Risks in Mergers and Acquisitions: Evidence from Acquirers' Mandatory Risk Factor Disclosure*

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Abstract

We use the acquirer's mandatory risk factor disclosure in merger filings to study the composition of risks in mergers and acquisitions and the potential effects of major risk factors on post-merger outcomes. Employing an unsupervised topic modeling approach, we identify four major risk factors: one about firm fundamentals (technology and product), two about information asymmetry (valuation and fairness; accounting information), and one about shareholder control (ownership and dilution). Contrary to expectation, the widely studied culture risk has a low weight in the risk factor disclosure. The four major risk factors have large and diverging effects on the acquirer's post-merger outcomes. While the ownership and dilution risk decreases the acquirer's post-merger integration problems and performance volatility, the other three risk factors increase the acquirer's post-merger integration problems and performance volatility.

Keywords: mergers and acquisitions, risk factor disclosure, risks in M&A, technology and product, valuation and fairness, accounting information, ownership and dilution, post-merger outcomes.

JEL Classification: G32; G34; G38

I. INTRODUCTION

Mergers and acquisitions (M&A) are highly risky investments, and acquirers often suffer unexpected consequences and poor post-merger performance (Andrade, Mitchell, and Stafford 2001; McGee, Thomas, and Thomson 2015).[1] In this paper, we use a unique data source to study the composition of risks in M&A and the (diverging) effects of major risks on merger outcomes.

It is challenging to identify risks in M&A. We overcome this difficulty by using the mandatory risk factor disclosure made by acquirer firms. Specifically, acquirers issuing stocks as part of their payment are required to submit Form S-4 (i.e., Registration Statement Under the Securities Act of 1933) to the U.S. Securities and Exchange Commission (SEC). In this situation, acquirers must explicitly disclose potential risks of the deal in the "Risk Factors" section of their S-4 filing. This risk factor disclosure, therefore, provides a unique data source for us to study the risks in M&A.

We obtain data for U.S. domestic M&A transactions announced between 1995 and 2018 from the Thomson One Banker SDC database and construct a sample of 2,875 M&A deals with bidders that filed Form S-4 with the SEC. We find that acquirers make substantial mandatory risk disclosures, as the average length of the Risk Factors section is 2,989 words, with a large standard deviation of 2,449 words across the sample deals.

Since we are the first to study acquirers' risk factor disclosure, we conduct two analyses to validate the informativeness of the disclosure. First, we find that the length of merger risk factor disclosure is positively related to firm and deal characteristics that indicate greater risks. Specifically, the risk factor disclosure is significantly longer when the acquirer firm is smaller, less profitable, or has higher past return volatility, and when the deal's relative size (relative to the

[1] Netter, Stegemoller, and Wintoki (2011) show that although bidder announcement return is close to zero on average, the standard deviation is nearly 10 percent, indicating incredibly high uncertainties for acquirers.

bidder) is large. Second, we find that the length of risk factor disclosure positively predicts the acquirer's post-merger integration problems and performance volatility.[2] These results indicate that the acquirer's mandatory risk factor disclosure provides useful information about the acquirer's risks in M&A.[3]

Next, we proceed with our main analysis by classifying the acquirer's risk factor disclosure into specific risk topics. Motivated by the literature, we predict four major types of risks in M&A. First, while asset and technology complementarity is a major driver of synergies (e.g., Rhodes-Kropf and Robinson 2008; Hoberg and Phillips 2010; Bena and Li 2014; Liu, Shu, Towery, and Wang 2022), acquirers often encounter difficulties in integrating product lines and technologies (McGee et al. 2015; Hoberg and Philips 2018). We, therefore, predict that *technology and product* risk is a major risk factor. Second, given the large literature on severe information asymmetry in M&A (e.g., Hansen 1987), we expect that risks related to information asymmetry are among the major topics in the risk factor disclosure.

Third, whether M&A introduce a significant dilution in ownership is an important consideration for the acquirer's shareholders, particularly in stock-for-stock mergers (e.g., Burch, Morgan, and Wolf 2004; Li, Liu, and Wu 2018). As a result, *ownership and dilution* could be a major risk factor. Lastly, recent studies identify corporate culture conflicts as an important risk that leads to merger failures (e.g., Ahern, Daminelli, and Fracassi 2015; McGee et al. 2015; Graham, Grennan, Harvey, and Rajgopal 2019). We thus anticipate culture risk to be emphasized in the risk factor disclosure.

We employ an unsupervised topic modeling approach, Latent Dirichlet Allocation (LDA),

[2] We control for the acquirer's pre-merger performance volatility in this analysis.

[3] These results are also consistent with the existing literature finding that regular risk factor disclosures in 10-Ks provide useful information about the firms' risks (e.g., Campbell, Chen, Dhaliwal, Lu, and Steele 2014; Hope, Hu, and Lu 2016; Israelsen and Yonker 2017; Campbell, Cecchini, Cianci, Ehinger, and Werner 2019).

to classify the content of S-4 risk factor disclosure into topics. LDA has been widely used in the literature to analyze SEC filings including 10-K risk factor disclosure.[4] This approach utilizes a generative statistical model to simulate how human beings write a document, and the output of the topics is determined by the content of the text based on Bayesian techniques (rather than researchers' keyword choices).[5]

We follow the literature and classify the acquirer's risk factor disclosure into 25 topics.[6] To focus on the major topics and make our analyses manageable, we focus on the top-five topics, which account for over 45 percent of the weight in the risk factor disclosure. For each topic, LDA produces a list of keywords, and we interpret each topic by both analyzing the keywords and reading examples of the corresponding content.[7]

Consistent with our prediction, we find that two of the five topics concern risk about *technology and product*, such as innovation uncertainties, intellectual property litigation, competing products by rivals, uncertainties about suppliers, or launching a new product. These two topics together account for 16 percent of the acquirer's risk disclosure on average.

The next two topics are related to information asymmetry. Specifically, the first one concerns risk about target *valuation and fairness* (weight of 13 percent), including uncertainties about fairness opinions, target valuation, shareholder welfare, or payment method, especially stock payment. The second one concerns risk about *accounting information* (weight of 11 percent), such as the uncertainties and details of pro forma financial statements and the extent to which the predictions can be realized.

[4] See, for example, Bao and Datta (2014); Israelsen (2014); Dyer, Lang, and Stice-Lawrence (2017); Huang, Lehavy, Zang, and Zheng (2018); Hanley and Hoberg (2019); Lopez-Lira (2019); Brown, Crowley, and Elliott (2020); and Dasgupta, Harford, Ma, Wang, and Xie (2020).
[5] We describe the details of LDA in our subsection "Unsupervised Topic Modeling Approach."
[6] Prior studies show that 25 is an optimal choice for LDA modeling in the risk factor disclosure setting (e.g., Huang and Li 2011; Bao and Datta 2014; Lopez-Lira 2019).
[7] Appendix D provides ten examples for each topic to illustrate the context of keywords in risk factor disclosure.

As we predicted, the other major topic concerns risk about *ownership and dilution* (weight of 5 percent), such as target shareholders exercising substantial influence in the merged firm, changes in ownership structure, or the issuance of new shares. Moreover, the weights of all four major risk factors have standard deviations twice as much as their means, suggesting a high heterogeneity in the composition of risks in M&A.

Surprisingly, and inconsistent with our prediction, we find that culture risk has a low weight in the risk factor disclosure, as it is not even among the top-25 topics. This result holds when we adopt an alternative approach of keyword search in the risk factor disclosure. As discussed later, we find little evidence that bidder managers strategically avoid disclosing culture risk to reduce investor opposition or litigation risk. Therefore, our finding suggests that either culture risk is less prominent than the other risk factors or that acquirer managers overlook culture risk, categorically, in M&A.

We then examine how the major risk factors affect the acquirer's post-merger outcomes, with a focus on post-merger integration problems and the acquirer's post-merger performance volatility. We predict that the major risk factors will generally cause complexities in the acquirer's post-merger integration process and operations and, therefore, will increase integration problems and performance volatilities. However, the effect of *ownership and dilution* risk will be less clear. The presence of the target's shareholders in the merged firm may either cause potential conflicts (a negative impact on post-merger integration and operation) or facilitate cooperation between the acquirer and target firms (a positive impact on post-merger integration and operation).

We first examine post-merger integration. Following Hoberg and Phillips (2018), we construct a binary measure of *ex post* integration problems based on textual analysis of post-merger 10-Ks. The regression results show that, consistent with our prediction, *technology and product*

risk significantly and positively predicts the likelihood of post-merger integration difficulty. For example, a one standard deviation increase in *technology and product* risk is associated with a 14 percent increase in the likelihood of integration problems. This result emphasizes that the difficulties of integrating product lines and technologies substantially impact post-merger integration (McGee et al. 2015; Hoberg and Philips 2018). In addition, we find that *accounting information* risk also positively predicts the likelihood of integration problems.

Interestingly, we find that a one standard deviation increase in *ownership and dilution* risk is associated with a 9 percent *decrease* in post-merger integration problems. This finding indicates that a greater influence of target shareholders in the merged firm, despite being a concern to acquirer managers, seems to facilitate the post-merger integration.[8]

Next, we examine the acquirer's post-merger performance volatility. We find that, consistent with our predictions, the three risk factors of *technology and product*, *accounting information*, and *valuation and fairness* positively predict the acquirer's post-merger return on assets (ROA) volatility and stock return volatility. In contrast, *ownership and dilution* risk negatively predicts the acquirer's post-merger ROA volatility and stock return volatility.

We also examine the effect of risk factors on deal duration. The major risk factors about information asymmetry and controls can cost acquirers additional time to complete the deal. However, *technology and product* risk may decrease deal duration, as the literature suggests that acquirers with greater uncertainties in post-merger operations tend to close deals more quickly because a delay may cause additional complications in realizing synergies (e.g., Bradley, Desai, and Kim 1988; Hoberg and Phillips 2010; Offenberg and Pirinsky 2015). Consistent with the

[8] It is also possible that target shareholders seek control of the merged firm if they predict a smooth post-merger integration. Inconsistent with this explanation, our further analyses suggest that ownership dilution affects post-merger integration but not the reverse.

predicted diverging effects, we find that *technology and product* risk is negatively related to deal duration, whereas the three other risk factors are positively associated with deal duration.

Finally, we perform several robustness tests and further analyses. First, we employ a two-step Heckman model with an instrument to test the potential for sample selection bias, as our sample excludes all-cash deals. All our results hold after we control for sample selection. Second, we conduct a pseudo-risk factor analysis, which shows that our findings are driven by firm-specific (deal-specific) risks rather than market-wide or industry-wide risks. Third, our results hold after controlling for the acquirer's 10-K risk factor disclosure, indicating that S-4 risk factor disclosure contains acquirer-specific risks that are distinct from the content in regular 10-K risk factor disclosure. Fourth, we investigate the possibility that acquirer managers make their risk factor disclosure strategically (e.g., by avoiding disclosure of culture risks) to reduce shareholder opposition or litigation risk, and we find little supportive evidence.

Our paper contributes to the literature on M&A by shedding light on the composition of risks in M&A and the effects of major risk factors on merger outcomes. Specifically, we reveal four major risk factors related to firm fundamentals, information asymmetry, and shareholder control in M&A. Furthermore, these major risk factors have significant and diverging effects on the acquirer's post-merger integration and performance volatility. While previous studies rely on firm and deal characteristics to assess the risks in M&A, our study provides a novel approach to measure risks in M&A *ex ante*, which can have broad applications in future M&A research.

Our paper also extends the growing literature on risk factor disclosure. While previous studies focus on 10-K risk factor disclosure (e.g., Campbell et al. 2014; Hope et al. 2016; Israelsen and Yonker 2017), we are the first to study risk factor disclosure in merger filings. On the one hand, we find that, consistent with the existing literature, the acquirer's risk factor disclosure

contains useful information about the risks in M&A and predicts merger outcomes. On the other hand, we show that information in the acquirer's risk factor S-4 disclosure is distinct from that in 10-K risk factor disclosure.

Finally, our paper is related to the literature on the acquirer's information disclosure in M&A. For example, several studies find that M&A conference calls can alleviate information asymmetry and affect acquisition returns (e.g., Kimbrough and Louis 2011; Hu, Shohfi, and Wang 2018; Dasgupta et al. 2020). While these studies examine the acquirer's voluntary information disclosure, we study the acquirer's mandatory disclosure in merger filings to understand the risks in M&A.

II. INSTITUTIONAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Background of the S-4 Filing and Risk Factor Disclosure

In the U.S., a public company that issues new shares to finance an acquisition is required to submit Form S-4 (i.e., Registration Statement Under the Securities Act of 1933) to the SEC. Any material information related to the merger, such as the merging parties' business operations and information about the transaction, needs to be disclosed in the filing.[9] The primary SEC regulations governing the content of Form S-4 are Regulation S-K and Regulation S-X.

Item 503(c) (17 C.F.R. § 229.503) of Regulation S-K requires explicitly that an issuer include in Form S-4 a "Risk Factors" section to disclose the risk factors that could make the proposed transaction risky or speculative. We illustrate the acquirer's risk factor disclosure in Appendix B with an example of PeopleSoft acquiring Vantive in 1999. The Risk Factors section of this S-4 filing details the risk factors relevant to the deal, such as uncertainties about the market value of the bidder's stock, a potential decrease in product sales, risk of ownership dilution, and

[9] See Liu et al. (2022) for more details on S-4 and other disclosure requirements in mergers and acquisitions.

potential failure to integrate the two firms' business operations, product developments, and research and development (R&D) activities.

The SEC mandate for firms to include a Risk Factors section in 10-Ks started in 2005, whereas acquirers have to disclose risk factors related to the merger or acquisition in Form S-4 throughout our sample period. It is worth noting that the risk factor disclosure in S-4 is different from that in 10-K filings in its nature and content. Risk factor disclosure in a 10-K focuses on the firm's systematic risk and stand-alone risks. In contrast, risk factor disclosure in a transactional filing (i.e., the merger filing of S-4) focuses on deal-specific risks, which largely depend on the target firm's valuation, the merger process, and post-merger integration. Therefore, risk factor disclosure in S-4 provides a unique data source for us to identify risks specific to M&A deals.[10]

Hypotheses Development: Informativeness of Risk Factor Disclosure

Existing literature documents that firms' mandatory risk factor disclosures in 10-Ks provide useful information about firms' risks (e.g., Campbell et al. 2014; Hope et al. 2016; Israelsen and Yonker 2017; Campbell et al. 2019). For example, Campbell et al. (2014) show that 10-K risk factor disclosures meaningfully reflect firm-specific risks and provide useful information to investors. If acquirers also make authentic risk factor disclosure, then the risk factor disclosure in S-4 should be informative about deal-specific risks. Specifically, we expect the length of S-4 risk factor disclosure to be positively associated with acquirer and deal characteristics that indicate higher risks, as stated in the following hypothesis:

H1a: The length of risk factor disclosure in an acquirer's S-4 filing is positively associated with the acquirer and deal characteristics that indicate higher risks.

[10] Our subsection "Controlling for 10-K Risk Factor Disclosure" shows that our findings for transactional risk factor disclosure hold after controlling for the acquirer's 10-K risk factor disclosure, which indicates that risk factor disclosure in M&A filings provides unique information about deal-specific risks.

Alternatively, an acquirer's risk factor disclosure could be uninformative because the SEC does not provide clear guidance on the content of risk factor disclosure. Given that each M&A deal has its unique set of risks, managers have broad discretion in the content and format of S-4 risk factor disclosure. Moreover, risk factor disclosure might be distorted by the acquirer manager's incentive to facilitate M&A, such as by withholding negative information that could dissuade shareholders from approving the transaction. It is also possible that managers under- or overestimate some of the deal-related risks given the complexity of M&A transactions. Therefore, the alternative hypothesis predicts that risk factor disclosure in the merger setting is unrelated to post-merger integration problems.

If S-4 risk factor disclosure is informative, we should also observe corresponding relations between the risk factor disclosure and post-merger outcomes. We focus on two important post-merger outcomes: the acquirer's post-merger integration problems and post-merger performance volatility, as a riskier transaction will be more likely to meet with difficulties in the post-merger integration process and with uncertainties in the acquirer's post-merger operations. This discussion leads to the following hypothesis:

> **H1b:** The length of risk factor disclosure positively predicts post-merger integration problems and the acquirer's post-merger performance volatility.

As already mentioned, alternatively, the acquirer's risk factor disclosure might not be informative about risks of the deal, in which case the S-4 risk factor disclosure will be unrelated to post-merger integration problems or to the acquirer's post-merger performance volatility.

Hypotheses Development: Major Risk Factors in M&A

Our main analyses focus on understanding the composition of risks in M&A and the potential (diverging) effects of major risk factors on merger outcomes. Specifically, existing literature suggests several major risk factors in M&A.

