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UNIVERSITY OF OKLAHOMA
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**Accounting and Financial Reporting for Development
Stage Enterprises:**

An Empirical Investigation of SFAS No. 7

A dissertation

SUBMITTED TO THE GRADUATE FACULTY

In partial fulfillment of the requirements for the

degree of

Doctor of Philosophy

By

Rick Francis

Norman, Oklahoma

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**Accounting and Financial Reporting for Development
Stage Enterprises:
An Empirical Investigation of SFAS No. 7**

**A dissertation APPROVED FOR THE
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Abstract

The primary purpose of this study is to investigate the value-relevance of the financial reporting required by SFAS 7 for development stage enterprises. These firms have no significant operations or revenues, but they incur substantial pre-operating costs. SFAS 7 requires development stage firms to report a cumulative, life-to-date total for each line-item of the income and cash flow statements in addition to the traditional comparative reporting. The FASB says "the cumulative information required under SFAS 7 will provide useful information about the activities of development stage firms." However, no empirical evidence exists to support the FASB's claim. This study generates empirical evidence to help evaluate the value-relevance of the cumulative disclosures required by SFAS 7. The study also compares the value-relevance of accounting information during the development and operating stages. Descriptive statistics are also included.

The empirical results are inconsistent with investors finding the cumulative reporting required by SFAS 7 to be useful. Neither summary nor component measures of cumulative earnings have any significant correlation with equity values. The results are consistent with investors finding the book value of equity (or assets in place) and cash to be relevant for equity valuation. A comparison of the relevance of earnings for equity values during and after the development stage finds no significant difference between the two time periods. Overall, investors appear to use some accounting information for their valuations of development stage firms.

1. Introduction

The framework for generally accepted accounting principles rests principally upon the notion that “one-size-fits-all.” One notable exception exists for the financial reporting required of development stage enterprises. These firms are essentially “start-ups” with substantial pre-operating costs, but no revenues. Development stage firms once used Article 5A of Regulation S-X to defer pre-operating costs and report them in a non-traditional version of the balance sheet. SFAS 7 supersedes Article 5A and eliminates both the deferral of pre-operating costs and the use of non-traditional financial statements. Development stage firms now report cumulative life-to-date totals for each line-item in the statements of income and cash flows in addition to traditional reporting requirements. In 1975, the FASB noted that the cumulative disclosures required by SFAS 7 convey information comparable to the special accounting and reporting practices allowed under Article 5A. Additionally, the FASB said “that the cumulative information required under SFAS 7 will provide useful information about the activities of development stage firms (SFAS 7, para 43).” However, no empirical evidence exists for the FASB’s position. Therefore, the primary purpose of this study is to investigate whether the cumulative disclosures actually provide value-relevant information.

Development stage firms have no significant revenues, and the conservative nature of generally accepted accounting principles forces these firms to report only losses in the near-term. The positive share prices of development stage firms imply that investors expect profits in the long-run. In

other words, investors seem to look beyond the current period losses to establish the values of development stage firms. Thus, accounting earnings may have little value-relevance for development stage firms.

The OLS regressions generate no evidence that suggests the cumulative income statement reporting required by SFAS 7 has any value-relevance for development stage enterprises. However, the results are consistent with investors using the book value of equity in their market valuations. Cash is one component of the book value of equity that has a significant correlation with market equity values. Summary measures of net income, as well as some earnings components, appear to be relevant for development stage firm value. Overall, the results are consistent with investors using some accounting information for the equity valuation of development stage firms.

The empirical results are also consistent with investors finding cumulative earnings to be relevant for the equity valuation of operating firms. Furthermore, cumulative earnings have incremental value-relevance beyond the book value of equity and current period earnings. Similarly, the book value of equity and current period earnings have incremental value-relevance beyond cumulative earnings. Thus, the findings are consistent with prior studies that find accounting information is relevant for equity values of operating firms.

The second empirical analysis compares the value-relevance of accounting information during the development and operating stages. In contrast to development stage firms, operating firms earn revenues and generally report profits in both the near-term and long-run. Moreover, several

studies find the earnings and/or book values of operating firms to be value-relevant (see Ball and Brown, 1968; Ou and Penman, 1989; among others). Thus, a structural break may occur in the value-relevance of earnings as firms move from the development stage to the operating stage.

A returns model using dummy variables provides evidence that is consistent with investors finding no significant difference for the usefulness of earnings between the development and operating stages. The results are robust to within-firms and between-firms designs. An additional test fails to find a significant difference for the value-relevance of earnings of operating firms with and without development stage histories.

Johnson (1992) calls for accounting research on the usefulness of existing disclosures in financial statements. The results of this study answer this call, and provide empirical evidence for the value-relevance of accounting information for development stage firms. Holthausen and Watts (2000) suggest that standard setters find it difficult to interpret the evidence generated by the value-relevance research since forces other than equity valuation shape accounting standards. Standard setters must therefore consider the results of the current study against the backdrop of the suggestions made by Holthausen and Watts (2000). That is, the current study assesses the relevance of the disclosures required by SFAS 7 for market value, and does not assess the relevance of the disclosures for the risk of a firm, the contracts of a firm, or the stewardship of the managers of a firm.

Although the academic literature contains several studies of the relation

between accounting information and security valuation, it does not contain a single study that examines accounting or financial reporting for development stage enterprises. Thus, another goal of this study is to acquaint the academic literature with these firms. The following section reviews the literature relevant for development stage firms. Sections three and four develop the research questions and discuss the methods used to test the research questions. Sections five and six describe the sample data and report the empirical findings, respectively. Section 7 concludes the study.

2. Development Stage Background and Literature Review

2.1 History of development stage accounting and reporting

The most notable attribute of development stage firms is the significant costs they incur before they commence operations, more commonly known as pre-operating costs. Since development stage firms have no significant revenues from operating activities to match against pre-operating costs (Wharton, 1970), many accountants feel the matching principle should lead to the deferral of these costs. However, others question the ability of pre-operating costs to qualify as assets with future economic benefits. Thus, a key accounting issue is whether to expense or defer pre-operating costs.

Prior to SFAS 7, both the regulations of the Securities and Exchange Commission (SEC) and the proposed Audit Guide issued by the AICPA Committee on Companies in the Development Stage allowed development stage enterprises to defer pre-operating costs (SFAS 7, para 34). Many development stage firms did not issue traditional balance sheets. Instead, these firms often

reported their financial results using Article 5A of Regulation S-X. Article 5A required a statement of assets and unrecovered promotional, exploratory and development costs (SFAS 7, para 35) in lieu of a balance sheet.

The statement of assets and unrecovered promotional, exploratory and development costs differs from a traditional balance sheet in the treatment of pre-operating costs. GAAP requires costs that are properly recorded on the balance sheet as assets to have some reasonable expectation for future recovery. Since a traditional balance sheet requires the auditor to express an opinion concerning its presentation in conformity with GAAP, the auditor generally requires the immediate write-off of most development stage pre-operating costs. The prospect for the immediate write-off of pre-operating costs prompted development stage firms to turn to Article 5A for relief. The majority of auditors adopted the position that Article 5A financial statements did not purport to present financial position, and therefore, did not require an evaluation in terms of generally accepted accounting principles (Wharton, 1970). Article 5A essentially allowed auditors to accommodate their development stage clients that wished to defer pre-operating costs with uncertain prospects for recovery. Thus, many development stage firms used Article 5A to avoid recognizing large accounting losses.

One significant side-effect of Article 5A accounting is the lack of comparability of the financial statements with traditional GAAP statements. Sophisticated investors could have difficulty comparing a statement of assets and unrecovered promotional, exploratory and development costs for a

development stage firm with a traditional statement of financial position for an operating firm. Also, Article 5A did not require the presentation of an income statement, thereby making the comparison process even more challenging. Thus, financial reporting under Article 5A created financial statements that were not comparable between firms.

The FASB expressed concern during the deliberations for SFAS 7 that deferring pre-operating costs may cause financial statement users to reach unjustified conclusions about the recoverability of these costs. The FASB also said "the distinction between costs that would be reported as assets and costs that would be reported as unrecovered costs under Regulation S-X Article 5A is one that many investors would overlook (SFAS 7, para 38)." Apparently, the Board's concern was that investors might interpret the accumulation of pre-operating costs as an asset.

In sum, development stage enterprises used unique accounting practices and unique reporting formats that compromised the comparability of their financial statements. Neither the Accounting Principles Board nor its predecessor, the Committee on Accounting Procedure, established standards of financial accounting and reporting for development stage enterprises (SFAS 7, para 3). After recognizing the shortcomings of the current accounting and reporting practices in the early 1970's, standard setters began formulating solutions to correct these problems.

2.2 Statement of Financial Accounting Standard No. 7

The FASB enacted SFAS 7 in June 1975 to unify the accounting and reporting by both development stage enterprises and established operating firms. SFAS 7 contains three primary components: 1) it establishes guidelines for identifying development stage enterprises; 2) it requires development stage enterprises to use the same generally accepted accounting principles and financial statements as traditional operating firms; and 3) it requires supplemental disclosures on the face of the financial statements above and beyond those required for operating firms. The following three sections address each of these components separately.

2.2.1 Guidelines for identifying development stage enterprises

SFAS 7, paragraph 8, defines a development stage firm as one devoting substantially all of its efforts to establishing a new business and either no principal operations exist or there are no significant revenues from principal operations. Development stage firms typically focus on activities such as financial planning, raising capital, researching and developing new technologies, acquiring property, plant and equipment, developing markets and initializing production. In sum, the language of paragraphs 8 and 9 from SFAS 7 reduces the subjectivity involved in identifying a development stage firm.

Although SFAS 7 provides helpful parameters for identifying development stage firms, some degree of judgment remains. It seems realistic that managers and independent auditors work together to determine when a development stage firm becomes an operating firm. Managers facing current and future losses may

have some incentive to seek the development stage classification if the shareholders of an operating firm are less tolerant of losses than shareholders of a development stage firm. Conversely, managers may have incentive to seek classification as an operating firm if there is a link between their compensation and the firm's commencement of operations. While analyzing the costs and benefits of the development stage designation is beyond the scope of this study, it is important to recognize that management incentives may influence the empirical results.

2.2.2 Development stage firms must follow GAAP

A key component of SFAS 7 is the requirement for development stage and operating firms to use the same guidelines for determining whether to capitalize or expense certain costs (SFAS 7, para 10). SFAS 7 requires development stage firms to expense most pre-operating costs immediately and therefore, report significant losses. Some respondents to the Exposure Draft expressed concern that expensing pre-operating costs may reduce the ability of the development stage firm to raise additional capital. The FASB conducted discussions with fifteen venture capital officers and learned that "whether a development stage enterprise defers or expenses pre-operating costs has little effect on the amount of venture capital provided to that enterprise (SFAS 7, para. 49)." Thus, the venture capitalists' responses seem to favor the FASB's position to require development stage firms to use the same accounting guidelines as operating firms, i.e. expense most pre-operating costs immediately.

