Financial Hedging and Corporate Investment*

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Abstract

Mergers and acquisitions (M&As) comprise the most important form of corporate investment. Their capital intensiveness makes deal financing decisions central to the M&A process. Building on the well-documented relationship between corporate financial hedging and firms' borrowing costs, this study examines the impact of utilizing financial derivatives instruments on M&A financing choices and the likelihood of undertaking acquisition investments. Our results show that engaging in financial hedging enables firms to pursue inorganic growth opportunities in the form of M&As. Acquiring firms with financial hedging programs are more likely to pay for their deals with cash and use external borrowing which appears to be largely driven by the impact of financial hedging on their borrowing cost. Our study contributes to existing literature by establishing that financial hedging could serve as an effective vehicle for firms to bring their inorganic investment plans to fruition by facilitating their financing.

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1 Introduction

M&A activity has recovered after a slump in the aftermath of 2007 financial crisis with the global deal volume exceeding $3 trillion for the fourth year in 2017.[1] With many firms struggling to identify organic growth opportunities, inorganic growth through acquisitions is frequently deployed as the main path to corporate growth. M&As comprise the most important form of corporate investment while acquisition decisions are of critical importance for firms' fortunes and tend to impinge on their shareholders' wealth (Bruner, 2002; Moeller et al., 2005; Betton et al., 2008; Alexandridis et al., 2017). Due to the fact that M&A deals are capital intensive and typically require significant funding capacity,[2] both the acquisition decision as well as the associated financing choice greatly rely on a firm's ability to borrow externally. Therefore, financing choices, borrowing capacity, as well as the cost of capital are central to acquiring firms in the M&A process.[3] A firm's access to credit markets can have a significant impact on its M&A financing choices as well as its propensity to undertake such investment projects (Jensen, 1986; Jung et al., 1996; Harford, 1999; Karampatsas et al., 2014). Since corporate financial hedging has been shown to have a significant impact on firms' borrowing and financing costs (Campello et al., 2011; Chen and King, 2014), this study examines its role as a driver of firms' acquisition decisions and financing choices.

Financial derivatives have been extensively utilized by firms for the purpose of hedging financial risks, more so during periods of significant volatility in interest and exchange rates. A survey conducted by the International Swaps and Derivatives Association (ISDA) reported that 94% of the world's 500 largest companies use financial derivatives to manage their business and financial risks. Similarly, a CitiFX Global Corporate Risk Management survey reports that among 307 major corporate clients that participated in a survey, 77%

[1] Financial Times, December 2017

[2] According to Elsas et al. (2014), U.S. firms externally finance 67% of their capital expenditures and 83% of their acquisition deals.

[3] Cash, stock, or a combination of both comprise the main payment modes in acquisition deals while earlier literature has highlighted the importance of public debt and bank loans as key sources of funding in cash-financed transactions (e.g., Bharadwaj and Shivdasani, 2003; Faccio and Masulis, 2005; Harford et al., 2009; Uysal, 2011).

hedge existing net assets or liabilities denominated in foreign currency and 76% hedge forecasted foreign currency transactions. By introducing frictions to the Modigliani and Miller (1958) perfect market model, optimal hedging theories identify various gains from financial hedging, such as reducing financial distress costs (Mayers and Smith, 1982) and effective tax expenses (Smith and Stulz, 1985), mitigating agency costs related to risk-shifting, under-investment, and information asymmetry between firm managers and shareholders (Campbell and Kracaw, 1990; Froot et al., 1993), and increasing the firm's external financing capacity (Leland, 1998). More importantly, financial hedging can alleviate a firm's investment constraints and facilitate access to external capital markets by reducing its cost of capital. It can also improve a firm's internal financing capacity by mitigating future cash flow volatility and reducing the likelihood of negative future cash flows (Froot et al., 1993).

Along these lines, Campello et al. (2011) show that U.S. firms using interest rate (IR) and foreign currency (FX) derivatives are able to attain more favorable bank loan terms. They document less investment restrictions in loan agreements for firms with financial hedging programs, which fosters more internal corporate investment (CAPEX). Chen and King (2014) also document that financial hedging is associated with a lower cost of public debt financing. Building on this work, this paper provides a holistic analysis of the relationship between corporate financial hedging, investment decisions, and the associated financing choices.

Because of the risk reduction properties of financial derivatives, firms that employ such instruments are subject to lower borrowing costs and less external financing constraints, making them more likely to carry out sizable investments relative to non-users. For the same reasons, financial hedging can also have a bearing on the choice of the investment financing mode. Arguably, M&As provide an ideal setting to study the effect of financial hedging on corporate investment behavior for the following reasons. First, M&As comprise the most important form of corporate investment. U.S. deal volume reached $1.50 trillion in 2017 according to SDC while the total value of CAPEX for all U.S. firms for the

same year was only \$0.87 trillion.[4] Second, while CAPEX also includes outflows for the maintenance or replacement of existing assets, a sample of M&As might more fully capture a firm's strategic investment behavior. Accordingly, it might not be possible to empirically disentangle asset maintenance from strategic investment when dealing with CAPEX. Third, risk management is more of an issue for acquisition deals since they naturally entail more risk due to their inorganic nature and have been shown to frequently destroy shareholder value. Last, M&As are more likely (relative to CAPEX) to be financed through external debt because of their capital intensiveness, while payment method and financing information are more directly observable for M&A transactions than for internal investment (e.g., Petersen and Thiagarajan, 2000; Campello et al., 2011), allowing us to more effectively investigate the impact of financial hedging on corporate investment financing decisions.

We study a sample of U.S. public acquisitions and collect financial hedging information for acquiring firms following Hoberg and Moon (2017) using the text analysis software developed by MetaHeuristica LLC to search for hedging information in acquiring firms' 10-K reports filed prior to the deal announcement. The MetaHeuristica database covers EDGAR fillings between 1997 and 2011 so our sample acquisitions spans 1998–2012. Among our sample M&A deals, 61% of acquirers use at least one of two types of financial derivatives: interest rate derivatives (Ird) and foreign currency derivatives (Fcd), in the fiscal year prior to the deal announcement. Around 47.5% of our sample acquirers use Ird and 42.7% use Fcd in the fiscal year prior to announcing acquisitions.

We first examine the impact of corporate financial hedging on acquisitiveness: the likelihood of a firm carrying out acquisition investments. When comparing acquiring firms to randomly selected non-acquirers from the same fiscal year, we find that the former are more likely to be users of financial derivatives. Matching acquirers to non-acquiring firms based on additional firm characteristics, including industry, size, Tobin's Q, stock return, asset growth, and cash holdings, also points to a positive association between utilizing

[4]The figures reported here are for U.S. firms listed on either NYSE, AMEX, or NASDAQ.

financial hedging instruments and the probability of a firm being an acquirer. Firms with IR risk hedging programs have an 8.2% higher (marginal effect) probability of announcing acquisition deals compared to their counterparts that do not utilize such instruments. Both univariate and multivariate test results corroborate that firms with financial hedging programs in place are more likely to engage in acquisitions. The probability of a firm carrying out acquisitions is also higher when multiple types of financial derivatives are utilized; for each additional type of financial derivative being utilized, the acquisition probability increases by around 9.8%. Along these lines, our results confirm that corporate financial hedging has a significant impact on a firm's investment behavior; the use of financial derivatives at the corporate level can contribute towards alleviating financial constraints, enabling firms to carry out their inorganic growth plans by carrying out more M&A investments.

Next, we examine whether corporate financial hedging has an impact on M&A financing choices. We conjecture that the share of cash in the acquisition offer should increase with financial hedging activity, for two reasons. First, financial hedging can facilitate access to external capital markets by reducing the probability of negative future cash flows, making derivatives users more likely to meet interest payments to creditors than non-users. Second, financial hedging can improve access to debt financing by lowering borrowing costs. In accord with our hypothesis, we document a positive association between acquiring firms' hedging activity and the use of cash in the M&A offers. Acquirers with IR risk hedging programs have a 7.8% higher probability of paying for a deal entirely in cash compared to those not employing such instruments. We also find that the typical offer of Ird users comprises 23.0% more cash than that of non-users. Since derivatives users generally have lower cash holdings than non-users in our M&A sample, the higher cash element in this case can be linked to acquirers' ability to raise financing through external borrowing.

In order to examine whether the higher propensity for cash payments can indeed be attributed to external borrowing, we collect external financing information on corporate bonds and loans for our sample M&A transactions from three sources: SDC M&A, SDC

Global New Issues, and LPC DealScan. We provide additional evidence that acquirers with financial hedging programs tend to use more external borrowing when paying for acquisitions. For instance, acquirers employing *Ird* hedging have a 6.8% higher probability to utilize external borrowing to finance their M&A deals than those without such hedging programs in place. In addition, hedging for multiple risk types makes it more likely to use external borrowing to pay for acquisition investments since for each additional category of financial derivatives, the probability of using external borrowing to finance a deal increases by 2.6%.

To address the possibility that our results are driven by omitted variables, simultaneity, or measurement error, we adopt an instrumental variable (IV) approach as a quasi-experiment by using regression models augmented with an endogenous binary treatment variable. The IV in the first-stage regression should drive corporate financial hedging decisions but not be directly correlated with the dependent variable in the second-stage. Based on earlier literature (e.g., Smith and Stulz, 1985; Nance et al., 1993; Geczy et al., 1997; Graham and Smith, 1999), one of the major reasons for firms to employ financial hedging programs is the associated tax savings. According to the simulation of Graham and Smith (1999), the financial hedging reduces firms' volatility of taxable liabilities, which in turn results in lower tax liabilities. The authors employ a model to estimate a firm's incentive to hedge which is the convexity of the firm's tax function. To the best of our knowledge, there is no literature pointing to a direct relationship between tax convexity and firms' financing choices in M&A transactions. The utilization of the tax convexity measure developed by Graham and Smith (1999) as our IV is also in line with Campello et al. (2011), Chen and King (2014), and Bartram (2017). As the endogenous variables in our regressions are discrete, we use a bivariate probit model if the dependent variable in the second variable is discrete (e.g., Angrist, 2001; Karampatsas et al., 2014) and a treatment effect model if it is continuous. As an alternative way to address endogeneity concerns associated with any potential self-selection bias, we also apply the propensity score matching (PSM) method by pairing derivatives users with similar (in terms of leverage, cash

holdings, growth opportunities, and deal relative size) non-users in our M&A sample. We then compare the financing characteristics of these two pairs. Controlling for endogeneity with either approach yields similar results with our previous tests regarding the impact of financial hedging on firms' M&A financing decisions.

Finally, to delve further into the role of borrowing cost in driving the documented relationship between financial hedging and M&A financing, we use a two-stage IV approach. In the first-stage regression, we isolate the variation of acquirers' loan spreads between derivatives users and non-users. We find that derivatives users have a significantly lower value weighted loan spread over a three-year period prior to the deal announcement. In the second-stage, we find that the predicted loan spreads from the first-stage regression are negatively linked to both cash payment and debt financing. This evidence is consistent with the conjecture that our hedging proxy variable is a strong predictor of loan spreads which, in turn, can explain firms' financing choices when making M&A investments.

Our study contributes to the existing financial hedging and M&A literature in several important ways. First, we provide evidence that financial hedging and investment activities are inter-related; acquirers with financial hedging programs are more likely to undertake M&A investment projects, taking advantage of the more favorable financing terms and ample access to external financing. Thus, we contribute to existing literature on the relationship between the cost of borrowing and corporate investment by showing that financial hedging could serve as an effective vehicle for firms to bring their investment plans to fruition by lowering their borrowing cost and facilitating their financing. Second, this is to our knowledge the first study providing direct evidence on the role of financial hedging in investment financing choices. Our results are consistent with the view that financial hedging can improve a firm's borrowing capacity and reduce its borrowing cost, in accordance with the pecking order theory's prediction that the cost of capital should have a significant impact on a firm's investment and financing choices. Third, our findings point to a significant role of financial hedging as a determinant of M&A financing over and above a firm's capital structure and other factors identified by the existing literature on

acquisition payment methods (e.g., Travlos, 1987; Martin, 1996; Faccio and Masulis, 2005; Karampatsas et al., 2014).

