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The Vertical Information Transfer Effects of  
Earnings Restatements along the Supply Chain

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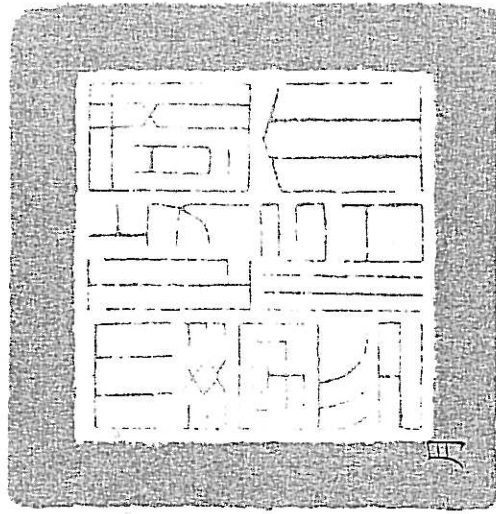
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盈餘重編之供應鏈外溢效果

The Spillover Effects of Earnings Restatements Along the  
Supply Chain

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## 摘要

本研究主要探討盈餘重編宣告如何影響重編公司之供應商的股價評價與實質投資決策。首先，本研究假設並發現，盈餘重編宣告除了導致重編公司的股價顯著下跌外，亦誘發其上游供應商的股價顯著下跌。實證進一步發現，供應商的股價依盈餘重編之資訊內涵而調整，促使投資人關注重編事件對上游供應商的預期盈餘之影響，也提醒投資人去關心中游供應商的財務報表品質。其次，本研究假設，盈餘重編宣告傳遞有關重編公司未來前景不佳及財務報表不實的資訊，將影響其供應商對投入特定關係資產所能獲得收益之預期，進而影響其對重編公司所投入的特定關係資產投資決策。實證結果支持前述假說，重編公司之供應商於重編宣告年度後將減少其研究發展支出，且此研究發展支出之變動與重編宣告所引起的股價變動具顯著關聯性。最後本文假設，重編公司扭曲其實際盈餘數字將影響供應商的投資決策，進而影響供應商的投資效率性。研究發現，供應商在重編公司財務報表誤述期間有顯著超額投資之現象。然而，此供應商之超額投資現象在盈餘重編宣告年度後不再顯著。

**關鍵詞:** 盈餘重編、資訊移轉效果、對特定關係資產投資、投資無效率、供應商。

## Abstract

This dissertation extends prior research on earnings restatements by examining the effects of earnings restatements on valuation and investment decisions of restating firms' suppliers. First, this paper hypothesizes and finds that earnings restatements that adversely affect stock price of the restating firms also induce their suppliers' stock price declines. These stock price declines are related to changes in analysts' earnings forecasts and seem to reflect investors' financial reporting quality concerns. Second, I hypothesize that earnings restatements contain information about the value of relationship-specific investments by suppliers. This information causes suppliers to revise their belief about the value of relationship-specific investments, and therefore affects their subsequent relationship-specific investment decisions. Consistent with my prediction, I find that changes in suppliers' relationship-specific investments after restatement announcements are related to information in the restatements. Finally, I predict and find that a restating firm misreporting financial results induces its suppliers to make excess investments during the misreporting period, while excess investment is no longer positive after the restatement announcement.

**Keywords:** earnings restatements; information transfer effects; relationship-specific investments; investment inefficiency; suppliers.

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## 1. Introduction

Earnings restatements occur when financial reports are discovered not to be consistent with the Generally Accepted Accounting Principles (GAAP). Empirical evidence indicates that restating firms experience a significant decline in their stock price (Palmrose et al. 2004), suggesting restatement announcement conveys incremental information. Furthermore, it appears that restatement information is transferred from restating firms to the rivals in their industry. Existing research finds that rival firms of the restating firm also suffer significantly negative abnormal returns at restatement announcement (Xu et al. 2006; Gleason et al. 2008).<sup>1</sup> The information in restatements also alters rivals to revise their belief about the value of the investments, and therefore affects their subsequent investment decisions (Durnev and Mangen 2008). This suggests that earnings restatements provide new information to rivals about the value of their investment projects.

Earnings restatement information released by one firm has a resulting effect on the firm's suppliers, suggesting that vertical spillover effects of earnings restatements spread along the supply chain. In the customer-supplier relationship, the correlation in the economic activities of restating firms and their suppliers is positive. With a positive correlation in economic activities of restating firms and their suppliers, restatement information which conveys information about the restating firms will also convey news about a supplier, therefore affects the suppliers' stock price and investment decisions. In addition, prior research suggests that suppliers use major customer's financial reports as an information source for their investment decisions (Raman and Shahrur 2008), suggesting that restating firms misreporting financial results will affect the supplier's investment decisions. To date, few studies have examined whether and how earnings restatements affect

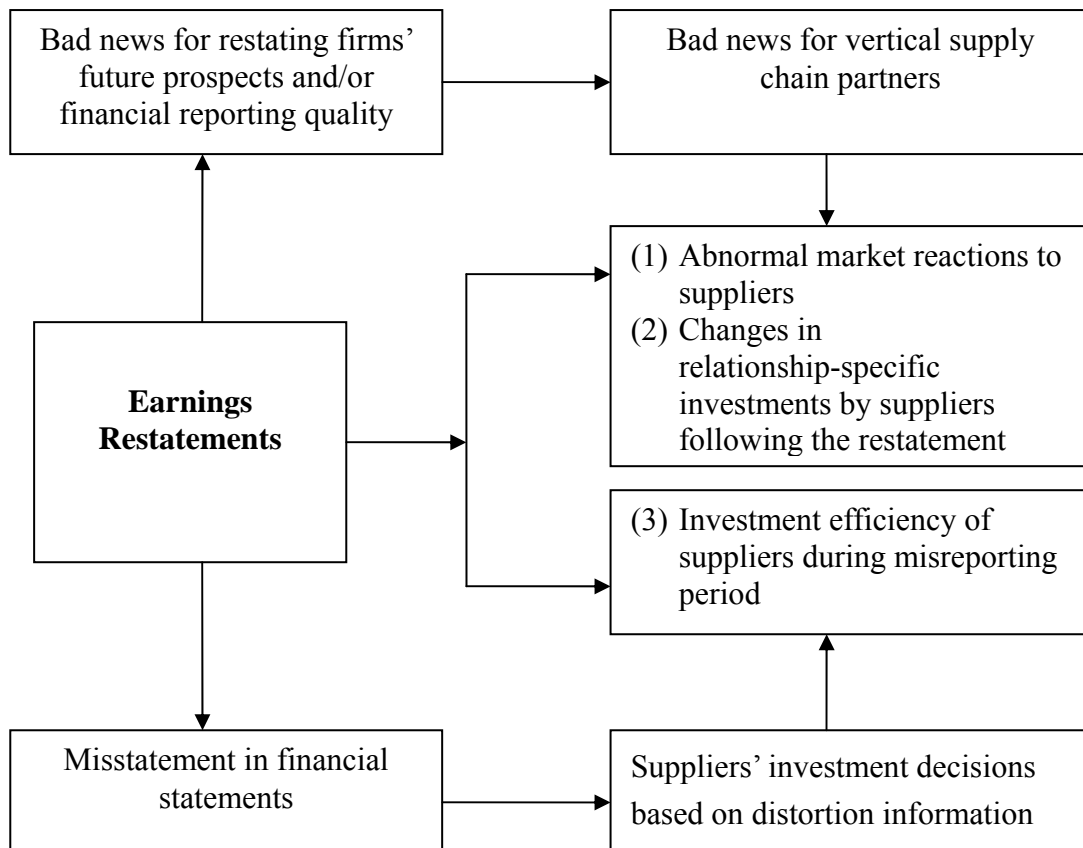
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<sup>1</sup> This is termed intra-industry contagion effects or intra-industry information transfers.

suppliers' stock price and capital investment decisions. My dissertation contributes to restatement research by examining whether and how earnings restatements released by one firm have valuation and investment implications for firms that are linked in the supply chain.

Specifically, this dissertation addresses this research issue in three essays by examining (1) whether and how information released by earnings restatements affects the valuation of the restating firm's suppliers surrounding the restatement announcement, (2) whether and how earnings restatements discovered at one firm affect the incentives of suppliers to undertake relationship-specific investments following the restatement, and (3) whether a firm misreporting financial results induces its suppliers to make suboptimal investments during the misreporting period.

The remainder of this dissertation is organized as follows. In the chapter 2, chapter 3, and chapter 4, I present the three studies related to the effects of earnings restatements on suppliers. In each of these studies, I describe the research methodology and present my empirical results, after that I discuss the findings. The chapter 5 I conclude the major findings of these studies, whereas I indicate possible limitations and suggest some potential directions for future research.



**Figure 1 Research Framework**

## **2. The vertical information transfer effects of earnings restatements along the supply chain**

### **2.1. Introduction**

The collapse of Enron and the sharply increasing number of earnings restatements have raised widespread loss of investor confidence in the content and credibility of financial reporting.<sup>2</sup> This loss of market trust is a cumulative process with spillover effects. For example, the day after WorldCom announced it would restate earnings to the tune of \$3.8 billion, rival firms with questionable reporting, such as Qwest, experienced noteworthy crashes in their stock prices. In addition, WorldCom's restatement announcement also induces adverse effects on its key suppliers' stock prices.<sup>3</sup> This suggests that the vertical information transfer of earnings restatements spread along the supply chain.

This paper examines whether and how information released by earnings restatements affects the valuation of the restating firm's suppliers. In customer-supplier relationship, the partner firms are stakeholders in each others' operation. This contractual relationship between a firm and its supply chain partners may be either implicit or explicit. Theory suggests that reported earnings are informative about one firm's future profitability, and often use in contracts or sever as monitoring mechanisms (Bushman and Smith 2001). Thus, information in earnings restatements to one of the firms in the relationship has a resulting effect on its supply chain partners.

Earnings restatements are likely to convey value-relevant information that will affect stock prices of suppliers for two reasons. First, some restatements have a material adverse effect on restating firm value (Palmrose et al 2004; Hribar and

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<sup>2</sup> Through the end of October, there were 1,031 restatements, compared with 650 for all of 2004 and only 270 in 2001, the year Enron collapsed, according to figures compiled by Glass, Lewis.

<sup>3</sup> See for example, "Impending WorldCom Bankruptcy?" (*RHK Telecommunications Industry Analysis*, June 27, 2002).

Jenkins 2004), which provides evidence that restatements are really bad news for restating firms' future earnings prospects. Second, restatements are acknowledgement that prior financial statements were misstatement. They indicate a breakdown in a firm's internal control system (Kinney and McDaniel 1989), which increases information risk for investors. Consequently, earnings restatements will convey information that alters investors' perceptions about the future earnings performance and/or financial reporting quality of suppliers of restating firms, because such event is a salient negative firm-specific event.

This paper hypothesizes that earnings restatements have negative implications for the restating firm's stock prices will also convey bad news about the value of its suppliers for two reasons. First, earnings restatements with negative implications for restating firms' future prospects could convey information that the ability and incentive of the restating firm to honor its explicit or implicit commitments for customers and suppliers is perceived to be lower. As suggested by implicit contract studies, financial health influence the restating firm's incentive to continue to invest in upholding its reputation for dealing honestly with suppliers, for providing quality products to its customers, and for its overall integrity (see, e.g., Bowen et al. 1995; Burgstahler and Dichev 1997; Cornell and Shapiro 1987; Maksimovic and Titman 1991). Second, earnings restatements revealing improper accounting practice and accounting irregularities may also convey unfavorable information about the accounting quality of the restating firms' suppliers, which likely damages the investors' confidence in the accounting practices of the restating firm's suppliers. Thus, the bad news embodied in restating firms' restatement announcements will be incorporated into the suppliers' stock prices.

Using firm-level data, I find that significant negative abnormal returns to major suppliers surrounding earnings restatement announcements. This is evidence that

investors update their valuation about suppliers that has made an implicit or explicit business transaction commitment based on the information conveyed by restatements. I also find supplier contagion effects are more prominent for restatements that result in a more negative abnormal return to the restating firm at the time of restatement announcements and for restatements that are to correct revenue recognition errors. Moreover, I find supply chain contagion effects are more prominent for restatements that involve accounting fraud, suggesting fraud restatements cause more concerns about the financial reporting quality of suppliers, thus the stock price effects on suppliers are likely to be most evident around fraud events.

In addition to examining whether earnings restatements induce supply chain information transfer effects, my analysis further extends previous research by considering how earnings restatements provide useful information about the future prospects of the restating firm's suppliers. To test this economic prospect concern, this paper hypothesizes that revisions in analysts' earnings forecasts convey information about future earnings prospects for suppliers. Consistent with this conjecture, I find that analysts revise their earnings expectations for suppliers downward after the announcement of restatements. Changes in analyst earnings forecast revisions for suppliers are positively related to proxies for information in earnings restatements, such as suppliers' and restating firms' abnormal returns surrounding the restatement announcements.

To test whether earnings restatements induce accounting quality concerns over suppliers, I conduct a cross-sectional variation in restatement information transfer effect on suppliers. As expected, I find that suppliers suffer greater negative valuation effects when they have high performance-adjusted discretionary accruals, suggesting earnings restatements alter investors' perceptions about the financial reporting quality of suppliers. Furthermore, I find that accounting fraud restatements increase perceived

risk/uncertainty for suppliers and so are associated with more negative supplier contagion stock returns. This suggests that fraud restatements are more likely to prompt investors to question over the suppliers' accounting quality. Finally, I use several variables (suppliers' sales dependence and alliance agreement) to measure the extent to which economic activities of suppliers rely on the restating firm. I find that suppliers suffer greater negative valuation effects when their economic activities are more reliant on the restating firms. This evidence suggests that the stock market reaction to earnings restatement announcements takes into account the economic activities that relate suppliers to the restating firms.

This paper makes several contributions to literature on earnings restatements and information transfers. First, this study extends the recent evidence in Gleason et al. (2008) of earnings restatements induce intra-industry contagion effects on rivals in the same industries. As indicated by Olsen and Dietrich (1985) and Bernard (1985), the information transfers are not necessarily limited to firms' industry rivals. My paper provides new evidence that investors update their valuation about suppliers of the restating firm based on the information conveyed by earning restatements. Second, my findings also complement prior research on supply chain information transfer (e.g., Olsen and Dietric 1985; Hertzal et al. 2006; Pandit et al. 2007). My paper provides new evidence, in the context of material accounting irregularities, complements a much richer setting in accounting and finance literature regarding to how material earnings-related information affects the valuation for the restating firm's supply chain partners. Finally, this paper also documents several factors that help explain cross-sectional variations in the supplier's stock price response to restatement announcements. Thus, my findings further shed some light on how

restatement-induced vertical information transfers operate (e.g., Schipper 1990).<sup>4</sup>

The remainder of the paper is organized as follows. Section 2.2 reviews prior research and develops hypotheses. Section 2.3 describes research design and sample selection. Section 2.4 presents my empirical results. Section 2.5 provides robustness tests. My conclusions are presented in Section 2.6.

## **2.2 Literature review and hypothesis development**

### **2.2.1. Earnings restatements and valuation effects**

There has been substantial empirical research examining whether earnings restatements are associated with changes in stock prices. A large majority of studies have documented that restatement announcement typically has a substantial adverse valuation effect on the restating firms. The short-window cumulative average abnormal returns surrounding the restatement announcement range from –9.2 percent (Palmrose et al. 2004) to -12 percent (Turner et al. 2001). In addition, Dechow et al. (1996) find a –6 percent average return for a subset of restatement announcers that eventually subject to SEC enforcement actions.

The loss in market value can be attributed to diminished economic prospects, as measured by a downward revision in future expected earnings (Griffin 2003; Palmrose et al. 2004),<sup>5</sup> and a increase in information uncertainty/risk, as measured by an increase in analyst forecast dispersion (Palmrose et al. 2004) and cost of capital (Hribar and Jenkins 2004).<sup>6</sup> Consistent with diminished economic prospects agreement, Palmrose and Scholz (2004) found that 18 percent of restating firms are subsequently delisted and/or eventually file for bankruptcy protection. Restatements also have an adverse impact on the reputation of management and outside directors.

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<sup>4</sup> In Schipper (1990, p.101) notes that when compared to whether information transfers exist or not, “so far little attention has been given to explaining how such transfers operate.”

<sup>5</sup> Consistent with this notion, Griffin (2003) finds that analysts are more likely to revise forecasts down in the month of or up to six months after restatement than before.

<sup>6</sup> Information uncertainty/risk is uncertainty about the realized values of earnings caused by financial reporting imprecision and inaccuracy.



Some restating firms' management (Desai et al. 2006) and outside directors (Srinivasan 2005) suffer high turnover, and the incidence of lawsuit filed against firms following the restatement is high (Palmrose and Scholz 2004). Overall, these findings suggest that earnings restatements are negative firm-specific information events, and they are very costly for restating firms.

### **2.2.2. Earnings restatements and intra-industry information transfers**

Information transfer or contagion effect is firm-specific information event at one firm can have valuation implications for other related firms. This information transfer has been documented for different types of firm-specific information events in an the intra-industry setting, suggesting news releases of a given firm within an industry will impact on non-announcing firms in the same industry surrounding the information events announcement date.<sup>7</sup> Perhaps the most commonly investigated information events are related to earnings announcement.<sup>8</sup>

Recognizing the importance of the restatement-induced contagion effects on the restating firms' rivals, recent research documented that information conveyed by restatements is transferred from restating firms to their rivals in the same industry, in which rivals experience significantly negative abnormal returns at the restatement announcement (e.g., Xu et al. 2006; Gleason et al. 2008). This supports the notion that the restatements induce intra-industry contagion effects. This intra-industry information transfer is greater for industry rivals with lower earnings quality which measured by abnormal accruals (Gleason et al. 2008), and with more severe prior investment inefficiency of rival firms (Durnev and Mangen 2006).<sup>9</sup> In addition, Xu

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<sup>7</sup> This is termed intra-industry contagious effects or intra-industry information transfers.

<sup>8</sup> See, for example, Forster (1981), Clinch and Sinclair (1987), Pownall and Waymire (1989), Han and Wild (1990), Freeman and Tse (1992), Ramnath (2002), Baginski (1987), Han et al. (1989), and Pyro and Lustgarten (1990).

<sup>9</sup> Durnev and Mangen (2006) argue that the restatement signals for inefficient investment due to erroneous assumptions about the restating firms and document that restatement-induced contagion effect can be explained by prior inefficient investment.

et al. (2006) find the contagion effect is driven by revision in the expectation of short-term future earnings of the rival firms. Overall, these findings suggest that one firm's earnings restatements convey information useful to investors in updating stock price for other firms in the same industry.

