

ACCOUNTING SCANDALS IN IPO FIRMS: DO UNDERWRITERS AND VCS HELP?

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We examine whether underwriter reputation, venture capitalist (VC) backing, and VC reputation are related to the probability that a newly public firm has serious accounting problems. Using a novel data set, we find that the probability of restatement by an initial public offering (IPO) firm is positively related to underwriter reputation and negatively related to VC backing, VC reputation, and VC maturity. Our results do not appear to be driven by the endogeneity of underwriter reputation or VC backing. Our findings suggest that while VCs positively influence the financial reporting quality of IPO firms, underwriters' concerns about revenue generation outweigh their concerns about reputation.

We thank Christa Bouwman, Doug Cook, Anand Desai, Hui Guo, Thomas Hellmann, Chris Hennessey, Junsoo Lee, Jim Ligon, Thomas Moeller, Sukesh Patro, Mikhail Pevzner, Alexander Philipov, Mary Stone, David Walker, Suning Zhang, seminar participants at Kansas State University and University of Alabama, and participants at the 2010 Financial Intermediation Research Society Conference in Florence, Italy, the 2009 Conference on Empirical Legal Studies at University of Southern California, 2008 Center for Research in Security Prices Forum, European Finance Association—Athens meetings, Financial Management Association, Grapevine, TX meetings, George Mason University Conference on Fraud Prevention and Corporate Governance, and Washington Area Finance Conference for helpful comments. Special thanks are due to Dan Spulber (the editor), and to two anonymous referees and an anonymous coeditor for detailed comments and helpful suggestions. Agrawal acknowledges financial support from the William A. Powell, Jr. Chair in Finance and Banking.

1. INTRODUCTION

Investors buying shares in an initial public offering (IPO) face the classic “lemons” problem described by Akerlof (1970). Because the issuer has an information advantage, investors demand that the offer price be discounted for the possibility that the issuer is a low-quality firm.¹ One market mechanism that has emerged in response to the lemons problem is certification by more reputable investment banks, which have strong reputational incentives to only underwrite IPOs of high-quality firms. The effects of certification by more reputable investment banks have been documented by Michaely and Shaw (1994) and Carter et al. (1998), who report that IPOs underwritten by more reputable investment banks tend to have lower underpricing and lower long-run underperformance. This evidence suggests that more reputable underwriters reduce information asymmetry by certifying issuer quality.

Another mechanism that appears to mitigate the lemons problem in IPOs is venture capitalist (VC) backing. VCs promote entrepreneurship; they provide seed capital to young, growing firms that lack access to public equity markets, nurture these companies with advice on strategic issues, serve on their boards, help the firms hire key employees, provide business contacts, and monitor the firms’ growth and development (see, e.g., Gompers and Lerner, 1999; Hellmann and Puri, 2000, 2002; and Kaplan and Strömberg, 2003). VCs’ eventual goal is to exit their investments by taking their portfolio firms public or selling them to acquirers in the mergers and acquisitions (M&A) market. Consistent with VCs’ monitoring and certification roles, Megginson and Weiss (1991) find that VC-backed IPOs have lower underpricing, and Barry et al. (1990) find that IPO underpricing is inversely related to the quality of monitoring services provided by an issuer’s VCs.

But numerous stories in the news media suggest that some investment banks and VCs abandoned their roles as gatekeepers and monitors during the late 1990s stock market bubble, and media reports revealed that even reputable investment banks had underwritten a large number of low-quality IPOs. For example, in April 2001, *BusinessWeek* reported that 20 Internet firms whose IPOs were underwritten by Merrill Lynch during 1997–2000 had share prices at the end of 2000 that were 82% lower, on average, than their IPO prices. Similarly, the 95 Internet firms whose IPOs were underwritten by Credit Suisse First Boston during 1997–2000 had share prices at the end of 2000 that were 41% lower, on average, than their IPO prices (see Elstrom, 2001). The *New York Times* also reported in April 2001 that, among the technology firms

1. See Derrien (2005) and Ljungqvist et al. (2006) for an alternative view of IPO pricing.

whose IPOs were underwritten by Deutsche Bank and Morgan Stanley from 1998 to 2000, 16% and 9%, respectively, had share prices below \$1 by the end of 2000 (see Sorkin, 2001). Although these stories may simply reflect the bursting of the technology bubble, they cast doubt on the certification role of blue-chip investment banks in IPOs.

VCs were also blamed for the excesses of the tech boom. During the late 1990s, VCs often pushed start-up companies into the IPO market even if the companies lacked viable business plans (see Elstrom, 2001). Some VCs encouraged their portfolio firms to spend exorbitantly on marketing and mass-media advertising to stoke investor interest in the firms' IPOs rather than to attract real customers (see Useem, 2000; Mills, 2001; and Kehoe, 2002). These activities undermined VCs' credibility as monitors.

Several recent studies that examine the relation between underwriter reputation, VC-backing and earnings management by issuers around equity offerings provide mixed results.² Lee and Masulis (2008) find that issuers with IPOs underwritten by more reputable investment banks engage in less earnings management. Jo et al. (2007) obtain similar results when analyzing firms making seasoned equity offerings (SEOs). Morsfield and Tan (2006), however, find no relation between underwriter reputation and the abnormal accruals of IPO firms.

The evidence pertaining to VC influence on earnings management around equity offerings is mixed as well. Hochberg (2002) and Morsfield and Tan (2006) find that VC-backed IPO firms tend to engage in less earnings management in the IPO year, a result not supported by Lee and Masulis (2008), who find no relation between VC backing and earnings management in IPO firms.

We extend this line of research by using financial restatements rather than earnings management to measure financial reporting quality. Specifically, we examine the relation between the probability of financial restatement by newly public firms and underwriter reputation, VC-backing and VC reputation, a relation that, to our knowledge, no prior study has examined in detail.³ As discussed by Agrawal

2. Earnings management refers to managers' attempts to window-dress financial statements by choosing reporting methods and estimates that do not accurately reflect their firms' underlying economics (see, Healy and Wahlen, 1999). Most earnings management studies measure the degree to which a firm is managing its earnings by calculating accruals, i.e., the difference between earnings and cash flows. Large differences suggest that management has manipulated earnings by recording abnormal accruals. Healy and Wahlen provide an excellent review of the sizeable literature on earnings management.

3. Although Morsfield and Tan (2006) focus on the relation between VC-backing and IPO-year earnings management, they briefly examine the prevalence of earnings-decreasing restatements among VC-backed and non-VC-backed firms. Based on 42 earnings-decreasing restatements in their sample of 2,630 IPO firms, they find a higher frequency of post-IPO restatements by non-VC-backed firms.

and Chadha (2005), there are significant differences between earnings management and earnings misstatements that require restatement. First, although most public companies routinely manage their earnings and experience no significant repercussions, they seldom restate their financial statements to correct violations of generally accepted accounting principles (GAAP), and often face serious consequences when they do restate. Second, because earnings management cannot be measured directly, researchers use abnormal accruals to identify the incidence and magnitude of potential earnings manipulation. Restatements, on the other hand, provide direct evidence of misreporting because they are admissions by management that financial statements were materially misstated. Because of these differences, a study of IPO firms that restate soon after going public provides a different type of evidence that complements prior studies of earnings management in IPO firms. More broadly, our paper contributes to a burgeoning literature on VC financing, development, and monitoring of young entrepreneurial firms (see, e.g., Sahlman, 1990; Gompers and Lerner, 1999; Hellmann and Puri, 2002; and Kaplan and Strömberg, 2003).

We examine two samples, the first comprised of firms that went public during 1995–2005 and announced restatements within 3 years of their IPOs, the second a control sample of nonrestating IPO firms matched by industry and IPO size. We use a variety of sources to assemble a novel data set that includes hand-collected data on underwriters, VCs, corporate governance, executive compensation, and other IPO-firm characteristics. We use matched-pairs logistic regressions to examine how the probability of restatement by an IPO firm is related to the reputation of its underwriter, the availability of VC financing, and the reputation of the VCs backing the IPO firm. Our regressions control for other variables that prior studies have found to be significant determinants of the probability of restatement. We use these relations to distinguish between several competing hypotheses about the roles of underwriters and VCs in IPOs.

We find that the probability of restatement by an IPO firm is consistently and positively related to the reputation of its underwriter, and is negatively related to VC backing and VC reputation in a number of subsamples where misstatements are likely to be more harmful to VC reputations. We also find that the probability of restatement by an IPO firm is negatively related to VC maturity. These findings do not appear to be driven by the endogenous processes of selecting more reputable underwriters and obtaining VC financing. Our findings suggest that VCs, especially those that are mature and reputable, play an important monitoring role in financial reporting around IPOs. We find no evidence that more reputable underwriters certify the financial reporting quality

of issuers, suggesting that underwriter concerns about reputation are secondary to concerns about revenue generation.

The paper proceeds as follows: Section 2 reviews the pertinent literature; Section 3 briefly discusses underwriter due diligence and presents the underwriter certification and revenue generation hypotheses; Section 4 discusses the VC monitoring, moral hazard, and grandstanding hypotheses; Section 5 describes the sample and data; Section 6 discusses restating- and control-sample characteristics; Section 7 presents the methodology and results; Section 8 concludes.

2. LITERATURE REVIEW

This section briefly reviews the literatures on underwriter certification, the role of VCs in entrepreneurship, and earnings manipulation around equity offerings.

2.1 UNDERWRITER CERTIFICATION

Several studies examine underwriter certification of firms issuing equity. Booth and Smith (1986), Carter and Manaster (1990), and Carter et al. (1998) find evidence that more reputable underwriters certify the quality of IPO firms, reducing investor risk and short-term underpricing. Helou and Park (2001) find that stock prices drop more upon announcements of SEOs that are underwritten by less reputable investment banks. Chemmanur and Paeglis (2005) find that IPO firms with higher-quality managers tend to use more reputable underwriters. Fernando et al. (2006) develop and test a theory explaining the equilibrium matching of issuers and underwriters, creating a model of mutual choice that predicts that higher-quality IPO firms will pick, and be picked by, more reputable underwriters.

2.2 VCS' ROLE IN PROMOTING ENTREPRENEURSHIP

A large and growing literature examines the role of VCs in financing, developing, and monitoring young start-up firms, activities directed toward taking promising firms public or selling them in the M&A market. Although a comprehensive review of this literature is beyond the scope of this paper, we provide a brief review of some prominent themes. Gompers and Lerner (1999) synthesize their extensive research into the form, function, and cycle of VC funds. This research includes the structure and compensation of VC partnerships, the staging of venture financing, syndication of VC deals, VCs' oversight of private firms, the timing and performance of VC-backed IPOs, and VCs' efforts at

establishing reputations. Hellmann and Puri (2000) examine the role of VC financing in the development of innovative start-ups. They find that VCs are more likely to back innovator firms rather than imitator firms and that VCs reduce the time required to bring new products to market. Hellmann and Puri (2002) examine VCs' role in the development of young firms, for example, via adoption of human resource policies and stock option plans, the hiring of a marketing VP, and replacing the founder with an outside CEO. Kaplan and Strömberg (2003) analyze how contracts between VCs and entrepreneurs allow VCs to separately allocate rights to cash flows, board seats, voting, liquidation, and control. Nahata (2008) analyzes the performance implications of VC reputation for private companies. Hochberg et al. (2007) examine the performance consequences of VC networks. They find that better-networked VC firms have superior fund performance and invest in companies that are more likely to survive long enough to obtain later-stage financing and exit via IPOs or the M&A market. Black and Gilson (1998) analyze how the development of venture capital in a country requires a well-developed stock market, which facilitates exit from VC investments via IPOs and M&As.

2.3 EARNINGS MANIPULATION AROUND EQUITY OFFERINGS

An early study by Aharony et al., (1993) finds little evidence of earnings management in pre-IPO financial statements. The earnings management that they do observe is positively related to leverage and negatively related to firm size, underwriter reputation, and auditor quality. Later research on IPOs (see, e.g., Teoh et al., 1998a and Darrough and Rangan, 2005) and SEOs (see, e.g., Rangan, 1998; Teoh et al., 1998b; and Shivakumar, 2000) finds strong evidence of earnings management around equity offerings. A survey by Brau and Fawcett (2006) reveals that CFOs think that strong historical earnings is the most important positive signal for reducing asymmetric information before equity offerings.

3. UNDERWRITERS

3.1 UNDERWRITER DUE DILIGENCE

Sections 11 and 12(a)(2) of the Securities Act of 1933 hold underwriters accountable for misstated prospectuses filed by issuers. When an issuer's prospectus contains misstated audited financial statements, the underwriter can avoid liability by demonstrating that its due

diligence was sufficient to justify reasonable reliance on the independent accountant's opinion. If unaudited financial information in the prospectus is misstated, legal exoneration only requires that the underwriter show that it reasonably believed that the information was complete and accurate. The underwriter can satisfy the "reasonably believed" standard by obtaining a comfort letter from the independent accountant confirming that the unaudited financial information in the prospectus follows GAAP and that there have been no disclosure-worthy events since the financial information was prepared.

3.2 UNDERWRITER REPUTATION HYPOTHESIS

Obtaining written representation from the issuer's auditor may not protect an underwriter's reputation. If an issuer restates its financial statements soon after the IPO, its shareholders are likely to incur significant losses (see, e.g., Palmrose et al., 2004 and Agrawal and Chadha, 2005). The lead underwriter's reputation suffers as disgruntled investors associate their losses with the investment bank that managed the IPO. Empirical evidence suggests that the issuing client's financial reporting quality affects underwriter reputation. Song and Uzun (2004) find that underwriter reputation is damaged when IPO clients are sued for alleged accounting fraud.

Underwriters can protect their reputations by avoiding high-risk issuers. A more reputable underwriter is expected to have higher client-acceptance standards because its reputation sustains more damage after bad IPOs (see Chemmanur and Fulgheri, 1994). When a more reputable underwriter begins courting a firm that has IPO intentions, it has greater incentive to consider the reputation risk posed by this potential client. Equipped with extensive resources and experience, a more reputable underwriter discerns firm quality early in the courtship. More reputable underwriters will tend to avoid issuers with dubious management, aggressive accounting policies, or questionable business plans. Less discriminating and, presumably, less reputable underwriters are more apt to accept lower-quality firms as IPO clients. The underwriter reputation hypothesis predicts a negative relation between underwriter reputation and the probability of an IPO firm having serious accounting problems that necessitate restatement.

3.3 UNDERWRITER REVENUE GENERATION HYPOTHESIS

Profit motivates investment banks to underwrite IPOs, and generating fees is critical to advancement within investment banks. Knee (2006)

describes how revenue generation trumped reputation concerns even at “white-shoe” Wall Street firms in the 1990s. Knee (2006, pp. xvi–xvii) writes:

At one time. . .the institution’s reputation was viewed as its most important asset. Internal standards went well beyond any regulatory requirements to protect investors. And investment bankers advanced based largely on their success in simultaneously serving the client, preserving the franchise, and protecting the public. In place of this ideal, a culture of contingency emerged, a sense not only that each day might be your last, but that your value was linked exclusively to how much revenue was generated for the firm on that day—regardless of its source.

The diminished concern for reputation that Knee observes could also be explained by a greater ability to bear risk. Because of their size, diverse operations, and successful track records, bulge-bracket banks may be in a better position to tolerate the reputation risk posed by low-quality issuers. An example is Goldman Sachs, which has been referred to as the “Teflon” investment bank because its reputation has not suffered from its involvement in various scandals over the past decade (see McLean, 2004).

