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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 with a sample of 1,369 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-sized acquirer. Related to the CAR improvement, acquirers with financial hedging programs also have lower implied stock volatilities and higher deal completion probabilities than those without such programs. In addition, financial hedging reduces acquirers' waiting costs, allowing the longer negotiation time between acquirers and targets. Finally, we find that financial hedging has a long-term effect on acquirer firm value such that derivatives users have better post deal long-run performance than non-users. Overall, our findings provide new insights on a link between corporate financial hedging and investment decisions.

Keywords: Cross-border M&As; Financial Risk Management; Derivatives
JEL classification: F31; G13; G32; G34

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Highlights:

- Acquirers with financial hedging programs have better cross-border M&A deal performance than acquirers without such programs.
- Corporate financial hedging adds firm value: a $174.3 million shareholder gain for an average acquirer.
- Financial hedging reduces the uncertainty of a cross-border M&A deal, lowers an acquirer's costs of waiting, and increases a deal completion probability.
- Financial hedging improves the post deal long-term performance.

1 Introduction

Active corporate risk management hedges a firms' future uncertainty and reduces the probability of negative realizations. Derivatives have become increasingly important corporate financial risk management instruments over the past three decades.[1] Theoretical supports for corporate financial hedging rely on the relaxation of Modigliani and Miller's (1958) perfect market assumption. The major incentives of non-financial firms to use derivatives are: financial distress costs (Mayers and 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 the corporate debt tax shield (Leland, 1998). Despite the theoretical groundwork in support of corporate financial hedging, researchers find mixed empirical evidence of the link between financial hedging and firm value (e.g., Guay, 1999; Hentschel and Kothari, 2001; Guay and Kothari, 2003; Nelson et al., 2005; Jin and Jorion, 2006). Moreover, few existing studies have established the direct channels through which financial hedging affects firm value.

In this paper, we investigate whether corporate financial hedging improves firm value through studying cross-border M&As, an important corporate activity.[2] Compared to domestic M&As, cross-border M&As involve extra risk elements due to the differences in 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 it is important to study the role of corporate risk management in cross-border M&As.

As shown in Figure 1, the timeline of M&A transactions can be divided into three time

[1]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 for 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.

[2]Thomson Reuters reports that global cross-border M&As reached its peak level of $1.8 trillion in 2007, accounting 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.

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).[3] An acquirer of a typical cross-border M&A encounters several financial risk exposures associated with the deal. During the pre-acquisition and the interim periods, an acquirer is exposed to new foreign exchange (FX) risk, because a foreign target's purchasing price is denominated in the target nation's currency. In addition, if an acquisition requires external financing, the acquirer will be exposed to additional interest rate (IR) risk. Firms with an existing risk management program have better ability and lower costs in hedging the transaction risks associated with both FX and IR. Furthermore, acquirers engaging in financial hedging have lower external financing costs (e.g., Campello et al., 2011; Chen and King, 2014). 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 risk management strategies in response to the new risk exposures associated with the acquisition. A firm with sophisticated risk management programs has the better ability to deal with the increased risk exposure in the integration process than those without such programs. After a deal completion, the acquirer's balance sheet FX risk exposure increases because the acquired assets and liabilities are denominated in a foreign currency. It is also reasonable to expect that an acquirer's cash flow FX risk exposure will increase in the future as well, if the original purpose of the cross-border acquisition is not to hedge the acquirer's existing FX risk.

In summary, firms with a risk management program in place have lower costs 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 mitigates the information asymmetry problem. Last but not least, derivatives users pay lower interest spreads and have less

[3]We follow Ahern and Sosyura (2014) to define these three time periods.

capital expenditure restrictions in their loan agreements, leading to lower borrowing costs when deals require external financing (Campello et al., 2011). For these reasons, we predict that financial derivatives users achieve better cross-border M&A outcomes than non-users.

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.[4] The 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 in our sample are exposed to financial risk during the cross-border 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 acquirers do use derivatives to actively manage their 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, and this effect is economically significant. 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 an average-sized acquirer. Related to the CAR improvement, financial hedging also affects other deal outcomes. Firstly, consistent with the classic hedging theory that financial derivatives reduce users' future uncertainty, we find that the implied volatilities of at-the-money (ATM) options written on acquirers' stocks at the deal announcements are lower for derivatives users than non-users. Secondly, consistent with the

[4]Little empirical research has studied corporate financial hedging after 2000 due to the change in accounting rules on derivatives information disclosure in firms' annual financial reports. Please refer to Appendix A for a further discussion on the changes in these accounting rules.

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 of completion than firms without such experience. Thirdly, because derivatives users can hedge payment risks during pre-acquisition and interim periods, they have lower costs of waiting than non-users. Offenberg and Pirinsky (2015) suggest that a deal's completion time is determined by the trade-off between the costs and benefits of waiting. Consistent with their results, we find that it takes derivatives users an average of 22.8 days more to complete a cross-border deal than non-users. 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.

Our results are robust whether the benchmarks of acquirer CARs are measured by the standard market model, the Fama–French three-factor model (Fama and French, 1993), or the Carhart four-factor model (Carhart, 1997). In robustness tests, we mitigate the concern of the "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 adopt 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 financial derivatives. 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 are more pronounced when foreign currency risks are higher.

Our study provides novel evidence on a link between corporate financial hedging

and investment activities. This paper contributes to both the financial hedging and M&A literature. Firstly, 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. The causal effect and endogeneity issue are minimized in our studies because the market reaction is not a firm choice variable. Secondly, unlike the previous hedging literature that focuses on Tobin's Q (Brainard and Tobin, 1968), our paper is the first one to study the market reaction to corporate financial hedging using an event study method. Thirdly, we demonstrate if and how corporate financial hedging affects firm value over a sample period which has received less attention in the corporate hedging literature. Finally, our findings have important implications for firm managers in evaluating and managing financial risks associated with cross-border M&As. Previous M&A literature indicates that interim period risk and information asymmetry increase with the growth of market level volatility. We show the importance of corporate financial hedging with derivatives as an effective tool 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. Section 6 reports robustness checks and discussions. Finally, Section 7 concludes the paper.

2 Related literature

2.1 Financial hedging and firm value

Corporate managers believe that financial hedging adds firm value. As a result, 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 to manage risks

efficiently and increase shareholder value.[5] Despite the widespread use of financial derivatives among U.S. firms, there has been limited understanding of the channels through which financing hedging can affect firm value.

In theory, 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&As, as a special type of global investment strategy, are associated with great cash flow uncertainty and often require external financing. DeMarzo and Duffie (1995) demonstrate that financial hedging is optimal when managers have private information on a firm's expected profits, and that investors can 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 than external investors, which offers more incentives for acquirers to hedge. Any disclosed data about the corporate use of derivatives can further alleviate the information asymmetry problem associated with cross-border M&As.

A recent strand of empirical literature extracts 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 a sample of 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

[5]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.

of these studies use Tobin's Q as a proxy for firm value. Our paper offers new insights 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 (e.g., Jorion, 1990; Bartov et al., 1996; Pritamani et al., 2004). Martin et al. (1999) study the FX sensitivity of 168 U.S. multinational firms with foreign operations 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 the percentage of foreign sales. Allayannis and Ihrig (2001) examine the FX exposures of 18 U.S. manufacturing industry groups. They find that these groups exhibit significant foreign exchange sensitivity and that there is a strong relationship between foreign exchange sensitivity and industry markups. On the other hand, previous studies report that for firms with few foreign operations or sales, only a small percentage of them exhibit significant FX exposure (e.g., Chow et al., 1997). In this paper, we focus on 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, leverage, and more investment. In this paper, we use the event study method and take 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 the 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 show the channels through which a firm's hedging strategies 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 sheds light on this question by providing evidence that acquirers with financial hedging programs have lower implied stock return volatilities at announcements and higher probabilities of deal completion. We also show that derivatives users can afford to take longer time to negotiate better deal terms due to reduced waiting costs.

