ECONOMIC IMPLICATIONS OF STATEMENT OF FINANCIAL ACCOUNTING STANDARD NO. 2: REVIEW AND SYNTHESIS

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摘　要

本文旨在評估美國財務會計準則第二號公報（會計研究發展成本）之經濟意義。研究發展活動是美國企業活力的根源之一。第二號公報對財務報表的負面影響導致會計學者欲瞭解此公報的經濟影響程度。除了對小型研究發展公司以外，此公報對研究發展活動並無重大影響；在公報相關發佈日前後股價亦無重大反應。就實證會計理論（positive Accounting Theory）的角度來看，實證結果與紅利假設及槓桿假設（Debt/Equity Hypothesis）所預測者相一致。

Abstract

This study critically surveys the economic implications of SFAS2 *(Statement of Financial Accounting Standard No. 2)* based on the literature in relation to economic theory of R&D, market-reaction studies, and positive accounting theory. The economic implications here are defined as the economic importance of R&D, the effects of SFAS2 on the R&D expenditures, stock returns, and the impact of agency relationship (i.e., owner-management and debtholder-management contratual relationships).

The SFAS2 has adverse effects on financial statements; thus, it should have negative economic implications. The requirements of SFAS2 eliminate the flexibility of manipulating reported earnings by using R&D costs. This accounting standard decreases the earnings number, retained earnings, and capitalized value. It also increases the variability of the income streams over time. In addition, the requirements of SFAS2 force the firm to fully disclose the financial information of R&D costs in each period, therefore, reduce the competitive edge of the R&D activities. Theoretically, the requirements of SFAS2 should result in lower level of R&D expenditures based on the debt/equity hypothesis, negative stock return surrounding related event dates of this standard, and lesser amounts of bonus given to management.

The empirical findings are weak. The R&D expenditures in the post-SFAS2 periods are not significantly different from those of pre-SFAS2 periods. The firms affected by the SFAS2 were fear of the closeness to bond convenant. No significant market reaction was detected. Generally, market did not respone to relevant announcement dates of SFAS2. The results are consistent to bonus hypothesis; however, a firm would also rewrite compensation contract for adapting the requirements of SFAS2.

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1 The Importance of R&D Costs

This study critically surveys the economic implications of SFAS2 *(Statement of Financial Accounting Standard No. 2)* based on the results of the literature in relation to economic theory of R&D and positive accounting theory. The economic implications here are defined as the economic importance of R&D, the effects of SFAS2 on the stock returns and the agency relationship (i.e., owner-management and debtholder-management contratual relationships).

Research and development are two distinct invention activities toward patent. The cost outlays of R&D activities characterize "win-all" or "lose-all" game which are very different from product or price competition. If there are several competitiors in developing a same patent, the first one who successes will "win-all" patent, and the others will "lose-all" resources for the competition. Thus, the economic implications of R&D cost expenditures must not be the same as product or price competition. The disclosure of financial statements ties to the bond covenant, management compensation contract, and competition edge. The subsequent evaluations of SFAS2 should benefit the design of accounting regulation relating to R&D costs and other accounting rules. In addition, it would also help to allocate social resources optimally through financial presentation.

FASB (Financial Accounting Standards Board) issued SFAS2 in October 1974 which requires all R&D costs ought to be expensed. This mandatory accounting change might affect the invention competition, cause the change in the distribution of stock returns when this mandated change was announced, and recontract owner-management and debtholder-management relationships.

R&D activities play a very significant role in American economy. In addition to price competition and product competition in the economy, invention and innovation are another forms of competition. Kamien and Schwartz (1975) and Scherer (1970) surveyed literature on economics of R&D and discussed the relationship between market structure and technological innovation. They reported that the role of R&D activities in United States is not trivial, it accounts for about 2.5% of sales and 50% of net income across the economy. Gross expenditure on R&D remained fairly stable during the 1960s and 1970s at approximately 2% of GNP. Pharmaceuticals, Chemicals and Electronics are the three industries where R&D efforts are most intensive. It is worthwhile noting that there has been a decline in longer run riskier projects, and that by the mid 70's about 60% of all R&D was aimed at improving existing products (National Science Foundation, 1985).

Research and development activities can be defined as follows *(Statement of Financial Accounting Standard No. 2)*.

- **Research** is the planned search or critical investigation aimed at the discovery of new knowledge with the hope that such knowledge will be useful in developing a new product or serving a new process or technique or in bringing about a significant improvement to an existing product or process.
- **Development** is the translation of research findings or other knowledge into a plan or design for a new product or process or for a significant improvement to an existing product or process whether intended for sale or use.

