (2007). Collateral, debt capacity, and corporate investment: Evidence from a natural experiment. *Journal of Financial Economics*, 85(3), 709–734. <https://doi.org/10.1016/j.jfineco.2006.06.007>
- Goyal, V. K., & Yamada, T. (2004). Asset Price shocks, financial constraints, and investment: Evidence from Japan. *The Journal of Business*, 77(1), 175–199. <https://doi.org/10.1086/379866>
- Gustafson, M. T. (2018). Inter-market competition and bank loan spreads: Evidence from the securities offering reform. *Journal of Banking & Finance*, 94, 107–117. <https://doi.org/10.1016/j.jbankfin.2018.07.008>
- Hertzel, M. G., & Officer, M. S. (2012). Industry contagion in loan spreads. *Journal of Financial Economics*, 103(3), 493–506. <https://doi.org/10.1016/j.jfineco.2011.10.012>
- Hodder, J. E., & Tschoegl, A. E. (1985). Some aspects of Japanese corporate finance. *Journal of Financial and Quantitative Analysis*, 20(2), 173–191. <https://doi.org/10.2307/2330954>
- Hoshi, T., & Kashyap, A. K. (2004). *Corporate financing and governance in Japan: The road to the future*. MIT Press.
- Hosono, K. (2003). Growth opportunities, collateral and debt structure: The case of the Japanese machine manufacturing firms. *Japan and the World Economy*, 15(3), 275–297. [https://doi.org/10.1016/S0922-1425\(02\)00027-0](https://doi.org/10.1016/S0922-1425(02)00027-0)
- Huang, R., & Ritter, J. R. (2009). Testing theories of capital structure and estimating the speed of adjustment. *Journal of Financial and Quantitative Analysis*, 44(2), 237–271. <https://doi.org/10.1017/S0022109009090152>
- Imai, K., Keele, L., & Tingley, D. (2010). A general approach to causal mediation analysis. *Psychological Methods*, 15(4), 309–334. <https://doi.org/10.1037/a0020761>
- Ismail, A., & Krause, A. (2010). Determinants of the method of payment in mergers and acquisitions. *The Quarterly Review of Economics and Finance*, 50(4), 471–484. <https://doi.org/10.1016/j.qref.2010.06.003>

- Jarallah, S., Saleh, A. S., & Salim, R. (2019). Examining pecking order versus trade-off theories of capital structure: New evidence from Japanese firms. *International Journal of Finance & Economics*, 24(1), 204–211. <https://doi.org/10.1002/ijfe.1657>
- Jensen, M. C. (2005). Agency costs of overvalued equity. *Financial Management*, 34(1), 5–19. <https://doi.org/10.1111/j.1755-053X.2005.tb00090.x>
- Jiang, W., Li, K., & Shao, P. (2010). When shareholders are creditors: Effects of the simultaneous holding of equity and debt by non-commercial banking institutions. *The Review of Financial Studies*, 23(10), 3595–3637. <https://doi.org/10.1093/rfs/hhq056>
- Kanungo, R. P. (2021). Payment choice of M&As: Financial crisis and social innovation. *Industrial Marketing Management*, 97, 97–114. <https://doi.org/10.1016/j.indmarman.2021.06.012>
- Karampatsas, N., Petmezas, D., & Travlos, N. G. (2014). Credit ratings and the choice of payment method in mergers and acquisitions. *Journal of Corporate Finance*, 25, 474–493. <https://doi.org/10.1016/j.jcorpfin.2014.01.008>
- Karlson, K. B., Holm, A., & Breen, R. (2012). Comparing regression coefficients between same-sample nested models using logit and Probit: A new method. *Sociological Methodology*, 42(1), 286–313. <https://doi.org/10.1177/0081175012444861>
- Klitzka, M., He, J., & Schiereck, D. (2022). The rationality of M&a targets in the choice of payment methods. *Review of Managerial Science*, 16(4), 933–967. <https://doi.org/10.1007/s11846-021-00469-6>
- Li, S., Hoque, H., & Liu, J. (2023). Investor sentiment and firm capital structure. *Journal of Corporate Finance*, 80, Article 102426. <https://doi.org/10.1016/j.jcorpfin.2023.102426>
- Marciniakityte, D., & Varma, R. (2008). Consequences of overvalued equity: Evidence from earnings manipulation. *Journal of Corporate Finance*, 14(4), 418–430. <https://doi.org/10.1016/j.jcorpfin.2008.05.002>
- Martin, K. J. (1996). The method of payment in corporate acquisitions, investment opportunities, and management ownership. *The Journal of Finance*, 51(4), 1227–1246. <https://doi.org/10.1111/j.1540-6261.1996.tb04068.x>
- Martynova, M., & Renneboog, L. (2009). What determines the financing decision in corporate takeovers: Cost of capital, agency problems, or the means of payment? *Journal of Corporate Finance*, 15(3), 290–315. <https://doi.org/10.1016/j.jcorpfin.2008.12.004>
- McNichols, M. F. (2002). Discussion of the quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review*, 77(s-1), 61–69. <https://doi.org/10.2308/accr.2002.77.s-1.61>
- Merton, R. C. (1974). On the pricing of corporate debt: The risk structure of interest rates. *The Journal of Finance*, 29(2), 449–470. <https://doi.org/10.2307/2978814>
