

**Accounting for Business Combinations:
A Test for Long-Term Market Memory**

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ABSTRACT

The purpose of this research is to examine whether accounting methods for business combinations (purchase and pooling-of-interests accounting) have a different effect on firms' market value of equity in the combination year and thereafter. In particular, after the accounting method is no longer disclosed in the financial statements, does it have an impact on market value of equity of the combined firms because the accounting figures are different? A five-year period subsequent to a particular business combination is used because public companies are not required to disclose the details of the combination for more than three years after the effective date of the combination. This research, thus, tests whether market participants still take into consideration the accounting method of past business combinations when this information is no longer disclosed in the financial statements. In addition to the testing of the impact of the accounting methods, the value-relevance of goodwill amortization is investigated.

The sample consisted of 100 U.S. business combination transactions during the period 1985–1995 (77 pooling firms and 23 purchase firms). The results do not indicate that market participants price pooling firms and purchase firms differently at the time of business combinations. The results, in addition, do not confirm that when the details of a particular business combinations do not appear in the financial statements, pooling firms' accounting figures have a more positive effect on security prices than those of purchase firms. It seems that market participant are able, even in the long term, to account for the accounting difference between purchase and pooling-of-interests. Also, goodwill amortization does not appear to be value relevant.

DEDICATION

I would like to dedicate this dissertation to my parents, Somphong Chatraphorn and Jiranan Chatraphorn. Without their continuous love, support, and encouragement throughout this process, I would not be able to complete this dissertation. I love you all very much.

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Chapter 1

Introduction

The purpose of this research is to examine whether accounting methods for business combinations (purchase and pooling-of-interests accounting) have a different effect on firms' market value of equity in the combination year and thereafter. A five-year period subsequent to a particular business combination is of interest because public companies are not required to disclose the details of the combination for more than three years after the effective date of the combination. This research tests whether market participants still take into consideration the accounting method of past business combinations when this information is no longer disclosed in the financial statements. In addition to the testing of the impact of the accounting methods, the value-relevance of goodwill amortization is investigated.

Accounting for business combinations has been a controversial issue since the Accounting Principles Board (APB) promulgated Opinion No. 16 (Business Combinations) and No. 17 (Intangible Assets) in 1970. Two methods of accounting for business combinations¹ were established, but a firm did not get to freely choose between the two alternatives. To qualify for pooling-of-interests accounting, twelve criteria² set

¹ The differences between the two accounting methods are provided in Appendix A. Walter (1999) also provides the differences in details.

² See Appendix B.

forth in APB No. 16, requiring the identification of management intent with respect to the combination, had to be met entirely; otherwise, purchase accounting was required for business combination transactions.

Throughout the history of mergers and acquisitions, purchase accounting was employed by most acquiring firms (Spero and Kreiser 1997; *Accounting Trends & Techniques* 1999). Approximately ten percent of business combinations during the period 1995–1998 were accounted for as poolings of interests (*Accounting Trends & Techniques* 1999). This number represented fifty-five percent by dollar volume of business combinations, however (King and Kelly 2000).

Some large business combinations were specially structured to allow the requirements of pooling-of-interests accounting to be met—for example, the merger of Daimler-Benz and Chrysler, SBC Communications and Ameritech, Exxon and Mobil, and Citicorp and Travelers Group (Duncan and Carleton 1999). Linsmeier et al. (1998) claim that acquiring firms consume substantial resources in structuring transactions solely to meet the requirements of pooling-of-interests accounting. For instance, in the acquisition of NCR in 1991, AT&T paid an immense premium (\$325 million) to satisfy pooling criteria in order to avoid a future decrease in earnings due to annual goodwill amortization (Lys and Vincent 1995; Walter 1999).

Goodwill is often a large component of the consideration paid from an acquirer to a target firm. Approximately 66 percent of acquisition prices represent the excess of consideration paid to a target firm over the target firm's book value of equity³ (Ayers et al. 2000). Acquiring firms have been reluctant to use purchase accounting because they had to recognize a material amount of purchased goodwill that would reduce future earnings when amortized. Consequently, if purchase accounting was applied, there was huge annual goodwill amortization subsequent to the business combinations, and sometimes a reported net loss following the combinations (Davis 1992).

This dissertation is organized as follows. In the next chapter, the stream of literature concerning business combinations is presented. Chapter 3 develops hypotheses. Chapter 4 describes research design and methodology. Chapter 5 shows the empirical results with an analysis. Chapter 6 provides expected contributions and limitations.

³ The excess of consideration paid (fair market value) to target firms over the target firms' book value is equivalent to the accounting acquisition premium. The accounting acquisition premium, therefore, consists of written-up assets and goodwill.

Chapter 2

Literature Review

The discussion in this chapter begins with the steps that the Financial Accounting Standards Board took in the deliberation process of the new accounting standards for business combinations and intangible assets. Next, a review of relevant literature in the business combination area is provided beginning with the association between the characteristics of an acquirer and a target firm and the accounting method applied in the transaction. Also discussed is the reaction of market participants to the combined firm's accounting figures. Literature on the value relevance of the goodwill asset is summarized. The last section of the chapter describes how this dissertation differs from prior research.

2.1 New Accounting Standards for Business Combinations

The first two accounting standards governing business combination transactions were Accounting Principle Board (APB) Opinion No. 16 (Business Combinations) and No. 17 (Intangible Assets), issued in 1970. The Accounting Principle Board was replaced by the Financial Accounting Standards Board (FASB) in 1973. Later that year, the FASB issued, “ Request for Views Concerning APB Opinions and Accounting

Research Bulletins,” and received feedback concerning the controversial accounting for business combinations. The FASB continued to work on this project and, in 1976, issued the Discussion Memorandum, “Accounting for Business Combinations and Purchased Intangibles.” The FASB, however, dropped the project in 1981 because of other higher priority projects.

The project was reconsidered again in 1996 when the Financial Accounting Standards Advisory Council agreed to support the addition of the project to the FASB’s agenda. The FASB later added the project to its agenda and organized a business combinations task force to review all related materials in the area and to set scope, direction, and conduct of the project, as stated in the FASB Special Report, “Issues Associated with the FASB Project on Business Combinations.” Based on the G4+1⁴ Position Paper, “Recommendation for Achieving Convergence on the Methods of Accounting for Business Combinations,” which suggests the purchase method as the only preferred method for the transaction, the FASB issued its Invitation to Comment, “Methods of Accounting for Business Combinations: Recommendations of the G4+1 for Achieving Convergence,” at the end of 1998.

After receiving many comment letters, the Financial Accounting Standards Board finally issued an exposure draft, “Business Combinations and Intangible Assets,” on September 7, 1999. The key reason is to promote international comparability and to reduce the volume of work that both the Securities and Exchange Commission and the FASB staffs spend in investigating the compliance with the pooling-of-interests requirements. Based on the exposure draft, pooling-of-interests accounting would no longer be an acceptable accounting method for business combinations. The goodwill amortization period would be reduced from 40 years to 20 years.⁵ To mitigate the earnings shocks resulting from the shorter amortization period, the FASB would allow

⁴ G4+1 stands for Group of Four Plus One. They are the Australian Accounting Standard Board, the New Zealand Financial Reporting Standards Board, the United Kingdom Accounting Standards Board, the FASB, and the International Accounting Standards Committee as an observer.

⁵ *Accounting Trends & Techniques* (1999) reported a survey of 1998-99 annual reports of 600 industrial, merchandising and service corporations, and found that approximately 50 percent amortized the goodwill over a 40-year period.

merging companies to disclose two earnings per share figures—the regular earnings per share and the earnings per share before goodwill charges.

In December 2000, the Financial Accounting Standards Board decided to change the amortization guideline set forth in the exposure draft. The FASB then issued a new Exposure Draft, “Business Combination and Intangible Assets—Accounting for Goodwill” dated February 14, 2001. Instead of requiring that firms amortize goodwill over the proposed 20-year period, the Board opted for reviewing purchased goodwill for impairment.

The Financial Accounting Standards Board finally passed the two new accounting standards for business combinations in June 2001. The new accounting standards are Statement of Financial Accounting Standard (SFAS) No. 141 (Business Combinations) and No. 142 (Goodwill and Other Intangible Assets). These new standards supersede APB Opinion No. 16 and 17, respectively. According to SFAS 141, only the purchase method of accounting is allowed for business combinations having an effective date after June 30, 2001. Pooling-of-interests accounting is no longer an acceptable accounting method for business combinations. Per SFAS 142, the FASB also notes that because the acquired entity is operationally combined into the acquiring entity, goodwill occurring from business combinations provides expected synergies. Goodwill, therefore, has an indefinite useful life and does not need to be amortized annually. However, goodwill will be tested for impairment at a reporting unit level at least once a year.

2.2 Firm-Specific Characteristics and Accounting Methods for Business Combinations

Several empirical studies have addressed the firm-specific characteristics of acquirers and acquirees that lead to the decision to apply purchase or pooling-of-interests method of accounting for business combination transactions. The decision to use either method depends on the acquirer’s percentage of insiders’ ownership, the existence of

accounting-based compensation plans, leverage-based lending agreements, and political visibility (size of the firm) (Davis 1990; Dunne 1990; Nathan and Dunne 1991; Aboody et al. 2000). Highly levered firms and highly politically visible firms tend to use the purchase method. In addition, acquirers with share repurchase plans in existence prior to a business combination prefer purchase-method accounting due to the pooling requirement of no post-acquisition share repurchases (Aboody et al. 2000). Manager-controlled firms are more likely to apply pooling-of-interests accounting than are owner-controlled firms. Managers whose compensations are tied to earnings prefer pooling-of-interests accounting because of the attendant larger net income and return on investment. Moreover, the likelihood of pooling increases with the size of the accounting acquisition premium (Gagnon 1967; Copeland and Wojdak 1969; Anderson and Louderback 1975; Nathan and Dunne 1991; Aboody et al. 2000). In other words, acquirers using the pooling method tend to incur greater accounting acquisition premiums than do those applying purchase accounting.

Robinson and Shane (1990) found that the size of target firms and the accounting method significantly affect the offer price. They note that the relative size of a target to an acquirer is negatively correlated with the offer price because an acquirer is unwilling to use voting common stock to acquire a large target firm. Robinson and Shane (1990) also present empirical evidence that, other things being equal, the bid premium to target firms is greater for business combinations accounted for as pooling-of-interests.

2.3 Market's Reaction to the Earnings of the Combined Firms

In the seminal article on the market reaction to earnings of pooling and purchase firms, Hong et al. (1978) examined the effect of accounting methods for business combinations on the stock prices of acquiring companies. They applied an events study technique using the market model. Their sample consisted of 37 purchase firms and 122 pooling firms, with data acquired for the period 1954–1964. Their findings show no abnormal returns associated with the first earnings announcement (quarterly or annually)

or with the first annual earnings announcement after pooling-of-interests combinations. They also examined the cumulative abnormal residuals (CARs) of both purchase and pooling firms at the merger effective date. The sample of pooling firms exhibited no significant price movement around the merger date. The purchase firms, on the other hand, showed a strong positive price movement in the year prior to the merger date. Hong et al. (1978) concluded that “investors do not seem to have been fooled by this accounting convention into paying higher stock prices even though firms in our sample using pooling-of-interests accounting report higher earnings than if they had used the purchase method” (42).

Davis (1990) replicated and extended Hong et al. (1978) by having a more recent period (1971-1982) and more firms in the sample (108 pooling firms and 69 purchase firms). Davis used weekly returns instead of the monthly returns used by Hong et al. (1978). His results are similar to those of Hong et al. (1978). Cumulative abnormal residuals were significantly positive in the period twenty-six weeks prior to the merger announcement date for the entire sample of both purchase and pooling firms. A subsample of purchase firms exhibited significantly positive CARs throughout the entire test period, while a subsample of pooling firms provided positive but insignificant CARs around the merger announcement date.

Norris and Ayres (2000) conducted an events study on the impact on security prices of the first earnings announcement of firms that combined using purchase accounting. They analyzed a sample of 116 business combinations during the period 1984 to 1990. All business combinations were paid with cash or a mixture of cash and less than 50% common stock, requiring that purchase methods be applied. Both daily returns and monthly returns around the first earnings announcement date were investigated. The findings indicate that market participants react negatively to the amortization of goodwill in the income statements of purchase firms. That is, both daily and monthly abnormal returns are significantly negative around the quarterly earnings releases. In addition, they found that the greater the size of goodwill amortization, the greater the negative impact on the abnormal returns. This result, however, is supported

only by the monthly returns data. Norris and Ayres (2000) asserted that investors perceive the existence of goodwill amortization throughout the earnings announcement period, not just on the announcement date.

Martinez-Jerez (2001) also used an events study technique to investigate how market participants assess pooling-of-interests transactions at the announcement date of the business combinations. Analyzing a sample of 335 stock swap acquisitions during the period 1990–1998, he found a negative and significant market reaction of 4.03 percent around the announcement date. He reasoned that the negative reaction results from “investors interpreting the choice of pooling as a signal of the underlying agency conflict between managers and shareholders” (p. 2). The conflict occurs because, under pooling requirements, the acquirers have to relinquish valuable real options (share repurchases and asset divestitures) for two years. The results, however, contradict the earnings fixation hypothesis and the accounting irrelevance hypothesis.

Vincent (1997) provides evidence on whether market participants react similarly to the accounting figures of both purchase firms and pooling firms. Instead of looking only at the goodwill amount, however, she investigated the entire accounting acquisition premium—the difference between price paid to a target and the target’s book value of equity—of both groups of firms. The results indicate that market participants do not recognize the premium as an asset for the pooling firms, whereas they believe the premium is undervalued (overamortized) on the purchase firms’ books. Vincent (1997) also provides contradictory evidence that the amortization of the premium for purchase firms is understated. The amortization of pooling firms’ accounting acquisition premium is, in contrast, positively value-relevant to the investors. In addition, she first compared the sample of purchase firms to that of pooling firms adjusted to an “as if purchased” basis, then compared the sample of pooling firms to that of purchase firms adjusted to an “as if pooling” basis. The market-to-book value ratios of both groups of firms were not statistically different after the acquisition year. Market participants, on the other hand, gave significantly larger price-earnings ratios to pooling firms in the year of and a few years after the merger when the ratio was adjusted to reflect the purchase characteristics.

The findings are still unclear as to whether market participants could adjust for the accounting differences among firms after business combinations.