R&D cost expenditures characterize substantial future benefits to a firm. Considerable economic studies provide supports for the hypothesis that R&D efforts produce benefits for the firm. Mansfield (1969a), Minasian (1969) and Bailey (1972) reporting on research across a wide range of American industries, indicate that R&D expenditures results in average rates of return consistently greater than 20%. Freeman (1977) assessed the return on investment to industrial R&D in manufacturing industries at between 20% and 62%. McCulloch (1978), whose sample was biased towards chemical, pharmaceutical and petroleum products, estimated returns as lying between 7% and 54%. McGraw-Hill (1981) estimated that the percentage of total sales expected form new products fell from 16% in the early 1970's to 13% by 1978.

Investment in R&D activities thus appears to be similar to that of long-lived tangible assets. R&D activities usually generates future benefits which exist in intangible form, whereas other long-lived investments are usually in the form of tangible assets. An investment in R&D is an investment in producing knowledge or information, which are substantitally different from general commodities. The investment in R&D however involves a great deal of uncertainty. Patents may not be able to protect the benefits of R&D completely, but the evidence that firms continue to participate in R&D efforts shows there is at least some positive expected benefits in the future. Benefits of long-lived tangible assets generally are derived from production and sales activities, whereas benefits from R&D are realized indirectly through the impact of the discoveries on other assets; for example, the cost saving from the improvement of current manufacturing processes.

2 Accounting for R&D Costs

2.1 FASB's and SEC's position for R&D costs

FASB and SEC (Securities Exchange Commission) stand on the same line

relating to accounting for R&D costs. Essentially, both FASB and SEC require expensing R&D costs in the financial statements. In October 1974, the FASB issued SFAS2 *(Statement of Financial Accounting Standards No. 2), Accounting for Research and Development Costs.* The effective date of the standard was January 1, 1975. Subsequently, in October 1975, it was adopted by the SEC in its *Accounting Series Release No. 178.*

SFAS2 requires that all R&D costs ought to be expensed in the period incurred. However, the costs of machinery, equipment, and intangibles acquired for R&D purposes must be capitalized if the assets have alternate future use. The amortization of these assets should be periodically charged to R&D expense.

The issuance of SFAS2 was based on the following considerations (Discussion Memorandum 1973).

1. No causal relationship between R&D expenditures and future benefits.
2. The period and timing of the benefits are highly uncertain.
3. The lack of usefulness of information arising from capitalization.
4. Capitalization is useless in assessing the earning potential of the enterprise.
5. There is no evidence that capitalization would improve the ability to predict either the amount or variability of future rates of terturn.
6. Expensing of R&D is consistent with the efficient market hypothesis so long as there is full disclosure of the amount and types of expenditures.

The position of the SEC on the matter relies on the research results of the Department of Commerce studying on R&D. That is, "SFAS2 should not have a significant impact on those firms who have heretofore capitalized R&D." (U.S. Department of Commerce, 1975).

The requirements of SFAS2 mandate the accounting treatments of R&D costs; thus eliminate the flexibility of manipulating reported earnings by using R&D costs. From the viewpoint of financial statements, this accounting standard decreases the earnings number, retained earnings, and capitalized value. It also increases the variability of the income streams over time (Vigeland, 1981). In addition, the requirements of SFAS2 force the firm to fully disclose the financial information of R&D costs, therefore, reduce the competitive edge of the R&D activities.

2.2 Normative Deductive Theories Relating to Accounting for R&D

The dispute in relation to accounting for R&D costs focuses on whether R&D costs should be capitalized, expensed, or partially capitalized. Each side has its own

favorable arguments. This study re-organizes their discussions in a relevance-reliability framework *(Statement of Financial Concept No. 2,* qualitative criteria of financial statements).

Before SFAS2, there are two alternative accounting methods: complete capitalization or expensing of research and deferral of development expenditures. The advantages and disadvantages over these two alternative accounting methods have been controversial for a long periods. A few studies favor complete capitalization (Skinner, 1971; Cornwall, 1977; Thompson 1977), complete expensing has its champion (FASB 1974), as does expensing of research and deferral of development expenditures (Gallein and Newman, 1973; Buckland, 1974; Corbin, 1975; Batty, 1977; and Nobes, 1978).

