

Market Reaction to Proposed Changes in Accounting for Purchased Research and Development in R&D-Intensive Industries

ANNE CLEM*

ARNOLD R. COWAN*

CYNTHIA JEFFREY*

Many allege that the accounting profession has failed to adapt to fundamental changes in the business environment because it has not developed timely guidance for reporting intangible assets. Regulatory attention has also focused on the disclosure companies make with respect to intangible assets. Accounting for the value of intangible assets acquired in a merger transaction is a key component of this issue.

Specifically, the Securities and Exchange Commission (SEC) alleged that companies routinely overstated the amount allocated to purchased in-process research and development (IPR&D) and stated that the SEC would take steps to enforce generally accepted accounting principles (GAAP) to eliminate abuses of GAAP with respect to IPR&D. Others alleged that the SEC was creating GAAP, that they were unfairly singling out certain industries, and that they were unfairly generalizing abuses made by a few firms to the actions of many firms. In other words, competing hypotheses emerged with the first suggesting that the accounting treatment of IPR&D by companies was improper, while the second suggests that the SEC was establishing new accounting standards without carefully considering the issues.

This research examines the stock-price reaction for industry groups that are R&D intensive to proposed changes in accounting for IPR&D. We estimate the shareholder wealth effects associated with a series of events that indicate a potential regulatory change in accounting for IPR&D to infer the capital market's assessment as to whether the problem with IPR&D is inappropriate accounting on the part of companies, or inappropriate policy and enforcement on the part of the SEC and the Financial Accounting Standards Board (FASB).

The results show that the stock prices of firms in R&D-intensive in-

*Iowa State University

The authors gratefully acknowledge the helpful comments of participants at the 2004 JAAF/KPMG Foundation conference, an anonymous referee, participants at the Iowa State research workshop, and especially Theodore Sougiannis (discussant) and David Smith.

dustries react negatively, on average, to events that increase the probability of new rules restricting IPR&D charges or that increase the expected degree of SEC scrutiny of these charges. However, the FASB announcement that there would be no immediate changes required in accounting for IPR&D produces a positive market reaction. The results support the theory that investors perceive limitations in reporting IPR&D as detrimental to the evaluation of the present value of R&D intensive firms' future cash flows, indicating that the market is more concerned about increased regulation of IPR&D than about the reliability of accounting estimates.

Cross-sectional analysis examines four firm-specific variables: firm size, R&D expenses, recent acquisitions, and industry membership. Results indicate that the predicted reactions are strongest for firms with historically high R&D expenses and specifically those in the software industry. Larger firms and those with experience in acquiring firms with current R&D expense are less negatively affected by a call for the financial community to participate in reducing IPR&D charges. Finally, results indicate that firms having the greatest exposure to regulators' concerns have the most negative valuation impact.

1. Introduction

According to the Financial Accounting Standards Board (FASB), hundreds of articles, studies, and consultants' reports have criticized accounting for its failure to respond to fundamental changes in the economy because financial reporting does not adequately address the issues of accounting for intangible assets (FASB [2001c]). Accounting for intangible assets acquired in a merger transaction is an area of particular concern. One of the more difficult and contentious issues is the amount allocated to in-process research and development (IPR&D) acquired in a merger. The FASB specifically includes the issue of accounting for IPR&D costs in defining the scope of a proposed project on intangibles (FASB [2001c, p. 3]). The Securities and Exchange Commission (SEC) included IPR&D as a topic in its call for research issued at the American Accounting Association meeting on August 15, 1999 (Securities and Exchange Commission [1999]), and the largest accounting firms in the United States asked the FASB to review accounting for IPR&D (Schroeder [1999]).

Expensing of IPR&D is required by FASB Interpretation No. 4 (1975). Before 1990, however, there were only three cases of such expensing (Deng and Lev [1998]). The frequency and amount of IPR&D charges accelerated after the 1995 purchase of Lotus by IBM when IBM immediately wrote off \$1,840 million, which was 57.5 percent of the total purchase price and 24.2 percent of 1995 operating income. In 1998, Arthur Levitt, chairman of the Securities and Exchange Com-

R&D-INTENSIVE INDUSTRIES

407

mission, signaled increased regulatory attention would be paid to charges for IPR&D as part of the SEC initiative to improve the quality of financial reporting (Levitt [1998]).

The SEC questioned the appropriateness of past IPR&D charges, scrutinized reported IPR&D charge-offs by individual companies, and challenged companies to justify their charges. Specifically, the SEC alleged that companies routinely overstated the amount allocated to IPR&D (Levitt [1998]; Turner [1998]), and the SEC took steps that they claimed were to enforce GAAP with respect to accounting for IPR&D (Herhold [1999]). Others raised a competing hypothesis, alleging that the SEC was using oversight of the chief accountant and the review and comment process in the Division of Corporation Finance to define new GAAP that had the effect of unfairly singling out industries that were characterized by high growth, significant R&D activity, and significant merger activity. Further, there were claims that the SEC was unfairly generalizing the inappropriate accounting of a few firms to the actions of many firms (MacDonald [1999b]). Indeed, despite the SEC's claims that their goal was to enforce existing GAAP, later commentary by the Commission (Bayless [2000]) gives credibility to the notion that the Commission's intent was to establish new GAAP for accounting for IPR&D.

The Financial Accounting Standards Board responded to concerns about the accounting treatment of IPR&D with a plan to require capitalization of IPR&D and subsequent amortization. The FASB's announced intention was to have a new standard in place by the end of 1999 (FASB [1999b]). However, the complexity of accounting for intangibles acquired in a merger led the FASB to indefinitely delay an exposure draft on the topic (MacDonald [1999a]). The FASB noted a need to carefully deliberate the issue in a long-term project on intangibles (MacDonald [1999a]). The FASB added intangible assets as an agenda item in October 2001 (Lev [2001]). SFAS 141, *Business Combinations* (FASB [2001a]) leaves unchanged the requirement in FASB Interpretation No. 4 (1975) that IPR&D is expensed at the date of the business combination.

In this paper, we examine stock market reactions to potential and perceived changes in the treatment of IPR&D for firms in industry groups that are R&D intensive. Stock market reactions are used to infer the capital market's assessment of the expected impact of any changes in regulation and to evaluate the competing hypotheses as to whether there is inappropriate application of GAAP or potentially less informative disclosure about IPR&D as a result of regulatory actions. The SEC, industry analysts, and firms predict that either changes in the policy or the increased scrutiny of the charges taken under existing policy with respect to IPR&D charge-offs can have a significant impact on stock prices (Dugan [1999]).

The results show that the stock prices of firms in R&D-intensive industries react negatively, on average, to events that increase either the probability of new policy that would reduce disclosure about IPR&D charges or the probability of increased SEC scrutiny of IPR&D charges. The announcement of an FASB proposal to capitalize IPR&D charges, coming after protracted news coverage of SEC deliberations, evokes no significant market reaction. However, the FASB announce-

ment that it would defer the rule produces a positive market reaction that is statistically significant. The results indicate that investors viewed the potential for increased regulation of IPR&D charges as detrimental to the valuation of R&D intensive firms, indicating that the market is more concerned about increased regulation than about the reliability of accounting estimates.