Hopkins, Houston, and Peters (2000) conducted an experiment using buy-side equity-security analysts and portfolio managers as subjects. They examined whether the purchase/pooling accounting dichotomy and the number of years after the merger have some effects on firms' valuation. One hundred and thirteen analysts participated in the 3×2 between-subjects experiment. The independent variables were the accounting methods and the timing of the mergers, and the dependent variable was analysts' stock price assessments. The results suggest that the analysts give smaller values to combined firms using purchase accounting with subsequent annual goodwill amortization than those using pooling accounting. They also indicate that regular purchase-method combinations are valued less than those combinations in which purchase accounting was applied but for which the accounting acquisition premium was immediately expensed as in-process research and development. Subjects who analyzed financial statements of regular purchase-method firms further gave lower stock prices to those that merged three years earlier than those that merged in the study year. In addition, Hopkins et al. (2000) investigated the FASB's proposal to allow purchase firms to show earnings before goodwill amortization and goodwill amortization (net of tax) separately. The results show that the analysts assigned higher values to purchase firms applying the FASB-proposed income statement format than those using a traditional format. An empirical question still exists as to whether the overall findings can be applied generally to the competitive marketplace as a whole (Brown et al. 1999).

2.4 The Analysis of Goodwill

McCarthy and Schneider (1995) investigated whether market participants value goodwill as an asset on a firm's balance sheet during the five-year period 1988 through 1992. The analysis was based on the Feltham/Ohlson model—i.e., the market value of equity was regressed on non-goodwill assets, goodwill, liabilities, and net income. Their

findings indicate that the coefficient on goodwill is positive and highly significant across the entire test periods, suggesting that market participants perceive goodwill as an asset when assessing a firm's value.

Jennings et al. (1996) examined the relationship between equity values and accounting goodwill for U.S. business combinations occurring from 1982 to 1988. They constructed a model of market value of equity as a separate function of balance sheet elements and income statement elements. The results show that market participants perceive that purchased goodwill is an economic resource after the date of business combinations. By comparing the coefficients between the fixed assets and the goodwill, Jennings et al. (1996) concluded that “on average, either purchased goodwill is amortized ‘too quickly’ (i.e., over a period that is shorter than the expected duration of associated cash flow) or other assets are expensed ‘too slowly’” (521).

Wang (1993) provided empirical evidence on the value relevance of the purchased goodwill of companies in the service industry during the period 1988–1989. He employed a regression analysis of market value of equity on non-goodwill assets, goodwill, and liabilities, and tested the hypothesis that the goodwill coefficient would be equal to one. A deviation from one leads to overstated or understated goodwill. The results illustrate that market participants view reported goodwill as being undervalued when amortized according to the requirement of APB No. 17. This leads to the possibility that the maximum period allowed for goodwill amortization is too short.

Using the economic consequence theories of accounting choice, Hall (1993) determined what factors have an influence on a firm's selection of the goodwill amortization period. He hypothesized that there are three factors affecting the selection—debt contracting costs, political costs, and agency costs. The amortization period was regressed on the leverage ratio, firm size (measured by net sales), and the percentage of insiders' ownership, which are proxies for those three factors, respectively. The findings suggest that the length of the goodwill amortization period depends mainly on the firm's size and partly on the firm's leverage. That is, the greater the size of the

firm, the shorter the goodwill amortization period. Also, the higher the firm's leverage, the longer the goodwill amortization period.

2.5 The Present Research

The present research differs from previous research in several ways. First, this study looked specifically at the purchase/pooling accounting methods for business combinations. This allowed a closer examination of whether the decision to choose either method has an effect on the combined firms' market value of equity. Both purchase firms and poolings firms were investigated simultaneously. Second, this study included the most recent data on business combinations, particularly the combinations during the 1990s, some of which are very large in size (Duncan and Carleton 1999). Third, this study concentrated on the long-term memory of market participants. That is, it sought to examine the impacts of accounting for business combinations not only in the year of the acquisition but also during the five years subsequent to the combinations, which includes the periods when market participants have the opportunity to forget the method used in business combinations. This study further tested the value relevance of goodwill amortization during the five-year period following the combinations.

Chapter 3

Hypotheses

Based on the review of literature in Chapter 2, three hypotheses are developed in this chapter. The first concerns the reaction of market participants to financial statements disclosures by purchase and pooling firms in the year that a business combination occurs. The second hypothesis tests the market reaction to disclosures five years subsequent to the year of a business combination. The last hypothesis examines the value-relevance of goodwill amortization where the purchase method was applied.

3.1 The Effect on Stock Prices

Evidence is still inconsistent on whether the purchase/pooling accounting choice has an effect on security prices. Prior capital-market-based research indicates that market participants can see through the relatively larger earnings figures of pooling firms up to the end of an acquisition year (Hong et al. 1978; Davis 1990). Investors, on the other hand, favor purchase accounting at the announcement of the combination, but react negatively to the earnings releases of purchase firms (Norris and Ayres 2000). A recent behavioral research study shows contradictory evidence that security analysts value pooling firms ahead of purchase firms (Hopkins et al. 2000). The Financial Accounting

Standards Board (as noted in an exposure draft dated September 7, 1999) believes that pooling companies have competitive advantages over purchase firms due to the unrecognized fixed assets and intangibles of acquired firms. Purchase firms “face an unlevel playing field in competing for target companies with” pooling firms (FASB 1999, paragraph 84). In light of previous findings, this research tested whether the accounting method for business combinations has an effect on the market value of the equity of acquiring firms at the year of a business combination. The first hypothesis, stated in a null form, is:

H1₀: The method of accounting for business combinations has no effect on the combined firms’ security prices in the combination year.

The results of the analysis of the first hypothesis provide some evidence as to whether purchase/pooling figures get different treatment from investors even though there is no cash flow effect associated with the accounting differences.⁶ The results also provide some evidence concerning the appropriateness of the FASB’s intention to require all business combinations to be accounted for using purchase accounting. Specifically, failure to reject the first hypothesis would imply that market participants fail to differentiate the economic substance of the transaction from the form of the transaction in the acquisition year.

3.2 The Long-term Market Memory

Long-term market memory has been investigated in the context of accounting policy changes. Palepu (1987) reports that managers believe that market participants incur substantial costs when they attempt to adjust for accounting policy differences

across firms. Given current disclosure practices, it may be impossible for investors to assess the effect of changes in accounting policy following the year of the change (Schipper 1989). Even if investors are able to estimate the effects of the changes, they may simply forget the past accounting choices (Worthy 1984; Hopkins et al. 2000). Dharan and Lev (1993) show that, although investors are able to adjust for the effect of an accounting policy change in subsequent years, the adjustments may result from events (problems) occurring after the change.

Hand's (1990) findings support the extended functional fixation view that stock prices are determined sometimes by sophisticated investors and sometimes by unsophisticated investors. This view is a mixing of the efficient market hypothesis and the functional fixation hypothesis. The former implies that market participants are always able to see through the accounting data. The latter is a condition that investors "are fixated on the accounting output (for example, the profit output) and are unable to adjust to see that the change in output is due to the change in" accounting techniques (Belkaoui 1989, 21). This condition is applicable to less sophisticated investors who cannot differentiate the true cash flow implications of certain accounting information. These investors are likely to fixate to the disclosed earnings figures and to prefer the higher earnings of pooling firms. Because pooling-of-interests accounting generally produces higher earnings than purchase accounting in the combination year and thereafter, market participants tend to value pooling firms greater than purchase firms after the combination year. For example, Hopkins et al. (2000) provide evidence that pooling firms are awarded higher stock prices than purchase firms when the combination occurred three years ago. Further, security analysts place less value on purchase firms that merged three years ago than purchase firms that merged in current year.

Based on these previous empirical findings, the second hypothesis can be stated (in a null form):

⁶ Because the sample of purchase firms is limited to firms involved in tax-free reorganizations, the amortization of goodwill of those firms cannot be treated as an expense for tax purpose and, hence, there is

H2₀: When a particular business combination is no longer disclosed in the financial statements, pooling-of-interests accounting has the same effect on the combined firms' security prices as purchase accounting.

The Securities and Exchange Commission (SEC) requires that all public companies file an annual report (Form 10-K) that includes two years' audited balance sheets, three years' audited income statements, and three years' audited statements of changes in financial position. Therefore, the details of a particular business combination are disclosed in the annual report for at most three years after the effective date of the combination. Many firms typically show the details of business combinations in the notes to financial statements in the combination year and only one year afterward. It is expected that, after the three-year period, market participants are not as aware of that particular business combination and place greater value on pooling firms than on purchase firms. Five year-ends after the business combination are therefore selected for investigating the long-term effect of purchase/pooling accounting. Dharan and Rev (1993) and Vincent (1997) also used a five-year period for their longitudinal studies.

Rejection of the second hypothesis (H2) would suggest that market participants could not adjust the accounting figure differences between purchase firms and pooling firms when the details of the combinations no longer appear in the financial statements. The rejection would also confirm management's belief that investors fail to adjust earnings under both methods in subsequent years (Lys and Vincent 1995).

no tax saving. Pooling transactions are generally tax-free.

3.3 Income Statement Presentation: Traditional vs. FASB-Proposed Format

The third test is to examine the FASB's proposal to allow combined firms to separately disclose net income before and after goodwill charges, with separate disclosure of goodwill charges⁷ (net of tax) (FASB 1999). Jennings et al. (1996) found weak evidence, based on a sample of taxable and non-taxable combinations, that annual goodwill amortization is value-relevant based on a model expressing market value of equity as a function of only income statement elements. The coefficients on goodwill amortization expense were mostly negative but never significant in an annual regression analysis. Vincent (1997) showed a significantly negative coefficient on annual amortization of accounting acquisition premium in the first and second year subsequent to business combinations. A study by Brown et al. (1999) indicates a negative and marginally significant coefficient on intangibles amortization in a return-earnings regression equation.

This research seeks to investigate the value relevance of annual goodwill amortization of combined firms applying the purchase method in the year of and subsequent to the business combination using the well-known Feltham-Ohlson valuation model. The third hypothesis, stated in a null form, is:

H3₀: Goodwill amortization is not value-relevant.

A rejection of the third hypothesis would suggest that the goodwill amortization has an effect on stock prices even though the amortization provides no benefits from tax savings (only tax-free reorganizations would be used for this analysis). Rejection would also imply that market participants do not ignore the goodwill amortization in valuing a firm. The presentation of net income before goodwill charges therefore might not

mitigate the earnings shock from the increased goodwill charges due to a reduced goodwill amortization period. The rejection of H3 would also suggest that the FASB's proposal to permit two earnings figures is not necessary or appropriate.

⁷ Goodwill charges include goodwill amortization expense and goodwill impairment losses.

Chapter 4

Research Design and Methodology

To investigate the hypotheses developed in the previous chapter, this chapter advances valuation models based on the Feltham-Ohlson valuation model. Least-squares regression is used to analyze the data. Three models were built to examine the hypotheses. Data sources and data selection criteria are discussed in the last section.

4.1 Models

4.1.1 The Feltham-Ohlson Model

The Feltham-Ohlson model (Ohlson 1995; Feltham and Ohlson 1995) is the foundation of the valuation model in this dissertation. The model relates financial statement components directly to market value of equity without using dividends as a bridge. The model suggests that market value is a convex combination of a stock model of value and a flow model of value (Ohlson 1995). In other words, market value of equity can be expressed as book value plus discounted expected future abnormal earnings

assuming that the clean surplus relation⁸ and the linear information dynamics hold. Mathematically, the model can be shown as

$$P_t = b_t + \sum_{\tau=1}^{\infty} \frac{E_t[x_{t+\tau}^a]}{(1+r)^\tau} \quad (1)$$

where P_t = the security price at time t ,

b_t = the book value of equity at time t ,

x_t^a = abnormal earnings (or “residual income”) = $x_t - r \cdot b_{t-1}$,

x_t = earnings at time t , and

r = the discount rate.

Studies that utilize the model by regressing market value of equity on book value and net income are, for example, McCarthy and Schneider (1995), Vincent (1997), and Collins et al. (1997).

Ohlson (1995) derived the valuation model in equation (1) with the incorporation of the linear information dynamics assumption. The assumption states that abnormal earnings and nonaccounting information follow an autoregressive process, as follow:

$$x_{t+1}^a = \omega x_t^a + v_t + \varepsilon_{1,t+1}, \text{ and}$$

$$v_{t+1} = \gamma v_t + \varepsilon_{2,t+1},$$

where v_t = nonaccounting information,

ω and γ are known parameters between zero and one, and

ε 's are white-noise.

⁸ The clean surplus relation states that a change in book value results only from net income and dividends (net of capital contributions) (Ohlson 1995 and Feltham and Ohlson 1995).

The Feltham-Ohlson valuation model incorporating the linear information dynamics is:

$$P_t = b_t + \alpha_1 x_t^a + \alpha_2 v_t \quad (2)$$

where $\alpha_1 = \frac{\omega}{1 + r - \omega}$, and

$$\alpha_2 = \frac{1 + r}{[(1 + r - \omega)(1 + r - \gamma)]}.$$

Dechow et al. (1999), as suggested by Ohlson, define the nonaccounting information (v_t) as $v_t = f_t - r \cdot b_t - \omega x_t^a$, where f_t is the consensus forecast of the next period earnings. They utilized a 12% discount rate for the r . This number represents the long run average realized return on U.S. equities (Dechow et al. 1999). They also used earnings before extraordinary items and discontinued operations⁹ in the calculation of the abnormal earnings (x_t^a). They observed that “the valuation models incorporating information in analysts’ forecasts have the greatest ability to explain contemporaneous stock prices” (p. 29).

4.1.2 Dependent Variable

This study follows the Feltham-Ohlson valuation model as stated in equation (2). The only dependent variable is the security price (market value of equity) at time t or the time of the year-end of the financial statements.

⁹ Defining earnings as earnings before extraordinary items and discontinued operations violates the clean surplus relation. However, this prevents potential confounding effects of large one-time items (Barth, Beaver, Hand, and Landsman 1999, 2000; Bell, Landsman, Miller, and Yeh 2001; Dechow, Hutton, and Sloan 1999; Hand and Landsman 2000).

4.1.3 Independent Variables

According to the Feltham-Ohlson framework and equation (2), there are three main independent variables—book value of equity, abnormal earnings, and the nonaccounting information. The abnormal earnings and the nonaccounting information variables can be computed according to the definition provided in section 4.1.1. The book value of equity and net income (a component of abnormal earnings as described before), however, deserve more explanations. A firm's book value of equity (b_t) can be decomposed into book value of equity excluding an accounting acquisition premium and the premium. Likewise, the net income can be separated into net income before the amortization of the accounting acquisition premium and the amortization of the accounting acquisition premium.