The choice of accounting standards setters can be considered on the trade-off between two information qualitative criteria: relevance and reliability *(Statement of Financial Accounting Concept No. 2).* Relevance implies a set of accounting treatments which satisfy the rights and preferences of users. Fair disclosure of financial events is the essence of reliability.

2.2.1 Reliability Considerations

An asset should possess future benefits (Sprouse and Moonitz, 1962). Others argued that this benefit must be accurately measurable before it can be considered as an asset (FASB 1974, 1980; and Staubus, 1977). According to the first definition, R&D is an asset, but does not lend itself to accurate measurement. Thus, Munker and Ratcliffe (1980) state that R&D may very well be an asset, but it is not a recordable asset at the point of expenditure.

Hirschey and Weygandt (1985) empolyed a sound empirical study to provide the evidence relating to the nature of R&D costs and its amortization rate. Their results suggested that R&D costs and Advertising expenditures have significant effects on the market value of the firm. That is, R&D costs characterize future benefits of the firm. Therefore, R&D costs should be capitalized. Furthermore, they examined the theoretical amortization rate of the R&D costs. Their empirical evidence provides that a resonable amortization rate of capitalized R&D costs should be between 10% and 20% in linkage with its beneficial periods.

Cornwall (1977) offered another compromise view, his argument suggests that, unlike personnel costs and repair expenditures, R&D could be considered as part of the "fabric of the business" expenditure, – a prerequisite for survival. Gellein

and Newman (1973) made a similar point, separating continuing researech from "business preserving costs". However, separating researech from development expenditure only eases the problem slightly. Development expenditure, in being closer to the stage of production, is both easier to assess and has a higher probability of commercial success. The potential future benefits, however, are still not accuately measurable, and this simply reduces the risk but does not remove it. As Bedford (1968) has noted, risk can only be transformed to managable uncertainty when companies have established the linkage between R&D and future income.

2.3 Relevance Considerations

If the user-oriented approach is adopted to consider the production of financial reports, users' preferences become the most important factor to resolve the dilemma of accounting treatments relating to R&D costs. Dukes (1974, 1976) concluded from his analysis that investors acted as though they were making capitalization adjustments to research and development costs in estimating future earning potentials of the firm. Vigeland (1981) arrived at a similar conclusion. Horwitz and Kolodny (1980) detected significant effects of SFAS2 on R&D expenditure in small and high-technology OTC firms. In contrast, Dukes et al.(1980) could find significant results among NYSE and ASE listed frims. Thus, Horwitz and Kolodny (1980) suggested that the accounting treatment for R&D should be in accordance with the size of firms. For example, NYSE and ASE listed firms should adopt "big GAAP" (e.g., expensing) method for R&D costs whereas, OTC firms should employ the "small GAAP" (e.g., capitalization) method for R&D costs.

2.4 Empirical Implications

In addition to a few empirical studies with weak results, most studies surveyed above are normative in nature, they do not provide too much positive empirical evidence to support their arguments. In addition, their discussion still exists some weakness.

Hirschey and Weygandt (1985) attempted to provide a general framework of accounting for R&D costs. They suggested capitalization and amortization of R&D costs. However, their model still contains some problems, for example, the subjective nature of replacement cost. They also ignored the significance of indurstry group.

As described above, Pharmaceuticals, Chemicals and Electronics are the three industries where R&D efforts are most intensive. Therefore, the industry-group classification should result in a better empirical result. Other limitations of their study include, for instance, a lack of sensitivity of market value effects to industry and product characteristics, a lack of the expenditure patterns of rivals, and a lack of more detailed treatment of simultaneous influences in order to increase the precision of economic life and amortization rate estimates.

Furthermore, if the deferral method, or separating research and development for different accounting treatments is considered as a proper accounting practice, then, why should 80% of the firms (mostly large companies) adopt expensing method prior to the issuance of SFAS2 (Anton, 1976)? Why have all market reaction studies failed to find significant results (Dukes, 1976; Vigeland 1981)? Why have the results of positive-accounting-theory studies found no effect except for small high-technology OTC firms (Horwitz and Kolodny, 1980; Dukes et al., 1980; Elliott et al., 1984)?

Even though Horwitz and Kolodny (1980) suggested a "small GAAP" concept, the shock of expensing R&D expenditure among small high-tech OTC firms might be due to a temporary phenomenon (e.g., economic evironmental changes), or some other unobservable effects. In addition, their solution of using big and small GAAP in differing circumstances would increase administrative costs and reduce comparability of financial statements. As with so many aspects of the argument, the absence of any clear cut solution leaves the field open.