Despite the intra-industry information transfer effects of earnings restatements are well documented, prior research provided no evidence on whether and how earnings restatements detected at one firm have valuation implications for its suppliers. This paper extends prior research by examining the stock price effects of earnings restatements on suppliers. I believe this to be the first paper to provide more precise evidence on whether and how restatement effects spread along the supply chain.

### **2.2.3. Vertical information transfer hypotheses**

Given the significant valuation implications of earnings restatements, it seems plausible that there could be an impact on related firms in supply chain. For example, the day WorldCom announced it will restate earnings to the tune of \$3.8 billion, suppliers in equipment makers such as Juniper Network Inc., Nortel and Cisco Systems Inc., experienced noteworthy crashes in their stock prices (e.g., Berman 2002). In particular, Juniper Networks' stock drops more than 18 percent.<sup>10</sup> The anecdotal evidence supports the notion that earnings restatements could induce the vertical information transfer effects along the supply chain.

This vertical information transfer occurs when earnings restatements convey information useful to investors in pricing the value of related firm in the supply chain. In this paper, I consider two potential reasons for vertical information transfers: (1) earnings prospect concerns; and (2) accounting quality concerns.

#### *Earnings Prospect Concerns*

One potential reason is restatements will induce future earnings prospect

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<sup>10</sup> WorldCom accounted for 10% or more of Juniper Networks' quarterly revenue.

concerns about the restating firms' suppliers, and thus alter investors' future earnings expectation about the restating firms' suppliers. On the one hand, the correlation in the economic activities of the restating firm and its suppliers is likely to be positive because the restating firms are important source of revenue to a supplier. With a positive correlation in the economic activities between restating firm and its suppliers, earnings restatements which convey bad news about a restating firm's economic prospects will also convey bad news about the economic prospects of suppliers (e.g., Olsen and Dietrich 1985).

On the other hand, earnings restatements may impose spillover costs on a given supplier that has made an implicit/explicit commitment. Extant implicit contracting studies (Brown et al. 1995, Cornell and Shapiro 1987, Maksimovic and Titman 1991) suggest that one firm's financial health affects its incentives and abilities to fulfill the implicit/explicit commitments to customers and suppliers. Prior research finds that restating firms have weaker financial health than non-restating firms (Kinney and McDaniel 1989; DeFond and Jiambalvo 1991; Sennetti and Turner 1999). In addition, a restating firm's management attention and financial resource may be diverted around the litigation caused by the restatement (Palmrose et al. 2004). In these cases, the restating firm may reduce current levels of business to its suppliers, postpone the payment for suppliers, or cut corners in other ways to response litigation penalties caused by the restatement as well as to attempt to improve its financial health. Accordingly, the future earnings prospects of suppliers are perceived to be worse, such that suppliers also suffer negative stock price effects at the restatement announcement.

#### *Accounting Quality Concerns*

The second reason is that restatements detected at one firm might induce investors to question over the financial reporting quality of restating firm's suppliers.

Recent research documents that earnings restatements prompt investors to question whether rival firms in the same industry also adopt similar accounting practices as the restating firm (e.g., Raman and Shahrur 2008). Anecdotal evidence also suggests that earnings restatements induce accounting concerns for non-restating firms. For example, comment on WorldCom's restatement, one analyst stated that "The rotten egg here is not WorldCom and the telecom sector, but the accounting practices that are highly susceptible to interpretation" (Dignan 2002). This suggests that accounting quality concern is not restricted in the same industry as the restating firm.

In the customer-supplier relationship, accounting information plays an important role in firms' dealing because the terms of trade are determined in part by reputation considerations. Financial image is important to supply chain partners in assessing a related firm's reputation for explicit and/or implicit contract performance (Cornell and Shapiro 1987). Accordingly, the explicit and/or implicit claims have an effect on supply chain partners' choice of accounting methods (e.g., Bowen et al. 1995; Burgstahler and Dichev 1997). Specifically, firms with higher implicit claims have stronger incentive to use income-increasing accounting methods (Matsumoto 2002).<sup>11</sup> Applying this idea, I argue that the restating firm's suppliers may have stronger incentives to use income-increasing accounting methods to signal a good financial health to the restating firm, so that they could obtain better terms of trade before the restatement. In addition, restating firm and its suppliers may collude and use similar accounting practice to manage their financial statements. Supply chain relations are potentially important information channels as investors infer value relevant information from such economic links (Cohen and Frazzini 2006). The stock prices of these stakeholders then changes as investors alter their perceptions about the

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<sup>11</sup> Matsumoto (2002) finds that implicit claims are positively related to the frequency of positive abnormal accruals.

credibility of suppliers' past financial statements based on the information revealed by earnings restatements.

Overall, both arguments imply that earnings restatements convey the information about the economic prospects and/or accounting quality of suppliers. This leads to changes in stock prices of suppliers at the time of earnings restatement announcement. Thus, the first hypothesis, stated in alternative form, is as follows:

**H1:** Earnings restatement announcements will induce significant stock price effects on suppliers of the restating firm at the restatement announcement.

The focus of H1 is on whether investors update their valuation for the restating firms' suppliers based on the information revealed by the restatements. An important issue to consider is whether such vertical information transfer is signaling future earnings prospects of suppliers. If earnings restatements have implication for future earnings prospects of restating firms' suppliers, one should observe changes in analyst earnings forecast revisions for the restating firms' suppliers following the restatement announcements and such revisions should be related to the information in the restatement. This suggests that investors and analysts adjust their earnings forecasts for customers and suppliers based on the news revealed by restatements of the restating firm. Examining the extent to which investors and analysts use this information provides further insights into how earnings restatements influence the earnings expectations for suppliers, thus determining stock prices of suppliers. This leads to my second hypothesis:

**H2:** Changes in analyst forecast revisions for suppliers following earnings restatement announcements are associated with the information in earnings restatements.

As discussed above, earnings restatements will induce supply chain accounting quality concerns, and therefore affect the stock prices of the restating firm's suppliers.

If earnings restatements of one firm provide information that alters investors' beliefs about the accounting quality of the restating firms' suppliers, one would expect that the abnormal returns of the restating firm's suppliers surrounding restatement announcement are positively related to the measure for difference in earnings quality of the suppliers. This lead to my third hypothesis (in alternative form):

**H3:** Restatement-induced contagion stock price effects surrounding restatement announcements are positively associated with cross-sectional differences in earnings quality of suppliers.

## **2.3. Data**

### **2.3.1. Sample selection**

I first obtain a preliminary sample of 919 restating firms that announced restatements from January 1, 1997 to June 30, 2002 as provided in Government Accounting Office Report (2002).<sup>12</sup> I require restating firms covered by CRSP and Compustat. To do so, I checked all of the company names after merging the GAO data with CRSP and Compustat (207 firms). Based on previous study, I then exclude financial firms (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4999) (63 firms). I also exclude firms with multiple restatements (48 firms).

I next follow the approach of Fee and Thomas (2004) and Hertz et al. (2008) to identify major suppliers of restating firms. This approach is based on the segment sales information disclosure requirement. In accordance with the Statement of Financial Accounting Standards (SFAS) No. 131, firms are required to disclose the

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<sup>12</sup> Following Gleason et al. (2008) and Wilson (2008), I use restatement firm reported in GAO (2002) as our research sample. The database includes instances in which financial statements were not fairly presented in accordance with Generally Accepted Accounting Principles (GAO 2002). Restatements resulting from stock splits, mergers and acquisitions, or changes in accounting principles are not included in the report. During this period, the public concern on the reliability of financial reporting and corporate governance grew, leading to the passage of Sarbanes-Oxley Act in July 2002. Thus, there was no significant shift in the legal regime during our sample period.

identity of any customer that contributes at least 10% to the firm's total revenues.<sup>13</sup> This customer information is available on Compustat segment files, but the database reports only the name of the customer. And, further adding to the difficulty, sometimes it reports only the abbreviated versions of the names. To link the customer name with company in the CRSP or Compustat database, I use the following procedure. First, for each firm I determine whether the customer is another company listed on the CRSP or Compustat file and I assign it the corresponding CRSP permno number. To do so, I use a text-matching program to generate a list of potential matches to the customer's name to one of CRSP or Compustat firm. Subsequent to the text matching by computer, I hand-matched the customer to the corresponding permno number by visually inspecting customers' name, segments, and industry information to ensure accuracy.<sup>14</sup>

Next, I use the resulting database following above procedure to identify my sample of restating firm suppliers, I identify all firms in the database that list a restating firm as a major customer in either of the three year prior to (and including) the restatement announcement year. My sample selection procedure results in a total of 88 restating firms that have at least one supplier.

For each restating firm with at least one supplier in our sample, I further confirm announcement date and the nature of the restatements. I obtain new reports from the ProQuest Newspaper database, Lexis-Nexis, and press release attached to 8-ks file with the SEC. Consistent with prior work (e.g., Hennes, et al. 2007), I exclude 9 technical restatements that do not imply an improper accounting in the original filing

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<sup>13</sup> Statement of Financial Accounting Standards No. 14 required firms to report certain financial information for any industry segment that comprised more than 10% of consolidated sales or revenues between 1977 and 1997. Effective 1998, Statement of Financial Accounting Standards No. 131 now governs required segment disclosures.

<sup>14</sup> While some discretion is involved in visually inspecting customer abbreviation with firm identities, I am conservative in conducting visual inspection that could reduce the sample size but ensures all matches are certain.

(e.g., restatements for merges and change in principle)<sup>15</sup>. I also eliminate interim restatements that are viewed as less severe than restatement of audited annual reports (4 firms). Finally, to provide the most powerful test of hypotheses, I only focus on restatements that result from aggressive accounting practice. Thus, I drop firms that make income-decreasing restatements (6 firms). Following these screens, my final sample of restating firms contains 70 earnings restatements and I identify a total 229 individual suppliers. The distribution of restating firms and suppliers are presented in Table 2.1. The distribution of these samples over time is reported in Panel A of Table 2.1

[Insert Table 2.1 here]

Panel B of Table 2.1 reports summary information on the sample distribution by industry. Industries are as defined in Beneish et al. (2008). Panel B indicates that restating firms are widely distributed among industries, with some clustering of firms in durable manufacturers, computers, and retail industry.

### **2.3.2. Characteristics of suppliers**

Table 2.2 shows that on average 19.8 percent of a supplier's sales are sold to the restating firm. This result confirms that I have selected relationships where the supplier sells a substantial fraction of their output to the restating firm. The mean (median) of performance-adjusted discretionary accruals for suppliers is 0.096 (0.063). I find that smaller firms are relatively more likely to be identified as the restating firm's suppliers.

[Insert Table 2.2. here]

## **2.4. Empirical results**

### **2.4.1. Abnormal returns to restating firms and suppliers**

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<sup>15</sup> The GAO database includes restatement following the adoption of SAB No. 101 "Revenue Recognition in Financial Statements (SEC 1999). Restatements prompted by adoption of SAB No. 101 are excluded (6 firms) and the issuance of various EITF Consensuses. .



To investigate whether earnings restatements by one firm in supply chain induce vertical contagion stock price effects, I first examine the abnormal returns (*CAR*) to the restatement firms and suppliers. I use the date that the firm announces that it will restate earnings as the announcement date. Following prior research, I use event study methodology to estimate abnormal returns to firm  $i$  at date  $t$  ( $AR_{it}$ ) as follows:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (1)$$

where  $R_{mt}$  is the return on the CRSP value-weighted market portfolio on date  $t$ ,  $R_{it}$  is the realized return on firms  $i$  on date  $t$ , and intercept ( $\alpha_i$ ) and beta ( $\beta_i$ ) are parameters estimated using a market model. I use an estimation period from day -220 to day -21 relative to the earnings restatement date (day 0). Also, I require at least 100 trading days over the estimation window for a firm to be included in the sample. My valuation effect on restating firms and suppliers is defined as the cumulative abnormal return (*CAR*).

Table 3, Panel A presents cumulative abnormal returns (*CAR*) to restating firms and suppliers by window type. I first present the abnormal returns to the restating firms. Consistent with prior research, I confirm that restating firms experience significant negative abnormal returns at earnings restatement announcement. For example, the mean (median) three-day abnormal return for our sample of restating firms is -10.07 (-4.76) percent.<sup>16</sup> Consistent with the finding of Gleason et al. (2008), I also find that restating firms experience a significantly negative mean abnormal return of -3.02 percent over the nine trading days preceding the restatement announcement. My findings also confirm that there exists post-announcement stock price decline for restating firms. The mean abnormal return for restating firms is -1.95 percent over the nine trading days following the

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<sup>16</sup> The mean CAR for restating firms is similar to mean result found in other studies (range of -9.0 percent to -11.2 percent).

restatement announcement.

[Insert Table 2.3 here]

The evidence in Panel A of Table 2.3 also shows that restating firm's suppliers suffer significant adverse stock price effects surrounding restatement announcement. The CAR to suppliers averages a significant -1.98 percent ( $p < 0.01$ ) for the (-1, 1) window, -3.45 percent ( $p < 0.05$ ) for the (-5, 5) window. For longer window (-10, 10), the CAR to suppliers averages a significant -3.65 percent ( $p < 0.05$ ). In addition, we find there is evidence of information transfer from restating firms to its suppliers prior to the announcement. Subsequent to announcement day, the mean (median) abnormal return of suppliers is significantly different from zero, suggesting there is vertical information transfer between the restating firms and suppliers following the announcement.

Panel B of Table 2.3 reports the mean and median three-day abnormal returns to suppliers based on the four types of earnings restatements for each sample.<sup>17</sup> The first three types of restatements are based on GAO categories. In addition, following prior research's (e.g., Farber 2005) use of the SEC's AAERs to proxy for fraud, I also identify restatements with related SEC investigations as fraud restatements. Note that the categories with the most negative abnormal returns to the restating firms surrounding the restatement date are accounting fraud (-19.88 percent) and revenue recognition (-16.23 percent). Consistent with my prediction, I also find that suppliers experience more negative stock price effects for restatements involving accounting fraud (-3.60 percent) and for restatements to correct revenue recognition errors (-2.12 percent).

To examine how vertical supply chain effects interact with restating firms'

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<sup>17</sup> As sensitivity tests, I also use the CAR over 5-days reaction window -2 to 2 in my analysis. In the case we obtain similar results to reported results.

valuation effects, this paper tests supplier stock price effects conditioning on whether restatement firms' abnormal returns are less than or greater than median. Consistent with Wilson (2008), I use changes in stock price of restating firm at the restatement announcement as a proxy for the investor's concern on the impact of the restatement for future earnings. I define that the more perceived severe restatements are those for which the three-day cumulative abnormal returns surrounding the restatement announcement date is below the median CAR (i.e., more negative) for the restating firms.

Table 2.3, Panel C reports evidence that supplier information transfer effects are clearly more prominent when there restating firms have a severely negative stock price reaction to earnings restatement announcement. For example, suppliers experience an abnormal return of -3.52 percent ( $p < 0.01$ ) for restatements in which restating firms have abnormal returns are less or equal to median. Overall, my findings provide new evidence that negative valuation effects of earnings restatement extend to suppliers.

#### **2.4.2. Supplier contagion returns and analysts' earnings forecast revisions**

In the previous section, I report evidence suggesting that there is vertical information transfer from restating firm to suppliers surrounding the restatement announcement. To test H2, in this section, I investigate whether a restatement by one firm in the supply chain conveys new information about the future earnings prospects of the restating firms' suppliers. If earnings restatements by one firm in the supply chain induce economic prospect concern, the news in earnings restatements will affect analysts' EPS forecast for suppliers, and if so, earnings forecast revisions will be related to the information provided by the earnings restatement announcement. To test this conjecture, I analyze earnings forecast revisions for suppliers following the announcement. I measure analyst annual EPS forecasts

revisions by subtracting the mean EPS forecast outstanding 60 days after the restatement from the mean EPS forecast on day -1 before the announcement day.

[Insert Table 2.4 here]

Panel A, Table 2.4 supports that mean analyst forecasts for suppliers decline significantly subsequent to the earnings announcement. This decline is statistically different from zero at the 5 percent significance level. Panel B of Table 2.4 reports the relation between changes in analyst EPS forecast revision and severity of earnings restatements. Using Pearson correlation analysis, I find that analyst earnings forecast decline is significantly associated with more negative abnormal returns to restating firms (*ARRE*) and more negative abnormal returns to suppliers (*CAR*). These results support the notion that restatements convey new information about deteriorating economic of suppliers. In addition, earnings forecast revisions are associated with fraud restatements (more negative forecast revisions for restatement involving accounting fraud) and revenue restatements (more negative). I attribute downward revisions in analyst earnings forecast for suppliers to that the restating firm is important source of revenue to suppliers.

Overall, I find the evidence suggests that the investors and financial analysts revise their expectation of earnings to suppliers downward following restatement announcement. This is support the notion that restatements signal information which affects the market participant's assessments of the distribution of future earnings expectation of the restating firm's suppliers.

### **2.4.3. Supplier contagion returns and accounting quality of suppliers**

#### *Empirical Model*

The main objective of this section is to test whether restatement-induced supply chain contagion stock returns are related to proxy for earnings quality of suppliers and customers.

To test accounting quality concern, I use performance-adjusted discretionary accruals to proxy for suppliers' earnings quality (denoted by  $DA$ ). Following Hribar and Collins (2002), I use the direct approach to compute the total accruals ( $TACC$ ). I estimate a modified Jones model (Dechow et al. 1995) on a cross-sectional basis for each Fama and French (1997) industry with 20 or more firms in year  $t$ :<sup>18</sup>

$$TACC / A = \alpha(1 / A) + \beta_1(\Delta SALES / A - \Delta REC / A) + \beta_2(PPE / A) + \varepsilon \quad (2)$$

Where  $TACC$  equals to operating income less operating cash flows adjusted for discontinued operations and extraordinary items;  $A$  is total Assets at the end of year  $t-1$ ;  $\Delta SALES$  is change in sales for firm  $i$  in year  $t$ ;  $\Delta REC$  is change in accounts receivable for firm  $i$  in year  $t$ ;  $PPE$  equals property, plant and equipment for firm  $i$  in year  $t$ .

I compute the performance-adjusted discretionary accruals based on Cahan and Zhang (2006), an alternative approach to control for companies' performance effect. That is, for each Fama and French (1997), I divide my sample into deciles based on sample companies' return on assets ( $ROA$ ). I then adjust each discretionary accrual estimated from Equation (2) by subtracting the median discretionary accruals for the firm's industry- $ROA$  deciles.<sup>19</sup> I predict that supplier chain effects are related to performance-adjusted discretionary accruals.