Another key component of SFAS 7 requires development stage firms to present the same basic financial statements as operating firms. Requiring uniform accounting and reporting dramatically increases the comparability of financial statements between development stage and established operating firms, as well as between two development stage firms. Thus, SFAS 7 now requires development stage firms to present traditional balance sheets, income statements, statements of stockholders' equity, and statements of cash flows (changes in financial position).

2.2.3 Supplemental financial reporting for development stage firms

Although development stage firms prepare the same basic financial statements as their operating counterparts, some modifications are necessary. Financial reporting for a development stage firm includes a balance sheet that is identical to a traditional balance sheet, with the exception that the descriptive caption "deficit accumulated during the development stage" replaces "retained earnings" (SFAS 7, para. 11). Development stage income statements must include an additional column displaying the cumulative amounts of revenues and expenses since the inception of the firm (recall revenues are insignificant). In other words, development stage firms report life-to-date amounts for each line-item on the income statement. Similar cumulative disclosures must appear on the face of the cash flow statement. SFAS 7 requires the statement of stockholder's equity to reveal each issuance of equity instruments since inception, including date, number of shares and dollar amounts. The statement of stockholder's equity for development stage firms must also include a

description of the nature of any non-cash consideration received in exchange for equity instruments, as well as the basis for assigning amounts.

In summary, SFAS 7 provides guidelines and criteria for identifying development stage firms, eliminates the diversity among accounting and reporting practices for development stage firms, and prescribes supplemental financial reporting for development stage firms.

2.3 Prior literature

The accounting literature contains studies of firms with characteristics that are somewhat similar to development stage firms. For example, Hand (2000) and Trueman, Wong and Zhang (2000) examine the valuation of Internet firms. The development and use of new technologies are pervasive at both Internet and development stage firms, thus the two types of firms have some common characteristics. Similarly, Anthony and Ramesh (1992) and Black (1998) examine the relevance of accounting information during the various stages of firm maturity. One important characteristic of the firms used in the Internet and life-cycle studies is the presence of operating revenues. SFAS 7 specifies a development stage firm should have no operations or no significant revenues from operations. Horwitz and Kolodny (1980, 1981 a, b, c) find evidence that firms with capitalized R&D prior to the issuance of SFAS 2 were immature, small and unprofitable. It seems possible that Horwitz and Kolodny (1980, 1981 a, b, c) were unknowingly referring to development stage firms. Willenborg (1999) uses development stage firms to establish a sample of small initial public

offerings where audit quality is not a primary issue. In sum, none of the studies mentioned above directly examine development stage firms.

Hayn (1995), Jan and Ou (1995), Collins, Pincus and Xie (1999), and other studies examine how losses affect equity values. Hayn (1995) finds a differential market reaction between firms that report profits and losses. Most importantly, Hayn (1995) finds market participants react more strongly to profits than to losses. Jan and Ou (1995) note that the price-earnings relation is reliably negative for loss firms. Collins, Pincus, and Xie (1999) further examine the anomalous result found by Jan and Ou (1995). By adding the book value of equity to the model specification, Collins, Pincus and Xie (1999) eliminate the negative sign on earnings for loss firms. Collins, Pincus and Xie (1999) also find evidence that the book value of equity proxies for future expected earnings and abandonment value for loss firms. The Collins, Pincus and Xie (1999) study is important to this study for two reasons. First, development stage firms and the sample firms used by Collins, Pincus and Xie (1999) both report significant losses. Second, this study uses the same basic model specification as Collins, Pincus and Xie (1999). Thus, this study will augment the findings of Collins, Pincus and Xie (1999) by using a specialized sample of firms to examine the value-relevance of accounting information.

Although all of the above-mentioned studies utilize firms with characteristics similar to development stage firms, none directly assesses development stage accounting and reporting issues.

3. Research Questions

Sections 3.1 and 3.2 respectively address the following two broad research questions: 1) Is accounting information value-relevant for development stage firms? 2) Is accounting information more value-relevant after the development stage? The scarcity of relevant economic theory inhibits the ability to provide expected outcomes for many of the research questions. Therefore, the reader should bear in mind that this study is exploratory in nature.

3.1 Value-relevance of accounting information for development stage firms

Although the literature contains studies that find both earnings and book values are value-relevant for operating firms, these studies do not examine development stage firms. Accordingly, the first research question establishes baseline measures for the value-relevance of current period earnings and book values for development stage firms:

Q₁ : Do investors find current period earnings or the book value of equity to be value-relevant for development stage firms?

Black (1998) finds evidence consistent with the idea that current operating information is not value-relevant for start-up firms. Black (1998) theorizes that a large part of the value for start-up firms stems from uncertain future growth opportunities, thereby reducing the relevance of current period earnings. Development stage firm values depend upon future growth opportunities as well. Thus, the initial expectation seems to point towards current period earnings having little value-relevance for development stage firms.

Although earnings measures frequently appear as explanatory variables in

valuation models, other accounting information contributes to firm value as well. Burgstahler and Dichev (1997) conclude that equity value is a function of both expected earnings and the book value of equity. Moreover, Burgstahler and Dichev (1997), Berger et al. (1996), and Barth et al. (1996) argue that book value of equity serves as a proxy for abandonment value. Ohlson (1995) and Penman (1992) suggest that the book value of equity proxies for expected future normal earnings. Collins, Pincus and Xie (1999) find evidence consistent with the market relying on the book value of equity as a proxy for expected future normal earnings and as a proxy for abandonment value. Collins, Pincus and Xie (1999) argue that losses increase the value-relevance of the book value of equity because negative current earnings reveal little about future earnings. Thus, the previous research suggests that the book value of equity will be value-relevant for development stage firms.

Since development stage firms have no significant revenues, their operating cash flows are inherently negative. Development stage firms essentially stockpile cash, and costs such as research and development slowly deplete the reserves. These firms also make return trips to the equity market to rebuild their cash reserves. Opler, Pinkowitz, Stulz and Williamson (1999) find firms with strong growth opportunities and risky cash flows hold relatively high ratios of cash to non-cash assets. The opportunity costs of a cash shortage for these firms is great, since foregoing occasions to earn abnormal profits have sharp, adverse effects on growth firm values. Therefore, cash on hand seems vital for the valuation of the development stage firm. Whether or not cash is

more value-relevant than other assets is an empirical question. Research question (1a) examines the value-relevance of cash and non-cash assets:

Q_{1a}: Do development stage firm investors value cash and non-cash assets differentially?

The primary research issue in this study addresses the value-relevance of cumulative earnings disclosures required by SFAS 7. Paragraph 51 of SFAS 7 alleges that the cumulative reporting requirements provide the same information as previous accounting and reporting practices. Paragraph 40 of the Exposure Draft says "Developmental activities are likely to extend into two or more reporting periods...and for this reason the Board has placed emphasis on disclosure of the cumulative costs incurred and the cumulative amounts of funds obtained...to finance the developmental effort." Finally, paragraph 43 of SFAS 7 says "(the) disclosure of cumulative revenue and expenses and cumulative amounts of funds obtained...will provide useful information about the activities of development stage enterprises." However, no empirical evidence exists to corroborate the FASB's assertion that cumulative disclosures will provide useful information. The aim of research question two is to provide evidence concerning the value-relevance of cumulative earnings disclosures:

Q₂: Do investors find cumulative earnings to be value-relevant for development stage firms?

One argument for the value-relevance of cumulative earnings is that they may provide some history that current earnings omit. This history could be useful toward explaining the variation in stock prices across firms. Although the

cumulative earnings for development stage firms are losses, the market may perceive the losses as a necessary step toward profitability. In other words, the market may perceive cumulative losses as expenditures that generate assets. Following this line of thought leads to the expectation that cumulative earnings could have value-relevance for development stage firms. However, one significant component of retained earnings is cumulative earnings. Since the book value of equity is a covariate in the models used in this study, and retained earnings is a component of the book value of equity, cumulative earnings may have little incremental value-relevance.

Another consideration for the value-relevance of cumulative earnings is that they contain new information not otherwise available to investors. Development stage firms nearly always have a significant period of time where their ownership is non-public (i.e. private). For example, Aastrom Biosciences, Inc. is a development stage firm that was formed in 1989 and did not conduct a public offering until 1997. Gliatech, Inc. is another development stage firm that was formed in 1988 and did not offer its shares to the public until 1995. Any earnings, dividend or other retained earnings activity during the non-public stage is unavailable to investors. The cumulative earnings number essentially reveals the earnings of a private development stage firm (private earnings + public earnings = cumulative earnings). Overall, the value-relevance of cumulative earnings is an empirical question.

SFAC 5 (1984) notes that the individual items, or components, of financial statements may be more useful than aggregate information. Valuation models

often estimate stock prices by applying multipliers to aggregate earnings. For example, if earnings per share are \$1 and the appropriate multiplier is fifteen (15), then an estimate of the share price would be \$15. An aggregate earnings multiplier represents an average of the effects of the earnings components, such as sales, cost of goods sold, research and development, and administrative expenses. Investors may not assign equal importance to each earnings component, hence the multipliers may vary between the components. Research question three addresses the value-relevance of current period earnings components for development stage firms:

Q₃ : Do investors find components of current period earnings to be value-relevant for development stage firms?

The discussion immediately following question one develops expectations that current period earnings of development stage firms would have little value-relevance. It seems reasonable to have similar expectations for the value-relevance of current period components of earnings of development stage firms. However, the prior literature contains several studies that find the components of current period earnings for operating firms to be value-relevant (Barth, et al. 1990; Bowen, 1981; Lipe, 1986; among others). For example, some studies find research and development expense to be a component of earnings that investors seem to price as though it is an asset (e.g. Bublitz and Ettredge, 1989). These results create expectations that current period earnings components for development stage firms may have value-relevance. However, the value-

relevance of current period earnings is ambiguous and left to empirical investigation.

Similar to question two, the answer to research question four provides empirical evidence concerning the FASB's assertion that "the cumulative disclosures will provide useful information." Research question four simply expands question two by examining the components of cumulative earnings. The discussion following question two develops arguments for and against the value-relevance of cumulative earnings for development stage firms. Likewise, the previous paragraph contains arguments for and against the value-relevance of earnings components for development stage firms. Again, the expected outcome is uncertain. Research question four combines cumulative and component earnings concepts:

Q₄ : Do investors find components of cumulative earnings to be value-relevant for development stage firms?

3.2 Value-relevance of cumulative earnings for operating firms

Since GAAP precludes the presentation of cumulative earnings measures for operating firms, their value-relevance is currently unknown. Cumulative earnings may or may not value-relevance beyond the book value of equity for operating firms. Similarly, the book value of equity may or may not have value-relevance beyond cumulative earnings. Research question five examines the value-relevance that cumulative information may have for operating firms beyond the book value of equity and current period earnings:

Q₅ : Are cumulative earnings value-relevant for operating firms?