3 Effects of SFAS2 on R&D Expenditures

The major objective of this line of research is to investigate whether the mandatory requirements in SFAS2 cause the changes in expenditure level of R&D costs thus reach a more efficient social resource allocation. Primarily, there were three studies related to this issue; Dukes, Dyckman, and Elliott (hereafter DDE, 1980), Horwitz and Kolodny (hereafter HK, 1980), Elliott, Richardson, Dyckman, and Dukes (hereafter ERDD, 1984).

The change mandated by SFAS2 will affect reported net income unfavorably; therefore, it likely affects the nature of bonus plan and bond covenant. If the private R&D costs are funded by debts, the unfavorable net income might default bond covenant thus effect the potential R&D expenditures. Thus, the likelihood of adverse effects on R&D expenditure perhaps derives from the strong relationship between

reported income and R&D expenditures (Mueller, 1974; Kamien and Schwartz, 1975; Grabowski, 1968; and Elliott, 1971).

3.1 Research Process

DDE (1980) employed matched-firm tests to detect the likelihood of the effects of SFAS2 on R&D expenditures. They then adopted unmatched-firm tests to test the structural relationship between 1974 (pre-SFAS2) and 1976 (post-SFAS2) firms. A logit model was used for discriminating expensing or capitalizing firms. However, this model was found to be not useful. In matched-firm tests, 24 pairs of expensing and capitalizing firms were chosen by matching their industry, size, type of ownership, and other matched considerations to determine whether there exists a significant difference in R&D expenditure between pre-SFAS2 (1974) and post-SFAS2 (1976) periods. The Mann-Whitney U-Test, Komogorov-Simirnov Two-Sample Test, and Wilcoxon Matched-Pairs Signed-Pank Test were used for testing the relevant economic hypothesis. As for unmatched-firm tests, another 27 expensing firms were randomly selected from Compustat. Two sets of regression models were employed for testing the structural relationship between pre- and post-SFAS2 periods. The first set of regressions were:

RA: E74 Expensing firm regression based on 1974 data
RB: E76 Expensing firm regression based on 1976 data
RC: C74 Capitalizing firm regression based on 1974 data
RD: C76 Capitalizing firm regression based on 1976 data

The second set of regressions were:

RAB: E74 and E76 data
RBD: E76 and C76 data
RCD: C74 and C76 data
RAC: E74 and C74 data

In KH's study (1980), the questionnaire was sent to investigate the management attitude toward the R&D ruling. Their reponse rate was 34% (131/380). They selected 43 pairs of OTC sample firms to conduct another non-parametric Wilcoxon Matched-Pair Sign-Ranks Test. They asserted the possibility of reduction in R&D outlays, in terms of the percentage change in R&D outlay, or the ratio of R&D/Sales, or the ratio of R&D/Income before R&D, or the ratio of R&D of the treatment company to R&D of the treatment company plus that of the match company. They plotted the median value of R&D/Sales to compare expensing firms with the median

value of deferral firms. There were significant differences. A Wilcoxon Matched-Pairs Signed-Ranks Tests was employed to test the change in variability of R&D expenditure pattern of pre- and post-period of SFAS2.

The ERDD paper (1984) basically employed the same data set as DDE's (1980) and HK's (1980), and then with some refinement (restricted to COMPUSTAT and eliminating data misclassification pointed out by Wolfson, 1980), the Wilcoxon Matched-Pairs Signed-Ranks Tests was employed for testing DDE's and HK's hypotheses. In addition, ERDD adopted logit analysis to summarize the characteristics of capitalized firms.

3.2 Results and Implications

The empirical findings are

- No significant differences were found between R&D expenditures pre-SFAS2 and post-SFAS2 periods. Ball (1980) commented that this result may be partly from methodological weakness, and partly from management-owner internal adaptions. In addition, economic environmental problem (e.g., 1974 recession) and management sesitivity might have adjusted tht R&D policy according to SFAS2's requirements systematically prior to SFAS2.
- Unsophisticated investors indeed have some difficulties in evaluation the performance of small firms. That is, there exists market inefficiency phenomenon. Further research is required in order to understand what specific information contained in financial statements relating to R&D costs leads to market inefficiency such that SEC can make approriate regulations.
- If the deferral option were still available, R&D expenditures would be greater. This unfavorable effect is largely derived from small firms. If retained earnings' impact on bond convenants was introduced; the effect of SFAS2 on R&D expenditures was more pronounced.[1] Furthermore, this unfavorable effect might drive the firm to substitute R&D expenditures as patent purchase (Ball 1980).

