SFAS 14'S GEOGRAPHIC SEGMENT DISCLOSURES AND THE ABILITY OF SECURITY ANALYSTS TO FORECAST EARNINGS

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CHAPTER I

INTRODUCTION TO THE STUDY

In the present global economy, many companies are diversified, both geographically and by line of business (LOB). One question that arises with respect to multi-segment firms (LOB and multinational) is whether segmental disclosure should be required of these firms. The agencies that regulate U.S. accounting practices have answered this question in the affirmative by adopting standards that require multi-segment companies to disclose segment information. In August of 1969 the Security and Exchange Commission required LOB segment disclosure of revenue and earnings. Then in December of 1976 the Financial Accounting Standard Board (FASB) released Statement of Financial Accounting Standards No. 14 (SFAS 14), "Financial Reporting for Segments of a Business Enterprise," which required LOB segment, geographic segment, and major customer segment disclosure of revenues, earnings, and assets.

Several research studies have investigated the impact of the SEC's mandated LOB disclosures. The findings, while not unanimous, indicate that these disclosures are useful. However, very little research has investigated the usefulness of mandated geographic segment disclosures specifically. The purpose of this study is to test

empirically the usefulness of the geographic segment disclosure required by SFAS #14.

Disaggregation Theory

SFAS 14 is concerned with the disaggregation of financial information (see Appendix A for a detailed description of SFAS 14 disclosure requirements), where consolidated financial statements constitute information in the aggregate. The notion of providing disaggregated information is not new. Theorists such as Demski, Sorter, and Ijiri have addressed this issue at various times.

Demski (1977) addressed disaggregation using a fineness lemma to prove the "Impossibility Theorem," which states that no set of qualitative standards exists that, when applied to accounting alternatives, will always rank accounting alternatives consistent with individual preferences and beliefs. The fineness lemma states that information system n is as fine as n' if every signal from n is fully contained in a signal from n'. Accordingly, one information system can be preferred to another as long as it is finer than the other (Demski, 1977). The disaggregated information set required by SFAS 14 can be viewed as information set n' which contains all the information contained in consolidated statements (n) and more. Thus, in terms of the fineness lemma, the disaggregated information should be preferred a priori to the aggregated statements alone, absent consideration of information production costs and the usefulness of the additional data.

Sorter (1969) advocated disaggregation in development of an "events theory," which in part states that the financial statements should provide information about relevant economic events that might be useful in a variety of possible decision models. Sorter proposed that the users rather than the accountant should aggregate and assign weights and values to the data consistent with their own particular models of earnings and utility functions. Assuming that the establishment of operations in foreign countries by the U.S is one type of "relevant economic event," then multinational companies should report the results of their foreign operations by geographic area because this would allow the user the opportunity to aggregate the information as he or she sees fit. According to Sorter, the loss of information by aggregation and valuation by the accountant is greater than the associated benefit. In other words, less rather than more aggregation is appropriate.

Financial statements provide information about conditions, trends, and ratios that assist in predicting cash flows. In addition, part of an analysis of financial statements includes comparing information about one enterprise with information about other enterprises on an industry-wide basis, and with national or international economic information in general. Consistent with Sorter's ideas concerning "economic events," it was the opinion of the FASB that such comparisons help in determining whether the operations of a given enterprise may be expected to move

with, against, or independently of the business trends in its industry and in the economy within which it operates.

The absence of disaggregate information by industry or geographic location complicates the analysis of conditions, trends, and ratios and therefore weakens the ability to predict. According to the FASB this is due to the various industry segments or geographic regions of operations which may have different rates of profitability, degrees and types of risk, and opportunities for growth. In addition, companies may have different rates of return on the investment commitments in the various industry segments or geographic areas and differences in their future capital demands. Thus, disaggregation of consolidated financial statement data by industry and geographic location should be helpful to users. In other words, segment data provided by SFAS 14 should be useful to those who analyze the uncertainties surrounding the timing and amount of expected cash flows by making it possible to analyze separately the risks which relate to the investment in or a loan to an enterprise that operates in different industries or in different areas of the world.

Ijiri (1967) also favors disaggregation. He states that any aggregation involves loss of information, referencing in particular consolidated statements, which he considers to be less informative than the constituent companies' statements. This is because the consolidated value is composed of many different components. Thus, the

revenue, earnings, and assets that are in consolidated statements can be derived from the combining of a complete set of segment reports; however, the revenue, earnings, and assets of an individual segment can only be obtained from segmental reporting. Thus, consolidated reporting is less informative than segmental reporting. Similarly, the revenue, earnings, and assets that are in geographically aggregated statements can be derived from combining a complete set of geographic segment reports, but the revenue, earnings, and assets of individual geographic areas can only be obtained from geographically segmented statements. Ijiri's theories on disaggregation suggest that, because of possibly marginal information content, geographically segmented data are potentially useful for performance evaluation and forecasting purposes. This hypothesized marginal information content was, in fact, one reason the FASB stated for instituting SFAS 14. The reasons the FASB gave for requiring disaggregation of data (by industry, foreign operation, and customer) were to aid the evaluation of risk and return and to improve comparability among firms.