In addition to capturing whether earnings restatement trigger investors to concern the accounting quality of other firms in supply chain, I also consider factors that extant literature suggests might lead to cross-sectional variations in the nature and extent of supplier and customer contagion. I first consider the severity of the restatement. The abnormal returns to the restating firm capture the information in the

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<sup>18</sup> Following prior research (e.g., Kothari et al. 2005; Cahan and Zhang 2006), I winsorize all distributions to the 1<sup>st</sup> and 99<sup>th</sup> percentiles in estimating Equation (2).

<sup>19</sup> This approach does not impose linearity on the relation between accruals and the performance measure ( $ROA$ ) (Cahan and Zhang 2006).

restatement (Durnev and Magen 2008). I include the restating firm's three-day abnormal stock return (*ARRE*) to control for differences in investor perceptions of the severity and importance of the restatement and related information in the announcement. Given the underlying economics of the relationship between suppliers and the restating firms, one would expect to observe the coefficient on *ARRE* is positive.

I also consider that the economic bond between the restating firm and its suppliers. The literature suggests a vertical information transfer between two firms increase with their correlation in economic activities (Pandit et al. 2007; Olsen and Dietrich 1985). Applying this notion, I expect that suppliers will suffer more pronounced supplier contagion effects when suppliers' economic activities are more dependent on the restating firm. To measure the strength of economic bond between the restating firm and its suppliers (*DEPENDCENC*), I use the percentage of sales made by a supplier to the restating firm to assess the how reliant the supplier is on the restating firms for sales revenues.

Prior studies have viewed alliance as a form of relationship-specific investment by suppliers (e.g., Fee et al. 2006; Raman and Shahrur 2008). When suppliers invest in more relationship-specific investments to doing business with the restating firm, the more implicit/explicit claims held by customers and suppliers depend on the restating firm. Specifically, this variable captures the presence of specific contracts between the restating firm and its suppliers and customers. Thus, my second proxy for economic bond is alliance agreement. I expect that suppliers with alliance agreement with the restating firm will suffer pronounced supplier contagion. To gather information on alliances, I search for whether the restating firm and its suppliers were listed together in the Securities Data Corporation (SDC) strategic alliance database. I define *ALLIANCE* as a dummy variable that takes a value of one

if the firms in a relationship had a formal alliance agreement with the restating firm over three years before earnings restatement and zero otherwise.

Prior research documented that supplier power have an effect on suppliers by influencing the term of trading contracting. For example, restating firm relies on a larger supplier for its product as alternative source is not available or large enough. Thus, I expect that larger suppliers suffer less negative stock price effects at the time of earnings restatement announcements. Following prior research, I measure the degree of concentration of the restating firm by the sale-based Herfindahl index (*HERFINDAHL*), which equals the sum of the squared fraction of industry sales by all firms in the industry.

To mitigate problems of potentially omitted correlated variables, I include several variables into my cross-sectional regression to control for the characteristics of the restating firm, customers, and suppliers that might affect contagion stock returns to customers and suppliers. Other information transfer studies have indicated that the size of the restating firm may have an impact on stock returns (e.g., Gleason et al. 2008). Thus, I add *RESIZE*, the natural log of total assets, into the regression. The supplier long-term debt and debt in current liabilities divided by total assets (*LEVERAGE*) is used to control for the potential impact of financial leverage on abnormal returns to suppliers at the restatement announcement date (Hertzel et al. 2008). I also consider the effect of suppliers' firm size on the contagion effects (*SIZE*). *CFS*, sales to cash flows ratio, enters the regression is to control the profitability of suppliers. Finally, Book-to-market ratio (*BM*) is to control for suppliers' growth opportunity.

In summary, to conduct my main tests of accounting quality concern argument, I estimate Equation (3) for suppliers:

$$\begin{aligned}
CAR = & \beta_0 + \beta_1 ARRE + \beta_2 DA + \beta_3 DEPENDENCE + \beta_4 ALLIANCE + \beta_5 FRAUD \\
& + \beta_6 REVENUE + \beta_7 COST + \beta_8 RESIZE + \beta_9 HERFINDAHL + \beta_{10} LEVERAGE \\
& + \beta_{11} SIZE + \beta_{12} BM + \beta_{13} CFS + \varepsilon
\end{aligned} \tag{3}$$

Where *CAR* is the restatement-induced contagion stock returns to suppliers during the three-day event period (-1, 1) surround the restatement announcements, the independent variables are as described above, and  $\varepsilon$  is a random disturbance term.

### *Empirical Results*

Table 2.5 presents cross-sectional analysis of the three-day abnormal returns of the restating firms' suppliers.<sup>20</sup> The results reported here use individual firm observations although the portfolio regressions yield similar conclusions.<sup>21</sup> The *t*-values are computed with heteroskedasticity consistent standard errors if the tests reject homoskedasticity at the 10% significance level (White 1980).<sup>22</sup> To conduct my analysis, I winsorize all the dependent and independent variables at the 1<sup>st</sup> and the 99<sup>th</sup> percentiles in order to reduce the effect of outliers on my results.

[Insert Table 2.5 here]

In Model 1, the results show that the coefficient of *ARRE* is significantly positive, after including other potentially important variables in the regression.<sup>23</sup> This result is anticipated from the results shown in previous section. The supply chain effects are more severe for restating firm that have larger negative abnormal returns around the restatement announcement. The finding supports the notion that the extent of the announcement effects on suppliers are significantly influenced by the extent to which the restatement valuation effects on the restating firms.

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<sup>20</sup> The results of the analyses for the 21-day abnormal returns are qualitatively similar to the results in this section.

<sup>21</sup> Examining individual supplier firm, as opposed to supplier portfolio, allows me to test the importance of firm-specific variables in explaining the cross-sectional variation in abnormal returns to suppliers (as in Gleason et al. 2008 and others).

<sup>22</sup> The samples in Table 4 are smaller because of financial data unavailability.

<sup>23</sup> Variance inflation factor diagnostic statistics do not indicate multicollinearity as a problem (VIFs are less than 2.0).



As prediction, suppliers with high performance-adjusted discretionary accruals experience a more pronounced contagion stock price decline. This supports my hypothesis H3. The coefficients on *DA* are negative and significant, indicating that suppliers that have higher performance-adjusted discretionary accruals experience a more pronounced contagion stock price decline than do low-accruals firms. This finding supports the notion that earnings restatements provide useful information that alters investors' perceptions about the financial reporting credibility of restating firms' suppliers.

In all models, I add three variables related to types of restatements. As in the univariate results, I find that restatements of accounting fraud are associated with more negative supplier contagion stock returns. Consistent with prior research, my results support the notion that accounting fraud have more negative implications for restating firms' accounting quality, which in turn increases perceived risk/uncertainty for suppliers and so will induce more severe supply chain contagion effects on suppliers. However, I fail to find significant evidence that *REVENUE* and *COST* have any effect on abnormal returns of suppliers after controlling for *ARRE* and *FRAUD*.<sup>24</sup>

Note that as reported in Model 1, accounting fraud increases perceived risk/uncertainty for suppliers and so is associated with more negative supplier contagion stock returns. Thus, I add an interaction between accounting fraud and performance-adjusted discretionary accruals (*FRAUD\*DA*) into regression model. If the fraud restatements are more likely to prompt investors to question over the suppliers' accounting quality, then I expect a negative coefficient on the interaction terms. In Model 2, I present the coefficient on the interaction between the proxies for

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<sup>24</sup> Consistent with prior research (e.g., Palmrose et al. 2004), the result in model 2 suggests a meaningful association between fraud and revenue recognition restatement. I find the correlation between fraud and revenue recognition restatement is positive and significant (p-value<0.01).

earnings quality of suppliers and the accounting fraud. The evidence in Model 2 indicates negative and significant coefficients on the interaction term. This suggests that restatements involving accounting fraud are likely to cause greater concern about the credibility of financial information of restating firms' suppliers.

To further explore the relation between accounting quality of suppliers and restatement-induced supplier contagion returns, this paper examines that whether contagion stock price effects are more pronounced when restating firm and suppliers use the same external auditor, identify the restating firm's auditor for the fiscal year before the restatement is announced. Approximately 21 percent of the suppliers in my sample use the restating firms' auditor. Thus, I add a common-auditor indicator variable (*COM\_AUDITOR*) and an interaction between common-auditor indicator variable and performance-adjusted discretionary accruals into regression model.

In Model 3, I present the coefficients on the interaction between the proxies for earnings quality of suppliers and the common-auditor (*COM\_AUDITOR\*DA*). I find that contagion stock returns are negatively related to the incremental effect of *DA* when suppliers and the restating firms use the same auditor. This suggests that investors seem to impose an incremental contagion penalty on suppliers with high discretionary accruals when the supplier and restating firm employ the same external auditor.

The coefficient on *DEPENDENCE* is negative and significant in Model 1, supporting my prediction. This variable measures how reliant the suppliers are on the restating firms for sales revenues and, hence, supplier switching costs. The more dependent the supplier is on a restating firm the more negative will be the supplier's stock price reaction to the earnings restatement announcement. This evidence suggests that the stock market reaction to earnings restatement announcements takes into account the economic activities that relate suppliers to the restating firms. In

addition, I also find the coefficient on *ALLIANCE* is negative and significant, suggesting that suppliers have a formal alliance agreement with the restating firm suffer more negative contagion stock price effects.

However, there is no evidence to suggest that the concentration of supplier (*HERFINDAHL*), leverage (*LEVERAGE*), restating firm size (*RESIZE*), book-to-market ratio (*BM*) and cash flows to sales ratio (*CFS*) are relevant to determine supplier contagion stock returns.

## **2.5. Robustness checks and sensitivity tests**

### **2.5.1. Industry-level information transfer effects**

Using firm level analysis, in previous sections I have found that there are significant vertical information transfer effects for the restating firms' key suppliers at firm level. There are at least two reasons to expect that other firms in supplier industries could be affected by the information event of the restating firms. First, firms in the supplier industries could be potential suppliers of the restating firm even if not identified in SFAS No. 131 disclosures (Raman and Shahrur 2008). Second, earnings restatements announcements by a restating firm may reflect supply chain industry-wide economic prospects, and so other potential supplier firms in these industries could also suffer contagious effects of earnings restatements. To measure contagious effects on supplier industries, I use all firms with the same four-digit SIC code in my supplier industry as potential suppliers.

[Insert Table 2.6 here]

The results in Table 2.6 show evidence that restatement-induced contagion effects spread beyond key suppliers to their respective industries. Panel A of Table 6 shows that supplier industries suffer negative and significant three-day abnormal returns (-0.96 percent). The results in Panel B indicate that supplier industries suffer negative and significant abnormal returns for the subsample of restatement sample in

which restating firms are with abnormal returns less than sample median. My industry level analysis shows that vertical information transfer spread beyond suppliers to firms in their respective industries. As suggested by Bernard (1985), this industry effects could be attributes to earnings restatements convey information with industry-wide implications for potential suppliers, regardless of the existence of firm-to-firm contracts, thus affecting all suppliers in a major supplier industry.

### **2.5.2. Restatements with negative valuation effects**

To do a robustness check, I also exclude restatements that did not result in negative stock price effects on the restating firms. I focus only on restatement with negative valuation effects. The mean (median) three-day abnormal returns to suppliers is -2.73 (-0.79) percent ( $p\text{-value} < 0.01$ ). Overall, I find evidence that vertical information transfer effects improved when I focus on restating firms that have negative stock price reaction to earnings restatement announcement.

### **2.5.3. Alternative measure of accounting quality**

To do a robustness check, I also use alternative measure to capture whether restatement announcements cause investors to question over the suppliers' accounting quality. As a form of monitoring, auditing mitigates incentive problems between managers and outsiders (Butler et al. 2004). Specifically, the auditor plays an important role in determining whether the financial statements include a material misstatement or departure from GAAP. Thus, prior research has viewed audit opinions as a good measure for a firm's financial reporting quality. For example, extant research finds that modified audit opinion is positively associated with abnormal accruals (Francis and Krishnan 1999; Bartov et al. 2002; Butler et al. 2004). Thus, I predict that the coefficient on modified audit opinions is negatively associated with contagion stock returns, suggests that suppliers with modified audit opinions suffer more negative stock price effects at the time of restatement

announcement.

The auditor opinion data is from Compustat database. Under the SAS 58 regime, Compustat code 2 opinions include only qualifications for scope limitation and departures from GAAP. Other modifications, such as changes from one generally accepted accounting method to another and material uncertainties, should be classed as unqualified opinion with explanatory language (Compustat code 4). Following the approach of Butler et al. (2004), I define modified audit opinion (*OPINION*) as suppliers with a qualified opinion or unqualified with explanatory language and zero otherwise.

The coefficient on *OPINION* are negative and significant (Coef = -0.097,  $t$ -value = -2.52), indicating that suppliers that have modified audit opinions before the restatement announcement experience a more pronounced contagion stock price decline than do firms with clear auditor opinion. This finding further confirms the idea that earnings restatements provide useful information that alters investors' perceptions about the accounting quality of restating firms' suppliers.

## **2.6. Summary**

This paper is to investigate whether and how information released by earnings restatements affects the valuation of the restating firm's suppliers. Using event study, I find suppliers suffer negative stock price effects surrounding the restatement announcement. This supply chain contagion effect is more prominent for earnings restatements that result in a more negative abnormal return to restating firms around restatement announcements and for restatements that involve revenue recognition errors and accounting fraud. Information in earnings restatements is found to induce investors to worry about suppliers' future earnings prospects. I find a significant downward revision in suppliers' earnings forecasts following the restatement, which is positively correlated with the market reaction to earnings restatements. More

importantly, I find that suppliers suffer more stock price decline when they have high performance-adjusted discretionary accruals, suggesting supplier contagion effects can be attributed to investors' concerns over suppliers' accounting quality. Overall, my findings suggest that earnings restatements induce restating firms' suppliers facing increasing concerns about earnings prospects and accounting quality, and affect the stock prices of these firms.

**Table 2.1****Sample distribution**

<b>Panel A: Sample distribution by year</b>		
<b>Year</b>	<b>Restating firms</b>	<b>Suppliers</b>
<b>1997</b>	4	5
<b>1998</b>	10	22
<b>1999</b>	13	40
<b>2000</b>	10	63
<b>2001</b>	24	78
<b>2002</b>	9	21
<b>Total</b>	70	229

<b>Panel B: Sample distribution by industry</b>		
<b>Industry</b>	<b>Restating firms</b>	<b>Suppliers</b>
Mining and construction	1	1
Food	5	9
Textiles	1	1
chemicals	2	3
Pharmaceuticals	1	1
extractive	3	5
metal	1	1
Machinery	2	7
Electrical equipment	10	37
transportation	4	8
instruments	5	13
computers	16	68
wholesale	6	26
miscellaneous retail	10	37
restaurant	1	4
services	<u>2</u>	<u>2</u>
<b>Total</b>	70	229

Panel A presents the distribution of restating firms and suppliers by years. Panel B reports the distribution of restating firms and suppliers by industry. Suppliers are identified through SFAS No. 131 disclosures and this information is available on COMPUSTAT Segment file. The first column shows the number of restating firms that have at least one supplier. The second column reports the number of suppliers of the restating firms at individual firm level. Industries are defined in Beneish et al. (2008).

**Table 2.2**  
**Characteristics of suppliers**

Variable	Mean	Median	75 <sup>th</sup> Percentile	25 <sup>th</sup> Percentile	Standard Deviation
<i>ARRE</i>	-0.127	-0.053	-0.006	-0.105	0.141
<i>DEPENDENCE</i>	0.198	0.157	0.236	0.119	0.153
<i>ALLIANCE</i>	0.285	0.091	1.000	0.000	0.501
<i>RESIZE</i>	9.481	8.882	9.809	10.434	1.485
<i>DA</i>	0.096	0.063	0.121	0.042	0.161
<i>HERFINDAHL</i>	0.194	0.166	0.253	0.084	0.147
<i>SIZE</i>	5.009	3.963	4.798	5.743	1.677
<i>LEVERAGE</i>	0.212	0.143	0.336	0.007	0.249
<i>BM</i>	0.419	0.128	0.413	0.617	0.387
<i>CFS</i>	0.544	1.000	1.000	0.000	0.499

*ARRE*= the three-day abnormal returns to the restating firms; *DEPENDENCE*= supplier sales to restating firm divided by suppliers' total sales; *ALLIANCE* =a dummy variable that takes a value of one if the restating firm and its suppliers had a formal alliance agreement preceding the year of earnings restatement announcement and zero otherwise; *DA*= the absolute value of performance-adjusted discretionary accruals of suppliers before the restatement announcement; *HERFINDAHL* = the Herfindahl index of the suppliers; *RESIZE* = the natural logarithm of restating firms' total assets in restatement announcement year; *LEVERAGE*= total debt divided by total assets of suppliers at the end of the fiscal year before the restatement announcement; *SIZE*=the natural logarithm of suppliers' total assets; *BM* = suppliers' book value of equity divided by equity market value at the end of the fiscal year before the restatement announcement; *CFS*= operating cash flows to sales of suppliers at the end of the fiscal year before the restatement announcement.



**Table 2.3**  
**Abnormal returns to restating firms and suppliers**

Window	Restating firms			Suppliers		
	n	mean	median	n	mean	median
<b>Panel A: Abnormal Returns to restating firms and suppliers</b>						
CAR (-1,1)	70	-10.02%***	-4.76%***	219	-1.98%***	-0.49%**
CAR(-5,+5)	70	-11.51%***	-5.93%***	219	-3.45%**	-2.57%**
CAR(-10,+10)	69	-13.63%***	-6.11%***	213	-4.66%**	-1.08%**
CAR (-10,-2)	70	-3.02%***	-1.81%***	219	-2.29%**	-0.42%
CAR(+2,+10)	69	-1.95%***	-1.02%**	213	-1.38%**	-0.52%**
<b>Panel B: Three-Day Abnormal Returns Based on Reasons for Earnings Restatements</b>						
<b>Restatements</b>						
Fraud	23	-19.88%***	-16.31%***	87	-3.60%***	-1.17%***
Revenue	45	-16.23%***	-9.23%***	133	-2.12%***	-0.49%**
Cost or expense	18	-12.84%***	-8.25%***	21	-1.00%**	-0.32%*
Other	21	-4.21%***	-3.10%***	65	-0.37%	-0.027%
<b>Panel C: Three-Day Abnormal Returns Based on investor perceived severity of earnings restatements</b>						
CAR to restating firm > median				110	-3.52%***	-0.63%***
CAR to restating firm < median				109	-0.43%	-0.32%

\*\*\*, \*\*, \* denote level significantly different from zero at the 1%, 5%, and 10%, respectively, two-tailed. This table reports cumulative abnormal returns (*CAR*) to individual restating firms and suppliers at firm-level. Suppliers are identified through SFAS No. 131 disclosures and this information is available in COMPUSTAT Segment file. Any firm that lists the restating firm as a major customer is defined as supplier. The *t*-test is used to test the null hypothesis that the mean cumulative abnormal return is different from zero. Abnormal returns to restating firms and suppliers are estimated using market model with value weighted CRSP index as market index and estimate the parameters of the market model using data from 220 to 21 days before the announcement date. I use the date that the firm announces that it will restate earnings as the announcement date. In Panel B, I test supplier stock price effects based on the reasons of restatements. In Panel C, I test supplier stock price effects conditioning on whether restatement firms' abnormal returns are less than or greater than median.