3.3 Unsolved Problems

There are some unsolved problems.

1. The incentives in relation to early adoption of SFAS2 are unexplained. Wolfson (1980) commented on HK that forty of the deferral samples adopted the expensing method one or two years prior to the required date of SFAS2. If debt covenants had played a first order effect, why did the firm make voluntary wealth transfers from shareholders to bondholers by electing early adoption of SFAS2?
2. The regularities of sample firms selected by this line of study are unexplained, e.g., HK sample firms characterize a low propensity to pay dividends, and the compensation contract of some sample firms may not written on the basis of accounting income. Furthermore, the recontracting costs are so large such that management compensation would not be changed.

From the theory of the firm, if a change of accounting rules is considered as a change in the rules of a game, then it is simply a reassignment of property right, so long as the parties to the agreement can reconstruct the original regime through contractual agreement. However, redistribution of wealth might occur, such as transaction cost, contracting costs, and audit costs. Thus, the sum of gains and losses might be negative, since the initial arrangement was presumbly optimal. In addition, the motives for R&D decisions of firms in highly concentrated industries will differ from those of competitive firm, since expense preference behavior is not possible under the constraints imposed by competition. Marshall (1980) cited the economic theory of R&D to conclude that intense competition may lead to expenditures on R&D that are beyond social optimum. Thus mandatory change in R&D costs is desirable if this causes a decline in expenditures.

4 Economic Consequences and Positive Accounting Theory Relating to SFAS2

Market reaction studies evaluate whether shareholders' wealth has been changed due to SFAS2. Other studies relating to positive accounting theory verify three hypotheses: management compensation hypothesis, debt/equity hypothesis, and political cost hypothesis. Generally speaking, SFAS2 did not cause the changes in stock return

[1] ERDD concluded that for capitalizers, their economic position was weak and the decline (because of SFAS2) was a function of this weakness coupled with generally unfavorable economic conditions during the period 1970-77, including 1974 recession. Thus, the issue relating to the impact of SFAS2 on the R&D expenditures is still inconclusive.

distribution surrounding the event dates of SFAS2, and the empirical results confirm the prediction of positive accounting theory.

The normative deductive theories in relation to accounting for R&D costs could not fully answer that which accounting treatment would result in a more relevant financial statement, and a more efficient social resource allocation. For example, the requirements of SFAS2 cause unfavorable results in financial reports even firm's value; thus, it should result in an unfavorable effects on stock return surrounding the event dates of SFAS2. In addition, the mandated requirements of SFAS2 might also affect the management compensation, bond covenant, and political cost outlays of a firm. Therefore, certain economic rationalities could explain the effects of SFAS2.

4.1 Economic Consequences of SFAS2

The studies in relation to economic consequences of SFAS2 investigated the market reaction because of the issuance of SFAS2. Theoretically, the requirements of SFAS create the contractual costs of the firm (e.g, brokerage fees, monitoring costs, bonding costs, the residual loss from dysfunctional decisions, the costs of becoming informed, the costs of rewriting existing contracts, and bankruptcy costs). In addition, The requirements of SFAS2 affect the reported earnings and time series properties of the reported earnings. Therefore, the requirements of SFAS2 should cause the negative stock returns surrounding the relevant event dates of the issuance.

Based on efficint market hypothesis, investors are rational. The mandatory changes of SFAS2 do not have cash-flow implications, thus, should not associate with the change of the stock price. However, from the angle of positive accounting theory, the adverse effects of SFAS2 lead to incremental contratual costs and also decrease the competition edge; thus, these potential negative effects should associate with the unfavorable changes in stock return.

Expensing R&D costs understate earnings. Dukes (1976) believes that, if investors have certain a degree of reaction before the earnings number announcement, the mandatory change of one component of reporting earning may possess similar behavior as Ball and Brown (1968) and Beaver (1968) had reported. Vigeland (1981) hypothesized that adverse effects of SFAS2 on financial reports would induce management to alter its R&D activities. Thus, the stock price is affected for the following reasons:

1. The effect might result from new information.
2. SFAS2 might conceal management's expectation of potential benefits.
3. The systematic mismeasurement of earnings might induce management to change the R&D decision if the management compensation agreement is written on the basis of accounting income.
4. SFAS2 increases the variability of earning streams over time.