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) find that cross-border M&As could increase acquirers' foreign currency exposures. 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 M&As, including the market reaction to the deal announcement, 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 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 the stock market volatility increases, because higher interim period risk during high market volatility periods make deals less attractive to both potential acquirers and targets. Bhagwat and Dam (2014) provide evidence that acquirers bear more interim period risk than targets. These studies focus on the effect of market uncertainty on M&As, while our paper investigates the uncertainty of the deal itself. Furthermore, these studies only investigate the importance of M&A related 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 temporarily improve their stock performance after deal announcements by strategically managing media coverage during the pre-acquisition period. 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 (e.g., Amihud and Lev, 1981; Garfinkel and Hankins, 2011; Hankins, 2011) take M&As 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 with derivatives may not be effective because of the incompleteness and short-term property of these contracts. In this paper, we show that financial hedging does add firm value by reducing cross-border M&A deal related risks. Both cash flow and balance sheet risks associated with cross-border M&As 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 contracts. 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. Because M&A acquirers often 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

In previous empirical studies, there is no consensus as to whether corporate financial hedging actually adds value. Recent literature has documented that financial hedging increases a firm's Tobin's Q and long-run performance, while reducing external debt financing costs, total risk, and idiosyncratic risk (e.g., Guay, 1999; Allayannis and Weston, 2001; Lin et al., 2009; Bartram et al., 2011; Campello et al., 2011). However, two concerns remain on these findings. Firstly, it is difficult to reject the reverse causality explanation that firms with 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 engaging in a cross-border M&A deal is naturally exposed to FX risk, because the assets and liabilities of a target are denominated in the target's local currency and the acquirer will annex new foreign operations after the deal completion. The market reaction to cross-border M&A announcements is neither a firm characteristic nor a firm choice variable. Employing the standard event study approach in the M&A literature, we develop and test five hypotheses.

As shown in Figure 1, three time periods are defined along a typical M&A deal timeline. During the pre-acquisition period, firms with existing risk management programs have higher ability and lower costs to evaluate the financial risks associated with potential cross-border M&As. The financial hedging experience helps acquirers to make better decisions when choosing foreign targets. During the interim period, financial hedging reduces the transaction risk, which includes FX risk as well as IR risk if external financing is needed. After the deal completion, an acquirer with hedging experience can design more effective risk management strategies for the combined entity in the integration process. During the post-acquisition period, an acquirer's balance-sheet FX risk will increase, be-

cause 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 after cross-border M&As. 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 will 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.*

Related to the first hypothesis, we further investigate whether the use of derivatives may actually affect other deal outcomes related to the 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&As, the information on their hedging experience still sends investors a positive signal about the ability of management teams and reduces information asymmetry. Therefore, we predict that the market perceived stock return volatilities at deal announcements are lower for financial derivatives users than non-users.

- ***Hypothesis (H2):*** *The market perceived stock return volatilities at 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&As. Furthermore, when financial derivatives users choose to specifically hedge the financial risk associated with cross-border M&A deals, these derivatives contracts represent a contractual commitment to carry out the deal. As a result, financial derivatives users are more committed to M&A deals than non-users. Targets might also have more confidence in acquirers' ability to complete deals if acquirers are able to hedge deal payment risks. For these three reasons, we hypothesize that the hedging experience of acquirers increases the probability of successfully acquiring foreign targets.

- ***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 time, we hypothesize that financial hedging reduces the costs of waiting. Hedgers can thus afford to take longer time to carefully review the transaction details and negotiate more favorable deal terms than non-users. Besides, established hedging programs manifest acquirers' conservative attitude towards risks. So derivatives users are more inclined to take more time to carefully evaluate the transaction terms and potential deal risks.

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

Previous literature finds that financial hedging increases firm value in terms of Tobin's Q (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 derivatives 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. We start with all deals announced between January 1, 2000 and December 31, 2014. The sample begins in 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 fiscal years after 2000.[6]

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

3. The deal status is completed, withdrawn, or pending.[7]

4. We exclude all transactions that are labeled 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.

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

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

7. The percent of target shares held by the acquirer is 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. The reason is that financial firms are market makers who use financial derivatives with different motivations than 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 included in the S&P 1500 when deals were announced.[8] Lastly, we link our sample with 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 derivatives use data from the acquirer's 10-K or 10-K405 reports filed in the fiscal year preceding the deal announcement. All reports are collected from SEC's EDGAR electronic filing system. We require that an acquirer should have filed at least one 10-K or 10-K405 report when the deal was announced. Our final sample consists of 1,369 deals.[9]

We search the following keywords in order to locate the information of financial derivatives: "Item 7A", "derivative", "derivative(s) instrument(s)", "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

[8]The 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.

[9]Following the international finance and cross-border M&A literature, we delete observations in which the acquirer nations are Bermuda, Cayman Islands, Ecuador, and Netherlands Antilles.

payable".[10] 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 the management of 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 (e.g., Allayannis and Ofek, 2001; Allayannis and Weston, 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 whether a firm hedges FX risk between the 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 firm engages in financial hedging at all; 5) Hedging_scope, a 0/1/2 categorical variable indicating whether a firm hedges FX and/or IR risks; 6) Nv_derivatives, the notional 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.[11]

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), and foreign sales information from Compustat Segments Files. Among all 1,369 deals, we are able to collect geographical segment information for 1,323 deals. Following Allayannis and Weston (2001), we assume

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

[11] 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

that there are no foreign sales for the remaining 46 deal acquirers.[12]

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 macroeconomic shocks. The total number of deals drops twice following the burst of the Dot-com bubble in 2000 and the global financial crisis around 2008. There is a decrease of 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 and non-users exhibit a very similar time-series pattern as the total number of 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, suggesting that merger activities are positively correlated with the valuation of the stock market (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 relative to other world currencies during our sample period.

Panel A of Table 1 presents the distribution of our cross-border M&A sample by target nation/region. Our sample includes 1,369 cross-border M&As from a total of 58 different nations/regions. The top five target nations are the U.K. (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

[12] In unreported tests, we set the foreign sale as missing. All results remain unchanged.

Coal; and Consumer Durables are the three industry groups with the smallest number of observations and account for 13% of the deals in our sample. Panel A and B show that our sample includes targets from a wide range of nations/regions and that U.S. acquirers spread out in different industry groups, indicating our sample being fairly representative and well diversified.

Panel C of Table 1 presents summary statistics of our hand coded hedging variables. A detailed description of these hedging variables can be found in Appendix C. Among the 1,369 M&As, 994 (72.6%) deal acquirers report holding either FCD or IRD in the fiscal year preceding the deal announcement. Since 2000, it is no longer mandatory for U.S. public firms to report the notional value of their derivatives contracts when SFAS 133 became effective. However we find that among 994 deal acquirers engaging in financial hedging, 820 still voluntarily report the notional value of their derivatives contracts after SFAS 133 superseded SFAS 119. Among all 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 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 predictable FX exposures. Some studies also find that foreign debt issued for motivation other than hedging increases a firm's FX exposure, thus increasing the firm's incentive to use FCD.

Panel D of Table 1 presents summary statistics of deal and acquirer characteristics. Appendix C provides 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 samples. In total, we have 1,276 completed deals and 93 withdrawn deals. Deals initiated by derivatives users are less likely to use equity as a payment method. 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 and leverage, but smaller cash holding, institutional ownership, Runup, and Sigma.[13] We don't find a statistically significant difference in Tobin's Q between the user and non-user samples in the univariate test.[14]

5 Empirical results

5.1 Financial hedging and acquirer 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. Acquirers' CARs are measured over a window of $(-5, +5)$, where day 0 is the deal announcement date.[15]

Panel A of Table 2 reports the results of OLS regressions with robust standard errors for the $1,276$ completed deals. The dependent variables in all seven regressions are acquirer CARs around deal announcements. The independent variables of interest are corporate financial hedging proxy variables: the foreign currency derivatives user indicator (Fcd), the financial derivatives user indicator (Fcd/Ird),[16] the hedging scope indicator (Hedging_scope), and the notional value of financial derivatives normalized by acquirers' total

[13]Following Golubov et al. (2012), Runup is defined as the market adjusted buy-and-hold return of the acquirer's stock over the $(-205, -6)$ window, and Sigma is defined as the standard deviation of the acquirer's market-adjusted daily return over the same window.

[14]This does not conflict with the findings in previous hedging literature, because Tobin's Q is not measured cross-sectionally in our sample.

[15]We estimate the market model following the existing literature (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. The results are also robust to alternative CAR windows such as $(-3, +5)$ and $(-1, +5)$.

