

# Measuring Intangible Investment

## **THE BOUNDARIES OF FINANCIAL REPORTING AND HOW TO EXTEND THEM**

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## THE BOUNDARIES OF FINANCIAL REPORTING AND HOW TO EXTEND THEM\*

It is of great use to the sailor  
To know the length of his line, though  
He cannot with it fathom all the Depths of the ocean.  
John Locke, *An Essay Concerning  
Human Understanding* (1690)

We investigate in this study the usefulness of financial information to investors (the “length of the sailors line”) by comparison to the total information in the market-place (“the depth of the ocean”).<sup>1</sup> Our evidence indicates that the usefulness of reported earnings, cash flows and book (equity) values has been deteriorating over the last 20 years. How could such a deterioration take place while demand by investors for relevant information increases and regulators persist in their efforts to improve the quality and timeliness of financial information?

The answer, we hypothesise, is *change* which increasingly affects business enterprises. Be it driven by the ever stiffening competition, deregulation or innovation, the impact of change on firms’ operations and economic condition is not adequately reflected by the accounting measurement and reporting system. The large investments generally associated with change, such as restructuring costs and R&D expenditures, are immediately expensed, whereas the benefits of change are recorded in subsequent periods, unencumbered by the previously expensed investments. Consequently, the fundamental accounting measurement process of matching periodically costs with revenues is seriously distorted, adversely affecting the informativeness of financial information.<sup>2</sup>

We validate our conjecture that business change is an important factor responsible for the deterioration in the informativeness of financial information, by providing evidence that: *i*) the rate of change experienced by business enterprises has increased over the last 20 years; and *ii*) the increase in the rate of change is associated with the decline in the usefulness of financial information. We thus link empirically business change with the temporal decline of informativeness of financial information.

We next focus on the innovative activities of business enterprises -- the major initiator of change in developed economies. These activities, taking the form of investment in *intangible assets*, such as R&D, information technology, brands and human resources, constantly change firms’ products, operations, economic condition and market values. Yet, it is in the intangibles domain that accounting fails most

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seriously in reflecting enterprise value and performance, mainly due to the mismatching of costs with revenues.

We validate our hypothesis concerning the adverse informational consequences of the accounting treatment of intangibles by documenting: *i*) the existence of a positive association between the rate of business change and shifts in R&D spending; and *ii*) the association between changes in the informativeness of earnings and changes in R&D spending.

We thus link the increasing role of intangible investments in advanced economies, through the effect of these investments on the rate of business change, to the documented decline in the usefulness of financial information. This naturally raises the normative question of what can be done to arrest the deterioration in the usefulness of financial information, which we address in the last section of this study. We advance two proposals -- the capitalisation of intangible investments and a systematic restatement of financial reports. The first proposal expands on a practice which is currently used only in special circumstances (e.g. software development costs), whereas the second proposal is a more radical modification of current accounting practices.

## **1. The decreasing usefulness of financial information**

We rely in this study on statistical associations between accounting data and capital market values (stock prices and returns) to assess the usefulness of financial information to investors.<sup>3</sup> Such associations reflect the consequences of investors' *actions*, whereas alternative research techniques, such as questionnaire or interview studies, reflect investor's opinions and beliefs. Furthermore, empirical associations between market values and financial data allow for an assessment of the *incremental usefulness* of accounting data relative to other information sources (e.g. managers' voluntary disclosures or analysts' recommendations), whereas interview or prediction studies where information usefulness is assessed in terms of predictive power, such as in Ou and Penman (1989), generally do not compare the usefulness of accounting data with that of other information sources.<sup>4</sup>

### ***1.1 The weakening returns-earnings association***

It has been previously documented (e.g. Lev, 1989) that the association between reported earnings and stock returns is weak. Whether returns are measured over short (e.g. a few days around earnings announcement) or long (up to a year) intervals, earnings account for only 5 to 10 per cent of the differences in stock returns.<sup>5</sup> This result holds in cross-section and time-series studies, and applies to reported earnings as well as to earnings surprises. In this study we expand the scope of the examined information to include cash flows and book values, and extend the investigation of usefulness to the intertemporal dimension; that is, determining the changes that occurred over time in the informativeness of financial data. We focus on the last 20 years, since the recent far-reaching economic changes (e.g. globalisation of business operations, advent of many high-tech industries and extensive world-wide deregulations) render this period of particular interest for assessing the usefulness of financial information.

We start the analysis by examining the usefulness of reported earnings, using the following cross-sectional regression construct to estimate the association between annual stock returns and the level and change of earnings:

$$R_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 \Delta E_{it} + \varepsilon_{it}, t = 1977 - 1996 \quad (1)$$

where:

$R_{it}$  = firm  $i$ 's stock return for fiscal year  $t$ .

$E_{it}$  = reported earnings before extra ordinary items (COMPUSTAT item No. 58) of firm  $i$  in fiscal  $t$ .

$\Delta E_{it}$  = annual change in earnings:  $\Delta E_{it} = E_{it} - E_{i,t-1}$ , proxying for the surprise element in reported earnings.

Both  $E_{it}$  and  $\Delta E_{it}$  are scaled (divided) by firm  $i$ 's total market value of equity at the beginning of fiscal  $t$ . Our sources of data are the 1996 versions of the COMPUSTAT (both Current and Research files) and CRSP databases.

Table 1 presents estimates obtained from running regression (1) for each of the years, 1978-96 (1977 is "lost" due to the first differencing of earnings). The three data columns to the left of the table pertain to the total sample, which ranges in size from 3 700 to 6 800 firms per year. The right two columns report on a subsample of firms (1 300) with data in each of the 20 years examined (the "constant sample").

It is evident from Panel A of Table 1 that the association between stock returns and earnings, as measured by the coefficient of determination,  $R^2$ , has been declining throughout the 1977-96 period: from  $R^2$ s of 6-12 per cent in the first ten years of the sample to  $R^2$ s of 4-8 per cent in the last ten years.<sup>6</sup> A regression of the annual  $R^2$ s in Panel A on a Time variable indicates (Panel B) that the  $R^2$  decrease is statistically significant: the estimated Time coefficient is 80.002 ( $t = -2.97$ ).<sup>7</sup>

A different perspective on the informativeness of earnings is provided by the combined slope coefficients of earnings [ $\alpha_1 + \alpha_2$  in regression (1)]. This measure, dubbed the "earnings response coefficient" or ERC, reflects the average change in the stock price associated with a dollar change in earnings. A low slope coefficient, for example, suggests that reported earnings are not particularly informative to investors, probably because they are perceived as transitory or subject to managerial manipulation. In contrast, a high slope coefficient indicates that a large stock price change is associated with reported earnings, reflecting investors' belief that earnings are largely permanent (a reliable indicator of future profitability).<sup>8</sup> It has been shown (e.g. Lev, 1989, Appendix) that the estimated slope coefficient is a function of the precision of earnings.

The estimated slope coefficients (ERCs) in Table 1 (fourth column from left) have been decreasing over 1977-96, similarly to the  $R^2$ s: from a range of 0.75 – 0.90 in the first five years of the sample, to 0.60 – 0.80 in the last five years. A regression of the yearly ERCs on Time (Panel B) confirms that the ERC's decline is statistically significant: the estimated coefficient of Time is  $-0.011$  ( $t = -3.04$ ).<sup>9</sup>

The evidence on the declining slope coefficients of earnings complements the inferences based on declining  $R^2$ s. The  $R^2$  measure indicates the value-relevance of earnings *relative* to other sources of information. Accordingly, the temporally declining  $R^2$ s in Table 1 may be explained by an increase over time in the relative importance of non-accounting information (e.g. voluntary disclosures by managers or analysts' recommendations), even if the informativeness of earnings on a stand-alone basis remained unchanged. However, the regression slope coefficients (ERCs) are unaffected by the existence of other information items because the slope coefficients focus on the valuation impact of earnings. The pattern of

declining slope coefficients in Table 1 thus indicates a deterioration in the value-relevance of earnings to investors, irrespective of the role other information sources play in investors' decisions.

Note that the number of yearly observations in the total sample (second column from left in Table 1) is monotonically increasing, as new firms are added to the COMPUSTAT database. Is the documented weakening of the returns-earnings association due to the new firms joining the sample? To answer this question, we replicated the analysis with a "constant sample" of 1 300 firms which operated throughout the 20-year period, 1977-96. This sample is clearly subject to a survivorship bias, while the total sample which includes firms from the COMPUSTAT Research file (that is, deleted, bankrupt or merged companies) is not subject to such a bias. The estimates reported in the right two columns of Table 1 indicate that the declining returns-earnings association is *not* the result of new firms joining the sample. Similarly to the total sample, both the R<sup>2</sup>s and slope coefficients of the constant sample have been decreasing over time. The regressions on Time, reported in Panel B, indicate that the decreases in R<sup>2</sup> and ERCs of the constant sample are even more pronounced than those of the total sample (i.e. the Time coefficients of the constant sample for R<sup>2</sup> and ERC, -0.004 and -0.050, are larger than the corresponding coefficients of the total sample, -0.002 and -0.011).

Two comments: The R<sup>2</sup>s of the constant sample in Table 1 are in every year larger than those of the total sample, indicating that earnings are more informative for firms with extended history (for a similar result, see Lang, 1991). We will return to this important point in Section 4. Second, both the R<sup>2</sup>s and ERCs in Table 1 exhibit substantial volatility over time, a phenomenon noted in earlier research (e.g. Lev, 1989), which indicates the limited predictive usefulness of earnings.

Table 1. **The association between earnings and stock returns**  
 PANEL A: Equation (1)  $R_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 \Delta E_{it} + \varepsilon_{it}$

Year	TOTAL SAMPLE		CONSTANT SAMPLE		
	Number of observations	R <sup>2</sup>	ERC	R <sup>2</sup>	ERC
1978	3 689	0.115	0.907	0.167	1.689
1979	3 851	0.072	0.865	0.114	1.368
1980	4 141	0.059	0.768	0.092	1.367
1981	4 347	0.119	0.909	0.173	1.648
1982	4 822	0.066	0.755	0.099	1.190
1983	4 751	0.053	0.711	0.070	0.939
1984	5 074	0.111	0.753	0.245	1.177
1985	5 057	0.109	0.701	0.159	0.936
1986	5 048	0.076	0.633	0.169	1.067
1987	5 318	0.069	0.646	0.107	0.988
1988	5 350	0.074	0.575	0.079	0.609
1989	5 206	0.082	0.657	0.117	0.872
1990	5 162	0.070	0.537	0.135	0.788
1991	5 007	0.061	0.663	0.104	0.851
1992	5 245	0.061	0.635	0.062	0.534
1993	5 501	0.050	0.719	0.064	0.717
1994	6 532	0.064	0.671	0.098	0.826
1995	6 791	0.056	0.826	0.124	1.081
1996	6 593	0.037	0.610	0.031	0.418

Note: Estimates from yearly cross-sectional regressions of annual stock returns on the level and change of reported earnings.

