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Does Corporate Financial Risk Management Add Value? Evidence from Cross-Border Mergers and Acquisitions*

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Abstract

We study the effect of financial hedging on firm performance, using a sample of 1369 cross-border mergers and acquisitions (M&As) initiated by S&P 1500 firms between 2000 and 2014. Our results show that derivatives users have higher acquirer cumulative abnormal returns (CARs) around deal announcements than non-users, which translates into a $174.3 million shareholder gain for an average acquirer. The possible explanations of the CAR improvement are the lower stock return volatility and higher deal completion probability. Furthermore financial hedging can lower acquirers' waiting costs, offering longer time for acquirers to negotiate with targets. At last, these short-run improvements have a permanent effect on firm value such that derivatives users have better long-run performance than non-users after cross-border deal completion. Overall our findings provide new insights on a link between financial hedging and corporate investment decisions.

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1 Introduction

Active corporate risk management hedges firms' future uncertainty and reduces the probability of negative realizations. Derivatives have become increasingly important corporate financial hedging instruments over the past three decades. The 1998 Wharton survey of financial risk management by U.S. non-financial firms (Bodnar et al., 1998) finds that 41.5% of respondents use foreign exchange (FX) and 38% firms use interest rate (IR) derivatives. The International Swaps Derivatives Association (ISDA) 2009 survey indicates that 94% of the world's 500 largest companies use derivatives to manage their business and financial risks, of which 88% use derivatives to manage FX risk. According to the statistics released by the Bank of International Settlements (BIS), the notional value of outstanding IR and FX derivatives held by global non-financial customers was $15.7 trillion and $9.1 trillion respectively at the end of June 2014.

Optimal hedging theories are based on the relaxation of Modigliani and Miller (1958)'s perfect market assumption and identify the incentives of non-financial firms to use derivatives by adding frictions such as: financial distress costs (Mayers and Clifford W. Smith, 1982), agency problems (Stulz, 1984), corporate convex tax functions (Smith and Stulz, 1985), external financing costs (Froot et al., 1993), information asymmetry (DeMarzo and Duffie, 1995) and corporate debt tax shield (Leland, 1998). Despite the theoretical evidence in support of corporate financial hedging, researchers find mixed empirical evidence of the link between financial hedging and firm value/risks (See, e.g., Guay, 1999; Hentschel and Kothari, 2001; Guay and Kothari, 2003; Jin and Jorion, 2006). There are very few extent studies that demonstrate the channels through which financial hedging affects corporate value. [1]

In this paper, we investigate whether corporate financial hedging affects firm value through studying cross-border M&As, an important corporate strategy. Thomson Reuters reports that global cross-border M&As reached its peak level of $1.8 trillion in 2007, ac-

[1] Campello et al. (2011) study the issue and find that corporate derivatives users receive more favorable financing terms in their loan agreements than non-users.

counting for 44.8% of overall M&A volume. After the global financial crisis, the value of global cross-border M&As hit the bottom in 2009 and then gradually recovered to $1.3 trillion in 2014, accounting for 36.9% overall M&A volume. For cross-border M&As, national borders bring extra elements to corporate financial risk management of domestic M&As because of different culture, geography, capital market development, accounting rules, regulations and currencies. An acquisition of a foreign target significantly changes the acquirer's financial risk exposures, so corporate risk management plays an important role in cross-border M&As.

As shown in Figure 1, we divide the timeline of M&A transactions into 3 time periods: pre-acquisition period (between the start of private negotiation and deal announcement), interim period (between deal announcement and completion), and post-acquisition period (after deal completion). An acquirer of a typical cross-border M&A encounters new financial risk exposures associated with the deal. During the pre-acquisition and the interim periods, an acquirer is exposed to new FX risk, because a foreign target's purchasing price is denominated in the target nation's currency. Also, if acquisitions require external financing, acquirers will be exposed to additional IR risk. Firms with an existing risk management program have better ability and lower costs to hedge payment risks associated with both FX and IR variations. Furthermore, acquirers engaging in financial hedging have lower external financing costs (Campello et al., 2011). Finally, derivatives users are more experienced than non-users in evaluating a target's existing financial risk exposure and how an acquisition affects the combined entity's risk exposure.

During the post-acquisition period, an acquirer needs to adjust its existing risk management strategy according to the target's risk exposure in the integration process. Firms with a sophisticated risk management program have better ability to deal with increased risk exposure in the integration process than those without financial hedging experience. After a deal completion, the acquirer's balance sheet FX risk exposure increases because the acquired assets are denominated in a foreign currency. It is reasonable to expect that an acquirer's cash flow FX risk exposure will increase in the future, if the purpose of the

cross-border acquisition is not to hedge the acquirer's existing FX risk.

In general, firms with a risk management program in place have lower cost and better ability to hedge new risk exposures associated with cross-border M&As than non-users. And the information of financial hedging sends a positive signal to investors about the ability of an acquirer's management team, which reduces the information asymmetry problem. Last but not least, derivatives users pay lower interest spreads and have less capital expenditure restrictions in their loan agreements (Campello et al., 2011), suggesting lower external financing costs. For these reasons, we predict that financial derivatives users achieve better cross-border M&A outcomes than non-users.

Despite the fast growth of the corporate derivatives market, little empirical research studies corporate financial hedging after 2000 due to the change of accounting rules on disclosing derivatives information in firms' 10-K reports.[2] To shed light on the effectiveness of financial hedging in recent years, we study a sample of 1,369 cross-border M&As initiated by S&P 1500 firms between 2000 and 2014. S&P 1500 index covers 90% of the U.S. stock market capitalization and includes firms of various sizes (S&P 500 large cap, S&P 400 mid cap and S&P 600 small cap). For each deal, we hand collect the acquirer's derivatives information reported on its 10-K report prior to the corresponding deal announcement date, following the derivatives data collection procedure in Allayannis and Weston (2001) and Campello et al. (2011). These cross-border deals provide a near ideal laboratory to study the effect of corporate financial hedging on firm operation and investment outcomes because all acquirers are exposed to financial risk during the M&A process and the market reaction to deal announcements is not a choice variable of acquirers themselves. In Appendix B, we present a few statements selected from acquirers' 10-K reports. These statements provide direct evidence that financial derivatives have been used by acquirers to actively manage the financial risks associated with cross-border M&As.

Our empirical results show that financial derivatives users have better deal performance than non-users during cross-border M&As. The effect is economically significant.

[2]Please refer to Appendix A for further discussion on the changes of accounting rules.

For example, financial hedging is associated with an average 0.9% improvement in acquirer CARs around the deal announcement, which is equivalent to an increase of $174.3 million shareholder value for a mean-sized acquirer. We also find that the possible explanations of the CAR improvement are lower acquirer's stock return volatility, higher deal completion probability and longer deal completion time. At first, consistent with the classic hedging theory that financial derivatives reduce users' future uncertainty, we find that both total risk and idiosyncratic risk are lower for derivatives users than non-users around deal announcements. Besides the realized volatility, the implied volatility of at-the-money options written on acquirers' stocks at the deal announcements is also lower for derivatives users than non-users. Secondly, consistent with the information asymmetry theory (DeMarzo and Duffie, 1995), an existing financial hedging program signals the higher ability of an acquirer's management team. Our results indicate that deals initiated by firms with financial hedging experience have a higher probability to be completed than firms without such experience. Thirdly, because derivatives users can hedge payment risks during pre-acquisition and interim periods, they have a lower cost of waiting than non-users. Consistent with Offenberg and Pirinsky (2015) that a deal's completion time is determined by the trade-off between costs and benefits of waiting, we find that it takes derivatives users an average of 22.8 days more to complete a cross-border deal than non-users. Acquirers with financial hedging experience can afford to take more time to evaluate and negotiate deal terms. We also check whether these short-run improvements are reflected in acquirers' long-run performance and find that derivatives users have better long-term operating and stock performance than non-users after the deals.

In robustness tests, we mitigate the concern of "treatment effect" that derivatives users differ from non-users in their M&A announcement outcomes for reasons other than using derivatives per se. Specifically, we use an endogenous treatment effect model with two-step consistent estimates (Wooldridge, 2010). Geczy et al. (1997) find that the use of commodity derivatives, the R&D expenses over total sales ratio, the number of analysts following a firm and the foreign sales over total sales ratio can explain why firms use foreign

currency derivatives. Therefore, we use these four variables as instrumental variables in the first step probit regression to predict the use of foreign currency derivatives (Fcd) and interest rate derivatives (Ird). Our results are robust after controlling for the treatment effect.

We also examine how the volatility of U.S. dollar exchange rates affects our results. We find that financial hedging has a significantly (insignificantly) positive effect on acquirer abnormal returns in the high (low) U.S. dollar index volatility sample, suggesting that the benefits of financial hedging increase with deal risks.

Our study provides novel evidence on a link between corporate financial hedging and cross-border M&As. We make important contributions to both the financial hedging and M&A literature. First, we demonstrate if and how corporate financial hedging affects firm value over a sample period which has not been studied in the corporate hedging literature. Secondly, unlike the previous hedging literature that focuses on Tobin's Q, this is the first paper that studies market reaction to corporate financial hedging based on the event study method. Thirdly, our sample selection process naturally excludes firms without ex ante FX exposures so that we avoid the concern that firms without ex ante FX exposures choose not to hedge at all. And the causal effect and endogeneity issue are minimized in our studies because the market reaction is not a firm choice variable. Finally, our findings have important implications for firm managers to evaluate and manage financial risks associated with cross-border M&As. Previous literature indicates that interim risk and information asymmetry increase with the growth of market level volatility. We justify the importance of corporate financial hedging and suggest that financial hedging is an active and effective way to manage financial risks associated with cross-border M&As.

The paper proceeds as follows. Section 2 reviews the related literature. Section 3 develops hypotheses. Section 4 describes the data sample, variable definitions and summary statistics. Section 5 presents our main empirical results and Section 6 reports robustness checks. Section 7 concludes the paper.

2 Related literature

2.1 Financial hedging and firm value

Corporate managers believe that financial hedging adds firm value because derivatives have been used extensively by non-financial firms. It is also a commonly held view by academics that corporate financial hedging in general helps firms in managing risks efficiently and increasing firm value. In March 2004, ISDA conducted a survey of finance professors at the top 50 business schools worldwide to investigate their opinions on corporate financial hedging, as well as the impact of derivatives on the global financial system. A total of 84 professors from 42 institutions provided responses. When asked to rate the statement "Managing financial risk more effectively is a way for companies to build shareholder value," 44% strongly agreed, 47% agreed, 7% somewhat agreed, and only 2% somewhat disagreed. When asked whether "Derivatives help companies manage financial risk more efficiently," 49% strongly agreed, 43% agreed, 8% somewhat agreed, and no participant disagreed with the statement. Despite the widespread use of financial derivatives among U.S. firms, there has been limited understanding on the impact of financial hedging on firm performance and value. There is even less evidence on the implication of financial hedging on firms' operation and investment strategies.

Theoretically, financial hedging is beneficial to corporations only when certain frictions are introduced into the classic model of Modigliani and Miller (1958). Froot et al. (1993) suggest that financial hedging can mitigate the underinvestment problem by reducing firms' future cash flow uncertainty and external financing costs. Cross-border M&A is a special type of global investment strategies. It is associated with great cash flow uncertainty and may require external financing. DeMarzo and Duffie (1995) show that financial hedging is optimal when managers have private information on firm's expected profits, and investors may assess managers' abilities more precisely based on derivatives using information. In cross-border M&As, managers of acquiring firms usually have superior information on the deals to external investors, which offers more incentives for acquirers

to hedge. Any disclosed data about corporate use of derivatives can further alleviate the information asymmetry problem associated with cross-border M&As.

A recent strand of empirical literature studies derivatives data disclosed in firms' 10-K reports and finds mixed evidence on the effectiveness of corporate financial hedging. Allayannis et al. (2001), Carter et al. (2006), and Mackay and Moeller (2007) investigate U.S. firms and find that the financial hedging premium is between 5% and 10% of firm value. Using international data, Bartram et al. (2011) find strong evidence that financial hedging reduces firms' total risk and systematic risk. On the other hand, Jin and Jorion (2006) find that financial hedging has no significant effect on the market value of U.S. oil and gas producers. Similarly, Brown et al. (2006) find that selective hedging does not lead to better operating or financial performance among U.S. gold mining firms. Most of these studies use Tobin's Q as a proxy for firm value. Our paper offers a new insight on corporate financial hedging by directly studying the hedging effect on cross-border M&A outcomes such as: acquirer CARs, stock return volatility, deal completion probability, deal completion time and long-run performance.

Our paper is also related to previous literature on the FX sensitivity of a firm's share price (See, e.g., Jorion, 1990; Bartov et al., 1996; Pritamani et al., 2004). Martin et al. (1999) study the foreign exchange sensitivity of 168 U.S. multinational firms with foreign operation in Europe and find that 16% of the firms exhibit FX sensitivity, which is determined by the imbalance between foreign cash inflows and outflows, as well as percentage of foreign sales. Allayannis and Lhrig (2001) examine the FX exposures of 18 U.S. manufacturing industry groups. They find that these groups exhibit significant foreign exchange sensitivity and there is a strong relationship between foreign exchange sensitivity and industry markups. On the other hand, prior studies report that for firms with little foreign operation or sales, only a small percentage of them exhibit significant FX exposure (See, e.g., Chow et al., 1997). Our paper studies cross-border M&As initiated by S&P 1500 firms. This sample naturally excludes firms without ex ante foreign exchange exposure and mitigates the selection bias concern that firms without ex ante risk exposure

choose not to hedge.

To better understand the relationship between financial hedging and firm value, two questions need to be answered. First, does the use of derivatives alone account for the value premium, or is financial hedging a signal for some unobservable factors that drive corporate success? Guay and Kothari (2003) conclude that corporate derivatives positions in general are far too small to account for the valuation premium observed by Allayannis et al. (2001). Pérez-González and Yun (2013) use the innovation of weather derivatives as a natural experiment and find that the introduction of weather derivatives in the market leads to higher hedger firm value, investments and leverage. In this paper, we use event study method and acquirer CARs around deal announcements as a proxy for the hedging premium. The endogeneity and simultaneity concerns are minimized in our tests because CARs are the market reaction to deals, not a firm-choice variable. We also use treatment effect model to further test the robustness of our results and further mitigate the endogeneity issue.