[16]We don't include Ird as a hedging proxy variable because the direct effect of IR risk hedging on acquirer CARs is conditional on the issuance of debt by acquirers to finance cross-border M&As. We include Fcd/Ird as a hedging proxy variable because it indicates whether an acquirer has an established hedging program or not.

assets (NV_derivatives). We control for year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects in all regressions.

In columns 1–4, Fcd is the independent variable for financial hedging. In column 1, we do not include any control variables. Next we control for deal characteristics in column 2 and then add acquirer characteristics in column 3. In column 4, we add one more control variable, Foreign_debt, to control for the impact of foreign currency denominated debt on acquirer FX exposures (Kedia and Mozumdar, 2003). The coefficients for Fcd remain positive and statistically significant in all four regressions. These results suggest that cross-border M&A acquirers engaging in FX risk hedging activities have significantly higher CARs than non-hedgers at deal announcements. The improvement of CARs is economically significant as well. Using column 4 as an example, foreign currency derivatives users have an average 0.9% improvement on acquirer CARs, which is equivalent to $ 174.3 million shareholder value for an average-sized acquirer.

In column 5, we replace Fcd with Fcd/Ird, a broader indicator of financial hedging that includes the use of interest rate derivatives. The coefficient of Fcd/Ird remains positive and statistically significant. The same is true when we replace Fcd with Hedging_scope in column 6 and with NV_derivatives[17] in column 7. Overall, we find that derivatives users have significantly higher CARs than non-users, after controlling for various acquirer and deal characteristics. In addition, we find that acquirers with higher hedging scope (Hedging_scope) and more extensive hedging programs (NV_derivatives) experience higher announcement returns when compared with those with lower hedging scope and less extensive hedging programs.

The summary statistics in Panel D of Table 1 show that derivatives users and non-users significantly differ in firm sizes. Thus an alternative explanation of results in Panel A of Table 2 is that firms with larger size have higher acquirer CARs in cross-border M&As. Although firm size is already controlled in the OLS regressions as an acquirer

[17]Over our sample period 2000–2014, U.S. public companies are required to report the fair value of their derivatives positions. NV_derivatives is a noisy proxy for hedging scope and suffers self-selection reporting biases. Therefore, we focus on hedging indicator variables in the rest of our empirical analyses.

characteristic, we next estimate acquirer CARs using the Fama–French three-factor model as the benchmark, which directly eliminates the size effect from acquirer CARs. The summary statistics in Panel D of Table 1 also show that derivatives users and non-users significantly differ in their pre-announcement stock return runups. In order to rule out the momentum effect from acquirer CARs, we also calculate acquirer CARs using the Carhart four-factor model, which is the Fama–French three-factor model augmented by the Carhart momentum factor. Panel B of Table 2 shows that financial hedging continues to exhibit statistically positive effects on acquirer CARs when both size effect and momentum effect are controlled in the estimation of acquirer CARs.

Assuming that the OLS regression models in Panel A and Panel B of Table 2 are correctly specified, one question still remains: do the coefficients of hedging proxies actually measure the effect of corporate financial hedging? The answer is "no" if a typical acquirer who chooses to use financial derivatives would have higher CARs whether it engages in financial hedging or not. Then the hedging proxies actually represent for certain unobservable firm characteristics that drive higher acquirer CARs. This self-selection problem has been defined as the treatment effect in previous literature (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 (e.g., Wooldridge, 2010). Geczy et al. (1997) find that the use of other derivatives, the number of following financial analyst firms, R&D expenses, and foreign sales are all positively correlated with the likelihood that a firm uses currency derivatives.[18] Therefore, we use Commodity, Analyst_number, RD, and Foreign_sales/Sales as the instrument variables in the first-step treatment equation.

[18]The use of other derivatives is a proxy for economies of scale. Firms that use other hedging instruments have better hedging expertise and lower costs of establishing the foreign currency hedging program. The number of following financial analysts is a proxy for the pressure which managers receive on their firm performance. The more analysts following a firm, the higher probability that the firm engages in financial hedging to reduce the variation in firm performance. R&D expenses represent a firm's growth opportunities. The mismatch between domestic R&D expenses and foreign revenues motivates firms to engage in foreign currency hedging. The ratio of foreign sales to total sales indicates an acquirer's exposure to foreign currency risk. Higher foreign currency risk exposure is associated with greater potential hedging benefits and leads to the higher probability of FX hedging.

Table 3 presents the regression results of the treatment effect model. In the first-step treatment regressions, we use probit models in which the dependent variable is the hedging indicator variable Fcd.[19] Consistent with Geczy et al. (1997), the coefficients of Commodity and Foreign_sales/Sales are positive and statistically significant. However the coefficients of Analyst_number and RD are statistically insignificant. In the second-step outcome equations, the dependent variables are acquirer CARs estimated by the market model, the Fama–French three-factor model, and the Carhart four-factor model, respectively. We find that the coefficients of Fcd remain positive and statistically significant. Our findings that derivatives users have better CARs than non-users are robust after controlling for the treatment effect.

5.2 Other deal outcomes related to the acquirer CAR improvement

In this section, we investigate whether financial hedging affects other cross-border M&A deal outcomes, including acquirer stock return volatility, deal completion probability, and deal completion time.

5.2.1 Financial hedging and acquirer stock return volatility

High stock return volatility creates more information asymmetry between acquirer managers and outside investors, leading to higher external financing costs and more uncertainty on payments if the method of payment include stocks. We study the market's expectation of an acquirer's future stock volatility, namely implied volatility, at the cross-border M&A announcement dates. 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 ATM options with time to maturity of 30, 60, and 91 days, respectively. Our implied volatility variables are calculated as the average implied volatility of ATM call and put options with the same time to maturity.

[19] In unreported tests, we replace Fcd by Fcd/Ird and our results are robust.

In Panel A of Table 4, 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 for each sample, followed by the t-test and Wilcoxon test statistics on the mean difference between the two samples. For both measures of financial hedging and all three time to maturities, the implied volatility is significantly smaller at the 1% level for derivatives users.

Following Duchin and Schmidt (2013), we report the OLS regression results of implied volatility variables on hedging proxies in Panel B of Table 4. In all regressions we control for year and industry fixed effects. All coefficients for the two hedging proxies are negative and statistically significant at the 1% level, suggesting that hedgers have lower market perceived future stock return uncertainty than non-hedgers at announcement dates. Similar results are also found if we control for acquirer firm size and deal relative size in these regressions.

In summary, the implied volatility of derivatives users is lower than non-users at announcement dates, which indicates lower deal risks and leads to less information asymmetry. These results represent one possible explanation on the improvement of CARs which we documented in Section 5.1.

5.2.2 Financial hedging and the probability of deal completion

Before the completion of a cross-border M&A, an acquirer needs to evaluate a target's financial risk and bear the transaction risk. The probability of deal completion will increase with acquirers' hedging experience for three reasons. Firstly, because it is costly to establish hedging programs and the hedging positions will result in a contractual commitment to carry out the deal, a pre-established foreign currency hedging position for the target nation's currency signals the acquirer's commitment. Secondly, an established financial hedging program can help acquirers to evaluate the deal related financial risk and reduce the transaction risk exposure. It is less likely for acquirers with hedging experience to withdraw a deal due to the unexpected shocks in the financial market. Finally, hedging

reduces the implied volatility of acquirer stock returns and information asymmetry. Thus for deals involving stock payments, target shareholders are more willing to accept acquirer stocks. Furthermore, because derivatives users have lower external financing costs than non-users, they can offer more competitive terms to target firms in deal negotiations.

Columns 1–4 of Table 5 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 derivatives 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 for public companies and that shares of private firms are more concentrated (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 that tender offers have a positive effect on the deal completion probability while hostile deals and sigma value have a negative effect.

5.2.3 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 in a timely manner and can take more time to carefully review the deal terms.

Financial hedging activities may also reveal the conservative risk preference of acquirers. Therefore these acquirers spend a longer time on evaluating targets and negotiating better deal terms. Moreover, the more deliberate consideration and negotiation may result in better acquirer long-term performance, which we will investigate in the next section.