The rest of the paper is structured as follows. Section 2 reviews the related literature on corporate financial hedging and develops our hypotheses. Section 3 describes the sample, financial hedging variables and summary statistics. Section 4 reports the main empirical results along with the endogeneity tests and IV regressions for the role of borrowing costs in driving the documented hedging benefits. Finally, section 5 concludes the paper.

2 Hypothesis development and related literature

In this section, we develop our hypotheses building from the existing literature on financial hedging, borrowing costs, corporate investment, financing decisions, and their inter-relationships. Two focal strands of the literature on corporate financial hedging have focused on why firms use financial derivatives (e.g., Smith and Stulz, 1985; Nance et al., 1993; Geczy et al., 1997; Graham and Rogers, 2002) and how financial hedging affects firm value (e.g., Guay, 1999; Allayannis et al., 2001; Hentschel and Kothari, 2001; Carter et al., 2006; Bartram et al., 2011). In their seminal work, Modigliani and Miller (1958) define a perfect and frictionless capital market in which firm value is independent of financial hedging activities. Other studies have subsequently shown that firms have incentives to hedge due to market frictions such as taxes, information asymmetry, and transaction costs (e.g. Mayers and Smith, 1982; Smith and Stulz, 1985; Campbell and Kracaw, 1990; Froot et al., 1993; Leland, 1998). However, the empirical evidence on the benefits of hedging is mixed, with some studies documenting a positive impact of financial hedging on firm value (e.g. Allayannis et al., 2001; Mackay and Moeller, 2007; Bartram et al., 2011), while others have failed to find a significant relationship (e.g. Guay, 1999; Hentschel and Kothari, 2001; Jin and Jorion, 2006).

The impact of financial hedging on firm value can be largely attributed to the former's relationship with the cost of capital. Froot et al. (1993) document that financial hedging

improves a firm's ability to use internal cash and thus mitigate the financing restrictions on investment. Campello et al. (2011) argue that financial hedging reduces a firm's financial distress cost and the agency cost of risk-shifting. As a result, firms with financial hedging programs tend to be subject to more favorable bank loan terms. They also show that financial hedging can enhance a firm's investment opportunity set. Along these lines, Chen and King (2014) show that firms with financial hedging experience have lower borrowing costs in public debt markets and attribute this to a reduction of the agency costs related to underinvestment and risk-shifting, the lower information asymmetry, and the mitigation of the bankruptcy risk. Overall, financial hedging can reduce the likelihood of observing negative cash flows and mitigate the information asymmetry, therefore contributing to a lower cost of borrowing and wider access to credit markets.

Previous studies have also examined the relationship between borrowing costs and investment decisions. The "underinvestment theory", first pioneered by Myers (1977), posits that firms tend to bypass profitable investment opportunities when external borrowing is expensive, hampering the after-interest profits available to shareholders. Theoretical studies have applied the "underinvestment theory" when examining the interaction between firm financing frictions and investment decisions. For example, Stulz and Johnson (1985) develop a model in which secured debt may help firms mitigate the under-investment problem because the associated borrowing cost is reduced due to the less stringent monitoring requirements relative to unsecured debt. Similarly, Berkovitch and Kim (1990) demonstrate that issuing new debt with a higher seniority than the average seniority of a firm's outstanding debt reduces its cost of borrowing and boost its incentive to invest in positive net present value (NPV) projects. Consistent with these theoretical predictions, empirical studies provide the evidence that the cost of borrowing has a significant impact on firms' investment activities. Using quarterly capital expenditure as a proxy for firms' investment choices, Chava and Roberts (2008) examine the relationship between firms' financing restrictions and their investment decisions by focusing on debt covenants. They find that an increase in financing restrictions due to a violation of debt covenants results in investment

cut-backs.

Given the interrelationships among corporate financial hedging, borrowing costs, and investment decisions, a firm's financial hedging policy should have an impact on its investment decisions. On the one hand, financial hedging may reduce a firm's precautionary cash reserve due to the lower probability of covenant violations (Disatnik et al., 2014). Since firms with more cash holdings are more likely to engage in acquisitions (Harford, 1999), financial hedging should decrease firms' propensity to undertake M&As. On the other hand, both Campello et al. (2011) and Chen and King (2014) find that financial derivatives users have lower external borrowing costs and better access to credit markets. Rehman (2007) argues that borrowing costs should have a significant effect on a firm's acquisition decisions and Harford and Uysal (2014) documents that better access to credit markets can make a firm more acquisitive. This would imply that financial hedging should increase firms' propensity to undertake M&As. Consequently, the direction of the relationship between financial hedging and a firm's acquisitiveness remains an open empirical question. Our first testable hypothesis is derived as follows:

- ***Hypothesis (H1):*** *Firms with financial hedging programs are more likely to become acquirers.*

Next, we focus on the relationship between corporate financial hedging and M&A financing. According to the pecking order theory (Myers and Majluf, 1984; Myers, 1984) three sources of funds are available to the firm: internal cash, debt, and equity. Firms follow a financing hierarchy based on the different financing costs associated with these three sources due to information asymmetry. Firms employ internal finance first, then external borrowing, and equity as the last resort. Accordingly, when the amount of investment required exceeds a firm's retained cash and the cost of external borrowing is reduced as a result of financial hedging, firms should be more likely to opt for external borrowing to finance their investments. Since internal funds and external debt are the two main sources of cash payments in M&A, we would naturally expect that lower borrowing costs would

lead to a higher cash component in the M&A offer.[5] If financial hedging is associated with better access to external borrowing, then acquirers with financial hedging programs should be more likely to use cash as their method of payment in M&As.

In addition, Froot et al. (1993) and Altuntas et al. (2017) find that financial derivatives users have lower cash flow volatility than non-users and Minton and Schrand (1999) show that cash flow volatility is negatively associated with corporate investment. Although firms with financial hedging programs may have lower cash holdings (Disatnik et al., 2014), the cash flow stability they achieve through hedging risk exposures may allow them to more effectively plan ahead and utilize their expected cash flow to pay for M&As. Along these lines, our second testable prediction is:

- ***Hypothesis (H2):*** *Acquirers with financial hedging programs are more likely to pay their targets with cash.*

Our third hypothesis is directly linked to the fact that corporate financial hedging is typically associated with lower borrowing costs and cash holdings. Given the capital intensiveness of M&A investments, much of the cash component of an M&A offer typically stems from debt and we would expect this to be more pronounced the lower the cost of borrowing, which can be achieved through the use of financial derivatives. Hence, our third prediction is stated as follows:

- ***Hypothesis (H3):*** *Acquirers with financial hedging programs are more likely to finance their deals by external debt.*

[5] Martin (1996) notes that there are three possible payment methods in M&As: cash, stock, or a combination of both. Although it is possible that an acquirer may issue new shares and use the cash proceeds to pay for a deal, this secondary equity offering (SEO) practice is relatively rare in M&As. Marina and Renneboog (2009) find that only 11% of equity-financed deals in their sample involve SEOs, while the rest 89% of their equity-financed deals involve an outright stock swap.

3 Data and sample description

3.1 M&A data

Our M&A sample (reported in the Thomson Reuters SDC database) comprises U.S. deals announced during the period 1998–2012.[6] Both acquirers and targets are public firms. We also impose the following sample selection criteria: i) the deal status is either completed or withdrawn; ii) we exclude all minority stake purchases, acquisitions of remaining interest, privatizations, repurchases, exchange offers, self-tenders, recapitalizations or spinoffs; iii) the transaction value is at least $1 million and greater than 5% of the acquirer's market value; iv) the acquirer owns less than 50% of the target's shares before the transaction and seeks to own at least 90% following the deal completion; v) the acquirer has data available in Compustat and CRSP; vi) we exclude companies operating in the financial trading and banking industries according to the Fama-French 48 industry classification because they may hold financial derivatives for trading purposes.

3.2 Financial hedging data

We collect financial hedging data for acquirers from annual financial report filed in the fiscal year prior to the deal announcement. Following Hoberg and Moon (2017), we use the textual analysis software developed by MetaHeuristica LLC (accessed via Application Programming Interface (API)) to search for financial hedging information in acquirers' annual financial reports. The MetaHeuristica database covers firm electronic annual filings in the EDGAR database between 1997 and 2011. Following Hoberg and Moon (2017), we search in 10-K and 10-K405 filings including sub-reports EX-13 and EX-13.1 since financial hedging information is typically reported there. We focus on IR and FX derivatives because they are directly related to a firm's external financing costs (Campello et al., 2011; Chen and King, 2014). We collect IR hedging data as follows:

[6]Our financial hedging data is from a financial statement search index developed by MetaHeuristica LLC. The search index is only available for the period 1997–2011.

1. To be recorded as an instance (hit) of IR derivatives use, there must be at least one word (or its plural form) from each of the following three groups:
    - interest rate
    - forward, future, option, swap, spot, collar, cap, ceiling, floor, lock, derivative, hedge, hedging, hedged
    - contract, position, instrument, agreement, obligation, transaction, strategy
2. We require that the distance between any two words from the above three groups is no more than 25 words.
3. We exclude false positive hits with phrases such as: in the future, not, or insignificant.
4. We record the number of related hits for each acquirer's Central Index Key (CIK) code and fiscal year.[7]

We use the same process to collect information on the use of FX derivatives, but replace the term "interest rate" by "currency, foreign exchange, exchange rate". To make sure that the collection process is optimal, we try using different versions of the above data collection criteria such as alternative specifications of the key word list and the distance between key words. We then randomly select a small sample of acquirers and go through their annual financial reports and compare the manually collected hit results and those collected through different variations of the automated process discussed above. We find that the criteria set above provide information that best matches the information collected manually. We obtain a sample of 1,738 deals for which financial hedging data is available for acquiring firms.

Based on the number of hits, we derive an indicator variable Ird which is equal to one if there is at least one hit related to the use of interest rate derivatives, and zero otherwise. Similarly, an indicator variable Fcd is equal to one if there is at least one hit related to the use of FX derivatives, and zero otherwise. Ird/Fcd is an indicator variable equal to

[7] As in Hoberg and Moon (2017), we delete the hits only stating the definitions of financial derivatives.

one if either Fcd or Ird is equal to one, and zero otherwise. Finally, $Hedging\_scope$ is a categorical variable taking an integer value ranging from zero to two and captures the number of financial derivatives types employed by the acquiring firm.

3.3 Deal financing data

To examine the impact of corporate financial hedging on the external borrowing of acquisition deals, we collect financing information from: SDC Platinum M&A database, SDC Global New Issues database, and Loan Pricing Corporation (LPC) DealScan database. SDC Platinum M&A database reports a deals' source of funding and classifies external borrowing in six sources: bank loan, debt, line of credit, bridge loan, foreign lenders, and junk bonds.[8] However, the deal financing information documented in the SDC Platinum M&A database is incomplete and we therefore supplement it with information on private credit agreements and public corporate bond deals around the M&A transaction from SDC Global New Issues and LPC DealScan databases. The results reported in this paper are for the window from one year before deal announcement to the deal completion.[9] Specifically, we match DealScan with COMPUSTAT using the link table provided by Chava and Roberts (2008) and we match SDC Global New Issue with our M&A sample using the 6-digit CUSIP.