Secondly, if financial hedging does improve firm value, it would be important to answer the question how does a firm's hedging strategy lead to higher valuation. Campello et al. (2011) find that derivatives users receive more favorable financing terms in their loan agreements than non-users. Our paper contributes to this finding and provides evidence that derivatives users have lower stock return volatility around cross-border M&A announcements and a higher probability of deal completion. Furthermore, we show that derivatives users can afford to take longer time to complete a cross-border M&A deal. According to Offenberg and Pirinsky (2015), deal completion time is the result of a trade-off between the benefits and costs of waiting. Our results suggest that financial hedging can reduce the cost of waiting during deal negotiation periods, offering more time for acquirers to negotiate better deal terms.

2.2 Financial hedging and M&As

To the best of our knowledge, this is the first paper that studies corporate financial hedging outcomes using the event study method. M&As are important corporate events that have a huge impact on acquirers' future operation and growth. Moeller and Schlingemann (2005) indicate that cross-border M&As could increase acquirers' foreign currency exposure which should be incorporated in market reaction to the deals. They find that cross-border acquirers have worse stock and operating performance than acquirers of domestic deals, due to agency problems, differences in law, and hubris. Lin et al. (2009) find that because financial derivatives users suffer less information asymmetry than non-users, they tend to have better long-run stock performance than non-users after cross-border M&As. Our paper contributes to the M&A literature by comprehensively investigating the effect of financial hedging on cross-border acquirers' performance, such as the market reaction to the deal, the acquirer stock volatility, the probability of the deal completion, the time to complete the deal as well as the acquirer's long-run performance.

Our paper is also related to the growing literature that studies the uncertainty and risks associated with M&As. For example, Duchin and Schmidt (2013) find that the acquisitions initiated during U.S. merger waves have higher level of uncertainty and information asymmetry than those occurring out of merger waves, leading to worse deal outcomes. Bhagwat et al. (2014) suggest that M&A deal activities decrease when stock market volatility increases, because higher interim risks during high market volatility periods make deals less attractive to both potential acquirers and targets. Bhagwat and Dam (2014) provide evidence that bidders bear more interim risk than targets. These studies focus on the effect of market level uncertainty on M&As, while our paper investigates on the uncertainty of the deal itself. Furthermore these studies indicate the importance of M&A uncertainty to deal outcomes, but little is known about how acquirers can improve deal performance by actively managing the deal related risk.

Ahern and Sosyura (2014) document that acquirers can improve their stock performance after deal announcements by strategically managing media coverage during the

pre-acquisition period. But the improvement of stock performance is only temporary because neither the nature of the deal nor the acquirer's characteristics have been changed. Our paper provides evidence that acquirers can improve both short-run and long-run deal performance by actively hedging the deal's financial risks.

It is worth noting that some studies take M&As (See, e.g., Amihud and Lev, 1981; Hankins, 2011; Garfinkel and Hankins, 2011) as an operational hedging activity. Garfinkel and Hankins (2011) find that acquirers undertake vertical acquisitions to reduce their cash flow uncertainty, which contributes to the start of merger waves. Hankins (2011) and Froot et al. (1993) argue that corporate financial hedging may not be effective because of the incompleteness and short-term property of financial derivative contracts. In this paper, we support the view that financial hedging does add firm value. M&As are of great uncertainty to acquirers and the stock market reaction to deal announcements could have a huge impact on acquirers' market valuation. This is especially important for cross-border M&As in which the target's currency is different from the acquirer's. Both cash flow and balance sheet risk associated with cross-border M&A deals are major concerns to acquirers. According to the survey study by Bodnar et al. (1998), foreign currency derivatives are the most commonly used financial risk management approach and with 83% of the derivative-users use them. The survey also shows that balance sheet commitments and anticipated transactions are the top two motivations for U.S. corporations to use foreign currency derivatives. And because a large range of M&A acquirers undertake loans for deal payments, we believe that the use of interest rate derivatives could also contribute to the risk management of cross-border M&As.

3 Hypotheses and empirical predictions

Previous empirical studies have no consensus as to whether corporate financial hedging actually adds value. Recent literature has documented that the use of financial derivatives has a positive effect on firms' outcomes, such as Tobin's Q, long-run performance,

external debt financing costs, total risk and systematic risk (See, e.g., Allayannis and Weston, 2001; Lin et al., 2009; Campello et al., 2011; Bartram et al., 2011). However, two concerns remain on these findings. Firstly, it is difficult to reject the reverse causal explanation that firms with these better outcomes choose to use financial derivatives for hedging purposes. Secondly, financial hedging decisions are determined by firms' ex ante risk exposures and are correlated with other firm characteristics such as size and leverage.

To mitigate these two concerns, we investigate U.S. firms' cross-border M&As and exploit different deal outcomes between financial derivatives users and non-users. A firm that engages in a cross-border M&A deal is naturally exposed to FX risk, because the target's asset is denominated in foreign currency and the acquirer will get involved in foreign operations after the deal completion. The market reaction to cross-border M&A announcement is neither a firm characteristic nor a firm choice variable. Using the standard event study approach in the M&A literature, we develop and test five hypotheses.

Figure 1 shows three time periods of a M&A process. Firms with existing risk management programs have higher ability and lower costs to evaluate the financial risks associated with potential cross-border M&As during the pre-acquisition period. The financial hedging experience helps acquirers making better decisions to choose foreign targets. During the interim period financial hedging can reduce the transaction risk, including FX risk exposure and IR risk exposure if external financing is needed. After the deal completion, an acquirer with hedging experience can do a better job to design risk management strategies for the combined entity in the integration process. During the post-acquisition period, an acquirer's balance-sheet FX risk exposures will increase, because the acquired assets and liabilities are denominated in the target nation's currency. An acquirer's FX risk exposures associated with future cash flows may also change. In some cases, an acquisition of a foreign target increases the acquirer's exposure to the target nation's currency. In the other cases, U.S. acquirers may purchase a foreign target as an economic/operational hedge on its existing FX risk, so that the acquirers' foreign currency cash flow risk exposure on the target's nation gets reduced in the future. Derivatives users can manage

these balance-sheet and possible cash flow FX risks better than non-users. Last but not least, the use of financial derivatives sends investors a positive signal of acquirers' financial risk management expertise and mitigates the information asymmetry problem between the acquirer and outside investors (DeMarzo and Duffie, 1995). For these reasons, we expect that acquirers engaging in financial hedging have higher CARs around cross-border M&A announcements than non-users.

- ***Hypothesis (H1):*** *Acquirer CARs around cross-border M&A announcements are higher for financial derivatives users than non-users.*

To support our first hypothesis, we further investigate the possible sources of CAR improvement. If acquirers with financial hedging experience actually hedge the risk exposures associated with their cross-border M&As, the stock return volatilities of derivatives users should be lower than those of non-users around deal announcements. Even if derivatives users choose not to hedge the specific risks associated with cross-border M&A, the information on their hedging experience still sends investors a positive signal about the ability of management teams and reduces the information asymmetry problem. Therefore, we predict that stock return volatilities around deal announcements are lower for financial derivatives users than non-users.

- ***Hypothesis (H2):*** *The stock return volatilities around cross-border M&A announcements are lower for financial derivatives users than non-users.*

Financial derivatives users have expertise in evaluating and managing the potential financial risks involved in cross-border M&A deals, leading to better decision making. Furthermore, when financial derivatives users choose to hedge the financial risk associated with cross-border M&A deals, they may have already made substantial investments in the acquisition process and are more committed to the deal than non-users. For these two reasons, we hypothesize that the hedging experience of acquirers increases the probability of successfully acquiring a foreign target.

- ***Hypothesis (H3):*** *Cross-border M&As carried out by derivatives users have a higher probability of completion than those carried out by non-users*

Offenberg and Pirinsky (2015) establish that M&A deal completion time is the result of a trade-off between the costs and benefits of waiting. Because both FX and IR risks increase with waiting tim, we hypothesize that financial hedging reduces the cost of waiting. Thus, hedgers can afford to take longer time to carefully review the transaction details and negotiate more favorable deal terms than non-users.

- ***Hypothesis (H4):*** *Financial derivatives users have longer completion time on cross-border M&As than non-users*

Previous literature indicates that financial hedging increases firm value in terms of Tobin's Q (See, e.g., Allayannis and Weston, 2001; Mackay and Moeller, 2007; Bartram et al., 2011). Because acquirers with financial hedging experience choose better targets, negotiate more favorable deal terms, do a better job at integration and suffer less information asymmetry, we expect that derivative users can achieve better long-term performance than non-users after cross-border M&As.

- ***Hypothesis (H5):*** *Financial derivatives users have better long-run performance than non-users after cross-border M&As.*

4 Sample selection and descriptive statistics

In this section, we discuss our sample selection process and sample characteristics.

4.1 Basic sample selection

Our data come from several different sources. We first select a sample of cross-border M&As from Thomson Reuters Securities Data Company (SDC) Platinum Mergers and Acquisitions database, following a list of restrictions:

1. The deal was announced between January 1, 2000 and December 31, 2014. We choose our time period after January 1, 2000, because the Standards Board's Statement of Financial Accounting Standard No. 133 (SFAS 133, "Accounting for Derivative Instruments and Hedging Activities") is effective for all fiscal years after 2000.[3]

2. The acquirer is a U.S. public listed company. And the target is a non-U.S. company.

3. The status of the deal is completed, withdrawn or pending[4].

4. We focus on deals that involve clear changes in control, so we exclude all transactions that are labelled as a minority stake purchase, acquisitions of remaining interest, privatizations, repurchases, exchange offers, self-tenders, recapitalizations or spinoffs.

5. The transaction value is at least $1 million.

6. The acquirer's market value is at least $20 million in the last twelve months.

7. The percent of target shares held by the acquirer should be less than 10% prior to transaction and at least 50% after transaction.

8. Following Allayannis and Weston (2001), we exclude deals with acquirers or targets from the finance industry because financial firms are also market makers and use financial derivatives for different motivations from non-financial firms. We also exclude deals with acquirers or targets from the utility industry because utility companies are heavily regulated.

These criteria result in an initial sample of 2,753 deals. We further set the restriction that acquirers were listed in the S&P 1500 when deals were announced.[5] This reduces

[3] http://www.fasb.org/summary/stsum133.shtml. For more detailed discussion, please refer to Appendix A.

[4] We keep all the deals that are pending for more than three years. We read through news from LexisNexis as well as company press to update the current status of the deal. If the deal has been completed, we classify it as completed. Otherwise we classify it as withdrawn.

[5] S&P 1500, or S&P Composite 1500 Index, is made by Standard & Poor's. The index combines all stocks in three leading indices: the S&P 500, the S&P MidCap 400 and the S&P SmallCap 600. It covers approximately 90% of the U.S. stock market capitalization. We restrict our sample within the S&P 1500 because some control variables, such as corporate governance, are only available for this sample.

our sample size to 1,577 deals and our sample firms are representative of the U.S public companies. Lastly, we link our sample to the Centre for Research in Securities Prices (CRSP) and Compustat. 1,385 cross-border M&As remain in our sample.

4.2 Financial hedging variables

For each of the 1,385 M&As, we hand collect the acquirer's financial derivative use data from the acquirer's 10-K or 10-K405 forms filled in the fiscal year preceding deal announcements. All forms are acquired from SEC's EDGAR electronic filing system. We require that an acquirer should have at least filed one 10-K or 10-K405 form when the deal was announced. Our final sample consists of 1,369 deals[6].

We search the following keywords in order to locate the information of financial derivatives: "Item 7A", "derivative", "derivative instrument", "hedg", "financial instrument", "swap", "futures", "forward contract", "forward exchange", "option contract", "risk management", "foreign currency", "currency exchange", "notional", "fair value", "commodity", "borrowing", "debt", "credit facilities", "line(s) of credit", "notes payable"[7]. When a key word is found, we read the surrounding text and hand-code our hedging variables.

We focus on the use of foreign currency derivatives (FCD) and interest rate derivatives (IRD) because they are directly related to cross-border M&A risk exposures. We also collect the use of foreign currency denominated debt and commodity derivatives for our empirical analysis. Following the corporate financial hedging literature (See, e.g., Allayannis and Weston, 2001; Allayannis and Ofek, 2001; Purnanandam, 2008; Campello et al., 2011), we define the following proxies for corporate financial hedging: 1) Fcd, a 0/1 binary variable indicating whether a firm hedges FX risk; 2) Fcd_target, a 0/1 binary variable indicating

[6]Following the international finance and cross-border M&A literature, we delete observations in which acquirer nations are Bermuda, Cayman Islands, Ecuador and Netherlands Antilles. Our results are robust if we include these observations in our sample.

[7]These keywords have been used in previous corporate financial hedging studies (See, e.g., Allayannis and Weston, 2001; Allayannis and Ofek, 2001; Graham and Rogers, 2002; Campello et al., 2011). Hedging activities are often reported in the Item 7A Quantitative and Qualitative Disclosures about Market Risk or in the Notes to Consolidated Financial Statements normally under the item name like "derivative" or "financial instrument".

whether a firm hedges the FX risk between U.S. dollar and the target nation's currency; 3) Ird, a 0/1 binary variable indicating whether a firm hedges IR risk; 4) Fcd/Ird, a 0/1 binary variable indicating whether a firms engages in financial hedging at all; 5) Hedging_intensity, a 0/1/2 categorical variable indicating whether a firms hedges FX and/or IR risks; 6) Nv_derivatives, national value of FX and IR derivatives, normalized by total assets; 7) Commodity, a 0/1 binary variable indicating whether a firm hedges commodity price risk; 8) Foreign_debt, a 0/1 binary variable indicating whether a firm issues debt denominated in foreign currency.[8]

4.3 Other control variables

For the final sample of 1,369 deals, we obtain institutional investor ownership data from the Thomson Reuters 13F database; corporate governance information from the Institutional Shareholder Services (ISS, formerly RiskMetrics); foreign sales information from Compustat Segments Files. For all 1,369 deals, we are able to find geographical segment information for 1,323 deals. Following Allayannis and Weston (2001), we assume that there are no foreign sales for the remaining 46 deal acquirers.[9]

4.4 Descriptive statistics

Figure 2 shows the distribution of our cross-border M&A sample by announcement year over the sample period 2000-2014. Consistent with Harford (2005), we find a merger wave pattern in our sample which is mainly driven by macro-economic and technological shocks. The total number of deals drops twice following the burst of the 2000 Dot-com bubble and the global financial crisis around 2008. There is a recent decrease in deal numbers in 2014 because all deals initiated recently and not yet completed are not included in our sample. The number of deals initiated by derivatives users (the red line) and non-users (the green line) exhibit a very similar time-series pattern as the total number of

[8]We supplement the foreign currency debt information using bond data from SDC's global new issues data set for the period between 01/2000 and 04/2012

[9]We also set the foreign sale as missing as a robustness test. All results remain unchanged.

deals. Figure 2 also shows the S&P1500 index annual return (multiply by 100) and the trade weighted U.S. dollar index level. The annual deal numbers are positively correlated with the S&P 1500 index return, supporting that merger activities are positively correlated with the valuation of the stock market (See, e.g., Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf et al., 2005). The trade weighted U.S. dollar index level suggests that the U.S. dollar gradually depreciates relatively to other world currencies during our sample period.