Table 6 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 it takes financial derivatives users 69 days to close a deal, while it takes non-users 54 days for deal completion. The differences in average completion time between the user and non-user samples are statistically significant. Panel B presents the tobit regression analysis[20] of the completion time on hedging variables, controlling for various acquirer and deal characteristics. Consistent with the univariate test results, we find that the coefficients of hedging variables are all positive and statistically significant, suggesting that it takes derivatives users longer to close cross-border M&As than non-users. For example, it takes an acquirer with FX or IR hedging experience 23 days more to complete a cross-border M&A than a firm without such experience at all.

5.3 Financial hedging and long-term performance

The above findings suggest that financial hedging may help acquirers to evaluate foreign targets, negotiate favorable deal terms, and manage the financial risk of the combined entity. Furthermore, acquirers with established hedging programs have a better ability to adjust their existing risk management strategies to accommodate targets' financial risk exposures during the integration process. To test whether these benefits have been capitalized in firms' long-term performance, we study whether the long-term operating performance of derivatives users differs from that of non-users and present our results in Section 5.3.1. We

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

further compare the long-term stock performance between derivatives users and non-users in Section 5.3.2.

5.3.1 Long-term operating performance

Following Huson et al. (2004) and Guercio et al. (2008), we compute changes in operating return on assets ($\triangle ROA$) to measure acquirer post-merger long-term operating 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.[21] This method controls for mean reversion in accounting performance of firms experiencing substantial corporate events or extreme performance.

We use two hedging measures (Fcd and Fcd/Ird) to identify an acquirer's hedging program. 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 7. The average changes in $\triangle ROA$ 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 in $\triangle ROA$ between the two sub-samples are mostly significant for both the t-test and the Wilcoxon test. These results show that acquirers with hedging programs tend to have better long-term post-deal operating performance than acquirers without such programs.

5.3.2 Long-term stock performance

Besides long-term operating performance, we also study acquirer post-deal long-term stock performance. As noted by Kothari in the Handbook of Corporate Finance (Eckbo, 2007), risk adjustment is critically important in assessing the long-term performance of event studies. The key is that risk should be estimated based on the stock performance

[21] 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.

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 any 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 also require benchmark firms to be in the same industry as the acquirers. In summary, we match each acquirer to a firm from the same industry (2-digit SIC code), with similar size ($\pm 10\%$), and with closest book-to-market ratio.

Panel B of Table 7 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_scope. After controlling for various acquirer and deal characteristics, the coefficients of the three hedging measures are positive and statistically significant for all three time windows. 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, the results in Table 7 illustrate that financial hedging improves an acquirer's long-term operating and stock performance after cross-border M&As. This positive impact is more significant for acquirers with a larger variety of hedging programs. Our finding is consistent with the view that a financial hedging program could effectively hedge away some FX and IR risks involved in a cross-border M&A deal, resulting in an improvement of the long term post-deal performance. Our findings in Section 5.2.3 also demonstrate that acquirers with financial hedging program spend more time on negotiating more favorable deal terms, leading to better long-term post-deal performance.

6 Robustness tests and discussions

In this section, we provide robustness checks and further discussions of our main results.

6.1 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 Nelson (1959), who documents different merger frequencies in different industries. Similar studies on various types of shocks have been proposed more recently, such as deregulation (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). The stock market volatility is also critically influential on merger activities. Bhagwat et al. (2014) find 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 actual offer prices in U.S. dollars, which introduces great uncertainty for acquirers before deal completion dates. High currency volatility not only increases the acquirer's payment risk during the interim period, but also increases its subsequent cash flow risks and balance-sheet risks. Overall, high currency volatility is an unfavorable market condition for cross-border acquirers. We expect that financial hedging improves acquirer performance more in a high exchange rate volatility regime than in a low exchange rate volatility regime.

Table 8 presents OLS regression results 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 U.S. dollar index returns prior to deal announcements as the measure of foreign currency volatility. In columns 7–12, we use the standard deviations of 12 monthly returns of exchange rates between the U.S. dollar and the target nation's currency before deal announcements as the measure of foreign currency volatility. As shown in Table 8, the coefficients for all financial hedging measures are positive and statistically significant 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 periods of high currency risk, acquirers with financial hedging programs perform better than those without such programs. But this hedging benefit is not significant when the exchange rate volatility is low.

6.2 Acquirer CARs and foreign operation exposures

It is possible that an acquirer's foreign currency hedging activities are related to its existing foreign operation exposures before a cross-border M&A. An acquirer may choose to hedge foreign currency risk because of its knowledge of the foreign markets. While firms without or with less such exposures and knowledge may choose not to hedge. In other words, it may be the acquirer's knowledge about foreign markets rather than the financial hedging itself that leads to the improved deal performance documented in our empirical tests.

To mitigate this concern, we study whether an acquirer's foreign operation exposures can explain its CARs. We use Foreign_sales/Sales (the percentage of acquirer foreign sales to total sales) as the proxy for the foreign operation exposures. Then we replace financial hedging variables by Foreign_sales/Sales in the OLS regressions described in Table 2. As shown in Table 9, the coefficients of Foreign_sales/Sales are statistically insignificant both in a single-variable regression and in a multivariate regression controlling for various deal and acquirer characteristics. It suggests that the improvement in acquirer CARs is not caused by acquirers' foreign operation activities, but by their financial hedging.

6.3 Other hedging methods

Besides hedging with financial derivatives, natural hedging and operational hedging are also commonly used methods to reduce foreign currency exposures by non-financial firms. Natural hedging refers to the approach that a firm finances an international operation in the local nation's currency in order to naturally hedge its foreign currency cash inflow. It is commonly used by firms with long-term operating exposures of foreign currency risk. In our previous tests, we include foreign currency denominated debt as a control variable and the coefficients of our hedging proxies are still statistically significant. This is not surprising given that a portion of risk exposures associated with cross-border M&As are in the near future and with a predictable amount. Financial derivatives are effective tools in managing risk exposures of this nature. Our findings suggest that it is beneficial for acquirers to hedge these risk exposures with financial derivatives, even if the acquirers may also adopt natural hedging as a complement.

Operational hedging refers to the strategy that a firm shifts its production facilities or sources of inputs in order to match its costs and revenues in the same currency. Kim et al. (2006) find a substitute relationship between financial hedging and operational hedging for non-financial firms. 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 the 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 being 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, our findings that financial hedging significantly improves acquirer CARs at deal announcements remain valid.

6.4 Reverse causality

One of the major concerns in the corporate financial hedging literature is the potential reverse causality: firms with better outcomes may choose to hedge financial risks by derivatives. This issue is mitigated in our study for two reasons. Firstly, acquirer CARs represent the market reaction to cross-border M&A announcements, and the market reaction is neither a firm characteristic nor a firm choice variable. Secondly, the corporate financial hedging data are collected at the end of fiscal years prior to deal announcement dates. The chronological order of acquirer hedging activities and CARs naturally eliminates the reverse causality concern.

6.5 Target country fixed effect

In the previous cross-border M&A literature, country fixed effects are controlled if CARs are estimated for acquirers from different countries. In our empirical tests, all CARs are estimated within the same country: the U.S. However, it is still possible that U.S. acquirers have different risk exposures in different target countries and this difference is non-random. In unreported tests, we estimate the OLS regressions in Panel A of Table 2 and control for target country fixed effects. We find that our findings are robust after controlling target country fixed effects.

7 Summary and conclusions

Using hand-collected data on reported derivatives contracts by S&P 1500 firms, we study whether financial hedging adds value when companies engage in cross-border M&As. We find that acquirers with financial hedging programs have higher CARs than acquirers without such programs. We also show that financial hedging correlates with lower implied volatility of acquirer stocks at deal announcements, a higher deal completion probability, and a longer completion time. The improvement on these short-run outcomes is not temporary. Derivatives users have better post deal long-run performance than non-users. Our

results are consistent with the optimal hedging theories that financial hedging limits the negative realizations of future outcomes, which leads to less information asymmetry, lower external financing costs, and lower waiting costs.

We overcome two main challenges in empirical studies on corporate financial hedging. Firstly, with an event study research method, our results are not subject to the reverse causality concern that firms with better performance choose to use derivatives. Becasue the market reaction to cross-border M&As is not a firm choice variable, our results demonstrate the causal effect of hedging on firm value. Secondly, the selection bias concern that firms without ex ante risk exposures choose not to hedge is minimized in our study, because firms engaging in cross-border M&As all have FX exposures even if some of these firms do not have such exposures ex ante.