Cross-sectional analysis, using an econometric method that controls for return correlations across firms and for correlations between explanatory variables, examines four firm-specific variables: firm size, R&D expenses, recent acquisitions, and industry membership. This analysis uncovers no effects of predicted firm characteristics on stock-price reactions to the initial public disclosure of the increased SEC scrutiny of IPR&D charges. Over subsequent events, stock-price reactions depend on variables that represent firms' likelihood of being affected. In general, more negative stock-price reactions to events increasing the probability of regulation are associated with greater IPR&D charges and with membership in the software industry. Membership in the biotechnology industry reduces the negative impact of one announcement. Larger firms and those firms with experience in acquiring R&D-intensive firms are less negatively affected by a call for the financial community to participate in reducing IPR&D charges. These effects suggest that valuations reported by large and experienced firms might have greater credibility or be less affected by new regulation or increased scrutiny of IPR&D charges. In contrast, larger firms are more negatively affected by news that particular corporations are being singled out for review. This result supports the prediction that investors perceive the most negative impact on value for firms that have the greatest visibility with respect to regulators' concerns.

2. What Is IPR&D and Why Is It Important?

In-process research and development is the research and development acquired singly, as a part of a group of assets, or in a business combination accounted for using the purchase method. In an acquisition, the difference between the book value of the net assets of the acquired company and the purchase price is divided into two components: (1) the difference between book value and market value of tangible and identifiable intangible assets (including IPR&D) less the current market value of the liabilities and (2) the remainder of the purchase price, which is attributed to goodwill. During the event period for this research, goodwill was capitalized and amortized over a period not to exceed forty years; IPR&D was written off in the period of acquisition.¹

Attention has focused on IPR&D for at least four reasons: (1) the asset base

1. After the period examined in this paper, the accounting treatment of goodwill changed under SFAS 141 (FASB [2001a]) and SFAS 142 (FASB [2001b]) such that goodwill is subject to an annual impairment test rather than amortized over a fixed period. In the period of impairment, goodwill is charged against current earnings. The accounting treatment for IPR&D still requires that it be expensed in full in the period of acquisition.

of companies has changed and intangible assets, including research and development, have become increasingly important; (2) the new requirement that all mergers be accounted for using the purchase method means that the difference between purchase price and book value of the assets must be accounted for in all mergers; (3) the size and number of IPR&D charge-offs had been accelerating since 1990; and (4) the SEC questioned the valuation of IPR&D, focused attention on IPR&D because of the relative size of charges relative to the deal value, and indicated that the SEC filings of companies reporting large IPR&D charges might be examined (Schroeder [1999]).²

2.1 Previous Research on R&D

Internally generated research and development (R&D) is disclosed as a line item on the income statement. Existing research supports the conclusion that internal R&D contributes value to the firm; capital markets ascribe asset-like status to such expenditures (Linsmeier et al. [1998]). Higher than expected R&D expenditures tend to be accompanied by abnormally high stock returns (Woolridge [1988]; Chan et al. [1990]; Bublitz and Ettredge [1989]). Cockburn and Griliches (1988) and Hall (1993) find that the firms' market values incorporate R&D as an intangible asset. Hirschey and Weygandt (1985) infer from firms' market values that the lives of internally generated stocks of R&D range from 5 to 10 years.

Rather than determine asset values as a function of market values, Lev and Sougiannis (1996) estimate the value of R&D from the earnings that were ultimately derived from the R&D. They construct pro forma earnings under a capitalization and amortization accounting policy, and document an association for both stock prices and returns with the difference between reported earnings and pro forma earnings. Again, the finding is consistent with the hypotheses that the capital markets view R&D investments as assets and that those assets have measurable useful lives.

Hopkins et al. (2000) perform an experiment in which analysts value companies with recent merger activity. Their results indicate that analysts place a higher value on companies that immediately expensed the acquisition premium (e.g., IPR&D) relative to companies that capitalized and amortized the premium (e.g.,

2. While the SEC apparently focused on the size of the IPR&D charge relative to the deal value, some might question whether this is an appropriate metric for evaluating IPR&D charges. To give an example of a merger where IPR&D would be 100 percent of the purchase price, consider three graduate students on a university campus who rent office space, buy used office equipment, and purchase three computers, each with specialized software. Three years later, assume these graduate students have sequenced the DNA for corn and have modeled a genetic modification that they believe will make corn disease resistant. They do not have the resources to field-test the corn hybrid they have modeled. The fair market value of the identifiable assets (the office equipment, computers, and software) is zero. The company has no product and no revenue, so there is no goodwill. It is conceivable that there would be a company that would purchase their model, and potentially pay a significant amount for their work. The entire purchase price of the company would be assigned to IPR&D and expensed in the period of acquisition.

goodwill). Further, Deng and Lev (1998) report evidence of investor preference for IPR&D over goodwill. Deng and Lev find that investors assign a higher value to companies with IPR&D than companies with goodwill, implying that investors may react negatively to companies reclassifying IPR&D as goodwill.³

Dowdell and Press (2004) document the effect of SEC scrutiny of registrants' reporting of IPR&D and demonstrate the "potent impact of SEC opinions about proper accounting practice can have on financial reporting even when the agency is not formally setting new standards." Dowdell and Press report that SEC scrutiny resulted in restatements that reduced IPR&D charges by, on average, 62 percent. Dowdell and Press (2002) also report that larger initially expensed amounts of IPR&D are associated with higher price-to-book ratios and EPS growth forecasts—indicative of higher investor expectations—but *not* positively related to indicators of income smoothing or "taking a bath." These results indicate that IPR&D charges are value-relevant, and that SEC scrutiny can alter IPR&D accounting choices.

2.2 Recognition of IPR&D

When a company with an internal research and development program is acquired in a merger, the value of the IPR&D should be estimated and expensed in the period of the acquisition. Because internal R&D is expensed immediately, FASB Interpretation 4 (1975) requires IPR&D to be expensed at the date of the purchase. To the extent that the markets ascribe asset-like status to IPR&D, similar to findings for internal R&D, questions raised about possible overstatement of IPR&D assets are likely to have a negative effect on the value of companies that are in R&D-intensive industries and likely to have IPR&D charges.

To the extent that regulatory scrutiny provides incentives for companies to include in goodwill *all* of the excess of purchase price over the fair market value of the identifiable net tangible assets acquired, rather than separately disclosing a value for IPR&D, disclosure about IPR&D could be reduced or eliminated.⁴ The SEC targeted IPR&D charges that seemed large relative to the deal value and raised issues about the measurement techniques used to value IPR&D. To avoid scrutiny, it would appear that companies have only to eliminate the IPR&D charge and incorporate this value into goodwill. Intangible assets included in goodwill have varied lives and different expected future benefits, so the goodwill asset is more difficult to interpret than any single component that might be disclosed. To the extent that the market ascribes asset-like treatment to IPR&D with a definable

3. Dowdell and Press (2002) report in an earlier version of their working paper (2001) that despite the income-increasing nature of the restatements, there is a significant negative stock market reaction (on average -3.5%) to the announcement of the restatement.

4. Dowdell and Press (2004) report the means and median effects of the IPR&D revision on the main categories receiving allocations of purchase price. Goodwill and Other Intangibles increased significantly. The mean allocation to Goodwill and Other Assets increased from 11 to 39 percent of assets acquired, while the median allocation to Goodwill increased from 3 to 42 percent of assets acquired.

R&D-INTENSIVE INDUSTRIES

411

TABLE 1
Frequency of IPR&D in the Lexis-Nexis 10-K Library

Year	Number of IPR&D Records	Total Number of 10-K Records	IPR&D Records as a percentage of the Total
1990	9	4,713	0.2%
1991	20	6,300	0.3%
1992	27	7,298	0.4%
1993	80	11,607	0.7%
1994	75	6,985	1.1%
1995	130	9,500	1.4%
1996	383	15,153	2.5%
1997	550	15,226	3.6%
1998	703	14,902	4.7%

Source: Lexis-Nexis 10-K library.

useful life, decreased disclosure about this item would reduce the information available to investors about the future benefits expected from the research program.