The accounting acquisition premium—the difference between the consideration paid to an acquiree and the book value of the acquiree—can be calculated for both purchase and pooling firms. The amount that an acquirer pays to a target firm is equal to the market value of equity of the target firm. For pooling transactions, the market value of the target is calculated by multiplying the number of shares of an acquirer's common stock transferred to a target by the acquirer's closing stock price one business day prior to the announcement of the combination. On the other hand, the market value of the target in purchase transactions (the dollar amount of the deal) is generally available from the notes to the financial statements; otherwise, it is calculated in a manner similar to pooling transactions. The target's book value also needs to be determined and may not be available at the merger date. In that case, the target's book value is available from the most recent Form 10-K or 10-Q prior to the combination date.

The premium, which can be estimated from public sources, generally consists of two portions—written-up assets and goodwill. It is easy to determine both portions for purchase firms because the amount of goodwill from the combination is usually disclosed in the notes to the financial statements. Pooling firms show neither written-up assets nor goodwill in their financial statements, however. Therefore, the entire premium of both

groups of firms is entered into the regression analysis as an accounting acquisition premium.

4.1.4 Amortization Methods

4.1.4.1 Pooling Firms

Pooling firms do not recognize a premium in their books and, consequently, do not report amortization expense. The annual amortization expense must therefore be estimated. Vincent (1997) utilized two methods of estimating the amortization of the premium. The first is straight-line amortization over the average remaining depreciable life of acquirer's tangible assets. The author noted that, according to this method, the amortization period is often between ten and twenty years.

The second estimation method amortizes the premium over a forty-year period. This method does not take into account the fact that many companies amortize goodwill over a period less than forty years (*Accounting Trends & Techniques* 1999). In addition, not all of the premium is goodwill. An amortization period for the premium should be a weighted average of a depreciation period of fixed assets and an amortization period of intangible assets. Davis (1992) points out that goodwill is a large part of the accounting acquisition premium. Thus, the amortization period should lean toward a forty-year period (the maximum amortization period for goodwill).

A third method of amortizing the premium is thus proposed. The amortization period is based on the average goodwill amortization period of surveyed industrial and service firms in *Accounting Trends & Techniques* published annually by the American Institute of Certified Public Accountants. This method provides an amortization period that falls between those of the first two methods. According to the 1999 version of *Accounting Trends & Techniques*, the average amortization period of goodwill is approximately 35 years.

4.1.4.2 Purchase Firms

Each purchase firm's accounting acquisition premium can be decomposed into a written-up asset portion and a goodwill portion because the amount of goodwill is generally disclosed in the financial statements. The depreciation period of the written-up asset portion is based on the average remaining depreciable life of an acquirer's tangible assets. The annual amortization expense of the goodwill portion is based on the information provided in the notes to the financial statements.

4.1.5 Statistical Models

4.1.5.1 A Statistical Model for the First and Second Hypotheses

To address the first and second hypotheses following the Feltham-Ohlson valuation model, the following regression equation was used to investigate whether accounting methods for business combinations affect firm value in the acquisition year and thereafter.

$$\begin{aligned} MVE_{it} = & \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} \\ & + \beta_4 ABXBA_{it} + \beta_5 AAAP_{it} + \beta_6 ACCTG_i * AAAP_{it} \\ & + \beta_7 NAI_{it} + \varepsilon_{it} \end{aligned} \quad (3)$$

where: MVE_{it} = Market value of equity of firm i at time t ,

$BVEEAAP_{it}$ = Book value of equity excluding the accounting acquisition premium,

AAP_{it} = Accounting acquisition premium (net of accumulated amortization),

$ACCTG_i$ = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,
 $ABXBA_{it}$ = Abnormal earnings defined as earnings before one-time items and before amortization of accounting acquisition premium minus the discount rate times beginning book value of equity,
 $AAAP_{it}$ = Amortization of accounting acquisition premium, coded as a negative term,
 NAI_{it} = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter times the abnormal earnings,
 ε_{it} = A stochastic residual term to satisfy OLS assumptions, and
 $t = \{0,1,2,\dots,5\}$ = The end of the acquisition year and one to five year-ends following the acquisition.

All quantitative variables in equation (3), were deflated by the weighted average number of shares of common stock outstanding at the end of the year (per-share data) to reduce the effect of heteroscedasticity. The interaction terms between the dummy variable and other quantitative variables ($ACCTG_i * AAP_{it}$ and $ACCTG_i * AAAP_{it}$) are added to allow for differences in the slope of the regression equations between the two groups of firms (pooling firms and purchase firms). This can be seen by substituting $ACCTG = 1$ and $ACCTG = 0$ for purchase firms and pooling firms, respectively, in the equation (3).

Purchase firms:

$$\begin{aligned} E(MVE_{it}) = & \beta_0 + \beta_1 BVEEAAP_{it} + (\beta_2 + \beta_3) AAP_{it} \\ & + \beta_4 ABXBA_{it} + (\beta_5 + \beta_6) AAAP_{it} + \beta_7 NAI_{it} \end{aligned} \quad (4)$$

Pooling firms:

$$\begin{aligned} E(MVE_{it}) = & \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} \\ & + \beta_4 ABXBA_{it} + \beta_5 AAAP_{it} + \beta_7 NAI_{it} \end{aligned} \quad (5)$$

If differences in the accounting methods for business combinations have no effect on firms' market value of equity, the coefficients β_3 and β_6 should be insignificantly different from zero. A difference in slopes of AAP_{it} and $AAAP_{it}$ between equation (4) and (5), would indicate that the accounting methods for business combinations (purchase and pooling-of-interests) have different effects on the market value of equity. If the coefficients on AAP_{it} or $AAAP_{it}$ of pooling firms are greater than those of purchase firms, implying that β_3 or β_6 are significantly negative¹⁰, pooling firms' financial statements have a more positive effect on security prices than those of purchase firms. This would lead to the rejection of the first two hypotheses (H1₀ and H2₀).

4.1.5.2 A Statistical Model for the Third Hypothesis

A second model is presented to investigate the value-relevance of the goodwill amortization of *purchase* firms. This model includes only purchase firms because pooling firms do not recognize purchased goodwill in their financial statements. The

¹⁰ According to equation (4) and (5), the coefficients on AAP of purchase and pooling firms are $(\beta_2 + \beta_3)$ and (β_2) , respectively. Larger coefficient on AAP of pooling firms means that $(\beta_2) > (\beta_2 + \beta_3)$ or $0 > (\beta_3)$ which implies that β_3 is less than zero or is significantly negative.

model is similar to the equation (2). Only the goodwill amortization is separated out, however. The book value of equity remains intact. The regression model can be stated as:

$$MVE_{it} = \gamma_0 + \gamma_1 BVE_{it} + \gamma_2 ABXBG_{it} + \gamma_3 GWA_{it} + \gamma_4 NAI_{it} + \eta_{it} \quad (6)$$

where: BVE_{it} = Book value of equity of firm i at time t,

$ABXBG_{it}$ = Abnormal earnings defined as earnings before one-time items and before goodwill amortization minus the discount rate times beginning book value of equity,

GWA_{it} = Goodwill amortization, coded as a negative term, and

η_{it} = A stochastic residual term to satisfy OLS assumptions.

All variables in equation (6), were divided by the weighted average number of shares of common stock outstanding at the end of the year to lessen the effect of heteroscedasticity. A significantly positive coefficient on goodwill amortization expense (γ_3) would allow rejection of the third hypothesis ($H3_0$). This would lead to a conclusion that market participants incorporate the goodwill amortization expense in their valuation of a firm's stock price and the amortization expense reduces the firm's value. Rejection of $H3_0$ would also suggest that the earnings shocks would still exist if the FASB shortens the amortization period to 20 years. This dissertation, however, does not seek to investigate whether or not the proposed 20-year amortization period is appropriate.

For comparison purpose, a third model was constructed to investigate whether market participants implicitly recognize goodwill amortization of *pooling* firms as an expense. Only the pooling firms were included in the sample for this model. Because pooling firms do not amortize goodwill in their income statements, the amortization of accounting acquisition premium was used as a surrogate. Similar to the second model, the third model can be stated as (all variables are per-share data):

$$MVE_{it} = \alpha_0 + \alpha_1 BVE_{it} + \alpha_2 ABXBA_{it} + \alpha_3 AAP_{it} + \alpha_4 NAI_{it} + \xi_{it} \quad (7)$$

where: ξ_{it} = A stochastic residual term to satisfy OLS assumptions.

Because pooling firms do not have to amortize goodwill annually, the coefficient on the amortization of accounting acquisition premium (α_3) was expected to be not significantly different from zero. Investors' fixation on disclosed earnings of pooling firms should also support the expectation.

4.2 Data

4.2.1 Data Sources

Business combination data were obtained from the Mergers & Acquisitions database maintained by Thomson Financial Securities Data (formerly known as Securities Data Corporations). The database contains the comprehensive information concerning mergers and acquisitions in the United States from 1979 up until now. The information includes, for example, acquirer and target profiles, deal terms, deal value and stock premiums, and deal status. The Mergers & Acquisitions database was accessed through the internet using the software program "SDC Platinum" version 2.1.1.0. The program asks for searching criteria, such as the characteristics of companies, deals, advisors/fees, and financial information, and then runs the search and prints out a report.

Additional information concerning a business combination was collected from either annual reports or Forms 10-K. There are four sources to search for these reports. The first includes "Disclosure 10-K" and "Disclosure Annual Report" microfiche kept at the Center for Alternative Media at Newman Library at Virginia Tech. The collection consists of the reports up until 1994. The second source, NAARS, contains annual

reports of most public firms from 1972 to 1995. This database is a part of “LEXIS-NEXIS Academic Universe,” which can be reached through the library website <<http://www.lib.vt.edu>>.¹¹ The third source is the “Compact D/SEC” CD-ROM, maintained at the Newman Library under the call number “HG 4001 C65.” The CD-ROMs provide 10-K (annual) and 10-Q (quarterly) reports of public firms from September 1990 to the present. The final source is the EDGAR database of the Securities and Exchange Commission <<http://www.sec.gov>>. The database shows 10-K and 10-Q reports from 1993 through 2001.

Financial statement data, security prices, and earnings forecasts were obtained from COMPUSTAT, CRSP, and I/B/E/S, respectively. These databases can be accessed through Wharton Research Data Services (WRDS) <<http://wrds.wharton.upenn.edu>>.

Standard and Poor’s is the supplier of the COMPUSTAT database, which contains financial statement items of publicly held companies. Data are generally available for a maximum of twenty years. COMPUSTAT supplied the following annual data for this dissertation: “Total Stockholders’ Equity” (DATA216), “Net Income (Loss)” (DATA172), “Extraordinary Items and Discontinued Operations” (DATA48), and “Common Shares Used to Calculate EPS” (DATA54). All variables are shown in the database in millions of dollars, except the last one, which is expressed in millions.

CRSP (Center for Research in Security Prices at the University of Chicago) maintains information concerning stock prices of NYSE, AMEX, and NASDAQ listed firms. The stock price data are available from December 1925 to the present. The data item obtained from CRSP for this dissertation is the “Closing Price” (PRC).

I/B/E/S, created over twenty years ago, is a database providing primarily earnings forecasts. The database furnishes data concerning the mean estimates of one-year ahead

¹¹ From Newman Library website, click on “catalogs, directories, reference” and then click on a link to “LEXIS-NEXIS Academic Universe.” This will lead to the LEXIS-NEXIS website. Then, click on a “Business” icon and a “Company Financial” link. Next, change the “Source” to NAARS. From this point, anyone can search for the annual reports using a company name.

earnings forecasts (MEANEST). The data were used as the consensus analyst forecast of next period earnings in the computation of the nonaccounting information variable.

4.2.2 Data Selection Criteria

To be included in the sample, the business combinations had to satisfy the following criteria:

- 1) Consideration paid to target firms was greater than ten percent of acquirer's net assets. This is to ensure that small business combinations are not included. The inclusion of small acquisitions tends to dilute the impact of the merger events on average residuals (Hong et al. 1978; Davis 1990).
- 2) Consideration paid to target firms was greater than target firms' book value. This criterion guarantees that the accounting acquisition premium exists.
- 3) Only tax-free reorganizations were included. This criterion excludes taxable transactions. The criterion also implies stock-for-stock business combinations, which controls for the potentially confounding effects of taxes, liquidity, asymmetric information, ownership dilution, and other factors related to the method of acquisition accounting (Aboody et al. 2000).
- 4) Both acquirers and acquirees were U.S. firms actively traded on the U.S. organized exchanges. This forth criterion identifies the business combinations that are governed by U.S. accounting standards—i.e., APB No. 16 and APB No. 17. This criterion also limits the sample to firms that are likely to be actively traded to ensure the availability of financial data.

- 5) There were no other major business combinations (defined by criterion 1) by the same acquirer during the five-year period prior to and subsequent to a business combination included in the sample.

Business combinations occurring during the period 1985–1995 were included in the sample. Five year-ends prior to and five year-ends subsequent to the business combinations were also investigated; therefore, the analysis of the business combinations spanned the time period 1980–2000. Year 2000 was the last year that the information concerning the financial statements and stock prices was available in WRDS (at the time this dissertation was conducted).

4.2.3 Sample Construction

The details of business combinations were identified using the M&A database by applying the following criteria (in order): 1) Date Effective/Unconditional: 1/1/1985 to 12/31/1995, 2) Deal Status: C (Complete), 3) Acquirer Nation: U.S., 4) Target Nation: U.S., 5) Acquirer Public Status: P (Public), 6) Target Public Status: P, 7) Acquisition Techniques: 32 (Stock Swap), 8) Percent of Shares Acquired in Transaction: 90 to 100. Running the search using the above criteria yielded 1,031 business combinations. The search command “Percent of Shares Acquired in Transaction: 90 to 100” was imposed because it would give transactions that had a possibility that pooling-of-interests accounting might be applied in the business combinations.¹²

Next, each transaction was verified with the details in the notes to the financial statements of each acquirer. Some transactions were deleted due to the violation of criterion five (a clean combination before and after), criterion three, criterion two, or criterion one. An additional group was removed because the data were incomplete (no target firm’s book value, no earnings forecasts in I/B/E/S, no data in COMPUSTAT or CRSP, and/or less than 6 years of financial data). The final sample consisted of 100 U.S.

¹² See Appendix B: Criteria for Pooling-of-Interests Accounting.

business combinations between 1985 and 1995 (77 pooling firms and 23 purchase firms). Table 1 shows the details of how the sample was constructed. The names of the firms in the sample are listed in Appendix C.