Panel A of Table 1 presents the distribution of cross-border M&As by target nation/region. Our sample includes 1,369 cross-border M&As from a total of 58 different nations and regions. The top five target nations are the UK (294), Canada (219), Germany (134), France (89) and Australia (57). There are a total of 14 target nations that have more than 20 announced deals and a total of 24 nations that have more than 10 announced deals.

Panel B of Table 1 presents the distribution of cross-border M&As by acquirers' Fama-French 10 industry classification, excluding the finance and utility industries. Business equipment, manufacturing, and healthcare are the top three industries in terms of M&A numbers, accounting for 74.6% of our sample observations. Other; Oil, Gas and Coal; and Consumer Durables are the three industry groups with the smallest number and account for 13% of the deals in our sample. Panel A and B shows that our sample includes targets from a wide range of countries/regions and U.S. acquirers are not significantly concentrated in a few industries.

Panel C of Table 1 presents summary statistics of the hedging variables. A detailed description of these hedging variables can be found in Table C1. Among the 1,369 M&A, 72.6%(994) of deal acquirers report holding either FCD or IRD in the fiscal year preceding the deal announcement. It is no longer mandatory for U.S. public firms to report the notional value of their derivative contracts after SFAS 133 became effective in 2000. However we find that among 994 deal acquirers engaging in financial hedging, 820 still report the notional value of their derivatives contracts. This indicates that most U.S. companies

voluntarily continue to report the notional value of their outstanding financial derivatives after SFAS 133 superseded SFAS 119. Among derivatives users, 865 (87.0%) use FCD and 591(59.5%) use IRD. 456 deal acquirers hold the target nation's currency derivatives in the fiscal year prior to the deal announcement.

Panel C also reports that 19.8% of deal acquirers hold commodity derivatives in the fiscal year prior to the deal, and 19.9% of deal acquirers have foreign currency-denominated debt outstanding prior to deal announcements. Foreign currency-denominated debts can hedge firms' long-term FX exposures and FCD are commonly used to hedge short-term and predictable FX exposures. Some studies also find that foreign debt issued for non-hedging motivation increases a firm's FX exposure, thus increasing the incentive to use FCD.

Panel D of Table 1 presents summary statistics for various deal and acquirer characteristics. Please refer to Table C1 for detailed variable definitions. We report the number of observations, mean and standard deviations of each variable for the full, derivatives user and non-user samples respectively. The last column presents the statistical significance of mean difference tests between the derivatives user and non-user sub-samples. In total, we have $1,276$ completed deals and 93 withdrawn deals. Deals initiated by derivatives users are less likely to be financed wholly or partially by equity. One explanation is that deals financed by equity tend to involve less cash payments and hence less FX/IR risks. We also find that although deals carried out by derivatives users have higher transaction value, the relative size is smaller for derivatives users than non-users. Another notable observation is that it takes derivatives users more time to complete a deal than non-users. For acquirer characteristics, hedgers are more likely to be associated with larger size, leverage; but smaller cash holding, institutional ownership, Runup and Sigma[10]. We don't find a significant difference of Tobin's Q between the user and non-user samples in the univariate test.

[10]Following Golubov et al. (2012), Runup is defined as the market adjusted buy-and-hold return of the acquirer's stock over (-205,-6) window, and Sigma is defined as the standard deviation of the acquirer's market-adjusted daily return over the same window. Other variable definitions are discussed in Table C1.

5 Empirical results

5.1 Financial hedging and announcement CARs

To examine the wealth effect of financial hedging on acquirers, we study acquirer CARs estimated by a market model with the CRSP value-weighted index. Following Golubov et al. (2014), the market model is estimated using at least 30 non-missing daily return data over the $(-300, -91)$ period prior to deal announcements.[11] Acquirers' CARs are measured over a window of (-5, +5), where day 0 is the deal announcement date.[12]

Table 2 reports the results of OLS regressions with robust standard errors for the 1,276 completed cross-border M&As. The dependent variables in all seven regressions are acquirer CARs around deal announcements. The key independent variables are corporate financial hedging proxy variables: the foreign currency derivatives user indicator (Fcd), the financial derivatives user indicator (Fcd/Ird), the hedging intensity indicator (Hedging_intensity) and the notional value of financial derivatives normalized by acquirers' total assets (NV_derivatives). We control for year, Fama and French 10 industry, and S&P Index (S&P500, S&P400 and S&P600) fixed effects in all regressions. The detailed definitions of all the variables can be found in Table C1 of Appendix C.

In the first four regressions, Fcd is the key independent variable measuring financial hedging. Regression 1 is a single independent variable regression on Fcd. Next we control for deal characteristics in Regression 2 and further add acquirer characteristics in Regression 3. Following Golubov et al. (2012), we also include acquirer stock run-up and the idiosyncratic volatility (Sigma) over the window (-205, -6) in Regression 3. In Regression 4, we add one more control variable: Foreign_debt. Foreign currency denominated debt is another risk management tool to hedge long-term FX risks (Kedia and Mozumdar, 2003). The coefficients for Fcd remain statistically significantly positive in all four regressions.

[11] We also estimate the market model following existing literature (See, e.g., Cai and Sevilir, 2012; Ishii and Xuan, 2014; Qiu et al., 2014) over the period of $(-260, -60)$, $(-200, -20)$ and $(-200, -60)$. All results are similar.

[12] The results are robust to alternative windows such as $(-3, +5)$ and $(-1, +5)$

These results show that cross-border M&A acquirers who engage in FX risk hedging have significantly higher announcement abnormal returns than non-hedgers. The CAR improvement is economically significant as well. Using Regression 4 as an example, FCD users have an average 0.9% improvement on acquirer CARs, equivalent to $ 174.3 million shareholder value for an average sized acquirer.

In Regression 5, we replace Fcd by Fcd/Ird, a broader indicator of financial hedging that includes interest rate derivatives users. The coefficient of Fcd/Ird remains statistically significantly positive. The same is true when we replace Fcd by Hedging_intensity in Regression 6 and NV_derivatives in Regression 7. Overall, we find that derivatives users experience significantly higher CARs than non-users in cross-border M&As, after controlling for various acquirer and deal characteristics. In addition, we find that acquirers with higher hedging intensity and more extensive hedging programs experience higher announcement returns when compared with those with lower hedging intensity and less extensive hedging programs and those without a hedging program.

5.2 Financial hedging and acquirer stock return volatility

Table 3 details the testing results of hypothesis (H2), which states that stock return volatilities around cross-border M&A announcements are lower for financial derivatives users than non-users. High stock return volatility creates more information asymmetry between managers and investors, leading to higher external financing costs and more uncertainty on payments if stock is a method of payment. We investigate both realized volatility around M&A announcements and implied volatility at M&A announcements.

5.2.1 Realized volatility

Panel A of Table 3 presents the univariate test results of realized volatility differences between the derivatives user sample and the non-user sample. We use both Fcd and Fcd/Ird as proxies for financial hedging. The acquirer's total risk is measured as the standard deviation of acquirer stock returns around cross-border M&A announcements.

The acquirer's idiosyncratic risk is measured as the standard deviation of the error term in a market model or a four factor model. The four factor model includes market, size, value and momentum factors. Both total risk and idiosyncratic risk are estimated over different windows.

Panel A first reports the mean and standard deviation of realized volatility variables for the derivatives user and non-user samples respectively, followed by a t-test and a Wilcoxon test on the differences between these two samples. Both tests show that, on average, total risk and idiosyncratic risk are statistically significantly higher for derivatives non-users than users. The results are robust for different time windows.

Following Duchin and Schmidt (2013), we conduct a robustness test for our results of Panel A. Panel B reports the regression results for total risk and idiosyncratic risk on hedging proxies. In all regressions we control for year and industry fixed effects. All coefficients for the two hedging proxies are statistically significantly negative, suggesting that hedgers have lower total risk and idiosyncratic risk than non-hedgers around cross-border M&A announcements.

5.2.2 Implied volatility

In this section we study the market's expectation of an acquirer's future stock volatility at the cross-border M&A announcement, namely implied volatility. Following Bargeron et al. (2009) and Duchin and Schmidt (2013), we collect acquirer's implied volatility data from the estimated volatility surface in the Option Metric database for at-the-money (ATM) options with time to maturity of 91, 60 and 30 days separately. Our implied volatility variable is calculated as the average implied volatility of ATM call and put options with the same time to maturity.

In Panel C of Table 3, we present univariate test results of implied volatility between the derivatives user and non-user samples by two different measures of financial hedging: Fcd and Fcd/Ird. The means and standard deviations of implied volatility are reported, followed by the t-test and Wilcoxon test statistics on the mean difference between two

samples. For both measures of financial hedging and all three time-to-maturities, the implied volatility is statistically significantly smaller at 1% level for acquirers with hedging experience. In Panel D of Table 3, we report the OLS regressions of implied volatility variables on Fcd or Fcd/Ird variables, controlling for year and industry fixed effects. All coefficients of hedging dummies are statistically significantly negative at the 1% level, consistent with our findings in Panel C.

In summary, both realized volatility and implied volatility for derivatives users are lower than non-users around M&A announcements, leading to lower deal risks and less information asymmetry. These results provide one possible explanation on the improvement of CARs which we documented in Section 5.1.

5.3 Financial hedging and the probability of deal completion

An acquirer encounters three types of deal-related financial risk exposures in a cross-border M&A: transaction exposure, operation exposure and translation exposure. An established financial hedging program can help acquirers to reduce these risk exposures. The probability of deal completion will increase with acquirers' hedging experience for three reasons: Firstly, hedging reduces post-merger stock return volatility for the shareholders of acquiring firms. As a result, they are willing to offer more competitive terms to the investors of the target firm in deal negotiations. Secondly, for deals involving stock payments, reduced post-merger acquirer risk exposures means that target shareholders also face less risky deal payment, making them more willing to give concessions in their negotiations with acquiring firms. Finally, because it is costly to establish hedging programs, a pre-established foreign currency hedging position for the target nation's currency signals the acquirer's commitment to close the deal.

Columns 1-4 of Table 4 report the results of the probit regressions of deal completion probability on three measures of the acquirer's financial hedging activities: Fcd, Fcd/Ird and Fcd_target. In the first two regressions, the coefficients of the financial hedging variables (Fcd and Fcd/Ird) are not statistically significant. In columns 3 and 4, Fcd_target is

used as the hedging proxy. We find that if an acquirer holds the target nation's currency derivative contracts prior to the deal announcement, the probability of deal completion is significantly higher. This result is robust when a logit model is estimated with the same control variables, which is presented in column 5.

Apart from the impact of the hedging policy, we find that a deal is more likely to be successful when the target is a non-public rather than a public firm. One possible explanation is that the voting process for private companies is less complicated than public companies and shares of private firms are more concentrated than public firms (Golubov et al., 2012). We also find that acquirers with better governance mechanisms exhibit stronger abilities to get their deals closed. Consistent with Golubov et al. (2012), we find a positive effect of tender offers on deal completion probability while a negative effect of hostile deals and sigma value.

5.4 Financial hedging and deal completion time

As discussed in Section 3, the use of FCD and IRD could reduce acquirer's risks exposure during the interim period. According to the trade-off model developed by Offenberg and Pirinsky (2015), acquirers with financial hedging programs have lower waiting costs during the interim period. In other words, because of the reduced FX risk and IR risk in the interim period, acquirers with financial hedging programs have less incentive to close the deal quickly due to the concern on financial risk. Therefore they can spend a longer time on evaluating targets and negotiating better deal terms. What is more, because of the more deliberate negotiation and consideration, the long-term performance of those deals may get better, which we will investigate in the next step.

Table 5 reports the test results of the impact of the acquirer's financial hedging characteristics on its deal completion time. The dependent variable is Completion_time, which is defined as the number of calendar days between the deal announcement and deal completion reported by Thomson Financial SDC. The univariate test results are reported in Panel A. On average financial derivatives users close a deal 69 days after the deal announce-

ment, while non-users close a deal 54 days after the deal announcement. The differences of average completion time between the user and non-user samples are statistically significant. Panel B presents the tobit regression analysis[13] of the completion time on hedging variables, controlling for various acquirer and deal characteristics. Consistent with the univariate test, we find that the coefficients of hedging variables are all statistically significantly positive, suggesting that it takes derivatives users longer to close cross-border M&As than non-users. For example, it takes firms with FX or IR hedging experience 23 more days to complete a cross-border M&A than firms without hedging experience at all.

5.5 Financial hedging and long-term performance

The above findings suggest that financial hedging helps acquirers to evaluate foreign targets, negotiate favorable deal terms and manage the financial risk of the combined entity. To test whether these benefits can be capitalized in firms' long-term performance, Section 5.5.1 studies whether the long-term operating performance of cross-border M&As initiated by derivatives users differs from that of non-users. In Section 5.5.2, we further compare the long-term stock performance of cross-border M&As between derivatives user and non-user.