Under the revenue generation hypothesis, issuers with more reputable underwriters are not less likely to restate soon after going public. This hypothesis implies no relation or even a positive relation between underwriter reputation and the probability of an IPO firm having serious accounting problems. Notice that the underwriter reputation and revenue generation hypotheses are competing, but not mutually exclusive, hypotheses about the role of underwriters in the financial reporting process. We attempt to determine which concern, maintaining reputation or generating revenue, has greater influence on the behavior of more reputable underwriters.

4. VENTURE CAPITALISTS

VCs invest in private firms that they foresee as promising future IPO candidates or acquisition targets. Large equity stakes motivate VCs to monitor portfolio firms closely. As active investors, VCs hold board seats, set performance targets, and advise management on corporate strategy. They can also influence financial reporting. This section discusses VC influence on financial reporting under the monitoring, moral hazard, and grandstanding hypotheses.

4.1 VC MONITORING HYPOTHESIS

Under the VC monitoring hypothesis, VC backing, especially backing by more reputable VCs, improves financial reporting quality. Long-term reputation concerns and more immediate financial interests motivate VCs to monitor their investments. VCs require accurate accounting records because their ownership agreements contain accounting-based contingent rights and protective covenants (see Kaplan and Strömberg, 2003). And managing partners of VC firms disclose investment performance to limited partners (see Sahlman, 1990), who demand accurate numbers.

VCs review their portfolio firms' financial statements and ask about unexpected quarter-to-quarter changes. When unsatisfied with the explanations provided by management, VCs can investigate unusual fluctuations themselves. Being a large shareholder of a private company confers certain privileges. Unlike the external auditor, a VC shareholder, or its representative, has unfettered access to financial records, facilities, and employees. If a VC uncovers manipulation or misstatements resulting from incompetence or poor internal controls, the VC can order corrections, and if necessary, replace or reprimand the individuals responsible for the accounting problems. A large equity stake gives the VC the power to make changes.

VCs can also improve the financial reporting quality of their portfolio firms by controlling key personnel decisions and the compensation of external auditors. As demanding shareholders, VCs expect their portfolio firms to employ excellent CFOs and controllers, reducing the probability of accounting problems that require restatement. As experienced board members, VCs are less likely to haggle over audit fees with independent accountants, knowing that well-compensated accounting firms are less apt to skimp on audit procedures. Accordingly, the VC monitoring hypothesis implies that VC-backed issuers, especially those backed by more reputable VCs, are likely to have better financial reporting quality and less likely to restate soon after their IPOs. Evidence supporting the hypothesis that VC monitoring improves financial reporting includes Hochberg (2002) and Morsfield and Tan (2006), who find that, on average, VC-backed issuers have lower IPO-year discretionary accruals.

4.2 VC MORAL HAZARD HYPOTHESIS

The VC moral hazard hypothesis is less sanguine about VC influence on financial reporting. VCs expect high rates of return from risky investments in unproven firms. If most concerned about receiving

large payoffs in the near term, the VC may ignore or encourage accounting manipulation that inflates the post-IPO stock price. Pre-IPO overstatements could be used to increase demand for issuer shares and support higher underwriter valuations. Evidence suggests that pre-IPO manipulation can be effective; Neill et al. (1995) find that IPO firms that use aggressive accounting methods tend to command higher offer prices.

The incentive to manipulate earnings persists after the IPO when VCs sell their shares, typically more than 180 days after IPOs when lock-up agreements have expired and no longer prohibit VCs from selling shares. Most VC firms distribute issuer shares to their limited partners after the IPOs. Gompers and Lerner (1999) report that the mean (median) time from an IPO to the first distribution of issuer shares to limited partners is 1.7 (0.9) years. According to the VC moral hazard hypothesis, VC-backed issuers are more likely to restate their financial statements because VCs are willing to use earnings management to inflate share prices. Note that the VC monitoring and VC moral hazard hypotheses are competing and mutually exclusive hypotheses about the role of VCs in the financial reporting process.

4.3 VC GRANDSTANDING HYPOTHESIS

Under Gompers' (1996) VC grandstanding hypothesis, having short performance histories hinders the capital-raising efforts of young VC firms. Because young VC firms tend to be eager to lengthen their performance histories, they are more apt to hurry firms to the IPO market. Rushing earlier-stage firms to the IPO market causes young-VC-backed firms to be of lower quality, on average, than firms backed by mature VCs. The VC grandstanding hypothesis predicts that issuers backed by young (mature) VCs are more (less) likely to restate their financial statements following their IPOs. This hypothesis essentially partitions the population of VCs into two groups: young VC firms, whose behavior is characterized by the VC moral hazard hypothesis, and older, more established VC firms, whose behavior is described by the VC monitoring hypothesis.

5. SAMPLE AND DATA

5.1 RESTATEMENTS

We obtain from the U.S. General Accounting Office (2002) a list of financial restatements announced by U.S. public companies during the period January 1, 1997 to June 30, 2002. The restatements correct GAAP

violations. We extend the sample period by searching the Lexis-Nexis Newswires database for the period July 1, 2002 to December 31, 2005 using *restat!* as the keyword. We compare company names to issuers in the Securities Data Company Platinum database (hereafter, SDC) to determine which restating firms went public from January 1, 1995 to December 31, 2005. For each restating firm with an IPO during this period, we determine the first misstated quarter using original and amending 10-Ks or 10-Qs.⁴ We include a restating firm in the sample if (1) it announced a restatement within 3 years of its IPO, and (2) its first misstated quarter begins within 2 years of the IPO.⁵ These two requirements are met by 171 firms. Excluding spin-offs, equity carve-outs, firms with offer prices below \$5, and financial and utility firms reduces the sample to 137 firms. Table I summarizes the construction of our sample.

Panel A of Table II shows that more than half of the restatements affect core accounts, about 26% affect noncore accounts, while the remaining affect both types of accounts.⁶ About 77% (18%) of the restatements decrease (increase) earnings; about 5% do not affect earnings. In Panel B, the mean (median) change in earnings is about -166% (-12%). The mean (median) number of days from IPO to restatement announcement is 583 (599), or about 1.60 (1.64) years. The mean (median) misstated period begins 220 (five) days before the IPO. The mean (median) number of quarters restated is seven (four).

Panel C shows the distribution of the number of quarters restated. About half of the sample firms restate four or fewer quarters, close to one-fourth restate five to eight quarters, and the remaining firms restate more than eight quarters. Misstated periods spanning several years are common; about 16% of the restatements correct more than 16 consecutive quarters.

Panel D in Table II shows the industry distributions of our sample of restating IPO firms and the IPO population for the period 1995–2005.

4. In determining the beginning date of the misstated period, we consider prior-period adjustments to retained earnings. Also, if a firm restates its financials for calendar-year 1997, for example, but the amending 10-K indicates that the restatement relates only to the last two quarters of the year, then we consider July 1, 1997 as the beginning date of the misstatement.

5. The 2-year cutoff is chosen because Gompers and Lerner (1999) report that the mean (median) time from an IPO to the first distribution of issuer shares to limited partners is 1.7 (0.9) years. Clearly, VCs have an incentive to prop up the stock until they sell it. The 3-year cut-off is chosen because associating underwriters and VCs to restatements announced several years after IPOs is less plausible.

6. Core accounts are used to record routine transactions from operations and include sales revenue; cost of sales; selling, general and administrative expenses; accounts receivable; inventory; accounts payable; and certain accrued liabilities. Noncore accounts are used to record nonroutine transactions, nonoperating expenses and merger-related items. These definitions of core and noncore accounts are similar to those of Palmrose, Richardson and Scholz (2004).

TABLE I.
SAMPLE CONSTRUCTION

Description	Number of Firms		
	Announcement Periods		Total
	Jan. 1997– Jun. 2002	Jul. 2002– Dec. 2005	
Firms with IPOs during period 1995–2005	199	213	412
– Announcement occurs more than 3 years after IPO	76	88	164
– Misstated period begins more than 2 years after IPO	6	71	77
– Spinoffs	8	7	15
– Equity carve outs	4	0	4
– Firms with offer prices less than \$5	3	3	6
– Financial and utility firms	4	5	9
Total	98	39	137

Notes: The table above summarizes how we construct our sample. We obtain from the U.S. General Accounting Office (2002) a list of financial restatements that correct generally accepted accounting principles (GAAP) violations and were announced by U.S. public companies during the period January 1, 1997 to June 30, 2002. We extend the sample period by searching the Lexis-Nexis Newsires database for the period July 1, 2002 to December 31, 2005 using *restat!* as the keyword. We compare company names to issuers in the SDC Platinum database to determine which restating firms went public from January 1, 1995 to December 31, 2005. For each restating firm with an initial public offering (IPO) during this period, we determine the first misstated quarter using original and amending 10-Ks or 10-Qs. We include a restating firm in the sample if (1) it announced a restatement within 3 years of its IPO, and (2) its first misstated quarter begins within 2 years of the IPO. These two requirements are met by 171 firms. Excluding spin-offs, equity carve-outs, firms with offer prices below \$5, and financial and utility firms reduces the sample to 137 firms.

Using Song and Walkling's (1993) 20 industry groupings, we classify sample firms by industry based on their primary two-digit SIC codes that we obtain from SDC. About 46% of the restating firms are in services, 13% in machinery, 10% in retail trade, and 10% in transport, communications, and utilities. The remaining 21% of restating firms are distributed over eight other industries. The industry distribution of restating firms roughly mirrors that of the SDC population.

Panel E presents the sample distribution by year of restatement announcement and IPO year. About 80% of the restatements were announced during 1996–2002; the remaining restatements were announced after 2002. About 70% (30%) of the IPOs occurred during 1995–1999 (2000–2005).

5.2 CONTROL SAMPLE

To examine whether underwriter reputation and VC backing are related to the probability of an IPO firm restating soon after going public, we need to estimate a model of the probability of restatement by an

TABLE II.
SAMPLE DISTRIBUTION AND DESCRIPTIVE STATISTICS OF RESTATING FIRMS

Panel A: Distributions by nature of accounts restated and effect on earnings	
Accounts restated	Freq. % of Total
Core	75 54.7
Noncore	36 26.3
Mixed	26 19.0
Total	137 100.0
Restatements that	Freq. % of total
Reduce earnings	105 76.6
Increase earnings	25 18.2
Do not change earnings	7 5.1
Total	137 100.0

Panel B: Descriptive statistics of the restatements		
	Mean	Median
Original earnings ^{1,2} (\$ millions)	-33.9	-2.5
Restated earnings ^{1,2} (\$ millions)	-36.3	-5.8
Change in earnings ³ (%)	-165.9	-12.2
Absolute change in earnings (%)	193.9	24.6
Number of days from the IPO to the announcement date	583	599
Beginning of the misstated period minus the offering date (days)	-220	-5
Number of quarters restated	7.1	4
Length of misstated period	803	588

Continued

TABLE II.
CONTINUED

Panel C: Distribution of the number of quarters restated			
Number of Quarters Restated	Freq.		% of Total
1	21		15.3
2	15		10.9
3	23		16.8
4	11		8.0
5-8	34		24.8
9-12	7		5.1
13-16	4		2.9
17-20	11		8.0
21-24	11		8.0
Total	137		100.0

Panel D: Industry distribution			
Industry (SIC2 Codes)	Sample		SDC Population ⁴
	Freq.	% of Total	
Agriculture (01-09)	0	0.0	0.1
Mining (10-14)	3	2.2	1.7
Construction (15-19)	0	0.0	0.7
Food and tobacco (20-21)	4	2.9	1.3
Textiles and apparel (22-23)	0	0.0	1.0
Lumber, furniture, paper, and print (24-27)	3	2.2	1.5

Continued

TABLE II.
CONTINUED

Industry (SIC2 Codes)	Panel D: Industry distribution		Sample		SDC Population [†]	
	Freq.	% of Total	Freq.	% of Total	Freq.	% of Total
	Chemicals (28)	2	1.5	229	7.4	
Petroleum, rubber, and plastics (29–30)	0	0.0	12	0.4		
Leather, stone, glass (31–32)	0	0.0	11	0.4		
Primary and fabricated metals (33–34)	2	1.5	30	1.0		
Machinery (35–36)	18	13.1	344	11.1		
Transport equipment (37)	0	0.0	39	1.3		
Instruments and miscellaneous manufacturing (38–39)	7	5.1	213	6.9		
Transport, communications, utilities (40–49)	14	10.2	238	7.7		
Wholesale trade (50–51)	6	4.4	99	3.2		
Retail trade (52–59)	14	10.2	190	6.1		
Finance, insurance, real estate (60–69)	0	0.0	298	9.6		
Hotels and personal services (70–71)	1	0.7	24	0.8		
Services (72–89)	63	46.0	1,171	37.8		
Public administration and others (90–99)	0	0.0	1	0.0		
Total	137	100.0	3,094	100.0		

Continued

**TABLE II.
CONTINUED**

Panel E						
Year	Sample		IPOs		SDC Population ⁴	
	Restatement Announcements		IPOs		IPOs	
	Number of Firms	% of Total	Number of Firms	% of Total	Number of Firms	% of Total
1995	0	0.0	9	6.6	473	15.3
1996	1	0.7	24	17.5	698	22.6
1997	13	9.5	22	16.1	467	15.1
1998	22	16.1	15	10.9	276	8.9
1999	21	15.3	26	19.0	432	14.0
2000	21	15.3	12	8.8	247	8.0
2001	20	14.6	4	2.9	61	2.0
2002	12	8.8	6	4.4	60	1.9
2003	2	1.5	6	4.4	64	2.1
2004	7	5.1	11	8.0	163	5.3
2005	18	13.1	2	1.5	153	4.9
Total	137	100.0	137	100.0	3,094	100.0

Notes: Panels A, B, C, D, and E show, respectively, the frequency distributions of restating firms by nature of accounts restated and effect on earnings; descriptive statistics of the restatements, and frequency distributions by the number of quarters restated, by industry, and by year. The sample consists of 137 publicly traded U.S. companies that announced financial statement restatements during the period January 1, 1997 to December 31, 2005. Restated quarters begin within 2 years of the restating firms' IPO dates. Announcements occur within 3 years of the restating firms' IPOs. The restating IPO firms were identified using GAO (2002), which lists firms announcing restatements to correct GAAP violations during the period January 1, 1997 to June 30, 2002. Restatements announced during the period July 1, 2002 to December 31, 2005 were identified by searching the Lexis-Nexis News wires database using *restatff* as the keyword.

¹ All dollar values have been adjusted for inflation and converted to 2005 dollars.

² The sum of net income for all quarters affected by the restatement.

³ Defined as (Restated earnings - Original earnings) / |Original earnings|.

⁴ IPOs by U.S. firms during the period January 1, 1995 to December 31, 2005, excluding spin-offs, equity carve-outs, and issues with offer prices below \$5.

IPO firm. As the population of IPO firms contains very few firms that restate, a random sample of IPO firms would likely consist of mostly nonrestating firms.⁷ If we were to use a random sample to estimate a logistic model of the probability of restatement by an IPO firm, the binary dependent variable *Restating firm* would equal zero (for nonrestating firms) for all but a few observations. As Palepu (1986, pp. 6–7) points out, the lack of variation in the dependent variable causes the model to have little explanatory power. As an alternative, a state-based sample of equal proportions is a near-optimal sampling design in such cases. To pick a control sample of IPO firms, we use a matched-pairs, rather than a random, sampling approach, which precisely controls for potential industry and size effects and is used in several prior IPO studies (see, e.g., Megginson and Weiss, 1991; Drake and Vetsuypens, 1993; Bartov et al., 2002; and Ellul and Pagano, 2006).