Technology and Product Risk

Previous studies show that asset complementarity and technological linkages can create operating and innovation synergies (e.g., Rhodes-Kropf and Robinson 2008; Hoberg and Phillips 2010; Bena and Li 2014). However, the difficulty of integrating product lines and technologies is a major factor that prevents the merged firms from achieving such synergies (McGee et al. 2015; Hoberg and Philips 2018). Moreover, the development and implementation of technologies demand a skilled workforce, but M&A can cause uncertainty in retaining human capital, the loss of which may hurt the acquirer's ability to enhance technological capabilities after acquiring a knowledge-intensive target firm.

Given the importance of technology and product risk, we predict that a major risk topic managers discuss in the S-4 Risk Factor section is technology and product. Moreover, we anticipate that technology and product risk will be positively associated with the likelihood of post-merger integration problems and the acquirer's post-merger performance volatility.

H2a: Technology and product risk is a major risk factor discussed in S-4 risk factor disclosure; technology and product risk positively predicts the acquirer's post-merger integration problems and performance volatility.

Information Asymmetry and Adverse Selection

A takeover transaction is essentially a negotiation process with imperfect information. Theoretical studies show that with information asymmetry, particularly less information about the target firm, the acquirer will prefer to offer stock as a method of payment (e.g., Hansen 1987).

However, the choice of exchange medium is unlikely to fully eliminate the potential for adverse selection or overpayment.[11] We, therefore, predict that information asymmetry is another major risk topic that managers discuss in the risk factor disclosure. Additionally, information risk may cause distorted expectations for the parties involved and unexpected adjustments to initial plans, causing post-merger integration problems and performance volatility.

H2b: Information asymmetry is a major risk factor discussed in S-4 risk factor disclosure; information risk positively predicts post-merger integration problems and performance volatility.

Ownership Dilution

Dilution in ownership can be a major concern of acquirer shareholders, particularly in stock-for-stock mergers. Because of the dilution effect, U.S. stock exchanges require the approval of the acquirer's shareholders when the issuance of new shares reaches a threshold of 20 percent (Burch et al. 2004; Li, Liu, and Wu 2018). The effect of ownership dilution on post-merger integration is unclear *ex ante*. On the one hand, ownership dilution might cause potential conflicts in the merged firms and, in turn, lead to problems in post-merger integration. On the other hand, the target's shareholders, after having received a significant portion of the acquiring firm's stock, may have incentive to smooth the transition process by reducing integration problems.

H2c: Ownership dilution can be a major risk factor in stock deals; the effect of dilution risk on post-merger integration problems and performance volatility can be either positive or negative.

Corporate Culture

[11] Previous studies also show that acquirer and target firms attempt to alleviate information asymmetry using other mechanisms, such as third-party certifications, conference calls, and shared auditors (e.g., Officer 2004; Kimbrough and Louis 2011; and Dhaliwal, Lamoreaux, Litov, and Neyland 2016).

Finally, recent academic literature identifies conflicts of corporate culture as an important risk that leads to merger failures. For example, Ahern et al. (2015) show that culture gaps have an important influence on cross-border mergers. In a recent survey study, Graham et al. (2019) report that over half of executives believe that corporate culture is a top-three driver of firm value. Moreover, McGee et al. (2015) assert that combining different corporate cultures can be challenging and is responsible for worse *ex post* merger outcomes. The above discussion leads us to the following prediction:

> **H2d:** Culture risk is a major risk topic that managers discuss in the S-4 risk factor disclosure; culture risk positively predicts post-merger integration problems and performance volatility.

III. SAMPLE CONSTRUCTION AND SUMMARY STATISTICS

Sample Construction

We begin with all announced U.S. M&A transactions from January 1, 1995, to December 31, 2018, in the Thomson One Banker SDC database. Our sample period begins in 1995 because that is the earliest year when merger documents were disclosed on the SEC's Electronic Data Gathering and Retrieval (EDGAR) website.[12] We follow the literature and impose the following standard filters in constructing our sample: (1) the acquirer status is "Public"; (2) the form of the deal is "Merger (M)," "Acquisition of Assets (AA)," or "Acquisition of Majority Interest (AM)"; (3) the target's status is "Public," "Private," or "Subsidiary"; (4) the acquirer holds less than 50 percent of the shares of the target firm before the deal announcement and seeks to own 100 percent of the shares of the target firm after the deal; (5) the deal value reported in the Thomson One

[12] EDGAR also includes a small number of merger filings in 1994. We do not include them because these disclosures are uncommon and on a voluntary basis.

Banker SDC database is at least $1 million (in 1995 dollar value); and (6) the ratio of deal value to acquirer size is at least 1 percent. We then merge the M&A data with bidders' stock data from the Center for Research in Security Prices and financial data from Compustat.

Next, we require that bidders file Form S-4 with the SEC, which yields a sample of 3,577 deals. To collect information on risk factors, we further require that the deals' S-4 filings include a separate section of risk factor disclosure.[13] The requirement of risk factor disclosure yields a final sample of 2,875 deals from 1995 to 2018.

Summary Statistics

In Panel A of Table 1, we present the distribution of sample deals by year. We observe the highest numbers of deals from 1996 through 2001, which is consistent with prior studies that document a merger wave in this period (e.g., Andrade et al. 2001; Harford 2005). In Panel B of Table 1, we present the summary statistics for the sample's acquirers and deals. The acquirer characteristics include total assets, Tobin's Q, leverage, profitability, pre-merger stock return, pre-merger stock return volatility, the ownership of the top-five institutional investors, and a dummy variable for serial acquirers. The deal characteristics include deal value, deal duration, and dummy variables for tender offers, hostile deals, mixed payment, public targets, same-industry mergers, and withdrawn deals. The definitions of all the variables are provided in Appendix A.[14]

In Panel C of Table 1, we report summary statistics for the S-4 filings and risk factor disclosure. On average, an S-4 filing contains 76,513 words. The section of risk factor disclosure has an average length of 2,989 words, with a standard deviation of 2,449 words, indicating that the

[13] Item 503 of Regulation S-K requires S-4 filings to include a separate Risk Factors section. However, we find that in the earlier years of our sample period, a small number of S-4 filings do not include one.

[14] While a majority of acquirer and deal characteristics are in line with those documented in the literature, several of them deviate from the literature because our sample construction requires that bidders use stocks for at least part of the payment (and therefore have S-4 filings). For example, the percentages of hostile deals and tender offers are much lower than those documented in the literature. We address this issue in "Sample Selection" in Section VII.

length of risk factor disclosure varies substantially across deals.

IV. IS ACQUIRER RISK FACTOR DISCLOSURE INFORMATIVE?

We first test the informativeness of acquirers' mandatory risk factor disclosure in M&A. If it is informative about risks in M&A as H1a predicts, then we expect to observe a significantly positive relation between the length of risk disclosure and the acquirer and deal characteristics that indicate higher risks. We therefore estimate the following deal-level regression:

$$Ln(Length\ of\ RF) = \alpha + FirmChar. + DealChar. + IndustryFE + YearFE + \varepsilon, \quad (1)$$

where the dependent variable is the natural logarithm of the length of risk factor disclosure, measured by the total number of nonstop words in the Risk Factors section of the S-4 filing.[15]

The independent variables include a broad set of acquirer and deal characteristics from the literature. The acquirer characteristics include total assets, Tobin's Q, leverage, profitability, past one-year stock return, past one-year stock return volatility, an indicator variable for serial acquirers with another deal in the past three years, and ownership percentage of the top-five institutional shareholders. The deal characteristics we examine include deal value, method of payment, and indicator variables for tender offers, hostile deals, same-industry mergers, and public targets. We also include industry and year fixed effects in all regressions.

Columns (1) and (2) of Table 2 report the regression results. We find that four acquirer characteristics reliably predict the length of risk factor disclosure. Specifically, firm size and profitability significantly and negatively predict the length of risk factor disclosure, which is in line with the intuition that smaller and less profitable firms have greater acquisition risks.

[15] We follow the literature and remove stop words, which are commonly used words without useful information, such as "the," "an," "in," "about," and "during."

Moreover, past return volatility significantly and positively predicts the length of risk disclosure.[16] Regarding deal characteristics, we find that deal value significantly and positively predicts risk disclosure length. This is consistent with prior studies showing that larger acquisitions are associated with a higher level of deal risks (e.g., Bhagwat, Dam, and Harford 2016). For robustness, we also use the industry-adjusted length of risk factor disclosure to control for industry effects, and none of the significant coefficients above are altered. Overall, the results in Table 2 provide evidence supporting H1a, which predicts that the acquirer's risk factor disclosure provides useful information about risks in M&A. We test H1b in Section VI to further examine whether the acquirer's risk factor disclosure positively predicts post-integration problems and the acquirer's post-merger performance volatility.

V. CLASSIFYING M&A RISK FACTORS

The objective of our paper is to understand the composition of risks in M&A and the potential effects of the major risk factors on post-merger outcomes. For the first step, we take advantage of recent developments in textual analysis for identifying specific types of risks in the acquirer's risk factor disclosure.

Unsupervised Topic Modeling Approach

Most of the previous studies conducting textual analysis employ a dictionary-based methodology, which uses predetermined word lists for topics of interest such as positive or negative sentiment.[17] A limitation of this approach is that preset keywords are subject to human judgment and are likely to be context-specific (e.g., Loughran and McDonald 2016; Hansen,

[16] In addition, we observe that ownership by the top-five institutional investors also positively predicts the length of risk disclosure, which is consistent with previous studies showing that institutional shareholders tend to demand more information disclosure from corporate insiders (e.g., Bushee and Noe 2000; Ajinkya, Bhojraj, and Sengupta 2005; Boone and White 2015; Bird and Karolyi 2016; Abramova, Core, and Sutherland 2020).
[17] See Loughran and McDonald (2016) for a review of this literature.

McMahon, and Prat 2018). In the context of risk classifications, the commonly used "risk word" dictionary is constructed using regular filings such as 10-K or 10-Q and therefore may be less relevant to the event-based risk-factor disclosure of M&A filings.

To overcome this challenge, we employ LDA, an unsupervised topic modeling approach (Blei, Ng, and Jordan 2003). LDA uses a generative statistical model to simulate how human beings write a document and uses Bayesian techniques to identify topics based on the content in a corpus of documents.[18] The unsupervised nature of this approach does not require researchers to predefine keywords and therefore addresses the concern that keyword lists might lead to biases in classification or missing risk factors.

With the LDA approach, a researcher predefines the number of topics for a set of documents, and the LDA algorithm first randomly assigns a topic to each word in the documents. This first pass generates two parameters: the proportion of words in each document that are assigned to a specific topic, $Pr(Topic_i|Document_j)$, and the proportion of each topic accounted for by each word in all the documents, $Pr(Word_k|Topic_i)$. Next, LDA assumes that all other words except $Word_k$ are in the correct topics and reassigns $Word_k$ in Document j to a new topic to maximize the joint probability $Pr(Topic_i|Document_j) \times Pr(Word_k|Topic_i)$. LDA then repeats this procedure for each word until a steady state is reached.[19]

Despite its advantages, LDA has two limitations. First, an optimal number of topics must be chosen. Too few topics would group the content from different topics into a single topic, while too many topics would split the content of one topic into different topics. Second, for each topic, LDA outputs a list of keywords rather than an interpretation. Therefore, a researcher needs to

[18] LDA is based on how people write documents, in which they first think about the topics and then the specific words for each topic. LDA reverse-engineers this human thinking process by assuming that a document is a probability distribution over topics, and a topic in the document is a probability distribution over words.
[19] More detailed technical discussions of the LDA algorithm can be found in Blei et al. (2003) and Huang et al. (2018).

interpret each topic based on the list of keywords. This being said, LDA is increasingly used in finance and accounting to classify topics in documents including 10-K risk factor disclosures and analyst reports (e.g., Bao and Datta 2014; Israelsen 2014; Dyer et al. 2017; Huang et al. 2018; Hanley and Hoberg 2019; Lopez-Lira 2019; Brown et al. 2020).

Classification of Topics in Acquirers' Risk Factor Disclosure

To implement the LDA approach, we first remove stop words and numbers from the risk factor disclosure and lemmatize each word. We then follow the literature and eliminate the extremely frequent words that appear in more than 50 percent of the documents and the rare words that appear in fewer than 200 documents (e.g., Hardeniya 2015; Dyer et al. 2017). The extremely common words are likely boilerplate, such as "company," "business," and "stock,"; the rare words are likely firm-specific, such as the company name, product name, or brand. Finally, we follow the literature on risk factor disclosure and choose 25 topics for the LDA output (Huang and Li 2011; Bao and Datta, 2014; Israelsen 2014; Hanley and Hoberg 2019; Lopez-Lira 2019).[20]

We present the top-ten keywords generated by the LDA approach for each of the 25 risk topics in Appendix C. To make our analysis manageable, we follow the literature and focus on the top-five topics.[21] For each topic, we first identify the deals for which the topic weighs at least 5 percent of the Risk Factors section, and then we calculate the proportion of these deals among all

[20] Prior studies show that 25 is an optimal choice for LDA modeling in the risk factor disclosure setting. After reading hundreds of 10-K risk factor disclosures, Huang and Li (2011) summarize the risk factors into 25 categories. Using out-of-sample analysis, Bao and Datta (2014) and Lopez-Lira (2019) show that having 25 topics is the most suitable number for risk factor disclosure. Our results are robust with alternative choices of the number of topics or alternative thresholds of defining common words and rare words.

[21] For example, Lopez-Lira (2019) focuses on the top-four risk topics among the 25 topics.

sample deals.[22] After that, we sort the 25 topics by their corresponding proportions and choose the top five.

Appendix C shows that every top-five risk topic covers over 25 percent of the deals, indicating that they are indeed common topics in S-4 risk factor disclosure. These five topics also have the highest average weights in the sample deals' risk factor disclosure, ranging from 4.7 percent (topic 3) to 13.3 percent (topic 2). Besides the top-five topics, topic 7 also has a high weight of 11.1 percent. After reviewing the keywords and manually checking a random sample of risk disclosure for topic 7, we find that this topic is specific to bank mergers, such as risks about loans and deposits. Since our focus is acquirer risks in general, we do not include this topic in our analysis.

Next, we interpret the top-five topics based on their keywords. For topic 1, the most weighted keywords are "joint," "pro forma," "opinion," "unaudited," and "consummation," which point to uncertainties about financial statements and especially financial projections. We then select ten sample deals with the highest weights in this topic and manually check the contexts of these keywords (see Appendix D). We find that these keywords are indeed used in discussing uncertainties about financial statements and projections: for example, "the *assumptions* used in preparing the *unaudited pro forma* financial information may not prove to be accurate." We, therefore, label the first risk topic *accounting information*.

We follow a similar approach to interpret and label the other four risk topics. We name risk topic 2 *valuation and fairness*, which discusses fairness opinions, uncertainties about target

[22] The 5 percent filter excludes small weights in a single document that could be caused by noise in the estimation. In unreported results, we find that the topic ranking is not sensitive to the choice of alternative cutoff thresholds. For example, we obtain similar results using a threshold of 4 percent or 10 percent.

valuation, bidder shareholder welfare, and uncertainties about payment method.[23] We name topic 3 *ownership and dilution*, which discusses risks such as target shareholders attaining substantial influence in the merged firms, changes in ownership structure, and the issuance of new shares to target shareholders.[24]

We find that the content of topic 4 (whose keywords include "manufacturing," "supplier," "component," "patent," "intellectual," "equipment") and that of topic 5 (whose keywords include "software," "license," "marketing," "solution," "proprietary," "application," "support") are significantly overlapped. Both topics cover risks related to technology and product, which are often discussed together in the risk disclosure section. These two topics also capture human capital and intellectual property risk because technologies demand a skilled workforce. As a result, we combine topics 4 and 5 into one risk topic and label it *technology and product*.[25] Appendix D provides multiple examples of each risk topic as manifested in the sample deals.

Although we focus on the top-five topics in our main analysis, we go through the keywords for the other 20 topics and find that some belong to particular industries or deal categories. For example, in addition to topic 7 discussed above, topic 12 is specific to the cable/network industry, topic 14 is specific to the natural gas/utility industry, and topic 15 is specific to the healthcare industry.[26] Appendix C includes more details about the other 20 topics.

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[23] The keywords include "opinion," "approvals," "advisor," "election," "fairness," and "community." The keywords are often used in sentences like so: "stockholders may receive a form of consideration different from what they *elect*. . . . The *fairness opinion* of the financial *advisor* will not reflect changes in circumstances between the signing of the merger agreement and the completion of the merger."

[24] The keywords include "group," "class," "prefer," "dividends," "warrant," "conversion," "incorporation," "medium," and "convertible." The keywords are often used in sentences like so: "Holders of either *class* of common stock may be adversely affected by a *conversion* of one *group*'s *common* stock."

[25] The keywords frequently appear in sentences like these: "We rely on a limited number of *suppliers* for many *components* used in the assembly process. . . . The combined company may be unable to adequately protect its *intellectual* property, which may *harm* our business." We also conduct robustness test by separating these two topics and find similar results.

[26] Additionally, some of the less common risk topics, although not industry-specific, do not have an obvious interpretation.