Table 1. The association between earnings and stock returns (cont'd)

PANEL B: Time regressions:

$$R^2_t = a + b (\text{Time}_t) + c_t ; t = 1978 - 1996$$

$$\text{ERC}_t = a + b (\text{Time}_t) + c_t ; t = 1978 - 1996$$

(t-values in parentheses)

Total sample:	a	b	R <sup>2</sup>
R <sup>2</sup>	0.285 (4.00)	-0.002 (-2.97)	0.30
ERC	1.688 (5.25)	-0.011 (-3.04)	0.31
Constant sample:			
R <sup>2</sup>	0.470 (2.80)	-0.004 (-2.11)	0.16
ERC	5.353 (7.08)	-0.050 (-5.76)	0.64

Variable definition for Panel A:

$R_{it}$  = annual stock return of firm i in fiscal t.

$E_{it}$  and  $\Delta E_{it}$  = level and change of annual earnings of firm i in fiscal t.

ERC = combined slope coefficients, or "earnings response coefficient", namely the sum of the estimated regression coefficients  $\alpha_1$  and  $\alpha_2$  in regression (1).

Both  $E_{it}$  and  $\Delta E_{it}$  are scaled by market value of equity at the beginning of t.

The total sample includes all firms with the required data on the Current and Research COMPUSTAT files. Constant sample includes 1 300 companies with the required data on COMPUSTAT for the 20-year sample period (1977-96).

Variable definition for Panel B:

$R^2_t$ ,  $\text{ERC}_t$  = estimated annual coefficients of determination (adjusted  $R^2$ ) and combined earnings response coefficients (ERC), presented in Panel A.

$\text{Time}_t$  = a time variable, 78-96.

Summarising, our findings indicate that the cross-sectional association between stock returns and reported earnings, and by implication the usefulness of earnings to investors, has declined over the last 20 years. It is sometimes suggested that this decline is the result of the increase over time in the quality of analysts' forecasts of earnings and the consequent decrease in the surprise element in earnings. This is not the case; our analysis does<sup>10</sup> not focus on *investors' reaction* to an earnings announcement (an event study), where the extent of earnings surprise determines investors' reaction. Rather, our analysis which is based on annual earnings and returns, reflects the *consistency* between the information conveyed by earnings and that which affected investors' decisions during the entire year. Accordingly, our findings indicate that the consistency between the information conveyed by reported earnings and the information relevant to investors has decreased over time, irrespective of the quality of analysts' forecasts. Nor is the

increase in the availability of non-accounting information solely responsible for the decrease in earnings usefulness, as indicated by the declining earnings response coefficient.<sup>11</sup>

## 1.2 *Is cash king?*<sup>12</sup>

Cash flows are often claimed to be more informative than earnings because they are less amenable to subjective assumptions and managerial manipulation than accrual earnings. Cash flows are also perceived to be superior to earnings in situations where the latter are of questionable relevance, such as when earnings are negative due to the excessive expensing of intangibles (e.g. the case with many cellular and biotechnology companies). It is, therefore, instructive to examine the pattern of association between stock returns and cash flows. We accordingly run the following cross-sectional regression for each sample year (1977-96):

$$R_{it} = \beta_0 + \beta_1 CF_{it} + \beta_2 \Delta CF_{it} + \beta_3 ACC_{it} + \beta_4 \Delta ACC_{it} + \varepsilon_{it} , \quad (2)$$

Where:

$R_{it}$  = firm  $i$ 's stock return for fiscal year  $t$ .

$CF_{it}$  and  $\Delta CF_{it}$  = cash flow from operations and the yearly change in cash flows from operations, respectively.

$ACC_{it}$  and  $\Delta ACC_{it}$  = annual reported accruals and the change in annual accruals, where accruals equal the difference between reported earnings and cash flows from operations. The four independent variables in (2) are scaled by the beginning-of-year market value of equity. Regression (2) thus estimates the association between annual stock returns, on the one hand, and operating cash flows plus accounting accruals (the difference between earnings and cash flows) on the other hand. Table 2 reports yearly coefficient estimates of this regression.

The first notable result in Table 2 is that cash is hardly king: the association between operating cash flows (plus accruals) and stock returns, as measured by  $R^2$ , is not appreciably stronger than the association between earnings and returns ( $R^2$ s in Table 1).<sup>13</sup> As to the time pattern of association, the  $R^2$ s of both the total and constant samples have decreased over the examined period, although only the former's decrease is statistically significant (see Time coefficients in Panel B of Table 2). Similarly, the combined slope coefficients of the level and change of cash flows [ $\beta_1 + \beta_2$  in expression (2)], denoted as CFRC, tends to decrease over time, although only the decrease of the constant sample is statistically significant, as evidenced by the Time coefficients in Panel B. As was the case with earnings (Table 1), the  $R^2$ s of the constant sample are substantially larger than those of the total sample, indicating that operating cash flows are more informative for firms with a "history".

Table 2. **The association between cash flows and stock returns**<sup>1</sup>

Estimates from yearly cross-sectional regressions of annual stock returns on operating cash flows plus accruals

PANEL A: Equation (2)  $R_{it} = \beta_0 + \beta_1 CF_{it} + \beta_2 \Delta CF_{it} + \beta_3 ACC_{it} + \beta_4 \Delta ACC_{it} + \epsilon_t$

Year1	TOTAL SAMPLE		CONSTANT SAMPLE		
	Number of observations	R <sup>2</sup>	CFRC	R <sup>2</sup>	CFRC
1979	3 276	0.074	0.750	0.074	0.772
1980	3 432	0.052	0.574	0.065	0.797
1981	3 571	0.124	0.853	0.187	1.857
1982	3 945	0.059	0.560	0.091	1.112
1983	3 948	0.041	0.536	0.068	0.869
1984	4 169	0.111	0.679	0.240	1.169
1985	4 163	0.092	0.573	0.146	0.918
1986	4 098	0.063	0.515	0.122	0.939
1987	4 361	0.052	0.518	0.114	0.916
1988	4 361	0.064	0.496	0.110	0.447
1989	4 232	0.078	0.642	0.134	1.014
1990	4 179	0.058	0.472	0.124	0.823
1991	4 097	0.042	0.467	0.054	0.434
1992	4 321	0.052	0.548	0.057	0.535
1993	4 543	0.048	0.666	0.090	0.991
1994	4 953	0.071	0.685	0.136	0.928
1995	5 142	0.051	0.704	0.163	0.949
1996	4 953	0.036	0.416	0.029	0.288

CFRC = combined slope coefficients of the cash flow variables;  $\beta_1 + \beta_2$  in (2).

1. The time-series for cash flows starts with 1979, since the number of observations for 1977 (required for the cash flow change of 1978) was unusually low (998).

Table 2. **The association between cash flows and stock returns** (cont'd)

PANEL B: Time regressions:

$$R^2_t = a + b (\text{Time}_t) + c_t ; t = 1979 - 96$$

$$\text{CFRC} = a + b (\text{Time}_t) + c_t ; t = 1979 - 96$$

(t-values in parentheses)

<b>Total sample:</b>	<b>a</b>	<b>b</b>	<b>R<sup>2</sup></b>
R <sup>2</sup>	0.242 (2.77)	-0.002 (-2.04)	0.16
CFRC	1.159 (2.62)	-0.006 (-1.28)	0.04
<b>Constant sample:</b>			
R <sup>2</sup>	0.241 (1.13)	-0.001 (-0.61)	0.00
CFRC	3.424 (2.72)	-0.029 (-2.03)	0.15

Summarising, for a broad cross-section of firms, operating cash flows do not augment appreciably the informativeness (usefulness) of accrual earnings to investors.<sup>14</sup> The declining association with stock returns documented in the preceding section for earnings is also evident for cash flows, although it is less pronounced and occasionally statistically insignificant. The reason for the milder decline in the informativeness of cash flows relative to earnings is that some of the change-related items, such as accrued restructuring charges, adversely affect the informativeness of earnings while not affecting cash flows (see Section 2).

### 1.3 From stock returns to prices

Following Ohlson (1995), it has become popular in accounting research to examine the relevance of financial data by the following stock price (levels) regression:

$$P_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 BV_{it} + \varepsilon_{it}, \quad (3)$$

Where:

$P_{it}$  = share price of firm  $i$  at end of fiscal  $t$ ,

$E_{it}$  = earnings per share of  $i$  during year  $t$ ,

$BV_{it}$  = book value (equity) per share of  $i$  at end of  $t$ ,

$\varepsilon_{it}$  = other value-relevant information of firm  $i$  for year  $t$ , independent of earnings and book value.

This model expands the scope of the examined information by adding the book value of equity to the previously examined earnings and cash flows.

Estimates of regression (3) are presented in Table 3. It is evident that the association between stock prices and earnings + book value, as measured by  $R^2$ , decreased during 1977–96, from  $R^2$  levels of 0.90 in the late 1970s, to 0.80 in the 1980s and to 0.50 – 0.60 in the 1990s. A regression of the yearly  $R^2$ s on a Time Variable (Panel B) indeed yields a negative and statistically significant Time coefficient (-0.022,  $t = -5.07$ ). This finding of decreasing value-relevance of earnings + book value is consistent with our previous results derived from the returns-earnings and returns-cash flow relationships. We thus generalise and conclude that the association between key financial statement variables and both stock returns and prices has been declining over the last 20 years.

Collins *et al.* (1997), estimating regression (3) over the 1953-93 period, have reached a different conclusion: “We find that the combined value-relevance of earnings and book values has not declined over the past 40 years and, in fact, appears to have increased slightly.” (p.2). The source of the inconsistency appears to lie in the length of the examined period. While Collins *et al.* examine 40 years, our focus is on the last 20 years. In an earlier version of their paper (March 1996), they report yearly coefficient estimates and  $R^2$ s of regression (3). We regressed their yearly  $R^2$ s for the period 1977–93 on Time and obtained a negative coefficient (-0.0030), indicating decreasing  $R^2$ s. The coefficient, however, was statistically insignificant ( $t = -0.53$ ). Our sample period extends Collins *et al.*'s by three years (1994-96), each having a particularly low  $R^2$  (see Table 3). This may have contributed to the statistical significance of our negative Time coefficient (Panel B, Table 3).<sup>15</sup> Thus, while the association between stock prices and earnings + book value may have been stable over the last 40 years, our evidence indicates that it has decreased over the latter half of that period, which is the focus of our analysis.

#### **1.4 Comparison with related research**

The temporal association between capital market variables and financial data has recently received considerable attention (e.g. Collins *et al.*, 1997; Francis and Schipper, 1996; Ely and Waymire, 1996; Ramesh and Thiagarajan, 1995; Chang, 1998). To achieve some closure, it is important to compare our results with those of others.