3.3 Development and post-development stage value-relevance

As development stage firms commence normal operations, the relevance of the accounting information may change. Development stage investors expect losses in the short run and profits in the long run. Both the duration of expected losses and the expected post-development stage earnings affect the value of the development stage firm. As firms transcend the development stage, the uncertainty surrounding future earnings and cash flows diminishes. Estimating expected future earnings and cash flows after entering the operating stage may be easier than estimating future earnings and cash flows during the development stage since investors have more precise information about the viability of products or services offered by the company. Therefore, the value-relevance of accounting information may be stronger after development stage firms become operating firms. The sixth research question examines the relevance of summary measures of accounting information before and after the development stage:

Q₆ : Does the value-relevance of earnings for development stage firms change significantly after they become operating firms?

4. Method

This section introduces the various models and statistical tests used to examine the research questions. The existing literature contains no studies with models that use cumulative income statement disclosures as explanatory variables. Thus, the novelty of cumulative disclosures requires new models with tradeoffs between theoretical, econometric and practical considerations. Section

4.1 covers the methodologies employed to evaluate the value relevance of accounting information. Section 4.2 introduces the models used to compare the relevance of accounting information during and after the development stage. The reader should note that the unique nature of development stage firms and the lack of relevant economic theory reduce the ability to make predictions for the results of each statistical model.

4.1 Accounting information valuation models

The accounting literature contains several studies that identify the econometric problems associated with price or levels models. Barth and Kallapur (1996), Easton (2000) and Brown, Lo and Lys (1999) all document that price-levels models can lead researchers to draw incorrect inferences due to scale. Easton (1999) notes price-levels regressions may generate statistical associations that suffer from spurious effects of scale, and that researchers should use returns models unless there are compelling reasons for using the levels relation. Barth and Clinch (1999) note that returns specifications measure the extent to which accounting information reflects the unexpected information used by investors that leads to changes in security prices. In the absence of well-defined expectation models, many studies use changes in accounting measures as proxies for the unexpected information provided by accounting data during the period. However, a returns model using changes in cumulative accounting measures as explanatory variables is essentially a regression of returns on the levels of the various current period income statement measures. For example, assume general and administrative (G&A) expenses are

cumulatively \$1,000,000 through December 31, 1999 and G&A expenses for the year ended December 31, 2000 are \$200,000. The cumulative G&A expense through December 31, 2000 is \$1,200,000, and the amount of G&A for the year ended December 31, 2000 is equivalent to the change in the cumulative amounts. Consequently, a returns model using changes in cumulative amounts as proxies for expectations could erroneously measure the value-relevance of the level of current period earnings and reveal nothing about the relevance of cumulative accounting measures. Therefore, price-levels models are necessary to evaluate the cumulative disclosure research questions in this study.

Several accounting studies utilize price-levels models (Barth, et al. 1993; Kothari and Zimmerman, 1995; Francis and Schipper, 1996; Collins, et al., 1997) and find that both the book value of equity and net income are relevant for equity values (Barth, et al., 1998). A parsimonious model of market value is:

$$MVE_{it} = a_{0,t} + a_{1,t} BVE_{it} + a_{2,t} NI_{it} + \varepsilon_{it} \quad (1)$$

where MVE_{it} is the market value of equity at the end of fiscal year t , BVE_{it} is the book value of equity at the end of fiscal year t , NI_{it} is the net income before extraordinary items for fiscal year t , and ε_{it} is an error term. The coefficients a_1 and a_2 measure the relation that the book value of equity and net income have with market values of equity for each year of data (i.e. estimation of the model occurs annually across firms). However, five annual cross-sectional estimations complicate the interpretation of the statistical results (e.g. how do you interpret the coefficients when they vary in sign and significance between the years?).

Another estimation of equation (1) uses a sample that combines observations across firms and across time. This combination of observations creates the possibility for serial correlation in the error terms (the same firms occur repetitively across time). Although OLS estimates for the coefficients remain unbiased, the same does not hold for the related standard errors and t-statistics. Annual estimation of the model avoids the serial correlation problem, but makes limited use of the available data and reduces the power of the statistical tests. One approach to estimating equation (1) and other subsequent models used in this study is to allow each firm to appear in the pooled sample only once. This avoids the serial correlation problem. Although a theoretical basis for choosing when the firm should appear in the sample is unknown, one logical possibility is to include only the most recent, or latest, firm-year. This is somewhat of a modified time-series estimation of equation (1). Estimating the model across time, as well as across firms, should increase the power of the tests and the credibility of the results. The primary statistical inferences used in this study come from the sample that includes only the most recent observation for each development stage firm (hereafter, the most-recent cross-sectional sample). Research question one utilizes equation one.

A simple modification of equation (1) produces a model for research question (1a). Separating the book value of equity into components yields:

$$MVE_{it} = b_{0,t} + b_{1,t} CASH_{it} + b_{2,t} NON-CASH_{it} + b_{3,t} LIAB_{it} + b_{4,t} NI_{it} + \varepsilon_{it} \quad (1a)$$

where $NON-CASH_t$ is non-cash assets, $CASH_t$ is cash and cash equivalents at the end of time period t , and $LIAB_t$ is total liabilities at the end of time period t .

All other variables are as previously defined. If the coefficient for cash (b_1) is significantly greater than the coefficient for non-cash assets (b_2), then the evidence is consistent with cash being the most significant asset of development stage firms. A supplemental paired-difference t-test using the coefficients from the annual estimations provides additional evidence for question (1a).

Adding a variable for cumulative earnings to equation (1) permits an evaluation of its incremental value-relevance beyond the book value of equity and current period earnings. Research question two utilizes the following model:

$$MVE_{it} = c_{0,t} + c_{1,t} BVE_{it} + c_{2,t} CumNI_{it} + c_{3,t} NI_{it} + \varepsilon_{it} \quad (2)$$

where $CumNI_{it}$ is cumulative net income before extraordinary items from the inception of the firm through the end of fiscal year t . All other variables are as previously defined. Estimations of equation (2) occur using the most-recent sample mentioned earlier. If the coefficient for cumulative net income (c_2) is significantly different from zero, then the evidence is consistent with cumulative net income providing incremental information beyond that found in the book value of equity and current period net income. This would imply that the cumulative disclosures are value-relevant.

Some collinearity is expected between BVE and CumNI. However, secondary equity offerings by development stage firms are common, thus these two variables are not likely to be perfectly correlated. The tables include the condition index for each model to help identify potential cases of multicollinearity. Also, one of the goals of the study is to determine if the cumulative measure of

earnings has incremental explanatory power beyond the book value of equity. Thus, it seems proper to include both variables in the model.

Given the value-relevance of earnings components in the prior literature, a test of their relevance for development stage firms seems prudent. Measuring the value-relevance of the individual line-items of current period income for question three requires components models. Equation (3) separates the net income variable from equation (1) into a set of generalized income statement components. Research question three utilizes equation (3):

$$MVE_{it} = d_{0,t} + d_{1,t}BVE_{it} + d_{2,t}Rev_{it} + d_{3,t}R\&D_{it} + d_{4,t}OtherOper_{it} + d_{5,t}OtherNonOper_{it} + \varepsilon_{it} \quad (3)$$

where Rev_t is revenue, $R\&D_t$ is R&D expense, $OtherOper_t$ is other operating expense, and $OtherNonOper_t$ is other non-operating income and expense. Definitions of all other variables remain the same. Many development stage income statements do not contain a line-item for selling, general and administrative (SG&A) expenses. Instead, development stage firms will often disclose expenses such as salary & wage expense, property & casualty insurance expense, etc. as individual line-items. This introduces subjectivity into the classification scheme, and raises some concern for the uniformity or integrity of the data. The combination of SG&A type expenses with other operating expenses into the variable $OtherOper$ in equation (3) ensures the uniform classification of expenses across firms. Essentially, the variable $OtherOper$ contains all expenses except R&D, interest expense, discontinued operations, extraordinary items, and cumulative effects from changes in accounting

principles. One side-effect of this combination is that the variable OtherOper will contain heterogeneous components. For example, OtherOper could contain depreciation expense and gain on sale of investments. A loss of information occurs with the combination of heterogeneous components. However, the benefits of consistent classification seem to outweigh the loss of information from the combination.

If the coefficients from the most-recent estimation of equation (3) are significantly different from zero, then the evidence is consistent with the components being value-relevant. Since revenues are by definition insignificant, the correlation between current revenues and the market value of a development stage firm should be minimal. The sign for the coefficient of OtherNonOper should be positive, as interest income is the primary component, and the data are input as positive numbers. Hence, an increase in interest income should have a positive correlation with equity values. The signs of the coefficients for the remaining variables may vary according to whether investors perceive future benefits to outweigh current costs. Other explanations for the signs of the coefficients may exist as well.

Although many development stage firms incur R&D expense, some firms will not have such expenses due to the nature of their businesses. A sample of firms that includes firms with and without R&D may fail to detect any value-relevance. Similarly, software development firms may capitalize a prescribed portion of their development costs in accordance with SOP 98-1. A sample of firms that contains both firms that capitalize development costs and firms that

expense development costs may not generate reliable results for the R&D variable contained in equations (3) and (4). Thus, research questions three and four will utilize a supplemental sample that requires firms to have R&D expense and that excludes software development firms.

SFAS 7 requires cumulative disclosures for each line-item presented on the income statement, as well as for summary measures of net income.

Research question four uses equation (4) to examine the value-relevance of cumulative earnings components. Equation (4) expands equation (3) as follows:

$$\begin{aligned} MVE_{it} = & f_{0,t} + f_{1,t}BVE_{it} + f_{2,t}CumRev_{it} + f_{3,t}CumR\&D_{it} + f_{4,t}CumOtherOper_{it} + \\ & f_{5,t}CumOtherNonOper_{it} + f_{6,t}Rev_{it} + f_{7,t}R\&D_{it} + f_{8,t}OtherOper_{it} + f_{9,t}OtherNonOper_{it} \\ & + \varepsilon_{it} \end{aligned} \quad (4)$$

where $CumRev_t$ is cumulative revenue from the inception of the firm through the end of fiscal year t , $CumR\&D_t$ is the cumulative research and development expense from the inception of the firm through the end of fiscal year t , $CumOtherOper_t$ is the cumulative other operating expense from the inception of the firm through the end of fiscal year t , and $CumOtherNonOper_t$ is the cumulative other non-operating income and expense from the inception of the firm through the end of fiscal year t , and ε_t is an error term. As before, $CumOtherNonOper$ is primarily interest income. Definitions of all other variables remain the same.

Equation (4) measures the association between the cumulative income statement components and the market value of the firm, after controlling for the current period income statement components and the book value of equity. If

the coefficients of the cumulative variables in equation (4) are significantly different from zero, then the evidence is consistent with the cumulative disclosures containing incremental usefulness beyond the components of current period income.