Based on the deal financing information collected following the process above, we derive a broad borrowing indicator variable $Borrowing\_broad$ that is equal to one when the acquirer utilizes private or public borrowing credit facilities during the transaction window without setting any restrictions on the financing purpose of these facilities, and zero otherwise. We also employ a more narrow version of the financing variable $Borrowing\_narrow$, which is equal to one if the credit facility's primary purpose is for the corresponding M&A transaction, and zero otherwise.[10] We note however that the variable $Borrowing\_narrow$

[8] We go through all source of funds descriptions in SDC to verify that the source of funds refers to external borrowing. We provide a sample of excerpts in Appendix B to show how the database discloses the deal financing information.

[9] Our conclusion remains robust if we choose the window from one week before the deal announcement to the deal completion or the window from one year before the deal announcement to one year after the deal announcement.

[10] For the private credit contracts from DealScan, we check whether the "PRIMARYPURPOSE" is either

may underestimate an acquirers' use of external borrowing to finance M&A deals as in some cases, loan facilities classified as "Corp. Purpose" may be used for financing acquisition deals (Gao et al., 2018).[11]

3.4 Descriptive statistics

Table 1 presents the distribution of deals in our M&A sample by announcement year and industry. In Panel A of the table, the distribution of deals among the sample years seems normal, although there are relatively more deals in the first half of the sample period.[12] Panel B of Table 1 presents the distribution of acquirers in different industries based on the Fama–French 10 industry classification (Fama and French, 1997). Business equipment accounts for the largest number of our sample deals (37.51%), followed by other (13.35%)[13], healthcare (13.18%), and manufacturing (11.85%). This industry distribution is comparable to other M&A studies.

Table 2 reports the summary statistics of our main financial hedging variables. Detailed definitions of these variables are provided in Appendix A. From our M&A sample, 61.0% of acquirers utilize at least one type of IR and FX derivatives (Ird/Fcd), 47.5% use FX derivatives (Fcd) while 42.7% use IR derivatives (Ird). The mean of $Hedging\_scope$ indicates that, on average, our sample acquirers utilize 0.9 different categories of financial derivatives. The mean values of Ird and Fcd are slightly higher than those reported in Bartram et al. (2011) (40.4% and 37.8%) and Campello et al. (2011) (35.6% and 27.3%) who study financial hedging in general U.S. firms. It is possible that this divergence may be explained by a positive association between firms' employing financial hedging instruments

"Takeover", "Acquis line", or "Merger". Then we manually verify whether the "TARGETCOMPANY" is the target company of the corresponding M&A deals. For the public bond deals from SDC Global New Issues, we check whether the related M&A target's CUSIP (REL_MA_ACUSIP) is equal to that of the acquisition target.

[11] The inconsistency of the primary purpose of facility tagged "Corp. Purpose" between DealScan and firm's 10-Q filing is also noted by WRDS: https://wrds-www.wharton.upenn.edu/pages/support/data-overview/wrds-overview-dealscan/

[12] The period 1998–2001 includes the technology bubble boom.

[13] According to the definition of Fama-French 10 industry clarification, "other" includes industries such as mining, construction and building materials, transportation, business services, and entertainment.

and their propensity to engage in M&As, which is in accordance to our first hypothesis.

Panel B of Table 2 reports the summary statistics of deal and acquirer characteristics, partitioned by derivatives users and non-users. Detailed variable definitions are provided in Appendix A. For the purpose of the table, we classify derivatives users and non-users based on the indicator variable Ird/Fcd. There are in total 1,451 (83.5%) completed deals and 287 (16.5%) withdrawn deals. Deals carried out by derivatives users are associated with a higher deal completion probability. Derivatives users tend to be larger firms than non-users but carry out deals of smaller relative size. Moreover, derivatives users have lower *Tobin's Q*, higher leverage, higher free cash flow to equity, lower cash holdings, higher collateral, lower Runup, and higher asset growth than non-users. We later control for these characteristics when examining the impact of financial hedging on acquisition decisions and financing choices.

4 Empirical test results

4.1 Financial hedging and acquisition likelihood

In this section, we examine the relationship between corporate financial hedging and acquisition likelihood. According to our hypothesis, the underinvestment would be less of a problem for firms that employ financial derivatives because they tend to be subject to lower borrowing costs and exhibit more stable future cash flows, hence being more likely to undertake inorganic investment in the form of M&As (i.e., be more acquisitive).

Table 3 provides a univariate comparison of acquisition likelihood between derivatives users and non-users. Each acquirer is matched with a random non-acquiring firm from the same industry-year drawn from Compustat. We follow Ishii and Xuan (2014) and repeat this matching process 500 times. The randomly selected non-acquiring firms through this bootstrapping approach serve as the control sample. The table reports percentages of firms using financial derivatives in the M&A sample as well as the control sample. Panels A, B, and C report the results for matching processes based on the Fama–French 10, 30, and 48

industry classifications, respectively. For all four financial hedging proxy variables, Ird, Fcd, Ird/Fcd, and $Hedging\_scope$, the share of derivatives users in our M&A sample is higher than for those in the control sample, while the differences are statistically significant at the 1% level. For instance, in Panel A, 61% of acquirers employ either Ird or Fcd derivatives compared to only 41% of randomly selected non-acquirers. The univariate test results suggest that firms with financial hedging programs in place are more likely to carry out acquisition investments.

We next employ a multivariate probit framework to examine the relationship between financial hedging and the likelihood of carrying out acquisition investments, controlling for a number of variables that might be captured by our hedging indicators, hence driving our results. The dependent variable in the regressions, *Acquirer_dummy* is a binary variable taking the value of one if a sample firm is from our M&A deal sample and zero if it is from a control sample. Following Harford (1999) and Khan et al. (2012), acquirers are matched to non-acquirers from the Compustat/CRSP merged database in the same fiscal year as the deal announcement as well as different combinations of firm characteristics including industry (Fama-French 10 industries), firm size, Tobin's Q, stock returns, asset growth rates, and cash holdings. For the continuous firm characteristics we employ a ±20% matching range, so an acquirer with a *Tobin's Q* of 1 would be matched to non-acquiring firms with a *Tobin's Q* between 0.8 and 1.2 in the fiscal year prior to the deal announcement. Following Bena and Li (2014), we limit the number of matching firms to five by applying a random selection without replacement.

The independent variables of interest are the four financial hedging variables. We control for variations in market valuation and growth opportunities, by including the one-year firm stock return over the fiscal year prior to the deal announcement $One-year\_return$ (Khan et al., 2012) as well as $Tobin's\ Q$ (Shleifer and Vishny, 2003; Rhodes-Kropf et al., 2005). We also control for the value of a company's cash reserves ($Cash\_holding$) (Harford, 1999) as well as for acquirer size ($Size$), asset growth ($Asset\_growth$), leverage ($Leverage$), return on equity (ROA), and industry and year fixed effects.

Columns 1–4 of Table 4 report the results for a matching process where acquirers are matched to non-acquiring counterparts based on fiscal year alone. Columns 5–8 report the results based on different combinations of matching criteria indicated at the top of each column. For brevity, in Columns 5–8 we only report coefficients for the key independent variable of interest, Ird/Fcd.[14] As shown in Table 4, the coefficients of financial hedging variables are all positive and statistically significant across different specifications and irrespective of the matching approach employed. These results suggest that corporate financial hedging is instrumental in determining the probability that a firm carries out acquisition investments. Further, it seems that the more types of financial risk a firm hedges ($Hedging\_scope$), the more likely it carries out acquisitions. The effect of financial hedging on the likelihood of being an acquirer is economically significant. For example, Column 7 shows that financial hedging increases the probability of announcing an M&A deal by 6.4%. Overall, our findings are consistent with our hypothesis that financial hedging programs can exert a positive influence on the firm's ability to pursuing inorganic growth through undertaking M&A investments.

4.2 Financial hedging and M&A payment method

In this section, we examine the relationship between corporate financial hedging and the payment method used in M&As. Typically, a deal is paid for with cash, stock, or a combination of both. According to our hypothesis, acquirers with financial hedging programs should exhibit lower cash flow variability and have better access to external capital markets. Therefore, derivatives users should be expected to use more cash to pay for M&As.

We employ three payment mode variables. $Pure\_cash$ is an indicator variable equal to one for deals paid with 100% cash payment, and zero otherwise. $Cash\_major$ is an indicator variable equal to one if more than 50% of the payment is in cash, and zero otherwise. Finally, we also use a continuous variable, Pct_cash, which measures the percentage of

[14] Results are similar for Ird, Fcd, and $Hedging\_scope$.

cash consideration in the offer.

Table 5 presents a univariate comparison of the three cash payment variables between derivatives users and non-users, classified based on the three financial hedging variables: Ird, Fcd, and Ird/Fcd. The last column reports the mean difference in payment modes. Overall, 34.9% of the full M&A sample deals (1,738) are paid for entirely with cash ($Pure\_cash$) while 46.4% of the deals involve more than 50% cash payment ($Cash\_major$). In terms of M&A transaction value, 46.7% of the deal value is paid in cash (Pct_cash). The univariate tests show that the mean values of $Pure\_cash$ and $Cash\_major$ are significantly higher for derivatives users than non-users, suggesting that derivatives users are more likely to finance their deals entirely with cash. Along these lines, derivatives users tend to pay a higher percentage of cash in M&As than non-users do. Our results are consistent across all three derivatives user definitions: Ird, Fcd, and Ird/Fcd. The mean differences in cash proxy variables are statistically significant at the 1% level.[15] The univariate test results support the view that acquirers with financial hedging programs tend to employ more cash payment in M&As than those without such programs do.

Next, we perform multivariate regressions of the payment method on the hedging indicators and other control variables that have been linked to the payment mode in prior literature. We control for acquirer cash holdings ($Cash\_holding$) (e.g. Martin, 1996; Duchin et al., 2010; Disatnik et al., 2014), acquirer free-cash-flow ($Cashflow/Equity$) (e.g. Jensen, 1986; Karampatsas et al., 2014; Yang et al., 2017), acquirers' borrowing capacity ($Collateral$) and capital structure ($Leverage$) (e.g. Chaney et al., 1991; Faccio and Masulis, 2005), market timing ($Runup$) (e.g. Blackburn et al., 1997; Shleifer and Vishny, 2003; Dittmar and Dittmar, 2008; Savor and Lu, 2009; Akbulut, 2013; Fu et al., 2013; Boone et al., 2014; De Bodt et al., 2015), information asymmetry between inside and outside shareholders ($Average\_EPSSD$) (e.g. Hansen, 1987; Brown and Ryngaert, 1991; Boone et al., 2014; Eckbo et al., 2018), the acquirer's ownership structure

[15] In unreported tests, we find that the median differences in the cash percentage payment (Pct_cash) between these two samples are also significant at the 1% level, according to the Wilcoxson test results.

(*Blockholder_ownership*) (e.g. Harris and Raviv, 1990; Yook et al., 1999; Harford et al., 2012), and acquirer growth opportunities (*Tobin's Q*) (e.g. Martin, 1996; Dass et al., 2016). We also control for deal characteristics, such as acquirer toehold (*Toehold*), deal attitude (*Hostile*), tender offer (*Tender_offer*), industry relatedness between the acquirer and the target (*Related_industry*), multiple bidders (*Competition*), and the target-to-bidder relative size (*Relative_size*). We also control for year and industry fixed effects. The detailed definitions for the control variables are in Appendix A.

Table 6 reports the results of multivariate regressions in which the dependent variables are *Pure_cash*, *Cash_major*, and *Pct_cash*. When the dependent variable is a binary variable (*Pure_cash* or *Cash_major*) we employ a probit regression model, whereas we use a tobit model when the dependent variable is a continuous variable between zero and one (*Pct_cash*). The independent variables of interest are the financial hedging variables *Ird*, *Fcd*, *Ird/Fcd*, and *Hedging_scope*.