IPR&D is often recognized as a major portion of the value of an acquisition. For example, in the acquisition of Ares Software by Adobe Systems in 1996, nearly all (95%) of the purchase price was written off as IPR&D. Since 1995, the number and size of charges significantly increased. Table 1 details the frequency of IPR&D charges found in 10-Ks between 1990 and 1998 on the Lexis-Nexis database. The greatest increase is seen in 1996 with three times the number of reports as 1995. In 1998, nearly 5 percent of all 10-Ks in the population reported IPR&D.

Table 2 provides a similar analysis of 64 technology firms in the S&P 500 between 1990 and 1998.⁵ A jump in the frequency of IPR&D charges is seen in 1995 with 21.9 percent of the firms reporting such a charge compared with 10.9 percent in 1994. By 1998, 45.3 percent of the firms recorded IPR&D charges.

3. The SEC Position and Reaction by the FASB and Corporate America

In 1995, after IBM recorded a \$1.8 billion IPR&D write-off, John Glynn, accountant with the SEC, stated in a speech that marked the beginning of the SEC's focus on IPR&D write-offs: "When reviewing purchase price allocations that include significant charges for purchased R&D, the (SEC) staff is likely to raise such issues as the following in consideration of IPR&D:

⁵ Data on the S&P 500 technology firms comes from the April 23, 1999, report of *The Analyst's Accounting Observer*, by R. G. Associates, Inc.

TABLE 2

Frequency of IPR&D in the S&P 500 Technology Firms (64 firms)

Year	Number of Firms with IPR&D Charges	IPR&D Firms as a percentage of Total
1990	0	0.0%
1991	1	1.6%
1992	3	4.7%
1993	2	3.1%
1994	7	10.9%
1995	14	21.9%
1996	20	31.3%
1997	25	39.1%
1998	29	45.3%

Source: The *Analyst's Accounting Observer*, Volume 8, No. 5 (April 23, 1999) by R. G. Associates, Inc.

- Purchased R&D must be valued separately based on appropriate assumptions and valuation techniques.
- The staff believes that other identifiable intangible assets and goodwill exist in many business combinations involving significant amounts of acquired technology, and can be expected to challenge purchase price allocations in which substantially the entire purchase price is allocated to purchased R&D.”

The SEC challenged the costs allocated to IPR&D, questioning both valuation methods and the value assigned to core technologies and IPR&D. The Commission has stated that the *increasing size* of IPR&D charges has raised a “red flag.”

The SEC contends that it increased focus on the rules for expensing IPR&D because of apparent abuses in valuation. Robert Bayless, chief accountant with the SEC's Division of Corporation Finance stated, “What we're seeing is that a rule that has been in place since 1975 has been practiced for the last five years in an apparently more aggressive manner. . . . If that rule is being abused, then individual firms are tilting the playing field” (Herhold [1999]). SEC Chief Accountant Lynn Turner noted, “As the number of companies claiming larger (IPR&D) write-offs increased in early 1998, we began to dig deeper into the company's appraisal assumptions” (Schroeder [1999]). The SEC concern was reiterated by Chairman Arthur Levitt in a speech entitled “The Numbers Game” at the NYU Center of Law and Business; Levitt referred to current IPR&D accounting practices as “merger magic” (Levitt [1998]).

While the SEC claimed that it was enforcing current GAAP, there is some evidence that their intent was not to enforce current GAAP but rather to establish new GAAP. Robert Bayless (Bayless [2000]) stated in a speech given in 2000 that “it is the Division's review program—the staff's actual or potential challenge to a

R&D-INTENSIVE INDUSTRIES

413

registrant's accounting practices—that most significantly impacts contemporary U.S. accounting standards.” Bayless goes on to state that a primary objective of reviews of registrant's filings in 1999 under Chairman Levitt's Earnings Management Initiative was to “elicit improved disclosure in financial statements . . . about . . . purchased in process research and development. . . . In response to the Division's focused attention in this area, more than 50 companies revised their financial statements or earnings released to adjust downward the amounts allocated to purchased R&D.”⁶

As part of this initiative, in January 1999, the SEC sent letters to 150 companies indicating that their filings for fiscal year 1998 might be subject to review because of the *relative size* of various charges including IPR&D.⁷ In addition, the SEC communicated with the American Institute of Certified Public Accountants (AICPA) in two letters during 1998 that “significant problems in the recognition and valuation of IPR&D” are likely to lead to the review of filings and potentially to restatement of financials if a registrant's valuation of IPR&D is materially misleading.⁸

SEC scrutiny caused some high-technology firms to claim they had been unfairly targeted by a change in rules rather than enforcement of rules (MacDonald [1999b]). Mark Nebergall, a vice president for finance and tax policy of the 1,500-firm Software and Information Industry Association, was quoted as declaring the existence of “a resounding consensus that the SEC has been unfair” (Schroeder [1999]). FASB Chairman Ed Jenkins stated that, in response to assertions that amortizing IPR&D should not matter if it does not affect the cash flow of the merged company, “corporate executives tell him that they fear investors will not understand and will send a stock price down if reported earnings are affected” (Norris [1999]). Concern exists that stock price decreases may limit the ability of the firm to grow through acquisitions, a frequent strategy in technology fields where

6. In the past, the SEC has normally deferred to the FASB or the Emerging Issues Task Force (EITF) for issues of accounting policy and establishment of GAAP, while the SEC concentrates on enforcement of GAAP. In the instance of IPR&D, however, the purpose of the SEC seems to have been to influence policy. The attention that the SEC focused on IPR&D in letters and speeches did not lead to any significant enforcement actions. In 2003, the SEC published a report (SEC [2003]) detailing all of the enforcement actions filed by the SEC between July 31, 1997, and July 30, 2002. Of the 515 actions filed, only eight were related to improper asset valuation in a business combination. The report did not identify any of these actions as related to the valuation of goodwill or IPR&D.

7. The Division of Corporation Finance sent the letter to public companies expected to be preparing their annual statements. The letter is mentioned in a speech by Lynn Turner of February 10, 1999, on “Initiatives for Improving the Quality of Financial Reporting,” available at <http://www.sec.gov/news/speech/speecharchive/1999/spch252.htm>. A sample letter was formerly available on the SEC website. The letter reminded firms of disclosures applicable to asset write-downs, restructuring activities, acquired in-process research and development, and similar issues. The companies receiving the letters were selected based on news reports of significant charges they had taken in 1998.

8. The first, dated September 9, 1998, was sent from Lynn Turner, SEC chief accountant, to Robert Herz, chair of the AICPA SEC Regulations Committee. The second letter, dated October 9, 1998, was from Turner to Thomas Ray, director, Audit and Attest Standards, AICPA, with comments for potential topics for the current year Audit Risk Alerts. All SEC letters and speeches are available on <http://www.sec.gov>. URLs for each of these items are listed in the appendix to the paper.

time to market is critical. Finally, there are claims that fear of SEC review has caused executives to shy away from public criticism of SEC initiatives (MacDonald [1999b]). Philip B. Livingston, president and chief executive-elect for the Financial Executives Institute stated, "The SEC shouldn't punish the whole financial community for the sins of a few" (MacDonald [1999b]).