We obtain a control sample by using industry and IPO size to match each restating firm to a nonrestating firm that went public within 1 year of the restating firm's IPO. We define industry as a firm's two-digit primary SIC industry code from SDC. Six firms are matched by their one-digit SIC codes because firms with matching two-digit SIC codes are not available. We measure IPO size as inflation-adjusted IPO proceeds from U.S. markets.⁸ From the pool of nonrestating firms in the same industry and having IPOs within the 3-year (–1, +1) window, we select the control firm whose IPO size is closest to that of the restating firm.

5.3 UNDERWRITERS

5.3.1 IDENTIFYING INDEPENDENT UNDERWRITERS

The National Association of Securities Dealers (NASD) requires that a qualified independent underwriter perform IPO due diligence. Underwriters owning 5% or more of the issuer's outstanding debt or equity are not considered independent under NASD rule 2720(15)(E). We assume that the lead underwriter performs due diligence unless it owns issuer debt or at least 5% of the issuer's pre-IPO equity.⁹ We replace

7. We can use Panel E of Table II to approximate the unconditional likelihood of restatement by an IPO firm. For the period 1997–2005, SDC lists 1,923 IPOs by U.S. firms. During this period, 136 IPO firms announced restatements that satisfy the criteria listed in Table I, for an unconditional probability of restatement of 0.0707 ($=136/1,923$). Note that this calculation uses 136 firms, rather than 137, because in one instance, SEC filings indicate that a firm announced its restatement before January 1, 1997, the beginning date of the GAO database.

8. The distributions of U.S. IPO proceeds and global IPO proceeds are very similar in our sample.

9. The amount of issuer debt held by underwriters is not disclosed in the prospectus unless IPO proceeds are to be used to repay the debt. Determining whether the

a nonindependent lead underwriter with the independent underwriter having the next largest allotment of IPO shares.¹⁰

5.3.2 MEASURING UNDERWRITER REPUTATION

We use Loughran and Ritter's (2004) update of the Carter and Manaster (1990) and Carter et al. (1998) rankings of underwriter reputation.¹¹ Loughran and Ritter rank 120 underwriters that participated in the May 1999 IPO of Goldman Sachs Group, Inc., assigning the highest rank, nine, to managers and comanagers of the IPO. The rank of a nonmanager is relative to the proportion of the Goldman Sachs IPO that it underwrote. For an underwriter that did not participate in the Goldman Sachs IPO, Loughran and Ritter assign a rank of one or two if it underwrote penny stocks and was subject to an SEC enforcement action during 1995–1999. Loughran and Ritter rank the remaining underwriters by consulting an experienced investment banker and money manager. We define more reputable underwriters as those having Loughran–Ritter ranks of at least eight.¹² For restating or control firms with more than one lead underwriter, we compute a weighted average of their lead underwriters' ranks based on the number of IPO shares that they underwrite.

5.4 VENTURE CAPITALISTS

We obtain VC-ownership data from information about significant shareholders disclosed in IPO prospectuses.¹³ We define an issuer's

underwriter owns less than 5% of the issuer's debt is not possible in most cases, so we do not consider underwriters owning issuer debt to be independent.

10. The SDC database does not report allotted shares for 13 restating and 13 control firms that went public in 1995 or 1996, and their IPO prospectuses are not available from the SEC's Web site. For each of these 26 firms, we assume that total shares issued are divided equally among the lead underwriters. As the lead underwriters' debt and equity stakes are not available in these cases, we assume that they are independent.

11. We obtained the rankings from Professor Jay Ritter's Web site (<http://bear.cba.ufl.edu/ritter/>) in September 2006. One lead independent underwriter in the sample is not ranked by Loughran and Ritter (2004). We estimate this underwriter's rank using the OLS regression model:

$$\ln(\text{Underwriter reputation rank}_i) = \alpha + \beta(\text{IPO size}_i) + \varepsilon_i,$$

where *Underwriter reputation rank*_{*i*} is the Loughran and Ritter rank of underwriter *i*, and *IPO size*_{*i*} is the average global proceeds of IPOs where underwriter *i* is the lead manager. Results are similar to those in Tables 7 through 9 when we use the average yearly sum of IPO global proceeds instead of *IPO size*, and when we exclude from the sample the matched pair containing the underwriter not ranked by Loughran and Ritter.

12. Full and subsample regression results are similar when we use nine as the cut-off rank for more reputable underwriters.

13. For 26 restating and control firms whose IPO prospectuses are not available from the SEC's Web site, we obtain VC equity stakes from significant-shareholder information disclosed in follow-on registration statements or post-IPO proxy statements.

lead VC as the VC having the largest equity stake. We measure the reputation of an issuer's lead VC using IPO market share, *VC market share*, defined as the market value of all IPOs backed by the lead VC during the sample firm's IPO year and the prior 2 years divided by the market value of all IPOs in SDC that occurred during the same 3-year period. This measure of VC reputation is similar in spirit to that used in Nahata (2008).

Testing the VC grandstanding hypothesis requires measuring VC maturity. We use three proxies for VC maturity: VC-firm age, number of previous IPOs backed, and capital under management. Similar measures of VC experience have been used in prior studies such as Lerner (1994), Gompers (1996), Hochberg et al. (2007), and Sorensen (2007). VC-firm age is the number of years from the VC firm's first investment round, as reported by SDC, to the issuer's IPO date. Similarly, we sum VC activity before an issuer's IPO to compute the number of previous IPOs backed and capital under management.¹⁴ When calculating capital under management, we identify all investment rounds in which the VC participated before the restating or control firm's IPO date. SDC does not report the individual contribution of each VC firm that it reports as participating in a financing round, so we divide each investment round's total by the number of investors participating in the round and then sum the per-investor amounts of the identified rounds as a measure of the capital under a VC's management.¹⁵

6. FIRM CHARACTERISTICS

6.1 ABNORMAL RETURNS

We next examine stock price reactions to restatement announcements. We compute the abnormal return for stock i on day t as

$$e_{it} = r_{it} - r_{mt}, \quad (1)$$

where r_i and r_m are the stock returns for firm i and the market, respectively. The market return equals the return on the Center for Research in Securities Prices (CRSP) value-weighted stock index, covering NYSE, AMEX, and NASDAQ stocks. The cumulative abnormal return for firm

14. For VC shareholders not listed in the SDC database, none of the three proxies for VC maturity is available. We assume that these VCs are young firms when testing the VC grandstanding hypothesis.

15. Admittedly, this is a noisy measure. But noise should decrease the likelihood of finding an effect. In any case, capital under management is one of three alternate measures of VC experience.

i over days (t_1, t_2) is

$$CAR_{t_1, t_2}^i = \sum_{t=t_1}^{t_2} e_{it}. \quad (2)$$

We calculate CARs for five trading-day windows covering trading days $(-1, +1)$, $(-5, +1)$, $(-5, +5)$, $(-20, +1)$, and $(-20, +20)$ around the announcement date (day 0). Table III shows the mean and median CARs of the restating- and control-firm samples for the full sample period and two subperiods. Consistent with prior studies (e.g., Palmrose et al., 2004 and Agrawal and Chadha, 2005), the full sample of restating firms in Panel A experiences large, negative average abnormal returns around announcement dates. The mean (median) CAR of restating firms ranges from -10.8% (-5.0%) for the $(-1, +1)$ window to -25.0% (-16.8%) for the $(-20, +20)$ window. The mean and median CARs for control firms are statistically indistinguishable from zero for all but the longest trading-day window. The differences in the mean and median CARs between the two groups are highly statistically significant.

The full sample includes restatements announced both before and after the adoption of the Sarbanes–Oxley Act (SOX) on July 30, 2002. SOX significantly changed the financial reporting environment, requiring CEOs and CFOs to certify that financial information reported in 10-Ks and 10-Qs is fairly presented, and granting the Public Company Accounting Oversight Board the authority to investigate and discipline public accounting firms. Section 404 of the Act requires that the adequacy and soundness of a public company's internal controls be certified by independent accountants. The attention that GAAP compliance has received after SOX was enacted has produced a deluge of restatements correcting misstatements that have tended to be more benign in nature. Many companies have restated post-SOX to "clean house," even when the accounting issues involved have been relatively small.

To examine whether restatements in our sample have characteristics that are consistent with a SOX-induced change in the financial reporting environment, we partition the sample into restatements announced before SOX and those announced after SOX. Panel B (C) of Table III reports CARs for the pre-SOX (post-SOX) subsample. Panel B shows that pre-SOX, restatement announcements have large effects on stock prices. For restating firms, the mean pre-SOX CARs are lower than those for the full sample, ranging from -13.4% over days $(-1, +1)$ to -28.8% over days $(-20, +20)$. The mean and median CARs of restating firms are all statistically significant at the 1% level in two-tailed tests. For nonrestating firms, the mean pre-SOX CARs are insignificantly

TABLE III.
ABNORMAL RETURNS FOR RESTATING VERSUS CONTROL FIRMS OVER DAYS (-20,+20)

Trading Days	Mean		P-Value ¹	Median		P-Value ²	Sample Size
	Restate	Control		Restate	Control		
Panel A: Full sample							
(-1,+1)	-10.75 ^a	0.83	0.000	-4.96 ^a	0.02	0.000	109
(-5,+1)	-13.99 ^a	-0.30	0.000	-8.37 ^a	-0.68	0.000	109
(-5,+5)	-14.31 ^a	-1.08	0.000	-9.32 ^a	-1.60	0.000	109
(-20,+1)	-19.67 ^a	-2.16	0.000	-11.78 ^a	-1.14	0.000	109
(-20,+20)	-25.03 ^a	-5.67	0.001	-16.84 ^a	-4.79	0.000	107
Panel B: Announced before SOX ³							
(-1,+1)	-13.41 ^a	0.11	0.000	-10.56 ^a	0.07	0.000	87
(-5,+1)	-17.44 ^a	-0.39	0.000	-11.62 ^a	-0.68	0.000	87
(-5,+5)	-18.35 ^a	-1.13	0.000	-12.10 ^a	-2.14	0.000	87
(-20,+1)	-22.61 ^a	-2.82	0.001	-18.65 ^a	-3.14	0.000	87
(-20,+20)	-28.80 ^a	-6.97 ^c	0.002	-21.94 ^a	-6.74 ^b	0.001	85

Continued

TABLE III.
CONTINUED (-20,+20)

Trading Days	Mean		Median		Sample Size	
	Restate	Control	Restate	Control		
	P-Value ¹		P-Value ²			
	Panel C: Announced after SOX ³					
(-1,+1)	-0.20	3.67	0.224	-0.18	0.153	22
(-5,+1)	-0.37	0.09	0.916	-0.82	0.963	22
(-5,+5)	1.66	-0.88	0.559	-1.07	0.938	22
(-20,+1)	-8.06 ^c	0.45	0.185	1.21	0.076	22
(-20,+20)	-10.47 ^b	-0.67	0.165	-1.25	0.232	22

Notes: This table shows the mean and median abnormal returns of restating and control firms during the period beginning 20 trading days before and ending 20 trading days after the announcement date (day 0). Abnormal returns are calculated for five periods ranging in length from three trading days (-1,+1) to 41 trading days (-20,+20). For each firm, the abnormal return for trading day t is computed by subtracting the value-weighted CRSP (NYSE, Nasdaq, and AMEX) index rate of return from the rate of return on the firm's stock for trading day t . Both the index and stock rates of return include dividends and are obtained from CRSP. The abnormal rates of return are reported as percentages.

¹ For the matched-pairs t -test (2-tailed).

² For the Wilcoxon signed-ranks test (2-tailed).

³ Announced before July 30, 2002 (Panel B) or starting July 30, 2002 (Panel C).

a,b,c: Significantly different from zero at the 1%, 5%, or 10% levels, respectively, in 2-tailed tests.

different from zero, except for the $(-20, +20)$ window. Both the mean and median pre-SOX CARs for restating firms are significantly lower than those of nonrestating firms.

In contrast, Panel C shows that restatements announced after SOX have small or insignificant effects on stock prices. The mean and median post-SOX CARs of restating firms in this subsample are statistically insignificant for the three shorter windows. For the two longer windows, the mean and median post-SOX CARs of restating firms are statistically significant at the 10% level, but their magnitudes are substantially smaller than those for the full sample. For the post-SOX subsample, the differences in the mean and median CARs of restating and control firms are statistically insignificant.

6.2 IPO, UNDERWRITER, AND VC CHARACTERISTICS

Panel A of Table IV reports IPO characteristics for our restating and control samples. The mean (median) value of global proceeds raised by restating-firm IPOs is about \$89 (\$57) million. The control sample's mean and median values for IPO proceeds are similar to those of the restating sample due to our matching procedure. The median percentage of outstanding equity owned by pre-IPO shareholders immediately after the IPO is 73% (75%) for restating (control) firms.

Panel B in Table IV compares the characteristics of the IPO underwriters of restating and control firms. About 66% and 69% of restating and control firms, respectively, use reputable lead underwriters, those having reputation ranks of at least eight on a scale of one to nine. The mean (median) lead-underwriter reputation ranks of restating and control firms are 7.5 (eight) and 7.4 (eight), respectively. The median number of previous IPOs underwritten by lead underwriters of restating and control firms is 90 and 80, respectively. The median percentage of IPO shares allotted to lead underwriters is 39% for the restating sample, 41% for the control sample. None of the differences in the mean and median values of underwriter characteristics between restating and control firms is statistically significant at the 5% level.

Panel C in Table IV describes VC characteristics of the restating and control IPO samples. VCs back 64% (70%) of restating (control) IPO firms in our sample.¹⁶ The median age of lead VC firms is 8 (13) years for

16. The incidence of VC-backing in our sample of IPO firms that subsequently restate is somewhat higher than that found in prior studies that examine random samples of IPOs. For instance, about 50% of the 1,381 IPOs during 1993–2002 in Lee and Masulis's (2008) sample are VC-backed. One reason for the higher incidence of VC-backed firms in our sample is that unlike prior studies, we classify a firm as VC-backed if its IPO prospectus lists a VC shareholder, even if SDC lists the firm as not being VC-backed.