5.5.1 Long-term operating performance

Following Huson et al. (2004) and Guercio et al. (2008), we compute changes of operating return on assets ($\triangle ROA$) to measure acquirer post-merger long-term performance. ROA is defined as the ratio of operating income to the book value of total assets. Following Barber and Lyon (1996), we adjust ROA for the median ROA of a control group of firms that are from the same industry (2-digit SIC code) and have similar prior operating performance ($\pm 10\%$ ROA) in the fiscal year preceding the deal announcement.[14] This method

[13] In our cross-border M&A sample, some deals have completion time of 1 day. The tobit regression adjusts for the left-censoring observations at 1.

[14] When the above criteria yield no firms in the control group, we relax the same 2-digit SIC code requirement to the same 1-digit SIC code or further remove the industry requirement completely. If we still cannot find any firms in the control group, we choose the firm with the closest ROA in the fiscal year preceding the deal announcement.

controls for mean reversion in accounting performance of firms experiencing substantial corporate event or extreme performance.

We use two hedging measures (Fcd and Fcd/Ird) to identify an acquirer's hedging program. And for each hedging measure, we calculate $\triangle ROA$ over three, four and five years after deal announcements. The test results are detailed in Panel A of Table 6. The average changes of $\triangle ROA$ for derivatives users are all positive for both hedging measures over three different time windows, while the results for non-users are all negative. The differences of $\triangle ROA$ between the two sub-samples are mostly significant for both the t-test and the Wilcoxon test. The results suggest that acquirers with hedging programs tend to have better long-term post-deal operating performance than acquirers without such hedging programs.

5.5.2 Long-term stock performance

Besides the long-term operating performance, we also study acquirer post-deal long-term stock performance. As noted by Kothari in Handbook of Corporate Finance (Eckbo, 2007), risk adjustment is critically important in accessing the long-term performance of event studies. The key is that risk should be estimated based on the stock performance after the event. We calculate buy-and-hold abnormal stock returns as the measure of long-term stock performance. We use the control-firm method in order to reduce biases resulting from new listing, rebalancing and skewness (Barber and Lyon, 1997). Following Barber and Lyon (1997) and Lyon et al. (1999), we choose the stock return of a firm with similar size and book-to-market ratio as the benchmark. However, as pointed out by Duchin and Schmidt (2013), one of the major concerns on long-term event studies is the clustering of merger activities at the industry level, which could result in biased testing results if we assume the independence of stock returns across different firms. To mitigate this concern, we require benchmark firms to be in the same industry as the acquirers. In summary, we match each acquirer with a firm from the same industry (2-digit SIC code), similar size ($\pm 10\%$) and nearest book-to-market ratio.

Panel B of Table 6 presents the results of OLS regressions with robust standard errors. The dependent variables are the buy-and-hold abnormal returns (BHAR) of acquirers over three, four and five years respectively after deal announcements. We use three measures to identify acquirers' hedging programs: Fcd, Fcd/Ird and Hedging_intensity. After controlling for various acquirer and deal characteristics, the coefficients of the three hedging measures are all statistically significantly positive. Our results show that financial hedging improves an acquirer's long term stock performance after cross-border M&As and the impact is more pronounced for acquirers with broader financial hedging programs.

Overall, results in Table 6 support that financial hedging improves an acquirer's long term operating and stock performance after cross-border M&As. This positive impact is more pronounced for acquirers' with broader hedging programs. Our finding is consistent with the view that a financial hedging program could effectively hedge away part of the FX and IR risks involved in the cross-border M&A deals, resulting in an improvement of the long term post-deal performance. Our findings in Section 5.4 also demonstrate that acquirers with financial hedging program spend more time on negotiating more favourable deal terms, leading to better long-term post-deal performance.

6 Robustness tests and discussions

6.1 Treatment effect

In Section 5.1, we document that financial hedging has a positive effect on acquirer CARs. One question still remains: Assuming that the rest of the regression model is correctly specified, do the coefficients of hedging dummies actually measure the value of corporate financial hedging? The answer is no if the typical acquirer who chooses to use financial derivatives would have higher CARs whether it engages in financial hedging or not. This self-section problem has been defined as the treatment effect in previous literature (See, e.g., Greene, 2007). We address this concern by using a linear regression model augmented with an endogenous binary-treatment variable. The estimation is conducted

by a two-step consistent estimator (See, e.g., Wooldridge, 2010). Geczy et al. (1997) find that the use of other derivatives, the number of following financial analyst firms, the R&D expenses and foreign sales are all positively correlated with the likelihood that a firm uses currency derivatives. Therefore, we use Commodity, Analyst_number, RD and Foreign_sales/assets as the instrument variables in the first step treatment equation.

Table 7 presents the regression results of our treatment effect model. In the first step treatment regressions, we use probit models in which the dependent variables are hedging indicator variables: Fcd and Fcd/Ird. The coefficients of Commodity and Foreign_sales/assets are statistically significantly positive, while the coefficients of Analyst_number and RD are statistically insignificant. In the second step outcome equations, the dependent variables are acquirer CARs. We find that the coefficients of Fcd and Fcd/Ird remain statistically significantly positive. Thus our findings that derivatives users have better CARs than non-users are robust after controlling for the treatment effect.

6.2 Currency volatility and announcement returns

In the neoclassical theory framework, M&As are efficiency-improving reactions to various macroeconomic and industry shocks. The earliest study in this area can be traced to Wooldridge (1959), who documents different merger frequencies in different industries. Similar studies on various types of shocks have been proposed more recently, such as deregulation (See, e.g., Mitchell and Mulherin, 1996; Ovtchinnikov, 2013), technological innovation (Coase, 1937), supply changes (Jensen, 1993), economic conditions (Andrade et al., 2001), capital liquidity (Harford, 2005) and agency problems (Martynova and Renneboog, 2008). Among them, the stock market valuation is one of the most important factors that impact merger activities. Shleifer and Vishny (2003), Rhodes-Kropf and Viswanathan (2004) and Rhodes-Kropf et al. (2005) show that acquisitions are driven by overvaluation of acquiring firms who use their overvalued stock to purchase targets. Apart from the stock valuation, the stock market volatility is also critically influential on merger activities. Bhagwat et al. (2014) finds that higher stock uncertainty could impede M&A activities.

They argue that high volatility will reduce deal profitability, as well as increase the cost of the renegotiation and restrict the legal back-out abilities of acquirers, all of which make the deal less attractive to both acquirers and targets. In this section, we study the impact of currency volatility on the relationship between acquirer CARs and hedging proxy variables.

High currency volatility can result in dramatic variations of the actual offer price in U.S. dollars during the interim period, which could be a potential uncertainty for the acquirers in cross-border M&As. High currency volatility not only increases the acquirer's payment risk during the interim period, but also increases its following cash flow risks and balance sheet risks. So overall, high currency volatility is an unfavorable market condition for cross-border acquirers.

Table 8 presents OLS regressions of acquirer CARs on three different measures of the acquirer's hedging program over high currency volatility and low currency volatility periods. In columns 1-6, we use standard deviations of 12 monthly trade weighted US dollar index returns before deal announcements as the measure of foreign currency movement. In column 7-12, we use standard deviations of 12 monthly returns of exchange rates between USD and target nation's currency before deal announcements as the measure of foreign currency movement. As shown in Table 8, the coefficients for all financial hedging measures are statistically significantly positive when the deals follow a period of high currency volatility, but the coefficients become positive yet statistically insignificant when the deals follow a period of low currency volatility. These results show that during high currency volatility periods, acquirers with foreign currency or financial hedging programs perform better than those without such programs. And this hedging benefit is not significant when the exchange rate volatility is low.

6.3 Other hedging methods

Besides hedging with financial derivatives, "natural hedging" and operational hedging are also popular ways of reducing foreign currency risks in non-financial firms. "Natural hedging" means that a firm finances an international operation in the local nation's cur-

rency. It is commonly used by firms with long-term and unpredictable foreign currency risk exposures. In all our regressions, we include foreign currency denominated debt as a control variable and the coefficients of our hedging proxies are still statistically significant. Because a portion of risk exposures associated with a cross-border M&A is in the near future and with a predictable amount, our findings suggest that it is beneficial for acquirers to hedge these risks with financial derivatives.

Operational hedging means that a firm relocates its production facilities in order to match its costs and revenues in the same local nation's currency. Hankins (2011) finds that M&As within U.S. financial industry provide operational hedging by reducing the volatility of the combined entity's operational income. It is possible that some of cross-border M&As in our sample are operational hedging activities of acquirers. However, this possibility will only make our findings more significant because it has an opposite effect on the coefficients of the financial hedging indicator variables in our regressions. Derivatives users can hedge foreign currency risks in the first place, while non-users cannot manage foreign currency risks without operational hedging. Everything else to be equal, if a cross-border M&A is an operational hedging activity, it should have a lower marginal benefit effect on derivatives users than non-users. Even though cross-border M&As may serve as an operational hedging purpose and operational hedging may be a substitute for financial hedging, we still find that financial hedging significantly improves acquirer CARs at deal announcements.

7 Summary and conclusions

Corporate financial hedging reduces the uncertainty of a firm's predictable future activities. While foreign currency and interest rate derivatives have played an increasingly important role in corporate risk management, so far there is little direct evidence on how financial hedging affects a firm's value, other than Tobin's Q. In this paper, we investigate the role of financial hedging in cross-border M&As. Using hand-collected derivatives

data, we find evidence that acquirers with financial hedging programs experience better market reaction (CARs) to cross-border M&A announcements than acquirers without such programs. Furthermore, we show that financial hedging leads to lower acquirer stock volatilities around deal announcements, a higher deal completion probability and longer completion time. These short-run improvements are not just temporary and reflected in acquirers' long-run performance as well. Our findings are consistent with theories that financial hedging limits the negative realizations of future outcomes, and therefore leads to lower external financing costs, waiting costs and information asymmetry.

We overcome several challenges in empirical studies on corporate hedging. At first, the causal effect of hedging on firm value (Tobin's Q) is not a concern in this paper, because we use an event study method and the market reaction to cross-border M&As is not a firm choice variable. Secondly, the selection bias concern that firms do not have ex ante risk exposures choose not to hedge is minimized in our paper, because firms engage in cross-border M&As have FX exposure either ex ante or at deal announcements. Thirdly, we provide direct evidence that hedging improves the firm activities such as deal completion probability, which has not been discussed in the previous literature.

Our findings provide corporate managers a rationale for financial hedging that hedging programs are valued positively by stock market investors and economically significant value is created in cross-border M&As. Our paper also has an important implication for investors and financial analysts that the financial hedging data disclosed in firms' 10-K reports is valuable information when studying the market reaction to firm's investment activities.

Appendix A

This appendix discuss the Statements of Financial Accounting Standard (SFAS) and our sample period selection.

Published in 1990, Statement of Financial Accounting Standards (SFAS) 105 represents the first step taken by Financial Accounting Standards Board (FASB) to regulate the reporting on financial instruments and off-balance-sheet financing. It requires the disclosure of the notional principal amount of the financial instruments, the nature and terms of the instruments, the potential accounting loss as well as concentrations of credit risk from counterparties. FASB further improved the disclosure standard by publishing SFAS 107 in the following year, which requires all entities to disclose the fair value of financial instruments, both assets and liabilities, in addition to the disclosure required by SFAS 105. In 1994, FASB published SFAS 119, which amends SFAS 105 and 107 to further require the disclosure of financial instruments by class, business activity, and risk. It also requires the entities to make a distinction between financial instruments held for trading purpose or hedging purpose.

Because of the complexity of the issues about how financial instruments and transactions should be recognized and measured, FASB revised disclosure standards about financial instruments in SFAS 133, published in 1998. SFAS 133 supersedes SFAS 105, 107 and 109 to establish accounting and reporting standards for derivative instruments. It requires that an entity recognize all derivatives as either assets or liabilities in the statement of financial position and measure those instruments at fair value. In developing SFAS 133, the Financial Standards Accounting Board concludes that **fair value** is the most relevant measure for **financial instruments** and the only relevant measure for derivative instruments. Under SFAS 133, if certain conditions are met, a derivative may be specifically designated as (a) a hedge of the exposure to changes in the fair value of a recognized asset or liability or an unrecognized firm commitment, (b) a hedge of the exposure to variable cash flows of a forecasted transaction, or (c) a hedge of the foreign currency exposure of a net investment in a foreign operation, an unrecognized firm commitment. SFAS 133 standardizes the accounting for derivatives instruments and improves the transparency of hedging activity disclosure by all firms. To take advantage of improved derivative instrument disclosure practice adopted by all firms after the publication of SFAS 133, we select our sample period to start from 2000, the first year when SFAS 133 becomes effective.

The introduction of SFAS 133 has generated intense academic debate over how derivatives accounting affects corporate risk management strategies. Because SFAS 133 increases the disclosure transparency of financial hedging, it may encourage prudent risk management. On the other hand, fair value measurement may leads to more volatile short-term earnings of firms and therefore deters corporate financial hedging activities. Despite the debate, few corporate hedging studies have their sample spanned over the post-2000 period. For example, Campello et al. (2011) warns against the use of information reported under SFAS 133 in studies on firm hedging. Because fair value of financial instruments depends on movements of underlying asset prices and cannot be appropriately used as a proxy for hedging intensity.

To take advantage of improved derivative instrument disclosure practice adopted by all firms after the publication of SFAS 133, we select our sample period to start from 2000, the first year when SFAS 133 becomes effective. However, we mainly focus on derivatives use indicator dummies because notional values of FCD and IRD are not reported for all the derivatives users in our sample. We do find that 82.5% of hedgers still report the notional value of their outstanding financial instruments.

Appendix B

This appendix list examples of cross-border M&A deals in which U.S acquirers use financial derivatives to hedge the future risks associated with the deals. Deal numbers are listed before colons.

1815015040: Jabil Circuit Inc announced to acquire Taiwan Green Point Enterprises (Taiwan, New Taiwan Dollar) in 11/22/2006. ".....We entered into several individual Taiwanese dollar foreign currency swap arrangements in connection with our tender offer for Taiwan Green Point Enterprises Co., Ltd. (Green Point). These New Taiwan dollar foreign currency swap arrangements had a notional value of 18.4 billion New Taiwan dollars as of March 31, 2007 (approximately $557.7 million based on currency exchange rates at March 31, 2007) and the related non-deliverable forward contracts had a notional value of 10.0 billion New Taiwan dollars as of March 31, 2007 (approximately $302.5 million based on currency exchange rates at March 31, 2007). ....."