Ely and Waymire (1996) use a cross-sectional returns-earnings model similar to ours (1). They run this regression for every year, 1927-93, on a randomly selected sample of 100 companies. A regression of the highly volatile yearly estimated  $R^2$ s on time yielded a negative but insignificant time coefficient. However, when a few extreme observations (earnings changes larger than three standard deviations from the mean earnings change) were removed from the yearly returns-earnings regressions, the decline in  $R^2$  over the 75 years examined is statistically significant, and even more so for the recent period, 1951-93. This corroborates our result, based on a much larger sample, of a temporally decreasing returns-earnings association. Ely and Waymire also report for subperiods (their Table 2, Panel C) that the mean and median coefficients of the earnings variables (level and change) are the lowest in the 1974-93 period relative to previous periods (1927-73). Francis and Schipper (1996) also document a statistically significant decrease in the returns-earnings  $R^2$  over the 1951-93 period. However, they report that a different approach to assessing usefulness of financial information -- trading on perfect advanced knowledge of earnings -- does not indicate a usefulness decrease. A temporal decrease in the returns-earnings association is also documented by Chang (1998).

Table 3. **The association between stock prices, book values and earnings**

Estimates of yearly cross-sectional regressions of stock prices on earnings plus book values

PANEL A: Equation (3)  $P_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 BV_{it} + \epsilon_{it}$

Year	R <sup>2</sup>	Year	R <sup>2</sup>
1977	0.923	1987	0.993
1978	0.932	1988	0.837
1979	0.796	1989	0.525
1980	0.866	1990	0.538
1981	0.867	1991	0.780
1982	0.867	1992	0.469
1983	0.899	1993	0.546
1984	0.832	1994	0.558
1985	0.887	1995	0.560
1986	0.874	1996	0.618

$P_{it}$ ,  $E_{it}$ , and  $BV_{it}$  = share price at end of fiscal t, earnings per share and book value per share of firm i in fiscal t.

Panel B:  $R^2_t = a + b (\text{Time}_t) + c_t$ ; t = 1977 - 96

	a	b	R <sup>2</sup>
R <sup>2</sup>	2.649	-0.022	0.57
	(7.09)	(-5.07)	

In contrast with the uniform finding of a weakening returns-earnings association (and our finding of a decline in the returns-cash flow association), results from levels regressions (price on earnings + book value or on assets and liabilities) are mixed. Collins *et al.* (1997) and Francis and Schipper (1996) report a stable association over the 40 some years 1951-93. In contrast, Chang (1998), using various alternative methodologies, concludes that the value-relevance of earnings and book value has decreased over the last 40 years. Our regressions of price on earnings + book value (Section 1.3) indicates a weakening of the association over the last 20 years. While closure has yet to be reached with respect to price regressions, we wish to comment on an important aspect of the price analysis.

Collins *et al.* (1997, p. 22) note that “while the incremental value-relevance of “bottom line” earnings has declined, it has been replaced by increasing value-relevance of book values.” They further argue that non-recurring (one-time) items are a major reason for the increasing value-relevance of book values, since “It is reasonable to expect that firms divesting themselves of non-core lines of business and firms in financial difficulty report non-recurring items more frequently than other firms. If abandonment [asset realisation] value is more salient in these types of firms, and if abandonment value is associated with increasing value-relevance of book values, one would expect the value-relevance of book values to be increasing in non-recurring items.” (pp. 5-6). Collins *et al.* thus argue that asset write-offs, the major form of non-recurring items, enhance the value-relevance of book values by setting them closer to abandonment

values and consequently to market values. We agree with the chain of events, yet question whether this implies an increase in the value-relevance of book values as providers of *timely* information. The following example demonstrates our argument.

The regional telephone companies (Baby Bells) have gone through a gradual deregulation since the late 1980s, starting with state deregulations and culminating in the 1996 Federal Telecommunications Act. The old regulatory framework, based on assuring utilities a “fair return on assets” and thereby securing the values of these assets, was discarded in favour of incentive-based pricing mechanisms and the opening up of local markets to competition. Such a far-reaching deregulation obviously decreased the asset values of the capital-intensive phone companies. Investors recognised the impairment of asset values as the deregulation unfolded, so that when six of the seven regional phone companies and GTE Corp. belatedly wrote off \$26 billion of assets during 1993-95, the market reaction to these massive non-recurring items was relatively mild.<sup>16</sup> Following Collins *et al.*, it is reasonable that the \$26 billion asset write-offs brought the post-deregulation book values of assets of the regional phone companies closer to abandonment values and thereby to market values. But did the write-offs enhance the value-relevance of book values in the sense that they *provided* the information used by investors in revising the market values of the deregulated phone companies? Of course not. The value-revision by investors was triggered by information on deregulation, while the asset write-offs trailed that information by years. This example demonstrates that value-relevance, in the sense of *timeliness* of information release, cannot be inferred from stock price (levels) regressions.

Summarising, the collective evidence clearly indicates a temporally weakening returns-earnings and returns-cash flow associations, while the evidence from levels regressions regarding changes in the association between prices and book values + earnings is still mixed.

## **2. Business change and the deterioration of usefulness**

The accounting measurement and reporting system does not cope well with change. Be it driven by competition, deregulation or innovation, change profoundly affects the operations of business enterprises and their market values, yet such effects are either ignored by the accounting system or reflected in a biased and delayed manner. We contend that the increasing rate of change experienced by business enterprises, coupled with the ineffectiveness of the accounting system in reflecting the consequences of change, are major reasons for the documented decline in the usefulness of financial information. Empirical support for this contention is provided below.

### **2.1 *The increasing rate of business change***

It is widely believed that the rate of change of business enterprises has picked up considerably during the last 15-20 years. When polled, executives, investors and policy makers generally describe the business environment as changing in an ever increasing rate. For example:

“Virtually all of the business leaders interviewed say that change within their own companies has increased over the past two to three years. Only 3 per cent say that in one year their company will have remained the same with no significant changes. Such change is being driven by both external and internal factors. A new world economic order that is ushering in a broader competitive playing field is driving change from outside the company walls. But there is also major renovation happening within the company structure.” (Deloitte & Touche, 1995).

Empirical support for this view is, however, sparse.

To examine the pattern of business change, we used our sample of public companies derived from the Industrial and Research COMPUSTAT files and the CRSP database, roughly 4 000 to 6 500 public companies per year. For each year, we ranked the sample companies by the following accounting and market indicators of value:

- book (balance sheet) value of equity at fiscal year-end;
- market value of equity at year-end (i.e. number of outstanding common shares times share price).

We then classified the sample firms for each year and value indicator into ten portfolios of equal size (e.g. the first book value portfolio in 1978 includes the 10 per cent of sample firms with the largest book values, while the tenth portfolio includes the 10 per cent of the sample firms with the lowest book values in 1978).

We measure the rate of business change by the frequency and magnitude of *portfolio switches*, namely firms moving over time from one value portfolio to another. Specifically, for each firm and year we measure the “absolute rank change,” reflecting the movement across portfolios experienced by the firm from the previous to the current year. For example, a firm which was in 1977 in book value portfolio 1 and shifted in 1978 to portfolio 4, is assigned a rank change measure of three. We then compute for each year and value indicator the “mean absolute value of rank change,” reflecting the aggregate portfolio switches experienced by all the sample firms in that year.<sup>17</sup> Thus, when the portfolio membership of firms, classified by market or book values, is stable over time, our change measure will be low (zero at the limit), whereas when firms bounce a lot from year to year across portfolios, our change measure will be high. We allow the number of firms to change over the sample period (due to new firms becoming public or existing ones merging or going bankrupt). This approach to measuring the rate of business change bears similarity to Stigler’s suggestion for estimating optimal firm size by observing shifts in the size distribution of firms in an industry over time (Stigler 1966, pp. 159-160). If a specific size is optimal (yielding maximum economies of scale), one should observe a convergence over time to that size. Our approach is also similar in nature to the use of Markov Chains transition matrices to study mobility issues (e.g. Kemeny and Snell, 1967, pp. 191-200).

Table 4 presents the yearly “mean absolute value of rank change” measures for the sample companies. For market value rankings we used the CRSP database which reports stock prices for the period 1963-95. For the book value rankings we used COMPUSTAT, which provides data for 1977-96. It is evident from Panel A that the rate of business change, as measured by the frequency of firms switching across portfolio rankings, has increased over the last 20-30 years. The yearly “rank change” measures for both the market and book value indicators are generally increasing over time. For market value ranking, the change measures increased from 0.300-0.400 in the 1960s to 0.500-0.600 in the 1990s. For book value rankings, the change measures increase almost monotonically, from 0.200-0.300 in the late 1970s and early 1980s to 0.400-0.500 in the 1990s. These increases are statistically significant as evidenced by the t-values of the three slope coefficients of the Time regressions in Panel B. We thus corroborate empirically the casual observation of executives and investors concerning the increasing rate of change experienced by business enterprises.

Table 4 **The rate of business change**

Mean absolute value of yearly rank changes (MARC) experienced by firms classified into ten portfolios by market and book values

*Panel A.* yearly measures of change (MARC)

Market value portfolios				Book value portfolios	
Year	MARC measure	Year	MARC measure	Year	MARC measure
---	---	1978	0.404	1978	0.179
---	---	1979	0.384	1979	0.181
---	---	1980	0.429	1980	0.240
---	---	1981	0.545	1981	0.276
---	---	1982	0.568	1982	0.294
1964	0.309	1983	0.624	1983	0.374
1965	0.308	1984	0.583	1984	0.317
1966	0.418	1985	0.550	1985	0.382
1967	0.416	1986	0.588	1986	0.410
1968	0.487	1987	0.539	1987	0.390
1969	0.434	1988	0.516	1988	0.324
1970	0.499	1989	0.500	1989	0.237
1971	0.443	1990	0.565	1990	0.309
1972	0.432	1991	0.528	1991	0.387
1973	1.113	1992	0.587	1992	0.409
1974	0.547	1993	0.584	1993	0.487
1975	0.490	1994	0.517	1994	0.401
1976	0.422	1995	0.526	1995	0.417
1977	0.385	1996	---	1996	0.536

*Note:* MARC (mean absolute value of rank change) indicates the frequency of firms switching value portfolios from last year to the current year, as well as the number of portfolios switched (i.e. magnitude of switch) by each firm.

*Panel B.* Time regressions: mean absolute rank change (MARC) regressed on time

MARC (Indicator) <sub>t</sub> = a + b (Time <sub>t</sub> ) + c <sub>t</sub> ; (t-values in parentheses)			
	<b>A</b>	<b>B</b>	<b>R<sup>2</sup></b>
MARC (Market Val.), 1964-95	0.0026 (0.03)	0.0062 (5.33)	0.48
MARC (Market Val.), 1978-95	-0.0693 (-0.31)	0.0069 (2.63)	0.25
MARC (Book Val.), 1978-96	-0.8357 (-4.54)	0.0138 (6.44)	0.69

## 2.2. *The adverse impact of change on financial information*

How is the increasing rate of business change over the last two to three decades related to the documented decline in the usefulness of financial information? Answering this question requires a brief

examination of the accounting treatment of change and its consequences. The accounting system is primarily based on the recording and reporting of discrete, transaction-based events, such as sales, purchases, investments and cash receipts and disbursements.<sup>18</sup> In contrast, the impact of change on business enterprises is rarely triggered by specific transactions and is often continuous rather than discrete, affecting enterprise value long before explicit revenue or expense events warrant an accounting record. Consider once more the deregulation of the regional phone companies, discussed in Section 1.4 (the deregulation of electrical utilities followed shortly that of the phone companies). Naturally, such far-reaching deregulation (from the secure “rate base” system to the competitive incentive-based regulation) profoundly affected the prospects, risks and asset values of telephone and electrical utilities and consequently their market values, yet the impact of deregulation on accounting *recordable events* has been minor for years. The reasons are that the regional phone companies are deeply entrenched, regulators are slow moving and legal battles delay the inevitable -- an opening up of telecommunications and energy markets. Thus, while capital markets reflected in the early 1990s the diminished prospects and higher risk of the deregulated companies, the financial reports of those phone companies reflected only minimal revenue and expense consequences of deregulation.<sup>19</sup> Not surprisingly, as shown below, the statistical association between stock returns of the regional phone companies and their reported earnings declined in the 1990s.