TABLE IV.
IPO, UNDERWRITER, AND VC CHARACTERISTICS

Variable	Mean			Median			R/C Sample Size
	R	C	P-Value ¹	R	C	Wilcoxon P-Value ²	
Panel A: IPO characteristics							
Price per share (\$)	16.4	17.1	0.371	15.2	15.9	0.379	137/137
U.S. proceeds (\$ million)	84.4	79.6	0.357	57.3	52.4	0.139	137/137
Global proceeds (\$ million)	89.3	85.3	0.437	57.3	54.6	0.526	137/137
Percent ownership retained (Retained equity %)	71.3	73.3	0.127	72.9	75.4	0.130	137/137
Panel B: Underwriter characteristics							
Prop. with reputable lead underwriter	0.66	0.69	0.649	1	1	0.653	137/137
Lead underwriter reputation rank	7.5	7.4	0.479	8	8	0.756	137/137
Number of previous IPOs underwritten	136	123	0.345	90	80	0.479	137/137
Proportion of IPO shares allotted	47	49	0.311	39	41	0.303	137/137
Proportion with equity stake	0.06	0.12	0.088	0	0	0.088	137/137
Panel C: VC characteristics							
Proportion with VC backing	0.64	0.70	0.287	1	1	0.289	137/137
Lead VC							
Age	11.6	13.9	0.168	7.9	12.8	0.199	88/96
Number of previous IPOs backed	26	37	0.099	6	11	0.170	88/96
Capital under mgt. (\$million)	192	224	0.566	48	68	0.432	88/96
IPO market share (%) (VC market share)	1.84	1.94	0.743	1.01	0.95	0.783	88/96
Equity stake (%)	23.8	22.6	0.637	18.8	16.9	0.312	88/96

Continued

**TABLE IV.
CONTINUED**

Variable	Mean		Median		Wilcoxon P-Value ²	R/C Sample Size
	R	C	R	C		
Panel C: VC characteristics						
All VCs						
Average age (years)	11.4	12.2	0.430	11.5	12.0	0.448
Average number of previous IPOs backed	20	27	0.048	13	18	0.160
Average capital under mgt. (\$million)	133	163	0.377	59	93	0.421
Total equity stake (%)	38.4	38.0	0.890	39.0	39.3	0.926

Notes: Panels A, B, and C show the restating- and control-sample mean and median values of IPO, underwriter, and VC characteristics, respectively. Restating firms announced, within 3 years of their IPO dates, restatements to correct GAAP violations for quarters beginning within 2 years of their IPOs. Control firms are nonrestating IPO firms matched to restating firms by industry (two-digit or one-digit SIC code) and U.S. IPO proceeds. Each restating firm's IPO date is within 1 year of its matched control firm's IPO date. Percent ownership retained is the percentage of common shares owned by pre-IPO shareholders immediately after the IPO. A firm is classified as having a more reputable underwriter if its lead underwriter has a Loughran-Ritter reputation rank of at least eight on a scale of one to nine. The name of each IPO firm's lead underwriter is obtained from the SDC Platinum database. For an issuer with more than one lead underwriter, the lead underwriter reputation rank is a weighted average. We use IPO prospectuses to identify lead underwriters with pre-IPO equity or debt stakes in issuing firms. VC backing and equity interests are determined using the significant-shareholder information disclosed in IPO prospectuses. VC age is the difference, in years, between the sample firm's IPO date and the investment date of the VC firm's first listing in SDC. For an issuer with multiple VC shareholders, we compute the average age of its VCs. We sum a VC's activity from the beginning of the SDC database to the issuer's IPO date to obtain the number of previous IPOs backed by the VC and its capital under management; we compute averages when an issuer has multiple VC shareholders. The lead VC's IPO market share ($VC_{market\ share}$) is as defined in the Appendix. VC equity stake equals the sum of VC-owned shares reported in the significant shareholder section of the IPO prospectus divided by shares outstanding immediately after the IPO. A firm's lead VC has the largest equity stake. All dollar values are in inflation-adjusted 2005 dollars.

¹ For 2-tailed *t*-tests.

² For the Wilcoxon signed-rank or rank-sum tests (2-tailed).

the restating (control) sample. The number of IPOs previously backed by the lead VC of restating (control) firms has a mean of about 26 (37), considerably higher than the median of six (11). The median value of capital under management for the lead VC of restating (control) firms is \$48 (\$68) million. The median values for lead-VC equity stakes in restating and control firms are about 19% and 17%, respectively.

We measure VC reputation using *VC market share*, which equals the market value of all IPOs backed by a lead VC during the IPO year and the prior 2 years, divided by the market value of all IPOs in SDC that occurred during the same 3-year period. The median value of the lead VC's IPO market share is about 1% in both restating and control firms. None of the differences in the mean and median values of restating- and control-firm lead VC characteristics is statistically significant at the 5% level.

6.3 FINANCIAL CHARACTERISTICS

Panel A in Table V describes financial characteristics of restating and control firms for the fiscal years containing their IPOs. Balance sheet and income statement data are from Compustat; stock price data are from CRSP.¹⁷ The typical restating firm is small; the median values of sales, market capitalization, and workforce are \$48 million, \$241 million, and 400 employees, respectively. The typical restating firm has poor operating performance; operating cash flow and operating income as a percentage of total assets have median values of about $-\$3.6$ million and -3.6% , respectively. Finally, long-term debt is negligible in the typical restating or control firm; the median debt-to-assets ratio is 0.01 in both samples. None of the differences in the mean and median values of restating- and control-firm financial characteristics is statistically significant at the 5% level.

6.4 CEO AND BOARD CHARACTERISTICS

Panel B in Table V describes the characteristics of the CEO and board of directors. We obtain board data from IPO prospectuses in most cases.¹⁸ Founders lead 45% of restating firms and 49% of control firms. CEOs chair about 72% of restating-firm boards and 67% of control-firm boards. For both samples, the mean of *Board size* is 6.5, and the mean proportion

While our control sample is not matched on VC-backing, it has a similar proportion of VC-backed IPOs as the restating sample.

17. In cases where Compustat does not report data for the IPO year, we hand-collect the data from SEC filings.

18. For the 26 firms whose IPO prospectuses are not available from the SEC's Web site, we obtain board data from follow-on registration statements or post-IPO proxy statements.

TABLE V.
FINANCIAL AND CORPORATE GOVERNANCE CHARACTERISTICS

Variable	Mean			Median			Wilcoxon P-Value ²	Sample Size
	Restating	Control	P-Value ¹	Restating	Control	Control		
Panel A: Financial characteristics ³								
Sales (\$millions)	224	209	0.742	48	70		0.795	137
Total assets (\$millions)	285	312	0.628	96	110		0.732	137
Market capitalization (\$millions) ⁴	736	1,101	0.108	241	281		0.080	137
Firm value (\$millions) ⁵	903	1,243	0.154	324	331		0.208	137
Employees ('000s)	2.05	1.91	0.962	0.40	0.40		0.716	129
Operating income (\$millions)	0.15	0.53	0.951	-0.28	-0.32		0.728	137
Operating cash flow (\$millions)	1.59	7.20	0.235	-3.60	-0.76		0.315	137
Operating income/Assets (%) ⁶	-6.91	-6.37	0.841	-3.62	-0.48		0.330	137
Operating cash flow/Assets (%) ⁷	-0.42	-2.50	0.455	2.11	2.75		0.865	137
Return on assets (%) ⁸	-10.31	-9.71	0.846	-2.12	-2.60		0.579	137
Debt-to-assets (Long-term debt/Assets) ⁹	0.13	0.10	0.254	0.01	0.01		0.532	137
Panel B: CEO and board								
Proportion with founder CEO (CEO is founder)	0.45	0.49	0.425	0	0		0.428	137
Proportion where CEO chairs the board (CEO chairs board)	0.72	0.67	0.387	1	1		0.389	137
Proportion of inside directors	0.31	0.30	0.599	0.27	0.25		0.868	137
Proportion of gray directors	0.22	0.23	0.492	0.20	0.20		0.410	137
Proportion of independent directors (Independent directors %)	0.47	0.47	0.872	0.50	0.50		0.960	137
Board size	6.5	6.5	0.972	6	6		0.909	137

Continued

TABLE V.
CONTINUED

Variable	Mean			Median			Wilcoxon P-Value ²	Sample Size
	Restating	Control	P-Value ¹	Restating	Control	Control		
Panel B: CEO and board								
Prop. with independent financial expert on board (<i>Indep. financial expert</i>)	0.30	0.25	0.338	0	0	0	0.341	137
Prop. with independent financial expert on audit committee	0.24	0.20	0.477	0	0	0	0.481	137
Panel C: Institutional ownership ¹⁰								
Proportion with institutional shareholders	0.93	0.92	0.595	1	1	1	0.791	137
Number of institutional shareholders	28	29	0.583	22	22	22	0.431	137
Number of shares owned (millions)	4.4	4.5	0.861	2.5	2.6	2.6	0.885	137
Dollar value of shares owned (\$millions)	139	161	0.416	46	48	48	0.341	137
Percent of outstanding equity (<i>Institutional holdings</i> %)	20.9	19.2	0.320	17.3	18.7	18.7	0.497	137
Panel D: Exercisable stock options ¹¹								
CEO								
Shares underlying options ('000s)	264	173	0.074	25	20	20	0.071	137
Value of options (\$'000s) ¹²	4,074	1,854	0.054	29	0	0	0.391	137
Option sensitivity (\$'000s) ¹³	65	33	0.055	2	0	0	0.271	137

Continued

TABLE V.
CONTINUED

Variable	Mean			Median			Wilcoxon P-Value ²	Sample Size
	Restating	Control	P-Value ¹	Restating	Control	Control		
Panel D: Exercisable stock options ¹¹								
CFO								
Shares underlying options ('000s)	70	58	0.478	5	2		0.305	137
Value of options (\$'000s) ¹²	985	1,011	0.942	0	0		0.666	137
Option sensitivity (\$'000s) ¹³	15	14	0.783	0	0		0.673	137
CEO and CFO								
Shares underlying options ('000s)	334	230	0.072	66	67		0.155	137
Value of options (\$'000s) ¹²	5,059	2,865	0.087	192	211		0.508	137
Option sensitivity (\$'000s) ¹³	80	47	0.068	6	6		0.456	137
Panel E: Bank debt								
Proportion with bank loans (<i>Bank debt</i>) ¹⁴	0.77	0.64	0.024	1	1		0.023	137

Continued

TABLE V.
CONTINUED

Variable	Mean			Median			Sample Size
	Restating	Control	P-Value ¹	Restating	Control	Wilcoxon P-Value ²	
Panel F: Auditor reputation							
Proportion with Big Six auditor (<i>Big Six auditor</i>) ¹⁵	0.91	0.93	0.619	1	1	0.804	137

Notes: The sample consists of (1) 137 U.S. IPO firms that announced financial restatements during the period January 1, 1997 to December 31, 2005 within 3 years of their IPO dates, to correct misstated quarters beginning within 2 years of their IPO dates, and (2) a matched sample of 137 U.S. IPO firms that did not announce restatements to correct misstated quarters beginning within 3 years of their IPO dates. The restating IPO firms were identified from GAO (2002), which lists firms that announced during the period January 1, 1997 to June 30, 2002 restatements to correct GAAP violations. Restatements announced from July 1, 2002 to December 31, 2005 were identified by searching the Lexis-Nexis News wires database using *restat* as the keyword. Control firms were matched to restating firms according to industry (two-digit or one-digit SIC code) and IPO proceeds from U.S. markets. Each restating firm's IPO date is within 1 year of its matched control firm's IPO date. Data used to match firms were obtained from the SDC Platinum database. All dollar values are in inflation-adjusted 2005 dollars

1 For the matched-pairs *t*-test (2-tailed).

2 For the Wilcoxon signed-ranks test (2-tailed).

3 For the fiscal year containing the IPO.

4 Common shares outstanding multiplied by the share price at the first fiscal year-end following the IPO.

5 Firm value=Book value of total liabilities + Market value of stockholders' equity.

6 Operating income / Assets = Operating income after depreciation / Total assets.

7 Operating cash flow / Assets = Operating cash flow / Total assets.

8 Return on assets=Net income / Total assets.

9 Debt-to-assets=Long-term debt / Total assets.

10 Institutional shareholdings are based on 13F filings for the first calendar quarter ending after the IPO.

11 Options exercised during the fiscal year containing the IPO plus exercisable options at the end of that fiscal year.

12 Value calculated using the Black-Scholes model adjusted for dividend payouts.

13 Equals the product of option delta, 1% of the stock price, and the number of exercisable options held.

14 Defined as commercial bank loans or available lines of credit.

15 Auditor of the financial statements in the IPO prospectus having the name Arthur Andersen LLP, Coopers & Lybrand LLP, Deloitte & Touche LLP, Ernst & Young LLP, KPMG Peat Marwick LLP, PricewaterhouseCoopers LLP.

of independent directors is 0.47. An independent financial expert sits on the board of 30% of the restating firms and 25% of the control firms. None of the differences in the mean and median values of restating- and control-firm CEO and board characteristics is statistically significant at the 5% level.

6.5 INSTITUTIONAL OWNERSHIP

Panel C in Table V describes institutional ownership in restating and control firms at the first calendar quarter-end after the IPO. We obtain ownership data from Thomson Financial's database of 13F filings. More than 90% of restating and control firms have institutional shareholders. For both restating and control firms, the median number of institutional shareholders is about 22. The median value of institutional ownership is about 17% and 19% for the restating and control samples, respectively, at the first calendar quarter-end after the IPO. None of the differences in the mean and median values of restating- and control-firm institutional-ownership characteristics is statistically significant.

6.6 CEO AND CFO STOCK OPTIONS

Panel D in Table V describes stock options that are exercisable by CEOs and CFOs of restating and control firms during the fiscal years containing the IPOs. The mean number of shares underlying CEO (CFO) options is 264 (70) thousand for the restating sample and 173 (58) thousand for the control sample; the median number of shares underlying CEO (CFO) options is much smaller, about 25 (5) thousand for the restating sample and 20 (2) thousand for the control sample. The mean values of CEO option holdings for restating and control firms are about \$4.1 million and \$1.9 million, respectively. The mean value of CFO option holdings is about \$1.0 million for both restating and control firms. CEO (CFO) stock option sensitivity, measured as the dollar change in option value caused by a 1% change in stock price, has a mean of about \$65 (\$15) thousand and \$33 (\$14) thousand for restating and control firms, respectively. For CEO options, the differences in the restating- and control-firm mean values for shares underlying options, value of options, and option sensitivity are statistically significant at the 10% level or better. For CFO options, none of the differences between the restating and control samples is statistically significant.

6.7 BANK DEBT AND AUDITOR CHOICE

Panel E of Table V shows that about 77% of restating firms have bank loans compared to 64% of control firms; the difference is statistically

significant at the 5% level. In Panel F, about 91% of restating firms and 93% of control firms have Big Six auditors; the difference in the proportions is statistically insignificant.

7. CROSS-SECTIONAL REGRESSIONS

7.1 REGRESSION SPECIFICATION

We test whether underwriter reputation, VC backing and VC reputation are related to the probability of restatement and attempt to discriminate between two competing, mutually exclusive hypotheses about VC influence on the financial reporting quality of IPO firms: the VC monitoring and VC moral hazard hypotheses. We test a third hypothesis concerning VCs, the VC grandstanding hypothesis, by examining whether the influence of young VCs on the financial reporting quality of IPO firms differs from the influence of mature VCs. In addition, we attempt to determine whether maintaining reputation or generating revenue has a greater effect on underwriter behavior, and test two competing, but not mutually exclusive, hypotheses: the underwriter reputation and underwriter revenue generation hypotheses.

Testing whether underwriters and VCs affect the probability of restatement requires using a limited dependent variable model for binary response, such as the logistic regression model. The regular logistic regression model is unsuitable for our purposes because our sample consists of matched pairs of restating and control firms. For logistic regressions with matched-pairs samples where the dependent variable is a case or control, Hosmer and Lemeshow (2000, chapter 7) suggest using the matched-pairs (i.e., conditional or paired) logistic model. This model cannot be used for prediction, but yields consistent maximum likelihood estimators of the slope coefficients.¹⁹ Widely used in epidemiology, this model has also been used in economics and finance (see, e.g., Alexander and Cohen, 1999 and Agrawal and Chadha, 2005). Accordingly, we estimate a paired logistic model where the dependent variable is *Restating firm*, which equals one (zero) for restating (control) firms. As in Agrawal and Chadha (2005), we assume that serious earnings manipulation tends to be self-unraveling, forcing a firm to restate its financial statements. Under this assumption, firms in our control sample do not have serious earnings manipulation.

The main explanatory variables of interest are *Underwriter reputation rank*, *Reputable underwriter*, *VC-backed firm*, and *VC market share*.

19. For the case of a randomly picked (rather than matched-pairs) control sample, Palepu (1986) illustrates a modified logistic model suggested by Manski and McFadden (1981).

Underwriter reputation rank is the lead underwriter's Loughran–Ritter reputation rank. *Reputable underwriter* equals one if the lead underwriter of the IPO has a Loughran–Ritter reputation rank of at least eight and equals zero otherwise. *VC-backed firm* equals one if the sample firm's IPO prospectus lists a VC shareholder and equals zero otherwise. We use *VC market share* to measure the reputation of the lead VC. For VC-backed firms, *VC market share* equals the market value of IPOs backed by a sample firm's lead VC during the IPO year and the prior 2 years, divided by the market value of all IPOs in SDC for the same 3-year period; it equals zero for non-VC-backed firms.