- Mohanram, P., White, B., & Zhao, W. (2020). Stock-based compensation, financial analysts, and equity overvaluation. *Review of Accounting Studies*, 25(3), 1040–1077. <https://doi.org/10.1007/s11142-020-09541-0>
- Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2), 147–175. [https://doi.org/10.1016/0304-405X\(77\)90015-0](https://doi.org/10.1016/0304-405X(77)90015-0)
- Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance*, 39(3), 575–592. <https://doi.org/10.2307/2327916>
- Neyman, J., & Scott, E. L. (1948). Consistent estimates based on partially consistent observations. *Econometrica*, 16(1), 1–32. <https://doi.org/10.2307/1914288>
- Ogawa, K., & Suzuki, K. (2000). Demand for Bank loans and investment under borrowing constraints: A panel study of Japanese firm data. *Journal of the Japanese and International Economies*, 14(1), 1–21. <https://doi.org/10.1006/jjie.2000.0442>
- Peek, J., & Rosengren, E. S. (2005). Unnatural selection: Perverse incentives and the misallocation of credit in Japan. *American Economic Review*, 95(4), 1144–1166. <https://doi.org/10.1257/0002828054825691>
- Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies*, 22(1), 435–480. <https://doi.org/10.1093/rfs/hhn053>
- Pitthan, F., & De Witte, K. (2025). How learning about behavioural biases can improve financial literacy? *International Review of Economics & Finance*, 99, Article 103989. <https://doi.org/10.1016/j.iref.2025.103989>
- Rhodes-Kropf, M., Robinson, D. T., & Viswanathan, S. (2005). Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics*, 77(3), 561–603. <https://doi.org/10.1016/j.jfineco.2004.06.015>
- Rhodes-Kropf, M., & Viswanathan, S. (2004). Market valuation and merger waves. *The Journal of Finance*, 59(6), 2685–2718. <https://doi.org/10.1111/j.1540-6261.2004.00713.x>
- Seifert, B., & Gonenc, H. (2008). The international evidence on the pecking order hypothesis. *Journal of Multinational Financial Management*, 18(3), 244–260. <https://doi.org/10.1016/j.mulfin.2007.10.002>
- Shleifer, A., & Vishny, R. W. (2003). Stock market driven acquisitions. *Journal of Financial Economics*, 70(3), 295–311. [https://doi.org/10.1016/S0304-405X\(03\)00211-3](https://doi.org/10.1016/S0304-405X(03)00211-3)
- Sikochi, A. (2020). Corporate legal structure and bank loan spread. *Journal of Corporate Finance*, 64, Article 101656. <https://doi.org/10.1016/j.jcorpfin.2020.101656>
- Spies, D. K., & Affleck-Graves, J. (1999). The long-run performance of stock returns following debt offerings. *Journal of Financial Economics*, 54(1), 45–73. [https://doi.org/10.1016/S0304-405X\(99\)00031-8](https://doi.org/10.1016/S0304-405X(99)00031-8)
- Teti, E., Dallocchio, M., & Currao, T. (2022). Family ownership and M&A payment method. *International Journal of Finance & Economics*, 27(2), 1989–2005. <https://doi.org/10.1002/ijfe.2255>
- Tsai, P.-S., Yen, T.-Y., Ho, C.-C., & Tsai, P.-J. (2021). Market sentiment and the choice of payment method in mergers and acquisitions. *Journal of Corporate Accounting & Finance*, 32(3), 139–154. <https://doi.org/10.1002/jcaf.22501>
- Uchida, H. (2011). What do banks evaluate when they screen borrowers? Soft information, hard information and collateral. *Journal of Financial Services Research*, 40(1), 29–48. <https://doi.org/10.1007/s10693-010-0100-9>
- Uysal, V. B. (2011). Deviation from the target capital structure and acquisition choices. *Journal of Financial Economics*, 102(3), 602–620. <https://doi.org/10.1016/j.jfineco.2010.11.007>
- Vermaelen, T., & Xu, M. (2014). Acquisition finance and market timing. *Journal of Corporate Finance*, 25, 73–91. <https://doi.org/10.1016/j.jcorpfin.2013.11.004>
- Wang, J., & Wang, L. (2024). When shareholders cross-hold lenders' equity: The effects on the costs of bank loans. *Journal of Banking & Finance*, 163, Article 107189. <https://doi.org/10.1016/j.jbankfin.2024.107189>
- Wu, X., Sercu, P., & Yao, J. (2009). Does competition from new equity mitigate bank rent extraction? Insights from Japanese data. *Journal of Banking & Finance, Micro and Macro Foundations of International Financial Integration*, 33(10), 1884–1897. <https://doi.org/10.1016/j.jbankfin.2009.04.011>
- Yang, J., Guariglia, A., & Guo, J.(M.) (2019). To what extent does corporate liquidity affect M&A decisions, method of payment and performance? Evidence from China. *Journal of Corporate Finance*, 54, 128–152. <https://doi.org/10.1016/j.jcorpfin.2017.09.012>
- Yosha, O. (1995). Information disclosure costs and the choice of financing source. *Journal of Financial Intermediation*, 4(1), 3–20. <https://doi.org/10.1006/jfin.1995.1001>