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STAKEHOLDER AND INDUSTRY EFFECTS ON THE LEVEL OF SEGMENT REPORTING

A Dissertation

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

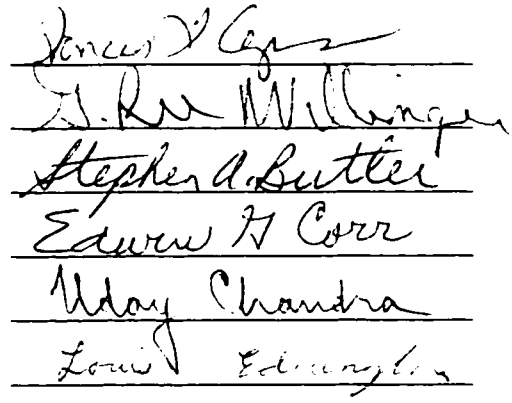
By

KELLEY A. STILL
Norman, Oklahoma
1997

STAKEHOLDER AND INDUSTRY EFFECTS ON THE LEVEL OF SEGMENT REPORTING

A Dissertation APPROVED FOR THE
COLLEGE OF BUSINESS ADMINISTRATION
SCHOOL OF ACCOUNTING

BY



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STAKEHOLDER AND INDUSTRY EFFECTS ON THE LEVEL OF SEGMENT REPORTING

I. INTRODUCTION

1.1 Discussion of the research problem

Current segment reporting requirements (Statement of Financial Accounting Standard No. 14)(SFAS 14) allow management a large degree of latitude in determining the segments reported (Financial Accounting Standards Board, 1976). This flexibility may allow firms to underreport the results of operations.

Underreporting information prevents investors from efficiently allocating resources. Financial statement user groups, such as the Association for Investment Management and Research (AIMR) and the Financial Analysts Federation, have stated that segment disclosure is important to them in their analyses of firms and they are concerned about its adequacy (AIMR, 1991 and Pacter, 1993). Two of the primary concerns are that firms do not disaggregate enough to report results for each line of business in which they are engaged and that the reporting levels are inconsistent both across firms and across time within firms. In response to segment reporting criticism, regulators are in the process of reevaluating disaggregated disclosure regulation (American Accounting Association's Financial Accounting Standards Committee, 1994).

The concern of underreporting suggests that financial statement users have an expectation of a given firm's level of segment reporting. This study addresses the underreporting concern by developing a measure that captures a firm's level of segment reporting relative to a reasonable expectation for segment reporting given the firm's operations. The concern of inconsistency in segment reporting levels across firms is addressed by identifying stakeholder relations and industry factors affecting firms' chosen levels of segment reporting.

Prior segment reporting research is extended in primarily two areas. One area is in the analysis of current segment reporting practices. Past criticisms of underreporting in segment reporting have not been quantified in terms of what was expected to be reported. In this study, I develop a measure of the level of segment reporting that models the number of segments reported as a percentage of the possible number as determined by the number of industries in which the company operates. This allows a segment reporting profile to be developed based on the sample firms. Results revealed that many firms do not identify as many segments for reporting as they have lines of business. However, most firms' disaggregate at least along broad industry lines. Many firms disaggregate more than the minimum indicated by the number of lines of business.

Segment reporting research is also extended by applying disclosure theory to segment reporting to address the issue of inconsistencies in reporting across firms. Even though segment reporting is mandated, the flexibility afforded in SFAS 14 allows segment reporting to resemble a discretionary disclosure. The basic premise underlying disclosure theory is that managers face a trade-off between providing financial reports that help capital markets value the firm accurately and withholding information to maximize the firm's product market advantage (Healy and Palepu, 1993). Harris (1994) addressed the effect of competition on segments identified for reporting. This study extends Harris' study by examining effect of stakeholder relationships, such as investors, creditors, managers and employees, and industry membership effects on segment reporting decisions. In brief, results show that dependence on the external capital market is positively associated with segment reporting levels. Additionally, industry membership, encompassing both herding behaviors and barriers-to-entry effects, are significantly associated with segment reporting levels.

This study is especially timely due to the FASB's current reevaluation of segment reporting requirements. The results of this study will aid regulators in determining the adequacy of current regulation. A current profile of segment reporting levels as well as factors affecting

segment reporting decisions will provide useful information to both standard setters and financial statement users.

1.2 Description of segment reporting requirements

As stated in Statement of Financial Accounting Standard No. 14 (SFAS 14), paragraph 5, the purpose of the segment reporting requirement is to assist financial statement users in analyzing and understanding the enterprise's financial statements by permitting better assessment of the enterprise's past performance and future prospects. The reporting requirements are not intended to allow for perfect comparability between similar segments of various enterprises. Managers have discretion in identifying appropriate segments to be reported, identifying assets for each segment and in allocating shared costs across segments to calculate segment operating income.

SFAS 14 offers guidance in determining reportable segments. The determination of an enterprise's industry segments must depend to a considerable extent on the judgment of the management of the enterprise.

According to SFAS 14, three main factors should be considered in determining whether products and services are related:

a. The nature of the product--related products and services would have similar purposes or uses and would be expected to have similar rates of profitability, similar

degrees of risk and similar opportunities for growth.

b. The nature of the production process--sharing of common production facilities, equipment and labor force and use of the same or similar raw materials may indicate that products are related.

c. Markets and marketing methods--how the product is marketed and the nature of the customers indicate the degree of relationship between products and services. For example, two products marketed by the same sales force to a common customer base may indicate related products. Additionally, the sensitivity of the market to price changes and other economic variables may indicate the degree of relatedness.

An identified segment is only considered to be significant, and therefore reportable, if it meets one of the following:

a) the segment's revenue is 10 percent or more of the combined revenue of the enterprise.

b) the absolute amount of the segment's operating profit or loss is 10 percent or more of the combined profit of all segments that did not incur an operating loss or the combined operating loss of all segments that did incur an operating loss, or

c) the segment's identifiable assets are 10 percent or more of the combined identifiable assets of all industry segments.

Once the company has identified the reportable

segments, the following information must be provided for each segment, either in the footnotes, body of the financial statements or in supplementary schedules:

Sales
Operating income
Depreciation, amortization or depletion
Capital Expenditures
Identifiable assets

Once the company has identified segments as reportable, the combined revenue from sales to unaffiliated customers of all reportable segments must constitute 75% of the combined revenue from unaffiliated customers of all firm operations. If segments identified to be reportable do not meet the 75% test, additional segments must be identified for reporting until the 75% test is met. In practice, it has been noted that segment data usually constitutes all the operations of a firm with insignificant operations apparently being combined with each other or other more significant operations.

Other disaggregated reporting are required, which are not within the scope of this study. Major customers, constituting 10% or more of a firm's sales, are required to be identified. Additionally, foreign and domestic operations are required to be broken out by broad geographic areas. Exports to any one foreign country in excess of 10% of total firm sales are required to be disclosed.

The SEC segment reporting requirements require firms to report sales to unaffiliated customers, transfers to other

segments, operating profit and identifiable assets for each reportable segment. If generally accepted accounting principles have been followed in preparing this information for the annual report, the firm can merely reference the annual report in their 10K report.

1.3 Summary

Managers have discretion in identifying segments to be reported, identifying assets associated with each segment and in allocating shared costs across segments to calculate segment operating profit. This study examines stakeholder and industry factors that may influence the chosen level of segment reporting. Associations found between segment reporting strategy and stakeholder relationships and industry characteristics provide additional insights into segment reporting choices and should be of value in formulating future reporting policy.

The remainder of this proposal is organized as follows. Section II discusses the motivations for segment reporting research and a review of the segment reporting literature. Section III discusses applies disclosure theory to segment reporting and develops hypotheses. Section IV contains the results of the data analyses for both the profile of segment reporting and explanatory models estimated for segment reporting levels. Section V summarizes the study and provides potential contributions of the research.

II. MOTIVATION AND PRIOR RESEARCH

Several financial reporting constituencies have been involved in the ongoing study and critique of segment reporting. These constituencies have included financial analysts, accounting practitioners, corporate managers, academic researchers and policy makers. This chapter provides some historical background and reviews the literature surrounding segment reporting from both the practitioner and academic research perspective.

2.1 Historical Background of Segment Reporting

In 1964, the U.S. Senate Judiciary Committee's Subcommittee on Antitrust and Monopoly held hearings regarding the economic concentration in American industry, particularly the conglomerate (diversified) form of business. Debate ensued among academicians, members of Congress, SEC officials, financial analysts, executives and accounting practitioners regarding the propriety of financial reporting for segments of a business enterprise. Segment reporting was controversial because it was counter to the idea that consolidated financial statements fairly present the financial position and operating results of a business.

APB Statement No. 2, "Disclosure of Supplemental

Financial Information by Diversified Companies," was issued in 1967 recommending voluntary disclosure of segment information. The SEC required line-of-business reporting in registration statements of new stock issues in 1969. In 1970, the SEC extended line-of-business reporting to Form 10-K, the report filed annually by all publicly held companies. In 1973, the New York Stock Exchange urged companies to include line-of-business reporting in the annual reports.

The FASB proceeded with formulation of segment reporting requirements responding to SEC actions and extensive research performed by the National Association of Accountants and the Financial Executives Institute (Backer and McFarland 1968, Mautz 1968). The FASB discussion memorandum, "An Analysis of Issues Related to Financial Reporting for Segments of a Business Enterprise," cited two points that were the bases for proponents of segment reporting: 1) various types of operations may have differing prospects for growth, rates of profitability, and degrees of risk, and 2) since management responsibility is frequently decentralized, the assessment of management ability requires less than total enterprise information.

FASB Statement No. 14, "Financial Reporting for Segments of a Business Enterprise (SFAS 14)," was issued in December of 1976. SFAS 14 has had minor amendments, but remains the standard for disclosure of industry segments.

2.2 Discussion of Literature from the Practice Perspective

Changes are currently underway in the way business segments will be reported. Both the Financial Accounting Standards Board (FASB) and the Canadian Accounting Standards Board (CASB) are in the midst of a joint project to improve their respective nation's segment reporting standards. Additionally, the International Accounting Standards Committee (IASC) has issued a draft of proposed changes in segment reporting (McConnell and Pacter, 1995). An exposure draft was released by the FASB in early 1996.

Revisiting segment reporting by the standard setting bodies is in response to years of concerns expressed by various groups representing financial statement users such as the Association for Investment Management and Research (AIMR) and the Financial Analysts Federation (FAF). The FAF annually confers awards upon companies with superior financial reporting. As early as 1984, the FAF became so incensed by the perceived deficiencies in segment reporting, they refused to award companies that did not do an "outstanding job" with segment reporting (Journal, 1984).

Specific suggestions for segment reporting by members of the FAF included: 1) be uniform in the way information is presented in each segment, 2) include segment sales and earnings graphs going back at least five years, 3) summarize the year's highlights and offer perspective on unusual events, 4) emphasize market size and growth rates or end users served by each segment and the backlog of key product lines and 5) break out foreign revenues, including export

They stated that analysts believe that segment reporting by lines of business and geographic market is essential to grasp the prospects of a firm.

The AIMR has two subcommittees that are concerned with financial reporting. Deficiencies in segment reporting have been observed by these groups annually for the past 20 years. In 1989, the AIMR surveyed the members of the FAF. 60% of the analysts agreed that many firms have "abused the latitude they have been given and created reporting segments which have little informational content".[2] Over 80% agreed that quarterly and annual segment disclosures should include a discussion of the criteria management used to determine the business segment definition. In 1993, the AIMR published a position paper, "Financial Reporting in the 1990's and Beyond". The following quote clearly outlines the importance of segment reporting to financial statement users:

> It is vital, essential, fundamental, indispensable, and integral to the investment analysis process. Analysts need to know and understand how the various components of a multifaceted enterprise behave economically. One weak member of the group is analogous to a section of blight on a piece of fruit; it has the potential to spread rot over the entirety. Even in the absence of weakness, different segments will generate dissimilar streams of cash flows to which are attached disparate risks and which bring about unique value. Thus, without disaggregation, there is no sensible way to predict the overall amounts, timing, or risks of a

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sales by a segment.

[2] Extracted from the "Results of the Survey of FAF Members and Information About Ongoing Research".

> complete enterprise's future cash flows. There is little dispute over the analytic usefulness of disaggregated financial data.

The FASB became aware of concerns such as the ones discussed above and issued a research report in 1993 (Pacter 1993) and an invitation to comment on business disclosures. The report noted that too many companies use broad definitions of industry to argue that they only operate in one line of business. Out of 6,935 public companies, 75% said they operated in one line of business in 1985-1991 period. Of the 1,051 largest companies, 43% had no disaggregated segments reported. Other criticisms listed in the report included the lack of meaningful geographic information, the absence of evidence that segment reporting follows the organizational units in which the company is managed, and the abundance of changes in segment definition from period to period.

The AICPA Special Committee on Financial Reporting published the results of its research in November, 1993 (The Jenkins Report). The report reflects the findings of the committee's study of the information needs of the users of financial reports; users being investors, creditors and their advisors (AICPA, 1993). The committee utilized various research techniques, including the study of prior studies and in-depth discussions with representatives of the various user groups. Among the highlights of the findings of the committee was a discussion of segment disclosures.

The committee found that both investors and creditors place a high value on segment reporting and believe that current disaggregated disclosures generally do not provide adequate information to help them predict an entity's future earnings and cash flows. The primary recommendation to improve segment reporting was to put reported segments more in alignment with information that is reported internally to senior management or the board of directors. Users also want segment data with quarterly reporting.

The American Accounting Association's Financial Accounting Standards Committee (The Committee) published a response to the FASB Discussion Memorandum `Reporting Disaggregated Information by Business Enterprises' (American Accounting Association, 1994). The Committee stated that they do not believe current segment reporting standards to be adequate for primarily two reasons: 1) The current criteria for identifying reportable segments is too vague and general and 2) there appears to be a lack of consistency in how firms define reportable segments across time. The Committee recommended that firms report by internal operating units. Auditors could determine that the segment reporting matches the way the firm is organized and that the reporting is adequate by referring to the firm's organizational chart. While this would result in less comparability across segments and firms by industry, it would result in more consistency in reporting by individual

firms. The Committee further recommended that more information be provided by segment such as quick assets, current assets, current liabilities, long-term liabilities, cost of goods sold, gross margin and operating cash flow. They cite Ou and Penman (1989) in recommending the expanded reporting due to the evidence that these items are useful in predicting future earnings increases and decreases.

Not all commentaries have agreed with the AICPA and AAA committees regarding segment definition. Wanda Wallace (1994) offered a perspective that is counter to enhancing segment reporting by running segments along internal reporting mechanisms. She stated that it would be naive to think that reporting along the same divisions as internal management would provide more useful information. An example cited was that a company that managed its operations geographically would not report any information by industry. Her conclusion was that stricter interpretation and application of the existing segment reporting standard would provide the most useful information.

The common thread running through the user concerns and recommendations is that more detailed information and more information items reported by segment are desirable. The recommendations from the users' perspectives may ignore reporting objectives by firms, such as limiting information available to competitors. The firm perspective was raised in a panel discussion of the Jenkins Report sponsored by the

CPA Journal (CPA Journal, 1995). One member of the panel noted that lenders were not that concerned with quarterly segment reporting as they are interested in the debt service ability of the legal entity as a whole. Another member of the panel noted that a member of the Financial Executives Institute applied the suggestions of the Jenkins Report to his own company's financial statements and found that each segment would require 61 pages in the annual report. This particular firm had five segments which would result in over 300 pages of financial data. Clearly, there are trade-offs in determining the appropriate level of disclosure.

2.3 Prior segment reporting research

Segment reporting research was active in the 1970's and early 1980's. The mid-1990's have seen a renewed interest in segment reporting. Most segment reporting studies can be characterized as one of two basic types: 1) those that examine the quality of segment operating income and the effect of segment data on earnings prediction and stock returns, and 2) those that examine the costs of segmental disclosures.

The quality of segment operating income and the effect of segment data on earnings prediciton and stock returns

The ability of segment reporting to improve earnings prediction has been studied alone and as a step toward market decisions. Kinney (1971) and Collins (1976) were

both earnings forecast model driven. Both studies found that segment data was useful in predicting future earnings of a firm. Kinney employed four models to predict the consolidated earnings of each sample firm for the subsequent year using voluntary segment data provided for years 1967 and 1968. Two of the models used consolidated income statement data, one model used segment sales and the final model used segment sales and segment earnings. The segment data models had better predictive power than the models with consolidated data. However, he noted that segment earnings did not add predictive power above segment sales alone. Collins (1976) confirmed Kinney's findings with an extension utilizing more models and a larger sample. Collins noted that segment earnings only offered nominal improvement in predictive power when coupled with segment sales than did segment sales alone. This suggests that arbitrary allocation of joint costs may limit the reliability and predictive usefulness of segment profitability data (Collins 1976).