**Table 2.4**  
**Revisions in analyst earnings forecast surrounding earnings restatement**  
**announcements**

**Panel A: Analysts' forecast revisions surrounding restatement announcement**

	<b>Suppliers</b> <b>(N=83)</b>	
	Mean	Median
Pre-restatement	0.0321	0.0168
Post-restatement	0.0293	0.0159
Changes in forecast revisions	-1.26%	-0.92%
t-statistic/Z-statistic	-2.13**	-4.11***

**Panel B: Test the relation between analysts' forecast revisions and severity of earnings restatements**

	Coef	p-value
Correlation with <i>ARRE</i>	0.256	0.014
Correlation with <i>CAR</i>	0.252	0.020
Correlation with <i>REVENUE</i>	-0.255	0.019
Correlation with <i>FRAUD</i>	-0.202	0.003

\*\*\*, \*\*, \* denote level significantly different from zero at the 1%, 5%, and 10%, respectively, two-tailed. Panel A of the table shows changes in analysts' forecast dispersion for suppliers. Pre-restatement mean (median) forecasted earnings are mean (median) of all analyst forecasts on day -1, scaled by share price at the fiscal year end preceding the restatement announcement. Post-restatement forecasted earnings are mean (median) of all forecasts 60 days after announcement, scaled by fiscal year end stock price. Change in forecast revisions is the difference between post-restatement forecasted earnings and pre-restatement forecasted earnings. Both earnings forecast (pre- and post- restatement) were for the same fiscal year. Panel B shows the relation between forecast dispersion and severity of earnings restatements. Pearson correlation coefficients are shown. *ARRE* is three-day abnormal returns to restating firms. *CAR* is three-day abnormal returns to suppliers. *FRAUD*= 1 if the restatement relates to accounting fraud, 0 otherwise; *REVENUE*= 1 if the restatement relates to revenue recognition errors, 0 otherwise.

**Table 2.5**  
**Cross-sectional analysis for suppliers**

Variable	Model 1		Model 2		Model 3	
	Coef	t-value	Coef	t-value	Coef	t-value
<i>Intercept</i>	-0.053	-1.09	-0.036	-0.89	-0.044	-1.01
<i>DA</i>	-0.061	-2.43 **	-0.050	-2.35 **	-0.032	-0.74
<i>DA*FRAUD</i>			-0.575	-3.80 ***		
<i>COM_AUDITOR</i>					-0.011	-0.59
<i>DA*COM_AUDITOR</i>					-0.156	-1.87 *
<i>DEPENDENCE</i>	-0.066	-1.87 *	-0.053	-1.67 *	-0.022	-1.65 *
<i>ALLIANCE</i>	-0.042	-2.35 **	-0.040	-2.13 **	-0.027	-1.69 *
<i>FRAUD</i>	-0.069	-2.81 ***	-0.008	-0.26	-0.085	-2.13 **
<i>REVENUE</i>	-0.006	-0.45	-0.007	-0.47	-0.015	-1.07
<i>COST</i>	-0.004	-0.29	-0.005	-0.37	-0.037	-0.90
<i>ARRE</i>	0.111	2.46 **	0.094	2.15 **	0.046	0.92
<i>RESIZE</i>	-0.004	-0.80	-0.003	-0.85	-0.006	-1.12
<i>HERFINDAHL</i>	0.006	1.61	0.034	0.92	0.006	1.50
<i>LEVERAGE</i>	-0.004	-0.20	-0.005	-0.25	-0.006	-1.22
<i>SIZE</i>	0.048	1.24	0.002	0.61	0.058	1.56
<i>BM</i>	-0.061	-1.20	-0.000	-0.77	-0.063	-1.60
<i>CFS</i>	0.002	0.11	0.006	0.72	0.014	1.26
Year and Industry Dummy Variables	Yes		Yes		Yes	
Adjusted R <sup>2</sup>	0.286		0.313		0.212	
Number of Observations	176		176		176	

\*\*\*, \*\*, \* denote level significantly different from zero at the 1%, 5%, and 10%, respectively, two-tailed.

The dependent variable is the three-day (-1, 1) announcement period return on individual suppliers. *ARRE*= the three-day abnormal returns to the restating firms; *DEPENDENCE*= supplier sales to restating firm divided by suppliers' total sales; *ALLIANCE* = a dummy variable that takes a value of one if the restating firm and its suppliers had a formal alliance agreement preceding the year of earnings restatement announcement and zero otherwise; *DA*= the absolute value of performance-adjusted discretionary accruals of suppliers before the restatement announcement; *FRAUD*= 1 if the restatement relates to accounting fraud, 0 otherwise; *FRAUD\*PADA* = the interaction between *PADA* and *FRAUD*; *REVENUE*= 1 if the restatement relates to revenue recognition errors, 0 otherwise; *COST*= 1 if the restatement relates to cost and expense, 0 otherwise; *HERFINDAHL* = the Herfindahl index of the suppliers; *RESIZE* = the natural logarithm of restating firms' total assets in restatement announcement year; *LEVERAGE*= total debt divided by total assets of suppliers at the end of the fiscal year before the restatement announcement; *SIZE*=the natural logarithm of suppliers' total assets; *BM* = suppliers' book value of equity divided by equity market value at the end of the fiscal year before the restatement announcement; *CFS*= operating cash flows to sales of suppliers at the end of the fiscal year before the restatement announcement. *COM\_AUDITOR* =1 if suppliers and the restating firms share the same external auditor; *DA\* COM\_AUDITOR* = the interaction between *DA* and *COM\_AUDITOR*.

**Table 2.6**  
**Abnormal returns to supplier industry**

<b>Panel A: Abnormal returns to supplier industries</b>			
<b>Window</b>	<b>Portfolios</b>	<b>mean</b>	<b>t-statistic</b>
CAR (-1,1)	70	-0.96%	-2.11 **
CAR (-2,2)	70	-1.20%	-1.98 **
CAR (-5,5)	70	-1.65%	-3.06 ***
CAR (-10,10)	70	-2.01%	-2.32 **
<b>Panel B: Conditioning on severity of earnings restatements</b>			
CAR to Restating firm <median	32	-1.25%	-2.54 ***
CAR to Restating firm >median	38	-0.51%	-0.84

\*\*\*, \*\*, \* denote level significantly different from zero at the 1%, 5%, and 10%, respectively, two-tailed. The *t*-test is used to test the null hypothesis that the mean cumulative abnormal return is different from zero.

This table reports cumulative abnormal returns (CAR) to suppliers at industry-level. The supplier industry is identified as all firms with the four-digit Standard Industrial Classification (SIC) code as the suppliers. Abnormal returns to suppliers are estimated using market model with value weighted CRSP index as market index and estimate the parameters of the market model using data from 220 to 21 days before the announcement date. In Panel B, I test supplier stock price effects conditioning on whether restatement firms' abnormal returns are less than or greater than median.

### **3. The impact of earnings restatements on suppliers' relationship-specific investments**

#### **3.1. Introduction**

A supplier's dealings with major customers in product markets often involve relationship-specific investments. Since such specialized investments have design characteristics specific to a particular firm (Williamson 1975), their value to the suppliers relies on the future prospects of the business relationship with the firm (Kale and Shahrur 2006; Raman and Shahrur 2008). Accordingly, the perception of suppliers about their customers' future prospects affects their incentives to undertake relationship-specific investments. If earnings restatements are informative about the value of relationship-specific investments by suppliers, then earnings restatements will affect their subsequent relationship-specific investment decisions.

Existing research in accounting examines the extent to which earnings restatements had valuation consequences<sup>25</sup>, but offers little evidence on the real effects of earnings restatements on the investment decisions of the restating firm's suppliers. Recognizing the importance of material earnings-related information to rival firm's real investments decisions, Durnev and Mangen (2008) find that earnings restatements have an effect on rival firms' subsequent investment decisions. This paper contributes to this line of research by examining whether and how earnings restatements discovered at one firm affect the incentives of suppliers to undertake relationship-specific investments following the restatement

This paper hypothesizes that the information in earnings restatements induces the restating firm's suppliers to revise their belief about the value of the relationship-specific investments, and therefore affects their subsequent

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<sup>25</sup> Research on restatements has documented that earnings restatement have material valuation effects on the restating firms (Palmrose et al. 2004; Hribar and Jenkins 2004) and other firms in the same industry (Xu et al. 2006; Gleason et al. 2008).

relationship-specific investment decisions. This hypothesis is motivated by two main arguments from prior research. On one hand, earnings restatements reveal unfavorable information about the restating firm's current and future prospects (Griffin 2003; Palmrose and Scholz 2004). The information about the restating firm's future prospects could induce the restating firm's suppliers to worry about the future revenue from relationship-specific investments. Alternatively, earnings restatements indicate improper accounting practices (Kinney and McDaniel 1989; Richardson et al. 2002), which damage the trust between the restating firm and its suppliers. Accordingly, suppliers would be less willing to undertake relationship-specific investments following the restatement. This is because earnings restatements convey information about suppliers' expected revenues from the relationship will be lower, thereby increasing the assessed risk of undertaking relationship-specific investments following the restatement.<sup>26</sup>

Following recent studies (e.g., Fee et al. 2006; Kale and Shahrur 2006; Raman and Shahrur 2008), I use R&D intensity of the restating firm's suppliers to measure relationship-specific investments by suppliers. Consistent with the predication, suppliers have negative changes in R&D investments around the restatement, a finding that supports that the relationship-specific investments of suppliers are influenced by information in earnings restatements. Furthermore, compared to selected benchmark control firms, suppliers significantly reduce their R&D expenditures following the restatement.

To confirm whether these changes in suppliers' R&D investments following the restatement announcement are associated with the information in the restatement, I use two empirical proxies for restatement information. The proxy is suppliers'

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<sup>26</sup> Graham et al. (2005) and Burgstahler and Dichev (1997) suggest that one firm's non-financial stakeholders use earnings reported in financial statements to evaluate the firm's performance.

abnormal returns around the restatement announcement. If restatement conveys news about suppliers' relationship-specific investment, its announcement induces investors to revise their beliefs about the value of these investments. As a result, suppliers' stock prices at the restatement announcement impound the news in the restatement. Consistent with prediction, after controlling for other factors affecting suppliers' R&D expenditures, I find changes in suppliers' R&D investments following the restatement announcement are significantly related to their abnormal returns at the restatement announcement.

The second proxy for the news in the restatement is restating firms' abnormal returns at the restatement announcement. As hypothesized, I find changes in suppliers' R&D expenditures following the restatement announcement are significantly related to restating firms' abnormal returns at the restatement announcement. This is evidence that earnings restatements provide bad news about the future prospects/uncertainty of the restating firms, which alters the suppliers' perceived revenues from relationship-specific investments following the restatement. Overall, I find evidence supports the idea that suppliers seem to incorporate information from earnings restatement announcements when they make their relationship-specific investment decisions following the restatement.

The extent to which these two measures are good proxies for the news in the restatements about suppliers' relationship-specific investment varies with economic factors that capture the interdependences between suppliers and restating firms such as supplier sales dependence and alliance agreement. Accordingly, I find that the association between the changes in suppliers' R&D intensities and proxies for the news in restatements is stronger when the strength of economic bond between suppliers and restating firms is higher.

Finally, I examine whether earnings restatements affect the incentives of

suppliers to continue the business relationship following the restatement. Using the logistic regression analysis, I find that the business relationships are more likely to terminate following the restatement announcement when the abnormal returns for either the restating firms or supplier is more negative. The results suggest that an important consequence of earnings restatement is the cost attribute to the termination of the restating firm's relationship with suppliers.

This paper makes two contributions to restatement literature. First, extant restatement research has primarily focused on the immediate consequences of the restatement announcement, including significant loss of market value following the restatement announcement (Anderson and Yohn 2002; Wu 2002; Palmrose et al. 2004), filing of class-action lawsuits against the firm (Palmrose and Scholz 2004), turnover of management (Desai et al. 2006) and outside members of the board of directors (Srinivasan 2005), and an increase in the cost of equity capital (Hribar and Jenkins 2004). However, whether earnings restatements have an impact on the suppliers' investment decisions is an open question in the literature. My study adds to these studies by considering whether earnings restatements affect the incentives of suppliers to invest the relationship-specific investments following the restatement. Thus, my study contributes to restatement literature.

Second, recent work by Raman and Shahrur (2008) analyzes the determinants and consequences of earnings management by firms in the context of their relationships with customers and suppliers, suggesting that firms' earnings management influences the relationship-specific investments by customers and suppliers. This paper extends their work by focusing on earnings restatements, and not on the earnings management. My restatement sample is limited to firms that have irregular accounting errors. This allows me more direct to examine how material accounting information influences the relationship between the firms and its



customers and suppliers.

The remainder of the paper proceeds as follows. Section 3.2 reviews the literature and develops the hypotheses on the potentially important determinants that could explain the cross-sectional variation of the real effect of earnings restatement on the relationship-specific investments by customers and suppliers. Section 3 describes the research design. Section 4 is the sample selection.

## **3.2. Literature review and hypothesis development**

### **3.2.1. Financial reporting and suppliers' investment decisions**

My work closely relates to research that examines the relationship between financial condition and implicit contracting between a firm and its non-financial stakeholders. Implicit contracting studies suggest that the earnings information in one firm's financial reporting can help customers and suppliers to evaluate the firm's reputation, because the value of their implicit/explicit claims will be sensitive to the firm's financial condition (e.g., Bowen et al. 1995; Cornell and Shapiro 1987). This suggests that a firm's financial health affects the firm's reputation with its suppliers through influencing the perception of suppliers about the firm's reputation for fulfilling their implicit and explicit commitments.

Consistent with this argument, Makasimovic and Titman (1991) indicate that customers may be unwilling to conduct business with high leverage firm because higher debt reduces the firm incentives to invest in its reputation and to produce high-quality products. Building on this work, Kale and Shahrur (2007) find that a firm's leverage is negatively related to relationship-specific investments, as measured by R&D intensities of customers/suppliers, suggesting that firm leverage adversely affects the incentives of customers/suppliers to undertake relationship-specific investments. Recognizing the importance of financial reporting to stakeholders' relationship-specific investments, Raman and Shahrur (2008) find that a firm can

influence the relationship-specific investments by customers and suppliers through increasing reported earnings resulting from earnings management. However, earnings management adversely affects the duration of customer-supplier relationships, suggesting that less credible financial reporting adversely affects the perception of suppliers about the restating firm's reputation.

Overall, these findings suggest that one firm's financial reporting revealing information about the firm's permanent level of future earnings can help suppliers to estimate the expected revenues from their investments, and therefore influences their subsequent relationship-specific investment decisions.

### **3.2.2. Earnings restatements and relationship-specific investments by suppliers**

This paper builds on the insights from the implicit contracting studies to formulate my main hypothesis regarding the effect of earnings restatements on relationship-specific investments by suppliers following the restatement. The firm's trading in input and output market often involves relationship-specific investments by supply chain partners. Relationship-specific investments are assets that have design characteristics specific to the transaction with the firm and which have lower values in alternative uses (Williamson 1975; Sansing 1999). Therefore, the value of relationship-specific investments by suppliers depends on one firm's future prospects.

Earnings restatements would influence the incentives of supply chain partners to undertake relationship-specific investments following the restatement announcement for two reasons. First, some earnings restatements convey unfavorable information about the restating firm's current and future prospects, which induces the restating firm's suppliers to concern about the expected revenues from relationship-specific investments. For example, some earnings restatements often lead to downward analysts' revisions in future expected earnings (e.g., Griffin 2003) and are subsequently delisted or eventually filed for bankruptcy protection (e.g., Palmrose

and Scholz 2004). This suggests that earnings restatements represent a deterioration in general operating health (and possible bankruptcy), which would trigger lower operating performance. Since the size of supplier future business transactions is positively correlated with the restating firm's future prospects, the suppliers' expected revenues from such investments will be lower if the restating firm's future prospects are less favorable. As a result, suppliers would be less willing to undertake relationship-specific investments.

Second, some earnings restatements convey unfavorable information about the restating firm's accounting practices, which damages trust between the restating firm and its suppliers, thereby affecting post-restatement relationship-specific investments by customers and suppliers. Earnings restatements represent improper accounting practices, which exposes managers and directors to greater litigation risks and stiffer penalties (Karpoff et al. 2004).<sup>27</sup> An increase in litigation risk leads to changes in management's risk-taking behavior, which affects the restating firm's investments and operation strategies, thereby adversely affecting future growth of the restating firms (Wallison 2003).<sup>28</sup> Additionally, the firm's management attention and financial resource may be diverted around the litigation caused by the restatement (Palmrose et al. 2004). In this context, the uncertainty about the terms of future transitions will be higher if the restating firm reduces incentives and financial resources to continue to invest in upholding its reputation for dealing honestly with suppliers and customers and for its overall integrity (Bowen et al. 1995; Maksimovic and Titman 1991). Consequently, the suppliers' investments will loss value when earnings restatements adversely affect the credibility and ability of the restating firm in contracting with

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<sup>27</sup> Karpoff et al. (2004) find that individuals involved in financial misrepresentations in the 1978-2002 periods were assessed about \$16 billion in fines.

<sup>28</sup> Consistent with this, Ribstein (2002) also argues that litigation risks of management could discourage CEOs from value-increasing risky investment.

customers and suppliers (e.g., Klein and Leffler 1981; Jarrell and Peltzman 1985; Karpoff and Lott 1993).

Overall, both arguments suggest that earnings restatements convey unfavorable information about the value of relationship-specific investments by suppliers. Thus, suppliers of the restating firm would change their relationship-specific investments following the restatement.