4.2 Value-relevance for development and post-development stage

The second broad research issue compares the value-relevance of accounting information during the development stage with the value-relevance of such information after the development stage. Lev (1989), Ely and Waymire (1999) and Francis and Schipper (1999) use adjusted R^2 as a primary measure for relevance. However, comparing adjusted R^2 during and after the development stage is statistically impractical, since the dependent variable varies between stages. Research question six utilizes a within-firms design where firms must appear in the development stage and the operating stage samples. The design for research question six utilizes dummy variables to detect any differences in the relevance of development stage and post-development stage accounting earnings. The dummy variables interact with accounting earnings and permit the detection of a differential slope coefficient for accounting information between the two groups of firms. Although a within-firms design reduces the influence of omitted variables, it necessarily reduces the sample size by requiring both development stage and post-development stage data. Since GAAP precludes the use of cumulative disclosures in post-development stage financial statements, they do not appear in the models used in this section.

Since the cumulative disclosures are of no interest for research question six, a returns specification is practical. Equation (5) is the basic Biddle, Seow and Siegel (1995) returns-earnings model with dummy variable interaction terms to capture any differential value-relevance between the development and post-development stage. Research question six utilizes equation (5):

$$Ret_{it} = g_{0,t} + g_{1,t}NI_{it} + g_{2,t} NI_{it-1} + g_{3,t} D_{it} + g_{4,t} D_{it}*NI_{it} + g_{5,t}D_{it}*NI_{it-1} + \varepsilon_{it} \quad (5)$$

where Ret_{it} is the raw 12-month stock return including dividends, D is a dummy variable with a value of one for firm-years during the post-development stage, and zero otherwise. All other variables are as defined previously. Deflation of NI_{it} and NI_{it-1} occurs using lagged price as specified in Biddle et al. (1995). If g_4 is significantly different from zero, then the evidence is consistent with investors finding the value-relevance of summary earnings to differ between the development and post-development stage. In other words, a significant positive (negative) coefficient for the dummy interaction variable is consistent with a stronger (weaker) reaction from investors to the accounting information of post-development stage firms relative to the accounting information of development stage firms.

4.3 Supplemental Analyses

The previous section uses a within-firms design to compare the value-relevance of accounting information during and after the development stage. An alternate approach is to use a between-firms design to make the same comparison. Comparing the results of the within-firms and between-firms tests will address how the designs of the tests affect the outcome. A similar result for

each design (within-firms vs. between-firms) increases the credibility of the results. Thus, a supplemental analysis for question six will utilize a between-firms design.

Not all operating firms have an extended development stage, thus, the relevance of accounting information may differ between firms with and without significant development stage histories. Another supplemental analysis compares the value-relevance of earnings for operating firms with and without development stage histories. Comparing the value-relevance of earnings using within- and between-firms designs, along with a comparison using firms with and without development stage histories, provides some degree of triangulation for the results of the study.

5. Sample

5.1 Primary sources of data

The Disclosure Global Access/Worldscope database supplies the basic sample of development stage firms for this study, and a supplementary SEC filings database supplies the cumulative disclosure information. Compustat and the Center for Research in Security Prices (CRSP) databases supply accounting and market data. A search of the financial footnotes in the Disclosure database for the years 1995-2000 and the SEC filings database provides a primary sample of 688 firm-year observations with cumulative disclosures.¹ Merging the primary sample with the 2000 Annual Compustat database reduces the sample to 383 firm-year observations. The common stock of many development stage firms

¹ The text search used the following terms: 1) development stage firm; 2) development stage enterprise; 3) development stage company.

trades on the Over-The-Counter Bulletin Board (OTCBB), thus, databases such as Compustat and CRSP do not generally contain the security prices. Secondary financial databases such as Yahoo.com contain security prices for many OTCBB firms and allow the recovery of 65 firm-years. The basic sample does not contain adequate data for annual regressions for the year 1995 (14 observations). After dropping these observations, the overall sample contains 434 firm-years (87 in 1996; 93 in 1997; 85 in 1998; 79 in 1999; 90 in 2000) and 163 firms. Most variables contain a few extreme observations, thus all variables receive winsorization at the first and ninety-ninth percentiles.

5.2 Descriptive statistics for development stage firms

The data used to answer research questions one through four reveal several interesting characteristics of development stage firms. Table 1 contains the complete industry membership for the sample. Fifty percent of the sample (218 of the 434 observations) belongs to the chemical industry (i.e. these observations have two-digit Standard Industrial Classification (SIC) of "28"). Manufacturers in general (SIC 35-38) have the next largest presence in the sample, with 92 firm-year observations (21%). Computer software and service providers (SIC 73) are the third largest group in the sample, with 34 firm-year observations (7%).

Table 2 contains other descriptive statistics for the sample (before winsorization). Development stage firms identify their inception dates on the face of their income statements, thus computing firm age is straightforward. The median age of the 163 firms is 8 years. The firm ages range from zero (firm was

incorporated in 2000) to 41 (firm was incorporated in 1959). A remarkable number of firms have significant corporate histories. Approximately 36 percent of the sample firms (60 of 163 firms) are at least 10 years old. One possible explanation for the significant firm ages is the large proportion of chemical and pharmaceutical firms in the sample. The sample contains 72 firms with the two-digit SIC of "28", and the median age for these firms is 8 years. Pharmaceutical firms are possibly seeking Food and Drug Administration (FDA) approval for their products. Firms must complete three phases of clinical testing by the FDA before receiving final approval for a product. The clinical testing, or trials, for an experimental drug require an average of 15 years to complete, according to the Pharmaceutical Research and Manufacturers of America association.

The market capitalizations (market caps) of development stage firms are small, as the median market cap is approximately \$43 million. Small share prices follow from the small market caps, as the median split-adjusted share price is \$5.25. A significant amount of dispersion exists in the distribution of monthly stock returns for these firms. One firm lost over 90% of its market value in one month. In contrast, another firm experienced a tenfold increase in its share price with a 1,034% one-month stock return. The median monthly stock return is -3%.

Although profits are rare among development stage firms, one observation indicates positive cumulative net income of \$101 million and another observation reveals annual income before extraordinary items of \$12 million. These aberrations result from unusual events, such as the receipt of a favorable

judgment in a patent infringement lawsuit. As expected, the median annual income before extraordinary items is a loss (approximately \$6 million). The large accounting losses reported by these firms reflect the consumption of investor capital. For example, the largest annual loss is approximately \$134 million, and the largest cumulative loss is approximately \$269 million. Of particular interest is how one firm is able to report annual revenues of approximately \$25 million, and yet continue to maintain its designation as a development stage firm. Nevertheless, revenues are generally small, as the median amounts of annual and cumulative revenues are \$57,000 and \$553,000, respectively.

Total assets range from a minimum of approximately \$100 to a maximum of \$1.3 billion, and the median amount of total assets is approximately \$9 million. Development stage firms have a strong need for cash on hand to fund the significant setup costs they incur. Thus, cash would seem to be a key tangible asset for development stage firms. The data support this idea, as the median amount of cash is approximately \$6 million.

With few assets to collateralize, equity would logically dominate debt in the capital structure of a development stage firm. The data support this inference as the sample firms have median amounts of debt and equity of \$2.3 million and \$5.7 million, respectively. The median amounts of short-term and long-term liabilities are \$1.6 million and \$0.10 million, respectively. Thus, where debt is present in the capital structure, it seems to be short-term in nature. Development stage firms seem to use preferred stock in a binary fashion, i.e. they use preferred stock extensively or not at all. The minimum and median

amounts of preferred stock are both zero, and the maximum amount is \$443 million. Sixty-nine (69) firm-years have zero or negative shareholders' equity. After excluding these observations, the median price-to-book ratio is 5.2. The minimum and maximum price-to-book ratios are 0.06 and 1775, respectively.

Auditor choice is an interesting issue considering the risk of development stage firms. The sample reveals that national (Big 5) independent auditors issue 3 out of 4 (323 of the 434 firm-years) audit opinions. Additionally, approximately 42% (181 of the 434 firm-years) of the sample audit opinions contain an explanatory paragraph. Most of these paragraphs notify the statement user that substantial doubt exists about the company's ability to continue as a going concern. Big 5 firms issued 226 of the 253 clean opinions in the sample. Nearly half of the opinions with explanatory paragraphs (84 of 181) are from non-national accounting firms, while nearly 90% of the "clean" opinions are from national accounting firms. This indicates a pecking order may exist for audit clients, where Big 5 firms prefer development stage firms with better future prospects to those with "going concern" issues.

Panel A of Table 3 contains the Pearson product-moment correlations and Spearman rank-order correlations for development stage firms. The market value of equity has significant correlation with all other variables, although its correlation with shares is much weaker. A noticeable amount of negative correlation exists between cumulative earnings and the book value of equity. Intuitively, net income and cumulative net income have a strong positive correlation.

5.3 Operating firm sample data

The 2000 Annual Compustat database (PST, Full Coverage and Research files) and the 2000 Center for Research in Security Prices (CRSP) databases provide the operating firm data. The Compustat database generates 420,280 firm-years for the years 1991-2000. Research question five requires the estimation of a cumulative earnings number for operating firms. This estimate requires retained earnings data from Compustat and dividend data from CRSP. Both cash and stock dividends affect retained earnings, thus both data items are necessary to compute a cumulative earnings number. Additionally, research question five utilizes equation (2), and requires share price, number of shares outstanding, the book value of equity, and current period earnings. The absence of any of these variables precludes the estimation of equation (2). Dropping the observations with missing data from Compustat or CRSP reduces the sample to 17,394 firm-years, and 2,641 firms.

5.4 Returns data

Research question six requires the use of firms that have both development and operating stage financial statements. Thus, the sample for question six is a subsample of the companies used for research questions one through four. Question six utilizes a within-firms design to examine the possibility of a structural break in the relevance of earnings for equity values between the development and operating stages. The within-firms design requires each sample firm to appear before and after the structural break, and it significantly reduces the sample size. There are 48 firms with adequate returns data to

execute the statistical analysis during the period 1996-2000. It is possible for a development stage firm to have more than two occurrences in this sample. For example, a development stage firm may have observations in 1996 and 1997 before moving to the operating stage in 1998 and 1999. Assuming this firm does not appear in 2000, this firm would have four occurrences in the sample. The within-firms sample has 75 development stage firm-years and 114 operating firm-years. The presence and subsequent absence of cumulative disclosures in the financial statements permits the identification of firms that move from the development stage to the operating stage. The goal for question six is to collect data for two distinct periods of time, thereby permitting a comparison of value-relevance between the two periods.

An alternative to the within-firms design is a between-firms design, where the sample firms differ between the development and operating stages. An important task for estimating a model using a between-firms design is to select operating firms that are similar to development stage firms. The selection of the operating firm sample uses four criteria to match development stage and operating firms. First, the operating firms must belong to one of the thirteen general industries that represent the development stage firms. The development stage firm sample contains thirteen (13) two-digit SICs.² Requiring operating firms to belong to the same industries as development stage firms helps reduce the effects of omitted variables.

Second, operating firm-years must have net income before extraordinary items that is less than zero (i.e. a loss observation). With the exception of one or

two unusual observations, all development stage firm observations have losses. The prior literature finds significant differential reactions between losses and profits, thus, it is important to match the development stage and operating firms on the sign of their reported earnings.