The FASB entered the IPR&D debate early in 1999. On January 13, 1999, the FASB issued a Status Report that focused on business combinations and the treatment of intangible assets, including the examination of IPR&D (FASB [1999a]). The March 30, 1999, Status Report (FASB [1999b]) indicated that a separate standard was planned for IPR&D and that all IPR&D should be recognized as an asset and amortized. The FASB reiterated this intent in their Action Alert of May 12, 1999 (FASB [1999c]). However, in late July of 1999 the FASB announced that it would suspend efforts to require capitalization of IPR&D, noting that the complexity of the issue made additional study necessary (MacDonald [1999a]).

4. Potential Effects of Changes in IPR&D Accounting

Expensing of IPR&D is required by FASB Interpretation No. 4 (FASB [1975]). The value of IPR&D is to be established at the time of purchase and immediately written off against earnings. However, the SEC is concerned that overvaluing IPR&D results in undervaluing goodwill. If the write-off were overstated and goodwill understated, the decrease in amortization expense, prior to SFAS No. 142 (FASB [2001b]), would cause future earnings to be overstated. After SFAS No. 142, a reduction in the valuation of goodwill would limit the possibility of subsequent impairment charges being recognized.

Criticism of reported IPR&D values, scrutiny of accounting practices, and investigations of particular companies by regulators are all likely to convey a negative signal to the market about the reliability of accounting numbers reported by the sample firms. Because IPR&D valuations should be related to future cash flows as the R&D efforts lead to new products, concerns about the validity of these reported numbers may lead to a decrease in stock prices. Alternatively, to the extent that the IPR&D asset is combined with goodwill, rather than being reported separately, estimates of the asset value and related cash flows for IPR&D are more difficult, which could also lead to a potentially lower stock price. A secondary effect of a decline in stock prices would be that mergers in which company stock is the consideration would become more difficult, further reducing their growth opportunities, and potentially leading to a larger decrease in the value of the company.

The market's reaction when it is determined that no significant change to accounting for IPR&D is likely allows us to make inferences about the market's perception with respect to the underlying reasons for concern. If the market reaction is positive, it would indicate that the market perceives the status quo to be preferable to changes in accounting for IPR&D. If the market reaction is negative, it would imply that the market perceives current accounting for IPR&D to be inadequate, indicating the accounting numbers are not perceived to be reliable.

A series of events between August 1998 and July 1999 defined the SEC's actions with respect to reporting for IPR&D and the FASB's deliberation of the issue. We examine the market reaction to eight events during the period. Table 3 summarizes the events.

5. Data and Methods

5.1 Sample Construction

The initial sample for this study was created by identifying the standard industrial classification (SIC) codes for companies that had high research and development expenditures. The industries that were selected are listed in Table 4. Seven industry groups are defined: computer software, computer hardware, biotechnology, communications, transportation equipment, other electronics, and instrumentation. The table reports the mean and median R&D intensity (R&D expenditures as a percentage of sales) for each of the industry groups included in the sample. Table 4 also shows that the industry-group median R&D intensity in 1998 ranges from 5 to 97 percent.

The initial sample includes 1,824 firms that appear in both the Compustat and CRSP databases. We eliminated firms from the initial sample for either of two reasons. First, those that did not have a price on the CRSP database on January 2, 1998, were removed (268 firms). Second, firms that did not have at least 300 daily returns in 1998–1999 were eliminated (73 firms). The final sample consists of 1,484 firms.

Descriptive statistics of firm characteristics appear in Table 4. The firm characteristics indicate a skewed distribution, with medians substantially smaller than means on all characteristics. The mean R&D intensity is 249 percent (median 13%); the mean of total assets is \$1.6 billion (median \$65 million) and mean market capitalization is \$3.1 billion (median \$108 million). Firms in the sample report median sales of \$56 million but report a net loss of approximately \$0.2 million in 1998. The expensing of research and development expenditures as incurred probably contributes to the low reported income.

5.2 Methods

We test the average stock-price reaction to each of the events using the multivariate regression model (MVRM) suggested by Schipper and Thompson (1983). The MVRM controls for cross-sectional heteroscedasticity and contemporaneous cross-correlation of the residuals. The MVRM approach extends the usual market model to a conditional return generating process by adding a dummy variable corresponding to each event period. (See Karafiath [1988] for a detailed discussion.) Since the event dates are identical for all the firms in this study, we can estimate the MVRM by forming the stocks into a portfolio and estimating a single regression equation on the portfolio returns (Thompson [1985]). To increase the efficiency of

TABLE 3
Event Date Descriptions and Predicted Reactions

Event Number	Event Date	Event Type	Event Description	Expected Market Reaction
1	Aug. 21, 1998	WSJ article "SEC Considers Limits on Acquisition Write-Offs" (MacDonald [1998a])	The article focused on concerns of the SEC that a rising number of companies were taking excessive acquisition charges for purchased research and development and goodwill. The article referred to a recent study at NYU that indicated only three companies wrote off part of their acquisitions as R&D during the 1980s, but 389 did so in the 1990s, with a record 156 in 1996 alone.	-
2	Sep. 29, 1998	WSJ article "SEC Chief Aims to Attack Abuses in Firms' Figures" (MacDonald [1998b])	This was the public unveiling of the SEC's focus on earnings management issues, including IPR&D. The article details the announcement of the SEC initiatives unveiled in a speech by Arthur Levitt, chairman of the SEC, entitled "The 'Numbers Game' " at New York University. Also on this date, America On-Line and MCI/Worldcomm announced reversals of previous merger-related charges, stating that these reversals were in response to SEC review (Mehta [1998]; MacDonald [1998b]).	-
3	Dec. 3, 1998	WSJ article "Heard on the Street: Let-out & Hauspie's Profit Picture Gets Cloudier as SEC Reviews Its Accounting for Acquisitions" (Puliam and Rose [1998])	The reversals were for mergers in both 1998, the current year, and 1997, the previous year. This event was noteworthy not only because of the reversed charge, but also because this was the first indication that the SEC might encourage/require retroactive restatement of financial statements for companies that took large charge-offs. As such, this reversal was widely reported by the press	-
4	Feb. 1, 1999	Two WSJ articles on proposed IPR&D changes: "Firms Say SEC Earnings Scrutiny Goes Too Far" (MacDonald [1999b]) and "High Technology Firms Are Upset Over SEC Crack-down on Write-Offs" (Schroeder [1999])	The first article details industry reaction to the proposed IPR&D changes. Also in this article is a discussion of industry reaction to the letter sent by the SEC in January 1999 to 150 firms expected to be preparing their Annual Reports on Form 10-K. The companies receiving the letter were selected based on news reports of significant charges they had taken in 1998. The second major article also explained the industry reaction to the proposed changes.	-

- 5 Feb. 10, 1999 Lynn Turner, chief accountant of the SEC, made speeches to the New York Society of Security Analysts, Inc., and the Software and Service Industry Analyst group on February 10
- 6 Feb. 24, 1999 Three articles in the *WSJ*, the *Washington Post*, and the *San Jose Mercury News* stating that the FASB proposed eliminating the IPR&D write-off (MacDonald [1999c]; Dugan [1999]; and Herhold [1999])
- 7 April 30, 1999 *WSJ* article "SEC Official Reports R&D Write-Offs Fell by Half due to Rules" (SEC official [1999])
- 8 July 28, 1999 *WSJ* article reporting FASB decision to defer plans to force capitalization of IPR&D (MacDonald [1999a])
- In the first speech, Turner made reference to the letter sent by the SEC in January and noted that a copy of the letter was available at the SEC website entitled "Initiatives for Improving the Quality of Financial Reporting." The second speech was specific to the scrutiny of IPR&D and was entitled, "Making Financial Statements Real: Recent Problems in the Accounting for Purchased IPR&D." There is indication in both of these speeches that the FASB would be considering the appropriateness of current account requirements on this issue.
- The board announced that all purchased in-process research and development should be recognized as an asset and amortized over its useful life and stated that the FASB expected to issue an exposure draft of this proposed change before the end of summer 1999. The proposal would preclude *any* expensing of IPR&D, regardless of the valuation models used. Additionally, the board determined that IPR&D would be addressed as a separate component from the business combinations project, and expressed their intention of issuing a separate standard specifically dealing with accounting for IPR&D.
- This article reported on a speech by Brian Lane, director of the SEC's division of corporate finance. Mr. Lane stated that companies had reduced previously reported IPR&D charges by about \$5 billion, which was about half of the \$10 billion that had come under SEC scrutiny. Mr. Lane indicated that the IPR&D charges of more than 50 companies had come under SEC scrutiny, and that this represented the "first wave" of SEC review of charges that appeared to be large.
- The FASB issued a news release stating that they would *defer* abolishing the write-off of IPR&D that was reported in the *Wall Street Journal*.