### **3.2.3. Hypotheses**

Once a firm's financial statements are detected to contain inaccurate, incomplete, or misleading financial reporting, they have to be restated. At the restatement announcement, suppliers learn new information about the misstatements in the restating firm's financial statements. If earnings restatements are informative about the value of the relationship-specific investments by suppliers following the restatement, one would expect to observe that changes in relationship-specific investments are related to proxies for information in earnings restatements. This is because the information in earnings restatements influences the suppliers' perceived revenue from relationship-specific investments following the restatement, thereby affecting their subsequent relationship-specific investments. The first hypothesis, stated more formally, is as follows (in alternative form):

**H1:** The changes in suppliers' relationship-specific investments are related to news in earnings restatements.

I now turn to cross-sectional variations in the link between changes in suppliers' relationship-specific investments and information in the earnings restatement. I hypothesize that the strength of economic bond between the restating firm and its suppliers will affect suppliers' relationship-specific investment decisions following the restatement. The idea here is that the more a supplier depends on a given restating firm, the more likely the supplier is making a substantial relationship-specific

investments, and, consequently, the greater will be concerns about the future prospect of the restating firms (Fee et al. 2006). If earnings restatements are informative about the value of relationship-specific investments by customers and suppliers, one would expect to observe greater changes in relationship-specific investments by suppliers following the restatement when the economic dependence between the restating firm and its suppliers is elevated. I therefore hypothesize that (in alternative form):

**H2:** The association between the changes in suppliers' relationship-specific investments following the restatement and information in the restatement is stronger when the strength of economic bond between the restating firm and suppliers is higher.

Earnings restatements could also affect the incentives of suppliers to continue the business relationship with the restating firms. This is because earnings restatement announcements could hurt the restating firm's reputation and ultimately lead to the termination of the business relationship. Consistent with this argument, anecdotal evidence supports the idea that suppliers would terminate their business relationship after the restatements. A Wall Street Journal article on the WorldCom's restatements documented that "Just short of two years ago, Nortel Networks Corp. announced a multibillion-dollar extension on a purchase agreement with WorldCom Inc., calling itself a "strategic vendor" of the rapidly growing long-distance telephone carrier. But, Nortel dispatched a news release this week noting that it "has no material exposure to WorldCom" and no customer financing arrangement with it" (Sender 2002). The above discussions lead to the following hypothesis:

**H3:** The news in earnings restatement announcement is associated with the incentive to suppliers to continue business relationship with the restating firm following the restatement announcement.

### **3.3. Research design**

### **3.3.1. Proxy for relationship-specific investments by suppliers**

To examine my hypotheses, I measure the importance of relationship-specific investments by suppliers using R&D intensity of the restating firm's suppliers. This is because the use of R&D intensity to proxy for asset specificity is abundant in empirical research. For example, Levy (1985) suggests that research-intensive industries are likely to engage specialized inputs that need transaction-specific investments by suppliers. Allen and Phillips (2000) argue that R&D-intensive industries are more likely to create relationship-specific assets. Specifically, in the accounting literature, Bowen et al. (1995) use the firm's R&D expenditure to capture the extent to which the claims of its stakeholders are uniquely tied to the firm's business. Recently, Raman and Shahrur (2008) also use R&D intensity to measure relationship-specific investments by customers and suppliers.

### **3.3.2. Changes in suppliers' relationship-specific investments**

If earnings restatements are informative about the value of relationship-specific investments by suppliers, then earnings restatements will affect post-restatement relationship-specific investments by suppliers. To test this conjecture, I first examine whether suppliers of restating firms show systematic changes in their relationship-specific investments around the year of the earnings restatement announcement. Specifically, I examine changes in suppliers' relationship-specific investments for three years before the restatement announcement (year -3 to year -1), the year of the restatement announcement (year 0), and the three years after the restatement announcement (year 1 to year 3). I focus on the years after the restatement announcement, and also provide evidence on the years before the restatement announcement for suppliers.

I use two measures for relationship-specific investment by suppliers. My first measure is based on the raw annual changes in R&D intensity of suppliers of the

restating firms. My second measure is the benchmark-adjusted annual changes in a supplier's R&D intensity. It is defined as the difference between raw changes in R&D intensity of the restating firm's suppliers and their benchmark firms.

To find out the benchmark firms, I use a matching-firm approach to facilitate comparisons of industry-adjusted pre- and post-restatement relationship-specific investments. Matching firms are chosen for each of restating firms' suppliers on the basis of industry and asset size. I first identify all firms on Compustat that are not in my sample (i.e. restating firms and suppliers) and that have R&D expenditure to assets data available for the same years as my sample firms. From these firms, I identify those firms with the same two-digit SIC code as my sample firm, assets size at the end of year -1 relative to the restatement announcement between 25% and 200% of the sample firm, and R&D intensity between 90% and 110% of the sample firm. From these firms I choose as the matching firm is the firm with the R&D intensity closest to that of my sample firm. If no matching firm is available that meets these criteria, I relax the industry screen to require only a match of the one-digit SIC code.

Next, I calculate this R&D intensity for my sample firms and for the matching firms for three years prior to the restatement announcement and for each of the three years following the year. For each year, I define the benchmark-adjusted R&D intensity measure as the sample firm's R&D intensity minus the benchmark firm's R&D intensity. This approach allows me to compare changes in relationship-specific investment of sample firm to changes in relationship-specific of the benchmark firm.

### **3.3.3. Empirical model**

This section tests whether the changes in suppliers' investments following the restatement announcement are related to my two proxies for the news in the restatement, as predicted by my first one hypothesis. The following year fixed effects

regression model is used:

$$\Delta R \& D = \beta NEWS + \Gamma' CONTROL + FixedEffects + \varepsilon \quad (1)$$

where  $\Delta R \& D$  is the change in supplier median R&D intensity, as measured by the year -1 to post-restatement median change in R&D intensity for suppliers. That is, it is calculated as median R&D intensity of the three-year +1, +2, +3 after the year 0 of the restatement announcement (defined as period  $P$ ) minus year -1 R&D intensity for suppliers (defined as period  $P-1$ ). I measure median change in R&D intensity over the three years allow for the possibility that investment takes time to react to earnings restatement announcement. The independent variables are as described below, and  $\varepsilon$  is a random disturbance term.

Following prior studies (e.g., Durnev and Mangen 2008), I use two proxies for the news in earnings restatements. The first proxy is the restating firms' abnormal returns at the time of the earnings restatement announcement ( $AAER$ ). The second proxy for the news in the earnings restatement is the abnormal returns of the suppliers ( $CAR$ ). The abnormal return of the restating firms and suppliers is measured at either days -1 and 1 or day -10 and 10. According to H1, changes in  $\Delta R \& D$  following the restatement announcement are related to restating firms' abnormal returns and to suppliers' abnormal returns, implying that  $\beta_1 \neq 0$ .

The vector  $CONTROL$  captures factors other than news in the restatement that affect changes in suppliers' R&D intensities  $\Delta R \& D$ . In the determinants of the supplier changes in suppliers' R&D intensities model, I follow prior research to control for several variables. The control variables specifically focus on capturing any changes in suppliers' external financing needs to control for the changes in suppliers' R&D intensities are driven by the impact of news in the restatement on their ability to raise external financing. Changes in external financing ( $\Delta FINANCING$ ) can affect suppliers' R&D expenditure, since suppliers that raise more external financing are



more likely to have capital to invest in R&D investments (Hribar and Jenkins 2004).  $\Delta FINANCING$  is the scaled change in the external financing of suppliers between periods  $P-1$  and  $P$ , defined as above. It is the sum of equity issues and debt issues in  $P$ , divided by total assets (Compustat data item 6) in  $P-1$ .

The changes in suppliers' cash ( $\Delta CASH$ ) can influence their investment. Following prior research,  $\Delta CASH$  is the scaled change in the cash of suppliers between periods  $P-1$  and  $P$ . Supplier surplus cash is the suppliers' cash from assets-in-place divided by total assets.

The changes in suppliers' Tobin's Q ( $\Delta Q$ ) is include in my regression model because stock price reflect the marginal product of capital, and can therefore affect firms' investment decisions (Tobin 1969). Following Durnev and Mangen (2008),  $\Delta Q$  is defined as change in assets plus market value of equality minus book value of equity dividend by total assets between periods  $P-1$  and  $P$ .

The changes in suppliers' size,  $\Delta SIZE$  also affect firms' investment decisions because of factor such as empire-building (Jensen 1986). Moreover, larger firms are less likely to be affected by information asymmetry problems and have easier access to capital.  $\Delta SIZE$  is the scaled change in the size of suppliers between periods  $P-1$  and  $P$ .  $SIZE$  is the natural logarithm of total assets. Finally, I also include fixed effects into the regression.

#### **3.3.4. Sample**

I first obtain a preliminary sample of 919 restating firms that announced restatements from January 1, 1997 to June 30, 2002 as provided in Government Accounting Office Report (2002).<sup>29</sup> I require restating firms covered by CRSP and

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<sup>29</sup> Following Gleason et al. (2008) and Wilson (2008), I use restatement firm reported in GAO (2002) as our research sample. The database includes instances in which financial statements were not fairly presented in accordance with Generally Accepted Accounting Principles (GAO 2002). Restatements resulting from stock splits, mergers and acquisitions, or changes in accounting principles are not included in the report. During this period, the public concern on the reliability of financial reporting

Compustat. To do so, I checked all of the company names after merging the GAO data with CRSP and Compustat (207 firms). Based on previous study, I then exclude financial firms (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4999) (63 firms). I also exclude firms with multiple restatements (48 firms).

I next follow the approach of Fee and Thomas (2004) and Hertz et al. (2008) to identify major suppliers of restating firms. This approach is based on the segment sales information disclosure requirement. In accordance with the Statement of Financial Accounting Standards (SFAS) No. 131, firms are required to disclose the identity of any customer that contributes at least 10% to the firm's total revenues.<sup>30</sup> This customer information is available on Compustat segment files, but the database reports only the name of the customer. And, further adding to the difficulty, sometimes it reports only the abbreviated versions of the names. To link the customer name with company in the CRSP or Compustat database, I use the following procedure. First, for each firm I determine whether the customer is another company listed on the CRSP or Compustat file and I assign it the corresponding CRSP permno number. To do so, I use a text-matching program to generate a list of potential matches to the customer's name to one of CRSP or Compustat firm. Subsequent to the text matching by computer, I hand-matched the customer to the corresponding permno number by visually inspecting customers' name, segments, and industry information to ensure accuracy.<sup>31</sup>

Next, I use the resulting database following above procedure to identify my

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and corporate governance grew, leading to the passage of Sarbanes-Oxley Act in July 2002. Thus, there was no significant shift in the legal regime during our sample period.

<sup>30</sup> Statement of Financial Accounting Standards No. 14 required firms to report certain financial information for any industry segment that comprised more than 10% of consolidated sales or revenues between 1977 and 1997. Effective 1998, Statement of Financial Accounting Standards No. 131 now governs required segment disclosures.

<sup>31</sup> While some discretion is involved in visually inspecting customer abbreviation with firm identities, I am conservative in conducting visual inspection that could reduce the sample size but ensures all matches are certain.

sample of restating firm suppliers, I identify all firms in the database that list a restating firm as a major customer in either of the three year prior to (and including) the restatement announcement year. My sample selection procedure results in a total of 88 restating firms that have at least one supplier.

For each restating firm with at least one supplier in our sample, I further confirm announcement date and the nature of the restatements. I obtain new reports from the ProQuest Newspaper database, Lexis-Nexis, and press release attached to 8-ks file with the SEC. Consistent with prior work (e.g., Hennes, et al. 2009), I exclude 9 technical restatements that do not imply an improper accounting in the original filing (e.g., restatements for merges and change in principle)<sup>32</sup>. I also eliminate interim restatements that are viewed as less severe than restatement of audited annual reports (4 firms). Finally, to provide the most powerful test of hypotheses, I only focus on restatements that result from aggressive accounting practice. Thus, I drop firms that make income-decreasing restatements (6 firms). Following these screens, my final sample of restating firms contains 70 earnings restatements and I identify a total 229 individual suppliers. The distribution of restating firms and suppliers are presented in Table 3.1. The distribution of these samples over time is reported in Panel A of Table 3.1.

[Insert Table 3.1 here]

Panel B of Table 3.1 reports summary information on the sample distribution by industry. Industries are as defined in Beneish et al. (2008). Panel B indicates that restating firms are widely distributed among industries, with some clustering of firms in durable manufacturers, computers, and retail industry.

### **3.4. Empirical results**

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<sup>32</sup> The GAO database includes restatement following the adoption of SAB No. 101 “Revenue Recognition in Financial Statements (SEC 1999). Restatements prompted by adoption of SAB No. 101 are excluded (6 firms) and the issuance of various EITF Consensuses. .

This paper starts my empirical analysis by providing descriptive statistics on the changes in suppliers' R&D intensities around the restatement announcement and on my proxies for the news in the restatement. Then I examine whether the changes in suppliers' R&D intensities following the restatement announcement are related to my proxies for the news in the restatement. Finally, I analyze cross-sectional variation in the extent to which my proxies capture the news in the restatement.

#### **3.4.1. Changes in suppliers' R&D intensity**

To test H1, I first analyze whether suppliers of restating firms show systematic changes in their relationship-specific investments around the year of the restatement announcement. The results are presented in Table 2. Panel A shows the unadjusted changes in suppliers' R&D intensities, whereas Panel B reports benchmark-adjusted changes in suppliers' R&D intensities.

[Insert Table 2 here]

Panel A of Table 2 shows that suppliers have negative changes in R&D intensities around the restatement. My evidence indicates that suppliers reduce their R&D expenditure during the year of event (-1 to 0) and the first year after the event (-1 to 1), a finding that supports that the relationship-specific investment of suppliers are influenced by earnings restatements. When I compare the suppliers to the matched sample, I find some evidence that the reduction in R&D investments for the suppliers during the year of the event is significantly different than the one for similar firms in their industry. Overall, the evidence suggests that suppliers invest less than their peers following the restatement announcement. This result is consistent with my argument that suppliers modify their relationship-specific investments as a result of the news in the restatement.

#### **3.4.2. Changes in suppliers' R&D intensity and restatement news**

*Descriptive Statistics*

Descriptive statistics for variables in regression are show in Table 3.3 of Panel A, while the correlation coefficients are reported in Panel B. Panel A of Table 3.3 shows that mean (median) of restating firms' cumulative abnormal returns around the restatement are negative, consistent with the literature (Palmrose et al. 2004). As my predication, the mean (median) of suppliers' abnormal returns are negative, suggests that the bad news in earnings restatements transfers from restating firms to their key suppliers.

[Insert Table 3.3 here]

Panel B indicates that the changes in suppliers' R&D intensities are significantly correlated with their abnormal returns  $CAR(-1,1)$  and restating firms' abnormal returns  $ARRE(-1,1)$ . This is consistent with H1, earnings restatements contain news about the relationship-specific investments, and therefore affects their subsequent investment decisions.

#### *Multivariate Analysis*

This section tests whether the changes in suppliers' R&D investments following the restatement announcement are related to my proxies for the news in the restatement.

The results from estimating equation (1) are shown in Table 3.4. Model 1 and Model 2 display the findings when the news in the restatement is measured by restating firm's abnormal returns at the restatement announcement. Model 3 and Model 4 report suppliers' abnormal returns. The period of abnormal returns to restating firms and suppliers is either short-window (-1,1) or long-window (-10,10).

[Insert Table 3.4 here]

The evidence in Table 3.4 is consistent with my hypothesis H1. After controlling for other factors that influence suppliers' R&D investment, I find that changes in suppliers' R&D intensities following the restatement announcement are significantly

positively related to proxies for the news in the restatement. Overall, Table 3.4 supports my argument that restatements convey information that induces suppliers to subsequently modify their relationship-investments.

To further examine whether news in earnings restatements affects the relationship-specific investments by suppliers, I consider the effects of types of earnings restatements on suppliers' relationship-specific investment decisions. Prior research suggests that firms with revenue recognition problems are likely to prompt investors to concern about the impact of restatements on the economic prospects of the restating firms (Wilson 2008). Empirical research (e.g., Ertimur et al. 2003) that find evidence that market participants focus on revenues rather than the expense component of earnings also provides support for testing differential changes in suppliers' relationship-specific investment decisions for restatements caused by revenue recognition errors and other errors. I hypothesize that changes in suppliers' R&D intensities following the restatement announcement will be more negative following restatement caused by revenue recognition errors relative to restatements made for other reasons.

Table 3.5 presents the results of changes in suppliers' R&D as a function of the types of earnings restatements. The results show that restatements of revenue are associated with more negative changes in suppliers' R&D intensities following the restatement announcement. The coefficient on *REVENUE* is negative and significant. This suggests that restatements made to correct revenue recognition errors related to restatements caused by other reasons will prompt suppliers to concern about the economic prospects of the restating firms, which affect the perceived revenue from relationship-specific investments, thereby decreasing suppliers' relationship-specific investments following restatements made for revenue recognition errors relative to restatements caused by other reasons.

[Insert Table 3.5 here]

### 3.4.3. Cross-sectional variation analysis

This paper argues in H2 that the extent to which the proxies the pertain to restating firm capture the news in the restatement depends on factors such as the economic bond between suppliers and restating firms. I test his hypothesis using the following empirical model:

$$\Delta R \& D = \beta_1 NEWS + \beta_2 BOND + \beta_3 NEWS * BOND + \Gamma' CONTROL + FixedEffects + \varepsilon \quad (2)$$

The variable *NEWS* is either restating firms' abnormal returns (*ARRE*) or the suppliers' abnormal returns (*CAR*). The variable *BOND* is the economic bond between suppliers and restating firms. Based on prior research, I use two proxies to capture the strength of economic bond between suppliers and restating firms. The first proxy is supplier sales dependence (*DEP*). To measure economic interdependence between restating firms and its suppliers, based on prior research (e.g., Fee et al. 2006), I scale supplier sales to the restating firm by supplier total sales in the same year to assess the importance of the restating firm to each supplier.

The second proxy for economic bond between restating firms and suppliers is alliance agreement (*ALLIANCE*). Prior studies have viewed alliance as a form of relationship-specific investment by suppliers (e.g., Fee et al. 2006; Raman and Shahrur 2008). When suppliers invest in more relationship-specific investments to doing business with the restating firm, the more implicit/explicit claims held by suppliers depend on the restating firm. Specifically, this variable captures the presence of specific contracts between the restating firm and its suppliers and customers. To gather information on alliances, I search for whether the restating firm and its suppliers were listed together in the Securities Data Corporation (SDC) strategic alliance database. I define *ALLIANCE* as a dummy variable that takes a value of one if the firms in a relationship had a formal alliance agreement with the

restating firm over three years before earnings restatement and zero otherwise. I predict in H2 that as the strength of economic bond between restating firms and suppliers increase, the association between changes in suppliers' R&D intensities and the two proxies for the news in the restatement captured by *NEWS* rises, implying that  $\beta_2 > 0$ .

The results are presented in Table 3.6. I first discuss the impact of the suppliers' sale dependence on restating firms. This variable measures how reliant the suppliers are on the restating firms for sales revenues. Model 1 and model 3 report the results when *DEP* and *NEWS\*DEP* is included. Consistent with H2, the coefficient  $\beta_2$  on interaction term *NEWS\*DEP* is significantly positive. This evidence indicates that when the suppliers is more reliant on restating firms, the association between suppliers' changes in R&D intensities and the two proxies for the news in the restatement captured by either abnormal returns to restating firm or abnormal returns to suppliers increases.