The coefficients of financial hedging binary variables (*Ird*, *Fcd*, and *Ird/Fcd*) are positive and statistically significant in most specifications, suggesting that the use of both IR and FX derivatives contributes to a higher likelihood of cash being used in the M&A offer. In Column 1 (2), the marginal effect tests suggest that there is a 7.8% (5.7%) higher probability that deals carried out by IR (FX) derivatives users are financed entirely with cash than those carried out by non-IR users (non-FX users). Further, Column 3 shows that the probability for pure cash financing is 9.5% higher for acquirers utilizing at least one type of IR and FX derivatives than non-users of derivatives products. Finally, deals carried out by acquirers that hedge more types of financial risks (*Hedging_scope*) are also more likely financed with pure cash. For each additional category of financial derivatives employed by an acquirer, the probability of pure cash payment increases by 5.3%. Our results for *Cash_major* in Columns 5–8 capture similar patterns to those for *Pure_cash*.

In Columns 9–12, we examine the relationship between financial hedging and the percentage of cash in the deal offer (*Pct_cash*) as reported in SDC. The coefficients of all three financial hedging binary variables remain positive and statistically significant,

suggesting that the use of either IR or FX derivatives contributes to a higher percentage of cash in M&A offers. Column 11 shows that, on average, the occurrence of corporate financial hedging through either FX or IR derivatives increases the percentage of cash consideration in an acquisition offer by 32%. We also find that *Hedging_scope* is positively associated with the percentage of cash. For each additional category of financial derivatives utilized by the acquirer, the offers involve 17.8% more cash.

Overall, our test results are consistent with our hypothesis that M&A deals by firms that utilize financial derivatives are more likely to be paid with cash.

4.3 Financial hedging and M&A external financing

So far, our results suggest that corporate financial hedging enables firms to directly finance their inorganic growth plans with cash. It is likely that the documented pattern stems from the external borrowing cost reduction properties of financial hedging. Given the capital intensiveness of M&A transactions and the fact that derivatives users are typically associated with lower precautionary cash reserves (Disatnik et al., 2014), the documented propensity to pay with cash can be in fact attributed to debt. In this section, we offer further insights on the impact of financial hedging on external debt financing in M&As.

Table 7 shows that 60.2% of the acquirers in our M&A sample make use of credit facilities (*Borrowing_broad*) around the transaction window. For all three classifications of derivatives users and non-users, the former are associated with more external borrowing activities than the latter. For example, in the case of *Ird*, 74.1% of derivatives users finance their deals through external borrowing compared to only 47.7% of non-users. In terms of M&A deal specific borrowing (*Borrowing_narrow*), 22.3% of the acquirers in our M&A sample use external borrowing which can be directly traced to the corresponding M&A transaction. For *Ird*/*Fcd* as an example, 26.0% of derivatives users finance their deals through external borrowing compared to only 16.5% of non-users. The differentials between derivatives users and non-users are statistically significant in the majority of cases. The only exception is for the combination of *Borrowing_narrow* and *Fcd* which could be

explained by the fact that FX derivatives tend to be used for hedging FX risk rather than IR risk so it might be expected to have less of an impact on firms' borrowing choices.

Table 8 reports the multivariate test results. We employ a probit model and control for various deal and firm characteristics in our analysis. The multivariate test results are largely consistent with the findings of our univariate tests. The positive and statistically significant coefficients of Ird suggest that the use of IR derivatives contributes to more external borrowing. Column 5 indicates that acquirers with IR hedging programs have a 6.8% higher probability of using external financing. The coefficient of FX derivatives is not statistically significant for M&A deal borrowing, suggesting that IR derivatives are more instrumental in driving M&A financing decisions than FX derivatives. Yet, the coefficients of Ird/Fcd and $Hedging\_scope$ remain positive and statistically significant. Overall, our results suggest that corporate financial hedging has a pertinent impact on the likelihood that acquirers raise funds through external borrowing to finance acquisitions. This is consistent with our hypothesis that the use of financial derivatives can be associated with a lower cost of borrowing, therefore, enabling firms to finance capital intensive investment projects such as M&As with external debt.

4.4 Controlling for endogeneity

One potential concern in corporate financial hedging studies is that firms do not make financial hedging decisions randomly (e.g. Campello et al., 2011; Chen and King, 2014; Bartram, 2017). Corporate hedging strategy may be associated with unobservable firm characteristics (e.g. managerial ability and shareholder incentives) that can, in turn, affect M&A payment and financing decisions. Although we control for a set of important firm and deal characteristics as well as industry and year fixed effects in our tests, any omitted variables may still lead to biased regression results. It is also possible that financing acquisitions through external borrowing can induce more hedging because of the heightened exposure to IR risk. In such case, the financial hedging and the financing decisions would be jointly determined, leading to a simultaneity problem. Finally, despite our hedg-

ing measures capturing firms' hedging activity directly, measurement errors in our main independent variables cannot be ruled out. All the above would give rise to endogeneity concerns casting doubts on the causality of our main results.

4.4.1 Instrument variable approach

In order to mitigate the endogeneity concern, we first use the IV model as an identification method (e.g. Heckman, 1978; Greene, 2007; Wooldridge, 2010; Allayannis et al., 2012). In the first-stage regressions, we estimate an acquirer's decision to use financial derivatives (Ird/Fcd) as a function of various deal and firm characteristics, controlling for year and industry fixed effects. The IV used in the first-stage regressions is $Tax\_convexity$. The incentives of corporate hedging have been extensively examined in the previous literature and tax-related benefits have been proposed as one of the major motivations for firms to hedge: if a firm has a convex function of tax schedule, financial hedging can smooth the taxable income of the company and thus reduce its expected tax liability (e.g., Mayers and Smith, 1982; Smith and Stulz, 1985; Nance et al., 1993; Geczy et al., 1997; Mian, 1996). In theory, there are mainly two factors contributing to the convexity of a firm's tax schedule: the progressivity of a firm's corporate tax structure (Smith and Stulz, 1985) and the tax shields (Zimmerman, 1983). Empirical studies also provide evidence to support the hedging incentives can be driven by these two factors (e.g., Nance et al., 1993; Geczy et al., 1997; Mian, 1996). In order to model the convexity of a firm's tax schedule, Graham and Smith (1999) use simulation methods to develop a model to estimate the tax convexity based on a 5% reduction in the volatility of taxable income. They further provide evidence for the tax benefits related to corporate hedging. The tax convexity estimated by Graham and Smith's (1999) model has been adopted in Campello et al. (2011), Chen and King (2014), and Bartram (2017) as the IV to address the endogeneity problem in corporate hedging decisions. Following these studies, we use $Tax\_convexity$ as the IV in our models.[16] Our IV satisfies the exclusion restriction because it is unlikely that tax convexity is associated

[16]For the detailed calculation of $Tax\_convexity$, please refer to Graham and Smith (1999), page 2256.

directly with the M&A financing decisions. Our IV also satisfies the relevance condition given the discussion above on how tax convexity can motivate firms to hedge. Finally, it is unlikely that any systematic correlation exists between potential measurement errors in our hedging variables and our IV.

In the second-stage regressions, we replace the financial hedging indicator variables used in sections 4.2 and 4.3 with the predicted probability of financial hedging from the first-stage regressions. According to Angrist (2001), when the endogenous explanatory variables are binary, the non-linear models in the second-stage do not generate consistent estimates if the models are not absolutely correct. Therefore, we employ the bivariate probit models when the dependent variable is discrete (Karampatsas et al., 2014) and the treatment effect models when the dependent variable in the second-stage is continuous (Heckman, 1978; Wooldridge, 2010).

Table 9 presents the results of the IV regressions. In the first-stage treatment probit regressions, the dependent variable is the financial hedging indicator variable Ird/Fcd. The coefficients of $Tax\_convexity$ are all statistically significant, suggesting that our IV meets the relevance condition. In the second-stage regressions, where the dependent variables are $Pure\_cash$, $Cash\_major$, Pct_cash, $Borrowing\_broad$, and $Borrowing\_narrow$, the estimated coefficients for the predicted hedging indicator variables are all positive and statistically significant, except for $Borrowing\_broad$. Overall, the results are still consistent with significant relationship between corporate financial hedging and acquirers' financing decisions in M&As after correcting for the potential endogeneity problems.

4.4.2 Propensity score matching

One advantage of using the IV estimation is that it accounts for unobserved confounding variables, but its weakness lies in that the exclusion restriction of the selected IV may not be fully met. In this section, we employ the propensity score matching (PSM) as a second identification approach to tackle the endogeneity concerns. The main difference between our IV and PSM methods is that our IV estimation relies on an IV that is associated

with financial hedging but not correlated with M&A financing decisions in order to control for *unobservable* differences in firm characteristics between derivative users and non-users. On the other hand, the PSM approach generates a matching group of derivatives non-users that are similar with derivatives users based on *observable* firm characteristics to resemble the situation when derivatives users choose not to hedge. The difference in payment and financing choices between the two groups can then be attributed to financial hedging. This tackles the concern that corporate financial hedging decisions may be non-random.

To apply our PSM tests, we first run a logit model to estimate the propensity score to hedge for each deal acquirer in our sample. The dependent variables in the logit model are Ird, Fcd, and Ird/Fcd, respectively. The explanatory variables in the logit model include $Leverage$, $Cash/assets$, *Tobin's Q*, and $Relative\_size$. We then use the estimated propensity scores to construct matched samples using both nearest-neighbour matching and Gaussian kernel matching methods. To eliminate any biased matched sample concerns, we test the difference in each explanatory variable used in the logit models between derivatives users and the matched non-users in untabulated tests and we find the differences to be insignificant.[17] In Table 10, we report the difference in the firm's payment and financing variables between derivatives users and matched non-users. For the financial hedging proxy variables Ird and Ird/Fcd, all the differences are positive and statistically significant, suggesting that our main results are robust.[18] For the financial hedging proxy variable Fcd, the differences of $Pure\_cash$, $Cash\_major$, Pct_cash, and $Borrowing\_broad$ between derivatives users and non-users are positive and statistically significant.

4.5 Do borrowing costs drive the results?

Although our study has established a link between financial hedging and corporate investment as well as financing decisions, there is so far no direct evidence on whether the documented link arises as a result of financial hedging's contribution in attaining a lower

[17] The results are available upon request.

[18] After matching, we also include the matching criteria as control variables in the second-stage regressions rather than using univariate t-tests. Our results remain robust.

cost of external borrowing. To shed light on the external borrowing cost curbing role of financial hedging in M&A investments, we first delve into the relationship between the use of financial hedging instruments and external borrowing costs. To this end, we collect borrowing facilities (loan) data for our sample acquiring firms from LPC Dealscan over a time period of three years prior to the deal announcement. We record the loan "all-in-spread" for each borrowing facility and compute the value weighted average of the spread: $Borrowing\_cost$. Panel A of Table 11 reports the univariate comparison of loan spreads between derivatives users and non-users. We find that acquirers with financial hedging programs have a lower value weighted loan spread than those without such programs. Using Ird/Fcd as an example, our univariate analysis suggests that on average derivatives users' loan spread is 41.9 basis points lower than non-users'.

Next, we examine whether the ultimate impact of financial hedging on M&A financing decisions are to any extent associated with acquirers' loan borrowing cost using a two-stage IV approach (e.g., Dahya et al., 2016; Alexandridis et al., 2017). Panel B of Table 11 reports the results from the two-stage regressions. In the first-stage regression, we isolate the variation of acquirers' loan spreads between derivatives users and non-users. The coefficient of Ird/Fcd is negative and statistically significant at the 1% level, suggesting that derivatives users have a significantly lower value weighted loan spread over a three-year period prior to the deal announcement after controlling for deal and firm characteristics in a multivariate regression setting. The coefficient -37.83 indicates that the derivatives users' loan spread is 37.83 basis points lower than the non-users' after controlling for firm and deal characteristics. In the second-stage regressions, the coefficients of the predicted loan spread (from the first-stage) are negatively linked to both, cash and debt financing (Columns 2–5). The evidence is consistent with the conjecture that our hedging indicator is a strong predictor of loan spreads which, in turn, can explain M&A financing behavior. Thus, our study is the first to point out that financial hedging could serve as an effective vehicle for firms to bring their investment plans to fruition by lowering their borrowing cost and facilitating their financing. We note however that, given the nature of the IV

approach employed, if firms' financial hedging can directly impact their M&A financing method other than through the former's impact on the borrowing cost, then the exclusion condition of the IV method would not be met. Therefore, any inferences from our analysis about the role of borrowing costs need to be made with caution.