The effect of cost allocations on reported segment earnings and/or returns has been examined by some studies. Recently, Givoly, Hayn and D'Souza (1995) (GHD) arrived at a similar conclusion to that of Collins'. GHD developed a measure of segment reporting quality utilizing the correlation of segments' performance measures (ie., sales, operating profit) with their respective industries'

performance measures. GHD found that the performance variables of multi-segment firms were less correlated with industry averages than stand-alone firms. Additionally, sales was found to be of higher quality than operating profit. An external validation of their quality measure found that stock returns were positively related to the quality measure.

Sannella (1987) proposed that since neither the amount of common cost allocated nor the allocation method is disclosed in segment reporting, management could use this flexibility in reporting standards to signal cash flow expectations through the choice of cost allocations. The model is set up such that if the segment's ability to bear, ie., segment profit before common cost allocation, is assumed to be held constant, and next period's cash flows are expected to be higher, then more common costs should be allocated to the high risk division. Conversely, if lower cash flows are expected, then more costs should be allocated to the segment with lower risk. The rationale is that when higher cash flows are expected, allocating more common costs to the high risk division will lower that segment's reported profit. Discounting the lower profit of the high risk division by a larger discount factor and discounting the increased profit of the low risk firm by a lower discount factor sums to an increase in the perceived value of the firm, which is consistent with the managers' expected cash

flow increase. Sanella tested the hypothesis that his model was a driver in cost allocations used in segment reporting. Using firm data gathered from Compustat for the period 1975-1980 and utilizing allocation methods reported to the Federal Trade Commission for years 1975-1976 and industry Beta's from Value-line as a measure of segment risk. Although his results were not statistically significant, he did conclude there was support for the hypothesis that a risk determined cost allocation method was used across firms, on average. He purports that the signaling implication provides additional support for the usefulness of segment reporting. Some studies focused on the relation between segment disclosures and security returns directly as opposed to the relation via segment earnings or cost allocations. Horwitz and Kolodny (1980) were unable to identify a difference in the pattern of return residuals between a group of firms that disclosed segment information for the first time and a group of single segment firms. Horwitz and Kolodny may have had a methodological problem due to trying to compare diversified firms (in the segment disclosure group) with single segment firms. Ajinkya (1980) improved on the design by comparing first time segment reporting firms with a control group of pre-requirement segment reporters. Ajinkya also failed to observe any difference in the risk-adjusted returns between the groups.

Swaminathan (1991) hypothesized that the disclosure of

segment data would provide a more precise information signal about firm value to investors. His results revealed an increased price variability for firms disclosing segment information, which did not support the hypothesis. Aitken, Czernkowski and Hooper (1994) performed a study of Australian segment disclosures. They hypothesized that segment disclosures provide investors with improved ability to predict earnings, which means the abnormal returns associated with unexpected earnings should be less for segment reporters. They found support for improved earnings predictability.

The costs of segmental disclosures

The "cost" of segment reporting is generally assumed to mean the cost to the firm in competitive advantage if proprietary information is revealed. Additionally, cost also includes the resources required to comply with regulation. Most cost related segment reporting research has been analytical with fewer studies of an empirical nature addressing this issue. Studying the costs associated with segment reporting is an attempt to view segment reporting from the perspective of management. One stream of analytical research (see, for example, Wagnehofer 1990, Hayes and Lundholm 1992, and Ronen and Livnat 1981) has addressed the bundling of segment data based on the level of competition in the industry and/or performance of the

segment relative to the industry. The general result has been that firms operating in highly competitive industries will tend to disclose less. This reduces the possibility of a competitor action resulting from the receipt of the firm's information. Hayes and Lundholm go further with an analysis of a pre-entry situation where the right information could prevent an entry, reducing competition. In this case, firms earning high levels of profits have incentives to distinguish themselves.

Harris (1994) was the first empirical study to apply disclosure theory to the segment reporting issue. She empirically tested the impact that competition-based disclosure theories have on segment reporting. Her study examined the impact the level of competition in a firm's industry has on its segment reporting decisions. She developed a measure of the degree of competition based on the persistence of return on assets in excess of the mean return on assets for the industry. Surprisingly, the likelihood of segment reporting increased as within-industry competition increased. This is consistent with the notion that firms would seek to protect profits in noncompetitive industries and would have lower disclosure costs in competitive industries. Further, she noted that firms with operations in industries with wide ranges of price to earnings ratios and wide ranges in the levels of earnings persistence were less likely to provide segment reporting.

If price to earnings ratios reveal growth opportunities, then apparently the costs of revealing the information to competitors exceeds the benefits of disclosing the information to investors.

Additionally, she examined newly reported segments and segments that were no longer reported separately, controlling for acquisitions, divestitures and discontinuances of operations. The evidence from examining newly reported segments and segments that were no longer reported separately revealed additional utilization of the flexibility of SFAS 14. Existing segments for which disclosure was halted predominantly performed significantly worse than other segments in the industry and the remainder of their own firm. Additionally, when segments reported decreased due to redefinition of business segments, variability in segment return on assets decreased across the firm. However, the results from examining newly disclosed segments did not support the claim that managers fear a negative reaction to early losses in new ventures. Newly disclosed segments tended to report a positive return on assets, but it was lower than both the firm and the industry average.

Harris extended prior research in the ability of segment data to improve earnings forecasts or explain firm value. Harris contended that the inability of segment profits to improve earnings forecasts may have been due to

the fact that segment profits would only be informative if segment profits exhibited varying levels of persistence across a firm. However, partitioning firms based on the across firm variation in segment profit persistence still did not improve earnings forecasts. Additionally, firm-wide profits explained more of the cross-sectional differences in market value than segment profits. This led Harris to conclude that the strategic manner in which segments are defined, as noted in the first part of her study, may reduce the usefulness of segment data.

2.4 Implications for future research

Harris (1994) is the first empirical study to have considered segment reporting as a management decision. Her focus was the impact of competition on the definition of segments reported. Acknowledgment that segment reporting, while mandated, allows for flexibility in interpretation to the extent that it shares characteristics with voluntary disclosures broadens the research perspective. Disclosure theory regarding competition was applied in the Harris (1994) study. A broader application of disclosure theory may prove useful in understanding the strategies employed by firms in determining their level of segment reporting. As discussed previously, users have been critical of the current state of segment reporting, resulting in FASB considering regulatory changes.

Additional research as to what segment data firms are providing versus what segment data firms could be providing may prove useful in documenting the actual current state of segment reporting. From the user perspective, criticism has been aimed at deficiencies in the level of segment reporting. Close examination of individual firms would be necessary to know that deficiencies exist. Disclosure theory suggests that with or without regulation, firms can be motivated to provide a great deal of financial disclosure (for example, see Healy and Palepu 1993, Frankel, McNichols and Wilson 1995, and Ronen and Livnat, 1981.) Additional research applying disclosure theory to firm segment reporting level decisions would be revealing to policy makers as well as users of financial reporting. From the policy making perspective, more knowledge of firm segment reporting motivations may improve the drafting of regulation. In theory, regulations are successful when they encourage firms to provide appropriate levels of useful (ie., informative) disclosure rather than a prescribed level of disclosure with varying degrees of usefulness (Hopkins, 1996).

The research in this dissertation falls into the category of examining the "cost" of segment disclosures. Disclosures require an analysis of the trade-off between benefits derived by providing data desired by the capital market and potential costs to firm value from an information

transfer to competitors (Healy and Palepu, 1993). This study examines factors that affect the various disclosure costs as perceived by the firm. Reducing the cost of capital is an example of an effect that reduces the cost of disclosure. Policy makers will benefit from evidence revealed by this study regarding current segment reporting practices and firm motivations behind the segment reporting disclosure decisions.

III. THEORY AND HYPOTHESES DEVELOPMENT

3.1 Level of segment reporting

SFAS 14 constrains the individual lines of business reported to ten, citing the cognitive overload that could be created by more. Very few firms, however, report the maximum ten segments, which indicates that the constraint imposed by regulation is not preventing firms from adequately disaggregating.[5]

Theory suggests that a firm's level of financial disclosure could be affected by stakeholder relationships (for example, see Kim 1993, Healy and Palepu 1993, Diamond 1985, Fishman and Hagerty 1989, Diamond and Verrechia 1991, Ronen and Livnat 1981, Bowen DuCharme and Shores 1995). In general, it is thought that disclosure decisions involve weighing the trade-off between providing financial reporting that enables the capital market to value the firm and withholding information to maximize the firm's product market advantage. Segment reporting particularly lends itself to this. Critics of segment reporting requirements cited the costs associated with revealing line of business information to competitors. Ceteris paribus, managers would prefer to reveal as little information as possible.

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[5] No sample firms reported 10 segments. The maximum number of segments reported is six. The mean number of segments reported is 1.79.

Reliance on the capital market, or external stakeholders, pulls the firm toward more disclosure. Ongoing relationships with stakeholders, such as stockholders, debtholders, managers, customers and employees, create varying incentives for firms to manage their financial disclosure, which includes segment reporting. Different industries indicate different operating environments that are expected to affect the stakeholder/disclosure relation.

The following discussion and development of hypotheses includes three sections delineating the types of factors expected to affect segment reporting. These major categories are relationships with investors, managers and lenders, relationships with employees and industry membership.

3.1.1 Segment reporting levels and investors, managers and lenders

Healy and Palepu (1993) summarize the key ideas of accounting information models. Financial reporting will always be an imperfect process as long as three conditions are present: 1) managers have superior information about the firm relative to investors, 2) managers incentives are not aligned with shareholders and 3) accounting and auditing rules are imperfect. These three conditions are expected to exist in practice. Managers are hired because of their superior information regarding the management of a

particular firm and that makes financial reporting potentially informative to shareholders and potential investors. Conflicts of interests between managers and shareholders and imperfect accounting rules and auditing can cause distortions in the information disclosed.

As mentioned before, a dependence on the external capital market is positively associated with the level of segment reporting. Below are discussions of proxies for reliance on the capital market and the motivation provided for selection of segment reporting strategy.

Capital Market Financing

If the firm is dependent on the capital market for financing, or prefers public financing, then the cost of capital can be lowered through a more efficient stock price. An efficient stock price as used by Fishman and Hagerty (1989) refers to a stock price that is an unbiased estimate of future firm value. Fishman and Hagerty (1989) model disclosure cost on both ends of the information chain. There is a cost to disclosure for the firm, but there is also a cost to a trader to analyze a firm's disclosures. All things being equal, the more informative the disclosure of a given firm, the more profitable it is for a trader to study the disclosure and trade on the information. So firms are in competition for attention from traders. More informative disclosures can attract traders away from other

firms elevating the given firm's market value. This results in a lower cost of capital and benefits stockholders. Fisherman and Hagerty's result reinforces the notion that mandatory disclosure policies are a waste of resources as firms have an incentive to provide the appropriate level of disclosure. This leads to the following hypothesis in the alternative form:

$H_{4.1}$: The level of segment reporting disclosed by a firm is positively associated with the level of reliance on the external capital market.

Past firm reliance on the external capital market will be operationalized as two measures: 1) the ratio of all bonds and other forms of market-based debt to total assets (BONDS) and 2) the percentage of stock outstanding held by officers and directors (DIRSTK). BONDS is expected to have a positive association with the level of segment reporting. DIRSTK is expected to have a negative association with the level of segment reporting as higher percentages of stock held by officers and directors indicates less reliance on raising equity capital from external investors.

The proxies used above are indicative of past reliance on the market for financing. A potential future need to raise capital or secure financing may provide an incentive for increased disclosure or higher levels of segment reporting. A logical proxy for this potential future need for capital is a firm's level of growth. Growth is defined

here as the five-year average annual increase in sales for years 1991 through 1995 (GROWTH). GROWTH is expected to have a positive association with the level of segment reporting.

Management stock ownership

The improvement in stock price efficiency shown to result from increased financial disclosure impacts shareholders positively (Fishman and Hagerty, 1989). Managers benefit as the improved opportunities should lead to improved firm operating performance which reflects on them and would positively impact their compensation and future employment prospects. Managers could also directly benefit from higher stock prices when a portion of their compensation is tied to stock or they have substantial personal wealth invested in firm stock. Incentives could exist for managers to favor higher levels of financial disclosure separate from the cost of capital and shareholder welfare issues. The following hypothesis is proposed:

H_{a2}: The level of segment reporting disclosed by a firm is positively associated with the proportion of stock-based executive compensation to total executive compensation.

The stock option component of executive compensation will be operationalized as the value of stock-based compensation relative to the total executive compensation for the top

five executives as reported in the proxy statement (EXCOMP). EXCOMP is expected to be positively associated with the level of segment reporting.

It has been hypothesized that a reliance on the external capital market is positively associated with the level of segment reporting. However, managers may deem the cost of increasing disclosure too great as better informed investors also means better informed competitors, particularly in the case of segment reporting. Managers may seek other forms of communication with investors such as those discussed below.

Dividends and stock repurchases

Past research has shown that investors interpret dividend increases and stock repurchases as signals of managers' confidence in the quality of current and future earnings (Asquith and Mullins 1983, Healy and Palepu 1989, and Healy and Palepu 1993). However, there is still a cost trade-off to be analyzed. Paying out dividends instead of providing more disclosure may protect valuable proprietary information, but the dividends are reducing the pool of funds available for investment. Cash payout can be a response to firm undervaluation if the cost of increased disclosure is more than the cash payout. With this reasoning, the following hypothesis is proposed:

$H_{3.1}$: The level of segment reporting is negatively associated with dividend increases and stock repurchases.

Dividend increases (DIVINC) are operationalized as a dummy variable when the dividends per share have increased over the past four years since 1991. In the past, dividends have been shown to be highly correlated with growth and risk (Beaver, Kettler and Scholes 1970). In this study, dividend policy is expressed as increases and were not found to be correlated with market beta, used as a proxy for risk. Therefore, it was deemed unnecessary to control for risk in the model. Stock repurchases (STKREP) are operationalized as the amount expended on stock repurchases relative to total assets. It has been noted when working with the sample data that stock repurchases tend to be the norm rather than the exception, however many of the repurchases are insignificant amounts. Therefore, it is more appropriate to examine the magnitude of stock repurchases as a means of communication with the market.

Private debt

It was mentioned above that uninformative or noisy financial disclosure negatively affects a firm's cost of capital. If increasing the level of public disclosure is undesirable (e.g. provides valuable information to a competitor), the firm can turn to private forms of

financing. It is easier for private debtholders to obtain confidential information to provide the necessary financing, thus lowering the firm's cost of capital without having to make costly financial disclosures (Myers and Majluf 1984). Larger proportions of debt provided by private sources would make less segment reporting feasible. This suggests the following hypothesis:

H_{11}: The level of segment reporting disclosed by a firm is negatively related to the level of debt provided by private sources.

The level of private debt (PRVDBT) will be operationalized as the ratio of debt provided by non-public sources to total assets.

Informed shareholders

Although there are benefits to shareholders of increased financial disclosure, there is a shareholder situation that does not result in more disclosure being the shareholders' preference. Kim (1993) explores the heterogeneous nature of a firm's shareholders. His study sees mandated disclosure rules as a result of conflicts among firms' shareholders with different risk attitudes and different access to inside information. There is no optimal policy equilibrium that is best for all shareholders. Better informed shareholders prefer less disclosure than less well-informed shareholders. Increased disclosure makes

investors more evenly informed and weakens the information advantage of the better informed. In practice, these better informed shareholders are assumed to be large-block shareholders who are active in management. It is not enough to just be a large-block shareholder as the desire to attract large-block investors has actually been shown to result in increased levels of disclosure (Diamond and Verrecchia 1991). The key is to be active in management as well. Because these well informed shareholders know the future prospects of the firm, they do not have to rely on public signals of the firm's true value. Minimizing disclosure means the firm saves the cost of disclosure, such as proprietary information gained by competitors. This benefit dominates potential gains from disclosure in the eyes of the well-informed, large, active shareholder, resulting in the following hypothesis:

H_{3}: The level of segment reporting disclosed by a firm is negatively related to the percentage of stock held by directors and officers.

The level of large shareholders who are active in management (DIRSTK) will be operationalized as the percentage of outstanding common stock owned by officers and directors. DIRSTK is expected to have a negative association with the level of segment reporting. Note that this is the same variable as being used to proxy for the level of dependence on external equity financing.