Major Risk Factors in S-4 Risk Factor Disclosure

We report in Table 3 the keywords for the four major risk factors identified by the LDA approach (Panel A) and summary statistics of the weights of these risk factors (Panel B). Our findings shed new light on the composition of risks in M&A. First, *technology and product* risk has the highest weight of 16 percent in the risk factor disclosure, consistent with H2a. The next two major risk factors are *valuation and fairness* (weight of 13 percent) and *accounting information* (weight of 11 percent), which are both associated with information asymmetry. This finding is consistent with H2b. *Ownership and dilution* is the fourth major risk factor (weight of 5 percent), which is consistent with H2c. These four major risk factors together account for about 45 percent of the risk factor disclosure for an average sample deal.

Second, for each of the four major risk factors, the standard deviation of the weight is about twice as much as the mean weight. This suggests a substantial variation in the composition of risk across sample deals.

Third, we find that cultural risk is not even among the 25 risk topics identified by LDA. To complement the LDA analysis, we employ an alternative approach of targeted keyword search for "culture" in the risk factor disclosure and find that only a quarter of risk factor disclosures briefly touch on culture-related issues. This surprising result is inconsistent with H2d, which predicts that cultural conflict will be a major topic in merger risk factor disclosure. We investigate in "Do Acquirer Managers Make Strategic Risk Factor Disclosure?" the possibility that bidder managers strategically withhold discussion of cultural risk, yet we find little evidence to support it. Our finding seems to suggest either that culture risk is not as influential as the other risk factors or that acquirer managers tend to overlook culture risk in M&A.

VI. MAJOR RISK FACTORS AND POST-MERGER OUTCOMES

In this section, we investigate how the major risk factors affect post-merger outcomes, with a focus on post-merger integration and acquirers' post-merger performance volatility. As we have already established, these risk factors may have diverging effects on post-merger outcomes.

Major Risk Factors and Post-merger Integration

The difficulty in post-merger integration is a major reason why many mergers fail to realize promised synergies. We, therefore, examine the effects of major risk factors on integration challenges after deal completion. We follow Hoberg and Phillips (2018) and construct a measure of *post-merger integration problems*, which is an indicator variable that equals one when at least one merger-related keyword (e.g., merger, mergers, merged, acquisition) and one integration-related keyword (e.g., challenge, challenging, difficulties) show up in the same paragraph in the acquirer's post-merger 10-K, and zero otherwise.

We test H2a to H2c by regressing *post-merger integration problems* on the weights of major risk factors in Table 4. Columns (1) to (4) include the major risk factors separately, and column (5) includes all four major risk factors. We also include the length of risk factor disclosure in all regressions to test H1b. We control for deal and firm characteristics. Column (1) shows that *technology and product* risk significantly and positively predicts post-merger integration problems. The coefficient of 0.178 (t-statistic 2.90) indicates that one standard deviation increase in *technology and product* risk is associated with an increase in the probability of post-merger integration problems by 10.4 percent from its mean.[27] This result supports H2a and is also consistent with previous studies showing that the difficulty of integrating product lines and technologies is a major issue in post-merger integration (McGee et al. 2015; Hoberg and Philips

[27] There is a 4.6 percentage point increase in *post-merger integration problems*, calculated as the coefficient of 0.178 (column [1] of Table 4) multiplied by 0.26 (i.e., the standard deviation of *technology and product* risk reported in Table 3); 10.4 percent is calculated as 6.3 percent divided by the mean probability of 44.5 percent.

2018).

We find that *accounting information* risk is positively related to post-merger integration problems (column [3]), and the coefficient on *valuation and fairness* risk is positive, albeit statistically insignificant (column [2]). These results are consistent with H2b, which predicts that risk factors related to information asymmetry hamper post-merger integration. We also find robust evidence that, consistent with H1b, the length of risk factor disclosure is significantly and positively related to post-merger integration problems in all regressions.

Interestingly, in column (4) of Table 4, we find that *ownership and dilution* risk negatively predicts post-merger integration problems. A one standard deviation increase in *ownership and dilution* risk is associated with a *decrease* in the chance of integration problems by 6.77 percent from its mean.[28] Therefore, this result supports a negative relation between ownership and dilution risk and post-merger integration problems, as predicted by H2c.

The observed negative relation between ownership and dilution risk has two potential explanations. On the one hand, the influence of target shareholders in the merged company, despite being a major concern of acquirer managers, may facilitate cooperation between acquirer and target during the transition process, thereby reducing integration problems (the "influence" explanation we discussed when developing H2c). On the other hand, target shareholders may seek ownership in the merged firm when they predict a smooth post-merger transition (the "selection" explanation).

We attempt to disentangle these two explanations by conducting cross-sectional analyses based on integration complexity. Under the "influence" explanation, we expect the observed

[28] There is a 3.0 percentage point decrease in *post-merger integration problems*, calculated as the coefficient of −0.311 (column [4] of Table 4) multiplied by 0.096 (i.e., the standard deviation of *ownership and dilution* risk reported in Table 3); 6.7 percent is calculated as 3.0 percent divided by the mean probability of 44.5 percent.

negative relation to be stronger among deals with *more* complex integration, where the influence of target shareholders matters more. Under the "selection" explanation, however, we expect the observed negative relation to be stronger among deals with *less* complex integration, where it is easier to predict the outcome of post-merger integration. We, therefore, construct three proxies for integration complexity based on the intuitions that integration tends to be more complicated when the acquirer faces greater market competition, has more volatile operations, or engages in more innovation activity. Specifically, the first proxy is a textual measure of acquirer product market competition, which counts the number of competition-related words in the acquirer's 10-K (Li, Lundholm, and Minnis 2013). The second proxy is the acquirer's pre-merger return volatility, defined as the standard deviation of the acquirer's monthly stock returns in the year before the merger announcement. The third proxy is the R&D intensity of the acquirer's industry, calculated as the average R&D intensity (a firm's R&D expenditure scaled by total assets) in the acquirer's two-digit SIC industry.

We repeat the regressions of post-merger integration for the two subsamples based on the median of each integration complexity measure. Table 5 shows that for all three integration complexity measures, the observed negative relation between *ownership and dilution* risk and post-merger integration concentrates in the high complexity subsample and disappears in the low complexity subsample. These results support the "influence" explanation rather than the "selection" explanation. In addition, the effects of *technology and product* risk and *accounting information* risk on integration also concentrate in the high complexity subsample, suggesting that these risks create integration problems only when the integration complexity is high.

Major Risk Factors and Acquirers' Post-merger Volatility

In this subsection, we further examine the relations between major risk factors and acquirers' post-merger performance volatility. In Panel A of Table 6, we present the regressions of the acquirer's post-merger ROA volatility, defined as the standard deviation of the acquirer's quarterly ROA in the 12 quarters after deal completion.[29] Besides the controls used in the previous analysis, we also control for the acquirer's ROA volatility in the eight quarters prior to the merger. We find that, consistent with H2a, *technology and product* risk is significantly and positively associated with post-merger ROA volatility. A one standard deviation increase in *technology and product* risk is associated with an increase in the acquirer's post-merger ROA volatility by 18.6% from its mean.[30] In column (5) (full model), we also find that *valuation and fairness* risk and *accounting information* risk are positively associated with ROA volatility, as predicted by H2b. Additionally, the coefficient of *ownership and dilution* risk is significantly negative, which is consistent with our findings on post-merger integration and supports H2c.[31]

We further examine acquirers' post-merger R&D volatility because innovation is a key driver of a firm's performance and growth. We focus on whether *technology and product* risk increases acquirer's post-merger R&D volatility. We measure R&D volatility as the standard deviation of the acquirer's quarterly R&D expenditures, scaled by total assets, in the 12 quarters after merger completion. We also control for the acquirer's R&D volatility in the pre-merger period. Panel B of Table 6 shows that *technology and product* risk significantly and positively predicts the acquirer's post-merger R&D volatility. A one standard deviation increase in

[29] We follow the literature and use quarterly ROA expenditures to construct the ROA volatility measure (e.g., Cao and Narayanamoorthy 2012; De Haan and Poghosyan 2012; Mian and Sankaraguruswamy 2012).
[30] There is a 0.29 percentage point increase in post-merger ROA volatility, calculated as the coefficient of 0.011 (column [1] of Table 6, Panel A) multiplied by 0.26 (i.e., the standard deviation of *technology and product* risk reported in Table 3); 18.6 percent is calculated as 0.29 percent divided by the mean ROA volatility of 1.56 percent.
[31] In unreported results, we also examine the acquirer's post-merger cash flow volatility and find that *technology and product* risk positively predicts cash flow volatility while *ownership and dilution* risk negatively predicts cash flow volatility.

technology and product risk is associated with a large increase in R&D volatility by 28.9 percent from its mean.[32] We also find that *valuation and fairness* risk is positively associated with the acquirer's post-merger R&D volatility, while *ownership and dilution* risk is negatively associated with the acquirer's post-merger R&D volatility. These results are in line with those for performance volatility in Panel A and provide further evidence on how risk factors affect the acquirer's post-merger operations.

Next, we turn to the acquirer's post-merger idiosyncratic return volatility in the year following the deal completion.[33] We define the bidder's idiosyncratic return volatility as the standard deviation of the residuals from the Fama-French three-factor model using monthly stock returns over the one-year window after the deal completion. The regression results in Table 7 show that, consistent with our results for operating performance volatility, *technology and product* risk and *valuation and fairness* risk significantly and positively predict post-merger return volatility, while *ownership and dilution* risk significantly and negatively predicts return volatility. The length of risk factor disclosure also has incremental power in predicting post-merger return volatility. Therefore, the results in Tables 6 and 7 support H2a to H2c about the diverging effects of major risk factors on the acquirer's post-merger performance volatility.

We also test H1b by including the length of the S-4 risk factor disclosure in all the regressions in Tables 6 and 7. We find that the length of risk factor disclosure significantly and positively predicts post-merger ROA volatility, R&D volatility, and return volatility. These results

[32] There is a 0.078 percentage point increase in post-merger R&D volatility, calculated as the coefficient of 0.003 (column [1] of Table 6, Panel B) multiplied by 0.26 (i.e., the standard deviation of *technology and product* risk reported in Table 5); 28.9 percent is calculated as 0.078 percent divided by the mean post-merger R&D volatility of 0.27 percent.

[33] We focus on idiosyncratic return volatility rather than total return volatility because S-4 risk factor disclosure mainly covers deal- and firm-specific risks. As a robustness check, we also examine the acquirer's total return volatility and find similar results.

support H1b, which predicts that the acquirer's risk factor disclosure provides useful information about the risks of M&A.

Major Risk Factors and Deal Duration

In this subsection, we examine the relations between major risk factors and deal duration, which is another important merger outcome. We predict that the major risk factors will have diverging effects on deal duration. On the one hand, previous studies document that prolonged deal completion may delay product integration and reduce synergies, particularly in highly competitive industries (e.g., Bradley et al. 1988; Hoberg and Phillips 2010; Offenberg and Pirinsk 2015). Therefore, acquirers with higher operational uncertainties due to *technology and product* risk will try to speed up deal completion because a delay may exacerbate these uncertainties. On the other hand, acquirers with higher *ownership and dilution* risk may take longer to complete the deals as extra time is needed to obtain shareholder approval (e.g., Li, Liu, and Wu 2018; Jiang, Li, and Mei 2019). Moreover, the information asymmetry associated with *valuation and fairness* risk and *accounting information* risk may also cause complexities and in turn delay the deal's completion.

We measure deal duration as the natural logarithm of the number of days between the announcement date and the completion date, and we present the regressions of deal duration on major risk factors in Table 8. Consistent with our prediction, we find that *technology and product* risk is significantly and negatively associated with deal duration. A one standard deviation increase in *technology and product* risk is associated with a 6.5 percent decrease in deal duration.[34] In contrast, the other three risk factors are significantly and positively associated with deal duration.

[34] The 6.5 percent decrease in deal duration is calculated as the coefficient of −0.252 (column [1] of Table 8) multiplied by 0.26 (i.e., the standard deviation of *technology and product* risk reported in Table 3).

VII. ROBUSTNESS TESTS AND ADDITIONAL ANALYSES

In this section, we first address the potential for sample selection bias using the Heckman two-step approach. We then conduct two robustness tests by using pseudo-risk factors and controlling for the acquirer's 10-K risk factor disclosure. Finally, we examine the possibility of strategic risk factor disclosure by acquirer managers.

Sample Selection

Our sample construction excludes all-cash deals where acquirers do not issue any new shares (and thus do not make S-4 filings). Therefore, a natural question is whether this sample selection affects the generalizability of our findings or, more specifically, whether stock payment is relevant to the effects of risk factors on the examined deal outcomes.

We address the concerns about potential sample selection bias using the two-stage Heckman (1979) model. Lennox, Francis, and Wang (2012) highlight the importance of including a variable that meets the exclusion criteria in the first stage of a Heckman model. Following He, Liu, Netter, and Shu (2020), we use the acquirer's marginal tax rate as the instrument as it is likely to satisfy both the relevance and the exclusion restrictions. Tax shields provide a significant benefit to debt financing. A higher marginal tax rate can increase an acquirer's tendency to issue debt and use the corresponding cash proceeds as a payment method, thus affecting the payment method. Moreover, the acquirer's marginal tax rate is unlikely to be directly related to its M&A risk factor disclosure. Following Blouin, Core, and Guay (2010), we measure a bidder's marginal tax rate for the year prior to the merger announcement, defined as the tax rate associated with the first dollar of interest deduction.[35]

[35] We thank authors Blouin et al. for making the marginal tax rate data publicly available through Wharton Research Data Services.

We report the results in Table 9. In the first stage, we expand the sample to include all mergers (i.e., cash or stock deals). The first-stage regression reported in column (1) confirms the documented relation between the marginal tax rate and the likelihood of stock payment (e.g., Erickson 1998). The second-stage regressions reported in columns (2) to (5) control for the inverse Mill's ratio, where the dependent variables are post-merger integration problems, post-merger return volatility, post-merger ROA volatility, and deal duration. Our results on major risk factors continue to hold in all these regressions, suggesting that our findings are unlikely to be affected by the sample selection.

Pseudo-Risk Factors Analysis

Given our findings that major risk factors have significant and diverging effects on M&A outcomes, one may wonder if these findings are driven by market-wide or industry-wide risks or the acquirer's idiosyncratic risks. We, therefore, conduct a pseudo-risk factors analysis to investigate this question. Specifically, for each acquirer *i*, we randomly pick another acquirer *j* from the same two-digit SIC industry in the same year and assign acquirer *j*'s risk factor weights and its length of risk factor disclosure to acquirer *i*. If our results are driven by market-wide or industry-wide risks, then we expect that these pseudo-risk factors will predict acquirer *i*'s post-merger outcomes similarly to the actual risk factors.

We report the results of the pseudo-risk factors analysis in Table 10, which shows that neither the pseudo-risk factors nor the pseudo-length of S-4 risk factor disclosure is significantly related to any of the post-merger outcomes. These results indicate that the observed effects of major risk factors on post-merger outcomes are driven by acquirer-specific risks rather than market- or industry-level risks.

Controlling for 10-K Risk Factor Disclosure

Given the existing literature on firms' 10-K risk factor disclosure, one may wonder if the S-4 risk factor disclosure simply repeats the information in the acquirer's 10-K risk factor disclosure, especially since prior studies show that risk factor disclosure in the 10-K contains useful information about the firm's risks (e.g., Campbell et al., 2014). We argue that this is unlikely the case for several reasons. First, most information in S-4 risk factor disclosure is deal-specific. For example, *valuation and fairness* risk and *ownership and dilution* risk are unique to M&A and unlikely to be disclosed in the acquirer's regular 10-K filings. Moreover, firms were not mandated to disclose risk factors in 10-Ks until 2005, whereas risk factor disclosure in S-4 was required during our entire sample period. We nonetheless examine this concern by conducting a robustness test that controls for 10-K risk factor disclosure.

Table 11 reports the regression analysis that controls for the length of acquirers' most recent 10-K risk factor disclosure prior to their M&A deal. For deals announced prior to 2005 (when no risk factor disclosure is required in 10-Ks), we create a dummy variable indicating missing 10-K risk factor disclosure. We find that the length of the 10-K risk factor disclosure does not predict any of the post-merger outcomes, except that it is negatively associated with deal duration (column [4]). More importantly, the effects of S-4 risk factors and the length of S-4 risk factor disclosure remain robust after we control for the 10-K risk factor disclosure. These results indicate that our findings on S-4 risk factors cannot be explained by 10-K risk factor disclosure.

Do Acquirer Managers Make Strategic Risk Factor Disclosure?

We acknowledge that acquirer managers could strategically make risk factor disclosure, and completely ruling out this possibility is difficult. Our results show that despite this concern, the acquirer's risk factor disclosure provides useful information about risks in M&A and reliably predicts M&A outcomes. In this subsection, we investigate the possibility of strategic disclosure

by examining the surprising result that acquirer managers make little disclosure about culture risk in M&A. Specifically, we examine whether the lack of cultural risk disclosure is due to acquirer managers' strategic behavior.