Third, the availability of the development stage firm data restricts the scope of the study to the period 1996-2000. Using data from the same time period should help reduce the effects of temporal variation. Finally, operating firms must have annual revenues less than \$1 million. In contrast to development stage firms, operating firms generally have significant revenues. The \$1 million revenue cap helps match the two samples in terms of firm sizes and sample sizes. Several of the operating firm-years also occur in the development stage firm sample (i.e. they were development stage firms in previous years and are now operating firms). The between-firms design of the test requires the deletion of these observations. Limiting the selection of operating firms to those with annual revenues less than or equal to \$1 million yields a sample with 242 firm-year observations, and median revenues of approximately \$343,000. The sample of development stage firms contains 229 firm-years, and the median annual revenues are approximately \$200,000. Thus, both the number of observations and the size of the firms are similar between the two groups. The between-firms sample consists of a total of 471 firm-years (229 development stage firm-years and 242 operating stage firm-years).

² The thirteen two-digit SICs are: 28, 30, 35, 36, 38, 39, 41, 48, 61, 67, 73, 80, and 87.

6. Results

This section provides empirical results for two groups of tests that examine how accounting information affects the equity values of development stage firms. The first group of tests examines the value-relevance of the book value of equity, current period summary earnings and cumulative summary earnings. In addition, this group of tests compares the value-relevance of current period and cumulative earnings components. The second group of tests compares the value-relevance of earnings during the development stage with the value-relevance of earnings after the development stage.

6.1 Scale effects

Recall that the nature of cumulative reporting necessitates the use of levels models. A basic concern with all levels models that use the market value of equity as a dependent variable is that the variation in market values may be attributable to variations in scale. Barth and Kallapur (1996) note that market values tend to be large where the "scale," or amount of original investment, is also large. Generally, variations in equity market values attributable to variations in scale are not of interest to researchers (Barth and Kallapur, 1996). Thus, the task at hand is to specify a model that controls for effects of scale without destroying the effects of other variables.

Researchers generally adopt one of two approaches to control for the effects of scale: 1) deflate all variables by a scale proxy, or 2) include a scale proxy as an independent variable. Barth and Kallapur (1996) note that deflation is a remedy for scale effects if the true scale factor is known. However, the true

scale factor is usually unobservable. Furthermore, Barth and Kallapur (1996) find that including a scale proxy as an independent variable is more effective than deflation as a remedy for scale-related coefficient bias. Several scale proxies exist, such as total assets, sales revenue, book value of equity, and number of shares outstanding. Sales revenue is not a reasonable scale proxy for development stage firms since they have no significant sales. Although the primary purpose of including the book value of equity as an explanatory variable in equations (1) through (4) is to measure its relevance for equity value, some studies use the book value of equity as a scale proxy. The book value of equity is not a good scale proxy for this study for two reasons. First, Barth and Kallapur (1996) note that it differs from the amount of original investment due to earnings and other transactions. Second, the book value of equity is sometimes negative for development stage firms. Nevertheless, the book value of equity could proxy for scale effects instead of a relevant component of firm value. Further exploration of this issue is necessary and occurs in a subsequent discussion. Brown, Lo and Lys (1999) suggest using lagged price as a scale proxy. However, given the limited history of development stage firms, lagged price may not be available, thereby diminishing an already small sample. Although frequently used as a deflator, the number of shares outstanding can be problematic as a scale proxy. Easton and Sommers (2000) note that management can control the number of shares outstanding using stock splits, thereby weakening its ability to proxy for original investment. More importantly, Barth and Kallapur (1996) indicate that deflation by number of shares can cause

White (1980) standard errors to severely understate the true standard errors. Thus, the use of shares outstanding as a deflator is not attractive. However, using shares outstanding as an independent variable to control for the effects of scale is a possibility.

Barth and Clinch (1999) find that including dividends and capital changes (new equity) reduces scale bias. Development stage firms have few if any dividends, but maintain a healthy appetite for capital. These firms report large accounting losses and deplete investor capital quickly. Since development stage firms often return to the equity market for additional capital, contributed capital seems to be a good choice as a proxy for original investment, or scale. In sum, using contributed capital as a scale proxy seems to create fewer problems than using the book value of equity and shares outstanding.

Although the use of contributed capital as an independent variable and as a proxy for scale has theoretical merit, its practical application creates serious side-effects. Specifically, including contributed capital as an independent variable creates near dependencies, or collinearity, among the independent variables. Belsley, Kuh and Welsch (1980) indicate that moderate to strong collinearity exists where the condition index is between 15 and 30, and severe collinearity exists where the condition index is greater than 30. Model specifications that include cumulative measures and contributed capital as independent variables generate condition index measures that range from 44 to

205. Thus, the collinearity between contributed capital and other independent variables precludes its use as a measure to counteract the effects of scale.³

While assets and shares outstanding both have shortcomings as proxies for scale, they create fewer problems with collinearity than the use of contributed capital. The condition index for models that contain assets as an independent variable ranges from 5 to 34. Use of shares outstanding as an independent variable reduces the condition index dramatically (range of 5 to 18). The smaller range of condition index measures for shares outstanding indicates fewer problems with collinearity. Thus, shares outstanding appear to be a quasi-superior control for the effects of scale relative to other available measures. All levels models used in this study for development stage firms use shares outstanding as an independent variable to control the effects of scale.⁴

Scale is more likely to be a problem when estimating equation two to explore research question five using operating firm data. Preliminary estimations of levels version of equation two produced incredibly large R^2 values (e.g. 93%), thereby creating strong suspicions for the presence of scale in the data. Instead of using shares outstanding as an additional independent variable in a levels model for question five, shares outstanding are used as a deflator to counteract the effects of scale. Collins, Pincus and Xie (1999) uses shares outstanding as a deflator in their study of operating firms. Thus, the use of shares outstanding as a deflator in this study is consistent with the prior literature.

³ Models using contributed capital as a deflator produce condition indices that range from 35 to 117.

⁴ Deflators such as assets and shares outstanding generate condition index measures that range from 2 to 3,011, indicating severe collinearity according to Belsley, Kuh and Welsch (1980).

Table 3 contains the correlation between the primary variables used in the levels regression models. Panel B contains the Pearson product-moment correlations and the Spearman rank-order correlations for operating firms. The degree of correlation between the market value of equity and cumulative net income is very strong, as is the correlation between current and cumulative earnings.

6.2 Heteroscedasticity

Annual ordinary least squares (OLS) regressions provide the basis for the statistical tests used in this study. Heteroscedasticity is always a concern in OLS models, and several remedies exist including deflation and use of White's heteroscedasticity-consistent standard errors. Barth and Kallapur (1996) find that deflation does not always eliminate heteroscedasticity and can affect other remedies, such as White's standard errors. The primary remedy for heteroscedasticity used in this study is White's heteroscedasticity-consistent standard errors. Barth and Kallapur (1996) find White (1980) standard errors are close to the true standard errors regardless of whether the errors are heteroscedastic.

6.3 Basic Value-Relevance

The first model analyzes how the book value of equity and current period earnings affect the market value of equity. Table 4, Panel A contains the results of the annual and most-recent cross-sectional regressions using equation (1). Explanatory power is significant with adjusted R^2 values ranging from 12 percent

to 41 percent. For each estimation, the data support rejecting the hypothesis that the slope coefficients are jointly equal to zero.

Overall, the book value of equity and net income seem to have some relevance for development stage firm value. Coefficients from the most-recent cross-sectional model for the book value of equity are positive and significantly different from zero (p-value of 0.003). The signs of the annual coefficients for the book value of equity are consistently positive. This result is consistent with Collins, Pincus and Xie (1999), who find evidence consistent with the book value of equity proxying for expected future earnings and/or abandonment value. The coefficient for net income is consistently negative in the annual regressions, and the most-recent cross-sectional model contains a significant negative coefficient (p-value of 0.012). The negative coefficient for current period earnings is inconsistent with Collins, Pincus, and Xie (1999), who find the coefficient for current period earnings to be positive when the book value of equity is included as an additional explanatory variable. The value-relevance of current period earnings is also inconsistent with the assertions of Black (1998), who suggests that current period operating information has little value-relevance for start-up firms. A significant negative coefficient for current period earnings is consistent with investors perceiving current losses as investments with future benefits. One explanation for the differing results between the current study and prior studies is that the samples for the studies are different (i.e. prior studies use operating firms, where the current study uses development stage firms). The coefficient for shares outstanding is consistently positive in the annual regressions, and the

most-recent cross-sectional coefficient is marginally significant with a p-value of 0.09. A positive intercept exists in the annual regressions, and is significant in the most-recent cross-sectional model.

It is possible that the book value of equity serves as a proxy for scale differences rather than as a value-relevant variable (Collins, Pincus and Xie, 1999). Collins, Pincus and Xie (1999) differentiate between these two interpretations by including an alternative scale proxy as an additional explanatory variable (i.e. in addition to the use of the book value of equity as an explanatory variable). If the explanatory power of the book value of equity decreases with the addition of an alternative scale proxy, then Collins, Pincus and Xie (1999) suggest that its primary role is that of a scale proxy. Conversely, if the book value of equity maintains significant explanatory power beyond that of an alternative scale proxy, Collins, Pincus and Xie (1999) state that it is a value-relevant variable. The results are virtually unchanged when equation (1) includes or excludes shares outstanding as an independent variable. This result is consistent with the findings of Collins, Pincus and Xie (1999).

Re-estimating equation (1) with shares outstanding as a deflator instead of an additional independent variable generates the same result for the book value of equity. However, current period earnings are not statistically significant in the deflated model. Thus, investors appear to find the book value of equity to be a value-relevant variable for development stage firms regardless of model specification.

Research question (1a) proposes cash to be more value-relevant than other assets of development stage firms. Table 4, Panel B contains the results of equation (1a). The model provides significant explanatory power, with adjusted R^2 values ranging from 24 percent to 46 percent. Each annual coefficient for cash assets is positive and noticeably larger than the respective annual coefficient for non-cash assets. A test for the equality of the two coefficients in the most-recent cross-sectional model fails to find a significant difference. However, a paired sample t-test using the annual coefficients for cash and non-cash assets provides evidence that is consistent with investors finding cash to be the most value-relevant accounting asset (p-value of 0.002). The most-recent cross-sectional model contains a positive and marginally significant coefficient for non-cash assets (p-value of 0.095). Additionally, the model contains a negative and marginally significant coefficient for liabilities (p-value of 0.078). The signs of the coefficients for non-cash assets vary between the years, while the signs of the coefficients for liabilities are consistently negative. The annual coefficients for net income are negative in four of the five annual regressions, and the most-recent cross-sectional coefficient is significantly different from zero (p-value of 0.041). A positive and marginally significant coefficient for shares outstanding exists in the most-recent cross-sectional model (p-value of 0.069), and the intercept is positive and significantly different from zero.