3.1.2 Stakeholder effects of employees

Employees are a stakeholder group who have an interest in the financial condition of a firm. Often contracts between a firm and its employees are implied and are self-enforcing due to reputation effects. Bowen, DuCharme and Shores (1995) (BDS) studied the effect of different stakeholder groups on accounting method choice. Employees seem particularly applicable to the segment reporting issue. BDS developed arguments for the effect the interests of employees would have on accounting method choice. This reasoning can be applied to segment reporting as well. The effect of employee relations on the financial reporting of the firm may be mixed. On the one hand, a firm wants to appear stable and successful to attract employees. Employees' implicit claims on a firm include a good working environment, security and prospects for the future. Firms with a unionized work force are involved in explicit contracting and may have different motivations. It may be costly to firms to reveal outstanding operating performance. BDS used the existence of a defined benefit pension plan as a proxy for existence of unions in the work force. They hypothesized and found a negative association between income increasing accounting methods and unionization. Applied to segment reporting, the desire to hide superior operating performance could be achieved through bundling a superior division with a lesser performing division. This leads to

the following hypothesis:

H_{a6}: The level of segment reporting disclosed by a firm will be negatively associated with the existence of a unionized work force in the firm.

Following BDS, the proxy for the existence of a unionized work force will be a dummy variable indicating the existence of a defined benefit pension plan. There are problems with studying the potential union effect on levels of segment reporting. One is that it is unknown if the defined benefit pension plan proxy is an adequate signal for the presence of a union. It is possible that older firms have defined benefit plans whether there is a union work force or not. It was noted in gathering the data that younger firms tended to have profit-sharing or defined contribution plans. Additionally, the union issue may be very industry driven. If an effect was found using the pension plan proxy, it may be picking up an industry effect other than unions. Another problem is that the sample is predominately made up of defined benefit pension plan firms. 112 out of 162 (69%) firms in the sample have defined benefit pension plans.

3.1.3 Industry effects on segment reporting

Herding behavior

Dye and Sridhar (1995) analyzed firm disclosure behavior within industries. They viewed firms' voluntary

disclosures as being motivated primarily by the resultant effect on firm value in the eyes of investors. They demonstrated a herding behavior for disclosure within industries. They attribute the herding behavior to the belief by firms that if one firm in the industry makes a disclosure, the market will assume the other firms in the industry have the information but withheld it. Even though segment reporting is a mandated disclosure, the large degree of latitude afforded managers in the development of the disclosure makes it take on characteristics of voluntary disclosure. Industry membership is expected to have explanatory power for the level of segment reporting, however no directions of associations are hypothesized.

Industry membership plays an additional role in modeling the level of segment reporting. Earlier it was noted that the different operating environments represented by industry membership may affect stakeholder relationships. Analyzing the level of segment reporting within industries will allow for those differences in modeling the level of segment reporting.

Barriers to entry

As discussed earlier, firms trade off the level of reporting investors would prefer with the level the firm would want competitors, or potential competitors, to possess. Newman and Sansing (1993) applied economic entry

deterrence modeling to the discretionary disclosure issue. No full-information equilibrium was found. A noisy signal (ie., low level segment reporting) is beneficial to shareholders when it deters entry.

Some industries naturally have more barriers to entry than others, depending on the complexity of the process or level of expertise needed to stay competitive. High barriers to entry may make the threat of entry into the industry by new firms lower, resulting in more precise information being disclosed. There are numerous measures that capture various components of barriers to entry. In this study, barriers to entry are proxied for using the level of capital intensity (property, plant and equipment as a percentage of total assets)(PPE) and research and development level (research and development expenses as a percentage of assets)(R&D)(Tirole, 1992). The following hypothesis is proposed capturing the barriers to entry industry effect:

H_1: The level of segment reporting disclosed by a firm is positively related to the level of barriers to entry.

The level of capital intensity and research and development are significantly associated with industry membership. Therefore, the barriers to entry effect is at least partially proxied for with analysis by industry. However, PPE and R&D will be included in the within-industry models

to determine if they can provide explanation for within-industry segment reporting differences.

IV. DATA ANALYSIS AND RESULTS

As previously mentioned, financial statement users' concerns have focused on the deficiency in segment reporting, particularly in the area of defining reportable segments. This study has been motivated by a desire to discover possible motivations underlying firms' segment reporting level decisions. This chapter includes a discussion of the sample selection process followed by a detailed description of the current segment reporting practices of the sample firms. Concluding the chapter are the hypotheses tests and results.

4.1 Sample selection

Six industries were subjectively selected to represent a mix of firms manufacturing durable and non-durable goods. The industries selected are Food Processing, Machinery, Chemicals, Electronics and Electrical (excepting computers), Transportation Equipment (excepting automobiles), and Textiles. 30 firms were randomly selected from within each industry. The selection process resulted in 162 firms[1] having enough data available to be included in the study.

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[1]In some industries, there were not firms available with full information for replacement, hence the sample fell short of 180 firms.

Table 1 reports the complete list of companies included in the study. Also reported are total assets, sales, number of lines of business, number of segments included in the SFAS 14 compliance segment reporting and the number of segments reported in the informal segment reporting included in parts of the annual report other than the financial statements. Table 2 reports the means of the above variables by industry.

Annual reports for each sample firm for years 1991 through 1995 were obtained for examination. Multiple years were necessary to observe changes in segments identified for reporting over the five year period. Because the levels-type variables utilized in the study change insignificantly across time and few segment reporting changes were noted, analysis of segment reporting practices and effects were performed on 1995 firm data. Detailed examination of the annual reports revealed that the SFAS 14 compliance segment reporting is not the only segment reporting provided by firms. Nearly all firms provide disaggregated data in the descriptive sections of the annual report outside of the formal financial statements. Firms have complete control over what data items are provided in the descriptive sections of the annual report. While the additional disaggregated data does not include all the items required by SFAS 14, it is, nonetheless, line of business financial reporting. For purposes of this study, <u>formal</u> segment

reporting refers to reporting presented in accordance with SFAS 14, including all required items: sales, operating profit, capital expenditures, identifiable assets and depreciation. Formal segment reporting is normally found in the footnotes to the financial statements, but may be reported elsewhere in the annual report. If all data items required by SFAS 14 are included, then it is considered formal segment reporting regardless of where it is found in the annual report. Informal segment reporting refers to partial segment reporting provided in parts of the annual report which are outside the audited financial statements. The informal segment reporting normally includes sales by segment and often includes operating profit or market share by segment.

The following items were gathered for all companies for year 1995 from annual reports:

Segments defined for reporting
Disaggregated reporting in the annual report outside of the formal financial statements
Firm research and development
Firm plant, property and equipment
Firm total assets
Public forms of debt
Private forms of debt
Stock repurchases
Type of pension/retirement plan
Growth in sales

The following item was obtained from the Disclosure database:

Lines of business as assigned by the SEC

The following items were obtained from proxy statements for

1995:

Stock-based portion of total executive compensation
Percentage of common stock held by officers and directors

The following item was obtained from Valueline or Standard and Poor's Stock reports for 1995:

Market beta

4.2 Changes in segment reporting

One of the user concerns about segment reporting previously discussed was the abundance of changes in segment definition from year to year. Harris (1994) found evidence of frequent changes in the way firms presented their business segments from year to year. The segment reporting footnotes or supplementary data were examined using annual reports for years 1991 through 1995 for each firm to document any changes in segment reporting. Changes could take the form of different segments being identified for reporting purposes or the level of detail provided for each segment. User concerns and prior research have highlighted frequent changes in segment definition from year to year as a deficiency in adequate segment reporting. The changes documented by this study portray less manipulation than originally expected. Out of the 162 companies included in the study, only four companies had actual changes in their formal segment reporting between years 1991 and 1995 that could not be explained by mergers, acquisitions, disposals

or discontinuance of operations. Structural firm changes such as these lead to an appropriate change in segments identified for disclosure and would not be the result of changing the way divisions or lines of business are grouped for disclosure. Following is a discussion of the four companies who were found to have changes in their formal segment reporting from 1991 to 1995.

In 1991, Sterling Chemicals gave sales information only for two segments in the descriptive portion of the annual report and reported on geographic segment data only in the footnotes to the financial statements. In 1995, Sterling provided all required items for the same two segments, again in the descriptive portion of the annual report. No particular reason could be identified for this increase in reporting except that their overall reporting in the annual report became more sophisticated over the five years.

Delta Woodside formally reported three segments in 1991, two types of fabric segments and an apparel segment. In 1995, they had combined the fabric segments into one segment and continued to show the apparel segment.

Springs Industries, also in the textile industry, combined two different fabric segments, finished and industrial, into one fabric segment called specialty fabrics.

In years 1991 through 1994, OEA identified two segments for formal reporting, government contracting and commercial.

In 1995, they still reported two segments, but were sorted differently into automotive and non-automotive. This was a move to define segments by product line rather than customer base, although the non-automotive segment appears to primarily be made up of the old government contracting segment.

This sample includes firms within a wide size range (See Table 2) and does not reflect any size related reporting patterns. Whether or not the firms included in the study are representative of the population of firms user groups and researchers have analyzed in the past is not known. However, this group of 162 firms representing six industries does not appear to exhibit frequent changes in segment definition for reporting purposes.

4.3 Segments reported versus lines of business

The "level" of segment reporting as used in this study refers to the segments defined for disclosure relative to the lines of business in which the firm operates. The lines of business (SIC codes) in which the firm operates are assigned by the SEC at the time of a firm's initial public offering and are updated annually from narrative provided regarding new developments by the firm in Form 10K. Form 10K requires a firm to provide a description of business that encompasses three main areas: 1) Development of business, which includes new operations, mergers,

acquisitions, dispositions, plans for new securities offerings and how the money is to be used, etc., 2) Financial information about industry segments, which is usually a reference to see the segment reporting provided in the annual report and 3) Narrative description of business, which includes descriptions of products and services, competitive environment, sources and availability of raw materials, seasonality, major customers, etc.

The lines of business as assigned by the SEC from the firm's explanation of its operations is independent of a firm's identification of segments to be reported in the annual report. However, it is plausible to consider the lines of business as identified by the SEC as an outline of what segments could be identified by a firm for reporting. examination of the U.S. Standard Industrial Classifications (SIC) revealed that the SIC codes at the four-digit level may separate lines of business too finely to match with the way firms operate. Additionally, the four-digit SIC codes, as assigned by the SEC, may include very minor areas of operation that differ only slightly from other operations. After reviewing the SIC code categories, it was determined that natural breaks in segment identification would be reasonable at the two-digit level. In other words, this author maintains that lines of business that are the same at the two-digit level could reasonably be combined for reporting purposes. Lines of business that are different at

the two-digit level are considered to be different "enough" to necessitate reporting as separate segments. For purposes of this study, the number of different SIC codes at the two-digit level for each sample firm is the minimum expectation of the number of segments disclosed for adequate segment reporting. Table 3 reports the breakdown of firms into the number of lines of business they are engaged in when separated at the two-digit level, hereafter referred to as lines of business (LOB). Analysis of the lines of business reports that 63% of firms are operating in two or more lines of business.

Table 4 presents a breakdown of the frequency of the actual number of segments reported both formally (FSSEGS) and informally (MDASEGS). Over 56% of sample firms maintain they operate in one segment (firms with one FSSEGS or MDASEGS are providing no segment reporting). However, the analysis in the second panel reveals that nearly 70% of firms offer partial segment reporting for two or more segments.

Many firms will state they operate in one segment in the footnotes to the financial statement while presenting sales and other data for several segments in the descriptive portion of the annual report. Panel 3 of Table 4 highlights the frequency of this behavior as well as all firms who disaggregate more informally than they do in their formal segment reporting. 49 firms (30%) in the sample provide no

disaggregated segment data formally or informally. Another 58 firms (36%) provide segment data both formally and informally for the same number of segments. The remaining 55 firms (34%) provide segment data for more segments informally than the number of segments reported in the formal segment reporting footnote. This number includes 42 firms who maintain they operate in one segment for formal segment reporting purposes, but then offer partial segment data on as many as eight divisions or product lines in the narrative portion of the annual report.

The number of segments a firm chooses to report relative to the lines of business in which they are engaged could be viewed as the firm's chosen "level" of segment reporting. Above, lines of business and segments reported both formally and informally were discussed. Table 5 presents a cross-tabulation of the segments reported, both formally and informally, by the number of lines of business. Panel 1 addresses formal segment reporting. Of the 91 firms not providing any formal segment reporting, 42 of them are operating in two or more lines of business. However, as shown in Panel 2, the number of firms not providing any segment reporting even when operating in multiple lines of business drops to 22 when informal segment reporting is included. Overall, at the formal level, 64 firms out of 162 (40%) report fewer segments than they have lines of business. The frequency of this behavior is much less when

including partial or informal segment reporting. Looking at Panel 2, the firms providing data for fewer segments than their number of lines of business sums to 43 of 162 firms (27%).

What is as interesting as the possible deficiencies in segment reporting as discussed above, is the evidence provided of segment reporting that may well exceed the minimum requirements of the segment reporting standard. Summing the number of firms who formally report more segments than they have lines of business, 22 firms (14%) are providing this high level of disaggregation. Informal, or partial, segment reporting as shown in Panel 2 is even more dramatic with 64 firms out of 162 (40%) providing more disaggregation than lines of business.

In summary, of the sample firms, 46% provide full segment reporting for the same number of segments as lines of business. 40% of the sample firms provide full segment reporting for fewer segments than lines of business and 14% provide full segment reporting for more segments than they have lines of business. Including partial, or informal, segment reporting in the analysis of firms' disclosure behaviors, of the sample firms, 33% provide data for the same number of segments as lines of business. 27% provide data for fewer segments and 40% provide data for more segments than they have lines of business. Whether looking at full segment reporting or partial segment reporting, the

majority of firms are providing data for at least as many segments as the lines of business in which they are engaged.

4.4 Hypotheses tests

The following equation, estimated with ordinary least squares regression[1], summarizes the explanatory variables used to test hypotheses 1-7:

$$\text{LEVEL} = B_0 + B_1\text{BONDS} + B_2\text{DEFBEN} + B_3\text{DIRSTK} + B_4\text{DIVINC} + B_5\text{EXCOMP} + B_6\text{GROWTH} + B_7\text{PP\&E} + B_8\text{PRVDBT} + B_9\text{R\&D} + B_{10}\text{STKREP}$$

Where:

LEVEL = number of segments reported divided by the number of lines of business at the two digit SIC code level in which the firm operates as assigned by the SEC. This variable will be expressed as LEVELI and LEVELII representing the variable calculated using the number

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[1] The small range of possible numbers making up both the numerator and denominator cause the dependent variables to be somewhat discreet and their distributions are somewhat bi-modal. Logistical regressions were estimated for the entire sample divided between underreporters and even or overreporters and the sample divided between underreporters and overreporters. The results were not different from the models when estimated using OLS. This result is not surprising given the results of a study comparing Probit and OLS in small samples (n=50 and 100)(Noreen, 1988). Noreen found that when the null hypothesis was true, OLS regression test statistics conformed closely to their theoretical distributions, closer than Probit. When the alternative hypothesis was true, OLS appeared to be as powerful as Probit. Model specification checks revealed no evidence of heteroskedasticity or multicollinearity.

of segments defined for formal segment reporting and the number of segments defined for informal segment reporting.

BONDS = amount of debt from public sources divided by total assets. Bonds is expected to have a positive association with LEVEL.

DEFBEN = dummy variable representing existence of a defined benefit pension plan as an indicator of a unionized work force. DEFBEN is expected to have a negative association with LEVEL.

DIRSTK = percentage of stock held or controlled by officers and directors. DIRSTK is expected to have a negative association with LEVEL.

DIVINC = a dummy variable representing an increase in dividend payout per share from years 1991 through 1995. DIV is expected to have a negative association with LEVEL.

EXCOMP = value of stock based compensation granted in a year relative to the total executive compensation. EXCOMP is expected to have a positive association with LEVEL.

GROWTH = sample period growth in sales. GROWTH is expected to have a positive association with LEVEL.

PPE = property, plant and equipment divided by total assets. PPE is expected to have a positive association with LEVEL.

PRVDBT = amount of debt from private sources divided by total assets. PRVDBT is expected to have a negative association with LEVEL.

R&D = research and development expense divided by total assets. R&D is expected to have a positive association with LEVEL.

STKREP = amount expended on stock repurchases divided by total assets. STKREP is expected to have a negative association with LEVEL.

Industry membership effects

As discussed in Chapter 4, industry membership is

expected to have an effect on segment reporting levels due to herding behavior and varying levels of competition between industries. As reported in Table 6, an analysis of segment reporting, both levels and raw number of segments reported, by industry reveals significant differences. There are significant differences in means for informal segment reporting and the actual number of segments reported both formally and informally. Industry means for formal segment reporting are not significantly different across industries.