We first construct a measure of culture risk disclosure by counting the occurrences of the word "culture" or its variants in the acquirer's risk factor disclosure. We find that only 26.8 percent of the acquirers discuss culture risk, and even if they do, the discussions are generally brief. This result is consistent with our previous finding that cultural risk is not even among the top-25 topics in S-4 risk factor disclosure.

Do acquirer managers strategically avoid disclosing culture risk because doing so would raise shareholder concerns and lower the likelihood of deal completion? To answer this question, we run a regression of a dummy variable for deal withdrawal on the measure of culture risk disclosure. For completeness, we also include the four major risk factors in the regressions. In Panel A of Table 12, the coefficient on culture risk is not statistically significant (t-statistic = 0.51), suggesting that culture risk disclosure does not seem to trigger shareholder opposition or completion failure. Additionally, in column (6) (full model), none of the major risk factors are significantly related to the likelihood of deal withdrawal. This result further suggests that the disclosure of the major risk factors is unlikely to be affected by managers' concern about shareholder opposition.

It is possible that the acquirer manager makes strategic disclosure to lower litigation risk. We measure the acquirer's post-merger litigation by the number of lawsuits where the acquirer is the defendant in the one-year period after deal completion. Panel B of Table 12 presents the regressions of post-merger litigation on the risk factors, in which the coefficient on culture risk is not statistically significant (t-statistic = −0.29). This result holds when we measure acquirer

litigation using lawsuits in the three-year period after deal completion (Panel C of Table 12). Furthermore, Panels B and C show that the coefficients on the four major risk factors are not statistically significant, either. Therefore, the disclosure of culture risk or the four major risk factors does not seem to increase the acquirer's litigation risk.

Overall, the results in Table 12 suggest that acquirers' desire to preempt investor opposition or litigation risk is unlikely to explain the low weight of culture risk in S-4 risk factor disclosure. While the results in this subsection help alleviate the concern that acquirers may disclose risk factors strategically, we acknowledge that it is infeasible for us to test all potential incentives for acquirers' strategic disclosure.

VIII. CONCLUSION

Using the unique data of acquirers' risk factor disclosure for a sample of 2,875 deals from 1995 to 2018, we investigate the composition of risk in M&A and the effects of major risks on acquirers' post-merger outcomes. We first show that the acquirer's risk factor disclosure provides useful information about risks in M&A, as the length of disclosure is positively and significantly associated with the acquirer and deal characteristics that indicate greater risks. Additionally, the length of merger risk factor disclosure positively predicts post-merger integration problems and performance volatility.

For our main analysis, we use an unsupervised topic modeling approach, LDA, to classify the content of the acquirer's risk factor disclosure into topics. Consistent with our predictions, we identify four major risk factors, including a risk factor about firm fundamentals (*technology and product*), two risk factors about information asymmetry (*valuation and fairness*; *accounting information*), and a risk factor about shareholder control (*ownership and dilution*). Perhaps

surprisingly, there is little disclosure about the risk of cultural conflicts, a widely investigated risk in the existing M&A literature.

Our further analyses reveal significant and diverging effects of the major risk factors and merger outcomes. Specifically, the three risk factors related to *technology and product*, *accounting information*, and *valuation and fairness* positively predict acquirers' post-merger integration problems and performance volatility, suggesting that operational uncertainties and information asymmetry are two main drivers of post-merger integration issues and performance volatility. Interestingly, *ownership and dilution* risk negatively predicts post-merger integration problems and performance volatility, suggesting that the influence of target shareholders in the combined company facilitates cooperation between the acquirer and target firms and in turn reduces post-merger integration problems and volatility.

Additionally, we find that while the major risk factors generally increase deal duration, *technology and product* risk decreases deal duration. This contrast suggests that acquirers with higher operational uncertainties tend to close the deal quickly as a delay may cause further complexities in post-merger operations. Our results hold through a broad set of robustness tests including the use of Heckman's two-stage model to test for sample selection bias, pseudo-risk factor analysis, and controlling for the acquirer's regular 10-K risk factor disclosure. What is more, we find little evidence of acquirer managers' strategic disclosure to reduce shareholder opposition or litigation risk.

Our findings contribute to the literature on M&A by providing new evidence of the composition of risk in M&A and the diverging effects of the major risk factors on M&A outcomes. We also provide a novel approach for future studies to measure specific risks in M&A *ex ante*. Additionally, our paper contributes to the literature on corporate disclosure as we are the first to

study the acquirer's risk factor disclosure in Form S-4. Our results show that merger risk factor disclosure contains useful information about the acquirer's risks in M&A, which is distinct from the regular risk factor disclosure found in 10-K filings.

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TABLE 1
Sample Distribution and Summary Statistics

Table 1 presents the temporal distribution and summary statistics for our sample of 2,875 M&A stock deals from 1995 through 2018. Panel A presents the distribution of sample deals by year. Panel B presents the summary statistics of the deal and firm characteristics used in our analyses. Panel C presents the summary statistics of the length of the S-4 filings and their sections of risk factor disclosure, measured by the total number of nonstop words. Definitions of all variables are provided in Appendix A.

Panel A: Sample Distribution by Year

Year	Number of Deals	Percentage	Cumulative Percentage
1995	68	2.37	2.37
1996	176	6.12	8.49
1997	249	8.66	17.15
1998	262	9.11	26.26
1999	275	9.57	35.83
2000	246	8.56	44.38
2001	187	6.5	50.89
2002	116	4.03	54.92
2003	132	4.59	59.51
2004	126	4.38	63.9
2005	136	4.73	68.63
2006	108	3.76	72.38
2007	95	3.3	75.69
2008	63	2.19	77.88
2009	60	2.09	79.97
2010	46	1.6	81.57
2011	39	1.36	82.92
2012	52	1.81	84.73
2013	59	2.05	86.78
2014	91	3.17	89.95
2015	103	3.58	93.53
2016	79	2.75	96.28
2017	54	1.88	98.16
2018	53	1.84	100
Total	2,875	100	

Panel B: Summary Statistics of Deal and Firm Characteristics

	N	Mean	Median	SD
Total Assets ($ million)	2,875	6094.67	1113.97	17280.61
Tobin's Q	2,875	3.993	2.233	5.337
Leverage	2,875	0.238	0.196	0.214
Profitability	2,875	-0.133	0.080	1.034
Past Return	2,875	0.349	0.186	0.845
Past Stock Return Volatility	2,875	13.056	9.896	9.799
Top Five Inst. Ownership	2,875	0.204	0.208	0.114
Serial Acquirer	2,875	0.552	1.000	0.497
Deal Value ($ million)	2,875	1626.24	179.67	4897.96
Tender	2,875	0.029	0.000	0.167
Hostile	2,875	0.008	0.000	0.089
Mixed Payment	2,875	0.476	0.000	0.500
Public Target	2,875	0.747	1.000	0.435
Same Industry	2,875	0.599	1.000	0.490
Withdrawn	2,875	0.068	0.000	0.252
Duration	2,875	155.48	137.00	81.33

Panel C: Summary Statistics of S-4 Filings and Risk Factor (RF) Disclosure

	N	Mean	Median	SD
Length of RF	2,875	2988.68	2268.00	2448.88
Length of S-4	2,875	76513.35	68997.00	32548.95
Ln(Length of RF)	2,875	7.674	7.727	0.860
Ln(Length of S-4)	2,875	11.167	11.142	0.390
Industry-Adjusted Length of RF	2,875	-0.011	0.000	0.609

TABLE 2

Regressions of Merger Risk Factor Disclosure on Firm and Deal Characteristics

Table 2 presents regressions of the length of the Risk Factor section in S-4 filings on firm and deal characteristics. The dependent variable is the natural logarithm of the length of risk factor disclosure (Models 1 and 2) or industry-adjusted length of risk factor disclosure (Models 3 to 5), where the length of risk disclosure is defined as the total number of nonstop words in the Risk Factor section of the bidder's S-4 filing. Industry-adjusted length of risk factor disclosure is the length of risk factor disclosure minus the average length of risk factor disclosure for the bidder's industry in a given year. We also control for a broad set of firm and deal characteristics as well as industry and year fixed effects. All the variables are defined in Appendix A. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Ln(Length of RF)		Ln(Industry-Adjusted Length of RF)		
	(1)	(2)	(3)	(4)	(5)
Ln(Total Assets)	-0.140***	-0.139***	-0.080***	-0.085***	-0.120***
	(-10.63)	(-9.64)	(-7.65)	(-7.71)	(-9.38)
Tobin's Q	-0.002	-0.001	-0.005	-0.004	-0.002
	(-0.45)	(-0.25)	(-1.48)	(-1.22)	(-0.47)
Leverage	-0.071	0.081	0.278***	0.275***	0.113
	(-0.73)	(0.91)	(3.76)	(3.70)	(1.45)
Profitability	-0.093***	-0.061***	-0.043***	-0.040***	-0.047***
	(-6.31)	(-4.27)	(-4.00)	(-3.67)	(-3.84)
Past Return	-0.050**	0.002	0.026	0.026	0.010
	(-2.21)	(0.08)	(1.54)	(1.48)	(0.57)
Past Return Volatility	1.737***	1.654***	0.423**	0.560***	0.893***
	(7.91)	(6.62)	(2.48)	(3.13)	(4.28)
Top Five Inst. Ownership	0.940***	0.281**	0.169	0.122	0.328***
	(5.87)	(2.18)	(1.52)	(1.10)	(2.81)
Serial Acquirer	-0.002	0.033	-0.007	0.001	0.023
	(-0.05)	(1.15)	(-0.28)	(0.04)	(0.88)
Ln(Deal Value)	0.109***	0.066***	0.027***	0.028***	0.057***
	(8.70)	(5.17)	(2.96)	(2.97)	(5.20)
Mixed Payment	0.141***	0.045	0.045*	0.033	0.034
	(4.00)	(1.61)	(1.79)	(1.36)	(1.36)
Tender	-0.009	-0.061	-0.082	-0.071	-0.036
	(-0.11)	(-0.77)	(-1.32)	(-1.14)	(-0.56)
Hostile	-0.343**	-0.062	-0.223*	-0.210*	-0.223*
	(-2.14)	(-0.38)	(-1.77)	(-1.65)	(-1.75)
Same Industry	0.071**	0.054*	0.054**	0.045*	0.038
	(2.05)	(1.83)	(2.06)	(1.73)	(1.45)
Public Target	-0.048	-0.044	-0.015	-0.016	-0.013
	(-1.20)	(-1.28)	(-0.52)	(-0.52)	(-0.45)
Industry Fixed Effects	No	Yes	No	No	Yes
Year Fixed Effects	No	Yes	No	Yes	Yes
Observations	2,875	2,875	2,875	2,875	2,875
R-squared	0.198	0.426	0.071	0.076	0.102

TABLE 3
Major Risk Topics in Merger Risk Factor Disclosure

Table 3 reports the four major risk topics in merger risk factor disclosure extracted using the Latent Dirichlet Allocation (LDA) approach. LDA uses the probability of words co-occurring within documents to identify topics and the words associated with each topic. We remove stop words and numerical words, and then lemmatize each word. We further eliminate common words that appear in more than 50 percent of the disclosures and uncommon words that appear in less than 10 percent of the disclosures. We follow the literature and classify the disclosures into 25 topics. Panel A reports the keywords for each of the four major risk topics. Panel B reports summary statistics of the weights of the four major topics in risk factor disclosure.

Panel A: Example of Keywords for Major Risk Topics

Major Risk Factors	Major Keywords
Technology and Product	Manufacturing, supplier, component, harm, patent, software, quarter, license, marketing, international
Valuation and Fairness	Bank, opinion, election, advisor, elect, community, fairness, average, adjustment, joint
Accounting Information	Joint, pro, forma, opinion, unaudited, consummation, stockholder, indebtedness, assumptions, consent
Ownership and Dilution	Group, class, prefer, series, dividends, warrant, conversion, incorporation, stockholder, convertible

Panel B: Weights of the Major Topics in Risk Factor Disclosure

Risk Category	N	Mean	Std	5 Pct	Median	95 Pct
Technology and Product	2,875	0.160	0.260	0.000	0.004	0.805
Valuation and Fairness	2,875	0.133	0.243	0.000	0.003	0.743
Accounting Information	2,875	0.112	0.209	0.000	0.004	0.653
Ownership and Dilution	2,875	0.047	0.096	0.000	0.000	0.252

TABLE 4
Major Risk Factors and Post-merger Integration Problems

Table 4 reports the linear probability regressions of acquirer's post-merger integration problems on the four major risk factors. The sample period is from 1995 to 2015 due to data availability. The dependent variable is an indicator that equals one if there are integration problems in the year after deal completion, constructed using the acquirer's post-merger 10-K (Hoberg and Phillips 2018). The main independent variables are the weights of the four major risk factors. We also control for the length of S-4 risk factor disclosure, firm and deal characteristics, and industry and year fixed effects. The definitions of all the variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Post-merger Integration Problems				
	(1)	(2)	(3)	(4)	(5)
Technology and Product	0.178***				0.187***
	(2.90)				(2.98)
Valuation and Fairness		0.039			0.078
		(0.71)			(1.37)
Accounting Information			0.176***		0.217***
			(2.74)		(3.18)
Ownership and Dilution				-0.311***	-0.244**
				(-3.10)	(-2.39)
Ln(S-4 Risk Factor Length)	0.076***	0.090***	0.102***	0.084***	0.100***
	(4.70)	(5.44)	(6.11)	(5.12)	(5.78)
Ln(Total Assets)	0.018*	0.018*	0.020**	0.017*	0.019*
	(1.82)	(1.83)	(2.01)	(1.72)	(1.89)
Tobin's Q	0.005*	0.005**	0.005**	0.005**	0.005*
	(1.91)	(2.01)	(1.99)	(2.02)	(1.89)
Leverage	-0.166***	-0.192***	-0.192***	-0.185***	-0.162**
	(-2.59)	(-3.00)	(-3.00)	(-2.90)	(-2.51)
Profitability	0.003	0.006	0.006	0.006	0.003
	(0.28)	(0.58)	(0.57)	(0.58)	(0.32)
Past Return	-0.004	-0.007	-0.006	-0.007	-0.003
	(-0.23)	(-0.41)	(-0.34)	(-0.42)	(-0.16)
Past Return Volatility	0.003*	0.003*	0.003*	0.003*	0.003
	(1.70)	(1.77)	(1.81)	(1.73)	(1.57)
Top Five Inst. Ownership	0.256***	0.276***	0.278***	0.248***	0.222**
	(2.76)	(2.98)	(3.02)	(2.68)	(2.40)
Serial Acquirer	0.072***	0.072***	0.073***	0.072***	0.075***
	(3.52)	(3.51)	(3.59)	(3.51)	(3.71)
Ln(Deal Value)	0.003	0.002	-0.004	0.002	-0.003
	(0.35)	(0.19)	(-0.44)	(0.23)	(-0.34)
Mixed Payment	0.000	-0.007	-0.003	-0.002	0.003
	(0.02)	(-0.32)	(-0.15)	(-0.11)	(0.14)
Tender	0.025	0.018	0.017	0.020	0.032
	(0.44)	(0.32)	(0.30)	(0.36)	(0.58)

Dep. Var.	Post-merger Integration Problems				
	(1)	(2)	(3)	(4)	(5)
Public Target	-0.000	-0.003	-0.005	-0.003	-0.007
	(-0.00)	(-0.16)	(-0.22)	(-0.12)	(-0.33)
Hostile	0.012	0.013	0.017	0.007	0.012
	(0.08)	(0.09)	(0.12)	(0.05)	(0.08)
Same Industry	-0.018	-0.014	-0.015	-0.013	-0.017
	(-0.87)	(-0.71)	(-0.77)	(-0.67)	(-0.85)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,495	2,495	2,495	2,495	2,495
R-squared	0.284	0.280	0.282	0.283	0.290

TABLE 5
Major Risk Factors and Post-merger Integration Problems: Subsample Analysis