We next discuss the variables that control for other potential determinants of earnings manipulation found to be important in prior studies (see, e.g., Dechow et al., 1996; Klein, 2002; Agrawal and Chadha, 2005; and Burns and Kedia, 2006). The Appendix summarizes the variables and data sources.

7.1.1 INDEPENDENT DIRECTORS%

We control for the percentage of independent directors on the board, following Klein (2002), who finds that this variable is negatively related to earnings management.

7.1.2 CEO IS FOUNDER

A founder CEO could use his influence to limit monitoring by independent directors. Agrawal and Chadha (2005) find that the presence of a founder CEO is positively related to the probability of restatement. We control for a founder CEO's influence via *CEO is founder*, a binary variable that equals one if a firm's CEO is a founder and equals zero otherwise.

7.1.3 CEO CHAIRS BOARD

CEOs who chair their firms' boards have more power to curtail monitoring by independent directors. Dechow et al. (1996) find that firms with chairman CEOs are more likely to manipulate earnings. Accordingly, we expect such firms to have a greater probability of restatement. *CEO chairs board* equals one if the CEO chairs the board; it equals zero otherwise.

7.1.4 BOARD SIZE

Jensen (1993) argues that larger boards tend to be less effective monitors of management. This argument implies that larger boards would be less likely to be effective in deterring managerial misconduct such as earnings manipulation. We expect *Board size*, the number of directors on the board, to be positively related to the probability of restatement.

7.1.5 INDEP. FINANCIAL EXPERT

Agrawal and Chadha (2005) find that the probability of restatement is negatively related to the presence of an independent director with

financial expertise. *Indep. financial expert* equals one if the IPO prospectus describes at least one independent director as a certified public accountant, chartered financial analyst, or having experience as a CFO, controller, vice president of finance, or treasurer; it equals zero otherwise. Independent directors do not have business relationships with the firm apart from their directorships. Family members of executives, former employees, debtholders at the IPO date, and parties receiving IPO proceeds are not considered independent.

7.1.6 OPERATING CASH FLOW/ASSETS

Managers at poorly performing firms have greater incentive to misstate financial statements. Consistent with this idea, Agrawal and Chadha (2005) find that poorly performing firms are more likely to restate. We measure firm performance with *Operating cash flow/Assets*, which equals operating cash flow for the fiscal year containing the IPO divided by year-end total assets.

7.1.7 MARKET CAPITALIZATION

We expect firm size to be related to the probability of restatement, although the sign of the relation is unclear *a priori*. On one hand, financial reporting is more burdensome for larger firms because their multifarious operations subject them to more accounting rules that can be violated. But greater scrutiny from analysts and the media could deter earnings manipulation by managers of large firms. Agrawal and Chadha (2005) find that larger firms are more likely to restate. We measure firm size as *Market capitalization*, the natural logarithm of shares outstanding multiplied by share price at the first fiscal year-end after the IPO.

7.1.8 INSTITUTIONAL HOLDINGS%

As large investors, institutional shareholders have greater incentives and more resources to monitor their investments. We expect the likelihood of earnings manipulation, and restatement, to be negatively related to institutional ownership in the firm. We measure institutional ownership as *Institutional holdings%*, the percentage of outstanding shares owned by institutional investors at the first calendar quarter-end after the IPO.

7.1.9 OPTION SENSITIVITY

Burns and Kedia (2006) find that the probability of restatement tends to increase with the sensitivity of CEO and CFO stock options to changes in stock price. *Option sensitivity* measures the dollar change in option value caused by a 1% change in stock price, and equals the product of option delta, 1% of the stock price, and the number of exercisable options. Option delta is derived from the Black–Scholes model adjusted

for dividend payout and equals

$$e^{-dT} \Phi(Z), \text{ where } Z = \frac{\ln(S|X) + T(r - d + \sigma^2/2)}{\sigma\sqrt{T}}.$$

We estimate the number of exercisable CEO and CFO options by adding options exercised during the IPO year to options exercisable at the end of that fiscal year. An officer's option delta is calculated using the strike prices, X , and expiration dates of options granted during the IPO year. Option data are obtained from prospectuses and post-IPO proxy statements filed after the IPO. Stock price, S , is observed at the first fiscal year-end after the IPO. Time to maturity, T , is the number of days from that fiscal year-end to the option's expiration date. Volatility, σ is the standard deviation of a firm's daily logarithmic stock return over the first 120 trading days following the IPO. The risk-free return, r , is the average daily logarithmic return on a 3-month U.S. Treasury bill over the 30-trading day period ending 120 trading days after the IPO. We sum a stock's dividends over the first 120 trading days after the IPO and multiply by 250/120 to annualize. The dividend rate, d , equals the annualized dividend divided by S . The expression, $\Phi(Z)$, is the standard normal distribution's cumulative distribution function evaluated at Z .

7.1.10 BANK DEBT

Having bank debt could affect the probability of earnings manipulation and restatement, although the sign of the relation is not clear *a priori*. On one hand, firms with bank debt have greater incentive to manipulate earnings so that reported performance complies with debt covenants. But an extensive literature (see, e.g., Diamond, 1984, 1991) shows that, as concentrated debtholders with access to borrowing firms' private information, banks are effective monitors of their debtors. Effective monitoring would constrain managers' ability to manipulate earnings. We measure the presence of bank debt using *Bank debt*, a binary variable that equals one if the firm's IPO prospectus discloses a commercial bank loan or line of credit, and equals zero otherwise.

7.1.11 LONG-TERM DEBT/ASSETS

Prior studies find that financial leverage is positively related to earnings manipulation (see, e.g., Dechow et al., 1996). We measure leverage as *Long-term debt/Assets*, which equals long-term debt divided by total assets at the end of the fiscal year containing the IPO.

7.1.12 BIG SIX AUDITOR

Top accounting firms are expected to perform more thorough audits, on average, than smaller accounting firms. Higher-quality audits are more likely to uncover material misstatements, which can be corrected

before financial statements are issued. We measure auditor reputation via a binary variable, *Big Six auditor*, which equals one, if the IPO firm's auditor is a top accounting firm, and equals zero otherwise.²⁰ We use SDC to identify each sample firm's auditor.

7.1.13 RETAINED EQUITY%

Pre-IPO shareholders typically wait until after the IPO to liquidate substantial portions of their holdings, generally after the expiration of a lock-up period. The continuous market for the stock after the IPO allows pre-IPO shareholders to time their stock sales. Because pre-IPO shareholders who retain larger equity stakes have more shares to sell after the IPO, they have greater incentive to inflate the stock price with earnings manipulation. We control for this incentive using *Retained equity%*, the percentage of common equity owned by pre-IPO shareholders immediately after the IPO.

We estimate the following matched-pairs logistic regression model:

$$\begin{aligned} \text{Restating firm} = f(\text{Underwriter reputation rank or Reputable} \\ \text{underwriter, VC - backed firm, VC market share,} \\ \text{Independent directors\% , CEO is founder, CEO} \\ \text{chairs board, Board size, Indep financial expert,} \\ \text{Operating cash flow / Assets, Market capitalization,} \\ \text{Institutional holdings\%, Option sensitivity,} \\ \text{Bank debt, Long-term debt/ Assets,} \\ \text{Big Six auditor, Retained equity\%)} \end{aligned} \quad (3)$$

7.2 CORRELATIONS

Panel A in Table VI shows Pearson product-moment correlation coefficients among the variables in equation (3). The lead underwriter's reputation rank (*Underwriter reputation rank*), the binary variable for a more reputable lead underwriter (*Reputable underwriter*), and the binary variable for VC backing (*VC-backed firm*) are positively correlated with each other and with the lead VC's market share in VC-backed firms (*VC market share*), *Board size*, firm size (*Market capitalization*), the binary variable *Big Six auditor*, and the percentage of outstanding equity retained by pre-IPO shareholders (*Retained equity%*). Operating

20. The top accounting firms during the sample period are Arthur Andersen LLP, Coopers & Lybrand LLP, Deloitte & Touche LLP, Ernst & Young LLP, KPMG Peat Marwick LLP, Pricewaterhouse LLP, and PricewaterhouseCoopers LLP.

TABLE VI.
CORRELATION

Panel A: Bivariate correlation coefficients

	Restating Firm	Underwriter Reputation Rank	Reputable Underwriter Firm	VC-backed Firm	VC Market Share	Independent Directors %	CEO is Founder	CEO Chairs Board Size	Financial Expert	Operating Cash Flow/Assets	Market Capitalization	Institutional Holdings %	Option Sensitivity	Bank Debt	Long-term Debt/Assets	Retained equity %
Restating firm	1.000															
Underwriter reputation rank	0.033	1.000														
Reputable underwriter firm	-0.023	0.810 ^a	1.000													
VC-backed firm	-0.062	0.371 ^a	0.295 ^a	1.000												
VC market share	-0.045	0.354 ^a	0.370 ^a	0.432 ^a	1.000											
Independent directors %	0.009	0.141 ^b	0.055	0.228 ^a	0.155 ^a	1.000										
CEO is founder	-0.044	-0.079	-0.054	0.001	-0.048	0.057	1.000									
CEO chairs board	0.056	0.017	0.001	0.029	0.023	-0.003	0.347 ^a	1.000								
Board size	-0.002	0.270 ^a	0.211 ^a	0.221 ^a	0.106 ^c	0.137 ^b	-0.187 ^a	-0.112 ^c	1.000							
Indep. financial expert	0.0570	-0.012	-0.011	-0.128 ^b	-0.122 ^b	0.268 ^a	-0.050	0.182 ^a	1.000							
Operating cash flow/Assets	-0.012	0.313 ^a	0.197 ^a	0.035	0.024	0.050	-0.062	0.108 ^c	0.079	0.118 ^b	1.000					
Market capitalization	-0.050	0.605 ^a	0.544 ^a	0.277 ^a	0.411 ^a	0.244 ^a	-0.120 ^b	-0.052	0.263 ^a	0.056	0.301 ^a	1.000				
Institutional holdings %	0.049	0.298 ^a	0.192 ^a	0.112 ^c	-0.022	-0.027	-0.154 ^a	-0.044	0.160 ^a	0.028	0.291 ^a	0.031	1.000			
Option sensitivity	0.103 ^c	0.173 ^a	0.169 ^a	0.090	0.228 ^a	0.080	-0.040	-0.031	0.159 ^a	0.002	0.040	0.394 ^a	0.089	1.000		

Continued

TABLE VI.
CONTINUED

Panel A: Bivariate correlation coefficients																
	Under- writer Reputa- tion Rank	Reputable Under- writer	VC- Backed Firm	VC Market Share	Inde- pendent Direc- tors %	CEO is Founder	CEO Chairs Board	Board Size	Indep. Finan- cial Expert	Operating Cash Flow/ Assets	Market Capital- ization	Insti- tutional Hold- ings %	Option Sensi- tivity	Bank Debt	Long- term Debt/ Assets	Re- tained Equity %
Bank debt	0.136 ^b	0.059	0.012	0.007	0.056	-0.109 ^c	0.060	0.021	0.178 ^a	-0.008	0.205 ^a	-0.004	1.000			
Long-term debt/Assets	0.059	0.160 ^a	0.131 ^b	0.013	0.016	-0.134 ^b	0.134 ^b	0.196 ^b	0.071	0.189 ^a	0.075	0.305 ^a	0.128 ^b	0.190 ^a	1.000	
Big six auditor Retained equity %	-0.027	0.463 ^a	0.311 ^a	0.194 ^a	0.138 ^b	0.074	-0.078	0.078	-0.060	0.181 ^a	0.250 ^a	0.159 ^a	0.060	0.103 ^c	0.045	1.000
	-0.082	0.393 ^a	0.408 ^a	0.250 ^a	0.367 ^a	0.224 ^a	0.060	-0.013	0.022	-0.035	0.575 ^a	-0.374 ^a	0.182 ^a	-0.111 ^c	-0.122 ^b	0.178 ^a
Panel B: Partial correlation coefficients																
Restating firm Underwriter reputation rank	1.000	0.144 ^b	1.000													
Reputable underwriter	-0.068	0.669 ^a	1.000													
VC-backed firm	-0.053	0.129 ^b	-0.043	1.000												
VC market share	-0.032	-0.01	0.122 ^b	0.308 ^a	1.000											
Independent directors %	0.042	0.050	-0.144 ^b	0.176 ^a	0.063	1.000										
CEO is founder	-0.062	0.007	0.027	0.028	-0.069	0.076	1.000									
CEO chairs board	0.058	0.069	-0.027	0.045	0.044	0.006	0.348 ^a	1.000								
Board size	-0.025	0.093	-0.029	0.161 ^a	-0.058	0.037	-0.110 ^c	-0.088	1.000							

Continued

TABLE VI.
CONTINUED

Panel B: Partial correlation coefficients

	Under- Writer Reputa- tion Rank	Reputable Under- writer Firm	VC- Backed Firm	VC Market Share	VC Direc- tors %	CEO is Founder	CEO Chairs Board	Board Size	Indep. Finan- cial Expert	Operating Cash Flow/ Assets	Market Capital- ization	Insti- tutional Hold- ings %	Option Sensitiv- ity	Bank Debt	Long- term Debt/ Assets	Relai- ned Equity %
Indep. financial expert	0.044	-0.058	0.051	-0.162 ^a	-0.107 ^c	0.304 ^a	0.009	0.170 ^a	1.000							
Operating cash flow/Assets	-0.057	0.129 ^b	-0.077	-0.054	-0.062	0.001	0.124 ^b	-0.051	0.097	1.000						
Market capital- ization	-0.080	0.226 ^a	0.049	-0.031	0.125 ^b	0.120 ^c	-0.054	0.059	0.004	0.287 ^a	1.000					
Institutional holdings %	-0.041	0.243 ^a	0.025	0.096	-0.047	0.043	-0.089	0.054	0.013	0.122 ^c	-0.027	1.000				
Option sensitivity	0.147 ^b	-0.103 ^c	-0.001	-0.045	0.112 ^c	-0.009	0.061	0.064	-0.031	-0.092	0.339 ^a	0.114 ^c	1.000			
Bank debt	0.136 ^b	-0.023	-0.040	-0.004	0.113 ^c	-0.108 ^c	0.039	-0.003	0.038	0.117 ^c	-0.012	0.113 ^c	-0.044	1.000		
Long-term debt/Assets	0.003	0.019	0.029	-0.022	0.000	-0.144 ^b	0.193 ^a	0.147 ^b	0.063	0.053	0.003	0.153 ^b	0.097	0.100	1.000	
Big Six auditor Retained equity %	-0.061	0.333 ^a	-0.111 ^c	0.032	-0.036	0.028	-0.027	-0.098	-0.057	0.049	-0.055	0.008	0.016	0.094	-0.017	1.000
	-0.051	0.109 ^c	0.097	0.058	0.085	0.063	0.086	-0.016	0.048	-0.148 ^b	0.375 ^a	-0.468 ^a	-0.002	-0.002	-0.048	0.051

Notes: Panel A (B) reports the bivariate (partial) correlation coefficients. The sample size is 274 firms (i.e., 157 matched pairs). The bivariate (partial) correlation-coefficient cutoff values for statistical significance at the 1%, 5%, and 10% levels in two-tailed tests are, respectively, 0.1554 (0.1591), 0.1185 (0.1214), and 0.0996 (0.1020). *Restating firm* is a binary variable that equals one for restating firms and zero for control firms. Other variables are defined in Table VII and the Appendix.
a,b,c Denote statistical significance at the 1%, 5%, and 10% level, respectively, in 2-tailed tests.

cash flow as a percentage of total assets (*Operating cash flow/Assets*), institutional shareholdings (*Institutional holdings%*), and the sensitivity of CEO and CFO stock options (*Option sensitivity*) are all positively correlated with *Underwriter reputation rank* and *Reputable underwriter*. All of these correlations are statistically significant at the 1% level in two-tailed tests.