The herding behavior explanation for different levels of segment reporting among industries may indicate intercept shifts for membership in certain industries. This would assume that industry membership effects could be picked up with industry dummy variables, forcing the slopes for the various effects to remain constant across all industries. However, it is more likely that the different operating environments dictated by industry membership alter the dynamics between firms and the various stakeholder groups. Therefore, it is more appropriate to control for industry effects by estimating the segment reporting level explanatory models within industries as well as for the sample as a whole. The capital intensity and research and development variables will partially proxy for industry effects in the models estimated for the whole sample.

Size effects

Firm size effects have historically been pervasive in affecting researchers' ability to study other effects in many types of studies (Watts and Zimmerman, 1986). Correlation analysis, as shown in Table 7, reveals significant correlation between firm size, represented by total assets, and the level of formal segment reporting (LEVELI). A plot revealed that segment reporting levels are well scattered without pattern except among the largest of the sample firms. Adding a control variable for size to the explanatory models does not seem logical in light of the variation in segment reporting across firms of all sizes. Removal of two firms from the pool of firms used to estimate models for formal segment reporting, LEVELI, removed the significant correlation between total assets and LEVELI as shown in the second panel of Table 7.

4.4.1 Explaining segment reporting levels across all sample firms

Table 8 provides Pearson correlations for the dependent variables, LEVELI and LEVELII, and the independent variables. DIRSTK is significantly correlated with both LEVELI and LEVELII. EXCOMP is significantly correlated with LEVELII. Correlations between the dependent and independent variables and correlations among the independent variables were considered in estimating various forms of the

explanatory model.

Formal segment reporting

Table 9 reports the results of five models estimated on the variable LEVELI (formal segments reported/lines of business). A check for outliers resulted in one observation which was Winsorized. The first model includes all variables included in the model presented at the beginning of section 4.4. In models two through five, various variables have been removed based on their lack of association with LEVELI and impact on other dependent variables. Even though multicollinearity technically is not present, the high level of correlation between some of the independent variables affects the results by robbing explanatory power from individual variables. As shown in Table 8, DIRSTK is highly correlated with BONDS, DEFBEN, DIVINC, EXCOMP, and GROWTH. Model 2 has improved explanatory power and reveals significant associations between the level of formal segment reporting and the percentage of stock held by officers and directors (DIRSTK) and growth in sales (GROWTH). Additionally, the associations are in the hypothesized direction. Other forms of the model are not more revealing. DIRSTK is the only variable that consistently remains significant regardless of the relations among the other independent variables.

Informal segment reporting

Table 10 contains the results of models estimated to explain informal segment reporting (LEVELII) across all sample firms. A check for outliers revealed four observations which were Winsorized. Model 1 contains all variables included in the hypotheses. Explanatory power is improved in modeling informal segment reporting versus formal segment reporting. This is intuitively appealing as firms have more control over informal segment reporting than formal segment reporting. This result reinforces the idea that reporting objectives can be met by managers using informal segment reporting without too much information being revealed to competitors. Informal segment reporting can be used to reduce the "cost" of disaggregated reporting.

Throughout all variations of the model, DIRSTK, EXCOMP and GROWTH are significant effects in the hypothesized directions. It should be noted when comparing Model 1 to the other models that the inclusion of research and development (R&D) as an explanatory variable has a two-fold effect. One effect is the association of the variable with the dependent variable and its correlations with the other independent variables. The other effect is that including R&D significantly reduces the size of the sample. Not all firms report R&D. The group of firms remaining in the sample when R&D is included may share some characteristics that alter the ability of estimated models to explain

segment reporting levels.

Exploration of research and development reporting effect

Before proceeding with further discussion of the results of the data analysis, the effect of the research and development variable (R&D) warrants investigation. As discussed above, R&D is not available for all firms, which changes the pool of firms used to estimate segment reporting level explanatory models when R&D is included. Table 11 provides insight into the potential effect the reduction in the sample has on the ability to explain segment reporting levels. Panel A presents the firms, by industry, divided into two groups, those that report research and development and those that do not. Nearly all firms in the machinery, chemical and electrical/electronic industries report research and development. The food and textile firms predominantly do not report research and development. Only the transportation industry does not seem to take a clear position on research and development reporting. This is a clear example of the herding behavior theory regarding disclosure discussed earlier. What is apparent from this is that in the models estimated utilizing the entire sample, the food and textiles industries are not represented when R&D is included as an explanatory variable. The results of the analysis performed on an industry by industry basis will reveal why explanatory power for the entire sample is

improved when the R&D variable virtually removes food and textile firms from the sample.

Panel B of Table 11 reports differences in the means of other variables between firms who do report research and development and firms that do not report research and development. The significance level reported is from a two-tailed test. LEVELII, the level of informal segment reporting, is significantly different between the two groups. If the voluntary reporting of research and development is an indication of a `more disclosure` firm strategy, then it follows that the mean level of segment reporting would be higher for that group. DIRSTK, EXCOMP and PRVDBT all have significant differences between the two groups. Following the logic described in discussing the LEVELII difference, the directions of the differences are intuitive. Based on disclosure theory as applied to EXCOMP in Chapter 3, the expectation would be that higher EXCOMP levels would allow for more disclosure. Again following the theory as discussed in Chapter 3, higher levels DIRSTK and PRVDBT would allow for less disclosure. Knowing the characteristics of the firms who report research and development and the firms that do not report research and development will aid the interpretation of the results of

models estimated with and without the R&D explanatory variable.

Exploration of the effect of single line of business firms

37% of the firms included in the sample operate in one line of business, as defined by this study. These firms, in theory, would not be expected to include segment reporting in their annual report. However, 11 of the 60 single line of business firms report two or more segments in formal segment reporting and 33 of the 60 single line of business firms report two or more segments in informal segment reporting. This overreporting demonstrates that single line of business firms are subject to factors that are associated with more disclosure as well as multi-line of business firms. The inclusion of single line of business firms in the sample does create a situation where a firm's choice to not segment report results in a segment reporting level of 1 (1/1). Firms such as this may not be the same as firms who are in three lines of business and report three segments, also a reporting level of 1 (3/3). The single line of business firms could be dampening the explanatory power of the effects hypothesized, particularly across industries. Tables 8A, 9A and 10A report Pearson correlations and results of models estimated on the entire sample, minus the single line of business firms. The same variables, DIRSTK and GROWTH, are significantly associated with LEVELI,

however, explanatory power of the models are improved. In models estimating LEVELII, DIRSTK and R&D are found to be significantly associated, which differs from models estimated on the entire sample. DIRSTK and EXCOMP were significantly associated with LEVELII when using the entire sample. Again, explanatory power of the models estimated for LEVELII was improved when single line of business firms were removed. Single line of business firms will not be removed when analyzing by industry due to sample sizes.

4.4.2 Explaining segment reporting levels within industries

Earlier, it was demonstrated that segment reporting levels differ across industries. The industry differences in segment reporting may be due to the herding behavior discussed in Chapter 3 or it may be due to operating and structural differences inherent to the individual industries. Operating or structural differences would impact the interaction between firms and their stakeholders, potentially impacting financial disclosure decisions. This possibility demands analysis of segment reporting levels within industries. Various models utilizing the effects considered in hypotheses 1-7 were estimated within industries.

Food and kindred products

Table 12 reports the results of a Pearson correlation

analysis among the variables. BONDS, DEFBEN, DIRSTK and EXCOMP demonstrate potential in explaining segment reporting levels. Table 13 contains the results of five models estimated to explain the level of formal segment reporting (LEVELI). The models were designed to account for correlations between the dependent variable and the explanatory variables and the correlations among the explanatory variables. DIRSTK is the only variable with consistent significant association with LEVELI.

Table 14 contains the results of models estimated to explain informal segment reorting (LEVELII). Explanatory power is enhanced when estimating models for LEVELII. As discussed before, the explanatory variables may have more impact in informal segment reporting where there is more management control over the disclosure. EXCOMP has a large coefficient and high level of significance with LEVELII, indicating a strong effect on the level of informal segment reporting.

Machinery manufacturing industry

Table 15 reports the results of a Pearson correlation analysis among the dependent and independent variables within the machinery manufacturing industry. Only R&D has an obvious correlation with LEVELI. However, the correlation is in the opposite direction of that hypothesized. The correlations within the explanatory

variables make several combinations possible to gain explanatory power. As demonstrated in Table 16, R&D is significantly associated with LEVELI. Additionally GROWTH adds explanatory power. Again, the association for both R&D and GROWTH are in the opposite direction of that hypothesized. An examination of the firms included in the sample for this industry reveals that size may play a role in the reporting. Earlier it was discussed that size was not found to be associated with the level of segment reporting after the removal of two firms from the sample as a whole. However, within this particular industry, the distribution is nearly categorical between large and small firms. The small firms demonstrate more underreporting as well as higher GROWTH and R&D. This explains higher GROWTH and R&D being associated with less reporting for this industry. The inclusion of R&D in the machinery manufacturing industry only excludes five sample firms from the estimation.

The estimation of models for informal segment reporting (LEVELII) is not similar to estimating LEVELI. The level of stock held or controlled by officers and directors and the existence of a defined benefit pension plan are found to be significantly associated with LEVELII, and in the hypothesized direction. Again, the inclusion of R&D, even when not significant, enhances explanatory power as shown in Model 5. Apparently, similar characteristics and behavior

within the research and development reporting group of firms enhances the ability to model the chosen level of disclosure.

Chemicals and allied products manufacturing industry

The results of the Pearson correlation analysis among the variables for firms in the chemicals industry are presented in Table 18. DIRSTK, EXCOMP and GROWTH have significant correlations with LEVELI and/or LEVELII. Table 19 reports the results of models estimated for the level of formal segment reporting (LEVELI). DIRSTK is the only variable with a significant association with LEVELI. Model 1 includes R&D, which adds explanatory power with its near-significant association with LEVELI and its reduction in sample size.

The variation in informal segment reporting is better explained by the hypothesized variables. DIRSTK and GROWTH are found to be significantly associated, and in the hypothesized direction, with LEVELII.

Transportation equipment manufacturing industry

Pearson correlations among the variables for firms in the transportation equipment manufacturing industry are reported in Table 21. GROWTH, PP&E and R&D are found to have significant or near-significant correlations with LEVELI and/or LEVELII. As shown in Table 22, explanatory

power is enhanced when the sample is restricted by the inclusion of R&D, even though R&D is not significantly associated with LEVELI. Correlations among the explanatory variables provide differing results in the model estimation. When R&D is included, PP&E is a significant effect, although not in the hypothesized direction. GROWTH is the only significant explanatory variable when R&D is omitted from the model.

Table 23 demonstrates impressive ability to explain the variation in informal segment reporting with the hypothesized effects. GROWTH, R&D and PP&E are shown to be significant, again with a significantly reduced sample due to the inclusion of R&D. An examination of the firms making up the transportation manufacturing industry reveals that the reporting of research and development may create a sub-group within the industry that are more alike. There is a wide variety of processes and customer bases within the sample firms. The R&D variable may filter firms resulting in a more homogeneous sample of firms.

Textile mill products industry

Table 24 contains the results of the Pearson correlation analysis for the textile mill products industry. BONDS and PP&E are shown to have significant correlations with segment reporting levels. R&D is not a presence in this industry. As shown in Table 25, BONDS and PP&E are

significant effects in explaining the variation in LEVELI. Contrary to what has been observed in other industries, hypothesized variables are less effective in explaining the variation in LEVELII than in LEVELI. Table 26 reports the results of estimation of models for LEVELII. BONDS are found to be a significant effect. PP&E, while not portraying a significant coefficient, does add explanatory power to the model, as shown by Models 2 and 3.

Electrical and electronic machinery, equipment and supplies industry (except computers)

Table 27 contains the Pearson correlations among variables for firms within the electrical/electronics industry. There are no significant correlations between formal and informal levels of segment reporting and the explanatory variables. However, the correlations among the explanatory variables make it possible for the sample to be blocked in such a way to find associations. Table 28 reveals that blocking the sample with DEFBEN allows for the impact of GROWTH to be revealed. However, it is important to note again that the restriction of the sample by the inclusion of R&D enhances the explanatory power of the models estimated.

Variations in informal segment reporting do not seem to be affected by the hypothesized variables. As shown in Table 29, DIRSTK has near significant associations, but the intercept is predominantly capturing the explanatory power.

Summary

Most of the variables hypothesized to be associated with the level of segment reporting have been shown to be significant factors, at least within some industries. Table 30 provides an overview of the variables that were shown to be significant by industry and for the entire sample. Because sample sizes are small in the within industry analyses, Table 30 also provides a summary of when the signs on the variables were in the hypothesized direction regardless of the significance level of the association with segment reporting levels. The percentage of stock held or controlled by officers and directors (DIRSTK) and growth in sales over the sample period (GROWTH) were the only factors found to be significantly associated with the level of formal segment reporting (LEVELI) for the sample as a whole. Informal segment reporting levels (LEVELII) across the entire sample were found to be associated with DIRSTK, GROWTH and the percentage of executive compensation that is stock-based (EXCOMP).

However, when models for LEVELI and LEVELII were estimated across sample firms within industries, most of the other variables were found to have explanatory power within various industries. Only the existence of dividend increases (DIVINC) and stock repurchases as a percentage of total assets (STKREP) are not found to be significant effects. DIRSTK and GROWTH are found to be the most

pervasive effects across the various industries and the sample as a whole.

In summary, evidence has been provided to support hypotheses 1, 2, 4, 5, 6, 7. There is no evidence of support for hypothesis 3. The need to have access to the capital market as proxied for by GROWTH has the most consistent effect on segment reporting levels. The counter effect to that, as proxied for by DIRSTK, meaning that higher levels of DIRSTK indicate less reliance on external stakeholders, has the second most broad effect. Additionally, industry membership was found to be a significant factor in firm choices of segment reporting levels. This was demonstrated by significant differences in segment reporting levels among industries (Table 6). The industry membership effect was also demonstrated by differences in explanatory variables found to be significantly associated with segment reporting levels across industries.

V. CONCLUSIONS

Many groups of financial statement users have stated that segment disclosure is important to them in their analyses of firms. These groups have also been critical of the large degree of latitude allowed management by SFAS 14 in defining and reporting business segment information. Past concerns have included the possibility that this flexibility allows for inconsistency in reporting quality between firms and within firms across time. An example of this inconsistency are past observations of frequent changes in firms' segment definition for reporting from year to year.

This dissertation extends prior segment reporting research by studying the association between underlying firm characteristics, such as stakeholder relationships and specific industry characteristics, and the level of segment reporting. This dissertation also extends prior segment reporting research by including an examination of informal, or partial, segment reporting offered in management's descriptive portion of the annual report. Many firms provide more disaggregation in parts of the annual report outside the audited financial statements. Because it is outside the audited financial statements, management can control what data is provided. Normally sales and possibly another piece of information such as operating income or market share is provided by segment. This segment reporting

does not meet the requirements of SFAS 14, hence the term "informal segment reporting" is coined.

The approach of this study was to select a sample of the size that allowed for in-depth examination of firms' entire financial reporting. This allowed for a detailed description of what segment reporting actually consists and how that compares to past concerns about segment reporting.

One interesting finding of the study was the lack of evidence to support segment reporting critics' claims that firms frequently change the segments defined for reporting. Out of 162 firms, only four firms changed the segments defined for reporting, across years 1991 through 1995, that was not due to a merger, acquisition, disposal or discontinuance of operations. This study's detailed analysis of annual reports allowed all structural changes that would, in turn, appropriately affect segments reported, to be identified.

Additionally, prior criticisms have cited the lack of adequate disaggregation in the segments defined for reporting. It is true that many firms maintain they operate in only one business segment, when in fact, the SEC has assigned them multiple SIC codes upon analyzing their operations. For this study, lines of business necessitating separate segment disclosure was defined to be SIC codes at the two-digit level. In this study's sample, 63% of the sample operate in two or more lines of business. Less than

44% of the sample provide full segment reporting for two or more segments. However, if the informal, or partial, segment reporting offered in the annual report is considered, the number of firms providing data for two or more segments jumps to 70%.

40% of the firms in the sample provide full segment reporting for fewer segments than they have lines of business. While this percentage appears troublesome, there are significant cases of "over-reporting". 14% of the sample provide full segment reporting for more segments than they have lines of business. When informal, or partial, segment reporting is included, the numbers are more promising. 27% of the sample provided data for fewer segments than they had lines of business and 40% provided more disaggregation in reporting than they had lines of business. Apparently firms do not categorically bundle their segments to obscure their activity and performance by line of business. The focus of this study was well-placed to attempt to identify factors affecting the levels of segment reporting selected by firms.

The informal, or partial, segment reporting provided by firms always consisted of sales and sometimes included operating profit and market share. What was glaringly absent from the informal reporting was capital expenditures and identifiable assets. It is possible that firms are anxious to provide investors with performance information on

a disaggregated level. However, capital expenditures relay where resources have been allocated and may reveal to competitors more information than desirable. Capital expenditures reveals a firm's positioning for the future, where sales is past activity that is usually well-known among industry members anyway. Current discussion regarding segment reporting regulation has had the tone that less flexibility allowed by financial accounting standards would improve segment reporting. The findings of this study provide evidence that a reduction in the required data items may encourage more disaggregated data being provided.