Table 5 presents a subsample analysis of the relation between major risk factors and post-merger integration problems. We separate sample deals into two subsamples based on the median of the bidder's product market competition (columns [1] and [2]), bidder's pre-merger stock return volatility (columns [3] and [4]), or bidder's industry R&D intensity (columns [5] and [6]). Product market competition of a bidder is the number of competition-related words scaled by the total number of words in the bidder's 10-K disclosure (multiplied by 1,000 for ease of reading). A bidder's pre-merger return volatility is defined as the standard deviation of the bidder's monthly stock returns in the year before the merger announcement. A bidder's industry R&D intensity is the average R&D intensity (bidder R&D expenditure scaled by total assets) of the bidder's two-digit SIC industry. The regression design is the same as that for Table 4, and the definitions of all variables are provided in Appendix A. For brevity, the coefficients on deal and firm characteristics are not reported. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Post-merger Integration Problems					
	Competition		Pre-merger Ret. Vol.		Industry R&D Intensity	
	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Technology and Product	0.184**	0.083	0.198***	0.139	0.184***	-0.190
	(2.37)	(0.66)	(2.79)	(1.15)	(2.59)	(-1.25)
Valuation and Fairness	0.086	0.002	0.152	0.044	-0.071	0.017
	(0.86)	(0.03)	(1.47)	(0.60)	(-0.57)	(0.24)
Accounting Information	0.262***	0.198*	0.362***	0.128	0.336***	0.027
	(2.75)	(1.77)	(4.11)	(1.31)	(4.22)	(0.18)
Ownership and Dilution	-0.446***	0.037	-0.342**	-0.139	-0.564***	0.033
	(-2.95)	(0.25)	(-2.26)	(-1.06)	(-4.24)	(0.22)
P-value of Coef. Dif. Technology and Product (H) − (L) > 0	0.25		0.34		0.01	
P-value of Coef. Dif. Valuation and Fairness (H) − (L) > 0	0.24		0.19		0.25	
P-value of Coef. Dif. Accounting Information (H) − (L) < 0	0.33		0.03		0.028	
P-value of Coef. Dif. Ownership and Dilution (H) − (L) < 0	0.06		0.12		0.001	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fiexed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,234	1,092	1,390	1,105	1,376	1,108
R-squared	0.277	0.363	0.266	0.377	0.295	0.368

TABLE 6

Major Risk Factors and Acquirer's Post-merger Operating Performance Volatility

Table 6 reports regressions of acquirer's post-merger volatility on the four major risk factors. The dependent variable is the acquirer's post-merger ROA volatility (Panel A) or post-merger R&D investment volatility (Panel B). The main independent variables are the weights of the four major risk factors. We control for the length of S-4 risk factor disclosure, deal and firm characteristics, and industry and year fixed effects in all regressions. The definitions of all variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel A: ROA Volatility

Dep. Var.	Acquirer's Post-merger ROA Volatility				
	(1)	(2)	(3)	(4)	(5)
Technology and Product	0.011***				0.012***
	(3.61)				(3.53)
Valuation and Fairness		0.003**			0.004**
		(2.08)			(2.37)
Accounting Information			0.002		0.005**
			(0.95)		(1.98)
Ownership and Dilution				-0.009***	-0.006*
				(-2.79)	(-1.85)
Ln(S-4 Risk Factor Length)	0.001	0.002**	0.002**	0.001**	0.002**
	(1.33)	(2.57)	(2.46)	(2.30)	(2.02)
Ln(Total Assets)	-0.001***	-0.001**	-0.001**	-0.001***	-0.001**
	(-2.63)	(-2.56)	(-2.47)	(-2.59)	(-2.54)
Tobin's Q	0.000*	0.000*	0.000*	0.000*	0.000*
	(1.86)	(1.95)	(1.93)	(1.93)	(1.85)
Leverage	-0.003	-0.005**	-0.005**	-0.004**	-0.003
	(-1.35)	(-2.08)	(-2.06)	(-2.00)	(-1.35)
Profitability	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(-2.95)	(-2.82)	(-2.83)	(-2.84)	(-2.93)
Past Return	0.000	0.000	0.000	0.000	0.000
	(0.34)	(0.11)	(0.16)	(0.11)	(0.35)
Past ROA Volatility	0.255***	0.257***	0.258***	0.257***	0.253***
	(6.53)	(6.56)	(6.60)	(6.58)	(6.46)
Top Five Inst. Ownership	0.002	0.003	0.003	0.003	0.001
	(0.39)	(0.69)	(0.74)	(0.55)	(0.20)
Serial Acquirer	-0.001	-0.001	-0.001	-0.001	-0.001
	(-0.95)	(-0.99)	(-0.97)	(-0.98)	(-0.83)
Ln(Deal Value)	-0.000	-0.001	-0.001	-0.001	-0.001
	(-1.25)	(-1.50)	(-1.63)	(-1.51)	(-1.52)
Mixed Payment	-0.002**	-0.002***	-0.002***	-0.002***	-0.002**
	(-2.51)	(-3.14)	(-3.01)	(-2.94)	(-2.53)
Tender	-0.003	-0.004*	-0.004*	-0.004*	-0.003
	(-1.61)	(-1.76)	(-1.87)	(-1.84)	(-1.47)
Public Target	-0.001	-0.001	-0.001	-0.001	-0.001
	(-0.43)	(-0.59)	(-0.52)	(-0.51)	(-0.64)

Dep. Var.	Acquirer's Post-merger ROA Volatility				
	(1)	(2)	(3)	(4)	(5)
Hostile	-0.004	-0.004	-0.004	-0.004	-0.004
	(-0.63)	(-0.64)	(-0.62)	(-0.66)	(-0.64)
Same Industry	0.000	0.000	0.000	0.000	0.000
	(0.16)	(0.31)	(0.24)	(0.30)	(0.21)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,481	2,481	2,481	2,481	2,481
R-squared	0.400	0.398	0.398	0.398	0.402

Panel B: R&D Investment Volatility

Dep. Var.	Acquirer's Post-merger R&D Volatility				
	(1)	(2)	(3)	(4)	(5)
Technology and Product	0.003**				0.003**
	(2.07)				(1.98)
Valuation and Fairness		0.001**			0.001**
		(2.27)			(2.26)
Accounting Information			0.000		0.001
			(0.43)		(1.24)
Ownership and Dilution				-0.004**	-0.003*
				(-2.24)	(-1.79)
Ln(S-4 Risk Factor Length)	0.001**	0.001***	0.001***	0.001***	0.001***
	(2.19)	(3.00)	(2.84)	(2.74)	(2.66)
Controls	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,497	2,497	2,497	2,497	2,497
R-squared	0.442	0.440	0.439	0.440	0.443

TABLE 7

Major Risk Factors and Acquirer's Post-merger Idiosyncratic Return Volatility

Table 7 reports regressions of the acquirer's post-merger idiosyncratic volatility on the four major risk factors. The dependent variable is the acquirer's one-year post-merger idiosyncratic return volatility, defined as the standard deviation of the residuals from the Fama-French three-factor model using monthly stock returns over the one-year window after deal completion. The main independent variables are the weights of the four major risk factors. We also control for the length of S-4 risk factor disclosure, firm and deal characteristics, and industry and year fixed effects. The definitions of all variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Acquirer's Post-merger Idiosyncratic Return Volatility				
	(1)	(2)	(3)	(4)	(5)
Technology and Product	1.837***				1.704**
	(2.63)				(2.40)
Valuation and Fairness		1.194***			1.176***
		(3.38)			(3.07)
Accounting Information			-0.318		0.250
			(-0.60)		(0.44)
Ownership and Dilution				-2.596***	-2.178**
				(-2.83)	(-2.39)
Ln(S-4 Risk Factor Length)	0.715***	0.936***	0.793***	0.805***	0.842***
	(5.24)	(6.51)	(5.84)	(6.14)	(5.28)
Ln(Total Assets)	-0.715***	-0.712***	-0.712***	-0.717***	-0.723***
	(-7.18)	(-7.12)	(-7.09)	(-7.17)	(-7.19)
Tobin's Q	0.045	0.049	0.049	0.048	0.044
	(1.49)	(1.60)	(1.60)	(1.60)	(1.49)
Leverage	0.662	0.415	0.425	0.471	0.676
	(1.18)	(0.74)	(0.75)	(0.84)	(1.21)
Profitability	-0.631***	-0.593***	-0.601***	-0.599***	-0.619***
	(-2.74)	(-2.61)	(-2.64)	(-2.64)	(-2.70)
Past Return	-0.308	-0.337*	-0.333*	-0.332*	-0.316*
	(-1.62)	(-1.77)	(-1.74)	(-1.75)	(-1.67)
Past Return Volatility	0.274***	0.273***	0.275***	0.274***	0.271***
	(9.79)	(9.78)	(9.84)	(9.84)	(9.74)
Top Five Inst. Ownership	-0.832	-0.721	-0.605	-0.848	-1.131
	(-0.80)	(-0.70)	(-0.59)	(-0.82)	(-1.08)
Serial Acquirer	-0.112	-0.108	-0.121	-0.114	-0.098
	(-0.59)	(-0.58)	(-0.64)	(-0.61)	(-0.52)
Ln(Deal Value)	-0.001	-0.013	-0.009	-0.015	0.000
	(-0.01)	(-0.16)	(-0.11)	(-0.18)	(0.00)
Mixed Payment	-0.227	-0.335*	-0.296	-0.271	-0.253
	(-1.14)	(-1.70)	(-1.50)	(-1.38)	(-1.26)
Tender	0.605	0.560	0.502	0.525	0.678
	(0.93)	(0.85)	(0.76)	(0.79)	(1.03)
Public Target	-0.680***	-0.748***	-0.696***	-0.711***	-0.739***
	(-2.87)	(-3.14)	(-2.93)	(-3.01)	(-3.10)

Dep. Var.	Acquirer's Post-merger Idiosyncratic Return Volatility				
	(1)	(2)	(3)	(4)	(5)
Hostile	-2.019*	-2.023*	-2.015*	-2.054*	-2.068*
	(-1.88)	(-1.87)	(-1.87)	(-1.88)	(-1.90)
Same Industry	-0.097	-0.063	-0.073	-0.062	-0.075
	(-0.50)	(-0.32)	(-0.37)	(-0.31)	(-0.38)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,513	2,513	2,513	2,513	2,513
R-squared	0.597	0.595	0.595	0.596	0.598

TABLE 8
Major Risk Factors and Deal Duration

Table 8 reports regressions of deal duration on the four major risk factors. The dependent variable is deal duration, defined as the natural logarithm of the number of days between the announcement date and the deal effective or withdrawn date. The main independent variables are the weights of the four major risk factors. We also control for the length of S-4 risk factor disclosure, deal and firm characteristics, and industry and year fixed effects. The definitions of all variables are provided in Appendix A. Each regression includes an (unreported) intercept. Robust t-statistics calculated using standard errors clustered by bidders are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Deal Duration				
	(1)	(2)	(3)	(4)	(5)
Technology and Product	-0.252***				-0.218***
	(-4.83)				(-4.12)
Valuation and Fairness		0.092**			0.130***
		(2.30)			(3.07)
Accounting Information			0.103*		0.120**
			(1.80)		(1.98)
Ownership and Dilution				0.394***	0.365***
				(3.66)	(3.43)
Ln(S-4 Risk Factor Length)	0.028**	0.023*	0.024*	0.016	0.050***
	(2.11)	(1.67)	(1.77)	(1.29)	(3.38)
Ln(Total Assets)	-0.037***	-0.037***	-0.036***	-0.036***	-0.035***
	(-4.60)	(-4.64)	(-4.43)	(-4.48)	(-4.38)
Tobin's Q	-0.009***	-0.010***	-0.010***	-0.010***	-0.009***
	(-3.90)	(-3.97)	(-3.96)	(-4.01)	(-3.94)
Leverage	0.133**	0.167***	0.167***	0.159***	0.130**
	(2.52)	(3.14)	(3.14)	(3.02)	(2.50)
Profitability	0.015*	0.012	0.011	0.011	0.015*
	(1.95)	(1.49)	(1.45)	(1.43)	(1.93)
Past Return	-0.028**	-0.024**	-0.023*	-0.024**	-0.026**
	(-2.28)	(-1.99)	(-1.91)	(-1.96)	(-2.17)
Past Idio. Return Volatility	0.000	-0.000	0.000	0.000	0.000
	(0.34)	(-0.02)	(0.12)	(0.19)	(0.26)
Top Five Inst. Ownership	-0.422***	-0.465***	-0.458***	-0.419***	-0.403***
	(-5.03)	(-5.52)	(-5.42)	(-5.00)	(-4.82)
Serial Acquirer	-0.049***	-0.049***	-0.047***	-0.049***	-0.047***
	(-2.81)	(-2.75)	(-2.68)	(-2.80)	(-2.68)
Ln(Deal Value)	0.054***	0.057***	0.053***	0.056***	0.051***
	(7.16)	(7.40)	(6.64)	(7.33)	(6.50)
Mixed Payment	0.029	0.033*	0.038**	0.033*	0.023
	(1.64)	(1.88)	(2.12)	(1.88)	(1.33)
Tender	-0.294***	-0.275***	-0.281***	-0.282***	-0.290***
	(-4.41)	(-4.10)	(-4.20)	(-4.20)	(-4.36)
Public Target	-0.019	-0.019	-0.018	-0.016	-0.025
	(-0.96)	(-0.96)	(-0.90)	(-0.78)	(-1.24)

Dep. Var.	Deal Duration				
	(1)	(2)	(3)	(4)	(5)
Hostile	0.431***	0.437***	0.441***	0.441***	0.442***
	(3.06)	(3.13)	(3.15)	(3.11)	(3.10)
Same Industry	-0.038**	-0.041**	-0.043**	-0.044**	-0.039**
	(-2.10)	(-2.26)	(-2.33)	(-2.39)	(-2.13)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,875	2,875	2,875	2,875	2,875
R-squared	0.242	0.235	0.235	0.240	0.249

TABLE 9
Control for Sample Selection: Heckman Two-Step Model

Table 9 presents robustness tests that control for potential sample selection bias using the Heckman selection model with an instrument variable, *Marginal Tax Rate*. We follow Blouin et al. (2010) and measure the marginal tax rate on the income before interest for the year before the merger announcement. In column (1), we report the first-stage estimation of the Heckman selection model. The dependent variable is an indicator that equals one if the deal payment includes stocks and zero otherwise. Columns (2) to (5) further include the Inverse Mills Ratio obtained from the Heckman selection model. In column (2), the dependent variable is post-merger integration problems, which is an indicator that equals one if there are integration problems in the year after deal completion, constructed using the acquirer's post-merger 10-Ks (Hoberg and Phillips 2018). In column (3), the dependent variable is the acquirer's post-merger idiosyncratic stock return volatility. In column (4), the dependent variable is the acquirer's post-merger ROA volatility. In column (5), the dependent variable is deal duration. The main independent variables are the weights of the four major risk factors. We also control for the length of S-4 risk factor disclosure, firm and deal characteristics, and industry and year fixed effects as in Table 8 (coefficients not reported for brevity). The definitions of all variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. For brevity, the coefficients on deal and firm characteristics are not reported. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Stock Pay	Post-merger Integration	Post-merger Idiosyncratic Return Volatility	Post-merger ROA Volatility	Duration
	1st Stage	2nd Stage	2nd Stage	2nd Stage	2nd Stage
	(1)	(2)	(3)	(4)	(5)
Marginal Tax Rate	-2.323***				
	(-11.21)				
Technology and Product		0.176***	1.653**	0.011***	-0.240***
		(2.76)	(2.36)	(3.27)	(-4.25)
Valuation and Fairness		0.068	1.069***	0.003*	0.150***
		(1.17)	(2.70)	(1.81)	(3.36)
Accounting Information		0.206***	-0.135	0.005*	0.083
		(2.92)	(-0.22)	(1.81)	(1.29)
Ownership and Dilution		-0.287***	-2.457**	-0.006*	0.373***
		(-2.68)	(-2.54)	(-1.83)	(3.11)
Ln(S-4 Risk Factor Length)		0.106***	0.727***	0.001	0.052***
		(5.99)	(4.43)	(1.51)	(3.17)
Inversed Mills Ratio		0.130	-5.902***	-0.012***	0.054
		(1.56)	(-5.50)	(-2.63)	(0.63)
Controls	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	19,369	2,415	2,385	2,437	2,493
R-/Pseudo-R-squared	0.2652	0.295	0.601	0.436	0.262

TABLE 10
Robustness Test: Pseudo-Risk Factor Analysis

Table 10 reports the results of pseudo-risk factor analysis, where for the sample deals we use randomly assigned weights of major risk factors of deals in the same industry-year rather than using the true weights of major risk factors. In column (1), the dependent variable is post-merger integration problems, which is an indicator that equals one if there are integration problems in the year after deal completion and zero otherwise, constructed using acquirers' post-merger 10-Ks (Hoberg and Phillips 2018). In column (2), the dependent variable is the acquirer's post-merger idiosyncratic return volatility, defined as the standard deviation of the residuals from the Fama-French three-factor model of monthly stock returns over the one-year window after deal completion. In column (3), the dependent variable is the acquirer's post-merger ROA volatility. In column (4), the dependent variable is deal duration. The main independent variables are the pseudo-weights of the major risk factors. We control for the length of S-4 risk factor disclosure, firm and deal characteristics, and industry and year fixed effects as in Table 8 (coefficients not reported for brevity). The definitions of all variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Integration	Post-merger Idiosyncratic Return Volatility	Post-merger ROA Volatility	Duration
	(1)	(2)	(3)	(4)
Technology and Product	0.054	-0.877	0.001	-0.055
	(0.98)	(-1.26)	(0.42)	(-1.11)
Valuation and Fairness	0.038	0.090	0.0001	-0.018
	(0.80)	(0.28)	(0.10)	(-0.44)
Accounting Information	-0.047	-0.945	-0.004	-0.068
	(-0.80)	(-1.39)	(-1.52)	(-1.21)
Ownership and Dilution	-0.055	-0.988	0.0001	-0.089
	(-0.54)	(-1.05)	(0.02)	(-0.88)
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,300	2,310	2,281	2,631
R-squared	0.264	0.599	0.394	0.241