Table 1
Sample Construction

1985–1995 U.S. business combinations of public firms	5,429
<u>Less</u> Stock swap with less than 90% of shares transferred	<u>(4,398)</u>
Business combinations with a possibility of pooling-of-interests	1,031
<u>Less</u> Transactions that fail to meet a clean business combination criterion*	(762)
Taxable business combinations	(80)
Price paid less than a target firm's book value	(7)
Price paid less than 10% of an acquirer's net assets	(3)
Incomplete data	<u>(79)</u> <u>(931)</u>
Total sample size	<u><u>100</u></u>
Pooling firms	77
Purchase firms	<u>23</u>
Final sample	<u><u>100</u></u>

* A clean business combination means that there were no other major business combinations done by the same acquirer during the five-year period prior to and subsequent to a business combination included in the sample.

Chapter 5

Analysis of Results

This chapter provides the results of the regression analyses of the valuation models described in the previous chapter. Descriptive statistics of the data are displayed first. Next, the results of an investigation into whether statistical assumptions underlying the regression analyses were violated are presented. Outliers and high influence points that were deleted from the analysis are noted. The last two sections discuss the results and provide conclusions.

5.1 Descriptive Statistics

5.1.1 Acquirers and Target Firms

Table 2 presents the details of the business combinations of 100 firms included in the sample. The table comprises four panels—Panel A: Distribution of Business Combination Transactions by Year, Panel B: Distribution of Business Combination Transactions by Acquirer’s Industry, Panel C: Distribution of Business Combination Transactions by Amount of Deal, and Panel D: Dollar Amounts. According to Table 2,

Table 2
Details of Business Combination Transactions

Panel A: Distribution of Business Combination Transactions by Year

Year	Pooling		Purchase		Total	
	Firms	%	Firms	%	Firms	%
1985	4	5.2	2	8.7	6	6
1986	5	6.5	1	4.3	6	6
1987	12	15.6	1	4.3	13	13
1988	11	14.3	3	13.1	14	14
1989	7	9.1	3	13.1	10	10
1990	5	6.5	0	-	5	5
1991	6	7.8	2	8.7	8	8
1992	4	5.2	5	21.8	9	9
1993	9	11.7	4	17.4	13	13
1994	4	5.2	1	4.3	5	5
1995	10	12.9	1	4.3	11	11
Total	77	100%	23	100%	100	100%

Table 2, continued
Details of Business Combination Transactions

Panel B: Distribution of Business Combination Transactions by Acquirer's Industry

Two-Digit SIC Code and Industry Name	Pooling		Purchase		Total	
	Firms	%	Firms	%	Firms	%
01 Agricultural product – crops	-		1	4.34	1	1
10 Metal mining	-		1	4.34	1	1
13 Oil & gas extraction	1	1.30	1	4.34	2	2
20 Food & kindred products	1	1.30	-		1	1
21 Tobacco products	1	1.30	-		1	1
22 Textile mill products	-		1	4.34	1	1
26 Paper & allied products	1	1.30	-		1	1
27 Printing & publishing	1	1.30	-		1	1
28 Chemicals & allied products	5	6.49	2	8.70	7	7
32 Stone, clay, & glass products	1	1.30	-		1	1
34 Fabricated metal products	2	2.60	1	4.34	3	3
35 Industrial machinery & equipment	5	6.49	1	4.34	6	6
36 Electronics & other electric equip.	4	5.19	3	13.04	7	7
38 Instruments & related products	4	5.19	1	4.34	5	5
39 Misc. manufacturing industries	1	1.30	-		1	1
46 Pipelines, except natural gas	1	1.30	-		1	1
48 Communication	3	3.90	1	4.34	4	4
49 Electric, gas, & sanitary services	2	2.60	-		2	2
51 Wholesale trade – non-durable	-		1	4.34	1	1
53 General merchandise stores	2	2.60	-		2	2
56 Apparel & accessory stores	-		1	4.34	1	1
58 Eating & drinking places	1	1.30	-		1	1
59 Miscellaneous retail	1	1.30	-		1	1
60 Depository institutions	17	22.07	1	4.34	18	18
63 Insurance carriers	2	2.60	1	4.34	3	3
64 Insurance agents	2	2.60	-		2	2
67 Holding & other investment office	2	2.60	2	8.70	4	4
73 Business services	11	14.28	2	8.70	13	13
80 Health services	4	5.19	-		4	4
82 Educational services	1	1.30	-		1	1
83 Social services	-		1	4.34	1	1
87 Engineering & Mgt. services	1	1.30	1	4.34	2	2
Total	77	100%	23	100%	100	100%

Table 2, continued
Details of Business Combination Transactions

Panel C: Distribution of Business Combination Transactions by Amount of Deal

Dollar Amount of Transaction (in millions)	Pooling		Purchase		Total	
	Firms	%	Firms	%	Firms	%
< \$50	20	26	8	35	28	28
\$51 – \$100	16	21	7	31	23	23
\$101 – \$200	13	17	4	17	17	17
\$201 – \$500	15	19	1	4	16	16
\$501 – \$1,000	6	8	2	9	8	8
> \$1,000	7	9	1	4	8	8
Total	77	100%	23	100%	100	100%

Table 2, continued
Details of Business Combination Transactions

Panel D: Dollar Amounts

	Pooling		Purchase		P-value	
	Mean	Median	Mean	Median	t-test	Wilcoxon
Acquirer's market value	\$1,381	\$527	\$1,878	\$417	0.5800	0.5609
Target's market value	\$562	\$116	\$242	\$89	0.1100	0.0630
(Transaction value)						
Acquisition premium	\$389	\$70	\$89	\$35	0.0150	0.0238

Unit: Millions of dollar

Panel A, business combination transactions in the sample are distributed fairly evenly across the sample period.

An inspection of Panel B of Table 2 shows that the banking industry (SIC code 60) prefers pooling-of-interests accounting in business combination transactions. Approximately twenty-two percent of sample firms (poolings) are in the banking industry. This also confirms the findings by Moehrle et al. (2000) that banks generally prefer pooling treatment. The second concentration of pooling firms is in the business services industry (computer software, computer systems, computer services, etc.) (SIC code 73). The sample purchase firms are distributed fairly evenly across industries in the sample, with the largest group in the electronics industry. Over the entire sample, firms in the banking and business services industry account for nearly one-third of the total.

Panel C of Table 2 shows the details of the transactions by dollar amount of the deal. Approximately half of the pooling transactions in the sample were valued at a hundred million dollars or less, while more than sixty percent of the purchase transactions in the sample were valued at no more than a hundred million dollars. Seven pooling firms paid more than a billion dollars, whereas only one purchase firm is that large. Panel D of Table 2 displays the mean and median of the transactions in terms of the transaction value and the accounting acquisition premium, as well as the size of the acquirers. The test of differences between pooling firms and purchase firms is also offered. Because the data are highly skewed (Mean >> Median), the distribution-free Wilcoxon rank sum test provides more reliable results. As can be seen from Panel D of Table 2, the median dollar value of the business combinations of pooling firms is greater than that of purchase firms (\$116 vs. \$89 million, $p = 0.0630$). In addition, the median amount of the accounting acquisition premium of pooling firms is significantly larger than that of purchase firms (\$70 vs. \$35 million, $p = 0.0238$). This also supports the previous results that acquirers pay more for a transaction where pooling-of-interests accounting is applied (Gagnon 1967; Copeland and Wojdak 1969; Anderson and Louderback 1975; Nathan and Dunne 1991; Aboody et al. 2000). With respect to the acquirers' size, as measured by the market value of equity, however, there is no

significant difference between the median dollar value of pooling acquirers and purchase acquirers.

5.1.2 Response Variable and Regressors

In order to present descriptive statistics of the abnormal earnings and the nonaccounting information variables, the persistence parameter (the autoregressive coefficient), ω , must be computed. Table 3 shows the estimation of the persistence parameter. The abnormal earnings were calculated by subtracting the expected returns on the beginning book value of equity from the earnings at the end of the period. The discount rate used was 12 percent (based, as in Dechow et al. (1999), on the long-term average stock market returns). The abnormal earnings were divided by weighted average number of shares of common stock outstanding at the end of the year. The data were pooled and analyzed using the maximum likelihood method. According to Table 3, the estimate of the persistence parameter is approximately 0.74 and is statistically significant. In addition, the persistence parameter is significantly different from the polar extremes of zero and one. This can be seen by the 95 percent confidence limits, which fall between 0.65 and 0.83. Therefore, $\omega = 0.74$ was used in the calculation of the nonaccounting information (see equation (2), and the accompanying discussion in section 4.1.1).

Table 4 presents descriptive statistics of variables used in the regression analysis. There are six panels in the table. Each represents one year of data. Year zero is the year that the business combination occurred. Year one represents one fiscal year following the combination, and so on. The market value of equity (MVE) is the response variable. All others are the regressors.

The SAS[®] System Version 8, developed by SAS Institute Inc., was used to analyze the data in this dissertation. The outputs in Table 4 were computed using SAS PROC CORR with PEARSON and SPEARMAN options. For all years, the means of the market value of equity are greater than the medians, suggesting a skewed distribution of

Table 3
The Estimation of the Persistence Parameter

$$x_{t+1}^a = \omega_0 + \omega_1 x_t^a + \varepsilon_{t+1}$$

Parameter	Estimate	P-value	95% Confidence Limits	
			Lower	Upper
Intercept	-0.06	.4255	-0.20	0.08
ω_1	0.74	<.0001	0.65	0.83

Definition of Variables: (All variables are per-share data.)

x_t^a = abnormal earnings at time t = $x_t - r \cdot b_{t-1}$,

x_t = earnings at time t,

r = the discount rate (12%), and

b_{t-1} = the book value of equity at time t-1.

Data were pooled and analyzed using the maximum likelihood method.

Table 4
Descriptive Statistics

Panel A: Year 0

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
MVE	100	25.76	21.56	17.87	1.72	111.25
BVEEAAP	100	12.07	10.18	9.15	0.19	45.53
AAP	100	3.63	2.58	4.65	0.02	32.67
ABXBA	100	-0.47	-0.15	1.51	-7.04	3.11
NAI	100	-0.25	-0.25	2.49	-5.86	8.42

Panel B: Year 1

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
MVE	100	23.27	19.75	14.38	1.31	81.38
BVEEAAP	100	11.67	10.19	8.73	0.60	51.52
AAP	100	2.95	1.99	3.82	0	32.46
ABXBA	100	-0.59	0.04	2.29	-6.12	6.61
AAAP	100	0.09	0.06	0.10	0	0.83
NAI	100	-0.13	-0.37	2.25	-5.22	9.45

Panel C: Year 2

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
MVE	100	24.35	20.50	17.91	2.75	95.25
BVEEAAP	100	11.80	10.00	9.06	0.45	58.78
AAP	100	2.76	1.91	3.79	0	32.69
ABXBA	100	-0.69	-0.75	2.34	-9.05	7.15
AAAP	100	0.07	0.06	0.10	0	0.86
NAI	100	0.08	-0.07	1.98	-5.41	9.62

Table 4, continued
Descriptive Statistics

Panel D: Year 3

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
MVE	100	25.51	23.44	18.19	2.38	81.25
BVEEAAP	100	11.65	10.60	7.95	0.33	39.96
AAP	100	2.62	1.77	3.96	0	35.02
ABXBA	100	-0.65	-0.36	2.22	-11.12	4.13
AAAP	100	0.08	0.05	0.11	0	0.95
NAI	100	0.34	0.23	2.03	-4.23	10.71

Panel E: Year 4

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
MVE	100	26.80	21.69	19.07	2.00	89.94
BVEEAAP	100	11.59	10.03	8.05	0.48	45.33
AAP	100	2.43	1.36	4.06	0	35.56
ABXBA	100	-0.17	-0.11	1.96	-8.21	5.29
AAAP	100	0.07	0.05	0.11	0	1.02
NAI	100	-0.08	-0.15	1.84	-4.01	8.03

Panel F: Year 5

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
MVE	100	27.70	21.50	21.87	0.94	88.87
BVEEAAP	100	11.35	10.28	8.49	-2.01	44.44
AAP	100	2.19	1.25	3.90	0	35.69
ABXBA	100	-0.14	0.05	2.22	-8.02	6.06
AAAP	100	0.07	0.04	0.11	0	1.02
NAI	100	-0.23	-0.26	1.97	-6.25	6.78

Table 4, continued
Descriptive Statistics

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABXBA = Abnormal earnings defined as earnings before one-time items and before amortization of accounting acquisition premium minus the discount rate (12%) times beginning book value of equity,

AAAP = Amortization of accounting acquisition premium, coded as a negative term,

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

The amortization method (for pooling firms) is based on a 40-year period.

the response variables. The minimum and maximum values of MVE also indicate that there are some outliers in the data set (MVE is always positive).

The data for the regressors are expressed as per-share amounts (the regressors are divided by a weighted average number of shares of common stock outstanding at the end of the year). The accounting acquisition premium (AAP) should systematically decrease year-by-year but the maximum value of AAP increases in year 3. This is possible because data are given on a per-share basis. The total dollar amount of the premium, however, does decrease in year three, four, and five. In addition, the mean and median of AAP monotonically decrease from year zero to year five. The amortization method of pooling firms' AAP as shown in Table 3 is based on the 40-year period, but the amortization period for purchase firms is the period disclosed in the financial statements.

It is interesting to note that the means of the abnormal earnings are negative in all years. The numbers, nevertheless, increase and are close to positive in year four and five. The nonaccounting information variables show both positive and negative numbers.

5.2 Diagnostics

The regression used to test the first and second hypotheses was initially run based on the statistical model in equation (3). The results of the analysis show problems concerning the statistical assumptions underlying the regression analysis.

Multicollinearity posed the biggest concern. Because a part of the “accounting acquisition premium” (AAP) is systematically amortized and the amount goes to the “amortization of the accounting acquisition premium” (AAAP), both variables are highly correlated. Pearson correlation coefficients for the year-by-year analysis are all greater than 0.9, and significant at less than the 0.0001 level. Multicollinearity detection devices (variance inflation factors and condition index) also suggest the problem is severe.¹³ To overcome the problem, two separate regression equations were run. The first equation

was similar to equation (3), but the net income was not decomposed into two parts (net income before the amortization and the amortization of the accounting acquisition premium). The second equation was also similar to equation (3), but the book value of equity was combined into one term. Because the second equation did not reveal any significant regression coefficients, the analyses in this dissertation were based solely on the first equation, or

$$MVE_{it} = \beta_0 + \beta_1 BV EEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} + \beta_4 ABX_{it} + \beta_5 NAI_{it} + \varepsilon_{it} \quad (8)$$

where ABX_{it} = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and all other terms are defined as before.

The next subsections describe the adequacy of the regression model. The statistical assumptions are: 1) the error terms have zero expectation, 2) the error terms are normally distributed, 3) the error terms are uncorrelated, and 4) the error terms have constant variance. In addition, multicollinearity among the regressors is discussed.