Panel B in Table VI reports the partial correlation coefficients. After controlling for other variables, *Reputable underwriter*, *Market capitalization*, *Institutional holdings%*, and *Big Six auditor* remain positively correlated with *Underwriter reputation rank*. *VC-backed firm* is positively correlated with the proportion of independent directors on the board (*Independent directors%*) and *Board size*, and is negatively correlated with having an independent financial expert on the board (*Indep. financial expert*). All of these partial correlations are statistically significant at the 1% level in two-tailed tests.

7.3 REGRESSION RESULTS: FULL SAMPLE

Table VII reports the results from two matched-pairs logistic regressions of restatement occurrence among IPO firms. The first regression uses *Underwriter reputation rank* to measure underwriter reputation; the second uses *Reputable underwriter*. The coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* are both positive; the coefficient estimate of the former is statistically significant at the 5% level. The nonnegative relation between underwriter reputation and the probability of an IPO firm restating soon after going public supports the underwriter revenue generation hypothesis, suggesting that underwriters care more about revenue generation than preserving or enhancing their reputations. The results support neither the VC monitoring hypothesis nor the VC moral hazard hypothesis as a dominant explanation for VC influence on the financial reporting quality of IPO firms; the coefficient estimates for *VC-backed firm* and *VC market share* are statistically insignificant.

Consistent with the findings of Burns and Kedia (2006), our results indicate that CEOs and CFOs whose compensation is more sensitive to stock option holdings are more likely to restate; the coefficient estimate for *Option sensitivity* is positive and statistically significant at the 1% level in the first regression and at the 5% level in the second. The marginal effect²¹ (dy/dx) of 0.001 for *Option sensitivity* in both regressions implies that a \$100 thousand increase in the sensitivity of

21. For a continuous explanatory variable, the marginal effect equals the partial derivative of the outcome probability with respect to the differenced explanatory variable, evaluated at the sample means of the other differenced explanatory variables. For a binary

TABLE VII.
MATCHED-PAIRS LOGISTIC REGRESSIONS
OF RESTATEMENT OCCURRENCE AMONG IPO FIRMS

Independent Variables	Dependent Variable: Restating Firm					
	Coef.	z-Stat	dy/dx	Coef.	z-Stat	dy/dx
Underwriter reputation rank	0.243	2.18 ^b	0.055			
Reputable underwriter				0.129	0.31	0.028
VC-backed firm	-0.430	-1.28	-0.099	-0.416	-1.25	-0.092
VC market share	-0.082	-1.03	-0.019	-0.063	-0.81	-0.014
Independent directors %	0.005	0.74	0.001	0.004	0.69	0.001
CEO is founder	-0.403	-1.15	-0.091	-0.381	-1.12	-0.082
CEO chairs board	0.297	0.94	0.066	0.237	0.75	0.050
Board size	-0.028	-0.30	-0.006	-0.009	-0.10	-0.002
Indep. financial expert	0.106	0.28	0.024	0.068	0.19	0.015
Operating cash flow/Assets	-0.004	-0.53	-0.001	-0.002	-0.26	0.000
Market capitalization	-0.202	-1.07	-0.046	-0.118	-0.66	-0.026
Institutional holdings %	-0.006	-0.44	-0.001	0.001	0.11	0.000
Option sensitivity	0.003	2.58 ^a	0.001	0.002	2.48 ^b	0.001
Bank debt	0.720	2.29 ^b	0.154	0.716	2.29 ^b	0.145
Long-term debt/Assets	0.827	1.05	0.187	0.791	1.04	0.171
Big Six auditor	-1.061	-1.66 ^c	-0.257	-0.655	-1.03	-0.153
Retained equity %	-0.010	-0.59	-0.002	-0.002	-0.16	-0.001
Number of pairs		137			137	
P-value of chi-squared test		0.2621			0.3962	
Pseudo R ²		0.1195			0.0958	

Notes: This table reports the estimated coefficients, z-statistics, and marginal effects (dy/dx) from matched-pairs logistic regressions of *Restating firm*, which equals one (zero) for restating (control) firms. The sample consists of 137 restating IPO firms and 137 nonrestating IPO firms matched by industry and IPO proceeds. Each restating firm's IPO occurred within 1 year of its matched control firm's IPO. Restating firms announced restatements during 1997–2005, within 3 years of their IPOs, to correct GAAP violations in misstated quarters beginning within 2 years of their IPOs. *Underwriter reputation rank* is the lead underwriter's Loughran–Ritter reputation rank on a scale of one (low) to nine. *Reputable underwriter* equals one if the lead IPO underwriter has a reputation rank of at least eight, and equals zero otherwise. *VC-backed firm* equals one if the sample firm's IPO prospectus lists a VC as a significant shareholder and equals zero otherwise. *VC market share* equals the lead VC's IPO market share in VC-backed firms and equals zero otherwise. *Independent directors %* is the percentage of board members who are independent directors. *CEO is founder* equals one if the CEO is a founder of the firm and equals zero otherwise. *CEO chairs board* equals one if the CEO chairs the board of directors and equals zero otherwise. *Board size* is the number of directors on the board. *Indep. financial expert* equals one if the IPO prospectus describes at least one independent director as a CPA, CFA, or having experience as a CFO, Controller or Treasurer; it equals zero otherwise. Financial ratios are calculated using amounts at the end of and for the fiscal year containing the IPO. *Operating cash flow/Assets* equals operating cash flow divided by total assets. *Market capitalization* is the natural logarithm of the product of shares outstanding and share price at the first fiscal year-end following the IPO, in millions of dollars. *Institutional holdings %* equals the percentage of outstanding shares owned by institutional investors at the first calendar quarter-end after the IPO. *Option sensitivity*, the dollar change in the value of CEO and CFO exercisable stock options resulting from a 1% change in stock price, is calculated as the product of option delta, 1% of the stock price, and the number of exercisable options held by the CEO and CFO. Option delta is calculated using the Black–Scholes model adjusted for dividend payout. Number of exercisable options held equals the number of shares underlying options exercised by the CEO and CFO during the fiscal year containing the IPO plus the number of shares underlying their exercisable options at the end of that fiscal year. *Bank debt* equals one (zero) if the IPO prospectus discloses a commercial bank loan or available line of credit. *Long-term debt/Assets* equal long-term debt divided by total assets. *Big Six auditor* equals one (zero) if the firm's auditor is a major public accounting firm. *Retained equity %* is the percentage of common shares owned by pre-IPO shareholders immediately after the IPO. All dollar values are in inflation-adjusted 2005 dollars.

^{a,b,c} Denote statistical significance at the 1%, 5%, and 10% level, respectively, in 2-tailed tests.

CEO and CFO stock options increases the probability of restatement by 0.1 or 10%. Our results are also consistent with the idea that firms with bank debt have greater incentives to manipulate earnings to comply with debt covenants; the coefficient estimate for *Bank debt* is positive and statistically significant at the 5% level in both regressions. The marginal effects of *Bank debt* are 0.154 and 0.145 in the two regressions, implying that firms with bank debt are about 15% more likely to restate. In the first regression, the coefficient estimate for the binary variable *Big Six auditor* is negative and statistically significant at the 10% level; the marginal effect of this variable implies that on average, firms with Big Six auditors are about 26% less likely to restate. The coefficient estimates for all other explanatory variables are statistically insignificant.

Table VIII reports results from regressions that test the VC grandstanding hypothesis that issuers backed by young (mature) VCs are more (less) likely to restate their financial statements soon after their IPOs. To test this hypothesis, we replace *VC-backed firm* in equation (3) with the variables *Backed by young VC firm* and *Backed by mature VC firm*, where *Backed by young VC firm* equals one if the sample firm's lead VC is in the bottom 50% of the sample when sorted by one of three proxies for VC maturity: VC-firm age, number of previous IPOs backed, and capital under management. For VC-backed firms, the binary variable *Backed by mature VC firm* is the complement of *Backed by young VC firm*. *Backed by young VC firm* and *Backed by mature VC firm* equal zero for all non-VC-backed firms. For each measure of VC maturity, we estimate two separate regressions, one each for our two measures of underwriter reputation, *Underwriter reputation rank* and *Reputable underwriter*. The VC grandstanding hypothesis predicts that the coefficient of *VC-backed firm* should be positive for young VCs and negative for mature VCs. Table VIII offers partial support for this hypothesis. The coefficient estimate for *Backed by mature VC firm* is negative and statistically significant at the 10% level or better in three of the six regressions; the coefficient estimate for *Backed by young VC firm* is statistically insignificant in all six regressions. The coefficient estimates for *Option sensitivity* and *Bank debt* continue to be positive and statistically significant; the economic magnitudes of their effects are similar to those reported in Table VII.

7.4 SUBSAMPLE RESULTS

We next consider whether our results on the effects that underwriter reputation, VC backing and VC reputation have on the probability

explanatory variable, the marginal effect is calculated as $G(\hat{\beta}_0 + X\hat{\beta}) - G(X\hat{\beta})$, where G is the logistic function, $\hat{\beta}_0$ is the coefficient estimate for the binary variable, and $X\hat{\beta}$ is the inner product of the sample means and coefficient estimates for the other differenced explanatory variables.

TABLE VIII.
MATCHED-PAIRS LOGISTIC REGRESSIONS OF RESTATEMENT OCCURRENCE AMONG IPO FIRMS, WITH ALTERNATIVE DEFINITIONS OF VC BACKING

Independent Variables	Dependent Variable: Restating Firm											
	Backed by Mature VC Firm = 1 if VC Firm Age is in Top 50% of Sample				Backed by Mature VC Firm = 1 if the Number of Previous IPOs Backed by VC is in Top 50% of Sample				Backed by Mature VC Firm = 1 if VC Capital under Management is in Top 50% of Sample			
	z- Coef.	dy/ dx	z- Stat	dy/ dx	z- Coef.	dy/ dx	z- Stat	dy/ dx	z- Coef.	dy/ dx	z- Stat	dy/ dx
Underwriter reputation rank	0.225	2.02 ^b	0.051	0.234	2.07 ^b	0.050	0.157	0.37	0.031	0.239	2.15 ^b	0.053
Reputable underwriter		0.101	0.24		0.021		0.157	0.37	0.031	0.134	0.32	0.028
Backed by young VC firm	-0.329	-0.92	-0.073	-0.277	-0.78	-0.058	-0.249	-0.71	-0.048	-0.372	-1.04	-0.081
Backed by mature VC firm	-0.631	-1.49	-0.136	-0.700	-1.68 ^c	-0.142	-0.821	-1.93 ^c	-0.166	-0.848	-2.00 ^b	-0.157
VC market share	-0.062	-0.78	-0.014	-0.037	-0.47	-0.008	-0.033	-0.42	-0.007	-0.012	-0.15	-0.002
Independent directors %	0.004	0.69	0.001	0.004	0.62	0.001	0.005	0.76	0.001	0.005	0.73	0.001
CEO is founder	-0.382	-1.09	-0.085	-0.352	-1.03	-0.075	-0.425	-1.20	-0.091	-0.405	-1.18	-0.080
CEO chairs board	0.286	0.91	0.063	0.225	0.72	0.047	0.301	0.96	0.063	0.244	0.77	0.047
Board size	-0.013	-0.13	-0.003	0.011	0.11	0.002	-0.032	-0.34	-0.007	-0.015	-0.17	-0.003
Indep. financial expert	0.097	0.26	0.022	0.064	0.19	0.014	0.061	0.17	0.013	0.027	0.08	0.005
Operating cash flow / Assets	-0.003	-0.38	-0.001	-0.001	-0.07	0.000	-0.002	-0.30	0.000	0.000	-0.02	0.000
Market capitalization	-0.210	-1.12	-0.047	-0.139	-0.78	-0.030	-0.247	-1.33	-0.053	-0.176	-1.00	-0.035
Institutional holdings %	-0.004	-0.28	-0.001	0.004	0.31	0.001	-0.005	-0.39	-0.001	0.002	0.14	0.000
Option sensitivity	0.002	2.42 ^b	0.001	0.002	2.30 ^b	0.000	0.002	2.55 ^b	0.001	0.002	2.47 ^b	0.000
Bank debt	0.685	2.16 ^b	0.146	0.669	2.11 ^b	0.135	0.724	2.26 ^b	0.146	0.718	2.25 ^b	0.132
Long-term debt / Assets	0.837	1.05	0.188	0.810	1.04	0.173	0.559	0.70	0.120	0.488	0.63	0.097

Continued

TABLE VIII.
CONTINUED

Independent Variables	Dependent Variable: Restating Firm																	
	Backed by Mature VC Firm = 1 if VC Firm Age Is in Top 50% of Sample				Backed by Mature VC Firm = 1 if the Number of Previous IPOs Backed by VC Is in Top 50% of Sample				Backed by Mature VC Firm = 1 if VC Capital under Management Is in Top 50% of Sample									
	Coef.	z-	Stat	dy/dx	Coef.	z-	Stat	dy/dx	Coef.	z-	Stat	dy/dx						
Big Six auditor	-1.048	-1.63	-0.253	-0.681	-1.08	-0.158	-0.931	-1.45	-0.220	-0.539	-0.87	-0.117	-1.028	-1.60	-0.247	-0.625	-0.99	-0.142
Retained equity	-0.009	-0.54	-0.002	-0.002	-0.12	0.000	-0.008	-0.48	-0.002	-0.001	-0.06	0.000	-0.009	-0.56	-0.002	-0.002	-0.13	0.000
Number of pairs		137			137		137			137		137		137			137	
P-value of chi-squared test		0.3061			0.4080		0.1464			0.3022		0.3030		0.4385			0.4385	
Pseudo R ²		0.1230			0.1032		0.1309			0.1099		0.1209		0.0982			0.0982	

Notes: This table reports the estimated coefficients, z-statistics, and marginal effects (dy/dx) from matched-pairs logistic regressions of *Restating firm*, which equals one (zero) for restating (control) firms. The sample consists of 137 restating and 137 control firms matched by industry and IPO proceeds. Each restating firm's IPO is within 1 year of its matched control firm's IPO. Restating firms announced restatements during the period January 1, 1997 to December 31, 2005 to correct GAAP violations in misstated quarters beginning within 2 years of their IPOs. Announcement dates are within 3 years of restating firms' IPOs. Nonrestating firms did not announce restatements within 3 years of their IPOs. *Backed by mature VC firm* equals one if the sample firm is VC-backed and its lead VC is in the top 50% of the sample when sorted by one of three proxies for VC maturity: VC-firm age, number of previous IPOs backed, and capital under management; it equals zero otherwise. *Backed by young VC firm* is the complement of *Backed by mature VC firm*. Other variables are defined in Table VII and the Appendix. All dollar values are in inflation-adjusted 2005 dollars

a,b,c Denote statistical significance at the 1%, 5%, and 10% level, respectively, in 2-tailed tests

of restatement differ in subsamples where misstatements tend to be more severe. If more reputable underwriters are selective, but not too selective—avoiding only the more suspect IPO clients—we would expect to observe underwriter certification in subsamples where misstatements are more severe. Similarly, the effect of VC monitoring could be stronger in subsamples of more serious cases.