TABLE 4
Sample Firm Characteristics

Panel A: Industry group distribution and industry R&D intensity

Industry Group	<i>N</i>	Mean R&D Intensity	Median R&D Intensity
Computer hardware	163	0.262	0.099
Computer software	326	0.527	0.171
Biotechnology	249	6.734	0.967
Communications	26	0.219	0.045
Transportation equipment	75	0.022	0.018
Other electronics	324	0.724	0.084
Instrumentation	321	4.883	0.108

Panel B: Descriptive statistics

Characteristic	Mean	Median	Standard Deviation	First Quartile	Third Quartile
R&D intensity	2.49	0.13	32.75	0.05	0.29
Total assets	1,600.89	65.10	13,689.86	24.08	266.35
Market capitalization	3,110.82	108.11	18,011.84	31.86	500.21
Sales	1,251.30	56.43	7,556.58	16.20	245.69
Net income	88.29	-0.20	787.47	-8.59	11.84
Earnings to price	-0.126	0.003	0.391	-0.160	0.047
Book-to-market assets	0.538	0.450	0.398	0.233	0.748
Percent acquiring a target with reported R&D expense in previous five quarters	0.94%				

All variables are measured in Compustat year 1998. Total assets, market capitalization, sales and net income are shown in millions of dollars.

R&D intensity = R&D expenditures (Compustat 46) ÷ Sales (Compustat 12).

Total assets = Compustat 6.

Market capitalization = Price-Fiscal year-Close (Compustat 199)* Common shares outstanding at year end (Compustat 25).

Net sales = Compustat 12.

Net income = Compustat 172.

Earnings to price = Compustat 12 ÷ 199.

Book-to-market assets = (Compustat 34 + 37) ÷ [#99* #25 - (#60 + #37 + #34)].

the parameter estimates, we use portfolio weights based on the estimated full covariance matrix of residuals, \mathbf{S} . The residuals used to compute \mathbf{S} come from a set of first-pass OLS regressions for each stock. The vector of portfolio weights is $\mathbf{P} = (\mathbf{1}'\mathbf{S}^{-1}\mathbf{1})^{-1}\mathbf{S}^{-1}\mathbf{1}$.

We estimate the following regression:

R&D-INTENSIVE INDUSTRIES

419

$$R_{pt} = \alpha_p + \beta_p R_{mt} + \sum_{k=1}^K \gamma_{pk} D_{kt} + \varepsilon_{pt}, \quad (1)$$

where

R_{pt} = return on portfolio p on day t ;

R_{mt} = return on the CRSP value-weighted NYSE-AMEX-Nasdaq index on day t ;

α_p = intercept coefficient for portfolio p ;

β_p = risk coefficient for portfolio p ;

γ_{pk} = effect of event k on portfolio p , $k=1, 2, \dots, K$;

D_{kt} = dummy variable, equal to 1 during event period k and 0 otherwise;

ε_{pt} = random disturbance, which is assumed to be normal and independent of the return on the market and the event period dummy variables.

Equation (1) measures the overall impact of the key events of the IPR&D controversy on all sample firms, but provides no evidence on whether the impact is a function of firm characteristics related to the probability of being affected by potential SEC or FASB actions. We examine four firm-specific characteristics: firm size, R&D expenses, recent acquisitions, and industry membership. We measure firm size by the market value of the equity, and R&D expense by R&D intensity. To measure recent acquisitions, we create a dummy variable that is equal to 1 if a firm made an acquisition of a target that reported R&D expense with the previous five quarters. To examine industry membership, we use dummy variables that indicate membership in computer hardware, computer software, or biotechnology.⁹

A typical method of testing the impact of such characteristics on stock-price reactions to events is to run cross-sectional regressions of stock-price reactions, one event at a time, on the characteristics of interest. With common event dates as we have in the current study, we are likely to have cross-sectional heteroscedasticity and cross-correlation of the residuals, which lead to biased standard errors of the coefficients.

To test the effects of these firm characteristics on the stock-price reaction to the events, we use a modified version of the portfolio weighting procedure suggested by Sefcik and Thompson (1986). In a Sefcik-Thompson-type estimation approach, information about the full covariance matrix of the residuals is included by creating P portfolios that separate the effects of each of P types of firm characteristics. Each portfolio is used in turn to reestimate eq. (1). The estimates of the γ_{pk} then reflect the effect of the p th characteristic on the stock-price reaction to the k th event.

9. A Practice Aid (2001) was published by the AICPA provides guidance on financial reporting of assets acquired to be used in R&D activities, including IPR&D projects. While this practice aid applies to all industries, the AICPA focuses on the software, electronic devices, and pharmaceutical industries because these constituents raised significant concerns about the application of GAAP and the materiality of the IPR&D charges in these industries. The computation of the PCCM weight matrix becomes problematic as the number of characteristics studied increases, so we limit the industry dummies included in the analysis to these three industries.

In general, for a sample of N firms, the researcher specifies a matrix of portfolio weights W with P rows and N columns to satisfy the constraint

$$WF = \mathbf{I}_{P \times P},$$

where F is an $N \times P$ matrix of firm characteristics and \mathbf{I} is the identity matrix. The p th portfolio based on the weights has all characteristics summing to zero except the p th characteristic, which sums to 1. Therefore, in the time-series regression for the p th portfolio, the influence of each characteristic but the p th is nullified (Thompson, [1995]). Sefcik and Thompson (1986) show that the portfolio approach avoids the omitted variables bias that plagues OLS cross-sectional regressions.

While Sefcik and Thompson (1986) point out that multiple weighting schemes are possible, they focus on the example of OLS weights, where $W = (F'F)^{-1}F'$. Chandra and Balachandran (1992) observe, consistent with the analysis of Sefcik and Thompson, that OLS weights do not exploit heteroscedasticity and cross-correlation to improve efficiency and power. To remedy this shortcoming, Chandra and Balachandran propose an extension of the Sefcik-Thompson procedure that they call the portfolio constant correlation model (PCCM). Chandra and Balachandran report that, in simulation, the PCCM test is well specified and more powerful and asymptotically efficient than the Sefcik-Thompson procedure with OLS weights. They also report that the PCCM test exhibits better power and specification than other selected non-OLS weighting schemes in samples with common event dates and a small number of industries. To date, we are aware of no other published accounting research that uses the PCCM model.¹⁰

To calculate the portfolio weights for the PCCM tests of firm characteristics, specifically let

$$\mathbf{F} = [1 \ \mathbf{X}_2 \ \dots \ \mathbf{X}_p], \quad (2)$$

where \mathbf{X}_p is an $N \times 1$ vector of the p th type firm characteristic (N is the number of stocks in the portfolio). The set of portfolio weights corresponding to the p th characteristic is the p th row of the $P \times N$ matrix

$$\mathbf{W} = \left(\mathbf{F}' (\sigma \mathbf{C} \sigma)^{-1} \mathbf{F} \right)^{-1} \mathbf{F}' (\sigma \mathbf{C} \sigma)^{-1}, \quad (3)$$

where σ is a diagonal matrix, the nonzero elements of which are the residual standard deviations of the N stocks, and \mathbf{C} is the constant correlation matrix of the raw returns of the stocks. The diagonal elements of \mathbf{C} are equal to 1. The off-diagonal elements vary by industry or industry pair, but are all equal to the same estimated average pairwise correlation between any two stocks in the same industry or industry pair. (See Chandra and Balachandran [1992]; and Aneja, Chandra, and Gunay [1989] for details.)