[Insert Table 3.6 here]

Next, model 2 and model 4 of Table 3.6 show that the coefficient  $\beta_2$  on interaction term *News\*Alliance* is positive and significant. This evidence suggests that when the suppliers had a formal alliance agreement with the restating firm, the association between suppliers' changes in R&D intensities and the two proxies for the news in the restatement captured by either abnormal returns to restating firm or abnormal returns to suppliers increases.

#### **3.4.4. Earnings restatements and duration of supplier and the restating firm relationships**

In addition to examining whether suppliers seem to incorporate information from earnings restatement announcements when they make their relationship-specific investment decisions following the restatement, I further examine whether earnings



restatements affect the incentives of suppliers and customers to continue the business relationship following the restatement. If earnings restatements affect business relationship between the restating firms and their suppliers, then the information in earnings restatement will be associated with termination of relationships.

To examine this argument, I use a logistic regression model where the dependent variable equals one if the relationship breaks up in the subsequent year, and zero otherwise. In this model, I treat relationship termination as a discrete variable for each year in the sample. In addition to the proxies for news in earnings restatements variables, which are the variables of interest, I follow Fee et al. (2006) and Raman and Shahrur (2008) and use a set of control variables in my test model setting. In summary, I use the following logistic regression model:

$$\begin{aligned} \text{TERMINATION} = & \beta_0 + \beta_1 \text{NEWS} + \beta_2 \text{DEP} + \beta_3 \text{R \& D} + \beta_4 \text{ALLIANCE} \\ & + \beta_5 \text{AGE} + \beta_6 \text{SIZE} + \beta_7 \text{FCFC} + \varepsilon \end{aligned} \quad (3)$$

where *TERMINATION* is a dummy variable that takes a value of one for suppliers if the relationship ends in the year subsequent to earnings restatement announcement, and zero otherwise. *NEWS* is either the abnormal returns of the restating firms (*AAER* (-1, 1) and *AAER* (-10, 10)) or the abnormal returns of suppliers (*CAR* (-1, 1) and *CAR* (-10, 10)). *DEP* is the percentage of supplier sales that are made to the restating firm. *R&D* is a supplier firm's annual R&D expenditures divided by total assets, where missing values for R&D are treat as zero. *ALLIANCE* is a dummy variable that takes a value of one if the firms in a relationship had a formal alliance agreement prior restatement announcement and zero otherwise. *AGE* is the number of years in which the supplier is listed on Compustat. *SIZE* is the natural logarithm of supplier total assets. *FCFC* is a dummy variable that takes a value of one if a supplier's free cash flow is less than or equal to zero. The free cash flow is a firm's income before extraordinary items plus depreciation and amortization less capital expenditures.

If information in earnings restatements influences the business relationships between the restating firm and its suppliers, one would observe that the coefficient on *NEWS* is negative in the model. This suggests that suppliers are more likely to terminate business relationship with the restating firms when abnormal returns to either the restating firm or suppliers are more negative. In this section, I examine whether information in earnings restatements affects the incentives of suppliers to continue the business relationship. I test H3 by examining regression results from analyses of the relationship duration.

The results of duration analysis reported in Table 3.7 are based on four models to verify the robustness of our conclusions. I estimate a logistic regression model where the dependent variable equals 1 if the relationship ends in the first year subsequent year, and 0 otherwise. In my logistic regression model I treat relationship termination as a discrete variable for each year in the sample. Consistent hypothesis H3 prediction, in all models I find that the coefficients on *NEWS* are negative and significant based on the Chi-squared statistic. This indicates that more severity of earnings restatements (more negative abnormal returns to either the restating firms or suppliers) is associated with a significantly larger likelihood of a relationship termination subsequent to restatement announcement year.

[Insert Table 3.7 here]

Finally, I find that higher levels of supplier R&D intensity increase the likelihood of relationship termination, consistent with the findings in prior research (e.g., Fee et al. 2006; Raman and Shahrur 2008). In addition, I find that higher levels of supplier sales dependence are associated with a significantly larger likelihood of a relationship termination subsequent to restatement announcement year. Overall, the findings in this section are consistent with the idea that the information in earnings restatements is associated with the duration of business relationships.

### **3.5. Summary**

This paper examines whether and how earnings restatements convey news relevant to the relationship-specific investment by suppliers. If so, restatement announcements induce suppliers to update their beliefs about the revenue from such specific assets. I then expect that suppliers following optimal capital budgeting modify their investment decisions subsequent to restatement announcements. Furthermore, I expect that these investments subsequent to restatement announcements are associated with the news in the restatement.

Following recent studies (e.g., Fee et al. 2006; Kale and Shahrur 2006; Raman and Shahrur 2008), I use R&D intensity of suppliers to proxy for relationship-specific investments by suppliers. The findings show that compared to selected benchmark control firms, suppliers significantly lower their R&D investment in the year after a restatement announcement. This change in suppliers' R&D investments is significantly related to various proxies for news in the restatements, such as suppliers' and restating firms' abnormal returns surrounding the restatement announcement. Finally, I find that the relationships are more likely to terminate when the restatement announcements cause more negative abnormal returns to either suppliers or the restating firms.

Overall, my work indicates that there is an information transfer from restating firms to their suppliers at the restatement announcement involving information about the value of suppliers' relationship-specific investment investments. This finding suggests that restatements of financial reports have direct implications for suppliers' relationship-specific investments, and affect the suppliers' allocation of resources.

**Table 3.1**  
**Sample distribution**

**Panel A: Sample distribution by year**

Year	Restating firms	Suppliers
1997	4	5
1998	10	22
1999	13	40
2000	10	63
2001	24	78
2002	9	21
<b>Total</b>	<b>70</b>	<b>229</b>

**Panel B: Sample distribution by industry**

Industry	Restating firms	Suppliers
Mining and construction	1	1
Food	5	9
Textiles	1	1
chemicals	2	3
Pharmaceuticals	1	1
extractive	3	5
metal	1	1
Machinery	2	7
Electrical equipment	10	37
transportation	4	8
instruments	5	13
computers	16	68
wholesale	6	26
miscellaneous retail	10	37
restaurant	1	4
services	<u>2</u>	<u>2</u>
<b>Total</b>	<b>70</b>	<b>229</b>

Panel A presents the distribution of restating firms and suppliers by years. Panel B reports the distribution of restating firms and suppliers by industry. Suppliers are identified through SFAS No. 131 disclosures and this information is available on COMPUSTAT Segment file. Any firm that lists the restating firm as a major customer is defined as supplier. The first column shows the number of restating firms that have at least one supplier. The last column reports the number of suppliers of the restating firms at individual firm level. Industries are defined in Beneish et al. (2008).

**Table 3.2**

**Annual changes in suppliers' R&D investments around the restatement announcement**

Year	N	Mean	<i>p</i> -value for t-value	Median	<i>p</i> -value for Wilcoxon
<b>Panel A: Unadjusted-R&amp;D intensity</b>					
Year -2 to Year -1	178	0.98%	0.081	0.21%	0.079
Year -1 to Year 0	171	-3.54%	0.070	-0.01%	0.007
Year -1 to Year +1	162	-1.22%	0.203	0.12%	0.102
Year -1 to Year +2	155	-0.68%	0.157	0.00%	0.257
Year -1 to Year +3	142	-0.47%	0.646	0.00%	0.576
Year -1 to post-restatement median	163	-0.92%	0.280	-0.01%	0.484
<b>Panel B: Benchmark-adjusted R&amp;D intensity</b>					
Year -2 to Year -1	167	0.84%	0.282	0.02%	0.924
Year -1 to Year 0	156	-1.70%	0.046	0.00%	0.511
Year -1 to Year +1	150	-2.01%	0.041	0.00%	0.461
Year -1 to Year +2	148	-1.40%	0.099	0.00%	0.531
Year -1 to Year +3	133	-1.19%	0.284	0.00%	0.990
Year -1 to post-restatement median	158	-1.93%	0.016	-0.10%	0.075

This table shows descriptive statistics for the annual changes in suppliers' R&D investments. Panel A displays the unadjusted annual changes in suppliers' R&D investments. Panel B shows benchmark-adjusted annual changes in R&D investments for suppliers and for benchmark firms that belong to the 4-digit SIC industries which have not had a restatement in our sample period of 1997 to 2002. The Student t and the Wilcoxon statistics test the hypothesis that the mean and median changes in suppliers' investment are significantly different from zero. *p*-values are calculated for two-tailed tests of significance.

**Table 3.3**  
**Descriptive statistics**

<b>Panel A: Descriptive statistic for main variables</b>						
Variable	N	Mean	Q1	Median	Q3	Std. Dev.
$\Delta R\&D$	155	-1.010	-0.010	0.001	0.017	0.310
CAR (-1,1)	226	-0.021	-0.053	-0.009	0.031	0.089
ARRE(-1,1)	226	-0.104	-0.075	-0.041	-0.003	0.138
$\Delta FINANCING$	226	0.212	0.009	0.077	0.336	0.246
$\Delta SIZE$	220	0.312	-0.087	0.089	2.434	2.549
$\Delta CASH$	226	-0.162	-0.391	-0.091	1.98	1.997
$\Delta Q$	225	-0.077	-0.109	-0.094	0.357	1.683
<b>Panel B: Pearson correlation coefficients for main variables</b>						
	CAR(-1,1)	ARRE(-1,1)	$\Delta FINANCING$	$\Delta SIZE$	$\Delta CASH$	$\Delta Q$
$\Delta R\&D$	0.187**	0.162**	-0.060	0.088	-0.165**	-0.232***
CAR(-1,1)		0.181***	0.104	-0.026	-0.080	-0.163**
ARRE(-1,1)			0.029	-0.054	-0.025	-0.176***
$\Delta FINANCING$				-0.085	0.058	-0.051
$\Delta SIZE$					-0.123*	0.027
$\Delta CASH$						0.189***

This table presents descriptive statistics for main variables and the Pearson correlation coefficients for main variables in this study.  $\Delta R\&D$  = the change in supplier median R&D intensity, as measured by the year -1 to post-restatement median change in R&D intensity for suppliers. It is calculated as median R&D intensity of the three-year +1, +2, +3 after the year 0 of the restatement announcement (defined as period  $P$ ) minus year -1 R&D intensity for suppliers (defined as period  $P-1$ ).  $\Delta FINANCING$  = the scaled change in the sum of equity issues and debt issues divided by total assets of suppliers between periods  $P-1$  and  $P$ ;  $\Delta CASH$  = the scaled change in cash from assets-in-place divided by total assets of suppliers between periods  $P-1$  and  $P$ .  $\Delta Q$  = change in assets plus market value of equality minus book value of equity dividend by total assets between periods  $P-1$  and  $P$ ;  $\Delta SIZE$  = the scaled change in the natural logarithm of total assets of suppliers between periods  $P-1$  and  $P$ .

**Table 3.4**  
**Changes in suppliers' R&D as a function of the news in the restatement**

Variable	Model 1		Model 2		Model 3		Model 4	
	ARRE (-1,1)		ARRE (-10,10)		CAR (-1,1)		CAR (-10,10)	
	Coef	t-value	Coef	t-value	Coef	t-value	Coef	t-value
<i>Intercept</i>	-0.155	-1.89 *	-0.155	-1.95 *	-0.040	-0.67	-0.043	-0.71
<i>News</i>	0.158	1.81 *	0.154	1.80 *	0.240	2.22 **	0.213	2.08 **
<i>ΔFinancing</i>	-0.042	-1.03	-0.014	-0.36	-0.028	-0.71	-0.022	-0.54
<i>ΔSize</i>	0.016	2.29 **	0.014	2.01 **	0.007	1.14	0.007	1.09
<i>ΔCash</i>	-0.048	-2.37 **	-0.034	-1.71 *	-0.029	-1.44	-0.029	-1.47
<i>ΔQ</i>	-0.003	-0.64	-0.006	-1.13	-0.011	-2.17 **	-0.012	-2.29 **
Year fixed effects	yes		yes		yes		yes	
Adjusted R <sup>2</sup>	0.157		0.130		0.143		0.134	
N	148		148		148		148	

Dependent variable is the change in supplier median R&D intensity ( $\Delta R\&D$ ).  $\Delta R\&D$  = the change in supplier median R&D intensity, as measured by the year -1 to post-restatement median change in R&D intensity for suppliers. It is calculated as median R&D intensity of the three-year +1, +2, +3 after the year 0 of the restatement announcement (defined as period  $P$ ) minus year -1 R&D intensity for suppliers (defined as period  $P-1$ ). *News* is either suppliers' abnormal returns around the restatement announcement, or restating firms' abnormal returns around the restatement announcement.  $\Delta Financing$  = the scaled change in the sum of equity issues and debt issues divided by total assets of suppliers between periods  $P-1$  and  $P$ ;  $\Delta Cash$  = the scaled change in cash from assets-in-place divided by total assets of suppliers between periods  $P-1$  and  $P$ ;  $\Delta Q$  = change in assets plus market value of equity minus book value of equity dividend by total assets between periods  $P-1$  and  $P$ ;  $\Delta Size$  = the scaled change in the natural logarithm of total assets of suppliers between periods  $P-1$  and  $P$ .

**Table 3.5**  
**Changes in suppliers' R&D as a function of the types of earnings restatements**

Variable	Model 1		Model 2	
	Coef	t-value	Coef	t-value
<i>Intercept</i>	-0.168	-2.09 *	-0.141	-1.70 *
<i>REVENUE</i>	-0.032	-1.77 *	-0.029	-1.53
<i>FRAUD*REVENUE</i>			-0.078	-2.02 **
<i>ΔFinancing</i>	-0.017	-0.44	-0.012	-0.30
<i>ΔSize</i>	0.013	1.99 **	0.015	2.30 **
<i>ΔCash</i>	-0.035	-1.77 *	-0.032	-1.65 *
<i>ΔQ</i>	-0.006	-1.26	-0.005	-1.07
Year fixed effects	yes		yes	
Adjusted R <sup>2</sup>	0.141		0.153	
N	148		148	

Dependent variable is the change in supplier median R&D intensity ( $\Delta R\&D$ ).  $\Delta R\&D$  = the change in supplier median R&D intensity, as measured by the year -1 to post-restatement median change in R&D intensity for suppliers. It is calculated as median R&D intensity of the three-year +1, +2, +3 after the year 0 of the restatement announcement (defined as period  $P$ ) minus year -1 R&D intensity for suppliers (defined as period  $P-1$ ).  $REVENUE=1$  if the restatement relates to revenue recognition errors, 0 otherwise;  $FRAUD=1$  if the restatement relates to accounting fraud, 0 otherwise;  $FRAUD*REVENUE=1$  if the restatement relates to revenue recognition errors and accounting fraud;  $\Delta Financing$  = the scaled change in the sum of equity issues and debt issues divided by total assets of suppliers between periods  $P-1$  and  $P$ ;  $\Delta Cash$  = the scaled change in cash from assets-in-place divided by total assets of suppliers between periods  $P-1$  and  $P$ ;  $\Delta Q$  = change in assets plus market value of equality minus book value of equity dividend by total assets between periods  $P-1$  and  $P$ ;  $\Delta Size$  = the scaled change in the natural logarithm of total assets of suppliers between periods  $P-1$  and  $P$ .



**Table 3.6**  
**The impact of the economic bond on the relation between changes in suppliers’  
relationship-specific investments and news in the restatement**

Variable	CAR(-1,1)				ARRE (-1,1)			
	(1)		(2)		(3)		(4)	
	Coef	t-value	Coef	t-value	Coef	t-value	Coef	t-value
<i>Intercept</i>	-0.024	-0.41	-0.023	-0.40	-0.145	-1.80 *	-0.152	-1.84 *
<i>NEWS</i>	0.425	1.77 *	0.594	3.54 ***	0.160	1.85 *	0.157	1.77 *
<i>DEP</i>	-0.085	-1.10			-0.071	-1.03		
<i>NEWS*DEP</i>	0.523	1.98 **			0.780	1.96 **		
<i>ALLIANCE</i>			0.012	0.58			0.011	0.49
<i>NEWS*ALLIANCE</i>			0.574	2.68 ***			0.023	0.16
$\Delta$ <i>FINANCING</i>	-0.032	-0.80	-0.036	-0.93	-0.054	-1.34	-0.041	-1.02
$\Delta$ <i>SIZE</i>	0.007	1.15	0.005	0.84	0.016	2.35 **	0.015	2.09 **
$\Delta$ <i>CASH</i>	-0.028	-1.42	-0.035	-1.74 *	-0.047	-2.36 **	-0.051	-2.39 **
$\Delta$ <i>Q</i>	-0.010	-2.04 **	-0.012	-2.41 **	-0.003	-0.52	-0.003	-0.62
<i>Year fixed effects</i>	yes		yes		yes		yes	
Adjusted R <sup>2</sup>	0.158		0.187		0.188		0.146	
N	148		148		148		148	

Dependent variable is the change in supplier median R&D intensity ( $\Delta R\&D$ ), as measured by the year -1 to post-restatement median change in R&D intensity for suppliers. *NEWS* is either the abnormal returns of the restating firms (*AAER* (-1, 1) and *AAER* (-10, 10)) or the abnormal returns of suppliers (*CAR* (-1, 1) and *CAR* (-10, 10)). It is calculated as median R&D intensity of the three-year +1, +2, +3 after the year 0 of the restatement announcement (defined as period *P*) minus year -1 R&D intensity for suppliers (defined as period *P-1*). *News* is either suppliers’ abnormal returns around the restatement announcement, or restating firms’ abnormal returns around the restatement announcement.  $\Delta$ *FINANCING* = the scaled change in the sum of equity issues and debt issues divided by total assets of suppliers between periods *P-1* and *P*;  $\Delta$ *CASH* = the scaled change in cash from assets-in-place divided by total assets of suppliers between periods *P-1* and *P*.  $\Delta$ *Q* = change in assets plus market value of equality minus book value of equity dividend by total assets between periods *P-1* and *P*;  $\Delta$ *SIZE* = the scaled change in the natural logarithm of total assets of suppliers between periods *P-1* and *P*. *ALLIANCE*= a dummy variable that takes a value of one if the firms in a relationship had a formal alliance agreement with the restating firm before earnings restatement and zero otherwise. *DEP*= supplier sales to restating firm/total sales.