Evaluation of risk and return is a central element of investment and lending decisions. According to the FASB, expected cash flows, which have an impact on risk and return, may be affected by the industry in which a firm operates, the international economic and political climate, and the economic and political climate of a geographic region. Investors or lenders who acquire equity or extend

credit would benefit (find the financial information more useful) from the disaggregation of total enterprise financial information if the disaggregated information helps in predicting future cash flows.

Purpose and Significance of the Study

The explicit expectations of SFAS 14 are consistent with general disaggregation theory, which suggests that, because of possible additional information content, geographically segmented data is potentially useful for performance evaluation and forecasting. The primary purpose of this study was to test empirically the usefulness of separate disclosure of the results of foreign operations segmented by geographic area. One empirical manifestation of usefulness can be the observable impact of additional information on the ability of financial analysts to predict firms' future earnings. Accordingly, the specific purpose of this research was to determine if financial analysts' forecasts improved for multinational companies as a result of the geographic segment disclosures required by SFAS 14.

The significance of this study lies in providing a simultaneous test of the validity of both SFAS 14-specific and general disaggregation theory, in the real-world context of financial statement use. Being sophisticated users, analysts can be expected to fully exploit information content imbedded in the geographical segment data. If

analysts use the geographic segment data mandated by SFAS 14, then one would expect their forecasts of earnings to improve with the initial reporting of this data.

This study tested the validity of SFAS 14 by determining if financial analysts' forecasts improved for multinational companies as a result of the geographic segment disclosures required by SFAS 14. There are basically two states of nature that can be observed in the present study. Evidence of marginal information content might be found. Such a finding is significant because it validates the purpose of SFAS 14: to assist users in analyzing a firm's financial statements. On the other hand, if such information content is not revealed, then the additional costs imposed upon firms through the additional disclosure requirements may not be justified, at least as regards these requirements in their present form. Such an outcome could obtain, of course, if the theoretical value of disaggregated data was simply not realizable in this particular setting. A more remote possibility is that disaggregation theory itself is intrinsically flawed, though the empirical studies reviewed in the next section support disaggregation theory in general, and specifically as it is manifest in SFAS 14. A more likely possibility is that the disclosure requirements as presently drawn may simply have failed to assure useful disaggregated data. If this is the case, the standard might have to be more stringent in terms

of detailed prescription with regard to the fineness of disaggregation or the construction of geographical segments, in order to assure information content for forecasting and other uses. Thus either possible outcome of the study, evidence of marginal information content or no evidence of marginal information content is significant.

Principal Hypotheses and Methodological Approach

Disaggregation theory states, in part, that incremental information is obtained in analyzing the parts that make a whole. SFAS 14 is concerned with providing disaggregated financial information by industry and geographic area. The objective of this study is to empirically test the usefulness of the geographic segment disclosures mandated by SFAS 14 by determining if financial analysts' forecasts improved for multinational companies as a result of the geographic segment disclosures required by SFAS 14.

The prediction circumstances controlled for in the current study are described in the following model;

$$FA = f(\ e,\ \ LOB,\ \ GEC,\ \ GEO)$$

where e = change in earnings variability, hence in earnings predictability, due to the incidence of SFAS 8 in particular.

LOB = change in level of disclosure of operations by line of business coincidental with the advent of SFAS 14.

GEC = change in the general economic and informational aspects of the temporal setting of prediction, and hence the possible earnings predictability.

GEO = change in level of disclosure of operations by geographic segment occasioned by the incidence of SFAS 14, i.e. the phenomenon of interest; however, pre-test disclosure prior to SFAS 14 is also possible.

The treatment firms in this study were U.S. companies that had operations in at least one foreign region but did not disclose geographic segment data prior to SFAS 14 (MNC/ngd). Two general types of control firms were used in this study. One type was U.S. companies with foreign operations in at least one foreign region that voluntarily disclosed geographic segment data prior to SFAS 14 (MNC/pgd). The other type of control firm was domestic companies without foreign operations that were unaffected by SFAS 14's mandated disclosure of geographic segment data (DOM). Treatment firms were matched with control firms from the first group above to control for general changes in prediction circumstances affecting all firms. That is, if a difference is found in comparing the changes in forecast accuracy then the difference cannot be attributed to the effects of the changes in general prediction circumstances, because the treatment firms (MNC/ngd) were matched to control firms (DOM). Treatment firms were also matched with relevant control firms from the second group to control for general changes in prediction circumstances affecting only multinational firms. As before, if a difference is found in

comparing changes in forecast accuracy then the difference cannot be attributed to the effects of the prediction circumstances affecting only MNC firms, because the treatment firms (MNC/ngd) were matched to control firms (DOM).