Re-estimating equation (1a) using shares outstanding as a deflator instead of an additional independent variable generates similar results. Cash

continues to be the most value-relevant asset in the deflated model, and liabilities are not statistically significant. However, current period earnings are not statistically significant in the deflated model.

One interpretation of the overall results is that investors use the book value of equity as an estimate of the assets in place for development stage firms (i.e. value of the firm = assets in place + future growth opportunities). The results are also consistent with the Collins, Pincus and Xie (1999), who use a sample of firms with multiple losses and find some evidence for the book value of equity acting as a proxy for abandonment, or liquidation value. A sample of development stage firms is similar to the Collins, Pincus and Xie (1999) sample (i.e. firms with multiple losses). The results are also consistent with investors finding cash to be the most significant accounting asset for development stage firms. The sample sizes used in this study are small and may lack the statistical power necessary to detect significant differences for some variables. Although the explanatory power of equations (1) and (1a) is significant, it is important to recognize that development stage firm investors most likely use a significant amount of non-accounting information for equity valuation.

6.4 Value-Relevance of Cumulative Net Income

Research question two investigates the value-relevance of cumulative summary earnings. Table 5 contains the results of the regressions that expand the basic model to include cumulative earnings before extraordinary items. Significant explanatory power continues to exist with adjusted R^2 values ranging from 14 to 41 percent, and the probability that the coefficients are simultaneously

equal to zero is less than 0.002. Cumulative net income has no significant correlation with market value, as the regression coefficient is negative and insignificantly different from zero. The signs of the annual coefficients for cumulative net income are inconsistent between years. Thus, cumulative net income seems to have no relevance for the equity valuation of development stage firms.

It is interesting to note that the annual coefficients for the book value of equity are consistently positive, and the coefficient from the most-recent cross-sectional model is positive and significantly different from zero (p-value of 0.002). This result is consistent with the result from equation (1). The coefficient for current period earnings in the most-recent cross-sectional model is negative, but is not significantly different from zero. The model also has a positive and significant intercept, but fails to generate a significant coefficient for shares outstanding. The inclusion or exclusion of shares outstanding as an independent variable has no significant effect upon the results. Re-estimating equation (2) using shares outstanding as a deflator instead of an additional independent variable generates nearly the same results.

In sum, the statistical models fail to find evidence that is consistent with cumulative summary earnings being relevant for the value of development stage firms. However, the evidence is consistent with investors using the book value of equity for their valuations of development stage firms. The statistical power may be low due to the small sample size used in the statistical tests, and it may preclude the detection of value-relevant accounting variables.

6.5 Value-Relevance of Earnings Components

Table 6 contains the results for the value-relevance of current period earnings components. Explanatory power for the regressions ranges from 13% to 43%, and rejection of the hypothesis that the coefficients are jointly equal to zero is possible for all years, as well as for the most-recent cross-sectional model. The coefficients for research and development expense and other operating expense are positive and significantly different from zero in the most-recent cross-sectional model. The results are consistent with investors finding current period costs to create future benefits. This is not surprising for research and development costs, but is somewhat surprising for general and administrative type costs. The coefficient for other operating expense is nearly twice as large as the coefficient for research and development expense. It is possible that investors find future benefits for planning and executing operational and financial strategies, acquiring property, plant and equipment, hiring and training personnel, etc. In general, the results are inconsistent with the suggestions of Black (1998), i.e. current operating information has little value-relevance for young firms.

Once again, investors appear to find the book value of equity to be value-relevant, as the most-recent cross-sectional estimation of equation (3) generates a positive and significant coefficient for the book value of equity (p-values of 0.009). The most-recent cross-sectional coefficient for shares outstanding is positive and marginally significant (p-value of 0.092), and the most-recent cross-sectional intercept is positive and significant.

The primary sample contains firms with and without research and development expense. The previous statistical tests find significant correlation between research and development expense and equity market values. Thus, modifying the sample to contain only firms with current period research and development expense is unnecessary.

The primary sample also contains firms that may capitalize software development expenses. This creates a sample of firms that use different methods of accounting for research and development expense. Thus, the results from Table 6 could be contaminated by the variation in accounting methods for one of the components of Equation (3). Excluding the observations from the business services industry (SIC 73) decreases the sample by 34 firm-years, and eliminates the influence of variation in accounting method for development costs. Re-estimating equation (3) with the new sample generates nearly the same results reported in Table 5. Thus, firms from the business services industry do not seem to have a significant influence over the results.

Re-estimating equation (3) using shares outstanding as a deflator instead of an additional independent variable generates the same results for the book value of equity and revenue. However, the deflated model finds no significance for R&D and other operating expenses. Other non-operating expenses are significant in the deflated model.

Table 7 contains the results for the value-relevance of cumulative earnings components. Explanatory power remains strong with adjusted R^2 values of 14% to 43%. Rejecting the hypothesis that the coefficients are jointly

equal to zero is possible with p-values of at least 0.016. None of the most-recent cross-sectional coefficients for the cumulative variables is significantly different from zero. The most-recent cross-sectional coefficient for current period other operating expense is significant (p-value of 0.025), but none of the other coefficients for current period earnings components is significant.

Similar to the results in Tables 4, 5 and 6, the most-recent cross-sectional coefficient for the book value of equity is positive and significantly different from zero (p-value of 0.009). Annual coefficients for the book value of equity are consistently positive. The coefficient for shares outstanding is positive and marginally significant (p-value of 0.099), and the intercept is also positive and marginally significant (p-value of 0.074).

Re-estimating equation (4) using shares outstanding as a deflator instead of an additional independent variable generates nearly the same results. The book value of equity continues to be significant, and none of the cumulative measures is significant. Current period R&D and current period other non-operating expenses are significant in the deflated model.

In sum, the results are consistent with some earnings components containing value-relevance for development stage firms. Specifically, investors seem to find current period research and development expense and current period other operating expense relevant for the valuation of development stage firms. Again, the book value of equity seems to have value-relevance. The statistical tests fail to find evidence that indicates the cumulative disclosures required by SFAS 7 contain any value-relevance.

6.6 Cumulative reporting for operating firms

Research question five explores the possibility that cumulative earnings are value-relevant for operating firms. Table 8 contains the results of using operating firm data to fit equation (2) over the period of 1991-2000. Preliminary estimations of equation (2) yield extremely large R^2 values, thereby creating a suspicion for the presence of scale in the data. Thus, shares outstanding is now a deflator in equation (2) instead of an additional independent variable.

Overall, the results are consistent with cumulative earnings containing value-relevance for operating firms. The most-recent cross-sectional estimation generates a positive and statistically significant coefficient for cumulative earnings (p-value of <0.0001). Also, the signs of the annual coefficients for cumulative earnings are consistently positive.

Table 8 also identifies a role for the book value of equity in the valuation of operating firms. The most-recent cross-sectional estimation generates a significant positive coefficient for the book value of equity (p-value of <0.0001). Additionally, the coefficients for current period earnings are positive and significantly different from zero. The signs of the coefficients for all variables are consistently positive in the annual regressions.

Overall, the results are consistent with the existing literature (i.e. accounting information has value-relevance for operating firms). Although GAAP precludes operating firms from reporting cumulative earnings, this accounting measure seems to have relevance for the equity value of operating firms. The

book value of equity contains incremental value-relevance beyond cumulative earnings, and net income is also value-relevant.

6.7 Value-relevance during and after the development stage

Research question six investigates the possibility that accounting information may be more value-relevant after the development stage than during the development stage. Table 9 contains the results of two returns regressions using equation (5). Both models use dummy a variable that is equal to one (1) if the observation is from the operating stage, and zero if the observation is from the development stage. The first regression utilizes a within-firms design, where the sample firms are identical for the development stage and the post-development stage. The second model utilizes a between-firms design, where the sample firms differ between the development stage and the operating stage. Both models use White (1980) standard errors.

Panel A of Table 9 contains the results of the first model. Overall, the model fails to reject the hypothesis that the coefficients for all independent variables are equal to zero (adjusted $R^2 = -.014$). In other words, the model fails to explain any significant variation in the returns of development stage enterprises. This suggests that accounting earnings do not provide new information useful for the equity valuation for development stage firms or operating firms that have recently graduated from the development stage. At the point where development stage firms move to the operating stage, they are similar to start-up firms. Black (1998) suggests that current operating information may not be value-relevant for firms in the start-up stage. Thus, the results in

Table 9, Panel A are consistent with Black (1998). Comparing the value-relevance of accounting information between the development and operating stages may require a larger sample with more power.

Panel B of Table 9 contains the model with a between-firms design. Although the sample contains operating firms, the design of test requires operating firm revenues to be small (i.e. <\$1 million). This helps match the development stage firms and operating firms on size. The model provides a significant amount of explanatory power (adjusted $R^2 = .054$, p-value of <0.0001). The coefficient for the interaction between the dummy variable and current period net income is positive, but insignificantly different from zero. This suggests that the relevance of earnings for firm value is similar for development stage firms and operating firms. Also, the coefficient for current period net income (g_1) is negative but insignificantly different from zero. This result suggests that the current period earnings of development stage firms contain no new information useful for equity valuation. Restricting the sample for the between-firms test to the period 1996-2000 necessarily reduces the sample size, as well as the power of the statistical tests. Different results may emerge as larger samples and more powerful tests become possible.

The substantive results of the within-firms and between-firms designs are similar. This implies that the value-relevance of earnings is similar for firms with and without development stage histories. The next section contains a direct test of this issue.

6.8 Supplementary Analysis

The previous section compares the value-relevance of earnings between the development stages and the operating stages of firms. Another possibility is to compare the value-relevance of earnings for two samples of operating firms. One sample represents operating firms with development stage histories (114 firm-years), and the other sample represents operating firms without development stage histories (242 firm-years). The value-relevance of earnings may vary, depending on whether or not firms have development stage histories.

Table 10 provides evidence that the value-relevance of earnings does not differ significantly between firms with and without development stage histories. The explanatory power of the model is low (adjusted $R^2 = 0.040$, p-value of 0.002), but significant. The coefficient for the interaction between the dummy variable and current period net income is insignificantly different from zero. Also, the coefficient for current period earnings (h_1) is positive but insignificantly different from zero. This is consistent with investors finding the earnings for firms without development stage histories to contain no new information useful for equity valuation. Given the low explanatory power of the model, investors likely use other accounting information, or possibly non-financial information, for the valuation of both groups of firms. Different results may emerge with larger, more powerful samples.

6.9 Summary and Implications of Empirical Results

The empirical results of this study provide no evidence for the FASB's assertion that "cumulative information required under SFAS 7 will provide useful

information about the activities of development stage firms.” Neither summary nor component measures of cumulative earnings have any significant correlation with the equity values of these firms. However, the results are consistent with investors finding the book value of equity to be value-relevant for development stage firms. The coefficients for the book value of equity are virtually identical regardless of the model specification. Also, cash seems to be the most relevant accounting asset for the equity value of development stage firms.