The subsamples we analyze are restatements that are earnings decreasing, correct misstated periods beginning within 1 year of the IPOs, are announced pre-SOX, are more serious, entail larger percentage changes in earnings, involve more restated quarters, result in negative restated earnings, or have lower announcement returns. To consider whether the stock market bubble affected underwriter and VC behavior, we also analyze “bubble” and “post-bubble” subsamples. For each subsample, we perform two regressions, the first estimating equation (3) using *Underwriter reputation rank* as the underwriter reputation measure, the second using *Reputable underwriter*. Sections 7.4.1 through 7.4.10 describe the subsamples and discuss the regression results that are reported in Table IX. To save space, Table IX only reports coefficient estimates, their z-statistics, and marginal effects for *Underwriter reputation rank*, *Reputable underwriter*, *VC-backed firm*, and *VC market share*, where *VC market share* measures VC reputation.

7.4.1 EARNINGS-DECREASING RESTATEMENTS

Earnings-decreasing restatements tend to have more negative effects on stock prices than do restatements that do not decrease earnings (see, e.g., Palmrose et al., 2004 and Agrawal and Chadha, 2005), potentially posing greater harm to underwriter and VC reputations. Accordingly, we examine whether VC monitoring and certification by more reputable underwriters imply better financial reporting quality in the subsample of earnings-decreasing restatements. We reestimate both regressions in Table VII for the subsample of earnings-decreasing restatements. Row one of Table IX shows that the coefficient estimates for *VC-backed firm* and *VC market share* are negative and statistically significant at the 5% level in both regressions. Based on the average marginal effect of *VC-backed firm* in the two regressions, the probability of restatement is about 6.4% lower in VC-backed firms. Similarly, based on the average marginal effect of *VC market share*, a VC-backed firm whose lead VC has a reputation measure that is one standard deviation (2.27%) higher is about 3.3% less likely to restate. These findings favor the VC monitoring hypothesis over the VC moral hazard hypothesis. The coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* are both nonnegative and favor the underwriter revenue generation hypothesis over the underwriter reputation hypothesis,

TABLE IX.
MATCHED-PAIRS LOGISTIC REGRESSIONS: SUBSAMPLES

Subsamples	Dependent Variable: Restating Firm																
	Explanatory Variables						Explanatory Variables										
	Underwriter Reputation Rank	VC-Backed Firm	VC Market Share	Reputable Underwriter	VC-Backed Firm	VC Market Share	Coef.	z-Stat	dy/dx	Coef.	z-Stat	dy/dx					
Earnings decreasing ¹	0.275	1.88 ^c	0.023	-0.074	-0.074	-0.196	-2.16 ^b	-0.017	0.352	0.68	0.022	-0.758	-1.99 ^b	-0.054	-0.183	-2.02 ^b	-0.012
Misslated period within 1 year of IPO ²	0.232	1.77 ^c	0.049	-0.047	-0.11	-0.084	-0.87	-0.018	0.028	0.05	0.006	-0.055	-0.14	-0.012	-0.059	-0.63	-0.012
Announced pre-SOX ³	0.215	1.80 ^c	0.039	-0.343	-0.94	-0.134	-1.36	-0.024	0.062	0.14	0.012	-0.359	-0.99	-0.069	-0.114	-1.20	-0.021
More serious ⁴	0.089	0.56	0.022	-0.201	-0.46	-0.157	-1.52	-0.039	0.247	0.44	0.059	-0.195	-0.45	-0.047	-0.160	-1.55	-0.038
Large misstatements ⁵	0.237	1.22	0.025	-0.376	-0.70	-0.097	-0.50	-0.010	0.210	0.30	0.016	-0.364	-0.69	-0.029	-0.099	-0.50	-0.008
More than four quarters restated	0.413	1.77 ^c	0.062	0.009	0.01	0.019	0.11	0.003	0.253	0.31	0.029	0.041	0.060	0.005	0.053	0.34	0.006
Negative restated earnings	0.216	1.75 ^c	0.054	-0.809	-1.80 ^c	-0.067	-0.73	-0.017	0.320	0.63	0.079	-0.785	-1.73 ^c	-0.194	-0.056	-0.64	-0.014
Worse announcement returns ⁶	0.321	1.63	0.010	-0.185	-0.36	-0.486	-2.13 ^b	-0.015	0.498	0.75	0.017	-0.127	-0.25	-0.005	-0.497	-2.15 ^b	-0.018

Continued

TABLE IX.
CONTINUED

Subsamples	Dependent Variable: Restating Firm																
	Explanatory Variables						Explanatory Variables										
	Underwriter Reputation Rank		VC-Backed Firm		VC Market Share		Reputable Underwriter		VC-Backed Firm		VC Market Share						
Coef.	z-Stat	dy/dx	Coef.	z-Stat	dy/dx	Coef.	z-Stat	dy/dx	Coef.	z-Stat	dy/dx	Coef.	z-Stat	dy/dx			
Earnings decreasing, announced pre-SOX ³	0.292	1.91 ^c	0.007	-0.759	-1.67 ^c	-0.019	-0.270	-2.45 ^b	0.390	0.67	0.007	-0.714	-1.62	-0.014	-0.265	-2.41 ^b	-0.005
Bubble period IPOs ⁷	0.236	2.00 ^b	0.045	-0.383	-1.03	-0.075	-0.112	-1.18	0.218	0.50	0.040	-0.391	-1.06	-0.075	-0.089	-0.96	-0.017

Notes: This table reports the estimated coefficients, z-statistics, and marginal effects (dy/dx) from matched-pairs logistic regressions of restatement occurrence among IPO firms. Regressions are similar to those in Table VII. Results are presented for 10 subsamples. The full sample consists of 137 restating and 137 nonrestating control firms that were matched by industry and IPO proceeds. To save space, estimated coefficients, z-statistics, and marginal effects (dy/dx) are reported for *Underwriter reputation rank*, *Reputable underwriter*, *VC-backed firm*, and *VC market share* only. a,b,c Denote statistical significance at the 1%, 5%, and 10% level, respectively, in 2-tailed tests.

1 Restated earnings are less than the original earnings.

2 The first restated quarter begins within 1 year of the restating firm's IPO date.

3 Restatements announced before July 30, 2002.

4 Excludes firms whose restatements were prompted by SAB 101 or guidance issued by the EITF; only corrected earnings releases, involved only noncore accounts, or were announced post-SOX and only involved lease accounting.

5 Restatements in the top 50% of the sample ranked by the absolute percentage change in reported earnings.

6 Restating firms in the bottom 50% of the sample based on the cumulative abnormal return over days (-5, +5), where day 0 is the announcement date.

7 Restating firms that went public before March 11, 2000.

suggesting that underwriters' incentives for revenue generation trump their reputation concerns.

7.4.2 MISSTATED PERIOD WITHIN 1 YEAR OF THE IPO

As discussed in Section 5.1, our sample consists of issuers whose misstatements began within 2 years after their IPOs. We next examine whether misstatements that begin within 1 year of IPOs have worse reputation effects for VCs and more reputable underwriters. The regression results for this subsample provide no evidence that the deterrent effect of VC monitoring is greater or that more reputable underwriters certify that issuers meet some minimal standard of financial reporting quality. Row two in Table IX shows that none of the coefficient estimates for *VC-backed firm* and *VC market share* is statistically significant. The coefficient estimate for *Underwriter reputation rank* is positive and statistically significant at the 10% level. The nonnegative coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* support the revenue generation hypothesis over the reputation hypothesis for underwriters.

7.4.3 RESTATEMENTS ANNOUNCED PRE-SOX

Because the CARs reported in Table II, and discussed in Section 6.1, suggest that restatements announced pre-SOX tend to be more serious, we next perform regressions using the subsample of restatements announced pre-SOX. Row three in Table IX shows that the coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* are both positive; the coefficient estimate of the former is statistically significant at the 10% level. The nonnegative coefficient estimates support the underwriter revenue generation hypothesis over the underwriter reputation hypothesis. The coefficient estimates for *VC-backed firm* and *VC market share* are statistically insignificant. The evidence from this subsample does not allow us to discriminate between the VC monitoring and the VC moral hazard hypotheses.

7.4.4 MORE SERIOUS MISSTATEMENTS

Our sample consists of firms that announced restatements to correct GAAP violations. These violations represent significant infractions because GAAP's financial reporting boundaries are wide, and misstatements require restatement only when material. Nevertheless, our sample includes some cases where firms restated to correct less flagrant violations that were more technical and, arguably, less serious in nature. For example, the sample includes four restatements prompted only by Staff Accounting Bulletin (SAB) 101, issued by the SEC to clarify revenue-recognition rules. The sample contains one additional restatement prompted by SAB 101 and guidance issued by the Emerging Issues Task Force (EITF), a group formed by the Financial Accounting

Standards Board to periodically identify emerging accounting issues and provide guidelines to establish a uniform set of accounting practices before divergent methods arise and become widespread. The sample also includes four firms that restated earnings releases and not financial statements in 10-Ks, 10-Qs, or prospectuses. In addition, the sample includes seven post-SOX restatements that only involve lease accounting. Finally, an additional 29 restatements in the sample do not involve core accounts. Excluding these less serious cases yields a subsample of 92 restatements. As shown in row four of Table IX, the estimated coefficients for *Underwriter reputation rank*, *Reputable underwriter*, *VC-backed firm* and *VC market share* are all statistically insignificant for this subsample. The nonnegative coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* are consistent with the hypothesis that revenue generation incentives affect underwriter behavior more than reputation concerns do.

7.4.5 LARGE MISSTATEMENTS

All else being equal, large misstatements are more misleading to investors than small misstatements are. We sort the sample by restatement size, defined as the absolute percentage change in reported earnings, and choose the largest restatements, the top 50% of the sample. Row five in Table IX shows the regression results for the large-misstatements subsample. The estimated coefficients of *Underwriter reputation rank*, *Reputable underwriter*, *VC-backed firm* and *VC market share* are all statistically insignificant. The results favor the revenue generation hypothesis over the reputation hypothesis for underwriters, but fail to distinguish between the monitoring and moral hazard hypotheses for VCs.

7.4.6 RESTATEMENTS WITH MORE QUARTERS RESTATED

All else being equal, the seriousness of a misstatement increases with the number of quarters restated. Restatements that correct lengthily misstated periods are likely to be more troubling to investors and more harmful to VC and underwriter reputations than are restatements that correct shorter misstated periods. We examine the subsample of restatements that correct more than four quarters, the median number restated by firms in our sample. Row six in Table IX shows that for this subsample, *Underwriter reputation rank*'s estimated coefficient is positive and statistically significant at the 10% level. On average, a one-unit increase in the reputation rank of a lead underwriter increases the probability of restatement by 6.2%. The nonnegative coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* suggest that for underwriters, revenue generation concerns dominate reputation concerns. The coefficient estimates for *VC-backed firm* and *VC market*

share are statistically insignificant and do not allow us to distinguish between the VC monitoring and the VC moral hazard hypotheses.

7.4.7 NEGATIVE RESTATED EARNINGS

Agrawal and Cooper (2007) find that, on average, stock price reactions to restatement announcements are worse when the restated earnings are negative, suggesting that these restatements are more harmful to underwriter and VC reputations. Row seven in Table IX shows that for this subsample, the coefficient estimate for *VC-backed firm* is negative and statistically significant at the 10% level in both regressions, a result that supports the VC monitoring hypothesis. After controlling for other factors, the probability of restatement by VC-backed firms is remarkably lower, about 19.6% on average. The coefficient estimate for *VC market share* is not statistically significant in either regression. The coefficient estimate for *Underwriter reputation rank* is positive and statistically significant at the 10% level. The nonnegative coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* favor the revenue generation hypothesis over the reputation hypothesis for underwriters.

7.4.8 RESTATEMENTS WITH WORSE VALUATION EFFECTS

Restatement announcements that induce large stock price declines are likely more harmful to underwriter and VC reputations, motivating more reputable underwriters to avoid issuers with more suspect financial reporting standards and providing VCs with greater incentive to closely monitor the financial reporting quality of firms in their portfolios. We examine this possibility by estimating equation (3) using the subsample of firms whose CARs(-5,+5) are in the bottom 50% of the full sample. Row eight in Table IX shows that in this subsample, the coefficient estimates for both *VC-backed firm* and *VC market share* are negative; the coefficient estimate of the latter is statistically significant at the 5% level in both regressions. For this subsample, VC-backed firms are not less likely, on average, to restate than are non-VC-backed firms. However, among issuers with VC backing, an issuer whose lead VC has a market share, our proxy for reputation, that exceeds the sample mean by one standard deviation is about 3.7% less likely to restate. This result favors the VC monitoring hypothesis over the VC moral hazard hypothesis. Neither of the coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* is negative, favoring the revenue generation hypothesis over the reputation hypothesis for underwriters.

7.4.9 EARNINGS-DECREASING RESTATEMENTS ANNOUNCED PRE-SOX

As earnings-decreasing restatements announced pre-SOX have worse effects on stock prices than do other restatements (see, e.g., Agrawal and Chadha (2005)), we perform regressions using this subsample and report results in row nine of Table IX. In both regressions, the coefficient estimates for *VC-backed firm* and *VC market share* are negative; the coefficient estimate of the former is statistically significant at the 10% level in the first regression model, and the coefficient of the latter is statistically significant at the 5% level. Based on the marginal effect for *VC-backed firm* from the first regression, the probability of restatement is 1.9% lower, on average, for VC-backed firms. Using the average marginal effect for *VC market share* from both regressions, we estimate that among VC-backed issuers, an issuer backed by a lead VC whose reputation, proxied by market share, is one standard deviation (2.27%) greater than the sample mean is about 1.2% less likely to restate.

These findings favor the VC monitoring hypothesis over the VC moral hazard hypothesis. The estimated coefficients of *Underwriter reputation rank* and *Reputable underwriter* are both positive; the coefficient estimate of the former is statistically significant at the 10% level. The nonnegative coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* favor the revenue generation hypothesis over the reputation hypothesis for underwriters.

7.4.10 BUBBLE AND POSTBUBBLE IPOs

Finally, we examine whether the late-1990s stock market bubble affected underwriter and VC behavior by analyzing the bubble and postbubble subsamples. We partition the sample into two subperiods using the IPO dates of restating firms. The bubble period ends on March 10, 2000, the day that the Nasdaq Composite Index reached its peak. Row 10 of Table IX shows that for the bubble period, the coefficient estimates for *Underwriter reputation rank* and *Reputable underwriter* are both positive; the coefficient estimate of the former is statistically significant at the 5% level. The nonnegative coefficient estimates favor the revenue generation hypothesis over the reputation hypothesis for underwriters. The estimated coefficients for *VC-backed firm* and *VC market share* are negative but statistically insignificant. The results for this subsample do not allow us to distinguish between the VC monitoring and the VC moral hazard hypotheses. The matched-pairs logistic model could not be estimated for the post-bubble subsample because all 35 of the matched pairs in this subsample lack discordant values (0–1 or 1–0) for the *VC-backed firm* variable.

7.5 ENDOGENEITY

The results reported in Tables VII through IX and discussed in Sections 7.3 and 7.4 suggest that the probability of an IPO firm restating soon after going public is: (1) consistently positively related to underwriter reputation, (2) negatively related to VC-backing and VC reputation in certain subsamples, and (3) negatively related to VC maturity. Although these findings are consistent with the underwriter revenue generation hypothesis, the VC monitoring hypothesis, and the VC grandstanding hypothesis, a potential concern with this interpretation is that our results could be due to the endogeneity of underwriter reputation and VC backing.