10. The only published application of the model that we know of is in the finance literature (Cowan, Howell, and Power [2002]).

6. Results

To document stock-price reactions, Table 5 reports portfolio cumulative abnormal returns (CARs), based on the multivariate regression model in equation (1), for the three-day period ($t = -1, 0,$ and $+1$ relative to the *Wall Street Journal* report) around each of the eight events.

Four of the eight events appear to reveal new information that affects the stock prices of firms in research and development intensive industries. Events 1, 4, and 5 produce negative stock-price reactions that are statistically significant at the 5 percent level or better. Each of these events is an action that increases the probability, or expected severity, of SEC action against firms writing off acquired IPR&D

TABLE 5
Stock-Price Reactions of Firms in Research and Development (R&D)-
Intensive Industries to News Reports Relating to Accounting for Purchased
In-Process R& D in the Period September 1998–August 1999

Variable Name	Day 0	Event	Abnormal Return	<i>t</i> Statistic
Intercept			0.0042	4.083***
Market index			2.4232	20.636***
Event 1	21 August 1998	SEC considering limits	-0.0268	-3.919***
Event 2	29 September 1998	Numbers game speech	0.0088	0.700
Event 3	3 December 1998	Retroactive review of Lernout and Hauspie	-0.0016	-0.182
Event 4	1 February 1999	Two <i>WSJ</i> articles on SEC scrutiny of IPR&D	-0.0075	-6.916***
Event 5	10 February 1999	Speeches to NY and software analysts	-0.0074	-1.845*
Event 6	24 February 1999	News reports of FASB proposal	-0.0024	-0.943
Event 7	30 April 1999	SEC speech mentioning drop in write-offs	0.0012	0.321
Event 8	28 July 1999	FASB defers rule abol- ishing write-off	0.0157	3.700***
		Regression $F(9,494)$	94.01***	
		Adjusted R^2	62.5%	

Portfolio abnormal return, expressed as a decimal and not a percentage, and *t* statistics, for 1,483 traded firms in the computer hardware, computer software, communications, biotechnology, and transportation industries around each of eight events. Abnormal returns are three times the coefficients, in a regression of portfolio returns (returns of sample firms weighted on the basis of the full estimated covariance matrix of residuals) on the CRSP value-weighted market index and dummy variables corresponding to the eight events. Each dummy variable is equal to one during the three-day event period ($t = -1, 0$ and $+1$ relative to each news report) and zero otherwise. The *t* statistics are based on the asymptotic estimator of White (1980).

expenses. The reaction to event 1, the initial report that the SEC would consider limits on purchased IPR&D write-offs, is highly economically significant at -2.68 percent. Events 4 and 5, in early February 1999, are an announcement of actions against specific firms, and a pair of speeches by SEC Chief Accountant Lynn Turner mentioning IPR&D write-offs, respectively. Both of these events evoke negative stock-price reactions of about three-fourths of one percent. Event 8, the FASB decision to defer a proposed rule abolishing IPR&D write-offs, produces a positive stock-price reaction of 1.57 percent, which is significant at the 0.1 percent level. The results support the idea that investors perceived limitations on IPR&D write-offs as detrimental to the present value of R&D intensive firms' future cash flows.

Table 6 reports tests using the PCCM approach of Chandra and Balachandran (1992). Each column of Table 6 presents the results for one event, similar to a regression of the stock-price reaction to that event, on the four firm-specific explanatory variables: firm size, R&D expenses, recent acquisitions, and industry membership. As explained above, however, the regressions are actually time-series regressions similar to Table 5 but with the portfolio of sample firms being differently weighted for each explanatory variable. The events for which statistically significant coefficients appear in Table 6 are not expected to directly match those manifesting significance in Table 5. Instead, the purpose of Table 6 is to test hypotheses about four firm characteristics that potentially cause different stock-price reactions to the events. The sign and significance of the coefficients are analogous to those in the cross-sectional regression commonly reported in conjunction with an event study. However, as the weights, by construction, do not sum to 1, the values of the coefficients cannot be interpreted as portfolio abnormal returns in the usual sense.

The computation of the PCCM weight matrix becomes problematic as the number of characteristics studied increases, so we limit the industry dummies included in the analysis to the three industries most frequently mentioned in reports of the IPR&D controversy, computer hardware and software and biotechnology.

Event 1, which produces a significant negative average stock-price reaction overall, does not receive a significant coefficient for any firm-characteristic portfolio. The results for event 1 suggest that investors, while concluding that possible SEC restrictions were bad news for stocks in the sample as a whole, did not distinguish the effect by firm size, R&D expenses, recent acquisitions, or industry membership.

Event 2, which is insignificant in Table 5, is significant for three explanatory variable portfolios in Table 6, suggesting that the "Numbers Game" speech contributed to investors sorting out the different effects of the potential SEC action. The event 2 stock-price reaction is a positive function of firm size and a dummy variable for recent acquisition of a firm reporting R&D expense, and a negative function of software industry membership. The results for size and acquisition activity are surprising given SEC Chairman Levitt's specific mention of large IPR&D writeoffs. However, Levitt also emphasized the need for the financial com-

TABLE 6
Tests of Effects of Firm Characteristics on Stock Price Reaction to Eight Events Relating to Rules on Accounting for Acquired In-Process Research and Development.

Variable	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8
Firm size (market value of equity)	-0.1171 (-0.71)	0.2235 (1.86*)	0.7597 (0.54)	-0.3116 (-2.43**)	0.6747 (0.62)	0.1599 (1.02)	0.1553 (0.46)	-0.1279 (-0.94)
R & D Intensity	-0.0610 (-1.07)	0.0363 (0.69)	0.3942 (0.69)	-0.1493 (-4.85***)	0.2935 (0.57)	0.0840 (1.65*)	0.0338 (0.26)	-0.0618 (-1.01)
1 = made acquisition within last five quarters of firm reporting R&D	-8.1619 (-0.46)	31.5424 (2.92**)	37.5414 (0.32)	-21.2684 (-1.23)	54.7297 (0.77)	4.0955 (0.21)	21.4629 (0.60)	-8.9565 (-0.74)
Computer hardware industry	-0.0203 (-0.98)	0.0055 (0.37)	0.1207 (0.56)	0.0323 (0.51)	0.0936 (0.59)	0.0280 (0.95)	0.0243 (0.93)	-0.0332 (-3.32***)
Computer software industry	0.0658 (0.58)	-0.1787 (-2.03*)	-0.3451 (-0.41)	0.1735 (1.62)	-0.3922 (-0.69)	-0.0374 (-0.33)	-0.1310 (-0.53)	0.0623 (0.66)
Biotechnology industry	0.1850 (0.89)	-0.2450 (-1.48)	-1.1559 (-0.61)	0.4672 (3.49***)	-0.9683 (-0.61)	-0.2211 (-1.19)	-0.1570 (-0.34)	0.1912 (0.95)