Overall, our results provide direct evidence that financial hedging increases firm value, especially when a company faces high future uncertainty in a cross-border M&A deal. Our findings also shed light on the value of financial hedging for firms engaging in other types of investment or financing activities, such as foreign direct investment, foreign joint-venture, and raising capital in foreign markets. Our paper contributes to the accounting literature of the financial reporting. The improvement on the quality of derivatives disclosure can help investors and financial analysts to better evaluate a company's risk management ability and thus make more informed decisions. From a policy perspective, regulating authorities around the world should require more transparency on the disclosure of derivatives information.

Appendix A

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

Published in 1990, SFAS 105 represents the first step taken by the 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 the concentrations of credit risk from counterparties. The FASB further improved disclosure standards 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, the 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 a trading purpose or a hedging purpose.

Because of the debate on how financial instruments and transactions should be recognized and measured, the FASB revised disclosure standards about financial instruments in SFAS 133, published in 1998. SFAS 133 supersedes SFAS 105, 107, and 119 to establish new accounting and reporting standards for financial 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 FASB concludes that fair value is the most relevant measure for financial instruments and the only relevant measure for financial 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.

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 lead to more volatile short-term firm earnings and therefore deter corporate financial hedging activities. Despite the debate, few corporate hedging studies have their sample spanned over the post-2000 period. The reason is that fair value of financial instruments depends on the market prices of underlying assets and cannot be appropriately used as a proxy for a firm's hedging scope.

To take advantage of the improved financial 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 focus mainly on derivatives indicator variables because the notional values of FCD and IRD are not reported for all derivatives users

in our sample. We find that 82.5% of hedgers still voluntarily report the notional values of their outstanding financial instruments.

Appendix B

This appendix lists the selected examples of our cross-border M&A sample deals in which U.S. acquirers use financial derivatives to hedge the financial risks associated with the deals. All statements are collected from 10-K reports. Deal numbers are listed before colons.

1815015040: Jabil Circuit, Inc. announced the acquisition of Taiwan Green Point Enterprises (Taiwan, New Taiwan Dollar) on 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 the acquisition of Newdeal Technologies SA (France, Euro) on 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 U.S. 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 the acquisition of Intec Telecom Systems PLC (UK, Pound Sterling) on 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 the acquisition of Merck KGaA-Generic Drugs (Germany, Euro) on 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 the acquisition of Yoplait SAS (France, Euro) on 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 the acquisition of Forbo-Adhesives Operations (Switzerland, Swiss Franc) on 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, FF refers to Kenneth French's web site at Dartmouth, 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		
$CAR\_[X,Y]$	Cumulative abnormal returns over the event window $[X,Y]$ days surrounding acquisition announcement, using the market model with the CRSP value-weighted index, the Fama–French three-factor model, and the Carhart four-factor model, respectively.	CRSP/FF
Implied volatility	The implied volatility of acquirer stock returns at the time of deal announcement. It is calculated as the average implied volatilities of the at-the-money (ATM) call option and the ATM put option with the same maturity.	Option Metrics
BHAR (Control Firm)	Acquirer 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	Acquirer abnormal return on an 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 operating performance (±10% ROA) in the fiscal year preceding the deal announcement.	Compustat
Completion	Indicator variable: 1 for deals that is completed, 0 for withdrawn deals.	SDC/LexisNexis
Completion_time	Number of days between the deal announcement date and the effective date.	SDC/LexisNexis
Deal characteristics		
Hostile	Indicator variable: 1 for hostile deals, 0 otherwise.	SDC
Tender	Indicator variable: 1 for tender offers, 0 otherwise.	SDC
Cash	Indicator variable: 1 for deals financed fully with cash, 0 otherwise.	SDC
Equity	Indicator variable: 1 for deals financed partially or fully with stock, 0 otherwise.	SDC

Continued on next page

Table C1 – continued from previous page

Variable	Definition	Source
Related_industry	Indicator variable: 1 if the target and the acquirer have the same two-digit standard industrial classification (SIC) code, 0 otherwise.	SDC
Toehold	Indicator variable: 1 if the acquirer has already held a certain percent of the target shares at the announcement, 0 otherwise.	SDC
Transaction_value	Value of transaction, in million dollars.	SDC
Relative_size	The ratio of transaction value to acquirer market value at the end of the fiscal year before the deal is announced.	SDC/Compustat
Firm characteristics		
Nonpublic	Indicator variable: 1 if the target is not a public firm, 0 otherwise.	SDC
Leverage	Acquirer's ratio of book value of debt to book value of total assets at the end of the fiscal year before the deal is announced.	Compustat
Tobin's Q	Acquirer's Tobin's Q at the end of the fiscal year before the deal is announced, following Baker and Wurgler (2002).	Compustat
Assets	Acquirer's total assets book value.	Compustat
Size	Natural log of acquirer's market value, adjusted for inflation.	Compustat
Cash/assets	Acquirer's cash and marketable securities, normalized by book value of assets.	Compustat
IO	Percentage 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	Acquirer's research and development expense in the fiscal year preceding the deal announcement, normalized by total sales (Geczy et al., 1997).	Compustat
Foreign_sales/Sales	The ratio of the acquirer's foreign sales over its total sales 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

Continued on next page

Table C1 – continued from previous page

Variable	Definition	Source
Governance	Following Bebchuk et al. (2009), 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 acquirer board directors are divided into separate classes with unequal voting rights, 0 otherwise.	ISS
Labylw_indicator	Indicator variable: 1 if the acquirer limited shareholder's ability through majority vote to amend the corporate bylaws, 0 otherwise.	ISS
Lachtr_indicator	Indicator variable: 1 if the acquirer limited shareholder's ability through majority vote to amend the corporate charter, 0 otherwise.	ISS
Supermajor_indicator	Indicator variable: 1 if the acquirer requires more than a majority of shareholders to approve a merger, 0 otherwise.	ISS
Gparachute_indicator	Indicator variable: 1 if the acquirer 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 acquirer has a poison pill clause, 0 otherwise.	ISS
Acquirer financial hedging characteristics		
Fcd/Ird	Indicator variable: 1 if the acquirer either uses foreign currency derivatives or interest rate derivatives in the fiscal year before deal announcement, 0 otherwise. Possible values: 0, 1.	EDGAR 10-K
Hedging_scope	Indicator variable: 2 if the acquirer uses both of the two types of derivatives contracts (FX and IR) in the fiscal year before deal announcement, 1 if the acquirer uses only one of the two types of derivatives contracts (FX or IR), 0 if the acquirer does not use foreign currency derivatives or interest rate derivatives. Possible values: 0, 1, 2.	EDGAR 10-K
Fcd	Indicator variable: 1 if the acquirer uses foreign currency derivatives in the fiscal year before the deal announcement, 0 otherwise.	EDGAR 10-K
Fcd_target	Indicator variable: 1 if the acquirer uses target nation's currency derivatives in the fiscal year before the deal announcement, 0 otherwise.	EDGAR 10-K
Ird	Indicator variable: 1 if the acquirer uses interest rate derivatives in the fiscal year before the deal announcement, 0 otherwise.	EDGAR 10-K

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Table C1 – continued from previous page

Variable	Definition	Source
Commodity	Indicator variable: 1 if the acquirer uses commodity derivatives contracts in the fiscal year before the deal announcement, 0 otherwise.	EDGAR 10-K
Foreign_debt	Indicator variable: 1 if the acquirer uses debt denominated in foreign currencies in the fiscal year before the deal announcement, 0 otherwise.	EDGAR 10-K/SDC Global New Issues
Nv_derivatives	Notional value of the financial derivatives contracts held by the acquirer at the end of the fiscal year before the deal announcement, normalized by the acquirer's total assets.	EDGAR 10-K

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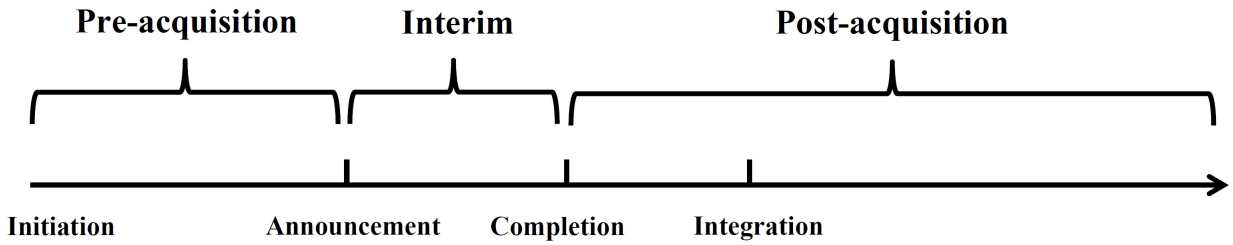
Figure 1: Financial risks along a cross-border M&A timeline. This figure presents a typical cross-border M&A timeline and the associated financial risks at different phases of the deal. We define the pre-acquisition period to be between the deal initiation date and the announcement date. During this period, acquirers and targets privately negotiate with each other. Next we define the interim period to be between the announcement date and deal completion date. Finally, we define the post-acquisition period as the period after the deal completion date, which can be further divided into the integration stage and the post-integration stage.