**Table 3.7**  
**Duration analysis**

Variable	Model 1		Model 2		Model 3		Model 4	
	Coef	Chi-Square	Coef	Chi-Square	Coef	Chi-Square	Coef	Chi-Square
Intercept	0.400	0.40	0.404	0.41	0.227	0.13	0.228	0.13
<i>NEWS</i>	-1.393	3.67 *	-1.120	3.31 *	-1.539	4.93 **	-1.421	5.18 **
<i>DEP</i>	3.520	6.79 ***	3.434	6.78 ***	3.202	5.63 **	3.202	5.72 **
<i>R&amp;D</i>	0.847	3.75 *	0.747	2.91 *	0.856	3.83 *	0.795	3.35 *
<i>ALLIANCE</i>	2.520	2.56	1.755	1.40	2.238	2.08	1.683	1.31
<i>AGE</i>	-0.004	0.09	-0.006	0.17	-0.003	0.06	-0.004	0.08
<i>FCFC</i>	0.451	2.14	0.398	1.67	0.430	1.93	0.429	1.93
<i>SIZE</i>	-0.081	0.76	-0.063	0.45	-0.063	0.46	-0.064	0.47
Log likelihood	21.46		19.85		23.19		19.92	
N	226		226		226		226	

This table reports results of logistic regression analyses of the relationship termination. *TERMINATION* is a dummy variable that takes a value of one for suppliers if the relationship ends in the year subsequent to earnings restatement announcement, and zero otherwise. *NEWS* is either the abnormal returns of the restating firms (*AAER* (-1, 1) and *AAER* (-10, 10)) or the abnormal returns of suppliers (*CAR* (-1, 1) and *CAR* (-10, 10)). *DEPENDENCE* is either the percentage of supplier sales that are made to the restating firm. *R&D* is a supplier firm's annual R&D expenditures divided by total assets, where missing values for R&D are treat as zero. *ALLIANCE* is a dummy variable that takes a value of one if the firms in a relationship had a formal alliance agreement prior restatement announcement and zero otherwise. *AGE* is the number of years in which the supplier is listed on Compustat. *SIZE* is the natural logarithm of supplier total assets. *FCFC* is a dummy variable that takes a value of one if a supplier's free cash flow is less than or equal to zero. The free cash flow is a firm's income before extraordinary items plus depreciation and amortization less capital expenditures.

## **4. Earnings restatements and the efficiency of supply chain capital investments**

### **4.1. Introduction**

This paper examines whether firms misreporting their financial results induce their suppliers to make suboptimal investment decisions. Prior studies suggest that financial reporting quality should affect one firm's investment efficiency (e.g., Bushman and Smith 2001; Healy and Palepu 2001; Lambert et al. 2007). Consistent with this argument, prior literature finds that a firm with lower financial reporting quality makes suboptimal investment decisions (e.g., Biddle and Hilary 2006; Verdi, 2006; Biddle et al. 2008; McNichols and Stubben 2008). Building on this line of research, Durnev and Mangent (2006) show that investment inefficiency of rival firms is related to misstatement information in the restating firm's financial statements, suggesting that earnings restatements are informative about the rivals' past investment efficiency. My paper extends prior research by documenting the effect of one firm's financial reporting quality, as measured by earnings restatements, on the investment process of firms that are linked in the supply chain.

Suppliers' investment decisions depend on expectations of the revenues of the investment, which in turn rely on expectations of future growth and product demand. To estimate the benefit of investments, suppliers consider their major customers' financial reports when making investment decisions for two reasons. First, the information about a major customers' permanent level of future earnings and cash flows can help suppliers mitigate post-investment uncertainty about product demand. Second, suppliers based on the information about the major customers to distinguish good-quality from poor-quality customers, thereby lowering the assessed risk of undertaking investments. This is because a major customer is an important source of revenue for a supplier. Consistent with this argument, prior studies suggest that

suppliers rely on customer firm's financial statements to identify investment opportunities and make investment decisions (Trueman and Titman 1988; Bowen et al. 1995; Raman and Shahrur 2008).<sup>33</sup> Overstatements of a restating firm's revenues and earnings are likely to distort the supplier's expectations of growth and product demand by those unaware of misstatements. Thus, the suppliers' capital investments based on misreporting financial results likely deviate from their value-maximizing levels and are inefficient during the misreporting period.

My study provides evidence on whether one firms' financial reporting quality affects resource allocation of the related firms in the supply chain by examining the capital expenditure decisions of restating firms' suppliers. My sample consists of firms that have overstated earnings substantially, which gives me greater confidence that I have identified lower financial reporting quality and that the distorted information could significantly affect suppliers' investment decisions. In addition, my data identifies the period for which manipulation is alleged, and permits me to test the suppliers' investment decisions in the year before, during, and following the misreporting period.

To test this investment inefficiency hypothesis, this paper first estimates investment efficiency for restating firms' suppliers. Based on prior research (e.g., Richardson 2006; Biddle et al. 2008; McNichols and Stubben 2008), the inefficiency of suppliers' investments is measured as the deviation of Tobin's q from its optimal level after controlling for other factors that affect suppliers' investment levels. My tests examine the suppliers' investment decisions in the misreporting and post-misreporting periods. First, I examine whether the investment decisions of suppliers based on overstating earnings information over-invest during the

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<sup>33</sup> The argument in prior research (Trueman and Titman 1988; Bowen et al. 1995) suggests that one firm's financial reporting influences stakeholders' investment decisions.

misreporting period. Second, I test whether suppliers' over-investment is eliminated once earnings restatements are detected. If suppliers over-invest during the misreporting period for a reason other than the effect of misleading information provided by restating firm, then one would not expect to observe a decline in investment when the restating firms' earnings are no longer misreported.

The findings indicate that restating firms' suppliers do over-invest in the misreporting period. I find significantly greater investment than would be expected based on investment fundamentals. Consistent with my prediction, over-investment is no longer significantly positive after the misreporting period. I also find evidence that supplier over-investments during the misreporting period are clearly more prominent when there restating firms have a severely negative stock price reaction to earnings restatement announcement. This result is consistent with that restatements yield more negative wealth effect for the restating firms have more significant overstating earnings information and so that suppliers make inefficiency investment decisions during the misreporting period. Additional test using matching control firms suggests that suppliers invest more than peer firms that their major customers did not overstate their earnings. Overall, my findings support my hypothesis that restating firms overstating earnings affect their suppliers' investment decisions. These findings suggest that an important consequence of earnings restatement is its effect on suppliers' investment decisions.

This paper makes several contributions to the restatement literature. First, prior research links financial reporting quality to one firm's real investment decisions (e.g., Biddle and Hilary 2006; Verdi 2006; Biddle et al. 2008), indicating that lower quality financial reporting is related to the firm's inefficiency capital investments. In particular, restatements of previously issued financial statements reflect low-quality financial reporting (e.g., Raghunandan et al. 2003; Kinney et al. 2004), which is

expected to raise suboptimal decisions by suppliers in the investment process. Thus, my analysis of restating firms' suppliers provides insights into whether accounting reporting quality disclosed by one firm influences its suppliers' capital investment efficiency.

Second, recent work of Durneave and Mangen (2006) shows that rival firms' investment inefficiency is influenced by misstatement information in the restating firm's financial statements, suggesting that the restating firm's financial reporting quality adversely affects the investment efficiency of firms that are in the same industry. My paper extends their work by focusing on the investment decisions of suppliers. As Bushman and Smith (2001) indicated, financial reporting can significantly affect the product market (rivals, customers and suppliers) and should not be ignored. Since truthful financial reporting influences product markets, misstatement financial reporting is likely to have an impact as well. Thus, this paper adds to these studies by considering a more direct link between misstatement financial reporting and their suppliers' capital investment decisions. This is evidence that one firm's financial reporting is an important input to the capital investment decisions of its supply chain partners. Given the inefficiency of capital investment entails high cost for the restating firms and its suppliers, the finding suggests a potential economic cost associated with earnings restatements.

## **4.2. Literature review and hypotheses**

### **4.2.1. Financial reporting quality and investment decisions**

Financial restatement information plays an important role in investment decisions. Prior research has documented that poor financial reporting quality increases agency cost by increasing the information asymmetry between the firm and shareholders (La Porta et al. 1997; Bushman and Smith 2001; Healy and Palepu 2001; Lambert 2001). Consistent with this argument, empirical studies show that lower

financial reporting quality damages investment efficiency (e.g., Biddle and Hilary 2006; Verdi 2006; Biddle et al. 2008). Overall, these studies suggest that one firm's financial reporting quality is informative about the firm's investment efficiency.

A number of studies view earnings restatements as an indicator of low-quality financial reporting (Kinney et al. 2004; Raghunandan et al. 2003). More importantly, recent work of McNichols and Stubben (2008) finds that restating firms manipulating their reported financial results over-invest substantially during the misreporting period. In addition, Bar-Gill and Bebchuk (2003) suggest that misstatement reporting allows low quality firms to pool with high quality firms, which allows them to raise external financial at lower costs. Consequently, low quality firms over-invest whereas high quality firms under-invest.

Building on prior research, Durneave and Mangen (2006) show that rival firms' investment efficiency is related to misstatement information in the restating firms' financial statements. However, it focuses on the relationship between errors in financial statements and rival firms' investment efficiency. However, these studies do not address whether one firm's intentional distortions in accounting numbers affect its suppliers' investments. Extending their work, my study examines whether one firm misreporting its financial results induce its suppliers to make suboptimal investment decisions.

#### **4.2.2. Financial reporting quality and suppliers' investment decisions**

The information released in one firm's financial statements can affect its supply chain participants' investment decisions. Contracting parties often use accounting numbers to evaluate one firm's performance, and accounting ratios frequently play a role in the regulatory decision-making process. Hence, misstatement in one firms' financial statement can affect the actions of economic agents participating in a particular supply chain arrangement. For example, Bowen et al. (1995) and

Burgstahler and Dicheve (1997) argue that firms can obtain favorable terms of trade from stakeholders by using accounting discretion to report higher earnings, which influences stakeholders' perceived revenues from the relationship, thereby affecting these stakeholders' investment decisions. Raman and Shahrur (2008) find that a firm can influence the relationship-specific investments by customers and suppliers through increasing reported earnings. This suggests that one firm's financial reporting is informative about the firm's future prospective, which conveys information about the future investment opportunities to the firm's customers and suppliers. Thus, the restating firm's financial reporting has a potential impact on investment decisions of the firm's and suppliers.

Overall, the above discussions suggest that the restating firm's financial statements affect its non-financial stakeholders' capital investment decisions. Given suppliers are not informed about the misstatements in the restating firm's financial statements, the restating firm's misstatement financial statements can affect its suppliers' capital investment decisions through the influence of the perception of the stakeholders about their value of investments and the cost of external financing. Consequently, when a restating firm's financial statements contain misstatement information, suppliers use such information to make their investment decisions will lead to inefficiency investments. That is, investments of suppliers based on such misreporting information likely deviate from their value-maximizing levels and are efficiency.

However, the literature has so far not examined whether one firm's financial reporting quality affects the efficiency of capital investments by customers and suppliers. Hence, this paper is the first to examine whether a restating firm misreporting its financial results induces its customers and suppliers to make suboptimal investment decisions.



### 4.2.3. Hypothesis development

This paper tests whether earnings restatements affects investment decisions of restating firms' suppliers. Suppliers' investment decisions depended on expectations of the profits of the investment, which in turn depend on expectations of future growth and product demand. Expectations of future growth are based on information about revenue and earnings of suppliers. Restating firms are major customers of suppliers and they are important revenue source to a supplier. Overstatement of revenues and earnings of the restating firm are likely to distort expectations of future growth of the restating firms. Thus, suppliers based on misreporting information could over-estimate the profitability of their investment based on the financial information in the restating firm's financial information, and over-investment.

My first hypothesis is that firms overstating financial results induce their suppliers to invest more than optimal investments. Because the earnings restatements in my samples are largely income-increasing, I hypothesize that the overstatement of financial results leads to over-investment to suppliers. My first hypothesis is as follows:

**H1:** Restating firms' suppliers will have greater investment levels than expected based on the value of their investment opportunities during the misreporting period.

My second hypothesis examines the years subsequent to misreporting period to provide evidence supporting that over-investment in prior years was because of intentional distortions information providing by restating firms' financial statements. These years reflect a period in which financial reporting improprieties have detected and have been disclosed. If suppliers over-invest during the manipulation period due to the distortion of information from restating firms' financial statements, then we would expect suppliers to stop over-investing once the reported information in the

restating firms' financial statements is no longer distorted. Once suppliers realize the restating firm's true financial situation, they will modify their investment decisions (e.g., Raman and Shahrur 2008). After the restatement announcement, I expect suppliers to invest in line with their revised fundamental or possibly less than fundamentals would indicate the detection of earnings restatements by restating firms leads to supplier contagion effects, thereby resulting in a loss of access to capital required for investment following the restatement announcement.

**H2:** Restating firms' suppliers will have less investment levels than expected based on the value of their investment opportunities in the post-restatement period.

### 4.3. Research design

#### 4.3.1. Identifying excess investment of suppliers

I follow McNichols and Stubben (2008) to estimate a model that predicts a firm's optimal investment levels and then use residuals from this model as a proxy for inefficient investment. The idea of this approach is that expected investment expenditure on new projects will be an increasing function of growth opportunities. The standard approach in finance and economics has been to use market price relative to some measure of fundamental value to determine growth opportunities. Based on prior research, I estimate a parsimonious model for investment demand as a function of growth opportunities measured by Tobin's Q (Tobin 1982).<sup>34</sup> This model is based on the argument that growth opportunities should explain corporate investment when markets are perfect (Hubbard 1998). Based on prior research, cash flows are included to control for differences in internal financing capability.

$$INV_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 CF_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

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<sup>34</sup> In addition to using Tobin's Q as a proxy for growth opportunities, I also use sales growth because Tobin's Q marginal Q is notoriously hard to measure.

where  $INV$  is capital expenditures (item 128, otherwise item 30) divided by net property, plant, and equipment (NPPE, item 8).  $Q$  is calculated as the ratio of the market value of total assets (defined as total assets (item 6) plus the product of stock price and the number of common shares outstanding minus the book value of equity (item 60) to book value of total assets (item 6) at the beginning of year  $t$ .  $CF$  is cash flows and is taken from the statement of cash flows (item 308).

Following prior research (e.g., McNichols and Stubben 2008), I include asset growth, past investment, and allows for variation in the relationship between investment and Tobin's  $Q$ . I estimate the model cross-sectional for all firms with at least 20 observations in a given year based on the Fama and French (1997) 48-industry classification. The fitted value from the above regression is the estimate of the expected level of investment. Thus, the unexplained portion (or residual) is the estimate of excess investment.

This approach implicitly assumes that the responsiveness of investment to growth opportunities is constant across firms in the same industry-year (McNichols and Stubben 2008). However, prior research indicates that the relationship between investment and Tobin's  $Q$  is a function of Tobin's  $Q$ . Therefore, I follow McNichols and Stubben (2008) to include incremental coefficients for the quartiles of Tobin's  $Q$ .

$$INV_{i,t} = \beta_0 + \beta_1 Q_{i,t-1} + \beta_2 Q\_QRT2_{i,t-1} + \beta_3 Q\_QRT3_{i,t-1} + \beta_4 Q\_QRT4_{i,t-1} + \beta_5 CF_{it} + \beta_6 GROWTH_{i,t-1} + \beta_7 INV_{i,t-1} + \varepsilon_{it} \quad (2)$$

where  $GROWTH_{i,t-1}$  is the natural log of total assets at the end of year  $t-1$  divided by total assets at the end of year  $t-2$ .  $Q\_QRT2_{i,t-1}$  ( $Q\_QRT3_{i,t-1}$ ,  $Q\_QRT4_{i,t-1}$ ) is  $Q_{i,t-1}$  times an indicator variable that equals 1 if  $Q_{i,t-1}$  is the second (third, fourth) quartile of its industry-year distribution.

#### 4.3.2. Empirical procedures

I use the predication error from Equation (2) which is estimated after excluding restating firms, as a measure of excess investment for suppliers in year  $t$ . My approach to examining the influence of misstatement information on suppliers' investment decisions is to examine the behavior of excess investment through time relative to the misreporting period. I examine the mean level of excess investment over the three years preceding the misreporting period, the year or years during the misreporting period, and the three years following the misreporting period. This estimation assumes that the proxies for the investment opportunity set capture the suppliers' optimal investment at each year, and thus excess investment that is significantly different from zero reflects deviations from optimal investment for the restating firms' suppliers. I predict that there is significantly positive excess investment during the misreporting period.

#### **4.3.3. Sample**

I first obtain a preliminary sample of 919 restating firms that announced restatements from January 1, 1997 to June 30, 2002 as provided in Government Accounting Office Report (2002).<sup>35</sup> I require restating firms covered by CRSP and Compustat. To do so, I checked all of the company names after merging the GAO data with CRSP and Compustat (207 firms). Based on previous study, I then exclude financial firms (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4999) (63 firms). I also exclude firms with multiple restatements (48 firms).

I next follow the approach of Fee and Thomas (2004) and Hertz et al. (2008) to identify major suppliers of restating firms. This approach is based on the segment

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<sup>35</sup> Following Gleason et al. (2008) and Wilson (2008), I use restatement firm reported in GAO (2002) as our research sample. The database includes instances in which financial statements were not fairly presented in accordance with Generally Accepted Accounting Principles (GAO 2002). Restatements resulting from stock splits, mergers and acquisitions, or changes in accounting principles are not included in the report. During this period, the public concern on the reliability of financial reporting and corporate governance grew, leading to the passage of Sarbanes-Oxley Act in July 2002. Thus, there was no significant shift in the legal regime during our sample period.

sales information disclosure requirement. In accordance with the Statement of Financial Accounting Standards (SFAS) No. 131, firms are required to disclose the identity of any customer that contributes at least 10% to the firm's total revenues.<sup>36</sup> This customer information is available on Compustat segment files, but the database reports only the name of the customer. And, further adding to the difficulty, sometimes it reports only the abbreviated versions of the names. To link the customer name with company in the CRSP or Compustat database, I use the following procedure. First, for each firm I determine whether the customer is another company listed on the CRSP or Compustat file and I assign it the corresponding CRSP permno number. To do so, I use a text-matching program to generate a list of potential matches to the customer's name to one of CRSP or Compustat firm. Subsequent to the text matching by computer, I hand-matched the customer to the corresponding permno number by visually inspecting customers' name, segments, and industry information to ensure accuracy.<sup>37</sup>

Next, I use the resulting database following above procedure to identify my sample of restating firm suppliers, I identify all firms in the database that list a restating firm as a major customer in either of the three year prior to (and including) the restatement announcement year. My sample selection procedure results in a total of 88 restating firms that have at least one supplier.

For each restating firm with at least one supplier in our sample, I further confirm announcement date and the nature of the restatements. I obtain new reports form the ProQuest Newspaper database, Lexis-Nexis, and press release attached to 8-ks file

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<sup>36</sup> Statement of Financial Accounting Standards No. 14 required firms to report certain financial information for any industry segment that comprised more than 10% of consolidated sales or revenues between 1977 and 1997. Effective 1998, Statement of Financial Accounting Standards No. 131 now governs required segment disclosures.