These potential adverse effects of SFAS2 on financial reports motivated Vigeland (1981) and Dukes (1976) to investigate how its effects impact on change in stock returns.

In Dukes' study (1976), the Litzenberger and Rao valuation model (1971) was employed for testing the association between reported earnings and the understatement of earnings. The independent variables of the model dichotomized the market value of the common stock into two components, a no-growth component and a growth component. Dukes selected beta-risk, research intensity (R&D/market value of the firm) to represent the no-growth component, and the discount value of the expected growth in investment as the growth of the firm. The dependent variable was defined as the ratio of earnings to the market value of the firm. Beta-risk was calculated from standard *CAPM* (Sharp, 1965; Lintner and Mossin, 1966), or from Bayesian revision formula by Vasicek (1973) using 60 months of data prior to the month of interest. The research intensity was determined by the ratio of the R&D expenditures to lagged value of reported earnings, or alternatively, by the total amount of R&D expenditure over N periods divided by the total earnings over the same periods. The historical growth in total assets was an observable variable in measuring the growth component of the model. Data for Dukes' study (1976) consisted of 52 NYSE firms selected from CRSP and Compustat between the periods January 1959 through June 1968. Of these, 41 were from chemicals, drugs, and electronics.

Vigeland (1981) compared the treatment group to the control group to determine whether there is statistical difference between their mean return surrounding four event dates:

12/31/1973 (Discussion Memo released date),
6/5/1974 (Exposure Draft released date),
10/10/1974 (Issuance date), and
1/1/1975 (Effective date).

The treatment group and control group were matched on the basis of risk class, industry classification, and size. Each of 190 NYSE and ASE firms were chosen from Compustat, for which weekly stock price and dividend data for the period from July 1, 1973 through June 30, 1975 were collected for testing the hypotheses.

4.1.1 Results and Implications

Dukes (1976) and Vigeland (1981) could not detect market reaction due to SFAS2, even when Dukes made several extensions to the basic model. The extensions considered intra-industry and inter-industry factors and likely measurement errors of dependent variables and independent variables.

Several potential reasons lead us to believe that Dukes' (1976) and Vigeland's (1980) results were biased, since:

- *Specification problem:* Dukes' study might not have specified all the relevant independent variables; for example, agency costs, political costs, recontracting costs, or others (Wolfson, 1980; Marshall, 1980).
- The final conclusion cannot be made unless the economic environmental factors are considered in the model, e.g., size effect, industrial concentration, 1974 recession. (Ball, 1980; Marshall, 1980).
- The way Dukes investigated the mandated change seems to address voluntary accounting change. Mandatory change involves global changes among firms. Voluntary accounting change only deals with internal decision-making of the firm.
- There might exist some counter effects to balance the negative effects of SFAS2. The mandated disclosure of R&D expenses allows management easier to access the revealed information; as a result, planning and control of R&D expenditures would be more effective and efficient (Ball, 1980).
- The level of R&D expenditures might have exceeded social optimum prior to SFAS2. If SFAS2 leads to reduce the R&D expenditures, the levels might still stay in or in excess of social optimum (Marshall 1980).
- Vigeland's study (1981) did not consider the variance of stock returns. The measurement technique (mean-return) in his model is not precise enough to detect sensitive changes in market prices.
- Firms might adopt R&D decision prior to SFAS2 in order to adapt the adverse effects of SFAS2 (Ball, 1980).
- Firms might purchase external patents instead of making R&D efforts by themselves to mitigate the effect of SFAS2 (Ball, 1980).

4.2 Management Compensation Hypothesis

If the management compensation contract is written on the basis of accounting

number, managers and owners of a firm might have incentives to install internal evaluation scheme to counter the potential dysfunctional internal decision-making due to SFAS2. That is, the internal incentive system could be revised to provide the same expected compensation after SFAS2 as before. Selto and Clouse (1985) tested this issue. In order to test this hypothesis, they broke the capitalizers into two subgroups, adapted firms and affected firms, where the distinction between them was whether the capitalizing firm internally adapted to counter the effects of SFAS2 on management compensation.

They predicted that potentially affected firms with the highest likely effect on reported earnings would be the most likely to adapt to counter evaluation bias. In addition, they infer that firms which did not adapt to SFAS2 did not expect the effect on R&D spending to be material. Questionnaires (40% response rate) were used to investigate the extent to which firms' managers chose to make internal changes which would counter the evaluation biases implicit in net income measurement under SFAS2. Nine response firms were classified as adapted and seven were affected firms. The sample size was rather small, and the survey indicated that managerial behavior was not easy to predict. One regression analysis was used to explain whether affected firms' R&D spending was significantly different from that of adapted and control firms or not.