- Pre-acquisition period: Evaluating target's financial risk
- Interim Period: Transaction risk
  - Transaction risk refers to the uncertainty that the U.S. dollar value of a target's price and the external financing costs change with the foreign exchange rate and the interest rate between the deal initiation and the deal completion.
- Post-acquisition period: Integration risk, Balance-sheet risk, Cash flow risk
  - Integration risk refers to the uncertainty for an acquirer when designing new financial risk management programs of the combined entity during the integration period.
  - Balance-sheet risk refers to the uncertainty on the U.S. dollar value of acquired assets or liabilities, due to the movement of foreign exchange rates.
  - Cash flow risk refers to the uncertainty on the U.S. dollar value of future operating cash flows, due to the movement of foreign exchange rates.

Figure 2: Distribution of cross-border M&As by year. This figure presents annual numbers of cross-border M&As initiated by S&P 1500 companies between 2000 and 2014. We also plot the annual numbers of cross-border M&As initiated by derivatives users and non-users using two solid lines. The two dotted lines represent the S&P 1500 index annual returns (multiply by 100) and the annual trade-weighted U.S. dollar index levels.

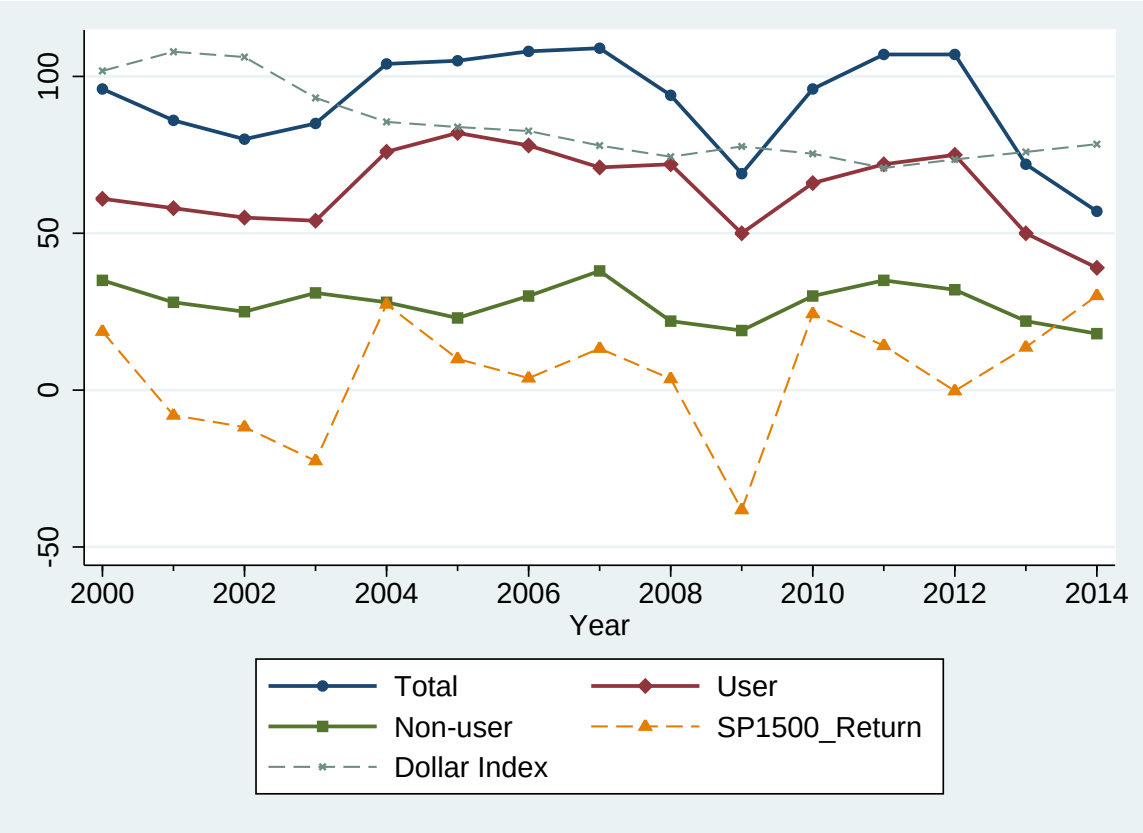


Table 1: Descriptive statistics

Panel A. Distribution of cross-border M&As by target country/region. This panel presents the numbers of cross-border M&A deals by target country/region. Our final sample includes 1,369 cross-border M&As between 2000 and 2014. All acquirers are S&P 1500 companies and targets are from 58 different foreign countries or regions.

Nation	Frequency	Pct.	Nation	Frequency	Pct.	Nation	Frequency	Pct.
United Kingdom	294	21.48	Norway	22	1.61	Taiwan	10	0.73
Canada	219	16.00	Belgium	21	1.53	Chile	9	0.66
Germany	134	9.79	Denmark	20	1.46	Russian Fed	9	0.66
France	89	6.50	Italy	20	1.46	Hong Kong	6	0.44
Australia	57	4.16	South Korea	19	1.39	Poland	6	0.44
Israel	48	3.51	Ireland-Rep	18	1.31	Austria	5	0.37
Switzerland	46	3.36	Japan	15	1.10	Luxembourg	5	0.37
Netherlands	44	3.21	Mexico	14	1.02	New Zealand	5	0.37
China	37	2.70	Spain	13	0.95	South Africa	5	0.37
Sweden	37	2.70	Argentina	11	0.80	Egypt	4	0.29
India	36	2.63	Finland	11	0.80	Others	37	2.69
Brazil	32	2.34	Singapore	11	0.80	Total	1,369	100

Panel B. Distribution of cross-border M&As by acquirer industry. This panel presents the numbers of cross-border M&A deals by acquirer's industry. Our sample includes 1,369 cross-border M&As between 2000 and 2014. All acquirers are S&P 1500 companies and targets are from 58 different foreign countries or regions. We assign 1,369 deal acquirers into Fama–French 10 industries based on the SIC code of the acquirers, excluding financial and public utility industries.

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, 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, TVs, Furniture, Household Appliances	41	2.99
Total	1,369	100

Panel C. Summary statistics of hand coded variables. This panel presents the 1,369 cross-border M&A acquirers' hedging information which we collect from their 10-K reports on EDGAR. The sample period is between 2000 and 2014. All acquirers are S&P 1500 companies and targets are non-U.S. companies. All variables are estimated in the fiscal year before the deal announcement. Fcd is equal to 1 if an acquirer engages in FX hedging, and 0 otherwise. Fcd_target is equal to 1 if an acquirer engages in FX hedging on the corresponding target's currency, and 0 otherwise. Fcd/Ird is equal to 1 if an acquirer engages in either FX and/or IR hedging, and 0 otherwise. Nv_derivatives (for hedgers) represents the total notional value of FX and IR contracts held by an acquirer, normalized by acquirer total assets. Ird is equal to 1 if an acquirer engages in IR hedging, and 0 otherwise. Hedging_scope is equal to 2 if an acquirer engages in both FX and IR hedging, 1 if an acquirer engages in either FX or IR hedging, and 0 if an acquirer does not hedge at all. Commodity is equal to 1 if an acquirer engages in commodity price hedging. Foreign_debt is equal to 1 if an acquirer has debt denominated in foreign currencies.