TABLE 11
Robustness Test: Control for Acquirer's 10-K Risk Factor Disclosure

Table 11 presents robustness tests that control for acquirer's 10-K risk factor disclosure. In column (1), the dependent variable is post-merger integration problems, which is an indicator that equals one if there are integration problems in the year after deal completion and zero otherwise, constructed using acquirers' post-merger 10-Ks (Hoberg and Phillips 2018). In column (2), the dependent variable is the acquirer's post-merger idiosyncratic stock return volatility. In column (3), the dependent variable is the acquirer's post-merger ROA volatility. In column (4), the dependent variable is deal duration. The main independent variables are the weights of the major risk factors, the length of S-4 risk factor disclosure, the length of the acquirer's 10-K risk factor disclosure prior to the merger, and *Missing 10-K*, which is an indicator variable with the value of one if the deal happened before 2005 (i.e., before the mandate of 10-K risk factor disclosure) or if the 10-K Risk Factors section is missing, and zero otherwise. We also control for firm and deal characteristics and industry and year fixed effects as in Table 8 (coefficients not reported for brevity). The definitions of all variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. For brevity, the coefficients on deal and firm characteristics are not reported. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Dep. Var.	Post-merger Integration	Post-merger Idiosyncratic Return Volatility	Post-merger ROA Volatility	Duration
	(1)	(2)	(3)	(4)
Technology and Product	0.212***	1.761**	0.010***	-0.227***
	(3.24)	(2.42)	(3.01)	(-3.97)
Valuation and Fairness	0.069	1.152***	0.004**	0.135***
	(1.18)	(2.83)	(2.39)	(3.08)
Accounting Information	0.216***	0.327	0.006**	0.058
	(3.05)	(0.54)	(2.34)	(0.92)
Ownership and Dilution	-0.227**	-2.104**	-0.004	0.323***
	(-2.06)	(-2.21)	(-1.21)	(2.74)
Ln(S-4 Risk Factor Length)	0.098***	0.890***	0.002**	0.044***
	(5.38)	(5.23)	(2.32)	(2.71)
Ln(10-K Risk Factor Length)	0.010	0.080	0.000	-0.018***
	(1.22)	(0.96)	(1.44)	(-2.71)
Missing 10-K	-0.519***	2.164**	0.015***	-0.122
	(-4.92)	(2.09)	(3.16)	(-1.16)
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,338	2,297	2,319	2,417
R-squared	0.287	0.595	0.435	0.263

TABLE 12
Deal Withdrawal and Post-merger Litigation

Table 12 reports regressions of deal withdrawal and post-merger litigation on major risk factors. In Panel A, the dependent variable is deal withdrawal, defined as an indicator variable that takes the value of one if the merger fails to be completed, and zero otherwise. In Panel B (Panel C), the dependent variable is one-year (three-year) post-merger litigation, defined as the number of lawsuits in the one-year (three-year) window after deal announcement. The main independent variables are culture risk and the four major risk factors. We control for deal and firm characteristics and industry and year fixed effects in all regressions as in Table 8 (coefficients not reported for brevity). The definitions of all the variables are provided in Appendix A. Each regression includes a separate (unreported) intercept. Robust t-statistics are calculated using standard errors clustered by bidders and are reported in parentheses. ***, **, * correspond to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel A: Deal Withdrawal

Dep. Var.	Deal Withdrawal					
	(1)	(2)	(3)	(4)	(5)	(6)
Culture	0.005					0.005
	(0.54)					(0.61)
Technology and Product		-0.024				-0.019
		(-0.86)				(-0.67)
Valuation and Fairness			-0.047**			-0.037
			(-2.22)			(-1.60)
Accounting Information				0.059*		0.044
				(1.74)		(1.22)
Ownership and Dilution					-0.000	-0.001
					(-0.01)	(-0.02)
Ln(S-4 Risk Factor Length)	0.006	0.008	0.003	0.013	0.007	0.008
	(0.83)	(1.13)	(0.38)	(1.60)	(0.99)	(0.86)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,875	2,875	2,875	2,875	2,875	2,875
R-squared	0.079	0.079	0.080	0.080	0.078	0.081

Panel B: One-Year Post-merger Litigation

Dep. Var.	One-Year Post-merger Litigation					
	(1)	(2)	(3)	(4)	(5)	(6)
Culture	-0.001					-0.001
	(-0.21)					(-0.17)
Technology and Product		-0.003				0.006
		(-0.18)				(0.39)
Valuation and Fairness			-0.039*			-0.033
			(-1.76)			(-1.49)
Accounting Information				0.026		0.019
				(0.68)		(0.48)
Ownership and Dilution					0.078*	0.080*
					(1.76)	(1.77)
Ln(S-4 Risk Factor Length)	-0.002	-0.002	-0.006	-0.000	-0.002	-0.003
	(-0.48)	(-0.53)	(-1.18)	(-0.01)	(-0.46)	(-0.55)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,875	2,875	2,875	2,875	2,875	2,875
R-squared	0.178	0.178	0.179	0.179	0.179	0.181

Panel C: Three-Years Post-merger Litigation

Dep. Var.	Three-Years Post-merger Litigation					
	(1)	(2)	(3)	(4)	(5)	(6)
Culture	0.002					0.003
	(0.25)					(0.31)
Technology and Product		-0.011				-0.001
		(-0.39)				(-0.03)
Valuation and Fairness			-0.028			-0.023
			(-0.78)			(-0.65)
Accounting Information				0.016		0.013
				(0.27)		(0.22)
Ownership and Dilution					0.159	0.159
					(1.41)	(1.40)
Ln(S-4 Risk Factor Length)	-0.001	0.000	-0.003	0.001	0.001	-0.001
	(-0.10)	(0.05)	(-0.32)	(0.13)	(0.07)	(-0.09)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,875	2,875	2,875	2,875	2,875	2,875
R-squared	0.214	0.214	0.214	0.214	0.216	0.216

APPENDIX A
Variable Definitions

Outcome Variable	**Definition**
One-Year Idiosyncratic Volatility	The standard deviation of an acquirer's monthly idiosyncratic stock returns in the year after deal completion. The idiosyncratic return is estimated using the Fama-French three-factor model using monthly stock returns over the one-year window.
Post-merger Integration Problems	An indicator variable that takes the value of one if an acquirer discloses integration challenges in its 10-K filing in the year after deal completion, and zero otherwise. Specifically, the merger-related keyword list includes "merger," "mergers," "merged," "acquisition," "acquisitions," and "acquired." Integration-related keyword list 1 includes "integration," "integrate," "integrating," and other synonyms. Integration-related keyword list 2 includes "challenge," "challenging," "difficulties," "difficulty," "inability," "failure," "unsuccessful," and other synonyms. We require at least one word from the merger list and from both integration lists to show up in the same paragraph for the integration indicator variable to take the value of one.
Post-merger ROA Volatility	The standard deviation of an acquirer's quarterly return on assets (earnings before interest and taxes / total assets) in the 12 quarters after deal completion.
Post-merger R&D Volatility	The standard deviation of an acquirer's quarterly R&D investment (R&D / total assets) in the 12 quarters after deal completion.
Deal Duration	The number of days between the announcement date and the completion date or withdrawn date. The natural logarithm is used in regressions.
Deal Withdrawn	Deal withdrawn is an indicator variable that takes the value of one if the merger did not go through, and zero otherwise.
One-Year Post-Merger Litigation	The number of lawsuits, in which the acquirer is the defendant, in one year after the deal announcement.
Three-Years Post-Merger Litigation	The number of lawsuits, in which the acquirer is the defendant, in three years after the deal announcement.
Independent Variable	
Length of RF	The total number of nonstop words in the Risk Factors section of the S-4 filing. The natural logarithm is used in regressions.
S-4 Risk Factor Length	The total number of nonstop words in the S-4 filing. The natural logarithm is used in regressions.
Industry-Adjusted Length of RF	The length of RF minus the average length of RF of the bidder's industry-year. Industry is defined based on two-digit SIC classification. The natural logarithm is used in regressions.
10-K Risk Factor Length	The number of nonstop words in the risk disclosure section of the 10-K filing. The natural logarithm is used in regressions.
Missing 10-K	An indicator that takes the value of one if the deal happened before 2005 or the 10-K Risk Factors section is missing and zero otherwise.
Total Assets	Acquirer's total assets.
Tobin's Q	Acquirer's market value divided by its total assets.
Leverage	Acquirer's market leverage, defined as the book value of debt divided by the sum of market value of equity and book value of debt.

Profit Margin	Acquirer's net income divided by sales.
Past Return	Acquirer's one-year stock return before the deal announcement.
Past Return Volatility	The standard deviation of the acquirer's monthly stock returns in the one-year period before the deal announcement.
Past Idio. Return Volatility	The standard deviation of the acquirer's monthly stock returns in the year before the deal announcement. Idiosyncratic return is estimated with the Fama-French three-factor model using monthly stock returns over the one-year window prior to merger announcement.
Past ROA Volatility	The standard deviation of the acquirer's quarterly return on assets in the eight quarters before the deal announcement.
Past R&D Volatility	The standard deviation of the acquirer's quarterly R&D investment in the eight quarters before the deal announcement.
Top Five Inst. Ownership	The fraction of shares outstanding held by the five largest institutional shareholders prior to the deal announcement.
Serial Acquirer	An indicator value that equals one if the acquirer has conducted another acquisition in the past three years of the focal deal.
Deal Value	Transaction value of the deal. The natural logarithm is used in regressions.
Mixed Payment	An indicator variable that takes the value of one if the acquirer uses cash as a part of the payment, and zero otherwise (note that our sample deals use stock for at least a part of the payment).
Public Target	An indicator variable that takes the value of one if the target is a public firm, and zero otherwise.
Tender	An indicator variable that takes the value of one if the acquirer uses a tender offer, and zero otherwise.
Hostile	An indicator variable that takes the value of one if the deal is hostile, and zero otherwise.
Same Industry	An indicator variable that takes the value of one if the acquirer and the target are from the same two-digit SIC industry, and zero otherwise.
Marginal Tax Rate	The marginal tax rate on the income before interest following Blouin et al. (2010) for the year prior to the merger announcement.

APPENDIX B
Disclosure of Risk Factors in Merger Filing: An Example

Appendix B presents an example of risk factor disclosure in the merger filing for the acquisition of Vantive by PeopleSoft in 1999. For brevity, we only include part of the section titled "Risk Factors." The complete section of risk factor disclosure and the merger filing can be found at: https://www.sec.gov/Archives/edgar/data/875570/000095014999002057/0000950149-99-002057.txt.

RISK FACTORS

Vantive stockholders should carefully consider the following risk factors, together with the other information included and incorporated by reference in this proxy statement/prospectus, in deciding whether to vote to approve the merger.

RISK FACTORS RELATING TO THE MERGER

CHANGES IN THE MARKET VALUE OF PEOPLESOFT COMMON STOCK COULD ADVERSELY AFFECT THE VALUE OF THE CONSIDERATION THAT YOU ARE RECEIVING FOR YOUR VANTIVE COMMON STOCK.

There will be no adjustment to the exchange ratio of 0.825 shares for changes in the market price of either Vantive common stock or PeopleSoft common stock, and Vantive is not permitted to walk away from the merger or resolicit the vote of its stockholders solely because of changes in the market price of PeopleSoft common stock. Accordingly, the specific dollar value of PeopleSoft common stock to be received by you upon completion of the merger will depend on the market value of PeopleSoft common stock at the time of the merger.

PEOPLESOFT AND VANTIVE COULD LOSE CUSTOMERS OR FAIL TO ATTRACT NEW CUSTOMERS AS A RESULT OF THE ANNOUNCEMENT OR CONSUMMATION OF THE MERGER, WHICH WOULD CAUSE A DECREASE IN REVENUE.

We cannot assure you that PeopleSoft's and Vantive's current customers will continue their current buying patterns. In addition, the announcement of the merger may inhibit PeopleSoft's and Vantive's attempts to attract new customers. Certain of Vantive's or PeopleSoft's current or potential customers may cancel or defer orders for each company's products as a result of the merger or the announcement of the merger. We believe these cancellations or deferrals may occur because some of our current or potential customers might be concerned about our ability to integrate our operations. See "-- We May Not Successfully Integrate Our Business Operations Or Our Management May Be Distracted By The Integration Process." Any such delay or cancellation would adversely affect PeopleSoft's or Vantive's or, after the merger, the combined company's sales.

WE MAY NOT SUCCESSFULLY INTEGRATE OUR BUSINESS OPERATIONS OR OUR MANAGEMENT MAY BE DISTRACTED BY THE INTEGRATION PROCESS.

After the merger has been completed, PeopleSoft may integrate, among other things, the following business operations of Vantive into PeopleSoft:

- product and service offerings;
- product development, sales and marketing;
- research and development;

- administrative and customer service functions; and
- management information systems.

Integrating the operations of Vantive with those of PeopleSoft after the merger may be difficult, costly and time consuming. The integration of our combined operations may temporarily distract management from the day-to-day business of the combined company after the merger. PeopleSoft and Vantive may fail to manage this integration effectively or to achieve any of the anticipated benefits that both companies hope will result from the merger.

VANTIVE STOCKHOLDERS MAY EXPERIENCE LOWER RETURNS ON THEIR INVESTMENT AFTER THE MERGER.

Vantive stockholders may receive a lower return on their investment after the merger than if the merger did not occur. If, for example, PeopleSoft does not achieve the anticipated operating and strategic benefits of the merger or if PeopleSoft does not otherwise achieve its business objectives and the market price for PeopleSoft's stock declines, a lower return could occur. The issuance of PeopleSoft common stock in the merger will result in dilution and this could hurt its market price. In addition, the trading price of PeopleSoft common stock has fluctuated significantly in the past and is likely to continue to do so. Often, these fluctuations have been greater than those experienced by the stock market in general.

APPENDIX C
25 Risk Topics Identified by LDA

Appendix C table reports the top-ten keywords for each of the 25 risk topics classified by LDA, as well as the relative importance of each topic in the risk factor disclosure. "Proportion Deals >5%" is the percentage of bidders that identify the topic with at least 5 percent weight in the risk factor disclosure. "Ave. Weight" is the average weight for each topic across all bidders. "Ave. STD" is the standard deviation of "Ave. Weight." We also add an interpretation for each topic.