5.2.1 Outliers and High Influence Points

Outliers are defined as “individual data points that do not fit the trend set by the balance of the data” (Myers 1990, 221). In other words, outliers are unusual observations in y (response variable) space. Identification of outliers also helps to reduce the violation of statistical assumptions. A common tool used to detect outliers is “ R -Student,” which follows the Student- t distribution. Myers (1990) and Montgomery, Peck, and Vining (2001) recommend that an observation should be treated as an outlier if its R -Student

¹³ The results of the regression analysis based on equation (3) are provided in Appendix D.

value (in absolute terms) is greater than $t_{\alpha^*, df}$, where α^* is equal to the significance level divided by twice the total observations and df is the degrees of freedom, which is equal to total observations minus total parameters minus one. An informal rule of thumb is that any observation that has an R -Student greater than two in magnitude could be a potential outlier (Myers 1990).

High influence points are observations that are unusual in both x (regressors) space and y (response variable) space. A high influence point has an impact on the regression analysis in that it can shift the regression line in its direction. One measure for the high influence points is Cook's D, which compares all regression coefficients simultaneously. Montgomery et al. (2001) suggest that an observation with Cook's D greater than one could be a potential high influence point.

A single point deletion scheme (DFBATAS) can be applied to detect the high influence points. DFBATAS provides the difference between the regression coefficient ($\hat{\beta}_j$) and the coefficient without the observation i in the calculation of the coefficient estimates ($\hat{\beta}_{j,-i}$). It detects size changes (in standard error units) in the regression coefficient when one of the observations is removed from the data set. A large value (in an absolute term) of DFBATAS for any one observation suggests that the observation has some influence on the regression coefficient. Myers (1990) and Montgomery et al. (2001) recommend that an observation be considered a high influence point if $|\text{DFBATAS}| > 2/\sqrt{n}$, where n is the total number of observations. In this study, the number of observations in each year is equal to 100; therefore, the cutoff point for $|\text{DFBATAS}|$ is equal to $2/\sqrt{100}$ or 0.2.

SAS PROC REG with R and INFLUENCE options in the MODEL statement was run to provide the value for R -Student, Cook's D, and DFBATAS for each observation. Because the measures are inter-related, an observation with high R -Student value tends also to have a high Cook's D value and a high DFBATAS. Any observation that was either an outlier or a high influence point was eliminated from the data set. Ten, nine,

eleven, ten, nine, and ten data points were deleted from the data in years zero to five, respectively. Therefore, the total observations analyzed in years zero to five were 90, 91, 89, 90, 91, and 90, respectively.

5.2.2 Normality

One statistical assumption of the regression model is that the error term is normally distributed. This assumption is required for hypothesis testing of the regression coefficients. SAS has a procedure for testing normality of the residuals by using PROC UNIVARIATE with NORMAL and PLOT options to test the residual variable from the regression analysis (PROC REG). Both Shapirol-Wilk and Kolmogorov-Smirnov (hereafter, S-W and K-S, respectively) statistics were used for testing normality under the null hypothesis that the residuals are normally distributed.

Table 5 provides normality tests for the data set. Panel A of Table 5 presents the tests for the original data. Per Panel A, the error terms are not normally distributed in the regression analysis for year zero, one, and four according to S-W statistic (p-values are 0.0044, 0.0224, and 0.0346, respectively). The K-S statistic reveals the same results. When the data were transformed using a square root transformation of the response variable (MVE), however, the null hypothesis that the error terms follow a normal distribution could not be rejected under both Shapiro-Wilk and Kolmogorov-Smirnov statistics (all p-values are greater than 0.1500). The results of the normality check for the transformed data are presented in Table 5, Panel B. Because the direction and the significance of the coefficients of the transformed data are similar to those of the original data, the results reported in this dissertation are based on the original data without any transformation.

In addition, the assumption that the error term has a zero expectation was checked. The violation of this assumption leads to the biased estimator ($\hat{\beta}$) of the true

Table 5
Tests for Normality

Panel A: Original Data

The dependent variable is market value of equity (MVE).

The amortization method (for pooling firms) is based on a 40-year period.

Year	n	Shapiro-Wilk		Kolmogorov-Smirnov	
		Statistic	P-value	Statistic	P-value
Year 0	90	0.96	0.0044	0.11	0.0105
Year 1	91	0.97	0.0224	0.10	0.0266
Year 2	89	0.98	0.1815	0.07	>0.1500
Year 3	90	0.99	0.4455	0.07	>0.1500
Year 4	91	0.97	0.0346	0.12	<0.0100
Year 5	90	0.99	0.4542	0.06	>0.1500

Table 5, continued
Tests for Normality

Panel B: Transformed Data

The dependent variable is square root of market value of equity (SQRTMVE).

The amortization method (for pooling firms) is based on a 40-year period.

Year	n	Shapiro-Wilk		Kolmogorov-Smirnov	
		Statistic	P-value	Statistic	P-value
Year 0	90	0.98	0.2538	0.05	>0.1500
Year 1	91	0.98	0.3364	0.08	>0.1500
Year 2	89	0.98	0.3651	0.07	>0.1500
Year 3	90	0.99	0.6558	0.05	>0.1500
Year 4	91	0.98	0.3537	0.05	>0.1500
Year 5	90	0.99	0.7676	0.07	>0.1500

regression coefficient (β). The regression analyses of the residuals for year zero to year five all have zero means.

5.2.3 Autocorrelation

The next regression assumption is that the error terms are uncorrelated. Autocorrelation means that the off-diagonal elements of the variance-covariance matrix of the error terms are nonzero (Kennedy 1998). The existence of autocorrelation is a potentially serious violation of the statistical assumptions behind the regression model (Montgomery et al. 2001). A test for autocorrelation is Durbin-Watson D statistic, which has the range from zero to four. A value of approximately two indicates no autocorrelation. A value of Durbin-Watson D less than two suggests a positive autocorrelation, while a value of Durbin-Watson D greater than two points out a negative autocorrelation. Ott (1992) recommends no serious problem of autocorrelation if the value of the D statistic is between 1.5 and 2.5.

SAS PROC REG was used to calculate the Durbin-Watson D statistic by adding a DW option in the MODEL statement. Table 6 reports the tests for autocorrelation. Durbin-Watson D statistic ranges from 1.665 (lowest) to 2.284 (highest) in the year-by-year regression analysis. The results indicate that autocorrelation does not seem to be a serious problem in the data set.

5.2.4 Heteroscedasticity

Heteroscedasticity exists when the diagonal elements of the variance-covariance matrix of the error terms are not all equal. In contrast, if the diagonal elements are all equal, the error terms are said to be homoscedastic (constant variance). The regression model assumes constant variance of the residuals. The violation of this assumption

Table 6
Tests for Autocorrelation

The dependent variable is market value of equity (MVE).

The amortization method (for pooling firms) is based on a 40-year period.

Year	Durbin-Watson D
Year 0	2.052
Year 1	2.284
Year 2	1.665
Year 3	1.756
Year 4	1.662
Year 5	1.749

affects the variance (and standard error) of parameter estimates, an interval estimation, and hypothesis testing (Kennedy 1998).

SAS PROC REG with a SPEC option in the MODEL statement provides the tests for heteroscedasticity (specification tests—tests of first and second moment specification). The results are displayed in Table 7. The null hypothesis is that the error terms have homogeneous variance. According to the tabled values, the null hypothesis could not be rejected at an acceptable level in all years. The p-values of the Chi-Square test range from 0.1015 in year zero to 0.4540 in year five. The residuals are therefore not heteroscedastic.

5.2.5 Multicollinearity

Multicollinearity is the condition whereby the regressor variables are empirically correlated. In other words, near-linear dependencies exist among the regressors when multicollinearity is present (Montgomery et al. 2001). Multicollinearity seriously affects the least-squares estimates of the regression coefficients; that is, it influences all computations involving the $(\mathbf{X}'\mathbf{X})^{-1}$ matrix, where \mathbf{X} is a matrix of regressor variables. The variance (and standard error) of parameter estimates also contains the $(\mathbf{X}'\mathbf{X})^{-1}$ matrix in the calculation. This leads to the unreliability of the hypothesis testing of the regression coefficients. This is why the basic model (equation (3)) was reduced to the currently reported model (equation (8)), (see Appendix D and Table D2 for this test on the originally proposed model).

There are many ways to detect multicollinearity. The first diagnostic is the correlation coefficients among the regressor variables. Large correlation coefficients (close to -1 or 1) indicate some linear dependencies between the regressors. A variance inflation factor (hereafter, VIF) can also identify whether multicollinearity exists or not. As a rule of thumb, a VIF greater than ten suggests that the regressor variables are highly correlated (Myers 1990; Kennedy 1998; Montgomery et al. 2001). In addition, a

Table 7
Tests for Heteroscedasticity

The dependent variable is market value of equity (MVE).

The amortization method (for pooling firms) is based on a 40-year period.

Specification Tests – Tests of First and Second Moment Specification

Year	DF	Chi-Square	Pr > ChiSq
Year 0	19	27.17	0.1015
Year 1	19	15.96	0.6602
Year 2	19	21.72	0.2982
Year 3	19	17.67	0.5445
Year 4	19	23.65	0.2098
Year 5	19	19.04	0.4540

condition index can diagnose the linear dependencies. As a rule of thumb, the condition index exceeding 30 indicates harmful collinearity among regressor variables (Myers 1990; Kennedy 1998; Montgomery et al. 2001).

SAS PROC REG with VIF and COLLINOINT options in the MODEL statement computes the results for the variance inflation factor and the condition index. Table 8 shows the results of collinearity diagnostics. Panel A of Table 8 reports the variance inflation factors. The VIFs of regressor variables in each year of analysis do not exceed the cut-off point (the highest is approximately 7.69). These numbers indicate that multicollinearity is not severe in the revised regression equation with the modified data set (the data set without outliers and high influence points). Panel B of Table 8 displays the condition index. Again, the condition indices for each yearly regression analysis are relatively low (no ones are above six). Both the variance inflation factor and the condition index confirm that the multicollinearity among the regressor variables is not strong in this data set.

Table 9 reports correlation coefficients among the regressor variables and between the regressors and the response variable. The analysis was performed using SAS PROC CORR with PEARSON and SPEARMAN options. The bottom-left cells are Pearson correlations and the upper-right ones are Spearman correlations. Pearson correlation coefficients also do not show any extremely high correlations (close to one in magnitude) between the regressors. This also supports the results shown in Table 8.

In summary, the statistical assumptions underlying the regression analysis were not seriously violated. The regression equation (8) is correctly specified.

5.3 Tests of Hypotheses

The results reported for hypotheses one and two are based on analyses using the regression equation (8). Also, the accounting acquisition premium of pooling firms was

Table 8
Collinearity Diagnostics

The dependent variable is market value of equity (MVE).

The amortization method (for pooling firms) is based on a 40-year period.

Panel A: Variance Inflation Factors

Variables	Variance Inflation Factors					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
BVEEAAP	1.32	1.62	1.40	1.56	1.67	2.28
AAP	1.06	1.12	1.08	1.11	1.02	1.07
ACCTG*AAP	1.19	1.32	1.06	1.18	1.04	1.15
ABX	1.77	4.20	3.04	3.54	3.38	5.19
NAI	1.95	4.13	2.77	3.10	2.66	7.69

Table 8, continued
Collinearity Diagnostics

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

Table 8, continued
Collinearity Diagnostics

Panel B: Condition Index

Eigenvalue Number	Condition Index					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.18	1.18	1.22	1.24	1.27	1.55
3	1.36	1.34	1.41	1.42	1.37	1.68
4	1.69	1.90	1.54	1.89	1.53	2.48
5	2.46	3.99	3.24	3.58	3.39	5.64

Table 9
Correlation Coefficients

The dependent variable is market value of equity (MVE).

The amortization method (for pooling firms) is based on a 40-year period.

Pearson correlations are in the bottom-left cells and Spearman correlations are in the upper-right cells.

Panel A: Year 0

	MVE	BVEEAAP	AAP	ACCTG*AAP	ABX	NAI
MVE	1	0.65 ^{***}	0.30 ^{***}	-0.07	0.39 ^{***}	0.12
BVEEAAP	0.64 ^{***}	1	0.12	0.05	0.24 ^{**}	0.18 [*]
AAP	0.32 ^{***}	0.02	1	-0.33 ^{***}	-0.11	0.25 ^{**}
ACCTG*AAP	0.10	0.35 ^{***}	-0.12	1	-0.06	-0.21 ^{**}
ABX	0.24 ^{**}	0.05	-0.08	-0.11	1	-0.39 ^{***}
NAI	0.09	0.27 ^{***}	0.17 [*]	0.20 [*]	-0.61 ^{***}	1

Panel B: Year 1

	MVE	BVEEAAP	AAP	ACCTG*AAP	ABX	NAI
MVE	1	0.59 ^{***}	0.30 ^{***}	0.00	0.53 ^{***}	-0.23 ^{**}
BVEEAAP	0.61 ^{***}	1	0.22 ^{**}	-0.04	0.38 ^{***}	-0.02
AAP	0.19 [*]	0.05	1	-0.36 ^{***}	0.15	0.06
ACCTG*AAP	0.20 [*]	0.33 ^{***}	-0.14	1	-0.16	0.19 [*]
ABX	0.49 ^{***}	0.28 ^{***}	0.05	-0.14	1	-0.73 ^{***}
NAI	-0.18 [*]	0.09	0.10	0.32 ^{***}	-0.78 ^{***}	1

Table 9, continued
Correlation Coefficients

Panel C: Year 2

	MVE	BVEEAAP	AAP	ACCTG*AAP	ABX	NAI
MVE	1	0.63 ^{***}	0.24 ^{**}	-0.09	0.54 ^{***}	-0.16
BVEEAAP	0.64 ^{***}	1	0.24 ^{**}	-0.08	0.39 ^{***}	-0.03
AAP	0.15	0.11	1	-0.37 ^{***}	0.05	0.10
ACCTG*AAP	-0.02	0.03	-0.18 [*]	1	0.12	-0.18 [*]
ABX	0.54 ^{***}	0.34 ^{***}	0.01	0.12	1	-0.60 ^{***}
NAI	-0.20 [*]	0.03	0.14	-0.18 [*]	-0.73 ^{***}	1

Panel D: Year 3

	MVE	BVEEAAP	AAP	ACCTG*AAP	ABX	NAI
MVE	1	0.62 ^{***}	0.14	0.06	0.67 ^{***}	-0.41 ^{***}
BVEEAAP	0.65 ^{***}	1	0.26 ^{**}	0.06	0.47 ^{***}	-0.19 [*]
AAP	0.05	0.09	1	-0.29 ^{***}	-0.06	0.29 ^{***}
ACCTG*AAP	0.02	0.22 ^{**}	0.02	1	-0.07	-0.01
ABX	0.68 ^{***}	0.41 ^{***}	-0.07	-0.20 [*]	1	-0.72 ^{***}
NAI	-0.41 ^{***}	-0.08	0.26 ^{**}	0.27 ^{**}	-0.76 ^{***}	1