Segment reporting is a required financial disclosure. However, the flexibility in SFAS 14 allows segment reporting to take on characteristics of voluntary disclosure. Therefore, this study draws on theories developed in the disclosure literature to attempt to explain the disaggregation levels in segment reporting chosen by firms. Several of the stakeholder relationships and industry characteristics posited to affect segment reporting levels were found to be significant. Industry membership was found to be a significant factor in a firm's chosen level of segment reporting. Informal segment reporting levels were found to differ on average across industries. Two reasonable explanations for an industry membership effect exist. One would be the disclosure herding behavior within industries included in the discussion of disclosure

theories. Another would be differences in the competitive environment present, as represented by the barriers-to-entry variables, R&D and PP&E.

The other industry based variables, level of research and development (R&D) and level of plant, property and equipment (PP&E) had limited findings of association with segment reporting levels. PP&E was a significant effect within the textiles and transportation manufacturing industries. R&D had a confounding effect on the study. It was directly found to have association with segment reporting levels in the machinery and transportation manufacturing industries. However, the inclusion of R&D as an explanatory variable reduced the pool of firms included in the estimation of the models. R&D is not reported by all firms. The reduction in the pool of firms actually improved explanatory power in the various models. Apparently, the shared characteristics of firms who voluntarily disclose research and development expenditures result in a sub-sample of firms who are more similarly affected by the hypothesized effects. An outgrowth of this study already in progress is to study the disclosure of research and development along with segment "over-reporting" as voluntary disclosures driven by certain firm characteristics.

The stakeholder effect found to be the most pervasive is the level of reliance on the external capital market as proxied for by growth in sales (GROWTH) and percentage of

stock held or controlled by officers and directors (DIRSTK). GROWTH was hypothesized and found to have a positive association with the level of segment reporting. Higher growth indicates a potential future need for capital, hence more information is provided as desired by investors. DIRSTK was hypothesized and found to have a negative association with the level of segment reporting. More stock controlled by officers and directors indicates less reliance on external financing. DIRSTK was a also a proxy for the effect on disclosure of informed shareholders. The larger the proportion of shareholders who are informed because of active involvement in the firm, the lower the need for disclosure to outside parties. DIRSTK was used as a proxy for two effects expressed in Hypotheses 1 and 5, therefore the exact source of its significant association is not known. However, reliance on the external capital market and the lack of need to disclose when higher levels of shareholders are informed through active participation are probably simultaneous scenarios that actually address the same effect. Overall, the significant, negative association of DIRSTK to segment reporting levels can be attributed to reliance on the external capital market. Earlier discussion of disclosure theory included the idea that access to the capital market is a motivation for increased disclosure as investors will be less interested in firms that are difficult to analyze. The evidence that a need for external

investors drives increased levels of segment reporting indicates that the flexibility built into SFAS 14 may not be misplaced. The market may discipline firms to find the appropriate segment reporting level.

The level of stock-based executive compensation (EXCOMP) is also a proxy for motivation provided by the external capital market. EXCOMP was found to be a significant effect for informal segment reporting across all sample firms, as well as the food and kindred products manufacturing industry. Other effects involving the capital market (BONDS), private financing (PRVDBT) and employee relations (DEFBEN) were found to be significant within one or more industries.

The only hypothesis that was not supported was regarding the choice by firms to communicate with the market in other ways when disclosure may competitively disadvantage the firm. Dividend increases as a signal to the market precluding increased disclosure (DIVINC) was not supported as being associated with segment reporting levels. Additionally, stock repurchases as a signal to the market of financial and operating strength, precluding increased disclosure (STKREP) did not find support as a significant effect.

A potential effect on formal segment reporting that has been included in an extension of this work is the effect of the audit firm on formal segment reporting. It is possible

that auditing firms systematically apply a firm-specific interpretation of SFAS 14 across audit clients. Firm training and financial reporting guidelines ensure a certain level of consistency in auditing techniques and reporting expectations within firms. The audit firm may provide a regulatory effect on the level of formal segment reporting disclosed, which could override the firm's segment reporting level choice.

This study is especially timely due to the FASB's current re-evaluation of segment reporting requirements. The results of this study, both in terms of what segment reporting currently consists as well as factors that affect firms' chosen disaggregation levels of segment reporting, will provide useful information to standard setters and other segment reporting or disclosure researchers. The lack of evidence to support frequent redefinition of segments and the evidence that many firms actually provide more disaggregation than would be expected by their operations should be considered in the policy-making process. Apparently, the policy-making process should not assume that the current financial reporting standard regulating segment reporting is resulting in mass under-reporting or manipulation.

Additionally, this study highlights the fact that the formal financial statements do not completely encompass a firm's financial reporting. Increased disaggregation

outside the formal financial statements may indicate discomfort with the current segment reporting regulation. Firms attempt to achieve their financial reporting goals outside of the audited financial statements. This informal, management-controlled information is provided directly to current investors and analysts and is available to all potential investors. Researchers gathering data items via financial statement databases may be missing this complementary financial information.

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TABLE 1

Listing of companies included in the study,
their total assets, sales, lines of business (per SIC codes as reported by the SEC),
lines of business categorized by the first two SIC code digits,
number of segments reported in formal segment reporting,
number of segments with partial reporting elsewhere in the annual report

COMPANY NAME	TOTAL ASSETS (in thous)	SALES (in thous)	LOB	FSSEGS	MDASEGS
FOOD PROCESSING:					
ALPINE LACE BRANDS	26,276	145,053	2	2	2
CAMPBELL SOUP CO.	6,315,000	7,278,000	1	1	3
CHIQUITA BRANDS INTL	2,623,533	2,565,992	2	1	1
DEAN FOODS CO	1,202,426	2,630,182	1	-	-
DOLE FOOD CO	2,442,192	3,804,000	1	1	3
FLOWERS INDUSTRIES	655,921	1,129,203	1	1	1
FOODBRANDS AMERICA	521,763	634,700	1	1	4
GENERAL MILLS	3,358,200	5,026,700	1	1	5
GOLDEN ENTERPRISES	52,011	128,145	3	1	1
H J HEINZ COMPANY	8,247,188	8,470,000	1	1	1
KELLOGG COMPANY	4,414,600	7,003,700	1	1	1
LANCE, INC.	256,460	356,055	1	1	1
MCCORMICK & CO.	1,614,341	1,858,694	3	1	4
MICHAEL FOODS, INC.	359,227	536,627	4	1	5
MIDWEST GRAIN PROD.	176,749	180,252	2	1	6
QUAKER OATS CO.	4,826,900	6,365,200	1	1	8
RALSTON PURINA CO.	4,567,200	7,210,300	2	4	4
RYMER FOODS, INC.	24,602	79,920	2	1	1
SARA LEE CORP	12,431,000	17,719,000	4	4	4
SENECA FOODS CORP	381,726	234,073	2	1	1
J. M. SMUCKER CO.	421,017	628,279	1	1	1
TASTY BAKING CO	85,302	141,831	1	1	1
TOFUTTI BRANDS INC.	1,545	5,023	1	1	1
UNITED FOODS, INC.	114,157	135,137	2	1	1
UNIVERSAL FOODS	776,870	792,971	1	1	5
VIE DE FRANCE	29,912	30,922	3	1	4
MACHINERY:					
ALLIED PRODUCTS	166,743	260,861	1	1	1
BRUNSWICK CORP	2,360,500	3,041,400	4	2	2
CASE CORP	5,469,000	4,937,000	1	1	3
CATERPILLAR, INC.	16,830,000	15,451,000	1	3	3
CMI CORP	109,219	130,578	2	1	1
COMML. INTERTECH	459,856	621,836	3	3	3
CUMMINS ENGINE CO	3,056,000	5,245,000	2	1	7
CURTISS-WRIGHT	246,201	154,446	2	2	2
DEERE & COMPANY	13,847,400	10,290,000	3	6	6
DETROIT DIESEL CORP	1,045,100	2,087,100	2	1	7
ENVIRONMENTAL ELE.	45,234	77,923	2	1	3
GRACO, INC.	217,833	386,314	1	1	4

COMPANY NAME	TOTAL ASSETS (in thous)	SALES (in thous)	LOB	FSSEGS	MDASEGS
INGERSOLL-RAND CO.	5,563,300	5,729,000	2	3	3
KAYDON CORP	267,675	229,924	2	1	4
KENNAMETAL, INC.	781,609	983,873	2	1	3
LYDALL, INC.	158,072	252,128	4	1	1
MANITOWOC COMPANY	324,915	313,149	2	3	3
MET-PRO CORP	45,168	50,005	1	2	2
MIDDLEBY CORP	84,040	139,188	1	1	1
MONARCH	101,348	114,991	1	3	3
OSMONICS	125,058	111,610	2	1	1
NACCO IND., INC.	1,833,837	2,204,500	5	5	5
OUTBOARD MARINE	907,000	1,229,200	2	1	2
PARKER HANNIFIN	2,302,209	3,214,370	3	2	3
PORTEC, INC.	57,818	97,072	3	3	3
SELAS CORP OF AMER.	67,959	71,215	2	3	3
STANDEX INTL. CORP	342,701	569,293	4	3	3
L. S. STARRETT CO.	213,940	214,215	1	1	1
TIMKEN COMPANY	1,925,925	2,230,504	2	2	2
TORO COMPANY	468,315	932,853	1	1	3
CHEMICALS:					
AIRGAS, INC.	645,637	687,983	2	2	2
ALBERMARLE CORP	1,204,491	1,244,222	1	1	7
AMERICAN VANGUARD	40,928	45,098	2	1	1
CABOT CORP	1,654,333	1,830,393	5	2	2
CYTEC INDUSTRIES	1,293,800	1,260,100	1	1	3
DEXTER CORP	934,161	1,088,905	3	6	6
DIONEX CORP	131,780	120,024	1	1	6
EASTMAN CHEMICAL	4,854,000	5,040,000	1	2	9
E-Z-EM	76,095	97,597	2	2	2
GENERAL MAGNAPLATE	12,923	9,623	1	1	1
HAUSER CHEM. RSCH.	84,568	59,267	2	1	4
H. B. FULLER COMPANY	828,929	1,243,818	1	1	4
KINARK CORP	18,375	25,246	2	2	2
LEARONAL, INC.	122,682	177,004	1	1	2
LOCTITE CORP	715,628	785,148	1	1	3
MACDERMID, INC.	123,305	182,100	2	1	2
MORTON INTERNAT.	2,756,000	3,325,900	2	3	3
MYCOGEN CORP	159,608	113,218	1	2	7
NALCO CHEMICAL CO	1,370,100	1,214,500	1	1	4
PENWEST, LTD.	186,760	174,200	3	1	1
PRAXAIR, INC.	4,134,000	3,146,000	2	1	1
QUAKER CHEMICAL	185,408	227,038	3	1	1
SEQUA CORP	1,621,978	1,414,139	5	4	4
STERLING CHEMICALS	609,939	1,030,198	1	2	2
SYNALLOY CORP	80,225	147,298	2	2	2
THIOKOL CORP	810,700	956,800	2	3	3
UNIVAR CORP	673,203	1,912,728	3	1	1
TRANSPORTATION:					
ARVIN INDUSTRIES, INC	1,291,000	1,966,400	4	2	2

COMPANY NAME	TOTAL ASSETS (in thous)	SALES (in thous)	LOB	FSSEGS	MDASEGS
ALLIED SIGNAL, INC.	12,465,000	14,346,000	3	3	3
CLARCOR, INC.	223,262	290,194	4	2	5
COLTEC INDUSTRIES	894,502	1,401,884	4	3	6
DANA CORP	5,110,800	5,563,300	3	3	5
EATON CORP	5,053,000	6,822,000	3	3	7
THE FAIRCHILD CORP	881,882	546,323	5	3	3
FEDERAL MOGAL CORP	1,714,400	1,995,900	4	1	3
FOUNTAIN POWERBOAT	16,334	38,727	2	1	1
GENCORP, INC.	1,458,000	1,772,000	5	3	3
HARLEY-DAVIDSON, INC	1,000,670	1,350,466	2	2	2
HARSCO CORP	1,310,662	1,495,466	5	3	3
HEICO CORP	47,401	40,379	2	2	2
NORTHRUP GRUMMAN	5,455,000	6,818,000	3	4	11
OEA, INC.	160,901	129,210	2	2	2
POLARIS INDUSTRIES	314,436	1,113,852	1	1	4
PS GROUP, INC.	305,971	167,004	4	3	3
ROHR, INC.	976,540	805,000	1	1	1
RPC, INC.	132,656	161,379	3	3	3
SUPERIOR INDUSTRIES	341,770	521,997	2	1	1
SUPREME INDUSTRIES	62,426	163,449	1	1	1
TELEFLEX, INC.	785,171	912,689	3	3	3
TEXTRON, INC.	23,172,000	6,468,000	5	6	6
THOR INDUSTRIES, INC.	148,460	562,681	1	2	2
TODD SHIPYARDS	110,924	69,096	3	1	2
TRINITY INDUSTRIES	1,420,000	2,314,900	5	6	6
UNITED TECH. CORP	15,958,000	22,802,000	3	5	5
TEXTILES: BELDING HEMINWAY	94,124	88,654	2	2	2
CONE MILLS CORP	584,320	910,217	2	2	5
CROWN CRAFTS, INC.	134,031	210,963	3	1	3
CULP, INC.	194,999	308,026	1	1	3
DECORATOR INDUS.	16,415	34,207	1	1	1
DELTA WOODSIDE IND.	610,296	597,541	4	3	3
DIXIE YARNS, INC.	396,997	670,842	1	2	2
DYERSBURG CORP	188,872	199,413	2	1	1
FAB INDUSTRIES	161,027	182,000	1	1	1
FIELDCREST CANNON	812,946	1,095,193	1	1	4
FRUIT OF THE LOOM	2,919,500	2,403,100	2	1	1
GRIFFON CORP	285,616	546,359	4	3	3
GUILFORD MILLS, INC.	586,371	782,518	1	1	1
HANCOCK FABRICS	201,835	364,192	2	1	1
JOHNSTON INDUS.	255,101	263,327	1	1	1
PAXAR CORP	157,140	201,436	3	1	1
PILLOWTEX CORP	324,710	474,899	1	1	1
RUSSELL CORP	1,118,164	1,152,633	1	1	1
SHAW INDUSTRIES	1,662,783	2,869,828	1	1	1
SPRINGS INDUSTRIES	1,527,544	2,233,053	3	2	2
TEXFI INDUSTRIES	96,045	257,258	1	2	2

COMPANY NAME	TOTAL ASSETS (in thous)	SALES (in thous)	LOB	FSSEGS	MDASEGS
THOMASTON MILLS, INC	186,323	276,490	1	1	1
TULTEX CORP	475,799	585,289	1	1	2
UNITED MERCHANTS	58,428	59,493	1	1	1
WORLDTEX, INC.	194,389	187,981	2	1	4
ELECT./ELECTRONIC: ALPHA INDUSTRIES	50,167	78,254	1	1	2
AMP, INC.	4,504,739	5,227,226	2	1	1
ARROW AUTOMOTIVE	69,005	106,574	2	1	1
AUGAT, INC.	407,476	534,873	2	1	3
BALDOR ELECTRIC CO	313,462	473,103	1	1	1
CATALINA LIGHTING	120,051	176,292	1	1	1
COLEMAN COMPANY	844,487	933,574	4	1	3
CTS CORPORATION	227,127	300,157	1	1	1
DEL ELECTRONICS	39,054	32,596	2	2	2
ESPEY MFG & ELEC.	28,839	14,574	1	1	3
GENERAL INSTRUMENT	2,300,758	2,432,024	4	2	2
GENERAL MICROWAVE	23,441	22,309	2	1	1
INTERMAGNETICS GEN.	103,706	83,877	3	2	3
LUKENS, INC.	919,663	1,049,158	2	2	2
LYNCH CORP.	302,439	338,166	6	3	3
MERRIMAC INDUSTRIES	15,188	14,396	1	1	1
NATIONAL SERVICE IND	1,131,346	1,970,627	5	3	3
OAK INDUSTRIES, INC.	312,728	276,580	4	2	3
PUBLICKER INDUS.	45,190	66,290	3	2	2
RAYCHEM CORP	1,454,745	1,530,573	3	4	4
ROGERS CORP	102,516	140,293	2	2	4
STANDARD MOTOR	512,150	663,485	2	1	4
SL INDUSTRIES	62,156	91,125	1	2	1
TECH/OPS SEVCON	12,981	22,431	2	1	1
THOMAS INDUSTRIES	313,533	490,573	2	2	1
TRW , INC.	5,890,000	10,172,000	4	3	3
VISHAY INTERTECH.	1,543,331	1,224,416	1	1	1