Topic #	Proportion Deals >5%	Ave. Weight	Ave. STD	Top-10 Keywords	Interpretation
1	0.346	0.112	0.209	Joint, pro, forma, opinion, unaudited, consummation, synergy, indebtedness, assumptions, consent	Accounting information
2	0.328	0.133	0.243	Bank, opinion, election, advisor, elect, community, fairness, average, adjustment, joint	Valuation and fairness
3	0.252	0.047	0.096	Group, class, prefer, series, dividends, medium, warrant, conversion, incorporation, convertible	Ownership and dilution
4	0.252	0.080	0.171	Manufacturing, supplier, component, harm, patent, intellectual, supply, manufacturer, foreign, equipment	Technology and product
5	0.250	0.080	0.177	Software, quarter, license, marketing, international, solution, proprietary, application, support, acceptance	Technology and product
6	0.241	0.046	0.093	Client, private, investor, goodwill, harm, analyst, Nasdaq, reporting, intangible, rule	Goodwill and intangible
7	0.219	0.111	0.244	Loan, bank, community, deposit, banking, institution, real, estate, portfolio, commercial	Banking industry
8	0.162	0.040	0.116	Estate, code, environmental, flow, qualification, charter, center, owner, indebtedness, local	Real estate industry
9	0.162	0.030	0.080	Foreign, NYSE, waste, country, currency, environmental, superior, dollar, international, local	International business
10	0.137	0.022	0.075	Note, indebtedness, senior, secure, guarantee, indenture, default, covenant, subordinate, principal	Financing and leverage
11	0.127	0.023	0.063	People, court, lawsuit, file, alliance, complaint, California, defendant, district, plaintiff	Regulatory and litigation
12	0.112	0.026	0.092	Network, communication, access, telecommunication, wireless, carrier, provider, local, long	Cable industry
13	0.112	0.035	0.116	Internet, advertising, user, commerce, web, online, content, medium, harm, network	Internet and cable

Topic #	Proportion Deals >5%	Ave. Weight	Ave. STD	Top-10 Keywords	Interpretation
14	0.106	0.035	0.125	Gas, oil, natural, production, reserve, flow, environmental, water, produce, expenditure	Utility industry
15	0.096	0.035	0.126	Health, care, healthcare, medical, Medicare, physician, program, provider, reimbursement, patient	Healthcare industry
16	0.094	0.036	0.137	Patent, clinical, candidate, trial, FDA, research, marketing, drug, license, manufacturing	Pharmaceutical industry
17	0.075	0.014	0.048	Contract, digital, government, program, award, commercial, agency, budget, contractor, audit	Government contract
18	0.055	0.009	0.034	Trust, old, line, real, mortgage, subordinate, Florida, commercial, distribution, liquidation	Real estate investment trust
19	0.053	0.014	0.054	National, American, store, America, city, food, bank, field, consumer, dividend	N/A
20	0.047	0.011	0.058	Unit, partnership, partner, distribution, gain, south, taxable, treat, IRS, affiliate	N/A
21	0.041	0.011	0.053	Energy, survive, power, utility, north, good, consolidated, team, generation, transmission	Utility industry
22	0.035	0.009	0.044	Texas, channel, television, merge, advertising, FCC, program, medium, regional, license	Broadcasting industry
23	0.023	0.005	0.019	Home, data, cable, consumer, protect, partner, distribution, feature, program, release	Cable industry
24	0.022	0.004	0.022	Holding, member, corp, express, step, second, class, group, amend, rule	N/A
25	0.015	0.003	0.010	Device, critical, international, independent, central, title, clearance, foreign, reputation, inventory	N/A

APPENDIX D

Case Studies of 50 Deals with High Exposures in Top-Five Risk Topics Listed in Appendix C

Obs	Year	Target	Acquiror	Risk Summary
Topic 1. Keywords: Joint, pro, forma, opinion, unaudited, consummation, synergy, indebtedness, assumptions, consent				
1	2015	Cameron International	Schlumberger	The actual financial condition and results of operations of Schlumberger following the merger may not be consistent with, or evident from, these **unaudited pro forma** condensed combined financial statements. In addition, the **assumptions** used in preparing the **unaudited pro forma** financial information may not prove to be accurate, and other factors may affect Schlumberger's financial condition or results of operations following the merger. www.sec.gov/Archives/edgar/data/87347/0001193125-15-336681-index.htm
2	2013	US Foods	Sysco	The **unaudited pro forma** financial data for Sysco and USF included in this consent solicitation statement/prospectus are preliminary, and Sysco's actual financial position and operations after the completion of the merger may differ materially from the **unaudited pro forma** financial data included in this consent solicitation statement/prospectus. The **unaudited pro forma** financial data for both Sysco and USF in this consent solicitation statement/prospectus are presented for illustrative purposes only and are not necessarily indicative of what Sysco's actual financial position or operations would have been had the merger been completed on the dates indicated. For more information, see "**Pro Forma** Financial Statements." www.sec.gov/Archives/edgar/data/96021/0001193125-14-228930-index.htm
3	2013	Firstbank Corp, Alma, Michigan	Mercantile Bank Corp	The **unaudited pro forma** condensed combined financial information in this **joint** proxy statement and prospectus is presented for illustrative purposes only and may not be reflective of the operating results and financial condition of the combined company following completion of the merger. Further, the combined company's actual results and financial position after the merger may differ materially and adversely from the **unaudited pro forma** condensed combined financial data that is included in this **joint** proxy statement and prospectus. The **unaudited pro forma** condensed combined financial information has been prepared based on the determination that Mercantile will be identified as the acquiror under GAAP and reflects adjustments based upon preliminary estimates of the fair value of assets to be acquired and liabilities to be assumed. The final acquisition accounting may differ materially from the **pro forma** condensed combined financial information reflected in this document. www.sec.gov/Archives/edgar/data/1042729/0001193125-13-369222-index.htm
4	2006	ADE Corp	KLA-Tencor Corp	Completion of the merger is conditioned upon the receipt of all material governmental authorizations, **consent**s, orders and approvals. The merger may not be completed until a significant period of time has passed after the special meeting. As a result, at the time of the special meeting, ADE stockholders will not know the value of the KLA-Tencor common stock that will be issued in connection with the merger. www.sec.gov/Archives/edgar/data/319201/0000891618-06-000126-index.htm
5	2016	Alon USA Energy	Delek Us Holdings	The **unaudited pro forma** condensed combined financial data for Delek included in this **joint** proxy statement/prospectus is preliminary, and the combined company's actual financial position and operations after the Mergers may differ materially from the **unaudited pro forma** financial data included in this **joint** proxy statement/prospectus. The prospective financial forecasts for Alon included in this joint proxy statement/prospectus are based on **assumptions** of, and information available to, Alon at the time such prospective financial forecasts were prepared. Alon does not know whether the **assumptions** made will prove correct. Any or

				all of such information may turn out to be wrong. Such information can be adversely affected by inaccurate **assumptions** or by known or unknown risks and uncertainties, many of which are beyond Alon's control. www.sec.gov/Archives/edgar/data/1694426/0001694426-17-000005-index.htm
6	2014	CareFusion Corp	Becton Dickinson & Co	The **unaudited pro forma** condensed combined financial statements in this document are presented for illustrative purposes only and are not necessarily indicative of what BD's actual financial condition or results of operations would have been had the merger been completed on the dates indicated. The **unaudited pro forma** condensed combined financial statements reflect adjustments, which are based upon **assumptions** and preliminary estimates, to record the CareFusion identifiable assets acquired and liabilities assumed at fair value and the resulting goodwill recognized. The total debt of BD as of June 30, 2014 was approximately $4 billion. BD's **pro forma indebtedness** as of June 30, 2014, after giving effect to the merger and the anticipated incurrence and extinguishment of **indebtedness** in connection therewith, will be approximately $15 billion. www.sec.gov/Archives/edgar/data/10795/0001193125-14-395507-index.htm
7	2015	Sirona Dental Systems	DENTSPLY International	The **unaudited pro forma** combined financial information included in this **joint** proxy statement/prospectus may not be indicative of what the combined company's actual financial position or results of operations would have been. The **unaudited pro forma** combined financial information included in this joint proxy statement/prospectus is presented solely for illustrative purposes and is not necessarily indicative of what the combined company's actual financial position or results of operations would have been had the merger been completed on the dates indicated. This **unaudited pro forma** combined financial information reflects adjustments that were developed using preliminary estimates based on available information and various **assumptions** and may be revised as additional information becomes available. Accordingly, the final acquisition accounting adjustments may differ materially from the **pro forma** adjustments reflected in this **joint** proxy statement/prospectus. www.sec.gov/Archives/edgar/data/818479/0001144204-15-061612-index.htm
8	2014	Pacer International	XPO Logistics	The **unaudited pro forma** financial statements contained in this document are presented for illustrative purposes only, are based on various adjustments, **assumptions** and preliminary estimates, and may not be an indication of the combined company's financial condition or results of operations following the merger for several reasons. See "**Unaudited Pro Forma** Financial Information." The actual financial condition and results of operations of the combined company following the merger may not be consistent with, or evident from, these **pro forma** financial statements. In addition, the **assumptions** used in preparing the **pro forma** financial information may not prove to be accurate, and other factors may affect the combined company's financial condition or results of operations following the merger. www.sec.gov/Archives/edgar/data/1166003/0001193125-14-025757-index.htm
9	2016	Memorial Resource Dvlp	Range Resources	The **pro forma** financial information contained in this document is presented for illustrative purposes only, is based on various adjustments, **assumptions** and preliminary estimates and may not be an indication of the combined company's financial condition or results of operations following the merger for several reasons. See "**Unaudited Pro Forma** Condensed Combined Financial Information" beginning on page 147. The actual financial condition and results of operations of the combined company following the merger may not be consistent with—or evident from—this **pro forma** financial information. In addition, the **assumptions** used in preparing the **pro forma** financial information may not prove to be accurate, and other factors may affect the combined company's financial condition or results of operations following the merger. www.sec.gov/Archives/edgar/data/315852/0001193125-16-620151-index.htm

10		1999	Warner-Lambert	American Home Products	Although AHP and Warner-Lambert expect that the elimination of duplicative expenses as well as the realization of other efficiencies related to the integration of the businesses may offset additional expenses over time, we cannot give any assurance that this net benefit will be achieved in the near term, or at all. See "**Unaudited Pro Forma** Combined Condensed Financial Statements" on page 57 for more detail on the charges we expect to incur in connection with the merger. The **pro forma** amounts do not include synergies resulting from the merger. See "**Unaudited Pro Forma** Combined Condensed Financial Statements" on page 57 for additional **pro forma** financial information for AmericanWarner. www.sec.gov/Archives/edgar/data/5187/0000912057-99-009871-index.htm

Topic 2. Keywords: Bank, opinion, election, advisor, elect, community, fairness, average, adjustment, joint

1	2008	MFB Corp, Mishawaka, Indiana	MutualFirst Financial	The **fairness opinions** obtained by MutualFirst and MFB from their respective financial **advisors** will not reflect changes in circumstances between signing the merger agreement and the merger. The **opinions** do not speak as of the time the merger will be completed or as of any date other than the dates of such **opinions**. Because MutualFirst and MFB currently do not anticipate asking their respective financial **advisors** to update their **opinions**, the January 7, 2008 **opinions** do not address the **fairness** of the merger consideration, from a financial point of view, at the time the merger is completed, but only as of January 7, 2008. For a description of the **opinion**s that MutualFirst and MFB received from their respective financial **advisors**, please refer to "The Merger—**Opinion** of Sandler O'Neill & Partners, L.P. –Financial **Advisor** to MutualFirst" and "The Merger—**Opinion** of Stifel, Nicolaus & Company Incorporated –Financial **Advisor** to MFB." MFB stockholders may receive a form of consideration different from what they **elect**. While each MFB stockholder may **elect** to receive all MutualFirst common stock, all cash or a combination of stock and cash in the merger, the percentages of the shares of MFB common stock outstanding immediately prior to the merger that will be converted into the stock consideration and the cash consideration are fixed at 80% and 20%, respectively. As a result, if either a stock **election** or a cash **election** proves to be more popular among MFB stockholders and you choose the form of **election** that is more popular, you might receive a portion of your consideration in the form you did not **elect**. If you receive less MutualFirst common stock than you **elect**ed, you will likely recognize more gain for federal income tax purposes than you would have recognized had you received more MutualFirst common stock. www.sec.gov/Archives/edgar/data/1094810/0000927089-08-000132-index.htm
2	2004	Madison Bancshares Grp Ltd, PA	Leesport Financial Corp, PA	The **fairness opinions** obtained by Leesport and Madison from Griffin Financial Group and Cedar Hill **Advisors**, respectively, will not reflect changes in circumstances between the delivery of the **opinions** and the completion of the transaction. Leesport and Madison will not obtain updated **opinions** as of the effective time of the transaction from Griffin Financial Group and Cedar Hill **Advisors**, Leesport's and Madison's respective financial **advisors**. Changes in the operations and prospects of Leesport or Madison, general market and economic conditions and other factors which may be beyond the control of Leesport and Madison, and on which the **fairness opinions** were based, may alter the value of Leesport or Madison or the prices of shares of Leesport common stock and shares of Madison common stock by the time the transaction is completed. The **opinions** do not speak as of the time the transaction will be completed or as of any date other than the dates of such **opinions**. For a description of the **opinions** that Leesport and Madison received from their respective financial **advisors**, please refer to "The Transaction-**Opinion** of Leesport's Financial **Advisor**" on page 30 and "The Transaction-**Opinion** of Madison's Financial **Advisor**" on page 37. www.sec.gov/Archives/edgar/data/775662/0001047469-04-019967-index.htm

3	2016	Ohio Legacy Corp	United Community Finl Corp	You may receive a form of consideration different from the form of consideration you **elect**. The **fairness opinion** states that the merger consideration is **fair** from a financial point of view on the date of the **opinion**, not as of the date the Merger is finally completed or as of any other date. Subsequent changes in the operation and prospects of Ohio Legacy or UCFC, changes in general market and economic conditions could significantly alter the value of Ohio Legacy or UCFC, or the price of UCFC common shares by the time the Merger is completed. www.sec.gov/Archives/edgar/data/707886/0001193125-16-775185-index.htm
4	2013	MetroCorp Bancshares	East West Bancorp	The **opinion** of MetroCorp's financial **advisor** will not reflect changes in circumstances between the signing of the merger agreement and the completion of the merger. Because MetroCorp does not anticipate asking its financial **advisor** to update its **opinion**, the **opinion** will not address the **fairness** of the per share merger consideration from a financial point of view at the time the merger is completed. www.sec.gov/Archives/edgar/data/1069157/0001104659-13-078082-index.htm
5	2003	FirstFedAmer Bancorp Inc, MA	Webster Financial Corp	Stockholders may receive a form of consideration different from what they **elect.** While each FIRSTFED stockholder may **elect** to receive cash or Webster common stock in the merger, 60% of the FIRSTFED common stock outstanding at completion of the merger will be converted into Webster common stock, with the remainder converted into the cash. www.sec.gov/Archives/edgar/data/801337/0000950123-03-014073-index.htm
6	2016	Carolina Bank Holdings Inc, NC	First Bancorp, Troy, NC	CLBH shareholders may receive a form of consideration different from what they **elect.** Although each CLBH shareholder may **elect** to receive all cash or all stock, the total merger consideration shall be prorated as necessary to ensure that 25% of the total outstanding shares of CLBH common stock will be exchanged for cash and 75% of the total outstanding shares of CLBH common stock will be exchanged for shares of First Bancorp common stock. www.sec.gov/Archives/edgar/data/811589/0001174947-16-003077-index.htm
7	2005	Amegy Bancorp Inc, TX	Zions Bancorp	Amegy shareholders may receive a form of consideration different from what they **elect**. If either the aggregate cash or stock **elections** exceed the maximum available, and you choose the consideration **election** that exceeds the maximum available, you will receive a portion of your consideration in cash and a portion of your consideration in Zions common stock. The value of the merger consideration to be received by Amegy shareholders will be substantially based on the **average** closing prices of Zions common stock on the NASDAQ during the ten trading days ending on the day before the completion of the merger. This **average** price may vary from the closing price of Zions common stock on the date we announced the merger. www.sec.gov/Archives/edgar/data/109380/0001193125-05-170301-index.htm
8	2015	High Point Bank Corp	BNC Bancorp, High Point, NC	HPTB shareholders may receive a form of consideration different from what they **elect**. If the aggregate stock **elections** are greater than the maximum, each stock **election** will be reduced pro rata based on the amount that the aggregate stock **elections** exceed the stock **election** maximum. The **opinion** obtained by HPTB from Sandler O'Neill will not reflect changes in circumstances between signing the merger agreement and the closing of the merger. For a description of the **opinions** that Jefferson received from its financial **advisors**, please refer to "The Merger—**Opinion** of Keefe Bruyette & Woods–Financial **Advisor** to Jefferson" and "The Merger—**Opinion** of Professional Bank Services–Financial **Advisor** to Jefferson." www.sec.gov/Archives/edgar/data/1210227/0001144204-16-095012-index.htm

9	2006	First Oak Brook Bancshares, IL	MB Financial Inc	First Oak Brook stockholders may receive a form of consideration different from what they **elect**. The **fairness opinions** obtained by MB Financial and First Oak Brook from their respective financial **advisors** will not reflect changes in circumstances between signing the merger agreement and the merger. The value of the merger consideration to be received by First Oak Brook stockholders will be based on the **average** closing price of MB Financial common stock on the Nasdaq Stock Market during the five trading days ending on the second trading day before the completion date of the merger. This **average** price may vary from the closing price of MB Financial common stock on the date we announced the merger. www.sec.gov/Archives/edgar/data/1139812/0001104659-06-039243-index.htm
10	2012	Beacon Fed Bancorp Inc, NY	Berkshire Hills Bancorp Inc	Beacon shareholders may receive a form of consideration different from what they **elect.** If you **elect** all cash and the available cash is oversubscribed, then you will receive a portion of the merger consideration in BHLB common stock. If you **elect** all stock and the available stock is oversubscribed, then you will receive a portion of the merger consideration in cash**.** The **fairness opinion** obtained by Beacon from its financial **advisor** will not reflect changes in circumstances subsequent to the date of the **fairness opinion.** KBW, Beacon's financial **advisor** in connection with the merger, has delivered to the board of directors of Beacon its **opinion** dated as of May 31, 2012. The **opinion** of KBW stated that as of such date, and based upon and subject to the factors and assumptions set forth therein, the merger consideration to be paid to the holders of the outstanding shares of Beacon common stock pursuant to the merger agreement was **fair** from a financial point of view to such holders. The **opinion** does not reflect changes that may occur or may have occurred after the date of the **opinion**. www.sec.gov/Archives/edgar/data/1108134/0001104659-12-047344-index.htm

Topic 3. Keywords: Group, class, prefer, series, dividends, warrant, conversion, incorporation, medium, convertible