We ran for the regional phone companies the returns-earnings regression (1) for two periods: the pre-deregulation period, 1984-89, and the deregulation period, 1990-96. The regressions are pooled time-series and cross-section, with fixed effects for both time (year) and firms. The estimated  $R^2$ s are: 0.93 for the pre-deregulation period vs. 0.72 for the deregulation period (these  $R^2$ s are very high because of the fixed effects). The estimated combined slope coefficients (ERCs) are: 1.85 for the pre-deregulation period vs. 0.68 for the deregulation period. The former combined slope coefficient (1.85) is significantly different from zero at the 0.02 level, while the latter coefficient (0.68) is insignificantly different from zero. Earnings of telephone companies have clearly become less useful to investors due to the significant change ushered in by deregulation and the accounting system’s delayed reaction to the deregulation.

In addition to deregulation, change is also driven by increased competition and innovation (from inside and outside the firm). In contrast with the delayed reaction of the accounting system to deregulation described above, in the cases of change driven by competition and innovation the accounting system frontloads the costs and postpones the recognition of benefits. For example, competitive pressures led businesses during the last two decades to profoundly restructure their operations, resulting in massive asset write-offs and other restructuring charges (e.g. for employee layoffs or production reengineering). These change-related costs were immediately expensed, while the benefits of restructuring, in the form of enhanced market share and lower production costs, followed over long periods of time. Consequently, the reported financial information fully reflected the cost of restructuring but not its benefits, and were therefore largely disconnected from market values which reflect the expected benefits along with the costs, as evident by the frequent positive reaction to restructuring announcements.<sup>20</sup> Similarly, product and process innovation, generally ushered in by research and development, constantly changes firms’ products and production processes. However, the accounting treatment of investment in innovation -- the immediate expensing of intangible assets -- is both biased and inconsistent.<sup>21</sup> Costs of innovation are recognised up front, while benefits are recorded in subsequent periods. To complicate things further, the accounting for intangibles is beset by inconsistencies. For example, software developed for internal use is expensed, while if similar software was acquired from a vendor it will be capitalised; completed technology included in a corporate acquisition is capitalised, while acquired technology-in-process is expensed (Deng and Lev, 1998).

Thus, most change-drivers (deregulation, competition, innovation) adversely effect the process of *matching* costs with revenues, leading to a disconnect between financial information and market values. Empirical support for the association between the increasing rate of business change and the decline in the informativeness of earnings is provided in the next section.

### 2.3 *Measuring the impact of change on informativeness of earnings*

In Section 2.1 we introduced a methodology designed to measure the rate of change experienced by business enterprises. Firms were ranked in each year by a value indicator (e.g. book value) and grouped into ten portfolios. The rate of change was then measured by the frequency and extent of firms switching portfolios from one year to another. We use this methodology here to examine our conjecture that the increasing rate of business change (documented in 2.1) adversely affected the informativeness of earnings. Specifically, we compute for each sample firm the *across time* mean absolute rank change, reflecting the number of times the firm switched book value portfolios during 1977-96, as well as the extent of such switches. To standardize the firm-specific measures, we scale this indicator by the number of years the firm existed in the sample. Consider, for example, a firm that was placed in the top book value portfolio during 1977 to 1983, then switched to the second (next to top) portfolio in 1984, and switched once more to the fifth portfolio in 1992, remaining in that portfolio until 1996. Such a firm is assigned a change indicator of 0.20 (1 point for the single rank switch in 1984 plus 3 points for the three-rank switch -- from 2 to 5 -- in 1992, divided by the 20 years of the firm in the sample). Having assigned a change indicator to each firm, we then classify the sample firms into “high” and “low” change groups by two criteria: *i*) “No Change” firms, namely those that throughout the sample period (1977-96) did not switch across book value portfolios (roughly 1 000 companies) *vs.* “Change” firms—the remaining sample firms (ranging from 3 000 in the early sample years to 5 500 in the mid-1990s); *ii*) “Low Change” firms -- those with a firm-specific change indicator equal to or smaller than 0.10 (including, of course, the No Change firms) *vs.* “High Change” firms -- the remaining sample.<sup>22</sup>

Next, we estimate the yearly cross sectional returns-earnings regression (1) separately for the stable and changing firms. If our hypothesis (Section 2.2) concerning the adverse impact of change on the informativeness of earnings is valid, then the regression’s  $R^2$  and combined slope coefficients (ERC) should be larger for stable firms (higher returns-earnings association) than for changing ones. Furthermore, given our evidence (Section 2.1) that the rate of change of business enterprises increased during the last 20 years, that increase clearly impacted more the changing firms than the stable ones. Accordingly, if our conjecture is valid, the *rate of decrease* of  $R^2$  and ERC over 1977-96 should be higher for changing firms than for stable ones. The data in Table 5 support both expectations.

Panel A of Table 5 reports yearly estimates of  $R^2$ s and combined slope coefficients for the four change-classifications of firms. Panel B reports means and medians of the 19 yearly estimates. The data corroborate our first expectation: both the means and medians of the yearly  $R^2$  and ERC are larger for “No Change” firms than for “Change” firms (e.g. mean  $R^2$  of 0.124 *vs.* 0.097 and mean ERC of 1.22 *vs.* 1.02). Similarly, the  $R^2$  and ERCs of the “Low Change” firms are larger than the association measures of the “High Change” firms. Thus, the rate of business change is negatively associated with the informativeness of earnings, as measured by the extent of the returns-earnings association.

Panel C of Table 5 presents estimates from regressions of the yearly  $R^2$  and ERCs (presented in Panel A) on a Time variable. The data support our second expectation -- the temporal decline in the returns-earnings association is more pronounced for High Change firms than for Low (or No) Change

ones. The four coefficients of Time in the  $R^2$  and ERC regressions for both the No Change and the Low Change groups are *not* statistically significant, and the  $R^2$  of those four regressions equal zero, indicating essentially no change over time in the returns-earnings association for stable companies. In contrast, the four Time coefficients of both the Change and High Change groups are *all negative* and statistically significant, and the four  $R^2$ s of these Time regressions range between 0.11–0.21, indicating that for changing firms the association between returns and earnings has declined over the last 20 years.

Summarising, we hypothesised in Section (2.2) that the documented decrease in the informativeness of financial information over the last 20 years (Section 1) is at least partially due to the ineffectiveness of the accounting system to reflect the consequences of business change in a timely and meaningful manner. We validated this hypothesis by presenting evidence that: *i*) the rate of change experienced by business enterprises increased over the 1977-96 period; and *ii*) the informativeness of earnings is negatively related to the rate of business change.

Table 5 **Business change and earnings informativeness**

Estimates of annual regressions of stock returns on the level and change of annual earnings, run separately for high and low change firms

*Panel A.* Yearly estimates of regression (1).

Year	<i>No change</i>		<i>vs.</i>		<i>Change</i>		<i>Low change</i>		<i>vs.</i>		<i>High change</i>	
	R <sup>2</sup>	ERC	R <sup>2</sup>	ERC	R <sup>2</sup>	ERC	R <sup>2</sup>	ERC	R <sup>2</sup>	ERC	R <sup>2</sup>	ERC
1978	0.11	1.28	0.12	1.17	0.13	1.36	0.12	1.15				
1979	0.16	1.96	0.09	1.02	0.15	1.85	0.09	1.01				
1980	0.05	0.79	0.08	1.07	0.06	0.90	0.09	1.09				
1981	0.26	1.69	0.11	1.03	0.28	1.81	0.10	1.00				
1982	0.08	1.05	0.09	1.12	0.10	1.20	0.09	1.10				
1983	0.09	1.11	0.07	1.01	0.07	1.02	0.07	1.03				
1984	0.23	0.77	0.16	1.13	0.23	0.91	0.15	1.10				
1985	0.13	0.93	0.14	1.08	0.17	1.05	0.14	1.07				
1986	0.12	1.23	0.12	1.04	0.15	1.24	0.11	1.03				
1987	0.03	0.65	0.07	0.87	0.04	0.75	0.07	0.86				
1988	0.08	1.05	0.12	0.94	0.07	0.91	0.12	0.94				
1989	0.14	1.14	0.10	0.96	0.11	1.23	0.10	0.96				
1990	0.12	0.83	0.10	0.89	0.10	0.96	0.10	0.89				
1991	0.08	0.99	0.09	0.96	0.11	1.11	0.09	0.95				
1992	0.16	1.53	0.09	0.95	0.15	1.58	0.09	0.93				
1993	0.12	1.68	0.08	1.06	0.11	1.49	0.08	1.07				
1994	0.22	1.80	0.10	1.05	0.17	1.47	0.10	1.06				
1995	0.10	1.22	0.06	1.01	0.12	1.43	0.06	1.00				
1996	0.07	1.41	0.06	0.96	0.06	1.27	0.06	0.96				

Firms classified as “No Change” are those that did not switch book value ranking during 1997-96, while “Change” firms are the rest of the sample. Firms classified as “Low Change” are those with a change indicator equal to or lower than 0.10, while “High Change” firms are the rest of the sample.

Panel B. 1977-96 Means and Medians of  $R^2$  and ERC by change group

Change group	$R^2$		ERC	
	Mean	Median	Mean	Median
No change vs. Change	0.124 0.097	0.116 0.095	1.22 1.02	1.14 1.02
Low change vs. High change	0.124 0.096	0.114 0.093	1.24 1.01	1.23 1.02

Panel C. Regressions of yearly  $R^2$  and ERC (Panel A) on time.

		Intercept	Time	$R^2$
[ No change } 	$R^2$	0.204 (0.88)	-0.001 (-0.35)	0.00
	ERC	0.514 (0.37)	0.008 (0.50)	0.00
[ Change } 	$R^2$	0.256 (2.86)	-0.002 (-1.78)	0.11
	ERC	1.636 (6.31)	-0.007 (-2.39)	0.21
[ Low change } 	$R^2$	0.330 (1.49)	-0.002 (-0.93)	0.00
	ERC	1.18 (1.02)	0.001 (0.05)	0.00
[ High change } 	$R^2$	0.246 (3.01)	-0.002 (-1.84)	0.12
	ERC	1.585 (6.14)	-0.007 (-2.23)	0.18

## 2.4 *Change, negative earnings and non-recurring items*

The role of negative earnings and non-recurring items (the two are, of course, related) in the informativeness of financial data has recently attracted research attention. Thus, Hayn (1995) reports that negative earnings account for some of the observed decline in the slope coefficient of the returns-earnings regression (ERC), and Collins *et al.* (1997, p. 22) conclude: "...much of the shift in value-relevance from earnings to book values can be explained by the increasing significance of one-time items, [and] the increased frequency of negative earnings,..."