5 Conclusion

In this paper, we examine the impact of corporate financial hedging on M&As that comprise the most important form of corporate investment. First, we present evidence that the use of financial derivatives increases the likelihood of a firm undertaking inorganic investments in the form of M&As. This is consistent with the view that financial hedging, through its impact on the cost of borrowing and access to external capital, can act as a vehicle for firms to mitigate financing restrictions and pursue their investment plans. Second, we find that acquiring firms with financial hedging programs in place are more likely to finance their acquisitions with cash and external borrowing. Our results are consistent with optimal hedging theories that corporate financial hedging may reduce firms' future cash flow variability and improve their access to external financing. Finally, we provide evidence that the impact of financial hedging on M&A financing decisions can be largely traced to lower borrowing spreads. Our paper contributes to the existing literature by showing that financial hedging can serve as an effective vehicle for firms to bring their inorganic investment plans to fruition by lowering their borrowing cost and facilitating their financing.

Appendix A

Table A1: Variable definitions

This table presents variable definitions and the corresponding data sources. SDC refers to the Thomson Reuters Securities Data Company, CRSP refers to the Centre for Research in Security Prices, IBES refers to the Institutional Brokers Estimate System, 13-F refers to the Thomson Reuters 13F Database, and EDGAR refers to the SEC Electronic Data Gathering, Analysis, and Retrieval.

Variable	Definition	Source
Payment/Financing characteristics		
Pure_cash	Indicator variable: 1 for deals with 100% cash payment, 0 otherwise.	SDC
Cash_major	Indicator variable: 1 for deals with more than 50% cash payment, 0 otherwise.	SDC
Pct_cash	The percentage of cash payment involved in the M&A transaction.	SDC
Borrowing_narrow	Indicator variable: 1 if acquirers raise external borrowing directly related to the specific deal from one year before the deal announcement to completion, 0 otherwise. .	SDC/Global New Issue/DealScan
Borrowing_broad	Indicator variable: 1 if acquirers raise external borrowing from one year before the deal announcement to completion, 0 otherwise.	SDC/Global New Issue/DealScan
Acquirer_dummy	Indicator variable: 1 if firms attempt at least one acquisition, 0 otherwise.	SDC
Borrowing_cost	The value weighted average of the all-in-spread drawn (basis point spread over LIBOR or LIBOR equivalent plus any related facility fees), with value being the amount of each loan facility of an acquirer over a time period of three years prior to the deal announcement.	DealScan
Deal characteristics		
Complete	Indicator variable: 1 for completed deals, 0 for withdrawn deals.	SDC
Toehold	Indicator variable: 1 if an acquirer already holds a certain percentage of the target shares at the announcement, 0 otherwise.	SDC
Hostile	Indicator variable: 1 for hostile deals, 0 otherwise.	SDC
Tender_offer	Indicator variable: 1 for tender offers, 0 otherwise.	SDC
Related_industry	Indicator variable: 1 if an acquirer and target have the same first two-digit SIC Codes, 0 otherwise.	SDC
Competition	Indicator variable: 1 if more than one firm is bidding for a target, 0 otherwise.	SDC

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Table A1 – continued from previous page

Variable	Definition	Source
Relative_size	The ratio of transaction value to acquirer market value at the fiscal year end prior to the deal announcement.	SDC/Compustat
Firm characteristics		
Size	The acquirer's book value of total assets at the fiscal year end prior to the deal announcement, in bil. 2012 U.S.$.	Compustat
Tobin's Q	The acquirer's *Tobin's Q* at the fiscal year end prior to the deal announcement.	Compustat
Leverage	The acquirer's ratio of the book value of debt to the book of value of total assets at the fiscal year end prior to the deal announcement.	Compustat
$Cashflow/Equity$	The acquirer's income before extraordinary items plus depreciation minus dividends on common and preferred stocks divided by the acquirer's market value at the fiscal year end prior to the deal announcement (Karampatsas et al., 2014).	Compustat
Cash_holding	The acquirer's cash holdings, including cash and marketable securities, normalized by total assets at the fiscal year end prior to the deal announcement.	Compustat
Collateral	The acquirer's property, plant and equipment normalized by total assets at the fiscal year end prior to the deal announcement.	Compustat
Runup	Market adjusted buy-and-hold return of an acquirer's stock over a $(-205, -6)$ window relative to the announcement day (Golubov et al., 2012).	CRSP
Average_EPSSD	The standard deviation of analysts forecasts on the acquirer's stock price during the fiscal year prior to the deal announcement.	IBES
Blockholder_ownership	The acquirer's blockholder ownership at the fiscal year end prior to the deal announcement (Karampatsas et al., 2014).	13-F
$One-year\_return$	The acquirer's stock return over the fiscal year prior to the deal announcement.	CRSP
Asset_growth	The growth of the total asset of an acquirer over the fiscal year prior to the deal announcement.	Compustat
Financial hedging variables		
Ird	Indicator variable: 1 if an acquirer uses interest rate derivatives in the fiscal year prior to the deal announcement, 0 otherwise.	EDGAR 10-K
Fcd	Indicator variable: 1 if an acquirer uses foreign currency derivatives in the fiscal year prior to the deal announcement, 0 otherwise.	EDGAR 10-K

Continued on next page

Table A1 – continued from previous page

Variable	Definition	Source
Ird/Fcd	Indicator variable: 1 if an acquirer uses either interest rate or foreign currency derivatives in the fiscal year prior to the deal announcement, 0 otherwise.	EDGAR 10-K
$Hedging\_scope$	Indicator variable: 2 if an acquirer uses two types of derivatives (FX and IR) in the fiscal year prior to the deal announcement, 1 if an acquirer uses only one of the two, 0 if an acquirer does not use either of the two.	EDGAR 10-K

Appendix B

This appendix presents examples of external borrowing related information from SDC on selected deals in our sample. The statements in quotes are from "Source of Funds" in SDC. Each deal is linked to a unique SDC deal number.

Bank Loan

775308020 SPX Corp announced a deal to acquire General Signal Corp on 20/07/1998: "The transaction was financed via a *$1.65 bil facility underwritten by Chase Manhattan Bank, consisting of a 1.4 mil term loan and $250 mil of revolving credit*."

787551020 Maxxim Medical Inc announced a deal to acquire Circon Corp on 20/11/1998: "The transaction was financed through *bank borrowings of up to $325 mil from NationsBank NA and NationsBanc Montgomery Securities*."

1064738020 Weyerhaeuser Co announced a deal to acquire Willamette Industries Inc on 13/11/2000: "The transaction was financed through a commitment from *Morgan Stanley Senior Funding Inc and Chase Manhattan Bank to provide senior bank financing in the aggregate amount of $5.3 bil*."

Bridge Loan

1220000020 Dominion Resources Inc announced a deal to acquire Louis Dreyfus Natural Gas Corp on 07/09/2001: "The cash portion of the transaction was financed with *a bridge loan facility*, which was *to be replaced with proceeds from a combination of permanent debt financing* and equity hybrids."

1284207020 Quest Diagnostic Inc announced a deal to acquire Unilab Corp on 02/04/2002: "The cash portion of the transaction was financed with *a new $550 mil one year bridge loan facility from Bank of America and Merrill Lynch Capital Corp*."

1527077020 Deluxe Corp announced a deal to acquire New England Business Service Inc on 17/05/2004: "The transaction was financed through *a $800 million bridge financing arranged by Bank One, NA, The Bank of New York and Wachovia Bank, National Association.*"

Debt

860058020 International Game Technology announced a deal to acquire Sodak Gaming Inc on 11/03/1999: "Then transaction was financed through a *$1 bil issue of 7.84% bonds.*"

954115020 Honeywell International Inc announced a deal to acquire Pittway Corp on 20/12/1999: "The transaction was financed through *issuing commercial paper at prevailing market terms* and expects that it will repay some or all of such commercial paper with proceeds from the sale of longer-term debt in the public or private debt markets."

1417227020 Armor Holdings Inc announced a deal to acquire Simula Inc on 23/07/2003: "The transaction was financed through *the private placement of $150 mil in senior subordinated notes due 2013.*"

Line of Credit

1523992020 Pioneer Natural Resources Co announced a deal to acquire Evergreen Resources Inc on 04/05/2004: "The transaction was to be financed via *a $900 mil, 364-day senior unsecured revolving credit facility underwritten by JPMorgan Chase Bank.*"

733499020 Hadco Corp announced a deal to acquire Continental Circuits Corp on 17/02/1998: "The transaction was financed with approximately *$222 million of borrowings pursuant to an existing $400 million senior revolving credit loan facility with BankBoston.*"

1830244020 Moog Inc announced a deal to acquire ZEVEX International Inc on 12/01/2007: "The transaction was financed by its *existing revolving credit facility.*"

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Table 1: Sample distribution

This table reports the distribution of M&A deals in our sample. The final sample includes 1,738 U.S. public M&As announced between 1998 and 2012. Acquirers and targets have CRSP and Compustat data, and acquirers have 10-K reports available on EDGAR for the fiscal year prior to the deal announcement. Panel A reports the distribution of M&A deals in our sample by deal announcement year and Panel B by acquirer Fama-French 10 industry.

Panel A. Distribution of M&As by announcement year.

Year	Frequency	Percentage
1998	216	12.43%
1999	226	13.00%
2000	196	11.28%
2001	158	9.09%
2002	96	5.52%
2003	106	6.10%
2004	88	5.06%
2005	95	5.47%
2006	105	6.04%
2007	94	5.41%
2008	89	5.12%
2009	67	3.86%
2010	80	4.60%
2011	58	3.34%
2012	64	3.68%
Total	1,738	100.00%

Panel B. Distribution of M&As by acquirer industry.

Fama–French 10 industries	Number	Percentage
Business Equipment	652	37.51
Other	232	13.35
Healthcare, Medical Equipment, Drugs	229	13.18
Manufacturing	206	11.85
Wholesale, Retail, and Some Services	115	6.62
Telephone and Television Transmission	82	4.72
Oil, Gas, and Coal Extraction and Products	75	4.32
Consumer NonDurables	65	3.74
Utilities	51	2.93
Consumer Durables	31	1.78
Total	1,738	100

Table 2: Descriptive statistics

Panel A. Summary statistics for financial hedging variables. This panel reports statistics on the use of financial derivatives for our sample acquirers. Our M&A sample is described in Table 1. Variables are constructed in the fiscal year prior to the deal announcement. Ird is a binary variable indicating whether an acquirer engages in IR hedging. Fcd is a binary variable indicating whether an acquirer engages in FX hedging. Ird/Fcd is a binary variable indicating whether an acquirer engages in at least one of FX and IR hedging. $Hedging\_scope$ indicates the number of financial hedging categories which an acquirer engages in.