Variable legend:

LOB--number of lines of business in which the firm is engaged as denoted by the number of SIC codes assigned to the firm by the SEC at the two-digit level
FSSEGS--number of segments reported in formal, or full, segment reporting
MDASEGS--number of segments reported in informal, or partial, segment reporting

TABLE 2

Descriptive data for sample sales and total assets (in thousands of dollars) by industry

SALES					
	n	Minimum	Maximum	Mean	Std. dev.
FOOD	26	5,023	17,719,000	2,888,075	4,115,072
MACH	30	50,005	15,451,000	2,045,685	3,435,103
CHEM	27	9,623	5,040,000	1,020,687	1,206,743
TRAN	27	38,727	22,802,000	2,986,604	5,102,366
TEX	25	34,207	2,869,828	678,196	757,915
ELEC	27	14,396	10,172,000	1,054,279	2,129,980
ALL FIRMS	162	5,023	22,802,000	1,790,604	3,292,000

TOTAL ASSETS					
	n	Minimum	Maximum	Mean	Std. dev.
FOOD	26	1,545	12,431,000	2,151,005	3,071,362
MACH	30	45,168	16,830,000	1,980,799	3,934,599
CHEM	27	12,923	4,854,000	938,132	1,224,572
TRAN	27	16,334	23,172,000	2,993,006	5,552,463
TEX	25	16,415	2,919,500	529,751	661,062
ELEC	27	12,981	5,890,000	801,862	1,402,918
ALL FIRMS	162	1,545	23,172,000	1,582,623	3,258,000

Industry legend:

FOOD--food and kindred products manufacturing
MACH--machinery manufacturing
CHEM--chemicals and allied products manufacturing
TRAN--transportation equipment manufacturing
TEX--textile mill products manufacturing
ELEC--electrical and electronic machinery, equipment and supplies manufacturing

TABLE 3

Number of firms by the number of different lines
of business in which they are engaged

LOB	FREQUENCY	PERCENT	CUMULATIVE PERCENT
1	60	37.0	37.0
2	51	31.5	68.5
3	25	15.4	84.0
4	16	9.9	93.8
5	9	5.6	99.4
6	1	.6	100.0
TOTAL	162	100.0	

Variable legend:

LOB--lines of business as designated by the number of different two-digit SIC codes
assigned to the firm by the SEC

TABLE 4

Segments reported in formal and informal segment reporting

Panel 1

Number of firms by how many segments are reported in formal financial statement segment reporting

FSSEGS	FREQUENCY	PERCENT	CUMULATIVE PERCENT
1	91	56.2	56 2
2	35	21.6	77.8
3	25	15.4	93.2
4	5	3.1	96.3
5	2	1.2	97.5
6	4	2.5	100.0
TOTAL	162	100.0	

Panel 2

Number of firms by how many segments are reported in partial segment reporting in areas of the annual report outside of the financial statements

MDASEGS	FREQUENCY	PERCENT	CUMULATIVE PERCENT
1	49	30.2	30.2
2	32	19.8	50.0
3	39	24.1	74.1
4	17	10.5	84.6
5	8	4.9	89.5
6	7	4.3	93.8
7	7	4.3	98.1
8	1	.6	98.8
9	1	.6	99.4
11	1	.6	100.0
TOTAL	162	100.0	

Variable legend:

FSSEGS--number of segments reported in formal, or full, segment reporting
MDASEGS--number of segments reported in informal, or partial, segment reporting

Table 4 (continued)

Panel 3

Cross-tabulation of firms by how many segments are reported in formal segment reporting by how many segments are reported in informal segment reporting

	FSSEGS						
MDASEGS	1	2	3	4	5	6	TOTAL
1	49						49
2	6	26					32
3	14	3	22				39
4	12	1		4			17
5	3	2	1		2		8
6	2		1			4	7
7	4	2	1				7
8	1						1
9		1					1
11				1			1
TOTAL	91	35	25	5	2	4	162

Variable legend:

FSSEGS--number of segments reported in formal, or full, segment reporting
MDASEGS--number of segments reported in informal, or partial, segment reporting

TABLE 5

Segments reported vs lines of business

Panel 1

Cross-tabulation for segments reported in full, formal segment reporting by the number of lines of business

	FSSEGS						
LOB	1	2	3	4	5	6	TOTAL
1	49	9	2				60
2	29	16	5	1			51
3	9	4	7	2	1	2	25
4	4	5	6	1			16
5		1	4	1	1	2	9
6			1				1
TOTAL	91	35	25	5	2	4	162

Panel 2

Cross-tabulation for segments reported in partial, informal segment reporting by the number of lines of business

	MDASEGS										
LOB	1	2	3	4	5	6	7	8	9	11	TOTAL
1	27	9	10	6	2	1	3	1	1		60
2	16	16	8	6	1	1	3				51
3	5	3	8	3	2	2	1			1	25
4	1	3	8	1	2	1					16
5		1	4	1	1	2					9
6			1								1
TOTAL	49	32	39	17	8	7	7	1	1	1	162

Legend:

LOB--Number of lines of business designated by the two-digit SIC code
FSSEGS--Number of segments reported in the formal, full segment reporting
MDASEGS--Number of segments reported in the informal, partial segment reporting

TABLE 6

Segment reporting by industry

Panel A

Mean, number of observations and standard deviations
for actual formal and informal segments reported and
formal and informal segment reporting levels by industry

Industry		LEVELI	LEVELII	FSSEGS	MDASEGS
FOOD	mean	.8750	1.9327	1.3077	2.9231
	n	26	26	26	26
	std dev	.4355	1.6139	.8376	2.1526
MACH	mean	.9167	1.6333	2.000	2.9333
	n	28	30	30	30
	std dev	.4530	1.0354	1.2865	1.6174
CHEM	mean	1.0074	2.1185	1.7407	3.1481
	n	27	27	27	27
	std dev	.5274	1.8806	1.1633	2.1609
TRAN	mean	.8993	1.2577	2.5926	3.5185
	n	27	27	27	27
	std dev	.3909	.8741	1.4212	2.2765
TEX	mean	.9133	1.2600	1.3600	1.9200
	n	25	25	25	25
	std dev	.4051	.8163	.6377	1.1874
ELEC	mean	.8062	1.1981	1.6667	2.4074
	n	27	27	27	27
	std dev	.3591	.7661	.8321	1.3661
ALL FIRMS	mean	.9031	1.5695	1.7901	2.8210
	n	160	162	162	162
	std dev	.4297	1.2701	1.1444	1.8846

Panel B

Results of ANOVA performed by industry
on formal and informal segments reported and formal
and informal segment reporting levels

ANOVA BY INDUSTRY					
Variable	df	ANOVA sum of squares	Mean square	F	Signif. Level
LEVELI	5	1.159	.232	.981	.431
LEVELII	5	32.200	6.440	2.997	.013
FSSEGS	5	29.862	5.972	5.147	.000
MDASEGS	5	41.589	8.318	2.447	.036

Legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
FSSEGS--number of segments reported in formal segment reporting
MDASEGS--number of segments reported in informal segment reporting

TABLE 7

Correlation of firm size and segment reporting levels

PANEL A

Pearson correlations, significance levels and number of observations for the segment reporting level variables, LEVELI and LEVELII, and firm size represented by total assets, TASSETS

	LEVELI	LEVELII	TASSETS
LEVELI	1.000 . 162		
LEVELII	.413 .000 162	1.000 . 162	
TASSETS	.296 .000 162	.124 .117 162	1.000 . 162

PANEL B

Pearson correlations, significance levels and number of observations for the segment reporting variables, LEVELI and LEVELII, and firm size, reprsented by total assets, TASSETS, after removal of two firms from the LEVELI pool

	LEVELI	LEVELII	TASSETS
LEVELI	1.000 . 160		
LEVELII	.418 .000 160	1.000 . 162	
TASSETS	.146 .066 160	.124 .117 162	1.000 . 162

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
TASSETS--Firm total assets

TABLE 8

Pearson correlations, significance level and number of observations for effects considered in hypotheses 1-7 across all sample firms

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 160							
LEVELII	.438 .000 160	1.000 . 162						
BONDS	.095 .231 160	.017 .833 162	1.000 . 162					
DEFBEN	.076 .341 160	.059 .458 162	.147 .061 162	1.000 . 162				
DIRSTK	-.250 .002 158	-.277 .000 160	-.206 .009 160	-.261 .001 160	1.000 . 160			
DIVINC	.076 .338 160	.124 .117 162	-.135 .087 162	.143 .069 162	-.247 .002 160	1.000 . 162		
EXCOMP	.069 .412 143	.272 .001 145	.081 .333 145	.188 .024 145	-.289 .000 145	.078 .351 145	1.000 . 145	
GROWTH	.037 .648 158	.118 .136 160	-.218 .006 160	-.320 .000 160	.182 .022 158	-.057 .477 160	.019 .825 143	1.000 . 160
PP&E	.060 .448 160	.032 .685 162	.014 .860 162	.087 .270 162	-.010 .901 160	.106 .181 162	-.076 .365 145	-.187 .018 160
PRVDBT	-.035 .660 160	-.040 .609 162	.081 .305 162	.065 .413 162	.049 .537 160	-.241 .002 162	-.003 .972 145	-.025 .753 160
R&D	-.052 .624 90	.177 .092 92	-.154 .143 92	-.200 .056 92	.047 .662 90	-.145 .168 92	.043 .707 80	.196 .063 91
STKREP	.004 .958 160	.123 .118 162	-.076 .339 162	-.122 .121 162	-.080 .315 160	.054 .497 162	.002 .981 145	-.072 .366 160

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 8 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 162			
PRVDBT	-.301 .000 162	1.000 . 162		
R&D	-.047 .660 92	-.049 .643 92	1.000 . 92	
STKREP	-.059 .456 162	-.153 .051 162	.080 .448 92	1.000 . 162

TABLE 9

Models estimated to explain the level of formal segment reporting across all sample firms

Dependent variable: LEVELI Hypothesized sign precedes variable name

	B_0	+BONDS	-DEFBEN	-DIRSTK	-DIVINC	+EXCOMP	+GROWTH
MODEL 1:							
B	1.097	-.518	-.120	-.595	.026	.124	.209
t	4.473	-1.075	-.831	-1.943	.247	.594	.436
sig.	.000	.286	.409	.056	.806	.554	.664
MODEL 2:							
B	.715	.057	.066	-.493	.064	-.014	.763
t	5.226	.158	.793	-2.476	.909	-.092	2.313
sig.	.000	.874	.429	.015	.365	.927	.022
MODEL 3:							
B	.857		.018	-.571	.032		.413
t	7.384		.230	-3.026	.459		1.273
sig.	.000		.818	.003	.647		.205
MODEL 4:							
B	.917	.368		-.527	.057		.390
t	12.446	1.047		-2.791	.810		1.253
sig.	.000	.297		.006	.419		.212
MODEL 5:							
B	.930			-.564		-.011	.592
t	13.691			-3.006		-.076	1.953
sig.	.000			.003		.939	.053

	+PP&E	-PRVDBT	+R&D	-STKREP	n	F	Adj. R^2
MODEL 1:							
B	.020	-.392	-.982	-.693	77	.792	-.025
t	.099	-.989	-.543	-.560			
sig.	.922	.326	.589	.577			
MODEL 2:							
B	.168			-.189	141	1.975	.053
t	1.374			-.188			
sig.	.172			.852			
MODEL 3:							
B	.128				156	2.533	.047
t	1.111						
sig.	.268						
MODEL 4:							
B					156	3.125	.052
t							
sig.							
MODEL 5:							
B					141	3.849	.058
t							
sig.							

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
BONDS--debt from public sources divided by total assets
DEFBEN--dummy variable denoting existence of a defined benefit pension plan
DIRSTK--percentage of outstanding stock owned or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over period 1991 to 1995
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from 1991 through 1995
PP&E--plant, property and equipment divided by total assets
PRVDBT--debt from private sources divided by total assets
R&D--research and development expense divided by total assets
STKREP--treasury stock expenditures divided by total assets

TABLE 10

Models estimated to explain the level of informal segment reporting across all firms

Dependent variable: LEVELII Hypothesized sign precedes variable name

	B_0	+BONDS	-DEFBEN	-DIRSTK	-DIVINC	+EXCOMP	+GROWTH
MODEL 1:							
B	.863	-.855	-.189	-1.915	.452	1.559	1.418
t	1.111	-.557	-.412	-1.970	1.342	2.340	.931
sig.	.270	.579	.682	.053	.184	.022	.355
MODEL 2:							
B	1.246			-1.519	.213	1.126	2.020
t	4.932			-2.483	.983	2.453	2.102
sig.	.000			.014	.327	.015	.037
MODEL 3:							
B	1.364			-1.663		1.125	2.029
t	6.133			-2.803		2.451	2.112
sig.	.000			.006		.016	.036
MODEL 4:							
B	1.051			-1.652		1.170	2.244
t	2.951			-2.787		2.542	2.293
sig.	.004			.006		.012	.023
MODEL 5:							
B	1.457			-1.736		1.107	
t	6.742			-2.917		2.398	
sig.	.000			.004		.018	

	+PP&E	-PRVDBT	+R&D	-STKREP	n	F	Adj. R^2
MODEL 1:							
B	.360	.262	7.561	4.688	79	2.678	.162
t	.569	.957	1.313	1.190			
sig.	.571	.340	.194	.238			
MODEL 2:							
B				4.954	143	5.178	.128
t				1.593			
sig.				.114			
MODEL 3:							
B				5.076	143	6.232	.128
t				1.634			
sig.				.105			
MODEL 4:							
B	.422			5.317	143	5.247	.130
t	1.122			1.709			
sig.	.264			.09			
MODEL 5:							
B					143	7.332	.118
t							
sig.							

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business

BONDS--debt from public sources divided by total assets

DEFBEN--dummy variable denoting existence of a defined benefit pension plan

DIRSTK--percentage of outstanding stock owned or controlled by officers and directors

DIVINC--dummy variable denoting increases in dividends per share over period 1991 to 1995

EXCOMP--percentage of executive compensation that is stock-based

GROWTH--percentage growth in sales from 1991 through 1995

PP&E--plant, property and equipment divided by total assets

PRVDBT--debt from private sources divided by total assets

R&D--research and development expense divided by total assets

STKREP--treasury stock expenditures divided by total assets

TABLE 8A

Pearson correlations, significance level and number of observations for effects considered in hypotheses 1-7 across all sample firms operating in more than one line of business

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.00 . 101							
LEVELII	.327 .001 101	1.00 . 102						
BONDS	.070 .488 101	-.007 .946 102	1.00 . 102					
DEFBEN	.228 .022 101	.247 .012 102	.157 .114 102	1.00 . 102				
DIRSTK	-.354 .000 100	-.330 .001 101	-.139 .165 101	-.379 .000 101	1.00 . 101			
DIVINC	.174 .082 101	.077 .441 102	-.119 .232 102	.204 .039 102	-.349 .000 101	1.00 . 102		
EXCOMP	.138 .195 90	.090 .399 91	.062 .557 91	.292 .005 91	-.314 .002 91	.155 .143 91	1.00 . 91	
GROWTH	-.151 .134 100	.023 .823 101	-.124 .217 101	-.345 .000 101	.084 .403 100	.062 .536 101	.068 .524 90	1.00 . 101
PP&E	.018 .862 101	.023 .821 102	-.018 .861 102	.119 .234 102	.028 .785 101	.089 .372 102	-.141 .181 91	-.171 .087 101
PRVDBT	.017 .869 101	-.052 .605 102	-.064 .520 102	-.033 .741 102	.069 .496 101	-.223 .024 102	-.002 .986 91	-.058 .562 101
R&D	-.049 .714 58	.204 .122 59	-.164 .214 59	-.053 .692 59	.065 .627 58	-.109 .412 59	.013 .928 51	-.066 .617 59
STKREP	-.022 .825 101	-.063 .527 102	-.047 .639 102	.012 .901 102	-.013 .896 101	-.022 .827 102	-.023 .828 91	-.061 .543 101

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 8A (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.00 . 102			
PRVDBT	-.317 .001 102	1.00 . 102		
R&D	.015 .909 59	-.068 .609 59	1.00 . 59	
STKREP	-.029 .774 102	-.087 .383 102	.033 .803 59	1.00 . 102

TABLE 9A

Models estimated to explain the level of formal segment reporting in multi-LOB firms

Dependent variable: LEVELI — Hypothesized sign precedes variable name

	B_0	+BONDS	-DEFBEN	-DIRSTK	-DIVINC	+EXCOMP	+GROWTH
MODEL 1:							
B	1.488	-.652	-.216	-.675	.133	.328	-2.198
t	3.855	-.1354	-1.204	-1.888	1.083	1.173	-2.687
sig.	.000	.183	.236	.067	.285	.248	.011
MODEL 2:							
B	1.321	-.783		-.657			-1.634
t	5.681	-1.831		-2.525			-2.803
sig.	.000	.073		.015			.007
MODEL 3:							
B	1.360	-.716		-.615			-1.524
t	6.739	-1.680		-2.398			-2.629
sig.	.000	.099		.020			.011
MODEL 4:							
B	.792		.100	-.603			
t	8.917		1.184	-3.030			
sig.	.000		.239	.003			
MODEL 5:							
B	.924			-.677			-.527
t	15.603			-3.547			-1.354
sig.	.000			.001			.179

	+PP&E	-PRVDBT	+R&D	-STKREP	n	F	Adj. R^2
MODEL 1:							
B	-.540	.194	-.696	-1.295	50	1.663	.119
t	-1.715	.389	-.364	-.768			
sig.	.094	.700	.718	.447			
MODEL 2:							
B	-.381	.265	-.886	-2.068	57	2.712	.176
t	-1.696	.803	-.550	-1.400			
sig.	.096	.426	.585	.168			
MODEL 3:							
B	-.357		-.961		57	3.226	.166
t	-1.584		-.594				
sig.	.119		.555				
MODEL 4:							
B					100	7.732	.120
t							
sig.							
MODEL 5:							
B					99	7.675	.120
t							
sig.							