In sum, the empirical evidence of SC indicated that firms with the largest expected effects on reported earnings were not more likely to adapt than other potentially affected firm. Those firms which did not adapt had relatively lower R&D expenditures than either adapted or control firms.

4.3 Debt/equity and Political Cost Hypotheses

The debt/equity hypothesis in positive accounting theory predicts that the higher the firm's debt/equity ratio, the more likely the firm capitalizes the R&D costs. The higher the debt/equity ration, the tighter the firm is to the constraint in the debt covenants. The closer the covenant constraint, the greater the probability of a convenant violation and of incurring costs from technical default. Manager exercising discretion by choosing capitalilzed R&D costs relax debt constraints and reduce the costs of technical default (Watts and Zimmerman, 1990, p.139).

The political costs hypothesis predicts that large firms rather than small firms are more likely to expense R&D costs. Underlying this hypothesis is the assumption that it is costly for individuals to become informed about whether accounting profits

really represent monopoly profits and to "contract" with others in the political process to enact laws and regulations that enhance their welfare. Thus, rational individuals are less than fully informed. The political process is no different from the market process in that respect. Given the cost of information and monitoring, managers have incentive to exercise discretion over accounting profits and the parties in the political process settle for a rational amount of *ex post* opportunism (Watts and Zimmerman, 1990, p.139).

Daley and Vigeland study (1983) investigated the effect of contracting costs and political costs on the choice between capitalizing or expensing R&D costs. They examined the potential effects for the contract costs in the form of bond covenant limitations on leverage, dividend payments, and interest coverage ratio. The hypothesis of political costs follows the propositions in Watt and Zimmerman (1978).

There were five hypotheses in the paper of DV (1983):

1. Firms which capitalized R&D were more heavily levered.
2. Firms which capitalized R&D had lower interest coverage ratios.
3. Firms which capitalized R&D had higher ratios of dividends to unrestricted retained earnings.
4. Firms which capitalized R&D cost had more public debt in their capital structure.
5. Firms which capitalized R&D tended to be smaller firms.

The sample included 313 firms (178 R&D expensing firms and 135 R&D capitalizing firms). The capitalizers were identified by reference to the *Disclosure Journal Index of Corporate Events*. The expensing firms were randomly chosen from other firms on *Compustat Annual Industrial File* that reported 1972 research and development expense.

Probit and logit analysis were constructed to test the hypotheses. Jackknife procedures combined with OLS estimation were used to test the measurement errors of the variables. DV (1983) regressed nonpublic debt/total tangible assets, public debt/total tangible assets, interest coverage ratio, sales, and dividends/inventory of payable funds against a discrete dependent variable, one for capitalizing firms, zero for expensing firms. All coefficients of regression had the predicted sign, and all but the coefficient of the dividends to inventory of payable funds are significant at the 0.5 level. Then, they matched the capitalizing firms with control firms in the same SIC code to determine whether difference in industry classification affected the results. The sample size for this test is 111 pairs of firms. The results of the Jackknife estimation procedure were as expected. All estimated coefficients in the model estimated on the matched pairs had the predicted signs, but only the public

and private debt/asset coefficients were more significant than in the previous estimation. The industry control appeared to increase the test's power for the debt/equity hypothesis, but reduce the power for the other hypotheses.

DV separated the sample set into a large firm subsample (156) and a small firm subsample (157) to test for size effect, and estimated their OLS model on each subsample separately. The two debt/asset coefficients are significant in both estimations, but the size (sales) coefficient is significant only for the small firms subsample. This confirms to the results of HK (1980) and ERDD (1984) with regards to the effect of firm size.

5 Concluding Remarks

5.1 Conclusions

According to the nature of R&D activities, the research costs should be expensed and the development costs should be capitalized. R&D are carried out to develop new products, improve old ones, and reduce future manufacturing costs. It is expected to benefit future periods, rather than the current period only. One approach to reflect this is to capitalize R&D costs and amortize over the beneficial periods. To consider the uncertain nature of future benefits, it may be better to capitalize development costs and to expense research costs. SFAS2 however required R&D costs to be treated as an expenses when incurred.

In addition, the related empirical studies provide the following evidence. Generally, there is no market reaction with respect to the announcement of SFAS No. 2. Perhaps, there is information under-utilized in the market. Moreover, the empirical findings weakly support the bonus and debt/equity hypotheses.