The previous results establish an uncertain role for earnings in the equity valuation of development stage firms. Cumulative earnings seem to have no value-relevance, while summary current period summary earnings contain significant value-relevance. Some, but not all, current period earnings components have value-relevance. The role of earnings for equity valuation during and after the development stage does not seem to be significantly different between the two time periods. Thus, no conclusive evidence is found for how investors use the earnings of development stage firms for equity valuation.

Investors seem to find cumulative earnings to be relevant for the valuation of operating firms. Moreover, this value-relevance is incremental to the relevance of the book value of equity. Current period earnings also appear to be value-relevant for operating firms.

The reader should consider that the sample for this evidence is small and covers a very narrow time period. This weakens the power of the statistical

tests, and may obscure important but small effects. Some of the variables may have value-relevance in larger samples.

Although the needs of equity investors are important to the FASB, other factors and constituencies also affect the requirements of SFAS 7 (Holthausen and Watts (2000)). It is possible that other cumulative reporting required by SFAS 7 but not examined in this study (e.g. cumulative cash flow and stockholders' equity information) could have some value-relevance. Thus, the results of this study do not prove that all of the cumulative reporting requirements of SFAS 7 are ineffective for all users. It is important to note that investors likely use significant amounts of non-financial information, in addition to accounting information, for the valuation of these firms.

7. Conclusion

SFAS 7 requires a one-size-fits-all approach to accounting where the traditional matching of revenues and expenses gives way to the immediate write-off of development stage costs. The FASB appears confident that the cumulative reporting requirements of SFAS 7 are useful, yet no empirical evidence exists to support their position. The primary goal of this study is to evaluate the value-relevance of the unique financial reporting requirements that SFAS 7 may have for development stage enterprises.

Some notable characteristics of development stage firms include a significant membership to the pharmaceutical industry, significant corporate histories, small market caps, significant accounting losses, little debt financing and volatile stock returns.

Overall, the empirical results provide no evidence for FASB's claim that cumulative reporting for development stage firms will be useful. Neither summary nor component measures of cumulative earnings appear to have value-relevance for these firms. One explanation for this finding is that the statistical tests may lack the power necessary to detect significant differences. The book value of equity appears to be useful for the valuation of development stage firms, as its significance is consistent across the various model specifications. Summary current period earnings also seem to contain value-relevance, although earnings and equity values have an inverse relation. Investors appear to find no significant increase in the value-relevance of earnings when development stage firms mature and become operating firms.

Although GAAP precludes such reporting, cumulative earnings seem to have incremental value-relevance for operating firms beyond the book value of equity. Similarly, the book value of equity and current period earnings have value-relevance for operating firms beyond cumulative earnings.

This study is the first to examine the value-relevance of accounting information for development stage firms. These firms receive scant attention from the financial press and the academic literature ignores them. Although these firms are obscure, the FASB developed an accounting standard aimed specifically at their activities and continues to require development stage firms to use SFAS 7 for accounting and financial reporting. The supplemental financial disclosures required by SFAS 7 create a real cost or burden. Thus, the value-relevance of the disclosures is of interest to both development stage firms and

the FASB as they weigh the costs and benefits of the standard. It is important to recognize that the current study assesses the relevance of the disclosures required by SFAS 7 for market value, and does not assess the relevance of the disclosures for assessing the risk of a firm, constructing the contracts of a firm, or evaluating the stewardship of the managers of a firm.

The finance literature contains studies of performance for venture-backed IPOs, thus, future research could examine how the presence of venture capital investment affects the success of development stage enterprises. Another avenue for future research is to examine the possibility that the cumulative disclosures required by SFAS 7 may be harmful, rather than helpful to investors. In other words, investors may misinterpret the cumulative information and make suboptimal decisions. Future research could also examine how the unique characteristics of development stage firms may affect the results of a small sample that contains both traditional operating and development stage firms.

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Table 1
Industry Membership
1996 - 2000

DNUM	Industry Name	Frequency
1000	Metal Mining	12
1300	Oil and Gas extraction	4
1400	Mining, Quarry non-metal Minerals	3
2000	Food and Kindred Products	1
2600	Paper and allied products	3
2800	Chemical and allied products	218
3000	Rubber and miscellaneous plastic products	4
3500	Industrial, Commercial Machinery, Computer Equipment	24
3600	Electrical, Other Electrical Equipment, except Computer Equipment	19
3700	Transportation Equipment	9
3800	Measuring Instruments, Photographic Goods, Watches	40
3900	Miscellaneous Manufacturing Industries	1
4100	Transit and Passenger Transportation	1
4800	Communications	19
4900	Electric and Gas Services	1
5900	Miscellaneous Retail	1
6100	Non-Depository Credit Institution	1
6500	Real Estate	1
6700	Holding, Other Investment Offices	10
7300	Business Services	34
7800	Motion Pictures	3
8000	Health Services	2
8700	Engineering, Accounting, Research, Management Services	20
9900	Non-Classifiable	3
Total Number of Firm-Years		434

Table 2
Descriptive Statistics
(in millions except age, share prices, returns and ratios) N=434 firm-years

	<u>Minimum</u>	<u>25%</u>	<u>Median</u>	<u>75%</u>	<u>Maximum</u>
Firm Age (in years)	0	5	8	11	41
Market Capitalization	\$0.021	\$13.738	\$43.202	\$107.384	\$3,656.359
Share Price (adjusted for splits)	\$0.063	\$2.500	\$5.250	\$10.063	\$117.438
Monthly Stock Return	-90.384%	-15.700%	-3.000%	11.960%	1034.400%
Annual Income Before Extra Items	(\$134.744)	(\$11.462)	(\$6.235)	(\$3.115)	\$12.346
Cumulative Income Before Extra Items	(\$269.235)	(\$46.687)	(\$25.983)	(\$13.037)	\$101.529
Annual Revenues	\$0.000	\$0.000	\$0.057	\$0.722	\$24.899
Cumulative Revenues	\$0.000	\$0.000	\$0.553	\$4.160	\$124.129
Total Assets	\$<0.001	\$2.773	\$9.757	\$23.520	\$1,323.582
Cash	\$0.000	\$0.707	\$6.379	\$18.597	\$467.073
Short-Term Liabilities	\$0.000	\$0.758	\$1.623	\$3.366	\$163.800
Long-Term Liabilities	\$0.000	\$0.000	\$0.105	\$1.000	\$546.212
Total Liabilities	\$0.000	\$1.062	\$2.329	\$5.074	\$710.016
Preferred Equity	\$0.000	\$0.000	\$0.000	\$0.000	\$443.012
Common Equity	(\$11.068)	\$0.429	\$5.707	\$18.318	\$955.833
Total Equity	(\$8.835)	\$1.250	\$6.667	\$19.267	\$955.952
Price-to-Book Ratio (BVE > 0 only)	0.065	2.728	5.215	11.350	1,775.670

Table 3
Correlation Matrices

Panel A - Development Stage Firms

	MVE	BVE	NI	Cum NI	Shares
MVE	1.00	0.59	-0.51	-0.44	0.14
BVE	0.66	1.00	-0.51	-0.38	0.01
NI	-0.69	-0.56	1.00	0.79	-0.02
Cum NI	-0.56	-0.41	0.72	1.00	-0.07
Shares	0.35	0.03	-0.21	-0.34	1.00

Pearson product-moment correlations in top diagonal, and
Spearman rank-order correlation

Panel B - Operating Firms

	MVE	BVE	NI	Cum NI
MVE	1.00	0.55	0.51	0.62
BVE	0.71	1.00	0.63	0.49
NI	0.64	0.93	1.00	0.87
Cum NI	0.93	0.69	0.64	1.00

Correlation using variables deflated by shares.

Pearson product-moment correlations in top diagonal, and
Spearman rank-order correlation in bottom diagonal.

Table 4
Annual OLS Regressions
1996-2000

Panel A

$$\text{Model: } MVE_{it} = a_{0,t} + a_{1,t} BVE_{it} + a_{2,t} NI_{it} + a_{3,t} \text{Shares}_{it} + e_{it} \quad (1)$$

where MVE is the market value of equity at the end of the third month after the end of the fiscal year, BVE is the book value of equity at the end of the fiscal year, NI is income before extraordinary items for fiscal year t, and Shares is the number of common shares outstanding at the end of fiscal year t. Statistical inferences made using White's heteroscedasticity-consistent standard errors. Numbers in parentheses are p-values for two-tailed tests. N = number of observations.

Year	N	(?) Intercept	(+) BVE	(?) NI	(?) Shares	Adjusted R ²	Overall Model p-value
96	87	34.555	0.492	-1.318	2.291	0.121	0.003
97	93	19.232	2.908	-2.520	0.328	0.360	<.0001
98	85	29.213	2.372	-1.004	0.303	0.217	<.0001
99	79	15.135	2.583	-14.202	0.814	0.365	<.0001
00	90	38.864	0.458	-3.197	0.624	0.287	<.0001
Most Recent*	163	34.271 (0.001)	1.095 (0.003)	-2.798 (0.012)	0.469 (0.090)	0.416	<.0001

* Includes observations for the most recent occurrence for each firm across all years (i.e. one occurrence per firm).

Panel B

$$\text{Model: } MVE_{it} = b_{0,t} + b_{1,t} \text{CASH}_{it} + b_{2,t} \text{NONCASH}_{it} + b_{3,t} \text{LIAB}_{it} + b_{4,t} NI_{it} + \text{SHARES}_{it} + e_{it} \quad (1a)$$

where CASH is cash and cash equivalents, NONCASH is all other assets, LIAB is total liabilities, and all other variables are as defined above. Numbers in parentheses are p-values. N = number of observations.

Year	N	Intercept	(+) Cash	(+) NonCash	(-) Liab	(?) NI	(?) Shares	Adjusted R ²	Overall Model p-value
96	87	14.580	3.166	0.804	-2.236	0.896	2.233	0.246	<.0001
97	93	19.704	3.155	-0.405	-1.498	-2.830	0.338	0.380	<.0001
98	85	16.272	3.847	0.500	-1.924	-1.564	0.324	0.333	<.0001
99	79	48.372	3.727	1.928	-1.255	-8.395	0.871	0.394	<.0001
00	90	28.508	1.819	-0.131	-0.081	-2.252	0.735	0.306	<.0001
Most Recent*	163	36.001 (0.001)	1.992 (<.0001)	1.331 (0.095)	-3.207 (0.078)	-2.140 (0.041)	0.527 (0.069)	0.462	<.0001

* Includes observations for the most recent occurrence for each firm across all years (i.e. one occurrence per firm).

Table 5
Annual OLS Regressions with Cumulative Net Income
1996-2000

$$MVE_{it} = b_{0,t} + b_{1,t}BVE_{it} + b_{2,t}CumNI_{it} + b_{3,t}NI_{it} + b_{4,t}Shares_{it} + e_{it} \quad (2)$$

where MVE is the market value of equity at the end of the third month after the end of the fiscal year, BVE is the book value of equity at the end of fiscal year t, CUMNI is cumulative income before extraordinary items for fiscal year t, NI is income before extraordinary items for fiscal year t, and Shares is the number of common shares outstanding at the end of fiscal year t. Values in parentheses are p-values.