It is important to note that the two "culprits"-- reported losses and non-recurring items -- are often the *symptom* rather than the *cause* of the decline in informativeness of financial information. We argued above that this decline is caused by business change which is not adequately reflected by the accounting system. It is that failure of the accounting system to reflect change that often manifests itself in reported losses and non-recurring items. For example, when firms restructure their operations they incur costs and expect benefits. Financial reports immediately reflect the former -- resulting in heavy losses -- while postponing the latter, whereas investors consider both costs and benefits simultaneously. However, it is the conservative accounting treatment of corporate restructuring that weakens the returns-earnings association, rather than the reported losses.

Cellular phone companies provide another case in point. Most cellular operators report chronic losses and their financial data (for the period 1987-95) were found to be largely unrelated to stock prices and returns (Amir and Lev, 1996). But the reported losses of cellular companies were not the cause of the disconnect between accounting data and market variables. Rather, these losses were a consequence of a deficient accounting procedure expensing all of the heavy customer acquisition costs of cellular companies, despite the fact that customers stay with a cellular operator for three or four years on average (i.e. such costs are an investment). Here too, accounting's failure to reflect change -- franchise growth of cellular companies -- is the cause of relevance lost, not the reported losses. Similarly, the large losses and frequent non-recurring items reported by acquiring companies writing off all the acquired R&D-in-process are a manifestation of an inadequate accounting practice, since these losses obviously do not reflect any decline in firms' operations (for elaboration, see Deng and Lev, 1998).<sup>23</sup> Once more, it's not the reported losses or non-recurring items that weaken the returns-earnings relation, rather the overly conservative accounting procedures applied by firms. The difference is not semantic; it becomes important when one is concerned with improving the usefulness of financial information.

Given the recent research attention to reported losses, we examined the role of such losses in our findings (Section 2.3) concerning the association between the rate of business change and the decline in earnings' informativeness. Specifically, we added to the Time regressions reported in Panel C of Table 5 the yearly percentage of firms with negative EPS. The regressions are thus:

$$\text{Estimated } R^2_t \text{ (or ERC}_t\text{)} = a + b \text{ Time}_t + c (\% \text{ Losses}) + \varepsilon, \quad t = 1978 - 1996 \quad (4)$$

We ran these regressions for both the "Change" and "High Change" companies, which in Panel C had a negative and statistically significant Time coefficient. Our estimates of regression (4) indicate that in all four regressions ( $R^2$  and ERC for Change and High Change firms) the coefficients of percentage losses [c in regression (4)] were statistically insignificant. Thus, the facts that the percentage of firms reporting losses in our sample (as well as in previous research) increases over time, and that changing firms have a higher frequency of reported losses than stable firms, do not alter our conclusion that firms characterised by a fast rate of change experience a decline in the informativeness of earnings.

### 3. Intangibles, innovation and change

Innovation, which is primarily achieved by investment in intangibles, such as R&D, information technology, brands and franchises, and human resources, is a major change-driver.<sup>24</sup> It is important to note, however, that not all intangible investments trigger change; in fact, many such investments are just aimed at preserving the *status quo*. For example, *applied research*, defined as “spending aimed at learning more about the technology process a firm *is already using*, or about a good that *it is already producing*” (Jovanovic and Nyarko, 1995, p. 5, emphasis ours), is generally aimed at securing the survival of the firm and sustaining its competitive position, rather than radically changing the firm’s operations. In contrast, *basic research*, defined as “spending directed towards processes *not yet in use*, or goods *not yet produced*” (Jovanovic and Nyarko, 1995, p. 6, emphasis ours) is aimed at initiating change.<sup>25</sup> The fact that certain R&D expenditures trigger change while others just preserve the *status quo* suggests that the *level* or *intensity* (intangibles’ spending relative to sales) of a firm’s investment in R&D does *not* necessarily lead to a loss of informativeness of financial data.

From an accounting perspective, too, the level of R&D expenditures does not necessarily affect the informativeness of earnings. Specifically, for firms in a steady state, where the rate of R&D spending is constant over time, reported earnings are invariant to the accounting treatment of R&D -- expensing vs. capitalisation. Such firms may spend considerably on R&D or on other intangibles, yet the immediate expensing of those intangibles will not detract from the informativeness (usefulness) of reported earnings. These observations, dealing with the nature of and the accounting for R&D have important implications for studies (discussed below) relating intangibles-intensity or membership in a high-tech industry to changes in the informativeness of earnings.

#### 3.1 Intangibles-intensity and earnings’ informativeness

Several studies on temporal changes in the informativeness of financial information (e.g. Collins *et al.*, 1997; Francis and Schipper, 1996) examined the association between the intensity of intangibles and the  $R^2$  of the returns-on-earnings or the price on earnings + book value associations. The stated reason was to examine the widespread belief that the controversial accounting treatment of intangible investments (immediate expensing, irrespective of the expected benefits of such investments) is a major reason for the low or decreasing informativeness of financial information. The researchers, however, report that firms engaged in intangible investments were not characterised by a lower association between stock prices (or returns) and financial data. For example, Collins *et al.* (1997, p. 13) conclude: “... in our sample the overall explanatory power of earnings and book values [with respect to stock prices] is slightly higher for intangible-intensive firms than for non-intensive firms.... Contrary to assertions in the financial press, the proportion of firms operating in intangible-intensive industries does not reduce the combined explanatory power of earnings and book values.”<sup>26</sup>

We argued above that the mere existence of intangible assets, indicated by a firm’s membership in a high-tech industry or by a high intensity of R&D, should not necessarily be associated with low or a temporal decline in the informativeness of financial information. For example, large, mature pharmaceutical companies (e.g. Merck, Ely Lilly, Baxter) are characterised by a relatively high yet *stable* rate of investment in R&D.<sup>27</sup> In such a steady-state environment, immediate expensing of R&D will result in earnings which are very close to those based on R&D capitalisation; hence no loss of informativeness can be ascribed to R&D. However, when the investment rate in intangibles *changes*, the accounting

treatment of intangibles matters: reported earnings based on immediate expensing will differ considerably from earnings based on capitalisation of intangibles.

Thus, it is the *rate of change* of intangible investment which adversely affects the informativeness of financial information, rather than the mere existence of intangibles. We accordingly conjecture that the expensing of intangibles (the current GAAP practice) by firms whose investment rate increases leads to a decline in the informativeness of reported earnings.

To examine this conjecture, we split our sample period, 1976-95, into three sub-periods, and compute for each sample firm the average R&D intensity (R&D to sales) in the “recent period” (1989-95) relative to the average R&D intensity in the “early period” (1976-83). The sample firms were then classified by the direction of change in R&D intensity into four categories: *Low-Low*, firms with R&D intensity of 1 per cent or lower in both the early and recent periods; *High-High*, firms with R&D intensity exceeding 1 per cent in both periods; *Low-High*, firms with R&D intensity below 1 per cent in the early period and above 1 per cent in the recent period; and *High-Low*, the converse of Low-High.<sup>28</sup> We then ran the cross-sectional returns on earnings (level and change) regression (1) for each of the four groups of firms for every year, 1976-96. We average the yearly regression estimates of  $R^2$  and the combined slope coefficients (ERCs), over the early sample period (1976-83) and the recent period (1989-95) and report these average estimates in Table 6.

The main diagonal of Table 6 reports mean regression estimates for *stable* R&D companies: Low-Low and High-High. The mean  $R^2$ s of both groups decreased from the early (1976-83) to the late (1989-95) period: from 0.137 to 0.099 for Low-Low and from 0.156 to 0.126 for High-High companies. These decreases in average  $R^2$ s for both groups, however, are statistically insignificant. The average ERCs of the Low-Low and High-High groups also decreased between the two periods: from 1.44 to 0.820 for Low-Low and from 1.94 to 1.14 for High-High. In contrast, the decreases in ERC of both groups are statistically significant ( $t = -6.28$  for Low-Low, and  $t = -3.45$  for High-High). Note that in conformity with others’ findings (e.g. Collins *et al.*, 1997), the  $R^2$ s and ERCs of the High-High companies -- intensive in R&D -- are larger than those of the Low-Low companies, indicating that high, yet stable R&D spending is not a cause for a weak association between earnings and stock returns.

The lower-left panel of Table 6 presents regression estimates for companies whose R&D intensity increased -- Low-High. As indicated in the table, the median R&D intensity of these companies increased from 0.4 per cent during 1976-83 to 1.8 per cent in 1989-95 (a 4.5-fold increase). These firms experienced a sharp decline over the sample period in the returns-earnings  $R^2$ : from 0.233 to 0.126 (a 46 per cent decrease,  $t$ -value of difference = -2.03), and an even steeper decline in ERC: from 2.17 to 1.06 (51 per cent decrease,  $t$ -value of difference = -2.29). In contrast, firms in the upper-right panel of Table 6 (High-Low), whose R&D intensity decreased over time (from a median of 1.6 to 0.3 per cent), experienced a significant *increase* in the association between returns and earnings. Notably, this is the only group in Table 6 which experienced  $R^2$  and ERC increases. The returns-earnings  $R^2$  of these firms increased from 0.080 to 0.178 (123 per cent,  $t$ -value of difference = 1.54), and the average ERC increased from 0.75 to 1.29 (72 per cent,  $t$ -value of difference = 1.61).

Thus, while the informativeness of earnings of all the sample firms decreased during the last 20 years, that of firms experiencing large changes in R&D intensity behaved differently. Consistent with our hypothesis, an *increase* in R&D intensity (Low-High) is associated with a steep *decrease* in earnings informativeness, while a *decrease* in R&D intensity is associated with a *rise* in earnings informativeness. It should be noted that at least part of the weakening of the returns-earnings association of the stable firms (Low-Low and High-High) may also be related to R&D changes, as the R&D intensity of both groups

increased within our cut-off, 1 per cent R&D intensity. For example, as indicated in Table 6, the median R&D intensity of the High-High group increased from 3.4 to 4.4 per cent. We conclude that while R&D change is not the only reason for the temporal decline in the informativeness of earnings, it appears to be an important one.