1620024040: Integra LifeSciences Holdings Corp announced to acquire Newdeal Technologies SA (France, Euro) in 11/18/2004. ".....In November 2004, we entered into a collar contract that expired on January 3, 2005 for 38.5 million euros to reduce our exposure to fluctuations in the exchange rate between the euro and the US dollar as a result of our commitment to acquire Newdeal in January 2005 for 38.5 million euros....The foreign currency collar expired in January 2005, concurrent with our acquisition of Newdeal Technologies. ....."

2223421040: CSG Systems International Inc. announced to acquire Intec Telecom Systems PLC (UK, Pound Stering) in 09/24/2010. "..... In September 2010, we entered into a pound sterling call/U.S. dollar put (the "Currency Option") at a strike price of 1.62 in conjunction with the Intec Acquisition to limit our exposure to adverse movements in the exchange rate between the two currencies leading up to the expected closing date. Upon the approval of the acquisition by Intec's shareholders in November 2010, we sold the Currency Option, and entered into a forward contract for the delivery of approximately 240 million pounds sterling (which included estimated Intec Acquisition costs at that time) at an exchange rate of approximately 1.61 (the "Currency Forward"). During December 2010, as part of the payment process for the pound sterling purchase price, we closed out our position in the Currency Forward at an average rate of 1.58. ....."

1827290040 Mylan Inc announced to acquire Merck KGaA-Generic Drugs (Germany, Euro) in 05/12/2007. "..... In conjunction with the Merck Generics transaction, the Company entered into a deal-contingent foreign currency option contract in order to mitigate the risk of foreign currency exposure. The contract is contingent upon the closing of this acquisition, and the premium of approximately $121.9 million will be paid only upon such closing. ..... "

2204146040 General Mills Inc. announced to acquire Yoplait SAS (France, Euro) in 05/18/2011. "..... During the fourth quarter of fiscal 2011 we entered into definitive agreements with PAI Partners and Sodiaal International to purchase interests in Yoplait entities for $1.2 billion. To reduce the risk of the U.S. dollar cost of the euro-denominated acquisition, we purchased call options covering £637 million at a cost of $12.7 million. ....."

2373743040 H.B. Fuller Co. announced to acquire Forbo-Adhesives Operations (Switzerland, Swiss Franc) in 12/22/2011. "..... As of December 3, 2011, we had a currency option on a portion of the acquisition purchase price for the pending acquisition of the global industrial adhesives business of Forbo Group. ....."

2471072040 Baxter International Inc announced to acquire Gambro AB (Sweden, Swedish Krona). "..... In December 2012, the company entered into option contracts with a total notional amount of $2.8 billion to hedge anticipated foreign currency cash outflows associated with the planned acquisition of Gambro. ....."

Appendix C

See Table C1.

Table C1: Variable Definitions

This table provides variable definitions and corresponding data-sources. CRSP refers to the Centre for Research in Security Prices; SDC refers to Thomson Reuters Securities Data Company; ISS refers to the Institutional Shareholder Services (formerly RiskMetrics); and EDGAR refers to the SEC Electronic Data Gathering, Analysis, and Retrieval.

Variable	Definition	Source
Deal outcomes		
$CAR[A,B]\_[X,Y]$	Cumulative abnormal returns over the event window $[X,Y]$ days surrounding acquisition announcement, using the market model with CRSP value-weighted index. The market model is estimated using the at least 30 non-missing daily returns data over the $[A,B]$ period prior to the announcement.	CRSP
Total risk	Historical standard deviation of bidders' stock returns over the event window $[X,Y]$ days surrounding acquisition announcements.	CRSP
Idiosyncratic Risk	Standard deviation of the residual terms of a market model or a four factor model, estimated over the event window $[X,Y]$ days surrounding acquisition announcements.	CRSP
Implied volatility	The implied volatility of acquirer stock return at the time of deal announcement. It is calculated as the average of implied volatilities of the at-the-money (ATM) call option and the ATM put option with the same maturity.	Option Metrics
BHAR (Control Firm)	Bidder buy-and-hold abnormal return with the benchmark being the return of a control firm with the same industry (2-digit SIC code), similar size (±10%) and the nearest book-to-market ratio.	Compustat/CRSP/FF Data Library
ROA	Bidder abnormal return on asset with the benchmark being the median return on asset of a group of Compustat firms within the same industry (2-digit SIC code) and similar previous operating performance(±10% ROA) in the fiscal year preceding the deal announcement.	Compustat
Completion	Dummy Variable: one for deals that is completed, zero for withdrawn deals.	SDC/LexisNexis
Complete_time	Number of days between deal announcement date and effective date.	SDC/LexisNexis

Continued on next page

Table C1 – continued from previous page

Variable	Definition	Source
Deal characteristics		
Hostile	Indicator variable: one for hostile deals, zero otherwise.	SDC
Tender	Indicator variable: one for tender offers, zero otherwise.	SDC
Cash	Indicator variable: one for deals financed fully with sash, zero otherwise.	SDC
Equity	Indicator variable: one for deals financed partially or fully with stock, zero otherwise.	SDC
Related_industry	Indicator variable: one if the target and bidder have the same two-digit standard industrial classification (SIC) Code.	SDC
Toehold	Indicator variable: one if the bidder already hold certain percent of the target shares at the announcement, zero otherwise.	SDC
Transaction_value	Value of transaction, in millions of dollars	SDC
Relative_size	The ratio of transaction value to bidder market value at the end of the fiscal year before the deal was announced.	SDC/Compustat
Firm characteristics		
Nonpublic	Indicator variable: one if the target is not a public firm, 0 otherwise.	SDC
Leverage	Bidder's ratio of book value of debt to book value of total assets at the end of the fiscal year before the deal was announced.	Compustat
Tobin's Q	Bidder's Tobin's Q at the end of the fiscal year before the deal was announced following Baker and Wurgler (2002).	Compustat
Assets	Bidder's total assets book value.	Compustat
Size	Natural log of acquirer's market value, adjusted for inflation.	Compustat
Cash/assets	Bidder's cash and marketable securities, normalized by book value of assets.	Compustat
IO	Percent of acquirer's common shares owned by institutional investors.	13F
Runup	Market adjusted buy-and-hold return of the acquirer's stock over (-205,-6) window (Golubov et al., 2012)	CRSP
Sigma	Standard deviation of the acquirer's market-adjusted daily return over (-205,-6) window (Golubov et al., 2012)	CRSP
Analyst_number	Number of analysts following the acquirer in the fiscal year preceding the deal announcement (Geczy et al., 1997)	IBES
RD	The research and development expense of acquirer in the fiscal year preceding the deal announcement, normalized total sales (Geczy et al., 1997)	Compustat

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Table C1 – continued from previous page

Variable	Definition	Source
Foreign_sales/assets	The ratio of acquirer's total foreign sales over its total asset at the end of the fiscal year preceding the deal announcement. Foreign sales are the sum of the sales of acquirer's all international segments	Compustat/Compustat Segments
Governance	Following Bebchuk and Cohen (2008), we construct a corporate governance index based on six provisions (see below). Each company in our database is given a score, from 0 to 6, based on the number of these provisions which the company has at the deal announcement	ISS
Cboard_indicator	Indicator Variable: 1 if the bidder bidder board directors are divided into separate classes with unequal voting rights, 0 otherwise.	ISS
Labylw_indicator	Indicator Variable: 1 if the bidder limited shareholder's ability through majority vote to amend the corporate bylaws, 0 otherwise.	ISS
Lachtr_indicator	Indicator Variable: 1 if the bidder limited shareholder's ability through majority vote to amend the corporate charter, 0 otherwise.	ISS
Supermajor_indicator	Indicator Variable: 1 if the bidder requires more than a majority of shareholders to approve a merger (more than 51% after 2007), 0 otherwise.	ISS
Gparachute_indicator	Indicator Variable: 1 if the bidder provide golden parachutes for management/board members in the event of firing, demotion or resignation following a change in control, 0 otherwise.	ISS
Ppill_indicator	Indicator Variable: 1 if the bidder has position pill, 0 otherwise.	ISS
Bidder derivative hedging characteristics		
Fcd/Ird	Indicator variable: 1 if the bidder either used foreign currency derivatives or interest rate derivatives in the last fiscal year before deal announcement, 0 otherwise. Possible values: 0, 1	EDGAR 10-K
Hedging_intensity	Indicator variable: 2 if the bidder used both of the two kinds of derivative contracts (FX and IR) in the last fiscal year before deal announcement, 1 if the bidder used only one of the two kinds of derivative contracts (FX or IR), 0 if the bidder did not use foreign currency derivatives or interest rate derivatives. Possible values: 0, 1, 2	EDGAR 10-K
Fcd	Indicator Variable: 1 if the bidder used foreign currency derivatives in the last fiscal year before the deal announcement, 0 otherwise	EDGAR 10-K

Continued on next page

Table C1 – continued from previous page

Variable	Definition	Source
Fcd_target	Indicator Variable: 1 if the bidder used target nation's currency derivatives in the last fiscal year before the deal announcement, 0 otherwise.	EDGAR 10-K
Ird	Indicator Variable: 1 if the bidder used interest rate derivatives in the last fiscal year before the deal announcement, 0 otherwise	EDGAR 10-K
Commodity	Indicator Variable: 1 if the bidder used commodity derivative contracts in the last fiscal year before the deal announcement.	EDGAR 10-K
Foreign_debt	Indicator Variable: 1 if the bidder used debt denominated in foreign currencies in the last fiscal year before the deal announcement.	EDGAR 10-K/SDC Global New Issues Dataset
Nv_derivatives	Notional Value of the financial derivative contracts that was hold by the bidder at the end of the fiscal year before the deal announcement, normalized by bidders' total assets.	EDGAR 10-K

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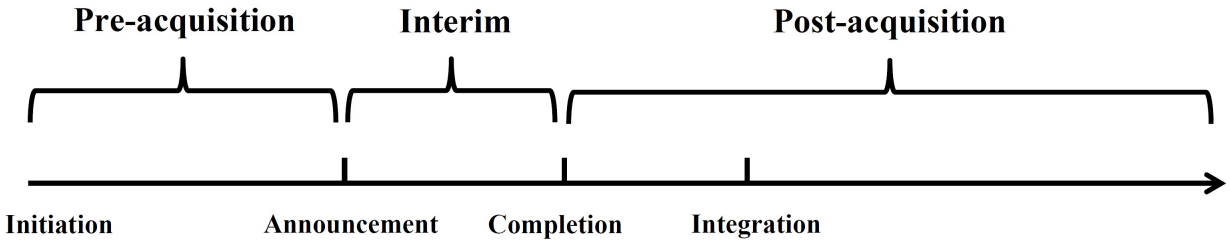
Figure 1: Financial risks along a cross-border M&A timeline. This figure presents a cross-border M&A timeline and the financial risks associated with each period. We define the pre-acquisition period to be between the deal initiation and deal announcement. During this period, acquirers and targets privately negotiate with each other. Next we define the interim period to be between the deal announcement and deal completion. At last, we define post-acquisition period that can be further divide into integration and post-integration periods.



Pre-acquisition Period: Evaluating target's financial Risk

Interim Period: Transaction Risk

Integration Period: Integration risk

Post-acquisition Period: Cash flow risk, Balance sheet risk

Figure 2: Cross-border M&A numbers by year. This figure presents the distribution of our cross-border M&A by announcement year, annual S&P 1500 index annual returns and annual trade weighted U.S. dollar index value. The blue solid line plots the annual numbers of cross-border M&A initiated by S&P 1500 companies over our sample period 2000-2014. The annual numbers of cross-border M&A initiated by derivatives users and non-users are represented by red and green solid lines respectively. The yellow dotted line represents the S&P 1500 index annual returns (multiply by 100) and the grey dotted line represents the annual trade weighted U.S. dollar index levels.

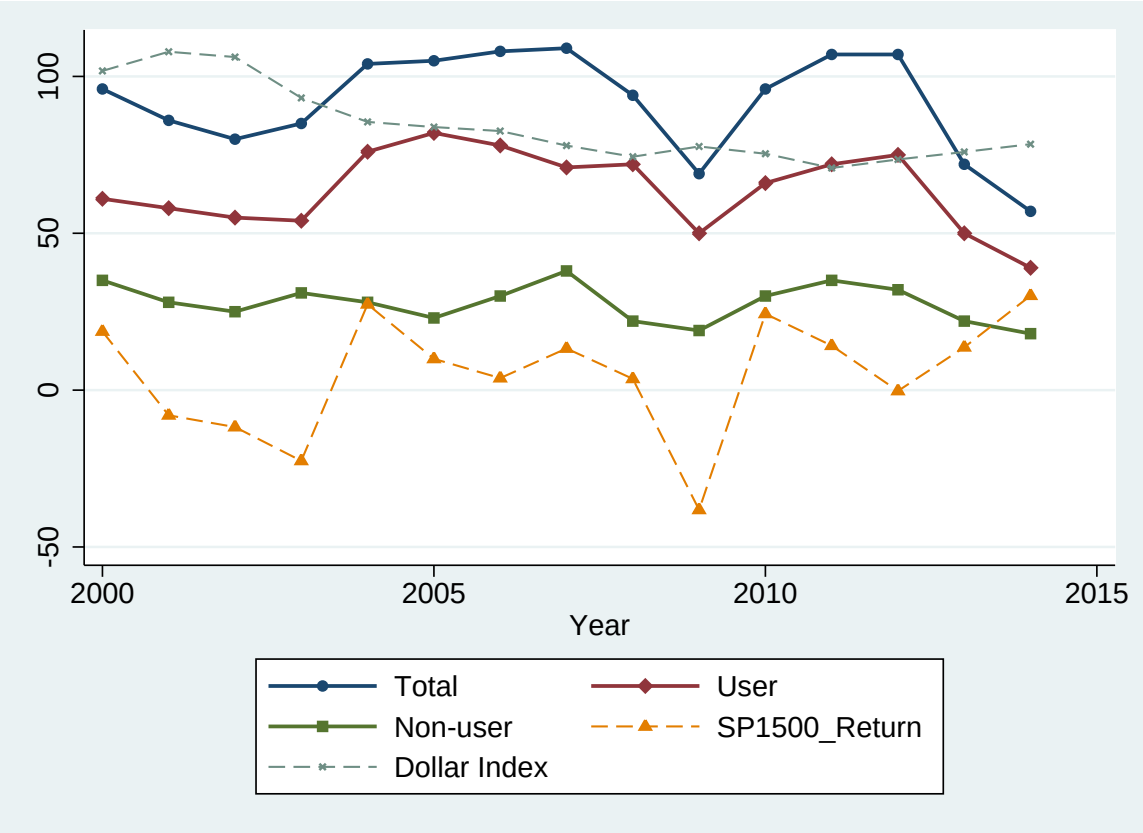


Table 1: Descriptive Statistics

Panel A. Number of Deals by Country/Region

This panel presents the number of cross-border M&A deals by targets' country/region. Our final sample includes 1,375 cross-border M&A deals from 62 different countries and regions. The countries are sorted by cross-border M&A numbers.