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
BONDS--debt from public sources divided by total assets
DEFBEN--dummy variable denoting existence of a defined benefit pension plan
DIRSTK--percentage of outstanding stock owned or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over period 1991 to 1995
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from 1991 through 1995
PP&E--plant, property and equipment divided by total assets
PRVDBT--debt from private sources divided by total assets
R&D--research and development expense divided by total assets
STKREP--treasury stock expenditures divided by total assets

TABLE 10A

Models estimated to explain the level of informal segment reporting--multi-LOB firms

Dependent variable: LEVELII Hypothesized sign precedes variable name

	B_0	+BONDS	-DEFBEN	-DIRSTK	-DIVINC	+EXCOMP	+GROWTH
MODEL 1:							
B	.373	-.242	.502	-1.258	.267	.149	.661
t	.520	-.271	1.516	-1.927	1.188	.286	.450
sig.	.606	.788	.137	.061	.242	.776	.655
MODEL 2:							
B	.444		.423	-1.133	.277	.247	
t	1.146		1.547	-1.897	1.346	.511	
sig.	.258		.129	.064	.185	.612	
MODEL 3:							
B	1.177			-1.683			
t	7.504			-3.707			
sig.	.000			.000			
MODEL 4:							
B	.903		.208	-1.375	.126		
t	3.064		.915	-2.573	.673		
sig.	.003		.364	.013	.504		
MODEL 5:							
B	1.131		.245	-1.026			
t	6.587		1.499	-2.673			
sig.	.000		.137	.009			

	+PP&E	-PRVDBT	+R&D	-STKREP	n	F	Adj. R^2
MODEL 1:							
B	-.142	.278	9.142	-1.834	51	2.170	.190
t	-.249	.328	2.574	-.585			
sig.	.805	.745	.014	.562			
MODEL 2:							
B			9.157	-1.658	51	3.701	.245
t			2.807	-.552			
sig.			.007	.584			
MODEL 3:							
B			6.147		58	8.625	.211
t			2.111				
sig.			.039				
MODEL 4:							
B			6.458		58	4.56	.200
t			2.188				
sig.			.033				
MODEL 5:							
B					101	7.261	.111
t							
sig.							

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business

BONDS--debt from public sources divided by total assets

DEFBEN--dummy variable denoting existence of a defined benefit pension plan

DIRSTK--percentage of outstanding stock owned or controlled by officers and directors

DIVINC--dummy variable denoting increases in dividends per share over period 1991 to 1995

EXCOMP--percentage of executive compensation that is stock-based

GROWTH--percentage growth in sales from 1991 through 1995

PP&E--plant, property and equipment divided by total assets

PRVDBT--debt from private sources divided by total assets

R&D--research and development expense divided by total assets

STKREP--treasury stock expenditures divided by total assets

TABLE 11

Panel A

Firms reporting research and development expense by industry

	R&D Reporting		
Industry	yes	no	Total firms
FOOD	5	21	26
MACH	25	5	30
CHEM	23	5	28
TRANS	17	10	27
TEX	2	23	25
ELEC	20	6	26
TOTALS	92	70	162

Panel B

Variable means comparison for firms who reported R&D and firms who did not report R&D

Variable	Means--R&D reporting	Means--no R&D reporting	Difference	Significance
LEVELI	.933	.865	.068	.323
LEVELII	1.744	1.340	.404	.045
BONDS	.055	.049	.006	.697
DIRSTK	.155	.223	-.068	.025
EXCOMP	.308	.187	.120	.002
GROWTH	.101	.085	.016	.350
PP&E	.625	.682	-.057	.233
PRVDBT	.372	.469	-.097	.001
STKREP	.017	.010	.007	.189

Industry legend:
FOOD--food and kindred products manufacturing
MACH--machinery manufacturing
CHEM--chemicals and allied products manufacturing
TRAN--transportation equipment manufacturing
TEX--textile mill products manufacturing
ELEC--electrical and electronic machinery, equipment and supplies manufacturingTABLE 7

Variable legend:
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--debt from public sources divided by total assets
DEFBEN--dummy variable denoting existence of a defined benefit pension plan
DIRSTK--percentage of outstanding stock owned or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over period 1991 to 1995
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from 1991 through 1995
PP&E--plant, property and equipment divided by total assets
PRVDBT--debt from private sources divided by total assets
R&D--research and development expense divided by total assets
STKREP--treasury stock expenditures divided by total assets

TABLE 12

Pearson correlations, significance levels, and number of observations for effects considered in hypotheses 1-7 across sample firms within the food and kindred products industry

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTR	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 26							
LEVELII	.447 .022 26	1.000 . 26						
BONDS	.514 .007 26	.069 .738 26	1.000 . 26					
DEFBEN	.371 .062 26	.280 .166 26	.491 .011 26	1.000 . 26				
DIRSTR	-.494 .010 26	-.276 .173 26	-.466 .016 26	-.315 .117 26	1.000 . 26			
DIVINC	.211 .301 26	.121 .557 26	.226 .267 26	.187 .360 26	-.445 .023 26	1.000 . 26		
EXCOMP	.280 .184 24	.675 .000 24	.202 .345 24	.306 .147 24	-.330 .115 24	.251 .237 24	1.000 . 24	
GROWTH	-.102 .634 24	.018 .934 24	-.257 .225 24	.039 .856 24	.411 .046 24	-.183 .391 24	-.332 .131 22	1.000 . 24
PP&E	-.090 .663 26	-.119 .562 26	-.113 .583 26	-.205 .316 26	-.054 .794 26	.231 .257 26	-.199 .351 24	-.196 .359 24
PRVDBT	-.013 .949 26	.089 .667 26	-.042 .840 26	.083 .686 26	-.121 .555 26	-.401 .042 26	.091 .671 24	-.089 .677 24
R&D	. . 5	-.572 .314 5	-.584 .301 5	. . 5	.601 .283 5	-.643 -.241 5	-.696 .192 5	.805 .195 4
STKREP	.300 .137 26	.137 .505 26	.461 .018 26	-.018 .931 26	-.359 .072 26	.303 .132 26	.042 .829 24	-.162 .451 24

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 12 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 26			
PRVDBT	-.536 .005 26	1.000 . 26		
R&D	-.748 .146 5	-.086 .891 5	1.000 . 5	
STKREP	.149 .466 26	-.168 .413 26	-.319 .601 5	1.000 . 26

TABLE 13

Models estimated to explain the level of formal segment reporting across sample firms within the food and kindred products manufacturing industry

Dependent variable: LEVELI Hypothesized signs below variable names

	B_0	BONDS +	DIRSTK -	DEFBEN -	GROWTH +	DIVINC -	EXCOM +	n F	Adj R2
MODEL 1:									
B	.913	2.122	-.865	.023	.590	.021		24	.216
t	4.043	1.587	-1.728	.110	.746	.012		2.26	
sig.	.001	.130	.101	.913	.465	.991			
MODEL 2:									
B	.822	.833	-.950	.078	.893		.328	22	.195
t	4.336	.589	-2.189	.384	1.173		.889	2.01	
sig.	.001	.564	.044	.706	.258		.387		
MODEL 3:									
B	.927	2.191	-.877		.612			24	.294
t	6.093	1.953	-1.965		.844			4.19	
sig.	.000	.065	.063		.409				
MODEL 4:									
B	.929	2.077	-.638					26	.290
t	6.324	1.903	-1.707					6.11	
sig.	.000	.070	.101						
MODEL 5:									
B	.939		-.822	.214				26	.234
t	5.287		-2.270	1.295				4.82	
sig.	.000		.033	.208					

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the period 1991 through 1995
EXCOM--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995

TABLE 14

Models estimated to explain the level of informal segment reporting across firms within the food and kindred products manufacturing industry

Dependent variable: LEVELII Hypothesized signs below variable names

	B_0	DIRSTK -	DEFBEN -	EXCOMP +	n	F	Adj R2
MODEL 1:							
B	1.120	-.382		4.689	24	8.884	.407
t	2.114	-.303		3.869			
sig.	.047	.765		.001			
MODEL 2:							
B	.999			4.810	24	18.438	.431
t	2.921			4.294			
sig.	.008			.000			
MODEL 3:							
B	.886		.210	4.678	24	8.918	.408
t	1.881		.359	3.897			
sig.	.074		.723	.001			

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held by officers and directors
EXCOMP--percentage of executive compensation that is stock-based

TABLE 15

Pearson correlations, significance level and number of observations for effects considered in hypotheses 1-7 across sample firms within the machinery manufacturing industry

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 28							
LEVELII	.233 .232 28	1.000 . 30						
BONDS	-.137 .489 28	-.027 .886 30	1.000 . 30					
DEFBEN	.153 .437 28	-.141 .456 30	-.128 .501 30	1.000 . 30				
DIRSTK	-.220 .270 27	-.280 .141 29	-.251 .189 29	-.537 .003 29	1.000 . 29			
DIVINC	.000 1.000 28	.140 .461 30	-.026 .890 30	-.026 .891 30	-.072 .711 29	1.000 . 30		
EXCOMP	-.081 .702 25	.247 .214 27	.075 .711 27	.214 .284 27	-.408 .035 27	.480 .011 27	1.000 . 27	
GROWTH	-.248 .203 28	-.139 .463 30	-.149 .433 30	-.127 .505 30	.098 .613 29	.348 .059 30	.045 .825 27	1.000 . 30
PP&E	-.097 .622 28	-.138 .469 30	.167 .377 30	.075 .695 30	-.079 .685 29	-.005 .980 30	-.100 .621 27	-.120 .529 30
PRVDBT	.080 .688 28	.158 .403 30	-.284 .129 30	.114 .549 30	.133 .493 29	-.096 .614 30	.088 .663 27	.001 .995 30
R&D	-.417 .048 23	.325 .113 25	.140 .504 25	-.507 .010 25	.101 .639 24	-.081 .702 25	-.042 .852 22	.020 .926 25
STKREP	-.091 .646 28	.175 .355 30	.010 .958 30	-.132 .485 30	-.157 .416 29	-.208 .270 30	.000 .999 27	-.109 .567 30

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the existence of a defined benefit pension plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets

STKREP--amount expended to repurchase outstanding stock divided by total assets
TABLE 15 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 30			
PRVDBT	-.505 .004 30	1.000 . 30		
R&D	.033 .877 25	-.124 .554 25	1.000 . 25	
STKREP	.021 .913 30	-.021 .911 30	.050 .812 25	1.000 . 30

TABLE 16

Models estimated to explain the level of formal segment reporting across sample firms within the machinery manufacturing industry

Dependent variable: LEVELI Hypothesized signs below variable names

	B_0	GROWTH +	R&D +	DIRSTK -	PRVDBT -	PP&E +	n F	Adj R2
MODEL 1:								
B	1.367	-3.649	-5.388	-.200	.764	-.365	22	.270
t	2.857	-2.313	-1.689	-.327	1.371	-.779	2.55	
sig.	.011	.034	.111	.748	.189	.447		
MODEL 2:								
B	1.057	-3.423	-5.173	-.232	.946		22	.286
t	4.021	-2.233	-1.647	-.386	1.892		3.108	
sig.	.001	.039	.118	.705	.076			
MODEL 3:								
B	.888		-5.370	-.700	.779		22	.128
t	3.191		-1.548	-1.124	1.425		2.031	
sig.	.005		.139	.276	.171			
MODEL 4:								
B	1.274	-3.558	-7.225		.661		22	.255
t	4.491	-2.186	-2.093		1.195		3.513	
sig.	.000	.042	.050		.247			

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
DIRSTK--percentage of stock outstanding held by officers and directors
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets

TABLE 17

Models estimated to explain the level of informal segment reporting across sample firms within the machinery manufacturing industry

Dependent variable: LEVELII Hypothesized signs are below variable names

	B_0	DEFBEN -	DIVINC -	DIRSTK -	EXCOMP +	GROWTH +	R&D +	n F	Adj R2
MODEL 1:									
B	2.491	-.808	.658	-4.013	-.138	-2.935	11.237	22	.140
t	1.879	-.888	1.071	-1.740	-.075	-.634	.975	1.571	
sig.	.080	.389	.301	.102	.941	.535	.345		
MODEL 2:									
B	3.281	-1.262	.443	-3.522	.400	-4.841		27	.125
t	3.719	-1.940	.897	-1.998	.256	-1.292		1.744	
sig.	.001	.066	.380	.059	.800	.210			
MODEL 3:									
B	3.408	-1.296		-3.756		-2.615		29	.130
t	4.519	-2.063		-2.385		-.808		2.395	
sig.	.000	.050		.025		.427			
MODEL 4:									
B	3.150	-1.252		-3.803				29	.142
t	4.641	-2.014		-2.433				3.311	
sig.	.000	.054		.022					
MODEL 5:									
B	2.677	-.956		-4.410			10.222	24	.205
t	2.453	-1.173		-2.318			1.035	2.983	
sig.	.023	.255		.031			.313		

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the period 1991 through 1995
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
R&D--expenditure on research and development divided by total assets

TABLE 18

Pearson correlations, significance levels and number of observations for effects considered in hypotheses 1-7 across firms within the chemicals and allied products manufacturing industry

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 27							
LEVELII	.582 .001 27	1.000 . 27						
BONDS	.078 .700 27	.058 .774 27	1.000 . 27					
DEFBEN	.010 .960 27	-.061 .762 27	.349 .075 27	1.000 . 27				
DIRSTK	-.347 .083 26	-.456 .019 26	-.135 .512 26	-.402 .042 26	1.000 . 26			
DIVINC	.020 .923 27	.108 .591 27	.257 .195 27	.210 .294 27	-.381 .055 26	1.000 . 27		
EXCOMP	.245 .249 24	.397 .054 24	-.272 .199 24	-.205 .335 24	-.221 .300 24	-.215 .313 24	1.000 . 24	
GROWTH	.244 .220 27	.429 .025 27	-.195 .329 27	-.468 .014 27	-.108 .598 26	-.268 .177 27	.358 .086 24	1.000 . 27
PP&E	.156 .436 27	.072 .722 27	.101 .616 27	.464 .015 27	-.161 .432 26	.101 .618 27	-.192 .369 24	-.355 .069 27
PRVDBT	-.270 .173 27	-.304 .123 27	-.047 .816 27	.359 .066 27	.114 .578 26	-.207 .300 27	-.141 .510 24	-.151 .452 27
R&D	.106 .639 22	.198 .376 22	-.338 .124 22	-.438 .041 22	.387 .083 21	-.514 .014 22	.325 .163 20	.505 .017 22
STKREP	-.129 .520 27	.163 .417 27	-.177 .377 27	-.075 .708 27	-.083 .688 26	-.033 .871 27	.069 .748 24	-.100 .618 27

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 18 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 27			
PRVDBT	.028 .890 27	1.000 . 27		
R&D	-.244 .274 22	.180 .422 22	1.000 . 22	
STKREP	-.233 .242 27	.023 .910 27	.217 .333 22	1.000 . 27

TABLE 19

Models estimated to explain the level of formal segment reporting across sample firms within the chemicals and allied products manufacturing industry