While the findings reported in Table 6 support our hypothesis concerning the association between R&D change and the informativeness of earnings, they are based on a subset of the sample, namely on firms that existed during the 20 year period, 1976-95. Furthermore, the changing R&D groups were comprised of a relatively small number of firms (Low-High -- 96 firms and High-Low -- 67 firms). To overcome the survivorship bias and the small subsamples, we used an alternative way of classifying firms into R&D-increasing and stable-R&D groups. Specifically, we defined as R&D increasing those firms with a high R&D intensity (greater than 1 per cent R&D/sales ratio) in the recent subperiod (1989-95). The stable R&D group contains all other firms. Thus, all sample firms (not just surviving ones) must be in one of these two groups. Focusing on firms with high R&D intensity in the recent period effectively segregates the total sample into R&D increasing and stable (or no) R&D firms. The reason: as reported in Table 6, both groups that had an above 1 per cent R&D intensity in the recent period, Low-High and High-High, experienced an *increase* in median R&D intensity. In contrast, the two groups with below 1 per cent R&D intensity in the recent period, High-Low and Low-Low, had declining and constant median R&D intensity, respectively. Indeed, for firms classified by the alternative method as R&D-increasing, the mean R&D intensity rose from 3.2 per cent in 1976-83 to 4.9 per cent in 1989-95, while the mean R&D intensity of the remaining firms (stable R&D) in fact decreased between the two periods from 2.4 to 2.1 per cent.

Table 6 R&D change and earnings informativeness

Recent sample period (1989-95)	Early sample period (1976-83)			
	Low R&D		High R&D	
Low R&D	MED R&D	0.000 → 0.000	MED R&D	0.016 → 0.003
	Mean R <sup>2</sup>	0.137 → 0.099	Mean R <sup>2</sup>	0.080 → 0.178
	Mean ERC	1.440 → 0.820	Mean ERC	0.750 → 1.290
High R&D	MED R&D	0.004 → 0.018	MED R&D	0.034 → 0.044
	Mean R <sup>2</sup>	0.233 → 0.126	Mean R <sup>2</sup>	0.156 → 0.126
	Mean ERC	2.170 → 1.060	Mean ERC	1.940 → 1.140

Notes:

Returns-earnings regressions (1) for four groups of firms classified by the direction of change in their R&D intensity from the early sample period (1976-83) to the recent sample period (1989-95). Arrows in each panel indicate the change in the measure (R<sup>2</sup> or ERC) from the early to the recent period.

MED R&D = median R&D in early and recent periods of firms in the panel.

Mean R<sup>2</sup> = mean over 1976-83 and 1989-95 of adjusted R<sup>2</sup> of the yearly returns on earnings cross-sectional regression (1).

Mean ERC = mean of combined slope coefficients [ $\alpha_1 + \alpha_2$  in (1)] over 1976-83 and 1989-95.

We ran the returns-earnings regressions (1) for each year (1976-95) separately for the R&D-increasing and stable-R&D groups and derived the yearly  $R^2$ s and combined slope coefficients. We then regressed those yearly  $R^2$ s and ERCs on Time and report the regression estimates in Table 7. It is evident that the estimated Time coefficients of the R&D-increasing group are substantially larger (in absolute value) than the Time coefficient of the stable-R&D group:  $-0.067$  vs.  $-0.030$  for the ERC regressions, and  $-0.007$  vs.  $-0.004$  for the  $R^2$  regressions.<sup>29</sup> We accordingly conclude that the weakening of the returns-earnings association is more pronounced for firms whose R&D intensity increased over the sample period than for stable-R&D companies. These results, while in the expected direction, are somewhat weaker than those reported in Table 6. The reason: the segregation of firms into R&D-increasing and R&D-decreasing companies in Table 6 was more effective in capturing R&D change than in Table 7. For example, the mean R&D intensity of the Low-High firms in Table 6 (not reported) changed from 0.4 per cent in 1976-83 period to 3.1 per cent in 1989-95 (an eight-fold change), while the mean R&D intensity of the R&D increasing firms in Table 7 only changed from 3.2 to 4.9 per cent during the corresponding periods.

### 3.2 *Intangibles and business change*

Our main thesis is that the increasing pace of business change coupled with the inadequacy of the accounting system to reflect change is a major reason for the decline in the usefulness of financial information. Innovation, in the form of investment in intangibles, is a major change-driver, and as such a contributor to the decline in information usefulness. In the previous section (3.1), we validated this link by providing evidence that an increasing (decreasing) rate of R&D intensity is associated with a decline (rise) in the informativeness of earnings. To complete the validation of our thesis and close the circle, we now provide evidence on the association between the rate of business change and the change in intangible investment. Specifically, we show that fast-changing firms experienced a larger increase in R&D intensity than stable companies. We do this by classifying firms into No Change and Change groups, and alternatively into Low Change and High Change Groups, as was done in Section 2.3 and presented in Table 5. We then measure for each of the four groups and years (1977-96) the average R&D intensity. We expect: *i*) the average R&D intensity of changing firms to be higher than that of stable firms; and, more importantly; *ii*) the rate of increase in R&D intensity of changing firms to be higher than that of stable companies.

Table 7 R&D change and earnings informativeness: total sample

$$\text{Regressions on Time: } R_t^2 \text{ (or } ERC_t) = a + b \text{ (Time}_t) + c$$

	Stable R&D firms			Increasing R&D firms		
	a	b	R <sup>2</sup>	a	b	R <sup>2</sup>
ERC Regressions	3.53 (-7.09)	-.030 (-5.20)	.59	7.187 (6.09)	-.067 (-4.91)	.56
R <sup>2</sup> Regressions	0.465 (3.54)	-.004 (-2.81)	.28	.703 (3.95)	-.007 (-3.35)	.36

*Note:*

Estimates of regressions of yearly R<sup>2</sup> and ERCs derived from returns-earnings regressions on a time variable. Analysis is done separately for firms with stable R&D intensity and firms characterised by an increasing R&D intensity.

Increasing-R&D firms are those with high R&D intensity (defined as greater than 1 per cent) in the recent subperiod, 1989-95. Stable-R&D firms are all other firms.

The data in Table 8 confirm both expectations. First, the mean R&D intensities (over the 1978-96 period) of the Change and High Change Groups (0.030 and 0.032) are larger than the average R&D intensities of the No Change and Low Change Groups (0.015 and 0.013). These differences are statistically significant at the 0.01 level. To examine the second expectation, we regress for each of the four change groups the yearly mean R&D intensity on Time. These regressions' estimates are presented in the three right columns of Table 8, indicating that the rate of increase in R&D intensity during 1978-96 was five to seven times larger for changing firms than for stable ones. Specifically, the Time coefficients of the Change and High Change groups, 0.0021 and 0.0022, are five to seven times larger than the Time coefficients of the No. Change and Low Change groups, 0.0004 and 0.0003, respectively. Note also the large differences in R<sup>2</sup>s: the Time variable explains almost perfectly the temporal variation in R&D intensity for changing firms (R<sup>2</sup>: 0.92 and 0.91), while for stable companies, Time provides only a partial explanation for temporal variance in R&D intensity (R<sup>2</sup>: 0.23 and 0.31).

Table 8 **The rate of change of firms and their R&D intensity**

Regression: Mean R&D intensity<sub>t</sub> = a + b (Time<sub>t</sub>) + ε<sub>t</sub>, t= 1978-96

<i>Business</i>	<i>Mean R&amp;D</i>	<i>Coefficient estimates</i>		
<i>Change Group</i>	<i>Intensity</i>	<i>a</i>	<i>b</i>	<i>R<sup>2</sup></i>
No Change vs.	0.015	-0.0174 (-1.38)	0.0004 (2.55)	0.23
Change	0.030	-0.1490 (-12.15)	0.0021 (14.61)	0.92
Low Change vs.	0.013	-0.0138 (-1.57)	0.0003 (3.03)	0.31
High Change	0.032	-0.1567 (-11.37)	0.0022 (13.71)	0.91

*Notes:*

Estimates from regressions of yearly average R&D intensity on time for firms grouped by rate of business change (t-values in parentheses)

The classification of firms into the four change groups is described in Section 2.3.

### 3.3 *Summary of evidence*

In this and the preceding section we provided evidence supporting the following phenomena and relationships: *i*) the rate of change experienced by business enterprises has increased over the last 20 years (Section 2.1); *ii*) an increasing rate of business change is associated with a decline in the informativeness of earnings (Section 2.3); *iii*) an increase (decrease) in R&D intensity is associated with a decline (rise) in earnings informativeness (Section 3.1); and *iv*) increase in the rate of business change is associated with an increase in R&D intensity. This evidence, we believe, supports our thesis that the documented decline in the usefulness of financial information to investors was caused by the increasing pace of change affecting business enterprises and the inadequacy of the accounting system to reflect the consequences of change. Among change-drivers, we focused on innovation, generally brought about by investment in intangibles, as contributing to the decline in the usefulness of financial information. In the next and final section we discuss two proposals for enhancing the usefulness of financial reports.

## 4. **Improving the usefulness of financial information**

We discuss below two proposals aimed at enhancing the usefulness of financial information. The first, capitalisation of intangibles, extends a practice currently used in limited circumstances, while the second, a systematic restatement of financial reports, calls for a substantial modification of current reporting practices.

#### 4.1 *The capitalisation of intangible investments*

We believe that the almost universal expensing of intangible investments in the United States is inconsistent with the FASB's conceptual framework, with recent theoretical developments in accounting, and contradicts empirical evidence. The conceptual framework defines an asset as:

“probable future economic benefit obtained or controlled by a particular entity as a result of past transactions or events (Para. 25). assets...may be intangible, and although not exchangeable they may be usable by the entity in producing or distributing other goods or services (Para. 26). anything that is commonly used to produce goods or services, whether tangible or intangible and whether or not it has a market price or is otherwise exchangeable, also has future economic benefit” (Para. 173). (FASB, Concept No. 6, 1985).

Surely, the recognition of intangible investments with attributable future benefits as assets is within the boundaries of GAAP. Objections centre on the uncertainty associated with the benefits of intangibles:

“The uncertainty [e.g. about R&D] is not about the intent to increase future economic benefits but about whether and, if so, to what extent they succeeded (sic) in doing so.” (FASB, Concept No. 6, 1985, Para. 175).

However, little if any guidance is given by the Conceptual Framework regarding acceptable (for asset recognition) vs. unacceptable levels of uncertainty. An operational approach to dealing with the uncertainty associated with intangibles was that taken by the FASB in SFAS No. 86 (software capitalisation) and a similar one by the International Accounting Standards Committee (IASC 1997), whereby asset recognition (capitalisation) is conditioned on an objective feasibility test, such as the existence of a working model for a software product or a successful clinical test for a drug. This approach for dealing with intangibles' uncertainty is reasonable, since estimating future benefits of a technologically feasible software product or a clinically proven drug is not less reliable than estimating the future benefits of a new record or a movie whose capitalised costs are recognised as assets by current accounting practices (SFAS Nos. 50 and 53).<sup>30</sup> Accordingly, we propose the capitalisation of all intangible investments with attributable benefits which have passed certain pre-specified technological feasibility tests.