For each event, the table reports the three-day abnormal return, expressed as a decimal and not a percent, of a portfolio constructed to be uniquely sensitive to the variable shown. The portfolio formation procedure is Chandra and Balachandran's (1992) extension of Sefcik and Thompson (1986). Each dummy variable is equal to one during the three-day event period ($t = -1, 0$ and $+1$ relative to each news report) and zero otherwise. The t statistics based on the asymptotic estimator of White (1980) appear in parentheses. The symbols *, **, and *** denote statistical significance at the 0.05, 0.01, and 0.001 levels, respectively, using a one-tailed test.

munity, rather than the government, to take the lead in solving IRP&D and other accounting problems. Investors may have concluded that large firms and those most active in acquisitions would be able persuade analysts, the SEC, and the FASB to accept those firms' existing practices. The negative relation to software industry membership supports the idea that it would be more difficult in practice to justify classifying acquired firms' software development activities as R&D. This is consistent with Levitt's implication that some acquiring firms classify too much of the purchase price as R&D.

Table 6 also reports that event 4 (with a significantly negative coefficient in Table 5) is a negative function of firm size and R&D, and a positive function of biotechnology industry membership. These article indicates that the SEC "crack-down" may be causing companies to "second guess" their accounting methods, and indicate that some executives were hesitant to air complaints because they were concerned about the potential their company would be targeted. The articles seem to indicate that companies may be willing to change their accounting simply to avoid scrutiny regardless of the underlying rationale for the charge-off. The articles also refer to the 150 letters sent to some registrants. Lacking either a comprehensive list of firms that already received the letter or details about how future letters would be directed, investors probably judged that the most negative impact would fall on firms with the greatest political risk (Watts and Zimmerman [1986]). Political risk is equivalent to visibility with respect to the issue on which regulators are focusing at a given time. Larger firms tend to be more visible with respect to any issue, and firms with greater R&D expenses would draw attention in this situation. Media reports focused on information technology firms, implying that biotechnology firms were less affected, consistent with the positive coefficient for biotechnology industry membership.

Event 6, the FASB proposal to eliminate IPR&D write-offs, is associated with a marginally significant positive coefficient for R&D intensity. While this is opposite the expected direction, the lack of overall significance for this event in Table 5 and the marginal significance of the coefficient in Table 5 suggest that the result is not meaningful.

The final statistically significant result in Table 6 is that the stock-price reaction to event 8, the deferral of the FASB proposal, is negatively associated with computer hardware industry membership. No industry-specific news reports around this date suggest a reason for the peculiar association. In Table 6, the sample is segregated into the three industries represented: biotechnology, computer hardware, and computer software. None of the industries shows any individual reaction that qualitatively differs from that discussed above for four of the dates. For the two dates that do indicate significant returns in the predicted direction, the biotechnology and computer hardware industries show results consistent with that reported for the total sample. In contrast, the software industry shows no reaction to these two events. A finding of no reaction would indicate that the market believes that, in general, previously announced numbers were not misleading. It is notable that under SFAS 86 (FASB [1985]), the software industry is already required to capi-

talize development costs once technological feasibility has been achieved or a detailed model has been developed. Because the historical cost of development is already disclosed on the acquired company's balance sheet prior to the merger, the market may find it easier to evaluate the reliability of IPR&D charges for software companies.

7. Conclusions

The debate over IPR&D accounting is likely to persist over the next several years because of its importance in evaluating the quality of earnings and estimating future cash flows. This issue arises not only as part of the discussion of merger accounting, but also in the more general consideration of how to value intangible assets in a relevant and reliable manner. The evidence in this study indicates that the stock prices of firms in R&D intensive industries react to changes in accounting for IPR&D, but the reactions vary by industry. The finding of a different reaction for the software industry raises the issue of how different product types affect the valuation of a firm, in particular how producers of intangible products are valued. The findings also raise the question of how IPR&D is incorporated into investor and analyst valuation models across different industry groups. As the importance of intangible assets and outputs continues to increase, accounting researchers will need to become increasingly concerned with developing and testing models which assist in providing values for intangible assets such as research and development and knowledge capital.

APPENDIX

List of Relevant Speeches and Letters

- SEC Call for Research (August 15, 1999).
<http://www.sec.gov/news/extra/aaacall.htm>
- Letter from the Office of the Chief Accountant Regarding the 1998–1999 Audit Risk Alerts. November 25, 1998 (letter dated October 9, 1998).
<http://www.sec.gov/info/accountants/staffletters/aclr1009.htm>
- Letter from the Office of the Chief Accountant to the AICPA SEC Regulations Committee Regarding the Need for Additional Guidance on In-Process Research and Development (letter dated September 9, 1998).
<http://www.sec.gov/info/accountants/staffletters/aclr1009.htm>
- “The ‘Numbers Game’ ”—Remarks of Chairman Arthur Levitt at the N.Y.U. Center for Law and Business, New York, September 28, 1998.
<http://www.sec.gov/news/speech/speecharchive/1998/spch220.txt>
- “Initiatives for Improving the Quality of Financial Reporting”—Remarks of Lynn E. Turner, Chief Accountant of the Commission, at the New York Society of Security Analysts, Inc., New York, February 10, 1999.
<http://www.sec.gov/news/speech/speecharchive/1999/spch252.htm>
- “Making Financial Statements Real: Recent Problems in the Accounting for Pur-

chased In-Process Research and Development”—Remarks of Lynn E. Turner, Chief Accountant of the Commission, at the Software and Service Industry Analyst Group, New York, February 10, 1999.

<http://www.sec.gov/news/speech/speecharchive/1999/spch251.htm>

- “A Partnership for the Public Trust”—Remarks of Chairman Arthur Levitt at the American Institute of Certified Public Accountants, Washington, D.C., December 8, 1998.