Table 9, continued
Correlation Coefficients

Panel E: Year 4

	MVE	BVEEAAP	AAP	ACCTG*AAP	ABX	NAI
MVE	1	0.62 ^{***}	0.22 ^{**}	0.00	0.66 ^{***}	-0.19 [*]
BVEEAAP	0.63 ^{***}	1	0.24 ^{**}	0.01	0.45 ^{***}	0.08
AAP	0.18 [*]	0.14	1	-0.26 ^{**}	0.19 [*]	-0.04
ACCTG*AAP	-0.06	0.13	0.00	1	-0.01	-0.02
ABX	0.64 ^{***}	0.45 ^{***}	0.05	-0.05	1	-0.58 ^{***}
NAI	-0.25 ^{**}	-0.05	0.01	0.04	-0.72 ^{***}	1

Panel F: Year 5

	MVE	BVEEAAP	AAP	ACCTG*AAP	ABX	NAI
MVE	1	0.66 ^{***}	0.24 ^{**}	0.01	0.70 ^{***}	-0.57 ^{***}
BVEEAAP	0.66 ^{***}	1	0.14	0.02	0.61 ^{***}	-0.73 ^{***}
AAP	0.18 [*]	-0.02	1	-0.26 ^{**}	0.09	0.02
ACCTG*AAP	0.00	0.07	-0.10	1	0.13	-0.21 ^{**}
ABX	0.67 ^{***}	0.60 ^{***}	-0.08	0.13	1	-0.80 ^{***}
NAI	-0.59 ^{***}	-0.72 ^{***}	0.15	-0.24 ^{**}	-0.89 ^{***}	1

Table 9, continued
Correlation Coefficients

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

Statistical significance (two-sided) indicated by:

*** less than 0.01

** less than 0.05

* less than 0.10

amortized over the forty-year period. Although two other methods (straight-line amortization over the average remaining depreciable life of an acquirer's tangible assets and the average goodwill amortization period from the *Accounting Trends & Techniques*) were proposed, these two methods produced results similar to the forty-year amortization method.¹⁴ In other words, the amortization method for the accounting acquisition premium had no effect on the regression outcome. Purchase firms' accounting acquisition premium was amortized based on the information disclosed in the notes to the financial statements.

5.3.1 Hypotheses One and Two

The first hypothesis states that the difference between accounting methods for business combinations has no effect on the security prices of the combined firms in the year that the business combination takes place. The interaction term between accounting method and the accounting acquisition premium (ACCTG*AAP) should be insignificantly different from zero.

The results of the regression analysis of equation (8), are provided in Table 10. The analysis was performed using SAS PROC REG. The data in the analysis were those without outliers and high influence points and were not transformed. Year zero is the year that a business combination occurred. The coefficient on the interaction term (ACCTG*AAP) is negative but insignificant ($p = 0.4607$); hence hypothesis one cannot be rejected. It appears that the method of accounting for business combinations does not significantly affect the market value of the stock in the year of the business combinations. Book value of equity (BVEEAAP), the accounting acquisition premium (AAP), and the abnormal earnings (ABX) are significantly positive ($p\text{-value} = <0.0001, <0.0001, \text{ and } 0.0109$, respectively). The nonaccounting information variable (NAI) has no effect on the security prices ($p\text{-value} = 0.7951$), however. The coefficient of determination (R^2 adjusted) is approximately 54%.

¹⁴ The results of the regression analysis of the other two amortization methods are reported in Appendix E.

Table 10
Regression Analysis for Hypotheses One and Two

$$MVE_{it} = \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} + \beta_4 ABX_{it} + \beta_5 NAI_{it} + \varepsilon_{it}$$

(P-values are in the parenthesis.)

Variables	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	7.83 (.0012)	14.17 (<.0001)	13.70 (<.0001)	15.88 (<.0001)	17.16 (<.0001)	10.04 (.0018)
BVEEAAP	1.09 (<.0001)	0.59 (<.0001)	0.94 (<.0001)	0.82 (<.0001)	0.85 (.0002)	1.37 (<.0001)
AAP	1.59 (<.0001)	0.72 (.0632)	0.40 (.3443)	0.35 (.4379)	0.40 (.1754)	1.80 (.0115)
ACCTG*AAP	-1.08 (.4607)	2.39 (.1928)	-1.51 (.4710)	0.63 (.6569)	-2.01 (.2635)	-0.50 (.8835)
ABX	2.55 (.0109)	2.27 (.0059)	3.03 (.0006)	3.73 (.0002)	5.97 (<.0001)	6.96 (<.0001)
NAI	0.16 (.7951)	0.40 (.6228)	0.77 (.3812)	-0.29 (.7667)	2.23 (.0447)	4.51 (.0226)
F value	22.13 (<.0001)	18.09 (<.0001)	19.74 (<.0001)	29.20 (<.0001)	24.85 (<.0001)	28.43 (<.0001)
R² (adjusted)	0.54	0.49	0.52	0.61	0.59	0.61
N	90	91	89	90	91	90

Table 10, continued
Regression Analysis for Hypotheses One and Two

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

The amortization method (for pooling firms) is based on a 40-year period.

Hypothesis two states that when a particular business combination is no longer disclosed in the financial statements, accounting for business combinations has no effect on the security price of the combined firms. Details of a particular business combination are disclosed in the financial statements for at most three years after the effective date of the combination. Thus, year four and year five are of interest here. The interaction term (ACCTG*AAP) of the regression analysis in year four and five is the key variable indicating whether or not the second hypothesis could be rejected. As described in section 4.1.5.1, if the coefficient on the interaction term is significantly negative, pooling-of-interest accounting has a more positive effect on security price than does purchase accounting.

According to Table 10, the interaction terms between accounting methods and the accounting acquisition premium (ACCTG*AAP) in all years one to five are insignificantly different from zero (p-value = 0.1928, 0.4710, 0.6569, 0.2635, and 0.8835, respectively). The signs of the coefficients are negative in almost all years (except in year one and three). Due to the insignificance of the interaction terms in year four and five, the second hypothesis cannot be rejected. The conclusion is that the evidence from this data set is not strong enough to support rejection of the second hypothesis that pooling firms' and purchase firms' accounting figures have a similar effect on security prices once the accounting method for a business combination is no longer disclosed in the financial statements. Even in the long term, market participants appear to adjust for the difference in the method of accounting for business combinations.

Per Table 10, the coefficients on book value (BVEEAAP) are significantly positive in all years. The coefficients on accounting acquisition premium (AAP) are positive and significant just in three out of six years of the analysis, however. The coefficients of abnormal earnings (ABX) are all positive and significant. In contrast, the coefficients on the nonaccounting information variable (NAI) are statistically insignificant in year zero to year three. But they become significantly positive in years four and five. The coefficients of determination (adjusted R^2) in year one to year five range from 0.49 (lowest) to 0.61 (highest).

5.3.2 Hypothesis Three

Hypothesis three states that goodwill amortization is not value-relevant. Panel A of Table 11 displays the results of the analysis of regression equation (6). Note that the analysis included only purchase firms. Periods of one to five years after the business combinations were analyzed using the regression method. According to Panel A of Table 11, all of the coefficients on goodwill amortization (GWA) are not statistically significant at an acceptable level. The lowest p-value (0.3651) occurs in year five. This leads to a conclusion that the evidence presented here is not strong enough to reject the third hypothesis. The coefficients on book value of equity (BVE) are significantly positive in all years. Similarly, those on the abnormal earnings before goodwill amortization (ABXBG) are mostly significantly positive, except in year one when the coefficient is marginally significant (p-value = 0.0761). The coefficients on the nonaccounting information variable (NAI) are all statistically insignificant. It is interesting to note that the coefficients of determination (R^2 adjusted) are relatively high, ranging from 0.62 (lowest) in year one and three to 0.89 (highest) in year two.

Panel B of Table 11 presents the results of the analysis of the third regression model (equation (7)). Only pooling-firm data were used for this analysis. The results in this panel serve as a comparison to those in Panel A. As expected, the coefficients on the amortization of accounting acquisition premium (AAP) variable are all insignificant. The lowest p-value (0.1621) occurs in the third year after the business combinations. Because the amortization of AAP is not disclosed in the financial statements, this could be a result of either market participants fixate on disclosed earnings or the amortization is not value-relevant. Because the two opposing theories lead to the same results (the insignificance of the coefficients of AAP variable), no distinction can be made.

The coefficients on the book value of equity (BVE) and the abnormal earnings (ABXBA) variables are statistically significant as usual. Those on the nonaccounting

Table 11
Regression Analysis for Hypothesis Three

Panel A: Purchase Firms

$$MVE_{it} = \gamma_0 + \gamma_1 BVE_{it} + \gamma_2 ABXBG_{it} + \gamma_3 GWA_{it} + \gamma_4 NAI_{it} + \eta_{it}$$

(P-values are in the parenthesis.)

Variables	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	13.16 (.0117)	7.99 (.0990)	14.24 (.0194)	16.50 (.0112)	13.82 (.0241)
BVE	1.00 (.0006)	1.30 (<.0001)	0.82 (0.0494)	0.96 (.0270)	1.30 (.0454)
ABXBG	2.50 (.0761)	1.79 (.4692)	2.65 (.2819)	4.42 (.1627)	4.64 (0.3110)
GWA	7.30 (.7786)	34.23 (.4790)	37.01 (.4911)	45.90 (.4058)	92.50 (.3651)
NAI	0.12 (.9317)	-0.05 (.9866)	0.22 (.9425)	-1.96 (.7080)	1.42 (.7818)
F value	8.71 (.0008)	36.64 (<.0001)	8.36 (<.0001)	10.97 (.0002)	15.15 (<.0001)
R² (adjusted)	0.62	0.89	0.62	0.68	0.75
N	20	19	19	20	20

Table 11, continued
Regression Analysis for Hypothesis Three

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVE = Book value of equity,

ABXBG = Abnormal earnings defined as earnings before one-time items and before goodwill amortization minus the discount rate (12%) times beginning book value of equity,

GWA = Goodwill amortization, coded as a negative term, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

Table 11, continued
Regression Analysis for Hypothesis Three

Panel B: Pooling Firms

$$MVE_{it} = \alpha_0 + \alpha_1 BVE_{it} + \alpha_2 ABXBA_{it} + \alpha_3 AAAP_{it} + \alpha_4 NAI_{it} + \xi_{it}$$

(P-values are in the parenthesis.)

Variables	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	17.89 (<.0001)	19.22 (<.0001)	17.72 (<.0001)	16.92 (<.0001)	10.03 (.0164)
BVE	0.42 (.0556)	0.55 (.0097)	0.66 (.0013)	0.67 (.0080)	1.44 (<.0001)
ABXBA	2.99 (.0113)	4.11 (<.0001)	4.71 (<.0001)	5.07 (.0011)	8.30 (<.0001)
AAAP	-12.13 (.2099)	-7.82 (.4265)	-12.68 (.1621)	-35.54 (.1920)	-41.27 (.2328)
NAI	1.19 (.2462)	2.07 (.0404)	0.58 (.5753)	2.61 (.0486)	7.15 (.0016)
F value	8.30 (<.0001)	15.87 (<.0001)	26.80 (<.0001)	11.28 (<.0001)	18.39 (<.0001)
R² (adjusted)	0.30	0.46	0.60	0.38	0.51
N	70	70	69	69	69

Table 11, continued
Regression Analysis for Hypothesis Three

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVE = Book value of equity,

ABXBA = Abnormal earnings defined as earnings before one-time items and before amortization of accounting acquisition premium minus the discount rate (12%) times beginning book value of equity,

AAAP = Amortization of accounting acquisition premium, coded as a negative term,

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

The amortization method (for pooling firms) is based on a 40-year period.

information variable are significant only in year two, four, and five. Unlike the model for purchase firms displayed in Panel A of Table 11, the pooling firms' coefficients of determination (R^2 adjusted) are relatively low. The numbers for pooling firms range from 0.30 to 0.60, while those for purchase firms are between 0.62 and 0.89. This means that the variability in the regressor variables of the purchase firms has more power to explain the variability in the market value of equity.

5.4 Conclusion

The results of this study do not show that market participants price pooling firms and purchase firms differently at the time of the business combinations. This result also confirms the events study findings by Hong et al. (1978) and Davis (1990). The results, however, do not support the belief that pooling firm's accounting figures receive higher valuations from market participants than those of purchase firms. Especially, evidence does not confirm that, when the details of a particular business combination do not appear in the financial statements (i.e., year four and year five of the analysis), pooling firms' numbers have a more positive effect on security prices than purchase firms' numbers. Thus, the results do not support the Financial Accounting Standard Board's position on the method of accounting for business combinations. The evidence also contradicts the FASB's comment that pooling firms have competitive advantages over purchase firms.

According to the above tests, market participants do not price the accounting acquisition premium as an asset. The results show that in only three out of six years of the analysis was the premium significantly positive. In addition, market participants do not value the amortization of the accounting acquisition premium as an expense for either pooling firms or purchase firms in any years subsequent to the business combinations. In other words, the amortization of the accounting acquisition premium is not value-relevant to the investors. This results support the FASB's position in Statement 142 (Goodwill and Other Intangible Assets) that goodwill does not need to be amortized annually. The results also suggest that the FASB's requirement of two earnings figures in the first

exposure draft on business combinations and intangible assets (dated September 7, 1999)
is not necessary due to the value-irrelevance of goodwill amortization.

Chapter 6

Contributions and Limitations

This chapter consists of three sections. The first section discusses the contributions that this dissertation provides to the existing literature on business combinations. As with any other study, there are some limitations occurring in this study, which are described in the next section. The last section provides implications for future research.

6.1 Contributions

The purpose of this study is to investigate whether accounting methods for business combinations have a different effect on firms' market value of equity in the year of business combinations and thereafter. The results, however, do not confirm that pooling firms get better treatment from market participants than purchase firms do either in the year of or subsequent to the business combination. It appears that the market participants do adjust for the differences in the accounting methods when assessing the value of the security. Thus, whether pooling-of-interests or purchase accounting is applied in the business combinations appears to be irrelevant.

This dissertation contributes to the literature on business combinations by presenting evidence concerning the effect of accounting methods for business combinations (purchase vs. pooling accounting) on security prices in the long run. Even though it may be too late for the results to be useful to the FASB in the deliberation process of the new accounting standards on business combinations and intangible assets, the results still show that the market participants are able, even in the long term, to account for the accounting differences between purchase and pooling-of-interests. This also adds to the view that markets can efficiently adjust for the differentials in accounting methods.