N=number of observations

Year	N	(?) Intercept	(+) BVE	(?) CumNI	(?) NI	(?) Shares	Adjusted R ²	Overall Model p-value
1996	87	26.290	0.492	-1.480	1.711	1.735	0.146	0.002
1997	93	22.443	3.042	0.938	-5.453	0.334	0.380	<.0001
1998	85	-1.454	2.615	-1.851	2.120	0.252	0.270	<.0001
1999	79	59.038	2.213	2.596	-20.337	0.948	0.372	<.0001
2000	90	35.706	0.455	-0.156	-2.925	0.618	0.279	<.0001
Most Recent*	163	28.678 (0.012)	1.102 (0.002)	-0.351 (0.402)	-2.092 (0.143)	0.452 (0.104)	0.415	<.0001

* Includes observations for the most recent occurrence for each firm across all years (i.e. one occurrence per firm).
Condition Index measures for each year are: 1996 - 6.54, 1997 - 6.17, 1998 - 5.02, 1999 - 5.41, and 2000 - 5.77.
Condition Index measure for the pooled model is 5.37 .

Table 6
Annual OLS Regressions with Current Period Earnings Components
1996-2000

$$MVE_{it} = c_{0,t} + c_{1,t}BVE_{it} + c_{2,t}Rev_{it} + c_{3,t}R\&D_{it} + c_{4,t}OtherOper_{it} + c_{5,t}OtherNonOper_{it} + c_{6,t}Shares_{it} + e_{it} \quad (3)$$

where MVE is the market value of equity at the end of the third month after the end of fiscal year t, BVE is the book value of equity at the end of fiscal year t, Rev is revenue for fiscal year t, R&D is research and development expense for fiscal year t, OtherOper is other operating expenses for fiscal year t, OtherNonOper is other non-operating expenses before extraordinary items for fiscal year t, and Shares is the number of common shares outstanding at the end of fiscal year t. Values in parentheses are p-values. N = number of observations.

Year	N	(?) Intercept	(+) BVE	(+) Rev	(+) R&D	(?) OtherOper	(?) OtherNonOper	(?) Shares	Adjusted R ²	Overall Model p-value
1996	87	31.122	0.412	1.334	0.937	1.917	8.338	2.306	0.132	0.007
1997	93	11.190	3.410	-5.264	-0.188	7.485	-5.330	0.285	0.376	<.0001
1998	85	36.526	2.977	-20.256	1.419	1.546	-6.512	0.227	0.289	<.0001
1999	79	-22.067	1.947	42.470	5.439	21.778	-30.959	0.807	0.393	<.0001
2000	90	39.604	0.548	-4.358	6.286	-1.424	3.630	0.705	0.316	<.0001
Most Recent*	163	26.506 (0.031)	0.843 (0.009)	-3.402 (0.364)	2.887 (0.034)	5.375 (0.033)	3.448 (0.584)	0.452 (0.092)	0.436	<.0001

* Includes observations for the most recent occurrence for each firm across all years (i.e. one occurrence per firm).

Table 7
Annual OLS Regressions with Cumulative Earnings Components
1996-2000
Panel A

$$MVE_{it} = d_{0,it} + d_{1,it}BVE_{it} + d_{2,it}CumRev_{it} + d_{3,it}CumR\&D_{it} + d_{4,it}CumOtherOper_{it} + d_{5,it}CumOtherNonOper_{it} + d_{6,it}Rev_{it} + d_{7,it}R\&D_{it} + d_{8,it}OtherOper_{it} + d_{9,it}OtherNonOper_{it} + d_{10,it}Shares + e_{it} \quad (4)$$

where MVE is the market value of equity at the end of the third month after the end of the fiscal year, BVE is the book value of equity at the end of fiscal year t, CumRev is cumulative revenue for fiscal year t, CumR&D is cumulative research and development expense, CumOtherOper is cumulative other operating expenses for fiscal year t, CumOtherNonOper is cumulative other non operating expense before extraordinary items for fiscal year t, Rev is revenue for fiscal year t, R&D is research and development expense for fiscal year t, OtherOper is other operating expense for fiscal year t, OtherNonOper is other nonoperating expense before extraordinary items for fiscal year t, and Shares is the number of common shares outstanding at the end of fiscal year t. Values in parentheses are p-values. N = number of observations.

Year	N	(?) Intercept	(+) BVE	(+) CumRev	(+) CumR&D	(?) Cum OtherOper	(?) Cum OtherNonOper
1996	87	28.071	0.431	-6.756	-0.508	4.507	2.049
1997	93	12.220	3.274	0.125	-0.464	-0.613	0.692
1998	85	3.036	3.746	-4.190	1.438	4.786	-4.096
1999	79	33.457	1.164	-9.483	-5.138	1.667	-5.900
2000	90	48.788	0.461	-1.224	-0.310	-1.029	3.526
Most Recent*	163	22.090 (0.074)	0.853 (0.009)	-0.201 (0.859)	0.833 (0.144)	-0.578 (0.376)	-0.650 (0.750)

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* Includes observations for the most recent occurrence for each firm across all years (i.e. one occurrence per firm).
Condition Index measures for each year are: 1996 - 16.41, 1997 - 18.32, 1998 - 10.89, 1999 - 8.56, and 2000 - 9.27.
Condition Index measure for the pooled model is 8.02.

Table 7
Annual OLS Regressions with Cumulative Earnings Components
1996-2000
Panel B

$$MVE_{it} = d_{0,it} + d_{1,it}BVE_{it} + d_{2,it}CumRev_{it} + d_{3,it}CumR\&D_{it} + d_{4,it}CumOtherOper_{it} + d_{5,it}CumOtherNonOper_{it} + d_{6,it}Rev_{it} + d_{7,it}R\&D_{it} + d_{8,it}OtherOper_{it} + d_{9,it}OtherNonOper_{it} + d_{10,it}Shares + e_{it} \quad (4)$$

N=number of observations		(+)	(+)	(?)	(?)	(?)	Adjusted	Overall
Year	N	Rev	R&D	OtherOper	OtherNonOper	Shares	R ²	Model p-value
1996	87	12.854	0.557	-6.557	13.736	1.988	0.140	0.016
1997	93	-3.388	1.717	9.046	-6.123	0.298	0.353	<.0001
1998	85	-8.657	-4.945	-5.438	0.613	0.041	0.374	<.0001
1999	79	79.083	14.306	26.676	-19.678	0.372	0.436	<.0001
2000	90	-1.844	7.561	0.323	2.665	0.817	0.297	<.0001
Most Recent*	163	-3.025 (0.527)	1.269 (0.504)	6.663 (0.025)	3.443 (0.608)	0.457 (0.099)	0.430	<.0001

* Includes observations for the most recent occurrence for each firm across all years (i.e. one occurrence per firm).

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Table 8
Annual OLS Regressions for Operating Firms with Cumulative Earnings
1991-2000

$$MVE_t = b_{0,t} + b_{1,t}BVE_t + b_{2,t}CumNI_t + b_{3,t}NI_t + e_t \quad (2)$$

where MVE is the market value of equity at the end of the third month after the end of the fiscal year, BVE is the book value of equity at the end of fiscal year t, CUMNI is cumulative income before extraordinary items for fiscal year t, and NI is income before extraordinary items for fiscal year t. Shares outstanding is used as a deflator. Values in parentheses are p-values. N = number of observations.

Year	N	(?) Intercept	(+) BVE	(?) CumNI	(+) NI	Adjusted R ²	Overall Model p-value	Condition Index
1991	1242	7.144	0.386	0.195	3.141	0.550	(<.0001)	5.17
1992	1239	8.125	0.508	0.125	3.965	0.532	(<.0001)	5.35
1993	1440	8.310	0.443	0.163	2.822	0.508	(<.0001)	5.21
1994	1598	7.343	0.408	0.147	3.814	0.531	(<.0001)	5.54
1995	1773	9.510	0.417	0.235	2.788	0.503	(<.0001)	5.53
1996	1859	10.219	0.408	0.171	4.083	0.496	(<.0001)	5.61
1997	1958	14.385	0.334	0.271	4.827	0.491	(<.0001)	5.33
1998	2064	13.117	0.211	0.308	2.769	0.336	(<.0001)	4.90
1999	2151	10.867	0.266	0.252	3.312	0.312	(<.0001)	4.81
2000	2060	11.558	0.297	0.170	4.548	0.465	(<.0001)	4.93
Most Recent Cross Sectional	2641	10.370 (<.0001)	0.394 (<.0001)	0.175 (<.0001)	3.875 (<.0001)	0.482	(<.0001)	6.15

* Indicates a p-value of 0.05 or less.

Table 9
Value-Relevance of Earnings
Development Stage versus Post-Development Stage
1996-2000

$$Ret_{it} = g_0 + g_1 NI_{it} + g_2 NI_{it-1} + g_3 D_{it} + g_4 D_{it} * NI_{it} + g_5 D_{it} * NI_{it-1} + e_{it} \quad (5)$$

where Ret_{it} is the raw 12-month stock return including dividends, D is a dummy variable with a value of one for firm-years during the post-development stage, and zero otherwise. N = number of observations.

Panel A - Within Firms

N	Intercept	NI_{it}	NI_{it-1}	D_{it}	$D_{it} * NI_{it}$	$D_{it} * NI_{it-1}$	Adjusted R^2	Overall Model p-value
189	0.093 (0.446)	-1.974 (0.080)	1.958 (0.039)	0.103 (0.593)	1.433 (0.317)	-1.571 (0.258)	-0.014	0.800

Panel B - Between Firms

N	Intercept	NI_{it}	NI_{it-1}	D_{it}	$D_{it} * NI_{it}$	$D_{it} * NI_{it-1}$	Adjusted R^2	Overall Model p-value
471	-0.034 (0.686)	-1.258 (0.137)	0.032 (0.631)	-0.148 (0.292)	1.606 (0.159)	-2.612 (0.017)	0.054	<.0001

Table 10
Value-Relevance of Post-Development Stage Earnings
Operating Firms with and without Development Stage Histories
1996-2000

$$Ret_{it} = h_0 + h_1NI_{it} + h_2NI_{it-1} + h_3D_{it} + h_4D_{it}*NI_{it} + h_5D_{it}*NI_{it-1} + \varepsilon_{it} \quad (5)$$

where Ret_{it} is the raw 12-month stock return including dividends, D is a dummy variable with a value of one for firm-years with development stage histories, and zero otherwise. N = number of observations.

N	Intercept	NI_{it}	NI_{it-1}	D_{it}	$D_{it}*NI_{it}$	$D_{it}*NI_{it-1}$	Adjusted R^2	Overall Model p-value
356	-0.182 (0.107)	0.349 (0.648)	-2.294 (0.044)	0.341 (0.207)	-0.231 (0.869)	1.540 (0.640)	0.040	0.002