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Ird	1,738	0.475	0.500	0	1
Fcd	1,738	0.427	0.495	0	1
Ird/Fcd	1,738	0.610	0.488	0	1
$Hedging\_scope$	1,738	0.902	0.820	0	2

Panel B. Summary statistics of control variables. This panel reports the summary statistics for our sample of M&As described in Table 1. The number of observations, means, and standard deviations for each variable are presented for the full sample, the sample of derivative users, and non-users. Derivatives users and non-users are determined based on the variable Ird/Fcd defined in Table 2. The last column (Diff) reports the significance levels from t-tests on the mean difference between derivatives users and non-users. Detailed definitions of all variables can be found in Appendix A. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Full sample			Derivatives user			Derivatives non-user			
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Diff**
Deal characteristics										
Complete	1,738	0.835	0.371	1,164	0.872	0.334	574	0.761	0.427	***
Toehold	1,738	0.032	0.175	1,164	0.032	0.176	574	0.031	0.174	
Hostile	1,738	0.024	0.154	1,164	0.026	0.159	574	0.021	0.143	
Tender_offer	1,738	0.187	0.390	1,164	0.210	0.407	574	0.141	0.348	***
Related_industry	1,738	0.631	0.483	1,164	0.608	0.488	574	0.676	0.468	***
Competition	1,738	0.078	0.268	1,164	0.081	0.273	574	0.071	0.258	
Relative_size	1,692	0.431	0.944	1,144	0.389	1.002	548	0.521	0.802	***
Acquirer characteristics										
Size	1,738	14.367	39.329	1,164	19.105	41.208	574	4.759	33.231	***
Tobin's Q	1,697	2.746	4.279	1,136	2.388	2.521	561	3.472	6.464	***
Leverage	1,738	49.096	24.807	1,164	53.264	22.566	574	40.646	26.928	***
Cashflow/Equity	1,735	-0.005	0.901	1,162	0.038	0.316	573	-0.092	1.499	***
Cash_holding	1,738	0.199	0.211	1,164	0.163	0.179	574	0.272	0.249	***
Collateral	1,729	0.233	0.217	1,156	0.251	0.218	573	0.198	0.211	***
Runup	1,733	1.206	0.738	1,163	1.157	0.606	570	1.306	0.944	***
Average_EPSSD	1,460	1.285	17.430	1,015	1.684	20.657	445	0.376	4.757	
Blockholder_ownership	1,738	0.149	0.135	1,164	0.148	0.132	574	0.151	0.142	
One − year_return	4,521	0.189	0.872	2,826	0.194	0.763	1,695	0.180	1.030	
Asset_growth	4,256	0.272	1.199	2,620	0.197	0.422	1,636	0.392	1.852	***

Table 3: Financial hedging and acquisitiveness: Univariate tests

The table reports financial hedging statistics for firms engaging in M&As and control samples of firms that do not carry out M&A investments. Each sample acquirer is matched to a random firm drawn from the sample acquirer's industry in the same year as the deal announcement and we repeat the bootstrap process five hundred times. The table reports the percentage of acquirers and control firms using financial derivatives, and their differences. Fama–French 10, 30, and 48 industry classifications are used in Panel A, B, and C, for the matching process respectively. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

Panel A. Fama–French 10 industries

	M&A Sample		Control Sample		Difference
	Mean	S.D.	Mean	S.D.	M&A−Control
Ird	0.475	0.500	0.312	0.169	0.163 ***
Fcd	0.427	0.495	0.226	0.105	0.201 ***
Ird/Fcd	0.610	0.488	0.410	0.152	0.200 ***
$Hedging\_scope$	0.902	0.820	0.538	0.224	0.364 ***

Panel B. Fama–French 30 industries

	M&A Sample		Control Sample		Difference
	Mean	S.D.	Mean	S.D.	M&A−Control
Ird	0.475	0.500	0.306	0.160	0.170 ***
Fcd	0.427	0.495	0.221	0.113	0.206 ***
Ird/Fcd	0.610	0.488	0.401	0.152	0.210 ***
$Hedging\_scope$	0.902	0.820	0.527	0.232	0.375 ***

Panel C. Fama–French 48 industries

	M&A Sample		Control Sample		Difference
	Mean	S.D.	Mean	S.D.	M&A−Control
Ird	0.475	0.500	0.300	0.164	0.175 ***
Fcd	0.427	0.495	0.226	0.118	0.201 ***
Ird/Fcd	0.610	0.488	0.398	0.157	0.212 ***
$Hedging\_scope$	0.902	0.820	0.526	0.240	0.376 ***

Table 4: Financial hedging and acquisitiveness: Multivariate analyses

The table reports logit regression results on the impact of financial hedging on firm acquisitiveness. The dependent variable is *Acquirer_dummy*, a binary variable equal to one for acquiring firms, and zero for the matched non-acquiring firms in the control sample. In Columns 1–4, the control sample for each acquirer comprises of five randomly drawn firms from the Compustat/CRSP merged database in the same year as the deal announcement year. In Column 5, the matching is performed based on industry, a similar range of total assets (80%–120%), and similar range of *Tobin's Q* (80%–120%). In Columns 6–8, we match by stock return (80%–120%), asset growth (80%–120%), and cash holdings (80%–120%). The number of matched firms for each acquirer is limited to five as in Bena and Li (2014). Detailed definitions of all variables can be found in Appendix A. Industry and year fixed effects are included in all regressions. The p-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Year only				**Industry, Size, & Tobin's Q**	**Industry, Size & Stock return**	**Industry, Size, & Asset growth**	**Industry, Size, & Cash holdings**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Ird	0.628***							
	(0.000)							
Fcd		0.795***						
		(0.000)						
Ird/Fcd			0.754***		0.186***	0.199***	0.308***	0.205***
			(0.000)		(0.006)	(0.009)	(0.000)	(0.005)
Hedging_scope				0.555***				
				(0.000)				
One − year_Return	0.055**	0.060**	0.056**	0.056**	-0.025	0.147***	0.011	-0.012
	(0.023)	(0.014)	(0.022)	(0.021)	(0.422)	(0.004)	(0.741)	(0.531)
Tobin's Q	0.002	0.003	0.005	0.004	0.130***	0.064***	0.021	0.068***
	(0.814)	(0.798)	(0.632)	(0.677)	(0.000)	(0.002)	(0.136)	(0.000)
Leverage	-0.005***	-0.003**	-0.005***	-0.005***	-0.006***	-0.007***	-0.008***	-0.007***
	(0.001)	(0.013)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.606***	0.524***	0.529***	0.496***	1.030***	1.574***	1.109***	1.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash_holding	-0.303*	-0.453***	-0.335*	-0.268	0.077	0.118	0.230	-1.180***
	(0.084)	(0.010)	(0.057)	(0.128)	(0.694)	(0.586)	(0.300)	(0.000)
Asset_growth	0.044**	0.048**	0.046**	0.048**	0.012	0.002	0.206***	0.028

Continued on next page

Table 4 – Continued from previous page

	Year only				Industry, Size, & Tobin's Q	Industry, Size & Stock return	Industry, Size, & Asset growth	Industry, Size, & Cash holdings
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	(0.037)	(0.024)	(0.026)	(0.021)	(0.489)	(0.868)	(0.000)	(0.147)
Size	0.010***	0.008***	0.009***	0.008***	0.015***	0.034***	0.032***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	-2.737***	-2.607***	-2.824***	-2.798***	-1.563***	-0.667***	-0.813***	-0.991***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	(0.001)	(0.000)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,502	9,502	9,502	9,502	6,637	4,390	4,120	5,371
Pseudo R-squared	0.080	0.087	0.086	0.091	0.051	0.109	0.104	0.113

Table 5: Financial hedging and M&A payment methods: Univariate tests

The table presents the univariate test results of the impact of financial hedging on M&A payment methods. *Pure_cash* is a binary variable equal to one for deals with 100% cash payment, and zero otherwise. Cash_major is a binary variable which is equal to one for deals with over 50% cash payment, and zero otherwise. *Pct_cash* is the percentage of cash payment in the total M&A transaction. We report the summary statistics of these three variables for the full sample, derivatives users, and non-users. The derivatives users and non-users are classified by the financial hedging proxy variables: *Ird*, *Fcd*, and *Ird/Fcd*, respectively. The last column reports the difference between derivatives users and non-users, and the significance levels of the t-test results. Detailed definitions of all variables can be found in Appendix A. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Full sample			Derivatives user			Non-user			Difference
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**t-test**
					Ird					
Pure_cash	1,738	0.349	0.477	826	0.426	0.495	912	0.280	0.449	0.146***
Cash_major	1,738	0.464	0.499	826	0.546	0.498	912	0.390	0.488	0.156***
Pct_cash	1,738	0.467	0.451	826	0.554	0.446	912	0.389	0.441	0.165***
					Fcd					
Pure_cash				742	0.464	0.499	996	0.264	0.441	0.200***
Cash_major				742	0.582	0.494	996	0.377	0.485	0.205***
Pct_cash				742	0.581	0.450	996	0.383	0.433	0.198***
					Ird/Fcd					
Pure_cash				1,061	0.422	0.494	677	0.235	0.424	0.187***
Cash_major				1,061	0.540	0.499	677	0.346	0.476	0.194***
Pct_cash				1,061	0.548	0.448	677	0.340	0.426	0.208***

Table 6: Financial hedging and M&A payment methods: Multivariate analyses

The table presents regression results of acquirer payment method on financial hedging variables. Our sample of M&As is described in Table 1. In Columns 1–4, the dependent variable in the probit regressions is *Pure_cash*, which is equal to one for deals with 100% cash payment, and zero otherwise. In Columns 5–8, the dependent variable in the probit regressions is *Cash_major*, which is equal to one for deals with more than 50% cash payment, and zero otherwise. In Columns 9–12, the dependent variable in the tobit regressions is *Pct_cash*, the percentage of cash consideration in the total offer. The independent variables of interests are *Fcd*, *Ird*, *Ird/Fcd*, and *Hedging_scope*. Detailed definitions of all variables can be found in Appendix A. Year and Fama–French 10 industry fixed effects are included in all the regressions. The p-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by ∗ ∗ ∗, ∗∗, and ∗.

	Pure_cash				***Cash_major***				***Pct_cash***			
Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Ird	0.270***				0.121				0.230**			
	(0.003)				(0.171)				(0.012)			
Fcd		0.197**				0.205**				0.223***		
		(0.021)				(0.015)				(0.009)		
Ird/Fcd			0.332***				0.197**				0.320***	
			(0.000)				(0.026)				(0.000)	
Hedging_scope				0.184***				0.129**				0.178***
				(0.001)				(0.017)				(0.001)
Toehold	0.188	0.177	0.197	0.186	-0.106	-0.110	-0.104	-0.108	-0.041	-0.041	-0.033	-0.039
	(0.423)	(0.454)	(0.401)	(0.430)	(0.651)	(0.642)	(0.659)	(0.646)	(0.872)	(0.873)	(0.898)	(0.877)
Hostile	0.066	0.068	0.059	0.059	0.084	0.084	0.082	0.082	-0.071	-0.074	-0.075	-0.075
	(0.786)	(0.780)	(0.808)	(0.808)	(0.726)	(0.726)	(0.733)	(0.732)	(0.823)	(0.815)	(0.814)	(0.814)
Tender_offer	0.897***	0.899***	0.894***	0.894***	1.257***	1.257***	1.254***	1.252***	1.287***	1.288***	1.278***	1.281***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Related_industry	-0.094	-0.102	-0.104	-0.096	0.007	0.005	0.004	0.007	-0.065	-0.072	-0.073	-0.067
	(0.270)	(0.230)	(0.222)	(0.259)	(0.930)	(0.956)	(0.966)	(0.931)	(0.446)	(0.398)	(0.395)	(0.431)
Competition	0.406***	0.399***	0.412***	0.411***	0.410***	0.412***	0.412***	0.413***	0.382**	0.384**	0.389**	0.388**
	(0.007)	(0.008)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.018)	(0.019)	(0.017)	(0.017)
Relative_size	-0.732***	-0.701***	-0.709***	-0.705***	-0.473***	-0.447***	-0.462***	-0.457***	-0.398***	-0.373***	-0.380***	-0.377***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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Table 6 - continued from previous page