The proposed capitalisation of intangibles will eliminate disturbing inconsistencies in current accounting practices. For example, the R&D associated with software or other products intended for *internal* use is expensed, while the cost of acquiring similar products from vendors is capitalised.<sup>31</sup> Traditionally, this inconsistency is explained by arguing that prices of acquired products are the result of arms-length market transactions, which is not the case for internally generated R&D.<sup>32</sup> But a requirement for a market transaction fails to explain the fast-growing practice of immediately expensing *acquired* R&D-in-process (Deng and Lev, 1998), which is a result of an arms-length transaction. While the fair market value of acquired R&D-in-process is determined by management, so are the market values of all other acquired assets which pass the test of asset recognition.

The proposed capitalisation of intangibles appears consistent with recent empirical evidence and theoretical developments in accounting. Specifically, it has been proposed (e.g. Dietrich *et al.*, 1997) that the “residual earnings” valuation framework developed by Edwards-Bell-Ohlson (e.g. Ohlson, 1995) can be used in the analysis of accounting principles. This valuation framework stipulates that the market value of the firm equals its current book value plus the present value of residual earnings (e.g. reported earnings minus a charge for equity capital). Accordingly, accounting measurement and reporting principles which improve the alignment of reported book value with the firm's intrinsic value, and/or

improve the prediction of earnings should be preferred over standards which do not measure up to these criteria.

Empirical evidence supports the notion that the recognition of intangibles in financial reports may achieve one or both of the above-stated criteria for a preferred accounting practice. For example, Lev and Sougiannis (1996) report that capitalised values of R&D are significantly associated with stock prices, along with reported book values. This implies that R&D capitalisation will improve the alignment of book values with stock prices (intrinsic values). Similarly, Aboody and Lev (1998) found that reported capitalised values of software development costs are positively and significantly associated with market values, after controlling for reported book values and earnings.<sup>33</sup> This evidence too is consistent with the notion that capitalised software improves the alignment of book values with intrinsic values (the latter proxied by the firm's market value). Furthermore, Aboody and Lev report that the annual values of software capitalisation are associated with subsequent changes in earnings, suggesting that such capitalisations provide relevant information for the prediction of future earnings (the second desired element of a standard according to the residual earnings model).<sup>34</sup> Amir and Lev's (1996) study of cellular (wireless) companies indicates that investors consider customer acquisition costs incurred and expensed by these companies as an asset rather than an expense.<sup>35</sup> This implies that the capitalisation of cellulars' customer acquisition costs will improve the alignment of book values with intrinsic value.

In the international arena, Abrahams and Sidhu (1997) report that capitalised R&D values on Australian companies' balance sheets are significantly associated with market values, and Barth and Clinch (1997) report that revaluations of intangibles by Australian companies are also associated with market values. Such evidence is consistent with the argument that the valuation of certain intangibles will improve the alignment of book values with intrinsic values.

We propose therefore the capitalisation of all intangible investments to which specific future benefits can be attributed and for which it is probable, in management's opinion, that the discounted value of expected benefits exceeds their cost in current dollars. Such capitalisation will generally apply to R&D expenditures, product development costs, investments aimed at brand development and customer-base enhancement, and restructuring and reorganisation costs. The key capitalisation criterion is the ability to attribute and reasonably estimate the benefits of the intangibles. In contrast with SFAS No. 86 (software capitalisation) and IASC's exposure draft on intangibles (ISAC, 1997) we see no reason to exclude from capitalisation previously expensed costs. More on this issue in the next section.

As is the case with all assets, the amortisation of the capitalised intangibles will be based on management's estimates of productive lives, guided by industry norms and research findings.<sup>36</sup> The amortisation rates will be revised as the actual benefits of intangibles materialise. A strict annual impairment test should be applied as a safeguard against overvaluation. Such a test, like the one mandated for tangible assets (SFAS No. 121), will be based on the present value of future benefits compared with the capitalised book values.

How will the reporting deficiencies discussed in previous sections (particularly 2.2) be alleviated by the proposed capitalisation of intangibles? First, such capitalisation will substantially improve the periodic matching of costs and benefits (e.g. reorganisation costs will be charged against their future benefits, product-development expenditures matched with subsequent revenues, and customer-acquisition costs amortised against consequent sales), resulting in reported earnings which will more meaningfully reflect enterprise performance. Second, the capitalised intangibles will be reported on corporate balance sheets, mitigating the current absurdity that the bricks and mortar of chemical, pharmaceutical, electronics, software, biotechnology and telecommunications companies are presented as assets, while the intangible investments of these companies which generate most of their revenues are nowhere to be found

in financial reports. Third, and most importantly, the capitalisation of intangibles is a crucial step in providing investors data to evaluate the success of the firm's innovative activities. The capitalised values, classified by homogeneous product/activity groups, coupled with a breakdown of the attributed revenues and gross margins will enable investors to assess the *rates of return* on the firm's investments in research, product development and brand enhancement. This important objective of disclosing cost values -- allowing for the assessment of return on investment -- is overlooked by those who object to capitalisation because cost of intangibles is in their opinion unrelated to their current value (e.g. Stewart, 1996).

#### 4.2 *Restated financial reports*

We hypothesise in this study that change and the inadequacy of the accounting system to reflect it in a timely and meaningful manner are mainly responsible for the deterioration in the usefulness of financial information. However, the consequences of change (e.g. the benefits of a corporate reorganisation or of a significant drug development) are admittedly uncertain, and this uncertainty is often invoked to justify the immediate expensing of most change-related investments. The difficulties of auditing the values of such uncertain investments (e.g. ascertaining whether expected benefits exceed costs) and the litigation exposure associated with presenting intangibles' values on balance sheets strengthen the case for the immediate expensing of intangibles and other change-related investments. How can this change-induced uncertainty be dealt with in financial reports?

A *continuous restatement* of financial reports may provide a reasonable balance between to investors' information needs and preparers' concern with uncertainty. Consider, for example, SFAS No. 86 mandating the capitalisation of software development costs. Such capitalisation starts when technological feasibility is established, that is at the completion of the programme design. However, all previously expensed development costs incurred during the research stage cannot be included in the capitalisation. Similarly, the recent exposure draft on intangible assets of the International Accounting Standards Committee (IASC, 1997) calls for the capitalisation of some intangible investments, yet states in Section 50: "Costs incurred to acquire or generate an intangible item that were initially recognised as an expense by the reporting enterprise should not be recognised as part of the cost of an intangible asset at a later date."

What justifies the prohibition to recognise as assets previously expensed costs, after resolution of much of the uncertainty concerning the product under development? Surely the capitalised value of the asset is considerably understated absent all the pre-technological feasibility costs. We could not find a justification in SFAS No. 86 or in IASC, 1997 for the exclusion from capitalisation of previously expensed R&D. Presumably such exclusion is justified by the matching principle: capitalisation in the current period of previously expensed costs requires a recognition of a gain in current income which was expensed in previous periods.<sup>37</sup>

But there is no need to reverse past expenses in the current period, thereby mismatching costs with revenues. An alternative procedure is to *restate* past financial statements, namely to adjust the reports of the last three to five years by capitalising the pre-feasibility expensed R&D. The main advantage of this procedure is that it will portray an improved *pattern* (e.g. growth) of earnings and book values, where the improvement results from a better matching of costs with revenues in the previously published reports. Given evidence that the pattern of past earnings is relevant for the interpretation of current earnings (Barth, 1997), an improved reporting of past earnings is obviously desirable.

Our proposal for restated financial reports is not restricted to the case of pre-feasibility expensed R&D. We propose a generalised reporting system in which financial statements will be *continuously revised* as uncertainty about major events is resolved. For example, when a pharmaceutical company embarks on a significant drug development, all related R&D expenditures should be expensed, given the significant uncertainty prevailing at the early stage of drug development. However, if and when the drug successfully passes human clinical tests -- a crucial feasibility hurdle -- cost capitalisation is warranted, given the substantial resolution of uncertainty. Capitalisation should include, of course, the past R&D which was expensed, which will be achieved by a restatement of past reports. Thus, a systematic restatement of past reports will reflect the continuous resolution of uncertainty which existed when such reports were released. As with any major accounting overhaul, a set of standards will have to be established regarding the events that justify restatements, how far back should the restatement extend and materiality standards for restatements. These technical issues are obviously beyond the current discussion.

Concerning restatement of prior periods' results, GAAP draws a sharp distinction between correction of past errors (warranting a restatement) and changes in estimates, for which restatement is prohibited:

“Errors in financial statements result from mathematical mistakes, mistakes in the application of accounting principles, or oversight or misuse of facts that existed at the time the financial statements were prepared. In contrast, a change in accounting estimates results from new information or subsequent developments and accordingly from better insight or improved judgement. Thus, an error is distinguishable from a change in estimate.” (SFAS No. 16, 1977, Para. 41).

The FASB, however, concedes that “Some respondents contend that the distinction between a correction of error and a change in estimate is too vague to be a basis for different accounting.” (SFAS No. 16, Para. 42). We concur. When an R&D project passes a feasibility test, the capitalisation of the R&D expensed in the past appears to us as a legitimate correction of a mistake, given hindsight. Accordingly, our proposal for a systematic revision of financial reports seems compatible with the spirit of GAAP.

More importantly, the systematic revision of past reports is essential, given the *contextual* role of financial information (Finger *et al.*, 1996). Financial reports serve two objectives: the provision of *new* information to investors, as well as making available a rich mosaic of data (context) within which current information is interpreted. Empirical evidence indicates that the effectiveness of financial information in meeting the first objective, namely providing timely information, is declining (e.g. Kothari and Sloan, 1992). The weak association between earnings and stock returns (see Section 1.1) is also a manifestation of low timeliness of financial reports. The increasing frequency and intensity of managers' voluntary disclosures (e.g. conference calls with analysts, pre-earnings announcements) obviously erodes the timeliness of financial reports. In contrast, the contextual role of financial reports remains an important (yet largely unresearched) objective of accounting data, irrespective of the growth of other information sources. Thus, for example, Lev *et al.*, (1998) report that investors' reaction to an FDA drug approval depends, among other things, on the past operating success of the developing company. Similarly, the evidence presented above (Sections 1.1 and 1.2) that the returns-earnings  $R^2$ s of firms with the full 20-year history are larger than the  $R^2$ s of firms with shorter historical record is also consistent with a contextual role of financial information. And the evidence in Petroni *et al.* (1997) that revisions of reserve estimates of insurance companies extending back as far as ten years are significantly associated with investors' reaction to current information is consistent with *both* the contextual role of financial data and value-relevance of revisions of such data.

If historical financial data affect the interpretation of new signals, then a continuous improvement of such data, in the form of a better matching of revenues with costs and the reporting of book values which are better aligned with intrinsic values, will contribute to investors' decisions. Such improvement of contextual data can be achieved by the proposed systematic restatement of past reports.

Summarising, the systematic restatement of past financial reports provides an operational response to genuine concerns about the considerable uncertainty associated with early-stage intangible investments. As such uncertainty is being resolved, past reports will be revised to reflect the capitalisation of the previously expensed costs. The major advantage of such revisions is the improvement brought about in the quality of the contextual information used in the interpretation of current signals. How is the restatement proposed here related to the intangibles' capitalisation proposed in the preceding section? Restatement may substitute for capitalisation in cases of considerable uncertainty (e.g. basic research). But restatement also complements and extends capitalisation of intangibles to events and decisions whose uncertainty at inception is being resolved later on.