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_scope	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. Summary statistics of key control variables. This panel presents summary statistics for 1,369 cross-border M&A deals in our sample. The sample period is between 2000 and 2014. All acquirers are S&P 1500 companies and all targets are non-U.S. companies. Summary statistics are presented for the full sample, financial derivatives user sample, and non-user sample. The last column reports the significance levels of the t-test on the difference between the two sub-groups. All variables are defined in Appendix C. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Full Sample			Derivatives User			Non-user			
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Diff**
Deal characteristics										
Completion	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										
Size	1,369	8.49	1.69	994	8.82	0.05	375	7.62	0.07	***
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: Acquirer announcement returns and financial hedging characteristics

Panel A. Market model. This panel presents the regression results of acquirer cumulative abnormal returns (CARs) on financial hedging characteristics. The OLS regressions with robust standard errors are based on a sample of 1,274 completed deals 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 $(-5, +5)$ where 0 is the announcement day. The benchmark is estimated by the market model with the CRSP value-weighted index over the pre-announcement window $(-300, -91)$. Detailed definitions of all variables can be found in Appendix C. Year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	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_scope						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

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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)
Tobin's 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	0.074

Panel B. Multi-factor model. This panel presents the regression results of acquirer cumulative abnormal returns (CARs) on financial hedging characteristics. The OLS regressions with robust standard errors are based on a sample of 1,274 completed deals 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 $(-5, +5)$ where 0 is the announcement day. In columns 1-4, the benchmark is estimated by the Fama–French three-factor model over the pre-announcement window $(-300, -91)$. In columns 5–8, the benchmark is estimated by the Carhart four-factor model (the Fama–French three-factor model including the Carhart momentum factor) over the pre-announcement window $(-300, -91)$. Detailed definitions of all variables can be found in Appendix C. Year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Fama–French three-factor				**Carhart four-factor**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Fcd	0.010**				0.010*			
	(0.044)				(0.060)			
Fcd/Ird		0.012**				0.012**		
		(0.044)				(0.045)		
Hedging_scope			0.005				0.005	
			(0.122)				(0.123)	
Nv_derivatives				0.017**				0.016**
				(0.024)				(0.041)
Cash	0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.000	-0.001
	(0.986)	(0.969)	(0.983)	(0.997)	(0.943)	(0.904)	(0.918)	(0.876)
Equity	-0.026*	-0.027*	-0.027*	-0.028**	-0.030*	-0.030*	-0.031*	-0.034***
	(0.083)	(0.080)	(0.078)	(0.012)	(0.058)	(0.056)	(0.055)	(0.004)
Nonpublic	-0.011	-0.011	-0.011	-0.014	-0.006	-0.006	-0.006	-0.007
	(0.245)	(0.228)	(0.244)	(0.178)	(0.519)	(0.491)	(0.516)	(0.477)
Toehold	0.031	0.030	0.030	0.025	0.024	0.023	0.023	0.015
	(0.158)	(0.167)	(0.164)	(0.439)	(0.364)	(0.376)	(0.376)	(0.645)
Hostile	0.005	0.005	0.004	0.001	0.005	0.004	0.004	0.001
	(0.758)	(0.786)	(0.812)	(0.971)	(0.759)	(0.783)	(0.816)	(0.976)
Tender	-0.022*	-0.023*	-0.023*	-0.024*	-0.018	-0.019	-0.019	-0.019
	(0.064)	(0.056)	(0.061)	(0.082)	(0.134)	(0.121)	(0.128)	(0.189)
Related_industry	-0.002	-0.002	-0.002	-0.004	-0.003	-0.004	-0.004	-0.005

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	Fama–French three-factor				Carhart four-factor			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	(0.668)	(0.614)	(0.593)	(0.417)	(0.451)	(0.410)	(0.393)	(0.360)
Relative_size	0.033	0.033	0.033	0.020	0.034	0.034	0.034	0.021
	(0.127)	(0.133)	(0.129)	(0.253)	(0.111)	(0.116)	(0.112)	(0.241)
Size	-0.003	-0.002	-0.003	-0.001	-0.003	-0.003	-0.004	-0.002
	(0.268)	(0.323)	(0.247)	(0.755)	(0.203)	(0.238)	(0.182)	(0.538)
Tobin's Q	0.000	0.000	0.000	-0.001	0.001	0.001	0.001	0.000
	(0.980)	(0.988)	(0.896)	(0.702)	(0.796)	(0.800)	(0.732)	(0.891)
Leverage	-0.015	-0.015	-0.015	-0.020	-0.014	-0.015	-0.014	-0.019
	(0.260)	(0.242)	(0.263)	(0.192)	(0.317)	(0.290)	(0.313)	(0.226)
Cash/assets	-0.027	-0.025	-0.026	-0.027	-0.022	-0.020	-0.021	-0.022
	(0.173)	(0.208)	(0.191)	(0.162)	(0.282)	(0.329)	(0.307)	(0.283)
Governance	-0.002	-0.002	-0.002	-0.003	-0.003	-0.002	-0.003	-0.003
	(0.279)	(0.347)	(0.309)	(0.226)	(0.227)	(0.287)	(0.253)	(0.202)
IO	0.004	0.004	0.003	0.010	0.000	0.000	-0.000	0.007
	(0.828)	(0.833)	(0.847)	(0.553)	(0.982)	(0.988)	(0.999)	(0.691)
Runup	-0.017*	-0.018*	-0.018*	-0.018**	-0.018*	-0.018*	-0.018*	-0.019**
	(0.095)	(0.093)	(0.089)	(0.023)	(0.091)	(0.089)	(0.085)	(0.018)
Sigma	0.103	0.164	0.144	0.201	0.258	0.319	0.298	0.311
	(0.869)	(0.792)	(0.818)	(0.639)	(0.696)	(0.627)	(0.652)	(0.484)
Foreign_debt	0.001	0.001	0.000	0.001	0.002	0.003	0.002	0.002
	(0.913)	(0.906)	(0.959)	(0.850)	(0.658)	(0.653)	(0.701)	(0.740)
Intercept	0.016	0.010	0.018	-0.002	0.016	0.010	0.018	-0.002
	(0.647)	(0.778)	(0.619)	(0.953)	(0.655)	(0.780)	(0.623)	(0.954)
S&P Index fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,180	1,180	1,180	1,031	1,180	1,180	1,180	1,031
Adj R-squared	0.053	0.053	0.052	0.060	0.050	0.051	0.049	0.057

Table 3: Treatment effect model on acquirer CARs

This table presents the regression results of acquirer cumulative abnormal returns (CARs) on financial hedging, using an endogenous binary-treatment model estimated by a two-step consistent estimator. The first-step treatment equation is estimated by a probit regression, where the dependent variable is Fcd. The four instrument variables used in the first-step treatment equation are Commodity, Analyst_number, RD and Foreign_sales/Sales. In the second-step outcome equation, the dependent variable is acquirer CARs estimated by the market model, the Fama–French three-factor model and the Carhart four-factor model, respectively. Detailed definitions of all variables can be found in Appendix C. Year, industry, and S&P Index fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	Treatment	**Market model Outcome**	**Three-factor model Outcome**	**Four-factor model Outcome**
Fcd		0.042 **	0.034 *	0.037 *
		(0.035)	(0.080)	(0.065)
Cash		0.000	0.001	0.001
		(0.983)	(0.910)	(0.898)
Equity		-0.028 *	-0.022	-0.026 *
		(0.050)	(0.114)	(0.075)
Nonpublic		-0.013	-0.016	-0.011
		(0.217)	(0.136)	(0.337)
Toehold		0.005	-0.011	-0.006
		(0.931)	(0.845)	(0.924)
Hostile		-0.015	0.022	0.015
		(0.744)	(0.640)	(0.756)
Tender		-0.009	-0.016	-0.011
		(0.559)	(0.284)	(0.458)
Related_industry		-0.005	-0.004	-0.005
		(0.330)	(0.419)	(0.318)
Relative_size		0.019	0.002	0.006
		(0.349)	(0.926)	(0.759)
Size	0.342 ***	-0.006 *	-0.005	-0.006 *
	(0.000)	(0.074)	(0.135)	(0.080)
Tobin's Q	-0.108 **	0.002	0.002	0.003
	(0.015)	(0.486)	(0.486)	(0.191)
Leverage	1.161 ***	-0.035 *	-0.038 **	-0.041 **
	(0.001)	(0.066)	(0.042)	(0.036)
Cash/assets		0.008	0.004	0.006
		(0.685)	(0.826)	(0.790)
Governance	0.114 **	-0.001	-0.001	-0.001
	(0.044)	(0.650)	(0.658)	(0.741)
IO	-0.230 *	-0.011	-0.003	-0.009
	(0.552)	(0.571)	(0.883)	(0.663)
Runup		-0.016 *	-0.016 *	-0.016
		(0.088)	(0.085)	(0.114)
Sigma		-0.993 **	-0.796 *	-0.739
		(0.037)	(0.087)	(0.132)
Foreign_debt	-0.219	0.003	0.000	0.002
	(0.132)	(0.705)	(0.966)	(0.798)
Commodity	0.562 ***			
	(0.004)			
Analyst_number	-0.015			
	(0.184)			
RD	-0.285			
	(0.745)			
Foreign_sales/Sales	1.886 ***			
	(0.000)			
Intercept	-2.690 ***	0.033	0.038	0.043
	(0.002)	(0.458)	(0.390)	(0.357)
S&P/Industry/Year fixed effects	YES	YES	YES	YES
Observations	805	805	805	805
$Prob > chi2$		0.000	0.000	0.000