	Pure_cash				*Cash_major*				*Pct_cash*			
Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Size	-0.001	-0.001	-0.001	-0.001	-0.002	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001	-0.001
	(0.522)	(0.570)	(0.564)	(0.407)	(0.212)	(0.150)	(0.197)	(0.136)	(0.280)	(0.248)	(0.272)	(0.166)
Tobin's Q	-0.034*	-0.034*	-0.034*	-0.034*	-0.048**	-0.049**	-0.048**	-0.048**	-0.051**	-0.052**	-0.052**	-0.052**
	(0.092)	(0.095)	(0.089)	(0.092)	(0.021)	(0.020)	(0.019)	(0.020)	(0.014)	(0.016)	(0.014)	(0.014)
Leverage	0.000	0.001	-0.000	0.000	-0.000	-0.000	-0.001	-0.001	0.001	0.001	-0.000	0.000
	(0.992)	(0.661)	(0.847)	(0.993)	(0.929)	(0.961)	(0.744)	(0.786)	(0.809)	(0.587)	(0.957)	(0.877)
Cashflow/Equity	0.328	0.322	0.295	0.307	0.592**	0.569**	0.569**	0.568**	0.325	0.309	0.300	0.305
	(0.165)	(0.175)	(0.205)	(0.192)	(0.012)	(0.016)	(0.017)	(0.017)	(0.102)	(0.126)	(0.120)	(0.118)
Cash_holding	-0.177	-0.270	-0.209	-0.194	-0.367	-0.399	-0.372	-0.352	-0.351	-0.420*	-0.357	-0.350
	(0.488)	(0.285)	(0.412)	(0.445)	(0.139)	(0.105)	(0.131)	(0.154)	(0.153)	(0.086)	(0.144)	(0.153)
Collateral	-0.156	-0.139	-0.162	-0.155	0.126	0.126	0.119	0.123	0.028	0.031	0.024	0.027
	(0.560)	(0.603)	(0.546)	(0.563)	(0.622)	(0.622)	(0.640)	(0.630)	(0.910)	(0.902)	(0.922)	(0.913)
Runup	-0.107	-0.097	-0.097	-0.098	-0.133*	-0.123	-0.127	-0.126	-0.114	-0.103	-0.104	-0.104
	(0.210)	(0.253)	(0.260)	(0.252)	(0.099)	(0.127)	(0.117)	(0.119)	(0.155)	(0.198)	(0.190)	(0.194)
Average_EPSSD	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004*	0.004*	0.004*	0.004*
	(0.220)	(0.222)	(0.235)	(0.224)	(0.185)	(0.186)	(0.191)	(0.185)	(0.093)	(0.092)	(0.096)	(0.086)
Blockholder_ownership	0.058	0.052	0.037	0.106	-0.433	-0.391	-0.437	-0.379	-0.142	-0.120	-0.150	-0.090
	(0.852)	(0.866)	(0.904)	(0.733)	(0.157)	(0.202)	(0.152)	(0.217)	(0.648)	(0.698)	(0.627)	(0.771)
Intercept	0.057	0.113	0.039	0.027	0.754**	0.741**	0.730**	0.700**	1.238***	1.272***	1.207***	1.194***
	(0.848)	(0.700)	(0.894)	(0.928)	(0.012)	(0.013)	(0.015)	(0.020)	(0.000)	(0.000)	(0.000)	(0.000)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,393	1,393	1,393	1,393	1,393	1,393	1,393	1,393	1,393	1,393	1,393	1,393
Pseudo R-squared	0.233	0.231	0.235	0.234	0.236	0.238	0.238	0.238	0.164	0.164	0.166	0.165

Table 7: Financial hedging and external financing: Univariate tests

The table presents the univariate test results of the impact of financial hedging on M&A external financing. *Borrowing_broad* is an indicator variable equal to one if an acquirer utilizes any private or public borrowing credit facilities during the transaction window without setting any restrictions on the purpose of these facilities, and zero otherwise. *Borrowing_narrow* is an indicator variable that is equal to one if the credit facility's primary purpose is for the corresponding M&A transaction, and zero otherwise. The summary statistics of these two variables are reported for full sample, derivatives users, and non-users. The derivatives users and non-users are determined based on the financial hedging variables: Ird, Fcd, and Ird/Fcd. The last column reports the difference between derivatives users and non-users, and the significance levels of the t-tests. Detailed definitions of all variables can be found in Appendix A. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Full Sample			Derivatives User			Derivatives Non-user			Difference
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**t-test**
						Ird				
Borrowing_broad	1,738	0.602	0.490	826	0.741	0.438	912	0.477	0.500	0.264***
						Fcd				
Borrowing_broad				742	0.663	0.473	996	0.557	0.497	0.106***
						Ird/Fcd				
Borrowing_broad				1,061	0.680	0.467	677	0.482	0.500	0.198***
						Ird				
Borrowing_narrow	1,738	0.223	0.416	826	0.292	0.455	912	0.160	0.367	0.132***
						Fcd				
Borrowing_narrow				742	0.220	0.414	996	0.225	0.418	-0.005
						Ird/Fcd				
Borrowing_narrow				1,061	0.260	0.438	677	0.165	0.372	0.095***

Table 8: Financial hedging and external Financing : Multivariate analyses

The table presents results of probit regressions of external financing on financial hedging for the sample of M&As described in Table 1. The dependent variables are *Borrowing_broad* in Columns 1–4 and *Borrowing_narrow* in Columns 5–8. The key independent variables are Fcd, Ird, Ird/Fcd, and *Hedging_scope*. Detailed definitions of all variables can be found in Appendix A. Year and Fama–French 10 industry fixed effects are controlled for all regressions. The p-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Borrowing_broad				***Borrowing_narrow***			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Ird	0.354***				0.293***			
	(0.000)				(0.003)			
Fcd		0.136*				-0.007		
		(0.100)				(0.946)		
Ird/Fcd			0.213**				0.213**	
			(0.012)				(0.038)	
Hedging_scope				0.191***				0.110*
				(0.000)				(0.073)
Toehold	-0.237	-0.240	-0.234	-0.238	0.052	0.019	0.044	0.040
	(0.302)	(0.291)	(0.304)	(0.297)	(0.835)	(0.940)	(0.861)	(0.874)
Hostile	-0.625***	-0.606**	-0.616***	-0.615***	-0.283	-0.265	-0.275	-0.274
	(0.009)	(0.011)	(0.010)	(0.010)	(0.278)	(0.306)	(0.289)	(0.291)
Tender_offer	0.597***	0.601***	0.598***	0.591***	1.125***	1.130***	1.126***	1.125***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Related_industry	0.089	0.075	0.076	0.082	0.120	0.115	0.111	0.116
	(0.283)	(0.365)	(0.358)	(0.321)	(0.207)	(0.222)	(0.239)	(0.219)
Competition	-0.567***	-0.565***	-0.562***	-0.563***	-0.325*	-0.345**	-0.332*	-0.331*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.056)	(0.043)	(0.051)	(0.052)
Relative_size	-0.075	-0.069	-0.069	-0.058	0.360***	0.359***	0.369***	0.369***
	(0.239)	(0.282)	(0.279)	(0.360)	(0.000)	(0.000)	(0.000)	(0.000)
Size	0.002*	0.003**	0.003**	0.002*	-0.008***	-0.007***	-0.008***	-0.008***
	(0.058)	(0.031)	(0.028)	(0.066)	(0.000)	(0.001)	(0.000)	(0.000)
Tobin's Q	0.021**	0.022**	0.021**	0.021**	-0.028	-0.029	-0.029	-0.029
	(0.045)	(0.036)	(0.040)	(0.040)	(0.369)	(0.341)	(0.350)	(0.341)
Leverage	0.002	0.004*	0.003	0.003	-0.003	-0.002	-0.003	-0.003
	(0.265)	(0.070)	(0.171)	(0.203)	(0.205)	(0.501)	(0.274)	(0.324)

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Table 8 – continued from previous page

	Borrowing_broad				*Borrowing_narrow*			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Cashflow/Equity	0.314	0.334	0.320	0.299	0.952***	0.992***	0.964***	0.965***
	(0.129)	(0.130)	(0.134)	(0.153)	(0.003)	(0.003)	(0.003)	(0.003)
Cash_holding	-1.634***	-1.744***	-1.715***	-1.673***	-2.170***	-2.311***	-2.265***	-2.255***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Collateral	0.149	0.148	0.145	0.148	0.013	0.001	0.008	0.012
	(0.559)	(0.560)	(0.568)	(0.560)	(0.961)	(0.997)	(0.976)	(0.964)
Runup	0.048	0.051	0.052	0.055	-0.164	-0.166	-0.160	-0.161
	(0.470)	(0.438)	(0.436)	(0.407)	(0.120)	(0.113)	(0.129)	(0.126)
Average_EPSSD	-0.003	-0.003	-0.003	-0.003	0.007**	0.007**	0.007**	0.007**
	(0.260)	(0.261)	(0.252)	(0.249)	(0.010)	(0.014)	(0.012)	(0.011)
Blockholder_ownership	-0.495	-0.558*	-0.571*	-0.472	-0.108	-0.165	-0.147	-0.110
	(0.101)	(0.063)	(0.057)	(0.119)	(0.758)	(0.638)	(0.676)	(0.755)
Intercept	0.685**	0.830***	0.784***	0.699**	0.338	0.486	0.393	0.392
	(0.021)	(0.005)	(0.008)	(0.018)	(0.301)	(0.133)	(0.229)	(0.231)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,393	1,393	1,393	1,393	1,393	1,393	1,393	1,393
Pseudo R-squared	0.178	0.171	0.173	0.176	0.250	0.245	0.247	0.247

Table 9: Financial hedging and M&A financing decisions: Endogeneity control

The table presents the results of IV regressions to control for potential endogeneity between financial hedging and M&A financing decisions. In the first-stage (Reduced) regressions, the dependent variable is Ird/Fcd. Following Campello et al. (2011), Chen and King (2014), and Bartram (2017), the IV used in the first-stage regressions is $Tax\_convexity$. In the second-stage (Structural) regressions, the dependent variables are $Pure\_cash$, $Cash\_major$, Pct_cash, $Borrowing\_broad$, and $Borrowing\_narrow$, respectively. A bivariate probit model is employed for $Pure\_cash$, $Cash\_major$, $Borrowing\_broad$, and $Borrowing\_narrow$ while a treatment effect model is employed for Pct_cash. Detailed definitions of all variables can be found in Appendix A. Year and Fama–French 10 industry fixed effects are controlled for all regressions. The p-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Pure_cash		***Cash_major***		***Pct_cash***		***Borrowing_broad***		***Borrowing_narrow***	
	Reduced	**Structural**	**Reduced**	**Structural**	**Reduced**	**Structural**	**Reduced**	**Structural**	**Reduced**	**Structural**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ird/Fcd		1.109***		1.213***		0.308**		-0.199		1.383***
		(0.003)		(0.002)		(0.026)		(0.831)		(0.000)
Toehold	-0.198	0.250	-0.200	-0.023		0.001	-0.230	-0.242	-0.252	0.108
	(0.399)	(0.269)	(0.388)	(0.919)		(0.993)	(0.336)	(0.282)	(0.280)	(0.646)
Hostile	0.228	-0.025	0.297	0.007		-0.001	0.231	-0.621**	0.198	-0.352
	(0.430)	(0.938)	(0.338)	(0.984)		(0.989)	(0.383)	(0.028)	(0.458)	(0.170)
Tender_offer	0.173	0.813***	0.188*	1.079***		0.364***	0.139	0.646***	0.217**	0.905***
	(0.106)	(0.000)	(0.079)	(0.000)		(0.000)	(0.196)	(0.000)	(0.048)	(0.000)
Related_industry	0.065	-0.133	0.069	-0.028		-0.022	0.074	0.110	0.037	0.091
	(0.448)	(0.112)	(0.419)	(0.733)		(0.334)	(0.392)	(0.193)	(0.668)	(0.322)
Competition	-0.093	0.404***	-0.091	0.411**		0.126***	-0.099	-0.616***	-0.081	-0.299*
	(0.546)	(0.010)	(0.562)	(0.011)		(0.002)	(0.515)	(0.000)	(0.597)	(0.080)
Relative_size	-0.199***	-0.565***	-0.204***	-0.313***		-0.108***	-0.212***	-0.079	-0.239***	0.423***
	(0.005)	(0.006)	(0.003)	(0.009)		(0.000)	(0.002)	(0.383)	(0.001)	(0.000)
Size	-0.002	-0.001	-0.001	-0.002**	-0.001	-0.001	-0.001	0.003	-0.001	-0.010***
	(0.611)	(0.238)	(0.661)	(0.024)	(0.550)	(0.143)	(0.885)	(0.311)	(0.754)	(0.000)
Tobin's Q	0.015	-0.028	0.016	-0.039*	0.019	-0.006	0.014	0.016	0.014	-0.026
	(0.319)	(0.194)	(0.301)	(0.076)	(0.170)	(0.121)	(0.363)	(0.278)	(0.366)	(0.444)
Leverage	0.020***	-0.006*	0.020***	-0.007**	0.019***	-0.002	0.020***	0.006	0.020***	-0.010***
	(0.000)	(0.077)	(0.000)	(0.016)	(0.000)	(0.135)	(0.000)	(0.330)	(0.000)	(0.001)
Cashflow/Equity	0.114	0.244	0.115	0.443*	0.111	0.010	0.115	0.427*	0.110	0.832**