6.2 Limitations

There are some limitations to this study. The results may be dependent on the sample selected. In order to not confound purchase/poolings, the sample was limited to firms that seldom have business combinations (no other material business combinations in the five-year period prior to and subsequent to the business combinations).

Measurement error may occur in the sample of pooling firms because the accounting acquisition premium must be estimated from publicly available data. Pooling firms do not disclose the value of resources transferred to the targets. That amount was estimated using an acquirer's stock price a day prior to the announcement, which might not represent a true value of the resource transferred. Moreover, the book value of target firms may not be available at the date of the combinations. In that case, the most recently published book value was derived from Form 10-Q or 10-K.

Measurement error may also result from the calculation of the amortization of the premium of pooling firms because the firms do not recognize the premium and its amortization in their financial statements. Vincent (1997), however, mentioned that this measurement error is not significant for the analysis. Duvall et al. (1992) conducted an experiment using graduate students to estimate the goodwill amortization expense and

concluded that the measurement error is large relative to the actual goodwill amortization but extremely small relative to revenue and earnings.

6.3 Implications for Future Research

Because the new accounting standards (SFAS 141 and 142) do not allow an acquirer to apply pooling-of-interests accounting in business combination transactions beginning July 1, 2001, research on the difference between pooling and purchase method may come to an end. However, the new standards provide many fruitful ways to conduct research in the business combinations area. For example, since the acquirers are not required to amortize goodwill annually, they are given authority to exercise their judgment concerning when and how much goodwill is impaired. This leads to research examining whether managers of the combined firms take this opportunity to manage earnings by using the goodwill impairment.

Future research could also be done in the area of acquired in-process research and development costs. Hopkins et al. (2000) found results based on a behavioral study that combined firms expensing all accounting acquisition premium as in-process research and development at the acquisition year are valued higher than firms capitalizing the premium as goodwill and later amortizing it. Because acquirers now do not need to amortize goodwill annually, the results may no longer hold true. Research could investigate whether acquirers still opt to treat the premium as in-process research and development or opt to capitalize the premium as goodwill asset. Capital market reactions to the first alternative could be tested.

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APPENDIX A

A Comparison of Purchase and Pooling-of-Interests Accounting

	Purchase Accounting	Pooling-of-Interests Accounting
Idea	Purchase a group of assets at a single price.	A fusion of existing accounting entities.
Requirement	None	12 criteria [*]
How to record the transaction ^{**}	A target firm's assets and liabilities are recorded at fair market value. The excess of consideration paid over a target's fair market value of net assets is recognized as goodwill.	A target firm's assets and liabilities are recorded at book value.
Retained earnings of a target firm	Not acknowledged.	A target's retained earnings are combined with an acquirer's retained earnings.
Income statements in a combination year	A target's earnings are combined with an acquirer's earnings starting from the date of the combination.	A target's earnings are combined with an acquirer's earnings from the beginning of the combination year.
Income statements after a combination year	Earnings are reduced by a depreciation of written-up assets and an amortization of goodwill (up to a 40-year period).	None
Share repurchase	No restriction.	Not allowed within two years after the combination (SEC regulation).
Asset divestiture	No restriction.	Not allowed to dispose of a major part of the assets within two years after the combination.

^{*} See Appendix B

^{**} Suppose that fair market value is greater than book value.

APPENDIX B

Criteria for Pooling-of-Interests Accounting

- 1) Each of the combining companies is autonomous and has not been a subsidiary or division of another corporation within two years before the plan of combination is initiated.
- 2) Each of the combining companies is independent of the other combining companies, meaning that none of the combining companies have significant equity investments (greater than 10 percent of outstanding voting common stock) in one another.
- 3) The combination is effected in a single transaction or is completed in accordance with a specific plan within one year after the plan is initiated.
- 4) Payment is effected by one corporation offering and issuing only common stock in exchange for substantially all (meaning 90 percent or more) of the voting common stock interest of another company. The common stock issued must have rights that are identical to those of the majority of the issuing company's outstanding voting common stock.
- 5) None of the combining companies changes the equity interest of its voting common stock for two years before the plan to combine is initiated or between the dates the combination is initiated and consummated. Changes to equity interests may include distributions to stockholders and additional issuances, exchanges, and retirements of securities.
- 6) None of the combining companies reacquires shares of its voting stock except for purposes other than business combinations. Examples of allowable share repurchases might include shares for stock option and compensation plans and other recurring distributions provided a systematic pattern is established at least two years before the plan of combination is initiated.

- 7) The ratio of the interest of an individual common stockholder to those of other common stockholders in the combination is unchanged before and after the combination. In other words, each individual common stockholder who exchanges his stock receives a voting common stock interest exactly in proportion to his relative voting common stock interest before the combination is effected.
- 8) Voting rights in the combined company are exercisable by the stockholders. This condition is not met, however, if shares of common stock issued to effect the combination are transferred to a voting trust, in which case the individual stockholders would lose the ability to vote.
- 9) The combination is resolved at the date the plan is consummated. In other words, the combined corporation does not agree to issue additional shares of stock or other consideration on any contingency at a later date to former stockholders of the combining companies.
- 10) The combined corporation does not agree to retire or reacquire any of the common stock issued to effect the combination.
- 11) The combined corporation does not enter into other financial arrangements—such as a guaranty of loans secured by stock issued in the combination, which in effect negates the exchange of equity securities—for the benefit of former stockholders of a combining company.
- 12) The combined corporation does not intend to dispose of a significant part of the assets of the combining companies—other than disposals in the normal course of business or to eliminate duplicate facilities or excess capacity—within two years after the combination.

Source: Financial Accounting Standards Board (1992), 209-212.

APPENDIX C

Sample Firms

Acquirer Name	Target Name	Accounting Method
3Com Corp	Bridge Communications Inc	Pooling
Advanced Micro Devices Inc	Monolithic Memories Inc	Pooling
AMP Inc	Matrix Science Corp	Purchase
Avery International Corp	Dennison Manufacturing Co	Pooling
Avid Technology Inc	Digidesign Inc	Pooling
Ball Corp	Heekin Can Inc	Purchase
Barrett Resources Corp	Plains Petroleum Co	Pooling
BellSouth Corp	Mobile Commun Corp of America	Purchase
Bio-Technology General Corp	Gynex Pharmaceuticals Inc	Pooling
BISYS Group Inc	Concord Holding Corp	Pooling
Borland International Inc	Ashton-Tate Corp	Pooling
Bristol-Myers Co	Squibb Corp	Pooling
Brite Voice Systems Inc	Perception Technology Corp	Pooling
Burnham Pacific Properties Inc	Burnham American Properties	Pooling
Calgene Inc	Plant Genetics Inc	Purchase
Children's Discovery Centers	Magic Years Child Care	Purchase
Chubb Corp	Sovereign Corp	Purchase
Citizens Banking Corp, Flint, MI	Second National Bk, Saginaw, MI	Pooling
Claire's Stores Inc	Decor Corp	Purchase
Commercial Bancorp	West Coast Bancorp	Pooling
Computer Horizons Corp	Worldwide Computer Services Inc	Purchase
COMSAT Corp	Radiation Systems Inc	Pooling
Comverse Technology Inc	StarTel Corp	Purchase
Costco Wholesale Corp	Price Co	Pooling
CR Bard Inc	MedChem Products Inc	Pooling
Cyprus Minerals Co	AMAX Inc	Purchase

Acquirer Name	Target Name	Accounting Method
Dean Foods Co	Larsen Co	Pooling
Dibrell Brothers Inc	Monk-Austin Inc	Pooling
Dime Bancorp Inc	Anchor Bancorp Inc, NY	Pooling
DNA Plant Technology Corp	Advanced Genetic Sciences Inc	Pooling
Dominion Bankshares, Roanoke, VA	Nashville CityBank, Tennessee	Pooling
Enzon Inc	Genex Corp	Purchase
Equifax Inc	Telecredit Inc	Pooling
First Commerce, New Orleans, LA	City National Bancshares Inc,	Pooling
First Data Corp	First Financial Management	Pooling
First Interstate Bancorp	Allied Bancshares, Houston, TX	Purchase
First Security Corp, Utah	First Natl Finl, Albuquerque, NM	Pooling
First Tennessee National Corp	Home Financial Corp	Pooling
FNB Corp, Hermitage, PA	Dollar Savings Assn, New Castle	Pooling
Fort Wayne Natl Corp, Indiana	FN Bancorp Inc	Pooling
Genzyme Corp	Vivigen Inc	Pooling
GlenFed Inc	Guarantee Financial, Fresno, CA	Pooling
GTE Corp	Contel Corp	Pooling
HealthSouth Rehabilitation	ReLife Inc	Pooling
Hotel Investors Trust	Hotel Properties Inc	Purchase
INCSTAR Corp	Clinical Sciences Inc	Pooling
Independence Bancorp, Perkasi	Third Natl Bk & Tr, Scranton, PA	Pooling
Informix Corp	Innovative Software Inc	Pooling
IRT Property Co	Harris-Teeter Properties Inc	Pooling
John H Harland Co	Scan-Tron Corp	Pooling
Jostens Inc	Wicat Systems Inc	Pooling
Keystone International Inc	Anderson Greenwood & Co	Pooling
KN Energy Inc	American Oil and Gas Co	Pooling
Lubrizol Corp	AgriGenetics Corp	Purchase
Marsh & McLennan Cos Inc	Strategic Planning Associates	Pooling

Acquirer Name	Target Name	Accounting Method
Maxtor Corp	US Design Corp	Pooling
May Department Stores Co	Associated Dry Goods Corp	Pooling
McKesson Corp	Mass Merchandisers Inc	Purchase
Medical Resource Cos of America	EquiVest Inc	Purchase
Medtronic Inc	Bio-Medicus Inc	Pooling
Meridian Bancorp Inc	Delaware Trust Co, DE	Pooling
MGI Properties Inc	Turner Equity Investors Inc	Purchase
Minnesota Power & Light Co	Baukol-Noonan Inc	Pooling
Mylan Laboratories Inc	Dow B Hickam Inc	Pooling
National Education Corp	Advanced Systems Inc	Pooling
National Medical Enterprises	Rehab Hospital Services Corp	Pooling
Newell Rubbermaid Inc	Sanford Corp	Pooling
North American Biologicals Inc	Univax Biologics Inc	Pooling
Novell Inc	Excelan Inc	Pooling
Office Depot Inc	Office Club	Pooling
Osmonics Inc	Autotrol Corp	Pooling
Pacific Western Bancshares, CA	Cobanco Inc, Santa Cruz	Pooling
PacifiCorp	Utah Power & Light Co	Pooling
Pall Corp	RAI Research Corp	Pooling
Parker-Hannifin Corp	Gull Inc	Pooling
Pitney Bowes Inc	Ameriscribe Corp	Purchase
Poe & Brown Inc	Brown & Brown Inc	Pooling
Puget Sound Bancorp, Tacoma, WA	Savings Bk of Puget Sound, WA	Pooling
Read-Rite Corp	Sunward Technologies Inc	Pooling
RPM Inc	Craft House Corp	Pooling
SAGE Software Inc	Index Technology Corp	Pooling
Santa Fe Energy Resources	Adobe Resources Corp	Purchase
Scios Inc	Nova Pharmaceutical Corp	Purchase
Sensormatic Electronics Corp	Knogo Corp	Purchase

Acquirer Name	Target Name	Accounting Method
Shaw Industries Inc	Salem Carpet Mills Inc	Purchase
Sierra Health Services Inc	CII Financial Inc	Pooling
Sprint Corp	Centel Corp	Pooling
Sterling Software Inc	Systems Center Inc	Pooling
SunGard Data Systems Inc	Dyatron Corp	Pooling
SunTrust Banks Inc, Atlanta, GA	Third Natl Corp, Nashville, TN	Pooling
Taunton Technologies Inc	VISX Inc	Pooling
Teradyne Inc	Zehntel Inc	Pooling
Thomas & Betts Corp	Vitramon Inc	Pooling
United Jersey Bks, Princeton, NJ	First Valley Corp	Pooling
UNUM Corp	Colonial Cos Inc	Pooling
Valley National Corp, Phoenix	Valley Utah Bancorp, Salt Lake	Pooling
Wendy's International Inc	Restaurant Systems Inc	Pooling
Western Digital Corp	Verticom Inc	Pooling
WPI Group Inc	Termiflex Corp	Purchase
Xoma Corp	Intl Genetic Engineering Inc	Pooling

APPENDIX D

Regression Analysis for Equation Three

This appendix shows the results of the regression analysis of the statistical model in equation (3). The estimation of the regression coefficients is provided in Table D1. The unusually large magnitude (and insignificance) of the coefficients on the amortization of accounting acquisition premium (AAAP) and the interaction term between the accounting method and the amortization of accounting acquisition premium (ACCTG*AAAP) suggests some degree of multicollinearity. Multicollinearity detection devices (the variance inflation factors and the condition index) as shown in Table D2 Panel A and B, respectively, confirm that multicollinearity problem is very severe in the regression analysis of equation (3). It can be seen that many of the variance inflation factors are above the cut-off point of 10.^{*} In addition, one of the condition indices (eigenvalue number 7) exceeds the cut-off point of 30. Therefore, the regression analysis based on the proposed statistical model in equation (3), does not provide appropriate and meaningful results. The revised statistical model is suggested in section 5.2 (equation (8)).

^{*} The details of multicollinearity detection devices are discussed in section 5.2.5.

Table D1
Regression Results for Equation Three

$$MVE_{it} = \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} + \beta_4 ABXBA_{it} \\ + \beta_5 AAAP_{it} + \beta_6 ACCTG_i * AAAP_{it} + \beta_7 NAI_{it} + \varepsilon_{it}$$

(P-values are in the parenthesis.)