Nation	Frequency	Pct.	Nation	Frequency	Pct.	Nation	Frequency	Pct.
United Kingdom	294	21.48	Spain	13	0.95	Peru	2	0.15
Canada	219	16.00	Argentina	11	0.8	Philippines	2	0.15
Germany	134	9.79	Finland	11	0.8	Romania	2	0.15
France	89	6.50	Singapore	11	0.8	Turkey	2	0.15
Australia	57	4.16	Taiwan	10	0.73	Antigua	1	0.07
Israel	48	3.51	Chile	9	0.66	Aruba	1	0.07
Switzerland	46	3.36	Russian Fed	9	0.66	Croatia	1	0.07
Netherlands	44	3.21	Hong Kong	6	0.44	Ghana	1	0.07
China	37	2.70	Poland	6	0.44	Greece	1	0.07
Sweden	37	2.70	Austria	5	0.37	Guatemala	1	0.07
India	36	2.63	Luxembourg	5	0.37	Iceland	1	0.07
Brazil	32	2.34	New Zealand	5	0.37	Morocco	1	0.07
Norway	22	1.61	South Africa	5	0.37	Portugal	1	0.07
Belgium	21	1.53	Egypt	4	0.29	Qatar	1	0.07
Denmark	20	1.46	Colombia	3	0.22	Rep of Congo	1	0.07
Italy	20	1.46	Czech Republic	3	0.22	Saudi Arabia	1	0.07
South Korea	19	1.39	Indonesia	3	0.22	Thailand	1	0.07
Ireland-Rep	18	1.31	Hungary	2	0.15	Uruguay	1	0.07
Japan	15	1.10	Lithuania	2	0.15			
Mexico	14	1.02	Malaysia	2	0.15	Total	1,369	100

Panel B. Number of Deals by Industry

This panel presents the number of cross-border M&A deals by U.S. acquirers' industry. We assign 1,375 deal acquirers into Fama-French 10 industries. And we exclude financial firms and public utility firms from our sample.

Fama-French 10 Industries	**Frequency**	**Percent**
Business Equipment – Computers, Software, and Electronic Equipment	485	35.43
Manufacturing – Machinery, Trucks, Planes, Chemicals, Off Furn, Paper, Com Printing	380	27.76
Healthcare, Medical Equipment, and Drugs	156	11.40
Consumer NonDurables – Food, Tobacco, Textiles, Apparel, Leather, Toys	89	6.50
Wholesale, Retail, and Some Services (Laundries, Repair Shops)	81	5.92
Other – Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment	78	5.70
Oil, Gas, and Coal Extraction and Products	59	4.31
Consumer Durables – Cars, TV's, Furniture, Household Appliances	41	2.99
Total	1,369	100

Panel C. Firm hedging Information

This panel presents the firm hedging information which we collect from firms' 10-K reports on EDGAR. Fcd is equal to 1 if an acquirer engages in FX hedging during the last fiscal year before a deal announcement, and 0 otherwise. Fcd_target is equal to 1 if an acquirer engages in FX hedging on an corresponding target's currency during the last fiscal year before a deal announcement, and 0 otherwise. Fcd/Ird is equal to 1 if an acquirer engages in either FX and/or IR hedging during the last fiscal year before a deal announcement, and 0 otherwise. Nv_derivatives (for hedgers) represents the total notional value of FX and IR contracts held by an acquirer at the end of the fiscal year before a deal announcement, normalized by total assets of the acquirer. Ird is equal to 1 if an acquirer engages in IR hedging during the last fiscal year before a deal announcement, and 0 otherwise. Hedging_intensity is equal to 2 if an acquirer engages in both FX and IR hedging during the last fiscal year before a deal announcement, 1 if an acquirer engages in either FX or IR hedging during the last fiscal year before a deal announcement, and 0 if an acquirer does not hedge at all. Commodity is equal to 1 if an acquirer engages in commodity price hedging during the last fiscal year before a deal announcement. Foreign_debt is equal to 1 if an acquirer has debt denominated in foreign currencies during the last fiscal year before a deal announcement.

Variable	**Obs.**	**Mean**	**Std. Dev.**	**p25**	**p50**	**p75**
Fcd	1,369	0.632	0.482			
Fcd_target	1,219	0.374	0.484			
Fcd/Ird	1,369	0.726	0.446			
Nv_derivatives (for hedgers)	820	0.129	0.371	0.025	0.078	0.159
Ird	1,369	0.432	0.495			
Hedging_intensity	1,369	1.064	0.780	1	1	2
Commodity	1,369	0.198	0.399			
Foreign_debt	1,369	0.199	0.399			

Panel D. Deal Information

This panel presents summary statistics for the cross-border M&A in our sample. All acquirers are S&P 1500 companies and all targets are foreign companies. Summary statistics are presented for the full sample, financial derivatives user sample and non-user sample. Variables are defined in Appendix B. Asterisks denote statistically significant differences between the two sub-samples at the 1% (***), 5% (**), or 10% (*) level.

	Full Sample			Derivatives User			Non-user			
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Diff**
Deal characteristics										
Complete	1,369	0.932	0.252	994	0.927	0.261	375	0.947	0.225	
Cash	1,369	0.438	0.496	994	0.438	0.496	375	0.437	0.497	
Equity	1,369	0.064	0.245	994	0.048	0.214	375	0.107	0.309	***
Nonpublic	1,369	0.869	0.337	994	0.867	0.340	375	0.875	0.332	
Toehold	1,369	0.006	0.076	994	0.007	0.084	375	0.003	0.052	
Hostile	1,369	0.005	0.071	994	0.005	0.071	375	0.005	0.073	
Tender	1,369	0.061	0.240	994	0.065	0.247	375	0.051	0.220	
Related_industry	1,369	0.573	0.495	994	0.561	0.496	375	0.605	0.489	
Completion_time	1,276	48.8	85.6	921	51.2	71.7	355	42.6	114.1	*
Relative_size	1,368	0.071	0.151	993	0.066	0.143	375	0.084	0.168	**
Transaction_value	1,368	491.2	3,686	993	594.8	4290.7	375	216.9	847.1	*
Acquirer characteristics										
Assets	1,369	12,839.4	48,576.3	994	16409.3	56119.3	375	3376.8	12064.5	***
Tobin's Q	1,369	2.280	1.696	994	2.243	1.689	375	2.376	1.716	
Leverage	1,369	0.434	0.193	994	0.471	0.185	375	0.336	0.180	***
Cash/assets	1,368	0.168	0.164	993	0.148	0.146	375	0.222	0.193	***
Governance	1,321	1.888	1.269	973	1.859	1.292	348	1.968	1.199	
IO	1,314	0.770	0.160	950	0.760	0.161	364	0.793	0.153	***
Runup	1,369	0.092	0.338	994	0.083	0.296	375	0.117	0.429	*
Sigma	1,369	0.020	0.009	994	0.018	0.009	375	0.024	0.011	***

Table 2: Bidder announcement returns and financial hedging characteristics

This table presents the effect of financial hedging on acquirer cumulative abnormal returns (CARs) around cross-border M&A announcements. The OLS regressions with robust standard errors are based on a sample of 1,282 completed cross-border M&A that are carried out by S&P 1500 firms between 2000 and 2014. The dependent variable is the acquirer CAR over the 11-day event window $(-5, +5)$ surrounding the deal announcement based on the market model estimated over the pre-announcement window of $(-300, -91)$ with the benchmark of CRSP value-weighted index. Detailed definitions of all variables are in Table C1. Year, Fama and French 10 industry and S&P Index(S&P500, S&P400 and S&P600) fixed effects are controlled for all regressions. P-Values are reported in the parentheses. Asterisks denote statistically significance at the 1% $(***)$, 5% $(**)$, or 10% $(*)$ level.

	1	**2**	**3**	**4**	**5**	**6**	**7**
Fcd	0.012**	0.011**	0.009*	0.009*			
	(0.016)	(0.032)	(0.067)	(0.068)			
Fcd/Ird					0.011**		
					(0.050)		
Hedging_Intensity						0.005*	
						(0.100)	
Nv_derivatives							0.017**
							(0.022)
Cash		0.000	-0.001	-0.001	-0.001	-0.001	-0.001
		(0.984)	(0.769)	(0.772)	(0.734)	(0.751)	(0.793)
Equity		-0.033***	-0.032**	-0.032**	-0.032*	-0.032**	-0.032***
		(0.021)	(0.039)	(0.039)	(0.037)	(0.037)	(0.004)
Nonpublic		-0.014	-0.008	-0.008	-0.008	-0.008	-0.010
		(0.104)	(0.386)	(0.388)	(0.365)	(0.384)	(0.327)
Toehold		0.029	0.039*	0.039*	0.039*	0.038*	0.032
		(0.203)	(0.079)	(0.077)	(0.085)	(0.083)	(0.316)
Hostile		-0.013	-0.019	-0.019	-0.019	-0.020	-0.023
		(0.351)	(0.153)	(0.167)	(0.170)	(0.147)	(0.557)
Tender		-0.011	-0.015	-0.015	-0.016	-0.015	-0.014
		(0.341)	(0.220)	(0.220)	(0.201)	(0.210)	(0.290)
Related_industry		-0.002	-0.003	-0.003	-0.003	-0.003	-0.005

Continued on next page

Table 2 – continued from previous page

	1	2	3	4	5	6	7
		(0.684)	(0.538)	(0.534)	(0.490)	(0.469)	(0.316)
Relative_size			0.041*	0.041*	0.041*	0.041*	0.026
			(0.065)	(0.064)	(0.068)	(0.065)	(0.127)
Size			-0.002	-0.003	-0.002	-0.003	-0.001
			(0.332)	(0.320)	(0.367)	(0.276)	(0.647)
Tobins'Q			-0.001	-0.001	-0.001	0.000	-0.001
			(0.819)	(0.828)	(0.823)	(0.912)	(0.475)
Leverage			-0.006	-0.006	-0.007	-0.007	-0.011
			(0.641)	(0.624)	(0.588)	(0.599)	(0.464)
Cash/assets			-0.019	-0.018	-0.016	-0.017	-0.020
			(0.346)	(0.363)	(0.418)	(0.396)	(0.313)
Governance			-0.001	-0.001	-0.001	-0.001	-0.002
			(0.615)	(0.624)	(0.725)	(0.670)	(0.440)
IO			-0.004	-0.004	-0.004	-0.004	0.002
			(0.818)	(0.832)	(0.826)	(0.812)	(0.922)
Runup			-0.020**	-0.019**	-0.019**	-0.020**	-0.019**
			(0.049)	(0.048)	(0.047)	(0.045)	(0.012)
Sigma			-0.022	-0.017	0.041	0.023	0.107
			(0.971)	(0.978)	(0.946)	(0.970)	(0.802)
Foreign_debt				0.002	0.002	0.001	0.002
				(0.739)	(0.733)	(0.791)	(0.797)
Intercept	-0.007	0.013	0.005	0.005	-0.001	0.007	-0.009
	(0.573)	(0.415)	(0.883)	(0.884)	(0.985)	(0.839)	(0.824)
S&P Index fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,274	1,180	1,180	1,180	1,180	1,180	1,031
Adj R-squared	0.044	0.056	0.066	0.066	0.067	0.065	0.036

Table 3: Bidder stock return volatility around acquisition announcement

Panel A. Realized volatility (averages). Panel A presents the average realized volatility around cross-border M&A announcements. Total risk is measured as the standard deviation of daily stock returns. Idiosyncratic risk is estimated by the standard market model and by a 4-factor model including market, size, value and momentum. [X, Y] represents an event window [X,Y] days surrounding an announcement. t-value represents the t-test statistic and p-value represents the Wilcoxon test statistic. Asterisks denote statistically significant differences between the two sub-samples at the 1% (***), 5% (**), or 10% (*) level.