<sup>37</sup> While some discretion is involved in visually inspecting customer abbreviation with firm identities, I am conservative in conducting visual inspection that could reduces the sample size but ensures all matches are certain.

with the SEC. Consistent with prior work (e.g., Hennes, et al. 2009), I exclude 9 technical restatements that do not imply an improper accounting in the original filing (e.g., restatements for merges and change in principle)<sup>38</sup>. I also eliminate interim restatements that are viewed as less severe than restatement of audited annual reports (4 firms). Finally, to provide the most powerful test of hypotheses, I only focus on restatements that result from aggressive accounting practice. Thus, I drop firms that make income-decreasing restatements (6 firms). Following these screens, my final sample of restating firms contains 70 earnings restatements and I identify a total 229 individual suppliers. The distribution of restating firms and suppliers are presented in Table 4.1. The distribution of these samples over time is reported in Panel A of Table 4.1.

[Insert Table 4.1 here]

Panel B of Table 4.1 reports summary information on the sample distribution by industry. Industries are as defined in Beneish et al. (2008). Panel B indicates that restating firms are widely distributed among industries, with some clustering of firms in durable manufacturers, computers, and retail industry. I hand collect from SEC filings the fiscal period affected by the restatement. About 15% of restating firms restate single quarter's financial statement. About 63% of the restating firms restate four or fewer quarters, 21% restate five to eight quarters, and 24 % the remaining restate nine or more quarters.

#### **4.4. Empirical results**

##### **4.4.1. Descriptive statistics**

Table 4.2 presents summary statistics for the supplier firm. Descriptive statistics

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<sup>38</sup> The GAO database includes restatement following the adoption of SAB No. 101 "Revenue Recognition in Financial Statements (SEC 1999). Restatements prompted by adoption of SAB No. 101 are excluded (6 firms) and the issuance of various EITF Consensuses. .

are presented in Panel A, and correlations are presented in Panel B. At the median, firms invest 32.7 percent of net property, plant, and equipment (*NPPE*). The inter-quartiles ranges indicate significant cross-sectional variation in these amounts. Specifically, at the quartiles, investment ranges from 16.7 percent to 66.7 percent of *NPPE*. The mean (median) *Q* of suppliers is 2.89 (1.51), consistent with unrecognized assets causing the market value of assets to exceed the book value of assets. Median cash flow from operation is positive. The mean (median) asset growth is 0.189 (0.126). The mean (median) excess investment (*EXINV*) is 0.112 (0.071).

[Insert Table 4.2 here]

Panel B of Table 4.2 reports Pearson correlations. Correlations are significantly different from zero. Suppliers' Investment is positively correlated with *Q*; suppliers firms with greater growth opportunities tend to invest more. Investment is also positively correlated with profitable, as measured by cash flows, and with asset growth.

#### **4.4.2 Primary results**

Table 4.3 reports multivariate regression results using the *Q* model of investment, as described in Equation (1) and Equation (2). Panel A shows summary statistic for the investment model regressions, and Panel B presents excess investment through event time for restating firms and suppliers.

[Insert Table 4.3 here]

Panel A shows summary statistics from 576 separate industry-year regression-mean coefficient estimates and adjusted  $R^2$  and Fama and Macbeth (1973) *t*-statistics. Panel A model 1 indicates that investment is positively associated with *Q* and positively associated with cash flows (*CF*). The results from the estimation of Equation (2) indicate investments are also significantly positively related to asset

growth and lagged investment. I also find that significant differences in the relationship between investment and Q across the distribution of Q. The incremental coefficients indicate that the magnitude of the relationship is greatest in the fourth quartile of Q and lowest when Q is the smallest. These results are consistent with the findings in McNichols and Stubben (2008).

In Panel B of Table 4.3, the first column reveals that excess investment to the restating firm is positive and increasing through the second year of the manipulation period, indicating the restating firms over-invest during the misreporting period. Excess investment is significantly positive one year before the misreporting period, but it is greatest during the first two years of the misreporting period. My results presented for the restating firm are similar to findings in the work of McNichols and Stubben (2008). The results suggest that restating firms overstated their accounting earnings over-invest during the misreporting period.

To test whether restating firm manipulating their reported earnings induce their suppliers to over-invest, I provide results of excess investment for suppliers. The second column reports the results for suppliers. I find evidence of over-investment during the misreporting period for suppliers, which is consistent with H1. Specifically, suppliers over-invest during the first years of the misreporting period. Excess investment is positive and increasing with a peak in the first year of the misreporting period.

Consistent with H2, excess investment is no longer positive after the restatement announcement year. It is negative but not significant. Investments of suppliers are then significantly lower than misreporting period. Overall, I find evidence of significant over-investment during the misreporting period, and that over-investment ends as the misreporting ends.

To examine how severity of earnings restatement interacts with suppliers'



investment decisions, I test suppliers' excess investments conditioning on whether restatement firms' abnormal returns are less than or greater than median. Based on prior research (e.g., Wilson 2008), I define that the more severe restatements are those for which the three-day cumulative abnormal returns surrounding the restatement announcement date is below the median CAR (i.e., more negative) for the restating firms.

The analyses for suppliers' excess investments are shown in Table 4.4. This reports excess investment separately for restatements that result in more negative market reactions and less negative market reaction. I find evidence that supplier over-investments during the misreporting period are clearly more prominent when there restating firms have a severely negative stock price reaction to earnings restatement announcement. Suppliers in the first two year of the misreporting period have larger magnitudes of excess investment for the subsample of restatement sample in which restating firms have abnormal returns are less or equal to median (0.050,  $t=2.09$ ) (0.056,  $t= 2.40$ ). This compares to a significant average excess investment of -0.039 in the first year of misreporting period for the subsample with restatement abnormal returns are greater than or equal to median.

[Insert Table 4.4 here]

It is interesting to note that significant over-investment before the misreporting period occurs only in the subsample of restating firm with more negative stock price effects at the time of earning restatement announcement. The more over-investment for suppliers in the presence of more negative restating firms' abnormal returns is consistent with that restatements yield more negative wealth effect for the restating firms have more significant misstated financial information and so that suppliers will make more inefficiency investment decisions during the misstated period. Consistent

with H2, in both cases I find that supplier excess investment is no longer significantly positive after the misreporting period.

Table 4.5 presents the investment of sample firms relative to that of control firms based on past growth and excess investment. Comparing investment of suppliers to that of control firms matched on asset growth the year before the misreporting period, I no longer find evidence of supplier over-investment before the misreporting period. This suggests that suppliers' investment is not significantly greater than that of firms with similar growth in the pre-misreporting period. Thus, this result indicates that greater suppliers' investment is likely due to growth expectations. However, I find that suppliers invest significantly more than the matched firms with similar growth during the second year of misreporting period (4.6 percent of *NPPE*), which is consistent with H1. This finding indicates that greater suppliers' investment is not due to growth expectations during the misreporting period. Furthermore, restating firms' suppliers invest less than growth-matched firms after the misreporting period; these differences are not statistically significant. That is, I find no evidence of over-investment for suppliers subsequent to the restatement.

[Insert Table 4.5 here]

I find similar results when controlling for excess investment the year before the misreporting period. The results indicate that restating firms' suppliers invest slightly more than control firms leading up to the misreporting period, and they generally invest more than control firms during the first year of the misstatement period (5.4 percent of *NPPE*), which is consistent with H1. Investment of suppliers is then lower than that of control firms after the restatement announcements. Consistent with H2, in both cases I find that supplier excess investment is no longer significantly positive after the misreporting period.

Table 4.6 presents the investment of suppliers based on types of earnings restatements. I find evidence that supplier over-investments during the misreporting period are clearly more prominent when restatements involve accounting fraud. Suppliers in the first two year of the misreporting period have larger magnitudes of excess investment for fraud firms' suppliers (0.113,  $t=3.19$ ) (0.74,  $t=2.37$ ). In addition, I find supplier over-investments during the misreporting period are clearly more prominent when restatements involve revenue recognition errors. However, I do not find similar results for restatements involving cost or expense errors.

[Insert Table 4.6 here]

Overall, the empirical results suggest that earnings restatements inducing over-investments by the restating firms will spillover to their suppliers. This is because with a positive correlation in economic activities between the restating firm and suppliers, over-investment by the restating firms implies a less efficient use of factors of production, which will increase the demand for inputs, thereby leading to supplier over-investment.

#### **4.5. Summary**

This paper examines whether restating firms misreporting their financial results induce their suppliers to make suboptimal investment decisions. To test this investment inefficiency hypothesis, this paper first estimates investment efficiency for major suppliers during the misreporting period. Based on prior research (e.g., Richardson 2006; Biddle et al. 2008), the inefficiency of suppliers' investments is measured as the deviation of Tobin's  $q$  from their optimal level. The findings indicate that restating firms' suppliers over-invest substantially during the misreporting period. I find significantly greater investment than would be expected based on investment fundamentals. Additional test using matching control firms suggest that supplier

invest more than peer firms that their major customers did not misreport their reported financial results. Overall, the empirical results suggest that earnings restatements inducing over-investments by the restating firms will spillover to their suppliers. This is because with a positive correlation in economic activities between the restating firm and suppliers, over-investment by the restating firms implies a less efficient use of factors of production, which will increase the demand for inputs, thereby leading to supplier over-investment.

**Table 4.1**  
**Sample distribution**

<b>Panel A: Distribution by Year</b>			
Year	Restating firms		Suppliers
	Count	Median Length	Count
1997	4	1	5
1998	10	2	22
1999	13	2	40
2000	10	1	63
2001	24	2	78
2002	9	1	21
total	70		229
<b>Panel B: Distribution by Industry</b>			
Industry	Count	Median Length	Count
Mining and construction	1	1	1
Food	5	2	9
Textiles	1	1	1
chemicals	2	1	3
Pharmaceuticals	1	1	1
extractive	3	2	5
metal	1	1	1
Machinery	2	1	7
Electrical equipment	10	2.5	37
transportation	4	2	8
instruments	5	1.5	13
computers	16	2	68
wholesale	6	2	26
miscellaneous retail	10	2	37
restaurant	1	1	4
services	2	1	2
Total	70		229

Count is the number of restating firms and their suppliers. Median length is the median number of years of restating firms' misreporting period. Industries are defined in

**Table 4.2**  
**Sample summary statistics**

<b>Panel A: Descriptive Statistics</b>						
<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Q1</b>	<b>Median</b>	<b>Q3</b>	<b>Std Dev.</b>
<i>INV</i>	229	0.643	0.167	0.327	0.667	0.987
<i>Q</i>	213	2.896	1.020	1.501	3.011	3.764
<i>CF</i>	223	-0.616	-0.512	0.217	0.858	6.616
<i>GROWTH</i>	226	0.189	-0.032	0.126	0.455	0.615
<i>EXINV</i>	203	0.112	-0.073	0.071	0.253	0.683

<b>Panel B: Pearson Correlation Matrix</b>				
	<i>INV</i>	<i>Q</i>	<i>CF</i>	<i>GROWTH</i>
<i>Q</i>	0.270***			
<i>CF</i>	0.275***	0.142**		
<i>GROWTH</i>	0.314***	0.387***	0.125**	
<i>EXINV</i>	0.788***	-0.118***	0.077*	-0.205***

Variable Definitions: *INV* = suppliers' capital expenditures scaled by beginning-of-year net property, plant, and equipment; *Q* = suppliers' Tobin's Q (market to book value of asset) at beginning of year. *CF* = suppliers' cash flow from operations scaled by beginning-of-year property, plant, and equipment; *GROWTH* = suppliers' natural log of total assets at end of prior year divided by total assets tow years prior; and *EXINV* = suppliers' excess investment, measured as the residual from and industry-year regression of *INV* onto *Q* and *CF*.

**Table 4.3**  
**Excess investment through event time**

<b>Panel A: Determinants of Investment (N=576)</b>				
Variable	(1)		(2)	
	Mean Estimate	FM t-stat	Mean Estimate	FM t-stat
$Q_{t-1}$	0.11	16.98***	0.15	10.10***
$Q\_Quartile2_{t-1}$			0.02	2.10**
$Q\_Quartile3_{t-1}$			0.04	4.39***
$Q\_Quartile4_{t-1}$			0.09	7.63***
$CF_t$	0.04	7.02***	0.02	3.07***
$GROWTH_{t-1}$			0.06	3.08***
$INV_{t-1}$			0.28	86.10***
Adjusted R <sup>2</sup>	0.49		0.67	

**Panel B: Excess Investment for restating firms and suppliers**

Event Year	Restating firms			Suppliers		
	N	Mean	t-value	N	Mean	t-value
-3	53	0.038	1.52	133	0.019	0.32
-2	55	0.046	1.61	159	0.029	0.73
-1	58	0.059	2.04	181	0.043	1.21
M1	68	0.105	4.39	203	0.102	2.09
M2	36	0.063	3.40	124	0.083	1.60
M3	16	0.051	1.08	48	0.061	1.54
1	59	-0.033	-0.70	193	-0.011	-0.53
2	57	-0.005	-0.12	175	0.012	0.58
3	58	0.001	0.24	169	0.063	1.79

Panel A reports summary statistics from industry-year regression of investment. Mean Estimate is the mean of 576 separate coefficient estimates, and FM t-stat is the Fama-MacBeth t-statistic. Panel B reports the mean of excess investment ( $EXINV$ ) through event time for restating firms and suppliers, based on Equation (2). Year -1 (Year -2, Year -3) is the first (second, third) year before the misreporting year. M1 (M2, M3) represents the first (second, third) year of the misreporting period. Year 1 (Year 2, Year 3) is the first (second, third) year following the restatement announcement.

**Table 4.4**  
**Excess investment through event time-by level of severity of restatements**

<b>Event Year</b>	<b>Low CAR Market Reaction</b>			<b>Higher CAR Market Reaction</b>		
	<b>N</b>	<b>Mean</b>	<b>t-value</b>	<b>N</b>	<b>Mean</b>	<b>t-value</b>
-3	67	0.034	1.80	66	0.019	0.41
-2	81	0.016	0.45	78	0.025	1.73
-1	89	0.028	1.11	92	0.040	1.93
M1	107	0.039	1.96	96	0.050	2.09
M2	62	0.027	0.76	62	0.056	2.40
M3	23	0.005	0.16	25	0.027	1.20
1	92	0.001	0.11	101	-0.016	-0.75
2	85	0.054	1.29	90	0.021	0.89
3	88	0.056	1.33	81	0.028	1.14

Table 4 reports the mean of excess investment (*EXINV*) through event time for restating firms and suppliers conditioning on whether restatement firms' abnormal returns are less than or greater than median. M1 (M2, M3) represents the first (second, third) year of the misreporting period. Year -1 (Year -2, Year -3) is the first (second, third) year before the misreporting year. M1 (M2, M3) represents the first (second, third) year of the misreporting period. Year 1 (Year 2, Year 3) is the first (second, third) year following the restatement announcement.



**Table 4.5**  
**Mean investment through event time-relative to control firms**

<b>Event Year</b>	<b>Growth Adjusted <i>EXINV</i></b>			<b>Investment Adjusted <i>EXINV</i></b>		
	<b>N</b>	<b>Mean</b>	<b>t-value</b>	<b>N</b>	<b>Mean</b>	<b>t-value</b>
-3	98	-0.001	-0.24	98	0.007	0.47
-2	109	0.015	0.73	109	0.019	0.62
-1	161	0.026	0.97	161	0.039	1.73
M1	181	0.037	1.54	181	0.054	2.23
M2	115	0.046	2.10	115	0.040	1.50
M3	42	0.031	0.98	42	0.021	1.33
1	188	-0.028	-1.48	188	-0.017	-0.45
2	177	0.019	0.77	177	0.021	1.25
3	124	0.025	1.32	124	0.037	1.43

Table 5 reports the mean of excess investment (*EXINV*) through event time for restating firms and suppliers, based on Equation (2). M1 (M2, M3) represents the first (second, third) year of the misreporting period. Missing data for control firms reduces the effective sample sizes. Growth adjusted *EXINV* is the mean investment of each sample firm's investment less that of a control firm matched on asset growth, size, and industry, in event year t-1. Investment adjusted is the mean investment of each supplier's investment less that of a control firm matched on excess investment, size, and industry, in event year t-1. Year -1 (Year -2, Year -3) is the first (second, third) year before the misreporting year. M1 (M2, M3) represents the first (second, third) year of the misreporting period. Year 1 (Year 2, Year 3) is the first (second, third) year following the restatement announcement.

**Table 4.6**  
**Excess investment through event time-by the types of earnings restatements**

Event Year	Fraud restatements			Revenue restatements			Cost restatements		
	N	Mean	t-value	N	Mean	t-value	N	Mean	t-value
-3	52	0.054	1.75	75	0.019	1.51	6	0.025	1.53
-2	64	0.036	1.31	86	0.005	0.23	9	0.012	0.97
-1	72	0.068	1.83	99	0.040	1.61	10	0.019	0.41
M1	75	0.113	3.19	107	0.055	1.87	21	0.030	1.62
M2	37	0.074	2.37	47	0.041	1.66	40	0.026	1.44
M3	11	0.045	1.55	25	0.031	1.28	12	0.029	1.51
1	72	-0.036	-1.71	97	-0.016	-0.75	24	0.000	0.15
2	71	-0.021	-0.79	95	0.018	1.07	9	0.001	0.65
3	68	0.000	0.31	94	0.000	0.29	7	0.013	0.84

Table 4 reports the mean of excess investment (*EXINV*) through event time for restating firms and suppliers conditioning on whether restatement firms' abnormal returns are less than or greater than median. M1 (M2, M3) represents the first (second, third) year of the misreporting period. Year -1 (Year -2, Year -3) is the first (second, third) year before the misreporting year. M1 (M2, M3) represents the first (second, third) year of the misreporting period. Year 1 (Year 2, Year 3) is the first (second, third) year following the restatement announcement.

## **5. Conclusions**

This thesis extends prior research on earnings restatements by examining the effects of earnings restatements on valuation and investment decisions of restating firms' suppliers. First, this paper hypothesizes and finds that earnings restatements that adversely affect stock price of the restating firms also induce their supplier stock price decline. The declines in stock price seem to reflect investors' future prospect concerns and accounting quality concerns about suppliers. Second, I hypothesize that earnings restatements contain information about the value of relationship-specific investments by suppliers. This information causes suppliers to revise their belief about the value of relationship-specific investments, and therefore affects their subsequent relationship-specific investment decisions. Consistent with my prediction, I find that changes in suppliers' relationship-specific investments after restatement announcements are related to information in the restatements. Finally, I predict and find that a restating firm misreporting financial results induces its suppliers to make excess investments during the misreporting period, while excess investment is no longer positive after the restatement announcement.

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