Variables	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	12.22 (<.0001)	17.49 (<.0001)	21.72 (<.0001)	16.18 (<.0001)	20.18 (<.0001)	16.74 (<.0001)
BVEEAAP	1.02 (<.0001)	0.50 (.0037)	0.46 (.0247)	1.00 (<.0001)	0.69 (.0035)	1.17 (.0001)
AAP	1.00 (.0015)	-14.29 (.2327)	-10.50 (.4896)	-5.93 (.6732)	21.15 (.2112)	32.72 (.0660)
ACCTG*AAP	-2.11 (.0857)	16.41 (.1763)	13.07 (.4022)	4.39 (.7613)	-21.80 (.2090)	-33.95 (.0656)
ABXBA	3.13 (.0130)	3.07 (.0013)	4.21 (.0004)	3.87 (.0008)	5.73 (<.0001)	6.74 (<.0001)
AAAP	-	-575.44 (.2205)	-407.32 (.4815)	-225.95 (.6645)	750.87 (.2171)	1129.68 (.0701)
ACCTG*AAAP	-	581.04 (.2162)	496.23 (.3948)	206.22 (.6936)	-722.69 (.2365)	-1094.88 (.0804)
NAI	0.40 (.5926)	0.57 (.5231)	0.65 (.5751)	-0.42 (.7218)	2.20 (.0800)	3.83 (.0785)
F value	13.89 (<.0001)	8.72 (<.0001)	10.74 (<.0001)	18.43 (<.0001)	11.05 (<.0001)	16.67 (<.0001)
R² (adjusted)	0.39	0.35	0.41	0.55	0.42	0.53
N	100	100	100	100	100	100

Table D1, continued
Regression Results for Equation Three

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

AAP = Accounting acquisition premium (net of accumulated amortization),

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

ABXBA = Abnormal earnings defined as earnings before one-time items and before amortization of accounting acquisition premium minus the discount rate (12%) times beginning book value of equity,

AAAP = Amortization of accounting acquisition premium, coded as a negative term,

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

The amortization method (for pooling firms) is based on a 40-year period.

Table D2
Collinearity Diagnostics for Equation Three

The dependent variable is market value of equity (MVE).

The amortization method (for pooling firms) is based on a 40-year period.

Panel A: Variance Inflation Factors

Variables	Variance Inflation Factors					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
BVEEAAP	1.30	1.58	1.77	1.37	1.58	2.74
AAP	1.05	1530.46	1711.30	2060.46	2164.41	2048.74
ACCTG*AAP	1.18	73.38	76.08	73.54	65.30	61.64
ABXBA	1.77	3.29	3.68	4.10	3.05	5.29
AAAP	-	1655.37	1724.99	2077.21	2193.44	2089.09
ACCTG*AAAP	-	435.93	246.15	229.91	214.51	208.50
NAI	1.80	2.96	2.74	3.77	2.42	7.83

Table D2, continued
Collinearity Diagnostics for Equation Three

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

AAP = Accounting acquisition premium (net of accumulated amortization),

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

ABXBA = Abnormal earnings defined as earnings before one-time items and before amortization of accounting acquisition premium minus the discount rate (12%) times beginning book value of equity,

AAAP = Amortization of accounting acquisition premium, coded as a negative term,

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

Table D2, continued
Collinearity Diagnostics for Equation Three

Panel B: Condition Index

Eigenvalue Number	Condition Index					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.13	1.10	1.05	1.04	1.07	1.23
3	1.36	1.30	1.08	1.19	1.10	1.33
4	1.52	1.58	1.63	1.58	1.58	2.66
5	2.38	2.38	3.38	3.41	3.08	3.52
6	-	3.8	3.81	4.09	3.42	5.94
7	-	91.97	89.27	98.76	99.23	111.38

APPENDIX E

Additional Regression Analysis for Hypotheses One and Two

This appendix shows the regression analysis of equation (8). However, pooling firms' accounting acquisition premium was amortized by the other two amortization methods (an average remaining depreciable life of an acquirer's tangible assets and an average goodwill amortization period). The results displayed in Table 10 are based on the forty-year amortization period for pooling firms' accounting acquisition premium. Note that in any case, the amortization period for purchase firm's accounting acquisition premium was obtained from the financial statements.

Panel A of Table E1 provides results using straight-line amortization method over the average remaining depreciable life of an acquirer's tangible assets for pooling firms' accounting acquisition premium. Table E1, Panel B shows the results based on the average goodwill amortization period from the *Accounting Trend & Techniques* (35 years). As can be seen, the results produced from the three amortization methods are similar in magnitude, direction, and significance.

Table E1
Additional Regression Analysis for Hypotheses One and Two

$$MVE_{it} = \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} + \beta_4 ABX_{it} + \beta_5 NAI_{it} + \varepsilon_{it}$$

(P-values are in the parenthesis.)

Panel A: Average Remaining Depreciable Life

Variables	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	7.83 (.0012)	14.20 (<.0001)	13.76 (<.0001)	16.13 (<.0001)	17.57 (<.0001)	11.81 (.0002)
BVEEAAP	1.09 (<.0001)	0.58 (<.0001)	0.93 (<.0001)	0.81 (<.0001)	0.84 (.0002)	1.33 (<.0001)
AAP	1.59 (<.0001)	0.81 (.0556)	0.53 (.3027)	0.39 (.4996)	0.45 (.3005)	2.28 (.0571)
ACCTG*AAP	-1.09 (.4607)	2.35 (.1979)	-1.62 (.4380)	0.50 (.7254)	-2.19 (.2267)	-1.86 (.5998)
ABX	2.55 (.0109)	2.26 (.0060)	3.01 (.0006)	3.74 (.0002)	5.99 (<.0001)	7.11 (<.0001)
NAI	0.16 (.7951)	0.38 (.6333)	0.74 (.4009)	-0.25 (.8013)	2.27 (.0424)	4.76 (.0182)
F value	22.13 (<.0001)	18.18 (<.0001)	19.81 (<.0001)	29.12 (<.0001)	24.47 (<.0001)	26.96 (<.0001)
R² (adjusted)	0.54	0.49	0.52	0.61	0.57	0.59
N	90	91	89	90	91	90

Table E1, continued
Additional Regression Analysis for Hypotheses One and Two

Panel B: Average Goodwill Amortization Period

Variables	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	7.83 (.0012)	14.17 (<.0001)	13.70 (<.0001)	15.88 (<.0001)	17.15 (<.0001)	10.05 (.0018)
BVEEAAP	1.09 (<.0001)	0.59 (<.0001)	0.94 (<.0001)	0.82 (<.0001)	0.85 (.0002)	1.37 (<.0001)
AAP	1.59 (<.0001)	0.73 (.0633)	0.40 (.3458)	0.35 (.4382)	0.40 (.1748)	1.84 (.0115)
ACCTG*AAP	-1.09 (.4607)	2.38 (.1931)	-1.52 (.4697)	0.62 (.6591)	-2.01 (.2620)	-0.54 (.8744)
ABX	2.55 (.0109)	2.27 (.0059)	3.03 (.0006)	3.73 (.0002)	5.97 (<.0001)	6.96 (<.0001)
NAI	0.16 (.7951)	0.40 (.6229)	0.77 (.3810)	-0.29 (.7667)	2.23 (.0447)	4.51 (.0226)
F value	22.13 (<.0001)	18.09 (<.0001)	19.74 (<.0001)	29.20 (<.0001)	24.85 (<.0001)	28.44 (<.0001)
R² (adjusted)	0.54	0.49	0.52	0.61	0.57	0.61
N	90	91	89	90	91	90

Table E1, continued
Additional Regression Analysis for Hypotheses One and Two

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

APPENDIX F

Additional Analysis with a Relative Size as a Control Variable

This appendix presents the results of the regression analysis of equation (8). In addition to the regressor variables already appeared in the equation, a relative size was added as a control variable. The relative size is defined as the ratio of market value of an acquirer to market value of a target firm.

Per Table F1, the relative size is positive and significant in three out of six years of the analysis. When acquirers' and target firms' size are controlled, the accounting acquisition premium is positively significant in four out of six years. However, the interaction terms (ACCTG*AAP) are still insignificant.

Table F1
A Relative Size as a Control Variable

$$MVE_{it} = \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} + \beta_4 ABX_{it} + \beta_5 NAI_{it} + \beta_6 R_SIZE_{it} + \varepsilon_{it}$$

(P-values are in the parenthesis.)

Variables	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	4.83 (.0685)	12.49 (<.0001)	11.64 (.0001)	14.19 (<.0001)	15.30 (<.0001)	9.52 (.0084)
BVEEAAP	1.07 (<.0001)	0.57 (<.0001)	0.93 (<.0001)	0.81 (<.0001)	0.83 (.0002)	1.37 (<.0001)
AAP	1.95 (<.0001)	1.00 (.0191)	0.75 (.1052)	0.64 (.1846)	0.55 (.0649)	1.88 (.0131)
ACCTG*AAP	-0.86 (.5487)	2.48 (.1716)	-1.52 (.4622)	0.64 (.6457)	-1.83 (.2998)	-0.41 (.9048)
ABX	2.06 (.0383)	2.23 (.0063)	2.95 (.0007)	3.73 (.0002)	5.70 (<.0001)	6.95 (<.0001)
NAI	0.08 (.8894)	0.36 (.6547)	0.62 (.4757)	-0.27 (.7854)	2.22 (.0420)	4.59 (.0221)
R_SIZE	0.20 (.0210)	0.12 (.1147)	0.14 (.0745)	0.12 (.1132)	0.17 (.0431)	0.04 (.7442)
F value	20.36 (<.0001)	15.77 (<.0001)	17.44 (<.0001)	25.21 (<.0001)	22.19 (<.0001)	23.46 (<.0001)
R² (adjusted)	0.57	0.50	0.53	0.62	0.59	0.60
N	90	91	89	90	91	90

Table F1, continued
A Relative Size as a Control Variable

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

R_SIZE = Relative size (an acquirer's market value of equity \div a target's market value of equity).

The amortization method (for pooling firms) is based on a 40-year period.

APPENDIX G

Regression Analysis for Hypotheses One and Two without Banking Industry

This appendix shows the results of the analysis of the regression equation (8). Unlike the results in Table 10, the results reported here are based on the sample without firms in banking industry (firms with a two-digit SIC code of 60). This analysis was conducted because banks played such a large role in pooling combinations but not in purchase, and because banking industry has its own unique set of accounting standards. The combination of these two factors indicated that banking industry might have an influence on the findings. The results, however, are similar to those displayed in Table 10.

Table G1
Regression Analysis for Hypotheses One and Two without Banking Industry

$$MVE_{it} = \beta_0 + \beta_1 BVEEAAP_{it} + \beta_2 AAP_{it} + \beta_3 ACCTG_i * AAP_{it} + \beta_4 ABX_{it} + \beta_5 NAI_{it} + \varepsilon_{it}$$

(P-values are in the parenthesis.)

Variables	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Intercept	6.16 (.0150)	15.62 (<.0001)	11.88 (<.0001)	14.52 (<.0001)	14.73 (<.0001)	7.93 (.0143)
BVEEAAP	1.44 (<.0001)	0.83 (<.0001)	1.29 (<.0001)	1.17 (<.0001)	1.27 (<.0001)	1.74 (<.0001)
AAP	1.66 (<.0001)	0.50 (.1998)	0.69 (.0624)	0.29 (.5086)	0.31 (.2529)	1.43 (.0363)
ACCTG*AAP	-2.34 (.1359)	0.19 (.9275)	-1.68 (.1497)	-1.08 (.4077)	-1.55 (.1626)	-1.26 (.6955)
ABX	1.96 (.0717)	3.11 (.0019)	3.35 (.0002)	3.60 (.0004)	5.10 (.0001)	6.19 (<.0001)
NAI	0.00 (.9960)	1.89 (.0511)	1.10 (.1879)	0.33 (.7501)	1.85 (.1224)	4.91 (.0128)
F value	27.31 (<.0001)	20.92 (<.0001)	31.37 (<.0001)	35.88 (<.0001)	30.92 (<.0001)	30.84 (<.0001)
R² (adjusted)	0.64	0.58	0.68	0.70	0.66	0.67
N	75	74	74	74	77	76

Table G1, continued
Regression Analysis for Hypotheses One and Two without Banking Industry

Definition of Variables: (All variables are per-share data.)

MVE = Market value of equity,

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

The amortization method (for pooling firms) is based on a 40-year period.

Firms with a two-digit SIC code of 60 were excluded from the sample.

APPENDIX H

Generalized Linear Model

The generalized linear model was utilized to analyze the data in all years together. Because the data in year 0 to year 5 were combined, some correlations among the response variables (market value of equity of firm *i*) exist. The least square estimator is not appropriate in this case due to the violation of the independence assumption. Instead, the maximum likelihood estimation was used to analyze the data. It is assumed that the residuals follow the first-order autoregressive process. SAS PROC GENMOD* produced the results shown in Table H1. Note that this is a repeated-measure-type analysis.

According to Table H1, the three-way interaction terms among the accounting acquisition premium, the accounting method, and the year after the business combination are significantly positive for business combinations that apply pooling-of-interests accounting. The results here contradict the ones in the year-by-year analysis. It is interesting to note that the interaction terms for purchase firms are all insignificantly different from zero. The book value of equity and the accounting acquisition premium are statistically significant. The abnormal earnings and nonaccounting information variable are, however, insignificant.

* The SAS code used in the analysis is as follow: PROC GENMOD; CLASS ACCTG COMPANY YEAR; MODEL MVE = YEAR BVVEEAAP AAP AAP*ACCTG*YEAR ABX NAI; REPEATED SUBJECT = COMPANY / TYPE = AR(1) CORRW; RUN; QUIT;

Table H1
Results of the Generalized Linear Model

Dependent variable = Market Value of Equity

Variable	ACCTG	Year	Estimate	P-value
Intercept			10.32	<.0001
Year		0	-3.67	.0340
		1	-4.49	.0090
		2	-2.86	.0915
		3	-1.72	.2461
		4	-0.72	.5187
		5	-	-
BVEEAAP			1.48	<.0001
AAP			-3.56	.0418
AAP*ACCTG*Year	Pooling	0	4.36	.0121
	Pooling	1	3.97	.0229
	Pooling	2	3.87	.0263
	Pooling	3	3.93	.0233
	Pooling	4	3.98	.0213
	Pooling	5	4.28	.0129
	Purchase	0	0.97	.4616
	Purchase	1	1.81	.2537
	Purchase	2	0.38	.8573
	Purchase	3	0.43	.7766
	Purchase	4	0.30	.7032
	Purchase	5	-	-
ABX			0.58	.2081
NAI			-0.03	.9292

Table H1, continued
Results of the Generalized Linear Model

Definition of Variables: (All variables are per-share data.)

BVEEAAP = Book value of equity excluding the accounting acquisition premium,

ACCTG = A dummy variable representing the accounting methods for business combinations, 0 for pooling firms and 1 for purchase firms,

AAP = Accounting acquisition premium (net of accumulated amortization),

ABX = Abnormal earnings defined as earnings before one-time items minus the discount rate (12%) times beginning book value of equity, and

NAI = Nonaccounting information defined as analysts' consensus forecast of one-year ahead earnings minus the discount rate times beginning book value of equity minus a persistence parameter (0.74) times the abnormal earnings.

The amortization method (for pooling firms) is based on a 40-year period.

VITA

Pongprot Chatraphorn

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Pongprot was offered an instructor of accounting position at Chulalongkorn University in 1995 and was awarded a scholarship to further his study at the graduate level in the United States.