	User		Non-user		Difference	
Windows	**Mean**	**S.D.**	**Mean**	**S.D.**	**t-value**	**z-value**
Total risk by Fcd						
$[-5,+5]$	2.19%	0.014	2.51%	0.014	3.88***	5.28***
$[-5,+20]$	2.19%	0.013	2.53%	0.014	4.54***	5.37***
$[0,+20]$	2.18%	0.013	2.54%	0.015	4.51***	5.40***
$[-5,+40]$	2.23%	0.013	2.56%	0.013	4.29***	5.59***
$[0,+40]$	2.24%	0.013	2.56%	0.014	4.27***	5.55***
Total risk by Fcd/Ird						
$[-5,+5]$	2.18%	0.014	2.64%	0.015	5.25***	6.44***
$[-5,+20]$	2.18%	0.013	2.66%	0.014	5.75***	6.66***
$[0,+20]$	2.18%	0.013	2.67%	0.015	5.74***	6.60***
$[-5,+40]$	2.22%	0.012	2.70%	0.014	5.89***	7.09***
$[0,+40]$	2.22%	0.013	2.71%	0.014	5.91***	7.09***
Market model idiosyncratic risk by Fcd						
$[-5,+20]$	1.74%	0.011	2.14%	0.013	6.03***	6.64***
$[0,+20]$	1.73%	0.011	2.14%	0.013	5.81***	6.70***
$[-5,+40]$	1.78%	0.011	2.17%	0.012	6.06***	7.01***
$[0,+40]$	1.78%	0.011	2.17%	0.012	5.95***	6.99***
Market model idiosyncratic risk by Fcd/Ird						
$[-5,+20]$	1.75%	0.011	2.25%	0.012	6.96***	7.82***
$[0,+20]$	1.75%	0.012	2.25%	0.013	6.70***	7.76***
$[-5,+40]$	1.79%	0.011	2.29%	0.012	7.29***	8.26***
$[0,+40]$	1.79%	0.011	2.29%	0.012	7.18***	8.19***
4-factor model idiosyncratic risk by Fcd						
$[-5,+20]$	1.68%	0.010	2.05%	0.012	5.94***	6.65***
$[0,+20]$	1.67%	0.011	2.05%	0.012	5.70***	6.65***
$[-5,+40]$	1.72%	0.010	2.07%	0.011	5.84***	6.78***
$[0,+40]$	1.72%	0.010	2.07%	0.011	5.69***	6.78***
4-factor model idiosyncratic risk by Fcd/Ird						
$[-5,+20]$	1.69%	0.011	2.15%	0.012	6.79***	7.75***
$[0,+20]$	1.68%	0.011	2.15%	0.012	6.46***	7.53***
$[-5,+40]$	1.72%	0.010	2.19%	0.011	7.14***	8.04***
$[0,+40]$	1.72%	0.010	2.19%	0.011	7.02***	7.96***

Panel B. Realized volatility (regressions). In Panel B, we regress each realized volatility variable on Fcd and Fcd/Ird dummies, controlling for year and industry fixed effects. Asterisks denote statistically significant differences between the two sub-samples at the 1% (∗ ∗ ∗), 5% (∗∗), or 10% (∗) level.

	[-5, +5]	**[-5, +20]**	**[0, +20]**	**[-5, +40]**	**[0, +40]**
			S.D. of stock returns		
Fcd	-0.0025 ***	-0.0028 ***	-0.0030 ***	-0.0025373 ***	-0.0026 ***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Fcd/Ird	-0.0034 ***	-0.0035 ***	-0.0037 ***	-0.0034 ***	-0.0035 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
			Idiosyncratic risk estimated by a market model		
Fcd		-0.0031 ***	-0.0032 ***	-0.0030 ***	-0.0030 ***
		(0.000)	(0.000)	(0.000)	(0.000)
Fcd/Ird		-0.0036 ***	-0.0036995 ***	-0.0035957 ***	-0.0036 ***
		(0.000)	(0.000)	(0.000)	(0.000)
			Idiosyncratic risk estimated by a four-factor model		
Fcd		-0.0030 ***	-0.0031 ***	-0.0028 ***	-0.0028 ***
		(0.000)	(0.000)	(0.000)	(0.000)
Fcd/Ird		-0.0034 ***	-0.0034 ***	-0.0034 ***	-0.0034 ***
		(0.000)	(0.000)	(0.000)	(0.000)

Panel C. Implied volatility (averages). Panel C compares acquirers' implied volatilities at cross-border M&A announcements between derivatives users and non-users. The implied volatility data is collected from the estimated volatility surface in the Option Metrics database for 30-day, 60-day and 91-day at-the-money (ATM) options. The implied volatility variables used in this paper is the average implied volatility of the ATM call and the ATM put with the same time-to-maturity. The last two columns report the difference tests between the two sub-groups. t-value represents the t-test statistic and p-value represents the Wilcoxon test statistic. Asterisks denote statistically significant differences between the two sub-samples at the 1% (∗ ∗ ∗), 5% (∗∗), or 10% (∗) level.

	User		**Non-user**		**Difference**	
Windows	**Mean**	**S.D.**	**Mean**	**S.D.**	**t-value**	**z-value**
Implied volatility by Fcd						
30 days	0.358	0.158	0.424	0.174	6.76***	7.39***
60 days	0.353	0.147	0.415	0.162	6.82***	7.40***
91 days	0.349	0.139	0.406	0.151	6.70***	7.27***
Implied volatility by Fcd/Ird						
30 days	0.357	0.157	0.448	0.175	8.84***	9.62***
60 days	0.352	0.146	0.439	0.162	9.02***	9.64***
91 days	0.348	0.138	0.428	0.151	8.93***	9.54***

Panel D. Implied volatility (regressions). In Panel D, we regress each implied volatility variable on Fcd and Fcd/Ird dummies, controlling for year and industry fixed effects. The p-value is reported in the parentheses. Asterisks denote statistically significant differences between the two sub-samples at the 1% (∗ ∗ ∗), 5% (∗∗), or 10% (∗) level.

	30 days	**60 days**	**91 days**
Fcd	-0.0565 ***	-0.0523 ***	-0.0473 ***
	(0.000)	(0.000)	(0.000)
Fcd/Ird	-0.0756 ***	-0.0712 ***	-0.0655 ***
	(0.000)	(0.000)	(0.000)

Table 4: Probability of deal completion and bidder financial hedging characteristics

This table represents the effect of financial hedging on cross-border M&A deal completion probability. Probit (column 1-4) and logit (column 5) regressions are based on a sample of 1,375 successful and unsuccessful cross-border M&A deals that are carried out by U.S S&P 1500 firms between 2000 and 2014. The dependent variable is a binary variable that takes the value of one if the deal was completed and zero otherwise. Detailed definitions of all variables are in Table C1. Year, Fama and French 10 industry and S&P Index(S&P500, S&P400 and S&P600) fixed effects are controlled for all regressions. The p-value is reported in the parentheses. Asterisks denote statistically significance at the 1% (***), 5% (**), or 10% (*) level.

	1	**2**	**3**	**4**	**5**
Fcd	-0.033				
	(0.804)				
Fcd/Ird		-0.053			
		(0.694)			
Fcd_target			0.292**	0.349**	0.730**
			(0.017)	(0.013)	(0.011)
Cash				0.150	0.273
				(0.267)	(0.309)
Equity				0.409	0.786
				(0.177)	(0.173)
Nonpublic				0.513**	0.860**
				(0.015)	(0.030)
Toehold				-0.029	-0.260
				(0.966)	(0.831)
Hostile				-1.476**	-3.047**
				(0.021)	(0.011)
Tender				1.048***	2.316***
				(0.005)	(0.009)
Related_industry				-0.185	-0.363
				(0.162)	(0.175)
Relative_size				-0.515	-1.171
				(0.207)	(0.118)
Size				-0.052	-0.115
				(0.494)	(0.448)
Tobin's Q				-0.052	-0.102
				(0.302)	(0.309)
Leverage				-0.015	0.098
				(0.971)	(0.901)
Cash/assets				0.247	0.449
				(0.648)	(0.675)

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Table 4 – continued from previous page

	1	2	3	4	5
Governance				0.138**	0.262**
				(0.033)	(0.041)
IO				-0.253	-0.517
				(0.567)	(0.564)
Runup				0.298	0.609
				(0.150)	(0.139)
Sigma				-32.841***	-64.609***
				(0.003)	(0.003)
Foreign_debt				-0.295*	-0.631**
				(0.054)	(0.035)
Intercept	1.548***	1.563***	1.413***	5.680	17.071
	(0.000)	(0.000)	(0.000)	(0.965)	(0.982)
S&P Index fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,369	1,369	1,219	1,128	1,128
Pseudo R-squared	0.042	0.042	0.049	0.127	0.128

Table 5: Deal completion time and bidder financial hedging characteristics

Panel A. Univariate tests

Panel A presents the summary statistics of deal completion time for financial derivatives users and non-users. We test the difference between financial derivatives users and non-users using the t-test and the Wilcoxon test. Test statistics t-value and z-value are reported. Asterisks denote statistically significance at the 1% (***), 5% (**), or 10% (*) level.

	User		**Non-user**		**Diff.**	
	Mean	**S.D.**	**Mean**	**S.D.**	**t-value**	**z-value**
Fcd	71.905	76.249	53.032	65.488	-3.294 ***	-3.955 ***
Fcd_target	76.484	77.885	58.304	70.060	-3.049 ***	-3.792***
Fcd/Ird	69.131	74.746	53.731	67.103	-2.424 **	-3.027 ***

Panel B. Multivariate tests

Panel B presents tobit regression results of deal completion time on bidder financial hedging characteristics. The sample includes 1,282 successful cross-border mergers and acquisitions that are carried out by U.S S&P 1500 firms between 2000 and 2014. The dependent variable is the number of days between deal announcement date and acquisition effective date. Detailed definitions of all variables are in the Appendix B. Year, Fama and French 10 industry and S&P Index(S&P500, S&P400 and S&P600) fixed effects are controlled for all regressions. P-Values are reported in the parentheses. Asterisks denote statistically significance at the 1% (***), 5% (**), or 10% (*) level.

	1	**2**	**3**	**4**
Fcd	32.37***			
	(0.000)			
Fcd_target		28.70***		
		(0.000)		
Fcd/Ird			22.84***	
			(0.007)	
Hedging_intensity				20.28***
				(0.000)
Cash	7.46	4.99	6.26	7.56
	(0.288)	(0.524)	(0.373)	(0.282)
Toehold	33.55	37.37	32.98	25.60
	(0.520)	(0.434)	(0.532)	(0.633)
Hostile	43.80	36.25	38.49	38.74
	(0.294)	(0.403)	(0.408)	(0.371)
Tender	47.25***	45.41***	47.08***	46.59***
	(0.000)	(0.000)	(0.000)	(0.000)
Related_industry	16.56**	18.64**	15.08**	15.15**
	(0.019)	(0.017)	(0.033)	(0.032)
Relative_size	109.33***	106.07***	105.32***	108.63***
	(0.000)	(0.000)	(0.000)	(0.000)
Runup	1.46	-0.33	0.59	0.29
	(0.894)	(0.978)	(0.957)	(0.979)
Sigma	-1940.7***	-1588.8**	-1944.0***	-1685.3***
	(0.001)	(0.011)	(0.001)	(0.004)
Foreign_debt	20.63**	24.45**	20.97**	16.78*
	(0.020)	(0.011)	(0.019)	(0.058)
Intercept	19.97	14.44	19.44	17.61
	(0.456)	(0.608)	(0.482)	(0.520)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	708	630	708	708
Pseudo R-squared	0.018	0.017	0.016	0.018

Table 6: Long-term performance and financial hedging

Panel A. Operating performance

Panel A. This panel presents the effect of financial hedging on acquirers' long-run operating performance. Following Huson et al. (2004), Guercio et al. (2008) and Duchin and Schmidt (2013), we compute changes of operating return on assets ($\triangle ROA$) to measure acquirers' long-run operating performance after cross-border M&A. Following Barber and Lyon (1996), all $\triangle ROA$ are adjusted for the median $\triangle ROA$ of a controlled group in which all firms have the same 2-digit SIC code and similar previous operating performance ($\pm$ 10% $\triangle ROA$) in the fiscal year preceding the deal announcement. $\triangle ROA$ are calculated over three different periods: 3 years, 4 years and 5 years after cross-border deal. We use two hedging measures Ird/Fcd and Fcd. The mean value of $\triangle ROA$ is reported for each group. Number of observations and standard deviations are reported in the parentheses. The t-value of t-test and z-value of Wilcoxon test for differences between financial derivative users and non-users are also presented. Asterisks denote statistically significance at the 1% (***), 5% (**), or 10% (*) level.

		Ird/Fcd		**Diff.**		**Fcd**		**Diff.**	
Variable	Total	User	Non-user	t-value	z-value	User	Non-user	t-value	z-value
$\triangle ROA_{t,t+3}$	-0.0007	0.0019	-0.0054	-1.622	-1.739*	0.0017	-0.0076	-1.921*	-1.714*
	(945, 0.0663)	(606, 0.0596)	(339, 0.0767)			(695, 0.0572)	(250, 0.0865)		
$\triangle ROA_{t,t+4}$	0.0049	0.0092	-0.0027	-2.496**	-2.884***	0.0079	-0.0035	-2.174**	-2.631***
	(824, 0.0658)	(531, 0.0604)	(293, 0.0740)			(610, 0.0583)	(214, 0.0831)		
$\triangle ROA_{t,t+5}$	0.0047	0.0086	-0.0026	-2.082***	-2.393**	0.0070	-0.0021	-1.542	-1.889*
	(719, 0.0685)	(470, 0.0620)	(249, 0.0791)			(539, 0.0599)	(180, 0.0894)		

Panel B. Stock market performance

This panel presents the effect of financial hedging on acquirers' long-run abnormal stock returns after cross-border M&A announcements. The OLS regressions with robust standard errors are based on a sample of 1,282 successful cross-border M&A initiated by U.S S&P 1500 firms between 2000 and 2014. The dependent variable is the acquirer's buy and hold abnormal return (BHAR) over 36 months, 48 months and 60 months respectively after deal announcements. We match acquirers with firms with the same 2-digit SIC code, similar size (± 10%) and closest book-to-market ratio. We use three hedging measures: Fcd/Ird, Fcd and Hedging_intensity. Detailed definitions of all variables are in Table C1. Year, Fama and French 10 industry and S&P Index(S&P500, S&P400 and S&P600) fixed effects are controlled for all regressions. P-values are reported in the parentheses. Asterisks denote statistically significance at the 1% (***), 5% (**), or 10% (*) level.