Dependent variable: LEVELI Hypothesized signs are below variable names

	B_0	DIRSTK -	PRVDBT -	R&D +	GROWTH +	n	F	Adj R2
MODEL 1:								
B	1.336	-1.315	-1.074	5.200		21	2.661	.199
t	4.767	-2.231	-1.327	1.712				
sig.	.000	.039	.202	.105				
MODEL 2:								
B	1.359	-.842	-.716		.587	26	1.850	.093
t	5.053	-1.581	-1.097		.854			
sig.	.000	.128	.284		.402			
MODEL 3:								
B	1.457	-.884	-.793			26	2.439	.103
t	6.018	-1.678	-1.235					
sig.	.000	.107	.229					
MODEL 4:								
B	1.036	-1.403		4.715		21	2.984	.166
t	6.106	-2.348		1.531				
sig.	.000	.031		.143				

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
DIRSTK--percentage of stock outstanding held by officers and directors
GROWTH--percentage growth in sales from period 1991 through 1995
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets

TABLE 20

Models estimated to explain the level of informal segment reporting across sample firms within the chemicals and allied products manufacturing industry

Dependent variable: LEVELII Hypothesized signs are below variable names

	B_0	DIRSTK -	EXCOMP +	GROWTH +	PRVDBT -	DEFBEN -	n F	Adj R2
MODEL 1:								
B	3.298	-3.481	1.352	4.548	-3.719		24	.356
t	3.186	-1.852	.911	1.864	-1.531		4.185	
sig.	.005	.080	.374	.078	.142			
MODEL 2:								
B	3.252	-3.952		4.476	-2.525		26	.307
t	3.820	-2.345		2.059	-1.223		4.687	
sig.	.001	.028		.052	.234			
MODEL 3:								
B	2.420	-4.158		4.844			26	.292
t	4.681	-2.453		2.226			6.151	
sig.	.000	.022		.036				
MODEL 4:								
B	3.885	-5.618				-1.014	26	.201
t	4.906	-2.875				-1.338	4.153	
sig.	.000	.009				.194		

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held by officers and directors
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PRVDBT--total liabilities provided by private sources divided by total assets

TABLE 21

Pearson correlations, significance levels and number of observations for effects considered in hypotheses 1-7 across sample firms within the transportation equipment manufacturing industry

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 27							
LEVELII	.513 .006 27	1.000 . 27						
BONDS	-.183 .360 27	-.055 .787 27	1.000 . 27					
DEFBEN	.019 .925 27	-.017 .935 27	.290 .143 27	1.000 . 27				
DIRSTK	-.005 .979 27	-.217 .278 27	-.140 .485 27	-.376 .053 27	1.000 . 27			
DIVINC	.208 .297 27	.157 .435 27	-.325 .098 27	.105 .603 27	-.414 .032 27	1.000 . 27		
EXCOMP	-.053 .806 24	.151 .483 24	.283 .180 24	.447 .028 24	-.561 .004 24	.193 .365 24	1.000 . 24	
GROWTH	.352 .072 27	.399 .039 27	-.410 -.034 27	-.538 .004 27	.353 .071 27	.186 .353 27	-.334 .110 24	1.000 . 27
PP&E	-.332 .091 27	-.336 .087 27	-.028 .890 27	.024 .905 27	.234 .241 27	-.139 .490 27	-.158 .462 24	-.207 .301 27
PRVDBT	.008 .969 27	.218 .276 27	.085 .672 27	-.007 .822 27	-.045 .822 27	-.125 .534 27	.304 .148 24	.203 .309 27
R&D	.280 .276 17	.680 .003 17	-.180 .489 17	-.049 .851 17	-.375 .138 17	.449 .071 17	.441 .115 14	.291 .258 17
STKREP	-.199 .318 27	-.229 .250 27	-.185 .354 27	.013 .950 27	-.019 .925 27	.225 .258 27	.220 .302 24	-.097 .631 27

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the presence of a defined benefit plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 21 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 27			
PRVDBT	-.040 .844 27	1.000 . 27		
R&D	-.024 .927 17	.177 .497 17	1.000 . 17	
STKREP	.029 .886 27	-.361 .065 27	-.068 .796 17	1.000 . 27

TABLE 22

Models estimated to explain the level of formal segment reporting
across sample firms within the transportation equipment manufacturing industry

Dependent variable: LEVELI Hypothesized signs below variable names

	B_0	GROWTH +	PP&E +	DEFBEN -	R&D +	n	F	Adj R2
MODEL 1:								
B	1.395	.237	-.900	-.068	5.083	17	2.721	.301
t	3.504	.237	2.549	.254	1.049			
sig.	.004	.817	.025	.804	.315			
MODEL 2:								
B	1.378		-.925		5.672	17	5.818	.376
t	6.085		3.103		1.342			
sig.	.000		.008		.201			
MODEL 3:								
B	.572	1.548		.238		27	2.719	.117
t	3.130	2.330		1.340				
sig.	.005	.029		.193				
MODEL 4:								
B	.840	1.344	-.355	.214		27	2.454	.144
t	3.104	1.999	1.324	1.214				
sig.	.005	.058	.199	.237				

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
DEFBEN--dummy variable denoting existence of a defined benefit pension plan
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
R&D--expenditures on research and development divided by total assets

TABLE 23

Models estimated to explain the level of informal segment reporting across sample firms within the transportation equipment manufacturing industry

Dependent variable: LEVELII — Hypothesized signs below variable names

	B_0	GROWTH +	R&D +	PP&E +	DEFBEN -	n	F	Adj R2
MODEL 1:								
B	1.043	2.108	26.691	-1.055		17	11.506	.663
t	2.697	2.145	3.780	-2.132				
sig.	.018	.051	.002	.053				
MODEL 2:								
B	.944	2.356	26.280	-1.012	.088	17	8.006	.637
t	1.512	1.505	3.459	-1.829	.209			
sig.	.156	.158	.005	.092	.838			
MODEL 3:								
B	1.551	2.341		-.849		27	3.253	.162
t	3.402	1.876		-1.441				
sig.	.002	.073		.163				

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business
DEFBEN--dummy variable denoting the presence of a defined benefit plan
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
R&D--expenditures on research and development divided by total assets

TABLE 24

Pearson correlations, significance levels and number of observations
for effects considered in hypotheses 1-7 across firms
within the textile mill products manufacturing industry

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 25							
LEVELII	.440 .028 25	1.000 . 25						
BONDS	.560 .004 25	.545 .005 25	1.000 . 25					
DEFBEN	.199 .340 25	.129 .538 25	.173 .409 25	1.000 . 25				
DIRSTK	-.099 .637 25	-.271 .190 25	-.378 .063 25	.134 .524 25	1.000 . 25			
DIVINC	.078 .711 25	-.151 .470 25	-.346 .090 25	.035 .868 25	.392 .053 25	1.000 . 25		
EXCOMP	-.174 .438 22	.058 .798 22	-.057 .802 22	.378 .083 22	-.159 .480 22	-.044 .845 22	1.000 . 22	
GROWTH	-.299 .147 25	-.119 .570 25	-.391 .053 25	-.348 .089 25	.165 .431 25	.122 .563 25	-.201 .370 22	1.000 . 25
PP&E	.471 .017 25	.340 .097 25	.204 .328 25	.143 .496 25	.111 .598 25	.298 .149 25	.058 .797 22	-.095 .653 25
PRVDBT	.132 .528 25	-.064 .762 25	.380 .061 25	.112 .593 25	.002 .991 25	-.232 .265 25	-.102 .651 22	-.243 .242 25
R&D	. . 2	. . 2	. . 2	. . 2	. . 2	. . 2	. . 1	. . 2
STKREP	-.028 .896 25	-.201 .336 25	-.236 .255 25	-.377 .063 25	-.087 .678 25	.251 .227 25	-.169 .452 22	.194 .352 25

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the existence of a defined benefit pension plan
DIRSTK--percentage of stock outstanding held by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 24 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 25			
PRVDBT	-.376 .064 25	1.000 . 25		
R&D	. . 2	. . 2	. . 2	
STKREP	-.363 .075 25	-.249 .230 25	. . 2	1.000 . 25

TABLE 25

Models estimated to explain the level of formal segment reporting across sample firms within the textile mill products industry

Dependent variable: LEVELI Hypothesized signs below variable names

	B_0	BONDS +	DEFBEN -	GROWTH +	PP&E +	DIVINC -	n F	Adj R2
MODEL 1:								
B	.446	1.460	.035	-.401	.562		25	.346
t	1.985	2.460	.245	-.390	2.160		4.172	
sig.	.061	.023	.809	.700	.043			
MODEL 2:								
B	.420	1.574			.571		25	.396
t	2.440	2.988			2.300		8.881	
sig.	.023	.007			.031			
MODEL 3:								
B	.422	1.826				.155	25	.396
t	2.451	3.118				.987	6.239	
sig.	.023	.005				.335		

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the existence of a defined benefit pension plan
DIVINC--dummy variable denoting increases in dividends per share over the period 1991 through 1995
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets

TABLE 26

Models estimated to explain the level of informal segment reporting across sample firms within the textile mill products industry

Dependent variable: LEVELII Hypothesized signs below variable names

	B_0	BONDS +	PP&E +	DIVINC -	n F	Adj R2
MODEL 1:						
B	.530	3.067	.817	-.117	25	.263
t	1.385	2.351	1.353	-.334	3.854	
sig.	.181	.029	.190	.741		
MODEL 2:						
B	.532	3.255	.736		25	.293
t	1.418	2.832	1.359		5.966	
sig.	.170	.010	.188			
MODEL 3:						
B	.992	3.574			25	.267
t	6.044	3.119			9.728	
sig.	.000	.005				

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DIVINC--dummy variable denoting increases in dividends per share over the sample period
PP&E--plant, property and equipment, at cost, divided by total assets

TABLE 27

Pearson correlations, significance levels and number of observations
for effects considered in hypotheses 1-7 across sample firms
within the electrical and electronic machinery, equipment and supplies industry

	LEVELI	LEVELII	BONDS	DEFBEN	DIRSTK	DIVINC	EXCOMP	GROWTH
LEVELI	1.000 . 27							
LEVELII	.286 .149 27	1.000 . 27						
BONDS	-.127 .527 27	-.267 .179 27	1.000 . 27					
DEFBEN	-.315 .110 27	.117 .562 27	-.253 .202 27	1.000 . 27				
DIRSTK	-.296 .134 27	-.365 .061 27	-.094 .641 27	-.041 .839 27	1.000 . 27			
DIVINC	-.138 .493 27	.244 .219 27	-.275 .165 27	.287 .147 27	-.362 .064 27	1.000 . 27		
EXCOMP	.083 .701 24	.038 .860 24	-.048 .824 24	-.029 .894 24	-.019 .931 24	-.138 .522 24	1.000 . 24	
GROWTH	-.127 .529 27	-.322 .101 27	.210 .293 27	-.382 .049 27	.267 .179 27	-.267 .179 27	.401 .052 24	1.000 . 27
PP&E	.161 .423 27	.245 .219 27	-.125 .534 27	.200 .316 27	-.202 .312 27	.112 .576 27	.190 .374 24	-.028 .891 27
PRVDBT	-.090 .656 27	-.249 .210 27	-.060 .766 27	-.209 .295 27	.252 .205 27	-.401 .038 27	.036 .869 24	.431 .025 27
R&D	-.074 .751 21	.088 .704 21	.091 .695 21	.101 .664 21	-.430 .052 21	.188 .414 21	.063 .803 18	-.421 .057 21
STKREP	.185 .355 27	-.125 .535 27	.009 .965 27	-.163 .416 27	.072 .719 27	-.178 .375 27	-.248 .243 24	-.209 .296 27

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the exostence of a defined benefit pension plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase stock outstanding divided by total assets

TABLE 27 (continued)

	PP&E	PRVDBT	R&D	STKREP
LEVELI				
LEVELII				
BONDS				
DEFBEN				
DIRSTK				
DIVINC				
EXCOMP				
GROWTH				
PP&E	1.000 . 27			
PRVDBT	-.281 .155 27	1.000 . 27		
R&D	.183 .427 21	-.081 .726 21	1.000 . 21	
STKREP	-.030 .883 27	-.395 .042 27	-.219 .339 21	1.000 . 27

TABLE 28

Models estimated to explain the level of formal segment reporting across sample firms within the electrical and electronic machinery, equipment and supplies manufacturing industry

Dependent variable: LEVELI Hypothesized signs below variable names

	B_0	DEFBEN -	DIRSTK -	GROWTH +	R&D +	n F	Adj R2
MODEL 1:							
B	1.189	-.304	-.450	-.735		27	.130
t	7.044	-2.051	-1.344	-1.040		2.300	
sig.	.000	.052	.192	.309			
MODEL 2:							
B	1.613	-.408	-.383	-1.892	-4.151	21	.229
t	5.898	-2.303	-.889	-2.137	-1.481	2.482	
sig.	.000	.035	.387	.048	.158		
MODEL 3:							
B	1.555	-.434		-2.148	-3.406	21	.238
t	5.891	-2.502		-2.581	-1.281	3.083	
sig.	.000	.023		.019	.217		
MODEL 4:							
B	1.140	-.318		-.993		27	.101
t	6.803	-2.112		-1.436		2.463	
sig.	.000	.045		.164			

Variable legend:

LEVELI--segments reported in formal segment reporting divided by lines of business
DEFBEN--dummy variable denoting the existence of a defined benefit pension plan
DIRSTK--percentage of stock outstanding held by officers and directors
GROWTH--percentage growth in sales from period 1991 through 1995
R&D--expenditures on research and development divided by total assets

TABLE 29

Models estimated to explain the level of informal segment reporting across sample firms within the electrical and electronic machinery, equipment and supplies manufacturing industry

Dependent variable: LEVELII Hypothesized signs below variable names

	B_0	GROWTH +	BONDS +	DIRSTK -	DEFBEN -	n F	Adj R2
MODEL 1:							
B	1.736	-1.289	-2.491	-1.290		27	.154
t	7.185	-.912	-1.402	-1.811		2.583	
sig.	.000	.371	.174	.083			
MODEL 2:							
B	1.790	-1.387	-2.553	-1.284	-.060	27	.117
t	4.681	-.902	-1.383	-1.764	-.185	1.864	
sig.	.000	.377	.180	.092	.855		
MODEL 3:							
B	1.642	-1.775		-1.131		27	.120
t	6.935	-1.269		-1.577		2.779	
sig.	.000	.217		.128			
MODEL 4:							
B	1.472			-1.373		27	.099
t	7.449			-1.963		3.853	
sig.	.000			.061			

Variable legend:

LEVELII--segments reported in informal segment reporting divided by lines of business
BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the existence of a defined benefit pension plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
GROWTH--percentage growth in sales from period 1991 through 1995

TABLE 30

Summary of effects found to have a significant association with the level of segment reporting by industry and for all sample firms denoted by X. Correct signs but not significantly associated denoted by *.

FORMAL SEGMENT REPORTING										
	BONDS	DEF BEN	DIR STK	DIV INC	EXC OMP	GRO WTH	PP&E	PRV DBT	R&D	STK REP
FOOD	X*		X*		*	*		*		
MACH			*			X		X	X	*
CHEM	*		X*		*	*	*	*	*	*
TRAN		*	*			X*	X		*	*
TEX	X*		*				X*			*
ELEC		X*	*	*	*	X	*	*		
ALL	*		X*		*	X*	*	*		

INFORMAL SEGMENT REPORTING										
	BONDS	DEF BEN	DIR STK	DIV INC	EXC OMP	GRO WTH	PP&E	PRV DBT	R&D	STK REP
FOOD	*		*		X*	*				
MACH		X*	X*		*				*	
CHEM	*	*	X*		*	X*	*	*	*	
TRAN		*	*		*	X*	X		X*	*
TEX	X*		*	*	*		X*	*		*
ELEC		*	*		*		*	*	*	*
ALL	*		X*		X*	X*	*	*	*	

Variable legend:

BONDS--amount of debt from public sources divided by total assets
DEFBEN--dummy variable denoting the existence of a defined benefit pension plan
DIRSTK--percentage of stock outstanding held or controlled by officers and directors
DIVINC--dummy variable denoting increases in dividends per share over the sample period
EXCOMP--percentage of executive compensation that is stock-based
GROWTH--percentage growth in sales from period 1991 through 1995
PP&E--plant, property and equipment, at cost, divided by total assets
PRVDBT--total liabilities provided by private sources divided by total assets
R&D--expenditures on research and development divided by total assets
STKREP--amount expended to repurchase outstanding stock divided by total assets

Industry legend:

FOOD--food and kindred products manufacturing
MACH--machinery manufacturing
CHEM--chemicals and allied products manufacturing
TRAN--transportation equipment manufacturing
TEX--textile mill products manufacturing
ELEC--electrical and electronic machinery, equipment and supplies manufacturing