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Table 9 – continued from previous page

	Pure_cash		*Cash_major*		*Pct_cash*		*Borrowing_broad*		*Borrowing_narrow*	
	Reduced	**Structural**	**Reduced**	**Structural**	**Reduced**	**Structural**	**Reduced**	**Structural**	**Reduced**	**Structural**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	(0.477)	(0.350)	(0.478)	(0.069)	(0.392)	(0.356)	(0.476)	(0.094)	(0.486)	(0.024)
Cash_holding	-0.805***	0.063	-0.787***	0.014	-0.833***	-0.044	-0.784***	-2.066***	-0.793***	-1.667***
	(0.001)	(0.808)	(0.001)	(0.959)	(0.000)	(0.571)	(0.002)	(0.000)	(0.001)	(0.000)
Collateral	0.132	-0.161	0.141	0.076		0.034	0.126	0.107	0.136	-0.164
	(0.614)	(0.554)	(0.593)	(0.768)		(0.631)	(0.626)	(0.686)	(0.597)	(0.523)
Runup	-0.059	-0.065	-0.056	-0.092	-0.088	-0.019	-0.063	0.071	-0.055	-0.128
	(0.408)	(0.432)	(0.430)	(0.236)	(0.214)	(0.374)	(0.384)	(0.368)	(0.444)	(0.190)
Average_EPSSD	0.008***	0.003	0.008**	0.003	0.007	0.001*	0.008*	-0.003	0.005	0.007*
	(0.006)	(0.284)	(0.015)	(0.260)	(0.484)	(0.074)	(0.055)	(0.334)	(0.264)	(0.057)
Blockholder_ownership	-0.325	0.164	-0.272	-0.250		-0.010	-0.426	-0.517	-0.456	0.012
	(0.319)	(0.613)	(0.413)	(0.442)		(0.903)	(0.196)	(0.111)	(0.152)	(0.970)
Tax_convexity	0.029***		0.027***		0.031***		0.027***		0.026***	
	(0.000)		(0.000)		(0.000)		(0.005)		(0.000)	
Intercept	-0.467	-0.415	-0.481	0.148	-0.561**	0.592***	-0.450	0.841*	-0.447	-0.167
	(0.123)	(0.245)	(0.112)	(0.707)	(0.047)	(0.000)	(0.147)	(0.050)	(0.140)	(0.628)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,339	1,339	1,339	1,339	1,339	1,339	1,339	1,339	1,339	1,339
Pseudo R-squared	0.227		0.200		0.279		0.181		0.169	

Table 10: Financial hedging and M&A financing decisions: Propensity score matching

The table reports acquirers' payment and financing choices adjusted using propensity score matching (PSM) methods. We use logit regressions to estimate the likelihood of a firm utilizing financial derivatives captured by the dependent variables being *Ird*, *Fcd*, and *Ird/Fcd*. The independent variables included in the logit regressions are *Relative_size*, *Leverage*, *Cash/assets*, and *Tobin's Q*. Using the propensity score generated in the logit regressions, we construct the matched samples using both nearest-neighbor matching and Gaussian kernel matching. The table reports the difference in the payment and financing methods variables (*Pure_cash*, *Cash_major*, *Pct_cash*, *Borrowing_broad*, and *Borrowing_narrow*) between derivatives users and matched non-users. Detailed definitions of all variables can be found in Appendix A. The p-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	5 Nearest	**10 Nearest**	**50 Nearest**	**Gaussian kernel**
			Ird	
Pure_cash	0.169 ***	0.163 ***	0.168 ***	0.100 ***
	(0.000)	(0.000)	(0.000)	(0.003)
Cash_mejor	0.160 ***	0.152 ***	0.151 ***	0.072 **
	(0.000)	(0.000)	(0.000)	(0.043)
Pct_cash	0.168 ***	0.162 ***	0.164 ***	0.094 ***
	(0.000)	(0.000)	(0.000)	(0.003)
Borrowing_broad	0.159 ***	0.161 ***	0.152 ***	0.152 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Borrowing_narrow	0.097 ***	0.086 ***	0.082 ***	0.067 **
	(0.000)	(0.000)	(0.001)	(0.028)
			Fcd	
Pure_cash	0.144 ***	0.150 ***	0.136 ***	0.094 ***
	(0.000)	(0.000)	(0.000)	(0.006)
Cash_mejor	0.161 ***	0.156 ***	0.145 ***	0.112 ***
	(0.000)	(0.000)	(0.000)	(0.001)
Pct_cash	0.152 ***	0.149 ***	0.140 ***	0.112 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Borrowing_broad	0.072 ***	0.077 ***	0.068 ***	0.025
	(0.005)	(0.002)	(0.005)	(0.460)
Borrowing_narrow	-0.008	0.003	-0.005	0.006
	(0.724)	(0.906)	(0.814)	(0.843)
			Ird/Fcd	
Pure_cash	0.175 ***	0.175 ***	0.173 ***	0.126 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash_mejor	0.160 ***	0.167 ***	0.168 ***	0.126 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Pct_cash	0.181 ***	0.185 ***	0.185 ***	0.148 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Borrowing_broad	0.135 ***	0.129 ***	0.117 ***	0.119 ***
	(0.000)	(0.000)	(0.000)	(0.001)
Borrowing_narrow	0.060 **	0.051 **	0.049 **	0.092 ***
	(0.018)	(0.041)	(0.049)	(0.001)

Table 11: Financial hedging and borrowing costs

Panel A. Univariate comparison between derivatives users and non-users. This panel presents the univariate test results of acquirer borrowing cost proxy variables *Borrowing_cost*: is the value weighted average of the all-in-spread drawn, with value being the amount of each loan facility of an acquirer over a time period of three years prior to the deal announcement. Summary statistics of *Borrowing_cost* are reported for the full sample, derivatives users, and non-users. The derivatives users and non-users are defined by the financial hedging proxy variables: *Ird*, *Fcd*, and *Fcd*/*Ird*, respectively. The last column reports the difference between derivatives users and non-users, and the significance levels of the t-test on the difference. Detailed definitions of all variables can be found in Appendix A. Significance at the 0.01, 0.05, and 0.10 levels is indicated by ∗ ∗ ∗, ∗∗, and ∗.

	Full sample			Derivatives user			Non-user			Difference
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**t-test**
					Ird					
Borrowing_cost	1,038	121.470	102.401	609	110.766	107.808	429	136.666	92.204	-25.900***
					Fcd					
Borrowing_cost				501	88.734	88.049	537	152.011	105.448	-63.277***
					Ird/*Fcd*					
Borrowing_cost				738	109.356	103.698	300	151.271	92.784	-41.915***

Panel B. Borrowing cost two-stage regressions. This panel reports the coefficients of a two-stage IV regressions for our sample of M&As described in Table 1. In the first-stage regressions, the dependent variable is *Borrowing_cost*. The main explanatory variable is the acquirer hedging proxy variable Ird/Fcd. The dependent variables in the second-stage regressions are *Pure_cash*, *Pct_cash*, *Borrowing_broad*, and *Borrowing_narrow*. The independent variable of interest is the predicted borrowing cost (*Borrowing_cost*) from the first-stage regression. Year and Fama–French 10 industry fixed effects are controlled for all regressions. Detailed definitions of all variables can be found in Appendix A. The p-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	First-stage	**Second-stage**			
	Borrowing_cost	***Pure_cash***	***Pct_cash***	***Borrowing_broad***	***Borrowing_narrow***
	1	**2**	**3**	**4**	**5**
Ird/Fcd	-37.83***				
	(0.000)				
Borrowing_cost		-0.002**	-0.002**	-0.002*	-0.001
		(0.041)	(0.050)	(0.085)	(0.213)
Toehold	8.513	0.159*	0.081	-0.089	-0.060
	(0.608)	(0.066)	(0.298)	(0.284)	(0.496)
Hostile	-21.68	-0.124	-0.099	-0.246***	-0.156*
	(0.209)	(0.177)	(0.233)	(0.005)	(0.097)
Tender_offer	-12.77*	0.312***	0.361***	0.126***	0.294***
	(0.075)	(0.000)	(0.000)	(0.001)	(0.000)
Related_industry	8.733	-0.054	-0.016	0.023	0.057*
	(0.156)	(0.103)	(0.589)	(0.463)	(0.091)
Competition	0.186	0.082	0.111**	-0.279***	-0.086
	(0.986)	(0.149)	(0.031)	(0.000)	(0.141)
Relative_size	27.76***	-0.076**	-0.033	0.031	0.174***
	(0.000)	(0.044)	(0.338)	(0.394)	(0.000)
Size	-0.442***	-0.001*	-0.001**	-0.000	-0.002***
	(0.000)	(0.062)	(0.011)	(0.638)	(0.006)

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Table 11 Panel B – continued from previous page

	First-stage	Second-stage			
	Borrowing_cost	***Pure_cash***	***Pct_cash***	***Borrowing_broad***	***Borrowing_narrow***
	1	**2**	**3**	**4**	**5**
Tobin's Q	-9.600***	-0.029**	-0.032***	-0.002	-0.008
	(0.000)	(0.025)	(0.007)	(0.896)	(0.540)
Leverage	0.327*	0.001	0.001	0.001	-0.000
	(0.056)	(0.188)	(0.314)	(0.207)	(0.928)
Cashflow/Equity	25.38	0.228**	0.264**	0.109	0.213*
	(0.243)	(0.046)	(0.011)	(0.322)	(0.067)
Cash_holding	73.75***	0.349**	0.204	-0.391***	-0.356**
	(0.002)	(0.013)	(0.109)	(0.004)	(0.013)
Collateral	27.51	0.016	0.032	0.071	0.007
	(0.128)	(0.866)	(0.714)	(0.453)	(0.940)
Runup	29.87***	0.028	0.011	0.044	0.006
	(0.000)	(0.537)	(0.791)	(0.319)	(0.898)
Average_EPSSD	0.102	0.002**	0.002***	-0.002*	0.000
	(0.593)	(0.013)	(0.010)	(0.056)	(0.848)
Blockholder_ownership	60.59**	0.133	-0.072	-0.235*	-0.040
	(0.012)	(0.337)	(0.567)	(0.080)	(0.780)
Intercept	153.3***	0.637***	0.800***	1.030***	0.581***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	842	842	842	842	842
Adj/Pseudo R-squared	0.322	0.277	0.277	0.098	0.147