	36m	**48m**	**60m**	**36m**	**48m**	**60m**	**36m**	**48m**	**60m**
Fcd	0.004**	0.005***	0.005***						
	(0.044)	(0.003)	(0.005)						
Fcd/Ird				0.007***	0.007***	0.007***			
				(0.001)	(0.000)	(0.001)			
Hedging_intensity							0.003**	0.004***	0.004**
							(0.011)	(0.001)	(0.015)
Cash	-0.003**	-0.003**	-0.003	-0.003**	-0.003**	-0.003*	-0.003**	-0.003**	-0.003
	(0.030)	(0.033)	(0.101)	(0.029)	(0.032)	(0.098)	(0.033)	(0.041)	(0.118)
Equity	-0.008*	-0.005	-0.003	-0.008*	-0.005	-0.002	-0.008*	-0.005	-0.003
	(0.051)	(0.116)	(0.416)	(0.064)	(0.154)	(0.533)	(0.053)	(0.126)	(0.422)
Nonpublic	-0.003	-0.004*	-0.004	-0.004	-0.004*	-0.004	-0.004	-0.004*	-0.004
	(0.151)	(0.092)	(0.141)	(0.111)	(0.069)	(0.127)	(0.146)	(0.093)	(0.140)
Toehold	-0.002	0.001	0.002	-0.003	0.000	-0.003	-0.003	-0.000	-0.002
	(0.775)	(0.950)	(0.835)	(0.721)	(0.978)	(0.712)	(0.708)	(0.964)	(0.767)
Hostile	-0.007	-0.016	-0.013	-0.007	-0.014	-0.011	-0.007	-0.015	-0.012
	(0.637)	(0.427)	(0.436)	(0.629)	(0.472)	(0.504)	(0.618)	(0.441)	(0.450)
Tender	-0.002	0.000	0.001	-0.003	-0.001	0.000	-0.003	-0.001	0.000
	(0.461)	(0.911)	(0.873)	(0.380)	(0.812)	(0.934)	(0.421)	(0.846)	(0.945)
Related_industry	0.004**	0.002	0.001	0.004**	0.002	0.001	0.004**	0.002	0.001
	(0.012)	(0.139)	(0.443)	(0.014)	(0.150)	(0.460)	(0.016)	(0.181)	(0.525)

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Panel B. – continued from previous page

	36m	48m	60m	36m	48m	60m	36m	48m	60m
Relative_size	-0.005	-0.009*	-0.011**	-0.005	-0.009*	-0.012***	-0.005	-0.009*	-0.011**
	(0.393)	(0.087)	(0.015)	(0.331)	(0.062)	(0.008)	(0.366)	(0.074)	(0.011)
Size	-0.001	-0.002*	-0.001	-0.001	-0.002*	-0.001	-0.001	-0.002**	-0.001
	(0.297)	(0.052)	(0.311)	(0.251)	(0.052)	(0.320)	(0.149)	(0.017)	(0.177)
Tobin's Q	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001*	0.001
	(0.760)	(0.164)	(0.660)	(0.721)	(0.153)	(0.651)	(0.520)	(0.056)	(0.409)
Leverage	0.003	0.006	0.009*	0.002	0.006	0.009*	0.002	0.005	0.009*
	(0.580)	(0.194)	(0.063)	(0.700)	(0.222)	(0.072)	(0.717)	(0.261)	(0.065)
Cash/assets	-0.003	-0.002	0.002	-0.002	-0.000	0.004	-0.002	-0.000	0.003
	(0.630)	(0.824)	(0.890)	(0.778)	(0.964)	(0.777)	(0.730)	(0.996)	(0.799)
Governance	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
	(0.619)	(0.722)	(0.732)	(0.503)	(0.570)	(0.549)	(0.564)	(0.614)	(0.619)
IO	-0.013**	-0.014***	-0.013**	-0.013**	-0.014***	-0.013**	-0.013**	-0.014***	-0.014**
	(0.014)	(0.004)	(0.014)	(0.013)	(0.005)	(0.015)	(0.012)	(0.004)	(0.014)
Foreign_debt	0.002	0.001	0.002	0.002	0.001	0.001	0.002	0.001	0.001
	(0.243)	(0.492)	(0.379)	(0.258)	(0.537)	(0.444)	(0.330)	(0.657)	(0.530)
Intercept	0.013	0.021*	0.008	0.012	0.019*	0.006	0.015	0.024**	0.010
	(0.205)	(0.066)	(0.458)	(0.246)	(0.099)	(0.571)	(0.156)	(0.045)	(0.371)
S&P Index fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	986	890	805	986	890	805	986	890	805
R-squared	0.058	0.084	0.072	0.066	0.091	0.078	0.061	0.088	0.072

Table 7: Treatment effect

This table presents the effect of financial hedging on acquirer CARs, using an endogenous binary-treatment model. Estimation is by a two-step consistent estimator. The first column for each hedging measure is the first-step treatment equation estimated by probit regression, where the dependent variables is Fcd or Fcd/Ird. Three instrument variables used in the first-step are Analyst_number, RD and Foreign_sales/assets. The second column for each hedging measure is the second-step outcome equation where the dependent variable is acquirer CAR. Detailed definitions of all variables are in Table C1. Year, industry and S&P Index fixed effects are controlled for all regressions. P-values are reported in the parentheses. Asterisks denote statistically significant differences between the two sub-samples at the 1% (***), 5% (**), or 10% (*) level.

	Fcd		**Fcd/Ird**	
	Treatment	**Outcome**	**Treatment**	**Outcome**
Fcd		0.042 **		
		(0.035)		
Fcd/Ird				0.069 ***
				(0.005)
Cash		0.000		0.000
		(0.983)		(0.931)
Equity		-0.028 *		-0.026 *
		(0.055)		(0.056)
Nonpublic		-0.013		-0.015
		(0.217)		(0.166)
Toehold		0.005		0.007
		(0.931)		(0.900)
Hostile		-0.015		-0.015
		(0.744)		(0.747)
Tender		-0.009		-0.010
		(0.559)		(0.501)
Related_industry		-0.005		-0.006
		(0.330)		(0.294)
Relative_size		0.019		0.018
		(0.349)		(0.372)
Size	0.342 ***	-0.006 *	0.351 ***	-0.007 **
	(0.000)	(0.074)	(0.000)	(0.041)
Tobin's Q	-0.108 **	0.002	-0.115 **	0.002
	(0.015)	(0.486)	(0.0143)	(0.372)
Leverage	1.161 ***	-0.035 *	1.513 ***	-0.046 **
	(0.001)	(0.066)	(0.000)	(0.025)
Cash/assets		0.008		0.016
		(0.685)		(0.439)
Governance	0.114 **	-0.001	-0.009	0.000
	(0.044)	(0.650)	(0.885)	(0.991)
IO	-0.230 *	-0.011	-0.033	-0.014
	(0.552)	(0.571)	(0.936)	(0.487)
Runup		-0.016 *		-0.016 *
		(0.088)		(0.088)
Sigma		-0.993 **		-0.888 *
		(0.037)		(0.061)
Foreign_debt	-0.219	0.003	-0.164	0.004
	(0.132)	(0.705)	(0.295)	(0.597)
Commodity	0.562 ***		0.705 ***	
	(0.004)		(0.005)	
Analyst_number	-0.015		-0.018	
	(0.184)		(0.129)	
RD	-0.285		-0.747	
	(0.745)		(0.404)	
Foreign_sales/assets	1.886 ***		1.216 ***	
	(0.000)		(0.000)	
Intercept	-2.690 ***	0.033	-2.372 ***	0.020
	(0.002)	(0.458)	(0.007)	(0.673)
S&P/Industry/Year fixed effects	YES	YES	YES	YES
Observations 805	805	805	805	
$Prob > chi2$	0.000		0.000	

Table 8: Currency Volatility

This table presents the effect of financial hedging on acquirers' CARs within low U.S. dollar exchange rate volatility sub-sample and high U.S. dollar exchange rate volatility sub-sample. In columns 1-6, we separate our total sample into two sub-samples by standard deviations of the trade weighted U.S. dollar index returns, 12 months before deal announcements. In columns 7-12, we separate our total sample into two sub-samples by standard deviations of the returns of the exchange rates between USD and target nation's currency, 12 months before deal announcements. We use three hedging measures: Fcd, Fcd/Ird and Hedging_intensity. Detailed definitions of all variables are in Table C1. Year, Fama and French 10 industry and S&P Index(S&P500, S&P400 and S&P600) fixed effects are controlled for all regressions. P-values are reported in the parentheses. Asterisks denote statistically significance at the 1% (***), 5% (**), or 10% (*) level.

	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Fcd	0.005	0.013*					0.002	0.017**				
	(0.469)	(0.086)					(0.817)	(0.020)				
Fcd/Ird			0.004	0.018**					0.002	0.018**		
			(0.592)	(0.036)					(0.820)	(0.025)		
Hedging_intensity					0.0004	0.010**					0.002	0.007*
					(0.928)	(0.038)					(0.737)	(0.079)
cash	-0.008	0.006	-0.008	0.005	-0.008	0.006	-0.004	0.002	-0.004	0.002	-0.003	0.002
	(0.210)	(0.390)	(0.196)	(0.398)	(0.197)	(0.385)	(0.607)	(0.742)	(0.602)	(0.786)	(0.619)	(0.779)
Equity	-0.014	-0.070***	-0.014	-0.070***	-0.014	-0.071**	-0.015	-0.050*	-0.015	-0.051*	-0.015	-0.052**
	(0.457)	(0.009)	(0.449)	(0.009)	(0.442)	(0.009)	(0.425)	(0.054)	(0.425)	(0.051)	(0.424)	(0.050)
Nonpublic	-0.004	-0.020	-0.004	-0.021	-0.003	-0.020	-0.004	-0.012	-0.004	-0.012	-0.004	-0.011
	(0.768)	(0.167)	(0.772)	(0.147)	(0.782)	(0.169)	(0.777)	(0.288)	(0.771)	(0.271)	(0.769)	(0.303)
Toehold	0.046	0.043	0.046	0.042	0.046	0.039	0.021	0.045	0.020	0.046	0.021	0.044
	(0.199)	(0.370)	(0.204)	(0.378)	(0.200)	(0.411)	(0.542)	(0.178)	(0.546)	(0.170)	(0.538)	(0.195)
Hostile	-0.013	-0.032	-0.012	-0.047**	-0.013	-0.043**	-0.007	0.000	-0.007	0.000	-0.007	0.000
	(0.549)	(0.104)	(0.577)	(0.021)	(0.534)	(0.034)	(0.702)	(.)	(0.705)	(.)	(0.702)	(.)
Tender	-0.022	-0.008	-0.022	-0.008	-0.022	-0.007	-0.020	0.001	-0.021	-0.000	-0.021	-0.000
	(0.207)	(0.675)	(0.201)	(0.658)	(0.209)	(0.712)	(0.257)	(0.951)	(0.255)	(0.998)	(0.251)	(0.996)
Related_industry	0.002	-0.005	0.002	-0.005	0.002	-0.005	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.773)	(0.410)	(0.794)	(0.393)	(0.789)	(0.401)	(0.883)	(0.899)	(0.881)	(0.817)	(0.869)	(0.808)
Relative_size	0.045	0.037	0.045	0.036	0.045	0.036	0.033	0.044	0.033	0.045	0.033	0.045
	(0.149)	(0.196)	(0.151)	(0.197)	(0.152)	(0.196)	(0.254)	(0.154)	(0.257)	(0.147)	(0.253)	(0.155)
Size	0.001	-0.006	0.001	-0.006*	0.001	-0.007*	-0.001	-0.002	-0.001	-0.001	-0.002	-0.002
	(0.778)	(0.101)	(0.717)	(0.091)	(0.741)	(0.062)	(0.699)	(0.605)	(0.709)	(0.701)	(0.660)	(0.602)
Tobin's Q	-0.002	0.000	-0.002	0.001	-0.002	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.450)	(0.941)	(0.446)	(0.922)	(0.460)	(0.879)	(0.553)	(0.834)	(0.551)	(0.832)	(0.584)	(0.848)
Leverage	-0.015	0.015	-0.014	0.012	-0.013	0.013	0.007	-0.012	0.007	-0.013	0.006	-0.011
	(0.354)	(0.514)	(0.359)	(0.595)	(0.405)	(0.571)	(0.717)	(0.583)	(0.711)	(0.550)	(0.751)	(0.607)
Cash/assets	-0.011	-0.009	-0.010	-0.006	-0.011	-0.007	0.009	-0.039	0.010	-0.035	0.010	-0.037
	(0.665)	(0.778)	(0.682)	(0.842)	(0.664)	(0.834)	(0.670)	(0.266)	(0.659)	(0.316)	(0.653)	(0.294)

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Table 8 – continued from previous page

	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Governance	-0.002	0.002	-0.002	0.002	-0.002	0.002	-0.000	-0.002	-0.000	-0.002	-0.000	-0.002
	(0.558)	(0.542)	(0.597)	(0.485)	(0.580)	(0.552)	(0.918)	(0.522)	(0.943)	(0.553)	(0.949)	(0.501)
IO	-0.006	0.003	-0.005	0.002	-0.006	0.002	-0.032	0.037	-0.032	0.038*	-0.032	0.037
	(0.828)	(0.908)	(0.830)	(0.945)	(0.821)	(0.947)	(0.238)	(0.109)	(0.232)	(0.098)	(0.225)	(0.104)
Runup	-0.011	-0.033***	-0.010	-0.033***	-0.011	-0.033***	-0.011	-0.030**	-0.011	-0.030**	-0.011	-0.030**
	(0.486)	(0.009)	(0.484)	(0.008)	(0.476)	(0.007)	(0.474)	(0.011)	(0.470)	(0.011)	(0.464)	(0.012)
Sigma	0.237	0.237	0.264	-0.166	0.241	-0.180	-0.132	0.126	-0.121	0.201	-0.113	0.169
	(0.755)	(0.778)	(0.731)	(0.842)	(0.754)	(0.831)	(0.850)	(0.890)	(0.863)	(0.824)	(0.872)	(0.853)
Foreign_debt	0.005	0.001	0.005	0.002	0.005	0.001	0.000	0.004	0.001	0.003	0.000	0.003
	(0.507)	(0.878)	(0.510)	(0.811)	(0.496)	(0.936)	(0.957)	(0.541)	(0.954)	(0.571)	(0.966)	(0.665)
Intercept	-0.024	0.040	-0.027	0.037	-0.025	0.047	0.013	-0.014	0.012	-0.024	0.015	-0.015
	(0.611)	(0.455)	(0.557)	(0.484)	(0.597)	(0.381)	(0.778)	(0.802)	(0.797)	(0.653)	(0.754)	(0.785)
S&P Index fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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	586	594	586	594	586	594	565	606	565	606	565	606
R-squared	0.103	0.102	0.103	0.104	0.102	0.103	0.103	0.115	0.103	0.115	0.104	0.110