1	1998	Tele-Communications Inc	AT&T Corp	Holders of different **classes** of AT&T stock may have competing interests. After completion of the merger, potential conflicts of interest may arise between holders of AT&T common stock and holders of New Liberty Media Group tracking stock with respect to, among other things, the payment of **dividends**, asset dispositions, and operational and financial decisions of the AT&T Board. www.sec.gov/Archives/edgar/data/5907/0000950130-99-000119-index.htm
2	1999	Metro Networks Inc	Westwood One Inc	Westwood is authorised to issue **preferred** shares that are adverse to common stockholders' interest and does not intend to pay any **dividends** on the Westwood common stock. www.sec.gov/Archives/edgar/data/771950/0001047469-99-033172-index.htm
3	2000	Intermedia Communications Inc	WorldCom Inc	Because the value of the WorldCom **preferred** stock to be issued in the merger will depend, in part, on the underlying value of the WorldCom common stock or, if issued, the WorldCom **group** stock and MCI **group** stock, Intermedia **preferred** stockholders cannot be certain that the value of the WorldCom **preferred** stock will be affected by the same factors as the Intermedia **preferred** stock. www.sec.gov/Archives/edgar/data/723527/0000950130-01-501394-index.htm
4	1997	Interenergy Corp	KN Energy Inc	shareholders of Interenergy Common Stock and **Series** A **Preferred** should consider that the price of K N Common Stock at the Effective Date, as well as the prices at the date of this Proxy Statement/Prospectus and at the date of the Interenergy Special Meeting, may vary as a result of changes in the business, operations or prospects of K N, general market and economic conditions and other factors. www.sec.gov/Archives/edgar/data/54502/0001035704-97-000364-index.htm
5	2004	Florida Digital Network Inc	ITC Deltacom Inc	The interest in ITC deltacom held by common stockholder post-merger will be subject to dilution from the **preferred** stock and **warrants**. www.sec.gov/Archives/edgar/data/1041954/0001193125-04-165782-index.htm

6	1999	SkyTel Communications Inc	MCI WorldCom	Holders of SkyTel **preferred** stock will become holders of MCI WorldCom **convertible** exchangeable **preferred** stock. There has been no public market for the MCI WorldCom **preferred** stock to be issued in connection with the merger. the price of those shares may fluctuate and the liquidity of those shares may be limited. www.sec.gov/Archives/edgar/data/723527/0000940180-99-001026-index.htm
7	1998	Meridian Data	Quantum Corp	In circumstances where the two **classes** of tracking stock vote together as a single **class**, holders of only one **class** of tracking stock cannot ensure that their voting power will be sufficient to protect their interests. www.sec.gov/Archives/edgar/data/709283/0001012870-99-002696-index.htm
8	2000	Fort James Corp	Georgia-Pacific Corp	Holders of either **class** of common stock may be adversely affected by a **conversion** of one **group**'s **common** stock. www.sec.gov/Archives/edgar/data/41077/0000940180-00-001022-index.htm
9	1996	FlightSafety International	Berkshire Hathaway Inc	Berkshire **class** A stock can be **convertible** into **class** B, but Berkshire **class** B stock is not **convertible** into **class** A or another securities. www.sec.gov/Archives/edgar/data/109694/0000898430-96-005413-index.htm
10	1995	TCI Pacific Communications Inc	Tele-Communications Inc	Two **class**es of UVSG common shares will be treated as single **class**. TCI is a holding company and its assets consist primarily of investments in its subsidiaries. TCI's ability to pay cash **dividend**s depends up the ability of TCI's subsidiaries to distribute amounts to TCI in the form of **dividend**s, loans or other forms of repayment of loans. www.sec.gov/Archives/edgar/data/925692/0000950109-95-005353-index.htm

Topic 4. Keywords: Manufacturing, supplier, component, harm, patent, intellectual, supply, manufacturer, foreign, equipment

1	1996	Semiconductor Systems Inc	FSI International Inc	While FSI attempts to protect its **intellectual** property through **patents**, copyrights, trade secrets, and non-disclosure agreements, it believes that its success will depend to a greater degree upon innovation, technological expertise, and the ability to quickly adapt to and deliver new technology www.sec.gov/Archives/edgar/data/841692/0000950131-96-000917-index.htm
2	1999	SEEQ Technology Inc	LSI Logic Corp	OUR BUSINESS AS A HIGH TECHNOLOGY COMPANY PRESENTS RISKS OF **INTELLECTUAL** PROPERTY OBSOLESCENCE, INFRINGEMENT AND LITIGATION. Our success is dependent in part on our technology and other proprietary rights, and we believe that there is value in the protection afforded by our **patents**, **patent** applications and trademarks www.sec.gov/Archives/edgar/data/703360/0000891618-99-002480-index.htm
3	2002	Clare Inc	IXYS Corp	In the event of any adverse ruling in any **intellectual** property litigation, including the pending litigation with International Rectifier, IXYS could be required to pay substantial damages, cease the **manufacturing**, use and sale of infringing products, discontinue the use of certain processes or obtain a license from the third party claiming infringement with royalty payment obligations by IXYS. An adverse decision in the International Rectifier litigation or any other infringement could materially and adversely affect IXYS' financial condition and results of operations. www.sec.gov/Archives/edgar/data/945699/0000891618-02-002193-index.htm

4	1997	Tinsley Laboratories Inc	Silicon Valley Group Inc	RAPID TECHNOLOGICAL CHANGE; DEPENDENCE ON NEW PRODUCT DEVELOPMENT Semiconductor **manufacturing equipment** and processes are subject to rapid technological change. SVG believes that its future success will depend upon its ability to continue to enhance its existing products and their process capabilities and to develop and **manufacture** new products with improved process capabilities that enable semiconductor **manufacturers** to fabricate semiconductors more efficiently. www.sec.gov/Archives/edgar/data/712752/0001047469-97-001318-index.htm
5	1997	Applied Intelligent Systems	Electro Scientific Inds Inc	**PATENTS** AND OTHER **INTELLECTUAL** PROPERTY. ESI's success depends in part on its proprietary technology. While ESI attempts to protect its proprietary technology through **patents**, copyrights and trade secrets, it believes that its success will depend largely upon continued innovation and technological expertise. www.sec.gov/Archives/edgar/data/726514/0000912057-97-032091-index.htm
6	2006	Accent Optical Techn Inc	Nanometrics Inc	Third parties have claimed and may claim in the future that Nanometrics, Accent Optical or the combined company have infringed or are infringing their **intellectual** property which claims may result in the combined company incurring significant litigation or licensing expenses or being prevented from selling certain of its products if the claims are successful. In the normal course of business, Nanometrics and Accent Optical have each received claims of infringement or otherwise become aware of potentially relevant **patents** or other **intellectual** property rights held by other parties. www.sec.gov/Archives/edgar/data/704532/0001193125-06-074094-index.htm
7	2000	GaSonics International Corp	Novellus Systems Inc	Novellus' results of operations also could be affected by new product announcements and releases by Novellus' competitors, the volume, mix and timing of orders received during a period, availability and pricing of key **components**, fluctuations in **foreign** exchange rates, and conditions in the semiconductor **equipment** industry. www.sec.gov/Archives/edgar/data/836106/0000891618-00-005180-index.htm
8	2000	e2E Corp	Plexus Corp	WE MAY NOT BE ABLE TO OBTAIN RAW MATERIALS OR **COMPONENTS** FOR OUR ASSEMBLIES ON A TIMELY BASIS OR AT ALL. We rely on a limited number of **suppliers** for many **components** used in the assembly process. We do not have any long-term **supply** agreements. At various times, there have been shortages of some of the electronic **components** that we use, and **suppliers** of some **components** have lacked sufficient capacity to meet the demand for these **components.** Over the past 12-plus months, **component** shortages have become more prevalent in our industry. www.sec.gov/Archives/edgar/data/785786/0000950124-00-006267-index.htm
9	2003	Genesis Microchip Inc	Pixelworks Inc	The combined company may be unable to adequately protect its **intellectual** property, which may **harm** our business. Pixelworks and Genesis Microchip have each been issued **patents** and have a number of pending United States and **foreign patent** applications. However, we cannot assure you that any **patent** will be issued as a result of any applications or, if issued, that any claims allowed will be sufficiently broad to protect our technology. In addition, it is possible that existing or future **patents** may be challenged, invalidated or circumvented. It may be possible for a third party to copy or otherwise obtain and use the combined company's products, or technology without authorization, develop similar technology independently or design around the combined company's **patents**. www.sec.gov/Archives/edgar/data/1040161/0001012870-03-001865-index.htm

10	2001	Dallas-Semiconductor Corp	Maxim Integrated Products Inc	Maxim relies primarily upon know-how, rather than on **patents**, to develop and maintain its competitive position. There can be no assurance that others will not develop or **patent** similar technology or reverse engineer Maxim's products or that the confidentiality agreements upon which Maxim relies will be adequate to protect its interests. Other companies have obtained **patents** covering a variety of semiconductor designs and processes, and Maxim might be required to obtain licenses under some of these **patents** or be precluded from making and selling the infringing products, if such **patents** are found to be valid. There can be no assurance that Maxim would be able to obtain licenses, if required, upon commercially reasonable terms. www.sec.gov/Archives/edgar/data/743316/0001095811-01-500103-index.htm

Topic 5. Keywords: Software, quarter, license, marketing, international, solution, proprietary, application, support, acceptance

1	1999	Raima Corp	Centura Software Corp	Centura and Raima generally enter into confidentiality or **license** agreements with their employees, consultants and vendors, and generally controls access to and distribution of its **software**, documentation and other **proprietary** information. Despite efforts to protect **proprietary** rights, unauthorized parties may attempt to copy aspects of Centura's or Raima's products or to obtain and use information that is regarded as **proprietary**. Policing such unauthorized use is difficult. There can be no assurance that the steps taken by Centura or Raima will prevent misappropriation of Centura's or Raima's technology or that such agreements will be enforceable. In addition, litigation may be necessary in the future to enforce intellectual property rights, to protect trade secrets or to determine the validity and scope of the **proprietary** rights of others. Such litigation could result in substantial costs and diversion of Centura's or Raima's resources. www.sec.gov/Archives/edgar/data/895021/0000895021-99-000004-index.htm
2	1996	Open Environment Corp	Borland International Inc	Despite Borland's efforts to protect its **proprietary** rights, unauthorized parties may attempt to copy aspects of Borland's products or to obtain and use information that Borland regards as **proprietary**. www.sec.gov/Archives/edgar/data/853273/0000950109-96-006638-index.htm
3	1998	Scopus Technology Inc	Siebel Sys Inc	Limited Deployment. Many of Siebel's customers are in the pilot phase of implementing Siebel's **software**. There can be no assurance that enterprise-wide deployments by such customers will be successful. Siebel's customers frequently contemplate the deployment of its products commercially to large numbers of sales, **marketing** and customer service personnel, many of whom have not previously used **application software** systems, and there can be no assurance of such end-users' **acceptance** of the product. If any of Siebel's customers are not able to customize and deploy Siebel Enterprise Applications successfully and on a timely basis to the number of anticipated users, Siebel's reputation could be significantly damaged, which could have a material adverse effect on Siebel's business, operating results and financial condition. www.sec.gov/Archives/edgar/data/1006835/0001012870-98-000679-index.htm
4	1996	Integrity QA Software	Pure Atria Corp	Pure Atria and Integrity also rely on certain **software** that it **licenses** from third parties, including **software** that is integrated with internally developed **software** and used in its products to perform key functions. There can be no assurance that these third-party **software licenses** will continue to be available to Pure Atria on commercially reasonable terms, or that the **software** will be appropriately **supported**, maintained or enhanced by the licensors. The loss of **licenses** to, or inability to **support**, maintain and enhance, any of such **software**, could result in increased costs, or in delays or reductions in product shipments until equivalent **software** could be developed, identified, **licensed** and integrated, which would materially adversely affect Pure Atria's business, operating results and financial condition. www.sec.gov/Archives/edgar/data/946487/0001012870-97-000026-index.htm

5	1999	ONTRACK Data International	Legato Systems Inc	Protection of Legato's and Ontrack's Intellectual Property Is Limited. Both Legato and Ontrack are technology companies. The success of Legato and Ontrack depends significantly on protecting their intellectual property which are their most important assets. Despite Legato's and Ontrack's efforts to protect their **proprietary** rights, unauthorized parties may attempt to copy aspects of their products or to obtain and use information that Legato or Ontrack regard as **proprietary**. Policing unauthorized use of Legato's or Ontrack's products is difficult, and **software** piracy can be expected to be a persistent problem. In licensing its products (other than in enterprise **license** transactions), Legato relies on "shrink wrap" **licenses** that are not signed by **license**es. Ontrack relies on "shrink wrap" **licenses** for sales of certain of its products. Such **licenses** may be unenforceable under the laws of certain jurisdictions. In addition, the laws of some foreign countries do not protect Legato's or Ontrack's **proprietary** rights to as great an extent as do the laws of the United States. Legato's and Ontrack's means of protecting their **proprietary** rights may not be adequate. Legato's or Ontrack's competitors may independently develop similar technology, duplicate Legato's or Ontrack's products or design around patents issued to Legato or Ontrack or other intellectual property rights of Legato or Ontrack. www.sec.gov/Archives/edgar/data/859360/0001012870-99-004726-index.htm
6	1998	Mastering Inc	PLATINUM Technology Inc	PLATINUM's success is heavily dependent upon its **proprietary software** technology. PLATINUM relies on a combination of contractual rights, trademarks, trade secrets, patents and copyright laws to establish or protect its **proprietary** rights in its products. PLATINUM's **license** agreements restrict a customer's use of PLATINUM's **software** and prohibit disclosure to third persons. Notwithstanding those restrictions, it may be possible for unauthorized persons to obtain copies of PLATINUM's **software** products. www.sec.gov/Archives/edgar/data/825703/0000950131-98-002515-index.htm
7	1997	OpenVision Technologies Inc	Veritas Software Corp	Dependence on **Proprietary** Technology; Risks of Infringement. The Combined Company's success depends upon its **proprietary** technology. The Combined Company will rely on a combination of copyright, trademark and trade secret laws, confidentiality procedures and licensing arrangements to establish and protect its **proprietary** rights. www.sec.gov/Archives/edgar/data/867666/0000891618-97-001308-index.htm
8	1998	Innovative Tech Systems Inc	Peregrine Systems Inc	DEPENDENCE ON **MARKET ACCEPTANCE** OF INFRASTRUCTURE MANAGEMENT **SOFTWARE SOLUTIONS**. Until recently, Peregrine's product strategy focused principally on integrating an array of IT management **applications** with traditional internal "help desk" **applications** to create an "Enterprise Service Desk" capable of managing multiple aspects of an enterprise's IT infrastructure. In recent years, Peregrine's **license** revenues have derived principally from sales of its SERVICECENTER suite of IT management **applications**. In September 1997, the Company broadened its IT infrastructure management product suite by acquiring ASSETCENTER, an asset management product line, through the acquisition (the "Apsylog Acquisition") of United Software, Inc., including its wholly-owned subsidiary Apsylog S.A. (collectively, "Apsylog"). In addition, Peregrine has increased the functionality of SERVICECENTER to manage aspects of the enterprise infrastructure not necessarily related to IT. www.sec.gov/Archives/edgar/data/1031107/0001047469-98-024932-index.htm

9	1996	SQA Inc	Rational Software Corp	Limited Protection of Intellectual Property and **Proprietary** Rights. Rational and SQA rely on a combination of copyright, trademark and trade secret laws, employee and third-party nondisclosure agreements and other methods to protect their respective **proprietary** rights. Despite these precautions, it may be possible for unauthorized third parties to copy certain portions of the companies' respective products or reverse engineer or obtain and use information that Rational or SQA regards as **proprietary.** Rational and SQA generally **license** their respective **software** products to end-users on a "right to use" basis pursuant to a perpetual **license**. Rational and SQA **license** their respective products primarily under "shrink-wrap" **licenses** (i.e., **licenses** included as part of the product packaging). Shrink-wrap **licenses** are not negotiated with or signed by individual **licensees**, and purport to take effect upon the opening of the product package. Certain **license** provisions protecting against unauthorized use, copying, transfer and disclosure of the **license**d program may be unenforceable under the laws of certain jurisdictions and foreign countries. In addition, the laws of some foreign countries do not protect **proprietary** rights to the same extent as do the laws of the United States. There can be no assurance that these protections will be adequate. To the extent that the Combined Company increases its **international** activities, its exposure to unauthorized copying and use of its products and **proprietary** information will increase. www.sec.gov/Archives/edgar/data/722056/0001012870-97-000054-index.htm
10	1998	Fulltime Software Inc	Legato Systems Inc	**License** and royalty revenue are difficult to forecast. In Legato's case, its royalty revenues are substantially dependent upon product **license** sales by original equipment manufacturers (OEMs) of their products that incorporate Legato's **software**. Accordingly, these royalty revenues are subject to OEMs' product cycles, which are also difficult to predict. Fluctuations in licensing activity from quarter-to-quarter further impact royalty revenues, because initial **license** fees generally are non-recurring and recognized upon the signing of a **license** agreement. www.sec.gov/Archives/edgar/data/859360/0000898430-99-000924-index.htm