## 5. Postscript

We have documented in this study a surprising phenomenon: despite increasing investor demand for information (evident, for example, by the expansion of services like Bloomberg and the proliferation of managers-analysts conference calls) and the persistent efforts of regulators (SEC, FASB) to improve corporate reporting, the usefulness of financial information to investors has been declining over the past 20 years. Such usefulness lost is manifested by a weakening association between capital market values and key financial variables -- earnings, cash flows and book values. We hypothesised and provided evidence that the increasing rate of business change and the inadequate accounting treatment of change and its consequences play an important role in the decline of financial information usefulness. Furthermore, we identified innovation, brought about by investment in intangibles, as a major change-agent contributing to the decline in the value-relevance of financial information. It is in the intangibles domain that current financial reporting fails most seriously in reflecting enterprise performance and value.

What are the social consequences of the decline in the usefulness of financial information? This is still an open question. If investors are able to supplement from other sources the information increasingly missing from financial reports at no added cost, then the social consequences of the accounting usefulness loss may not be serious, except for accountants. Preliminary evidence, however, is inconsistent with such a smooth, costless information substitution. Thus, for example, Barth *et al.*, (1997) report that the extent of mispricing of firms' shares is related to their investment in intangibles. Aboody and Lev (1998) find that gains to insiders in R&D-intensive companies are substantially larger than insider gains in firms without R&D. And Boone and Raman (1997) report that R&D intensity is associated with the size of bid-ask spreads and price sensitivity. These findings suggest that the reporting inadequacies associated with intangible investments may adversely affect investors' and firms' welfare.

Given that the accounting measurement and reporting system proved by its longevity and survivability to be an efficient information source, it seems socially worthwhile to modify it and arrest the decline in its usefulness. In this vein, we advanced two proposals that may enhance the usefulness of financial information: an extended capitalisation of intangible investments and a systematic restatement of past financial reports.

## NOTES

- 1 We assume that the major objective of financial reporting is the provision of decision-relevant information to investors, as stated in the FASB's Statement of Financial Accounting Concepts No. 1,  
  
"Financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit and similar decisions.... Financial reporting should provide information to help present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of prospective cash receipts from dividends or interest and the proceeds from the sale, redemption, or maturity of securities or loans." (FASB, 1978, paras. 34, 37).
- 2 It is not change *per se* that distorts financial reporting, rather the increased uncertainty generally associated with change (e.g. uncertainty about the consequences of a substantial restructuring, product development or deregulation). If the consequences of change were perfectly predictable, the accounting system would have no problem matching costs with revenues. The uncertainty ushered in by change provides the justification or excuse for the immediate expensing of practically all change-related outlays.
- 3 Since we are concerned with usefulness of financial information to investors, the contractual and stewardship (compensation) functions of such information are not examined here.
- 4 An important limitation should be noted. Association studies, such as those presented here, indicate an *upper bound* of usefulness of the examined financial data. The reason: unless the stock return interval around announcement is very narrow (e.g. a day), the existence of an association between an information item and stock return does not necessarily imply that the information item indeed triggered investors' reaction. It may be that other, more timely information (e.g. a voluntary managerial announcement) was responsible for the stock-price change.
- 5 Non-earnings accounting data (e.g. inventories, R&D, capital expenditures) increase the explanatory power of financial information with respect to stock returns to 15-25 per cent (Lev and Thiagarajan, 1993; Livnat and Zarowin, 1990).
- 6 All  $R^2$ s reported in this study are "adjusted  $R^2$ s".
- 7 All regressions on Time were also run with one- and two-lag autocorrelation corrections, with virtually identical results.
- 8 In a similar vein, Black (1993, p. 15) writes: "This suggests a definition of 'earnings quality.' A firm with high quality earnings will have a strong relation between earnings and [market] value."
- 9 Ramesh and Thiagarajan (1995) provide similar evidence of a temporal decrease of the returns-earnings slope coefficient (ERC). They subject the data to various statistical and specification tests, concluding that the intertemporal decrease in ERCs is both statistically significant and robust to different model specifications (e.g. accounting for firm-size effect). Hayn (1995) finds that some, but not all, of the decrease in ERCs can be attributed to negative earnings whose preponderance increased in the 1980s. Ramesh and Thiagarajan also examine the pattern of firm-specific (time-series) ERCs and find a similar

phenomenon of temporally declining response coefficients. The temporal decline in ERC is documented also when unexpected earnings relative to analysts' forecasts are considered (Cheng *et al.*, 1992).

- 10 Since in the early sample period firms did not report cash flows from operations, we computed this item as follows: Cash Flow from Operations = Net Income before Extraordinary Items + Depreciation + Annual Deferred Taxes – Annual Change in Current Assets – Cash + Annual Change in Current Liabilities – Current Maturities of Long-term Debt.
- 11 An increase in the variability of stock returns may have also contributed to the weakening of the returns-earnings association. See Francis and Schipper (1996) on this issue.
- 12 This is derived from a chapter entitled “Cash is King” in a leading book on valuation of business enterprises (Copeland *et al.*, 1996).
- 13 A similar result was noted by Livnat and Zarowin (1990) and Bowen *et al.* (1987).
- 14 It may still be the case that in special circumstances (e.g. financially distressed companies), cash flows provide substantial incremental information over earnings.
- 15 In their published version (Table 3), Collins *et al.*, report an average  $R^2$  of expression (3) of 0.754 for the period 1983-93. The corresponding average  $R^2$  of our estimates (our Table 3) is 0.744. It appears, therefore, that our estimates of regression (3) conform closely to those of Collins *et al.*, (not surprisingly, given the identical source of data).
- 16 Following are the 3-day market-adjusted returns (raw returns minus S&P 500) of the seven phone companies around the asset write-off announcements: Bell Atlantic: -1.97%, NYNEX: 6.94%, Bell South: -1.80%, Pacific Telesis: 0.25%, U.S. West: 5.22%, GTE: -2.90%, Ameritech: -1.25%. The average 3-day return is 0.64%.
- 17 We have also experimented with multi-year changes (e.g. rank changes over three to five years) and obtained similar results to the yearly changes reported below. Accordingly, the analyses reported here are based on yearly rank changes.
- 18 The exceptions are end-of-period adjustment entries, such as those reflecting depreciation and doubtful receivables, which are not transaction-based.
- 19 The significant and adverse reaction of investors to the telecommunications' deregulation is evident by the stock performance of the regional telephone companies which considerably underperformed the market return. The average 5-year (1991-95) cumulative return of the phone companies' stock was 93.25%, while the market return (CRSP value-weighted) over the corresponding period was 119.59%.
- 20 Indeed, empirical event studies (e.g. Francis *et al.*, 1996) indicate that often investors' reaction to the reported restructuring losses is in fact positive.
- 21 While it is generally believed that the expensing of intangibles is conservative, leading to lower reported profitability than under capitalisation, for mature firms immediate expensing is in fact aggressive. Specifically, when the growth rate of investment in intangibles is lower than the firm's return on equity (ROE), the expensing of intangibles results in *higher* ROE and ROA than if the intangibles were capitalised (see Beaver and Ryan, 1996; and Merck's example in Lev and Sougiannis, 1996, Appendix).
- 22 We have experimented with multiple change-cut-offs, such as 0.20, 0.30, and obtained similar results to those reported in Table 5.

- 23 An example is IBM's loss of \$538 million in the third quarter of 1995 due to the write-off of \$1 840 million acquired R&D-in-process (in the same quarter a year earlier, IBM reported positive earnings of \$710 million). Obviously, the \$538 million loss does not indicate any deterioration in IBM's operations; just the application of a questionable accounting procedure.
- 24 Often investment in intangibles also requires increased tangible investment in equipment and plant, see Lach and Schankerman (1989).
- 25 The pharmaceuticals industry provides an example of these two types of R&D. The first is aimed at developing New Molecular Entities (NMEs), which are entirely new drugs capable of changing the firm's product mix and competitive position. The second is aimed at modifying existing drugs, or changing the route of administration, thereby preserving the firm's competitive position.
- 26 Collins *et al.* do, however, find that the increased importance of intangible-intensive firms is associated with a shift in value-relevance from earnings to book values.
- 27 In fact, researchers report that the firm-specific time-series of R&D of most firms are remarkably stable (e.g. Hall, 1993), a fact which creates difficulties in estimating the association between the lag structure of R&D spending and subsequent benefits.
- 28 We also experimented with an R&D intensity cut-off of 0.5 per cent and found similar results to those of 1 per cent.
- 29 The difference between the ERCs Time coefficients (-0.067 and -0.030) is statistically significant at the 0.01 level, while the difference in the  $R^2$  coefficients (-0.007 and -0.004) is not statistically significant.
- 30 A different argument for the expensing of intangible investments is that the cost of intangibles is often unrelated to their current values (e.g. Schuetze, 1993). First, this argument can be levelled at many tangible investments whose costs are capitalised in financial reports. Second, this argument is inconsistent with empirical evidence which documents high levels of correlation between cost of R&D and its fair market value, or other value measures such as number of patents, innovations and intensity of patent citations (e.g. Deng and Lev, 1998; Audreusch, 1996). Third, even if the cost of intangibles were unrelated to current value, cost capitalisation is important for the assessment of return on investment in intangibles (as is the cost of a stock portfolio in a return computation).
- 31 The expensing of R&D of products for internal use *vs.* the capitalisation of similar but acquired products is also inconsistent with Coase's (1937) classic argument that the reason for the existence of firms is that they can perform certain functions or do certain things more efficiently than markets. Accordingly, when a firm decides to develop a product (e.g. a software package) for internal use rather than acquire it, it stands to reason that it can do it more efficiently than vendors (the market). What is then the logic of expensing the investment of the more efficient firm while capitalising the less efficient one?
- 32 This is not really a satisfactory explanation, since the major cost items of internally generated R&D, such as salaries of programmers and scientists and laboratory equipment, are also market-determined.
- 33 These capitalised values are publicly reported by software companies following SFAS No. 86.
- 34 It stands to reason that the annual software capitalisation figure improves the prediction of future earnings, since the software capitalisation is predicated on the success of the development programme (e.g. passing successfully feasibility tests, or developing a working pilot), see SFAS No. 86. Developmental success should be associated with subsequent sales and earnings growth.

- 35 A regression of stock returns on earnings before general expenses (which mainly include customer acquisition costs) and general expenses, finds the latter variable to have a positive, large (relative to earnings) and statistically significant coefficient.
- 36 For example, the US Bureau of Economic Analysis capitalises aggregate R&D expenditure in a satellite account to the national income and product accounts. This national R&D capital is amortised by 11 per cent per year, which is the mid-point of the range of empirical amortisation rates estimated by economists; see Carson *et al.* (1994).
- 37 Of course, the reversing of past R&D expensing could be made against equity or in comprehensive income, thereby leaving current income unaffected.

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