- Before SFAS2, most expensing firms were larger in size. (Elliott, et al., 1980; Horwitz and Kolodny, 1980; Daley and Vigeland, 1983; Elliott, et al., 1984).
- Most captilizers normally had higher leverage, lower interest coverage ratio, higher ratio of dividends to unrestricted retained earnings, more public debt, smaller firm size, significantly smaller earnings before R&D, lower funds flow from operations, lower retained earnings, and larger tax-loss carryforwards (Elliott, et al., 1984; Daley and Vigeland, 1983).
- In 1974, when SFAS2 was introduced, the United States was in a state of

recession; this coupled with their own weakness, may have led small and high-technology firms reduce their R&D expenditures. Thus, SFAS2 may be only one of the main reasons causing the decrease in R&D expenditure among small and high-tech OTC firms (Elliott, et al., 1984).

- Firms with the largest expected effects on earnings were no more likely to adapt than other potentially affected (capitalized) firms. Those firms which did not adapt had relatively lower R&D expenditures than either adapted or control firms (Selto and Clouse, 1985).
- These results were consistent with the debt/equity hypothesis, that is, high debt/equity ratios increase the likelihood of procedures that increase current period earnings (Daley and Vigeland, 1983).
- There was no market reaction to the introduction of SFAS2 (Dukes, 1976; Vigeland, 1981).

5.2 Remarks

5.2.1 Information Implications of R&D Costs

Prior to 1975, the FASB did not provide a uniform accounting treatment and definition for R&D costs. The majority of firms adopted the expensing method instead of the capitalizing method which, however, is a more reasonable accounting practice. Most studies investigated the effects of mandatory change and characteritics of capitalizing firms. Why did they not examine the reasons or merits of their preference in using the expensing method, even if this method has less theoretical supports? This section provides an alternative explanation.

The components of R&D expenditure can be separated into two parts, purchase of long-leved equipments, and payment of salaries and other consumption supplies. Prior to SFAS2, if a large proportion of R&D expenditures is in installing equipment, the firm may simply charge those costs into the Plant, Property, and Equipment accounts, and the rest of the expenditures are charged to operating or other expenses. Thus, if R&D is not a significant part of the firm's operations, management might have incentive to simplify the accounting treatment according to this approach regardless of situation.

Even if R&D is important, management might consider concealing R&D information in order to maintain a competitive edge in the firm's highly technologically competitive environment. For example, they either elect to charge

R&D consumption costs and R&D personnel costs to R&D expenses, or they simply combine R&D consumption costs and R&D personnel costs into operation expense accounts. Then they charge the purchase of equipment to a long-lived asset account. This accounting treatment not only releases "false" information (R&D expenditures) to rivals, but also simplifies accounting procedure.

As long as management cannot access rivals' R&D information, management must rely on limited information to plan and control R&D expenditure. In this case, the R&D expenditures would usually be more than the level they would be if management can easily access rivals' information. Therefore, aggreate R&D expenditure can be in excess of the social optimum (Marshall, 1980). In addition, due to the "win-all" nature of R&D costs as well as new product competition, to conceal R&D costs in the financial statement can lead to a better position in the market.

5.2.2 The Definition of R&D

The definition of R&D adopted by the FASB is based on a scientific definition. This may be misleading. It gives an impression that R&D activities are only conducted in engineering or manufacturing to the exclusion of other industries (e.g., service). However, the service industry (e.g., financial institution) should also have innovation activities and invention outlays. To offer a newly created financial product in the financial market (e.g., interest swap) to customer is costly rather than costless. The creativity in the service industry is the best way for maintaining growth. Therefore, the definition of R&D costs must include the industries other than engineering and manufacturing industries.

For example, interest swap is a new financial product for managing risk in a volatile interest environment provided by financial institutes during 1980s. Perhaps, interest swap is a common technique; however, each financial institute must create his own professionism to maintain (or expand) his market share by the nature of monopolistic competition. The development of individual professionism requires a great amount of professional experience and knowledge which should be properly measured and disclosed in financial statements. However, accountant may complain that this sort of R&D costs is lack of *certainty with respect to benefits* as well as *causal relationship between R&D expenditures and future benefits*. Undoubtfully, the success of firms's professionism increases the firms' marginal benefits. This type of R&D costs obviously has causal relationship between cost and benefit. Therefore,

how to measure and disclose the R&D costs occurred in the service industry should be a direction for future research.

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