Table 4: Acquirer stock return volatility around cross-border M&A announcements

Panel A. Implied volatility (averages). This panel presents the summary statistics of acquirer implied volatilities for derivatives users and non-users at announcement dates. 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 variable is defined as the average implied volatility of the ATM call and the ATM put options with the same time to maturity. The last two columns report the mean difference test results between the two sub-groups. T-values represent t-test statistics and z-values represent the Wilcoxon test statistics. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	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 B. Implied volatility (regressions). This panel presents coefficient estimates of Fcd or Fcd/Ird from OLS regressions, controlling for year and industry fixed effects. The dependent variable is the average implied volatility of the ATM call and the ATM put options with the same time to maturity: 30-day, 60-day, and 91-day. Acquirer size and relative deal size are further controlled in the regressions. We only report coefficient estimates of key independent variables: Fcd or Fcd/Ird. Detailed definitions of all variables can be found in Appendix C. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	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)
Control for size			
Fcd	-0.0180 **	-0.0172 **	-0.0149 **
	(0.028)	(0.021)	(0.033)
Fcd/Ird	-0.0376 ***	-0.0367 ***	-0.0338 ***
	(0.000)	(0.000)	(0.000)
Control for size and relative size			
Fcd	-0.0180 **	-0.0172 **	-0.0149 **
	(0.028)	(0.022)	(0.033)
Fcd/Ird	-0.0376 ***	-0.0368 ***	-0.0338 ***
	(0.000)	(0.000)	(0.000)

Table 5: Deal completion probabilities and financial hedging characteristics

This table represents the regression results of cross-border M&A deal completion on financial hedging. Probit (columns 1–4) and logit (column 5) regressions are estimated based on a sample of 1,369 successful and unsuccessful deals that are carried out by S&P 1500 firms between 2000 and 2014. The dependent variable is a binary variable that takes the value of 1 if the deal was completed and 0 otherwise. Detailed definitions of all variables can be found in Appendix C. Year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	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)
Governance				0.138**	0.262**
				(0.033)	(0.041)

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Table 5 – continued from previous page

	1	2	3	4	5
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 6: Deal completion time and acquirer financial hedging characteristics

Panel A. Univariate tests. This panel presents the summary statistics of deal completion time for financial derivatives users and non-users. Completion time is defined as the number of days between deal announcement date and acquisition effective date. We test the difference in the completion time between financial derivatives users and non-users using the t-test and the Wilcoxon test. Test statistics t-value and z-value are reported. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	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. This panel presents tobit regression results of deal completion time on acquirer financial hedging characteristics. The sample includes 1,282 successful cross-border mergers and acquisitions that are carried out by S&P 1500 firms between 2000 and 2014. The dependent variable, Completion_time, 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–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	1	**2**	**3**	**4**
Fcd	32.37***			
	(0.000)			
Fcd_target		28.70***		
		(0.000)		
Fcd/Ird			22.84***	
			(0.007)	
Hedging_scope				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 7: Long-run performance and financial hedging characteristics

Panel A. Operating performance. This panel presents mean difference test results of acquirer 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 acquirer long-run operating performance after cross-border M&As. 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. $\triangle ROA$ is calculated over three different periods: 3 years, 4 years, and 5 years after cross-border M&As. We report the summary statistics of $\triangle ROA$ for the total sample, derivatives user sample, and non-user sample, respectively. Derivatives users are defined by two hedging measures: Fcd and Fcd/Ird. The mean value of $\triangle ROA$ is reported for each group. The number of observations and standard deviations are reported in parentheses. T-values represent t-test statistics and z-values represent the Wilcoxon test statistics. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

		Fcd		**Diff.**		**Fcd/Ird**		**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 performance. This panel presents the regression results of acquirer long-run abnormal stock returns on financial hedging characteristics. The OLS regressions with robust standard errors are based on a sample of 1,276 successful cross-border M&As initiated by 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 announcement dates. We match acquirers with firms with the same 2-digit SIC code, similar size (± 10%), and the closest book-to-market ratio. We include three hedging measures in our tests: Fcd, Fcd/Ird, and Hedging_scope. Detailed definitions of all variables can be found in Appendix C. Year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by ∗ ∗ ∗, ∗∗, and ∗.

	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_scope							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)

Continued on next page

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 8: Currency Volatility

This table presents the test reults of acquirer cumulative abnormal returns (CARs) on financial hedging characteristics within a low U.S. dollar exchange rate volatility sub-sample and a high 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 announcement dates. In columns 7–12, we separate our total sample into two sub-samples by standard deviations of the returns of the exchange rates between the U.S. dollar and the target nation's currencies 12 months before deal announcements. We include three hedging measures in our tests: Fcd, Fcd/Ird, and Hedging_scope. Detailed definitions of all variables can be found in Appendix C. Year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by ∗ ∗ ∗, ∗∗, and ∗.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	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_scope					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

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Table 8 – continued from previous page

	1	2	3	4	5	6	7	8	9	10	11	12
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
	(0.665)	(0.778)	(0.682)	(0.842)	(0.664)	(0.834)	(0.670)	(0.266)	(0.659)	(0.316)	(0.653)	(0.294)
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

Table 9: Acquirer CARs and foreign sales

This table presents the regression results of acquirer cumulative abnormal returns (CARs) on acquirer foreign sales for a sample of cross-border M&As announced over the period 2000 to 2014. The OLS regressions with robust standard errors are based on a sample of 1,274 completed cross-border M&As 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 $(-5, +5)$ where 0 is the announcement day. The benchmark is estimated by the market model with the CRSP value-weighted index over the pre-announcement window $(-300, -91)$. The key independent variable is Foreign_sales/Sales (foreign sales normalized by total sales). Detailed definitions of all variables can be found in Appendix C. Year, Fama–French 10 industry, and S&P Index (S&P 500, S&P 400, and S&P 600) fixed effects are controlled for all regressions. P-values are reported in parentheses. Significance at the 0.01, 0.05, and 0.10 levels is indicated by $***$, $**$, and $*$.

	1	**2**
FSales	0.0112	0.00856
	(0.291)	(0.433)
Cash		-0.00106
		(0.809)
Equity		-0.0302*
		(0.074)
Nonpublic		-0.00504
		(0.571)
Toehold		0.0589***
		(0.003)
Hostile		-0.0247
		(0.103)
Tender		-0.0140
		(0.248)
Related_industry		-0.00362
		(0.414)
Relative_size		0.0454**
		(0.046)
Size		-0.00182
		(0.479)
Tobin's Q		0.000199
		(0.951)
Leverage		0.000948
		(0.944)
Cash/assets		-0.0166
		(0.433)
Governance		-0.000243
		(0.913)
IO		-0.00630
		(0.722)
Runup		-0.0206*
		(0.054)
Sigma		-0.193
		(0.754)
Foreign_debt		0.000642
		(0.903)
Intercept	-0.00443	-0.00920
	(0.724)	(0.801)
S&P Index fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	1,226	1,139
Adj R-squared	0.040	0.063