A substantial theoretical and empirical literature analyzes issuers' choice of underwriters (see, e.g., Titman and Trueman, 1986; Habib and Ljungqvist, 2001; Benveniste et al., 2003; and Ljungqvist et al., 2006). The theory and empirical evidence in Fernando et al. (2006) suggests that issuers and underwriters associate by mutual choice: issuers evaluate the abilities of prospective underwriters to certify, promote, place and support their offerings; and underwriters look for issuer characteristics that increase their short- and long-term profits. Thus, having a more reputable underwriter as the lead manager of an IPO is the outcome of an endogenous selection process.

Similarly, a large literature finds that VCs thoroughly vet firms before deciding to invest in them (see, e.g., Sahlman, 1990 and Kaplan and Strömberg, 2004). VCs also design elaborate contracts to reduce information asymmetry and agency problems with entrepreneurs (see, e.g., Gompers and Lerner, 1996; Black and Gilson, 1998; Hellmann, 1998; and Kaplan and Strömberg, 2003). Lee and Wahal (2004) argue that the thorough vetting process and the use of detailed contracts are indicative of an endogenous selection process, where obtaining VC financing results from extensive negotiations between entrepreneurs and VCs.

One approach to dealing with endogenous selection is to start with a random sample of firms and use either (1) propensity-score matching to pair each VC-backed firm with a "similar" non-VC-backed firm and do univariate comparisons for the characteristics of interest, or (2) endogenous switching regressions where the first stage is the estimation of a probit regression that predicts the receipt of venture financing and the second stage is an ordinary least squares (OLS) regression that uses estimates from the first stage to provide consistent parameter estimates. Several recent studies on VC influence use this approach (see, e.g., Lee and Wahal, 2004; Morsfield and Tan, 2006; and Lee and Masulis, 2008). Unfortunately, for reasons discussed in Section 5.2 above, using

a random sample is impractical when studying rare events such as IPO firms restating their financial statements soon after going public. Therefore, we use a matched-pairs sample of restating and control firms. As discussed in Section 7.1 above, we estimate a paired logistic model to estimate the relation between the probability of restatement by an IPO firm and its underwriter's reputation, VC-backing, and VC reputation.

In our main regression equation (3), the dependent variable *Restating firm* and the explanatory variables *Reputable underwriter* and *VC-backed firm* are binary (0,1) variables. There is yet no standard procedure for dealing with the endogeneity of a binary regressor in the paired logistic model. To test whether the endogeneity of underwriter reputation and VC-backing affects our main results in Sections 7.3 and 7.4 above, we use a two-stage procedure that is a variant of the Rivers and Vuong (1988) approach to dealing with an endogenous binary regressor in the regular logistic model. Because using predicted values from first-stage regressions that are nonlinear would be inappropriate (see Wooldridge (2002, p. 236, 478)), we use the linear probability model to estimate our first-stage regressions of *Reputable underwriter*, and *VC-backed firm*. We use the pooled sample of restating and control firms to estimate the first-stage OLS regressions of *Underwriter reputation rank*, *Reputable underwriter*, and *VC-backed firm*, and compute the residuals from each regression.

Next, we add the residuals of *Underwriter reputation rank* (or *Reputable underwriter*) and *VC-backed firm* as regressors in the second-stage matched-pairs logistic regressions of *Restating firm* (see equation (3) above). We then test for the joint significance of the coefficient estimates for the residuals of *Underwriter reputation rank* (or *Reputable underwriter*) and *VC-backed firm*.²² If the second-stage coefficient estimates for the two residuals are jointly insignificant, it would suggest that our main results in Tables VII through IX are not driven by endogenous selection of more reputable underwriters or VC-backing. If the coefficient estimates for the residuals are jointly significant, the second-stage coefficient estimates of *Underwriter reputation rank* (or *Reputable underwriter*) and *VC-backed firm* are the endogeneity-corrected estimates.

Our choice of instruments for *Underwriter reputation rank*, *Reputable underwriter* and *VC-backed firm* largely follows Fernando et al. (2006) and Lee and Masulis (2008) for equation (4) below, and follows Lee and Wahal (2004) and Lee and Masulis (2008) for equation (5). All financial statement variables are for the fiscal year ending closest (before or after) to the IPO date.

22. This is a variant of the Hausman (1978) test (see, e.g., Wooldridge, 2002 for an exposition).

$$\begin{aligned}
 &\text{Underwriter reputation rank or Reputable underwriter} \\
 &= f [\text{Total assets; Total debt/Total assets; } \ln(1 + \text{IPO global proceeds}); \\
 &\quad \text{binary variables to indicate positive earnings per share} \\
 &\quad \text{(EPS), Song and Walkling industry classification,} \\
 &\quad \text{IPO year, and IPO quarter}] \tag{4}
 \end{aligned}$$

$$\begin{aligned}
 \text{VC-backed firm} = f [&\text{Property, plant and equipment/Total assets;} \\
 &\text{Book equity per share/Offer price; Total assets} \\
 &\text{per share/Offer price; Sales per share/Offer} \\
 &\text{price; binary variables to indicate positive EPS,} \\
 &\text{belonging to the technology sector, IPO year,} \\
 &\text{IPO quarter, and having headquarters in} \\
 &\text{California, Massachusetts, or Texas}] \tag{5}
 \end{aligned}$$

The estimates of first-stage regressions of *Underwriter reputation rank*, *Reputable underwriter* and *VC-backed firm* that correspond to all the regressions reported in Tables VII through IX are highly statistically significant. The *F*-test for the null hypothesis that the coefficients of all the regressors equal zero has a *P*-value less than 0.0001 in all of the regressions. The adjusted R^2 is quite high (for microeconomic data) in all three regressions. For example, for the full sample, the adjusted R^2 is 0.963 for the *Underwriter reputation rank* regression, 0.784 for the *Reputable underwriter* regression, and 0.691 for the *VC-backed firm* regression.

In second-stage regressions of *Restating firm*, the Hausman test indicates that the coefficient estimates for the residuals from the first-stage regressions, where *Underwriter reputation rank* (or *Reputable underwriter*) and *VC-backed firm* are dependent variables, are jointly insignificant. We obtain this result for all of the regressions corresponding to those in Tables VII through IX.

These results suggest that our findings on the relation between (1) the probability of an IPO firm restating its financial statements, and (2) VC-backing and the reputation of an IPO firm's underwriter, are not driven by endogenous selection of more reputable underwriters and VC-backing. Nonetheless, as with any corporate finance study, we cannot rule out the possibility that our results are affected by endogeneity along other dimensions that we have not examined.

8. SUMMARY AND CONCLUSIONS

We examine how underwriter reputation, VC backing, and VC reputation are related to the financial reporting quality of IPO firms. As financial intermediaries, underwriters and VCs have strong incentives to develop and maintain their reputations. They can protect their reputations by working only with high-quality issuers, which are more likely to comply with GAAP and SEC reporting requirements and less likely to flout or ignore accounting rules to a degree that financial statements are materially misstated and require restatement. But underwriters keen on generating revenue and VCs bent on “cashing out” via successful IPOs by their portfolio firms also have incentives to ignore any dubious accounting practices at firms that they back. We analyze the net effect of reputation and immediate-profit incentives, attempting to determine which incentive has greater influence on underwriter and VC behavior.

We examine a sample of firms that went public during 1995–2005 and announced restatements within 3 years of their IPOs, and a control sample of nonrestating IPO firms matched by industry and IPO size. We use a panoply of sources to assemble a novel data set that includes hand-collected data on underwriters, VCs, corporate governance, executive compensation, and other IPO-firm characteristics. We use matched-pairs logistic regressions to examine how the probability of restatement by an IPO firm is related to the reputation of its lead underwriter, VC backing, and the reputation of its lead VC. We test several competing hypotheses and control for other factors that previous studies have found to be significant determinants of the probability of restatement.

We find that the probability of restatement by an IPO firm is (1) consistently and positively related to the reputation of its lead underwriter, (2) negatively related to VC backing and the reputation of its lead VC in several subsamples where misstatements are likely to be more harmful to VC reputations, and (3) negatively related to the maturity of its lead VC. The endogenous selection processes of choosing a more reputable underwriter and obtaining VC financing do not appear to drive our results. Our findings suggest that VCs, especially those that are mature and reputable, play an important monitoring role in financial reporting around IPOs, while underwriters’ concerns about generating revenue appear to override their concerns about reputation.

APPENDIX: DESCRIPTIONS OF VARIABLES USED IN THE REGRESSIONS

Variables Used in Regressions		Data source
Variable	Description	
Restating firm	Binary variable that equals one (zero) for restating (control) firms	GAO database of restatements, Lexis-Nexis News wires database, SEC filings, SDC
Underwriter reputation rank	Loughran-Ritter reputation rank of the lead underwriter on an ascending ordinal scale from one (low) to nine	Professor Jay Ritter's Web site: http://bear.cba.ufl.edu/ritter/
Reputable underwriter	Binary variable that equals one if the reputation rank of the lead underwriter is at least eight, and equals zero otherwise.	Professor Jay Ritter's Web site: http://bear.cba.ufl.edu/ritter/
VC-backed firm	Binary variable that equals one (zero) if the firm is (is not) backed by a VC	IPO prospectus
VC market share	The market value of IPOs backed by a sample firm's lead VC during the IPO year and the prior 2 years, divided by the market value of all IPOs in SDC for the same 3-year period, for VC-backed firms; zero for non-VC-backed firms	SDC, CRSP
Independent directors %	Percentage of directors on the board who are independent	IPO prospectus
CEO is founder	Binary variable that equals one (zero) if the CEO is (is not) a founder of the firm	IPO prospectus
CEO chairs board	Binary variable that equals one (zero) if the CEO chairs (does not chair) the board of directors	IPO prospectus
Board size	The number of directors	IPO prospectus
Indep. financial expert	Binary variable that equals one (zero) if the board has (does not have) an independent director who is a CPA, CFA, or has experience as a CFO, Controller or Treasurer	IPO prospectus

Continued

**APPENDIX: DESCRIPTIONS OF VARIABLES USED IN THE REGRESSIONS
(CONTINUED)**

Variables Used in Regressions		Data source
Variable	Description	
Operating cash flow / assets Market capitalization	Cash flow from operating activities divided by total assets ¹ Natural logarithm of the product of shares outstanding and share price, in \$ millions ¹	Compustat CRSP
Institutional holdings %	Percentage of a firm's outstanding shares owned by institutional investors ²	Thomson Financial 13F filings database
Option sensitivity	Stock option sensitivity, defined as the product of option delta, 1% of the stock price, and the number of exercisable options held by the CEO and CFO	IPO prospectus, proxy statements, CRSP
Bank debt	Binary variable that equals one (zero) if the firm has a commercial bank loan or available line of credit	IPO prospectus
Long-term debt / Assets	Long-term debt divided by total assets ¹	Compustat
Big Six auditor	Binary variable that equals one (zero) if the external auditor that is named in the IPO prospectus is (is not) a Big Six public accounting firm	IPO prospectus
Retained equity %	Percentage of common shares owned by pre-IPO shareholders immediately after the IPO	IPO prospectus
Backed by mature VC firm	Binary variable that equals one if a firm is VC-backed and its lead VC is in the top 50% of the sample when VCs are ranked by VC firm age, number of previous IPOs backed, or capital under management; equals zero otherwise	SDC, IPO prospectus

Continued

**APPENDIX: DESCRIPTIONS OF VARIABLES USED IN THE REGRESSIONS
(CONTINUED)**

Variables Used in Regressions		Data source
Variable	Description	
Backed by young VC firm	Binary variable that equals one if a firm is VC-backed and its lead VC is in the bottom 50% of the sample when VCs are ranked by VC firm age, number of previous IPOs backed, or capital under management; equals zero otherwise	SDC, IPO prospectus
<i>IPO characteristics</i>	Other variables used in univariate tests	
Price per share	Total IPO proceeds divided by number of shares issued	SDC
U.S. proceeds	Proceeds from shares issued in the U.S.	SDC
Global proceeds	Total IPO proceeds	SDC
<i>Underwriter characteristics</i>		
Proportion with reputable lead underwriter	Proportion of sample firms whose lead underwriter has a Loughran–Ritter reputation rank of at least eight on a scale from one (low) to nine	SDC, Professor Jay Ritter's Web site: http://bear.cba.ufl.edu/ritter/
Number of previous IPOs underwritten	Number of previous IPOs in SDC where the sample firm's lead underwriter served as lead manager	SDC
Proportion of IPO shares allotted	Number of shares underwritten by the lead underwriter divided by total IPO shares issued	IPO prospectus
Proportion with equity stake	Proportion of lead underwriters that own shares of the issuing firm	IPO prospectus
<i>VC characteristics</i>		
Proportion with VC backing	Proportion of sample firms that are backed by a VC	SDC, IPO prospectus

Continued

**APPENDIX: DESCRIPTIONS OF VARIABLES USED IN THE REGRESSIONS
(CONTINUED)**

Variables Used in Regressions		Data source
Variable	Description	
VC firm age	Number of years from the date of the VC firm's first listing in the SDC database to the sample firm's IPO date	SDC
Number of previous IPOs backed	Number of previous IPOs backed by a VC before the sample firm's IPO	SDC
Capital under management	The total amount that a VC has invested in IPO firms prior to the sample firm's IPO	SDC
Equity stake	VC-owned shares as a percentage of shares outstanding immediately after the IPO	IPO prospectus
<i>Financial characteristics¹</i>		
Sales	Total net sales	Compustat
Total assets	Total assets	Compustat
Firm value	Book value of total liabilities plus the market value of equity	Compustat, CRSP
Employees	Number of employees	Compustat
Operating income	Operating income	Compustat
Operating cash flow	Net cash flow from operating activities	Compustat
Operating income/assets	Operating income after depreciation divided by total assets	Compustat
Return on assets	Net income divided by total assets	Compustat
<i>Board of directors</i>		
Proportion of inside directors	Proportion of board members who are current or former employees of the firm	IPO prospectus

Continued

**APPENDIX: DESCRIPTIONS OF VARIABLES USED IN THE REGRESSIONS
(CONTINUED)**

Variables Used in Regressions		Data source
Variable	Description	
Proportion of gray directors	Proportion of board members who have business relationships with the firm apart from their directorships	IPO prospectus
Proportion with independent financial expert on audit committee	Proportion of firms with at least one independent director on the audit committee who is a CPA, CFA, or has experience as a CFO, Controller or Treasurer	IPO prospectus
<i>Institutional ownership</i> ²	Proportion of firms having at least one institutional shareholder	Thomson financial database of 13F filings
Proportion with institutional investors	Number of institutional investors that own shares of the sample firm	Thomson Financial database of 13F filings
Number of institutional investors	Total shares of the sample firm owned by institutional investors	Thomson Financial database of 13F filings
Number of shares owned	Value of a sample firm's shares that are owned by institutional investors	Thomson Financial database of 13F filings
Dollar value of shares owned	Number of options exercised during the fiscal year containing the IPO plus number of exercisable options at the end of that fiscal year	IPO prospectus, proxy statements
<i>Exercisable stock options</i>	Value of CEO and CFO stock options, calculated using the Black-Scholes model adjusted for dividend payout	IPO prospectus, proxy statements, CRSP
Shares underlying options		
Value of options		

Continued

**APPENDIX: DESCRIPTIONS OF VARIABLES USED IN THE REGRESSIONS
(CONTINUED)**

Variables Used in Regressions		
Variable	Description	Data source
Cumulative abnormal returns	For a given trading-day window, the sum of the daily differences from subtracting the value-weighted CRSP (NYSE, Nasdaq, and AMEX) index rate of return from the rate of return on a sample firm's stock	CRSP

¹ At the end of or for the fiscal year containing the IPO.

² At the end of the first calendar quarter after the IPO.

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