<http://www.sec.gov/news/speech/speecharchive/1998/spch230.txt>

REFERENCES

- American Institute of Certified Public Accountants IPR&D Task Force. 2001. “Assets Acquired in a Business Combination to be Used in Research and Development Activities: A Focus on Software, Electronic Devices, and Pharmaceutical Industries.” AICPA Practice Aid Series. New York: AICPA.
- Aneja, Yash P., R. Chandra, and E. Gunay. 1989. “A Portfolio Approach to Estimating the Average Correlation Coefficient for the Constant Correlation Model.” *Journal of Finance* 44 (5): 1435–1438.
- Bayless, Robert A. 2000. Speech by SEC Staff, “How the Division of Corporation Finance Influences Accounting Practices and Financial Reporting Standards.” Presented at the Technical Session of the 30th Annual Convention, National Association of Black Accountants, Washington, D.C. (July 19) <http://www.sec.gov/news/speech/spch394.htm>.
- Bublitz, B., and M. Ettredge. 1989. “The Information in Discretionary Outlays: Advertising, Research and Development.” *The Accounting Review* 64 (January): 108–124.
- Chan, S. J. Martin, and J. Kensinger. 1990. “Corporate Research and Development Expenditures and Share Value.” *Journal of Financial Economics* 26:255–276.
- Chandra, R., and B. V. Balachandran. 1992. “More Powerful Portfolio Approaches to Regressing Abnormal Returns on Firm-Specific Variables for Cross-Sectional Studies.” *Journal of Finance* 47: 2055–2070.
- Cockburn, I., and Z. Griliches. 1988. “Industry Effects and Appropriability Measures in the Stock Market’s Value of R&D and Patents.” *American Economic Review* 78:419–423.
- Cowan, A. R., J. C. Howell, and M. L. Power. 2002. “Wealth Effects of Banks’ Rights to Market and Originate Annuities.” *The Quarterly Review of Economics and Finance* 42:487–503.
- Deng, Z., and B. Lev. 1998. “The Valuation of Acquired R&D.” Working paper, New York University.
- Dowdell, T. D., and E. Press. 2002. “Restatement of In-Process Research and Development Write-Offs: The Impact of SEC Scrutiny.” Working paper, The Fox School of Business and Management, Temple University, Philadelphia, Penn.
- . 2004. “The Impact of SEC Scrutiny on Financial Statement Reporting of In-Process Research and Development expense.” *Journal of Accounting and Public Policy* 23 (3): 227–244.
- Dugan, I. J. 1999. “Merger Write-Off Targeted Accounting Change May Snag Tech Deals.” *The Washington Post* (February 25), E1.
- Financial Accounting Standards Board (FASB). 1975. “Applicability of FASB Statement No. 2 to Business Combinations Accounted for Under the Purchase Method.” *FASB Interpretation No. 4*. Stamford, Conn.: FASB.
- . 1985. *Accounting for the Cost of Computer Software to be Sold, Leased, or Otherwise Marketed. Statement of Financial Accounting Standards No. 86*. Stamford, Conn.: FASB.
- . 1999a. “Status Report No. 309,” *Financial Accounting Series no. 195-C*. January 13. Stamford, Conn.: FASB.
- . 1999b. “Status Report No. 311.” *Financial Accounting Series no. 195-C*. March 30. Stamford, Conn.: FASB.
- . 1999c. *FASB Action Alert*. May 12. Stamford, Conn.: FASB.
- . 2001a. *Business Combinations*. Statement of Financial Accounting Standards No. 141. Stamford, Conn.: FASB.

R&D-INTENSIVE INDUSTRIES

427

- . 2001b. *Goodwill and Other Intangible Assets. Statement of Financial Accounting Standards No. 142*. Stamford, Conn.: FASB.
- . 2001c. *Proposal for a New Agenda Project: Disclosure of Information About Intangible Assets not Recognized in Financial Statements*. Stamford, CT: FASB.
- Hall, B. 1993. "The Stock Market Value of R&D Investment During the 1980s." *American Economic Review* 83:259–264.
- Herhold, S. 1999. "Accounting Board Wants R&D Rule Ended." *San Jose Mercury Times* (February 25), online edition.
- Hirschey, M., and J Weygandt. 1985. "Amortization Policy for Advertising and Research and Development Expenditures." *Journal of Accounting Research* 23 (Spring): 326–335.
- Hopkins, P. E., R. W. Houston, and M. F. Peters. 2000. "Purchase, Pooling, and Equity Analysts' Valuation Judgments." *The Accounting Review* 75 (July): 257–281.
- Karafiath, I. 1988. "Using Dummy Variables in the Event Methodology." *Financial Review* 23:351–357.
- Lev, Baruch. 2001. E-mail communication to participants of the NYU Intangibles Conference.
- Lev, B., and T. Sougiannis. 1996. "The Capitalization, Amortization, and Value-Relevance of R&D." *Journal of Accounting and Economics* 21 (February): 107–138.
- Levitt, Arthur. 1998. "The Numbers Game." Remarks of Chairman Arthur Levitt at the NYU Center for Law and Business, New York, September 28. <http://www.sec.gov/news/speeches/spch2200.txt>.
- Linsmeier, T. J., J. R. Boatsman, R. H. Herz, R. G. Jennings, G. J. Jonas, M. H. Lang, K. R. Petroni, D. Shores, and J. M. Whalen. 1998. "Response to IASC Exposure Draft 60: Intangible Assets." *Accounting Horizons* 12 (3, September): 312–316.
- MacDonald, E. 1998a. "SEC Considers Limits on Acquisition Write-Offs." *Wall Street Journal* (August 21), Online edition.
- . 1998b. "SEC Chief Aims to Attack Abuses in Firms' Figures." *Wall Street Journal* (September 29), C25.
- . 1999a. "FASB Delays Killing Merger Write-Off." *Wall Street Journal* (July 29): A4.
- . 1999b. "Firms Say SEC Scrutiny of Earnings Goes too Far." *Wall Street Journal* (February 1), Online edition.
- . 1999c. "FASB to End Popular Write-Off for Research and Development." *Wall Street Journal* (February 25), Online edition.
- Mehta, S. 1998. "MCI WorldCom Sets Lower Charge for R&D Costs." *Wall Street Journal* (September 30), B6.
- Norris, F. 1999. "Merger Accounting: Fiction on Wall Street." *New York Times on the Web* (April 26).
- Pulliam, S., and M. Rose. 1998. "Heard on the Street: Lernout & Hauspie's Profit Picture Gets Cloudier as SEC Reviews Its Accounting for Acquisitions." *Wall Street Journal* (December 4), Online edition.
- R. G. Associates, Inc. 1999. *The Analyst's Accounting Observer* 8 (5, April 23).
- Schipper, K., and R. Thompson. 1983. "The Impact of Merger Related Regulations on the Shareholders of Acquiring Firms." *Journal of Accounting Research* 21:184–221.
- Schroeder, Michael. 1999. "High Technology Firms Are Upset Over SEC Crackdown on Write-Offs." *Wall Street Journal* (February 1), Online edition.
- "SEC official reports R&D write-offs fell by half due to rules." 1999. *Wall Street Journal* (April 30), Online edition.
- Securities and Exchange Commission (SEC). 1999. "Call for Research Issued at the American Accounting Association Annual Meeting." August 15, <http://www.sec.gov/news/extra/aaacall.htm>.
- . 2003. "Report Pursuant to Section 704 of the Sarbanes-Oxley Act of 2002," <http://www.sec.gov/news/studies/sox704report.pdf>.
- Sefcik, S. E., and R. Thompson. 1986. "An Approach to Statistical Inference in Cross-Sectional Models with Security Abnormal Returns as Dependent Variable." *Journal of Accounting Research* 24: 316–334.
- Thompson, R. 1985. "Conditioning the Return-Generating Process on Firm-Specific Events: A Discussion of Event Study Methods." *Journal of Financial and Quantitative Analysis* 20:151–168.
- Thompson, R. 1995. "Empirical Methods of Event Studies in Corporate Finance." In *Handbooks in Operations Research and Management Science, Vol. 9: Finance*. Edited by R. A. Jarrow, V. Maksimovic, and W. T. Ziemba, 963–992. Amsterdam: North-Holland.
- Turner, Lynn. 1998. Letter from the Office of the Chief Accountant to the AICPA SEC Regulations

- Committee Regarding the Need for Additional Guidance on In-Process Research and Development (September 9). <http://www.sec.gov/info/accountants/staffletters/aclr1009.htm>.
- . 1999. "Initiatives for Improving the Quality of Financial Reporting" (February 10). <http://www.sec.gov/news/speech/speecharchive/1999/spch252.htm>.
- Watts, R. L., and J. L. Zimmerman. 1986. *Positive Accounting Theory*. Englewood Cliffs, N.J.: (Prentice-Hall).
- White, H. 1980. "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity." *Econometrica* 53:1–16.
- Woolridge, R. 1988. "Competitive Decline and Corporate Restructuring. Is a Myopic Stock Market to Blame?" *Journal of Applied Corporate Finance* 1:26–36.