The principle means to control for extraneous sources of variation in forecast accuracy was classification of sample firms by type and the matching of types of firms for testing purposes.

As previously mentioned, the purpose of this study was to determine if financial analysts' forecasts of earnings for treatment firms significantly improved as a result of SFAS 14's geographic segment disclosures as compared to that of the control firms. The hypothesis was tested in order to determine if analysts' earnings forecasts for treatment firms (MNC/ngd) improved as compared to forecasts for control firms, (MNC/pgd and DOM), as a result of the reporting of SFAS 14's geographic segment data.

The expectation was that the results of the statistical tests would allow one to reject the null hypothesis of no difference in change in accuracy between treatment and control firms, thus allowing the conclusion that the new geographic segment data for treatment firms enabled analysts to make more accurate forecasts. This hypothesis was also tested allowing for a one-year and two-year period for companies to learn how to prepare and disclose the new geographic data and for users to learn how to use the new

data. The expectation was that the results of the statistical tests would again allow one to reject the null hypothesis of no difference and conclude that forecasts would continue to improve as a result of SFAS 14.

The statistical method used was a paired t-test. The t-test was used to compare change in mean adjusted forecast accuracy between treatment firms (MNC/ngd) and control firms (MNC/pgd and DOM).

Organization of the Study

A review of related research is presented in Chapter II. The methodology outlined above used is described in detail in Chapter III. The results of hypotheses testing are presented in Chapter IV. The results are summarized in Chapter V.

CHAPTER II

PRIOR RESEARCH

The research that was reviewed included studies that investigated the impact of line-of-business (LOB) and geographic (GEO) segment data on security prices (Kochanek, 1974; Collins, 1975; Horwitz and Kolodny, 1977; Collins and Simonds, 1979; Prodhan, 1986; and Prodhan and Harris, 1989), model-sourced earnings forecasts (Kinney, 1971; Collins, 1976; and Roberts, 1989) and analysts' earnings forecasts (Baldwin, 1984; Sayers, 1985; and Barefield, Comiskey and Snyir, 1979). Prior research was reviewed in order to condition and support the hypothesis of improvement in analysts' forecasts associated with the advent of GEO disclosures tested in the current study. In addition, prior research was reviewed to identify possible sample firms and methodological approaches.

Studies assessing the impact of LOB disclosures are relevant to this study because of the similarity between the disclosures required by the SEC and by the FASB in SFAS 14. That is, because of the similarity in the disclosure requirements, conclusions drawn and methodological choices made in studies assessing the impact of SEC's LOB segment

disclosures are pertinent to the current study. The SEC in 1969 required certain diversified firms to disclose LOB segment sales and LOB earnings data on 10-K reports. However, the SEC did not require the disclosure of identifiable assets. More specifically, the SEC required disclosure from companies with total sales and revenues of at least $50 million if at least 10% could be attributed to any LOB (industry) beginning with fiscal years ending on or after December 31, 1970. Firms with sales and revenues less than $50 million were required to disclose if at least 15% could be attributed to any LOB. In addition, the SEC required the disclosure of LOB sales and earnings for each of the five prior years, or for each fiscal year ending after December 31, 1966.

Studies Assessing the Impact of LOB Segment Data on Security Prices

Prior studies have assessed the impact of LOB disclosures on security price variability (Kochanek, 1974), market efficiency (Collins, 1975), systematic risk (market beta) (Horwitz and Kolodny, 1977; and Collins and Simonds, 1979) and unexpected returns (Horwitz and Kolodny, 1977; and Swaminathan, 1991). These studies support disaggregation theory, which in turn provides a basis for expecting geographic disclosures to improve analysts' ability to forecast earnings.

Studies performed assessing the impact of LOB disclosures on security price variability began with Kochanek (1974). His purpose was to examine security market reactions to accounting information for diversified firms which adopted LOB segmental financial disclosure practices. The hypotheses Kochanek (1974, p. 246) tested were that:

> Financial reports for diversified firms disclosing segment data reduce the uncertainty of investors to such a degree that (1) investors with segment data are better able to predict future earnings changes of the firm and (2) security price fluctuations of the firm are dampened.

Kochanek's empirical results supported the above hypotheses, thus strengthening the expectation that LOB segment data did provide a useful source of information to investors, at least in the predictions of security prices.

Collins (1975) tested the efficiency of the market with respect to non-public sub-entity data. The non-public data which Collins used was the LOB segment earnings data from 1967-1969. In 1970 the SEC required LOB segment data for the current year and for previous years as well (1967-1969). The SEC, by requiring prior LOB segment data, made previously private information public. Previous research had shown that segment-based earnings forecast models are superior to consolidated based earnings forecasts (Kinney, 1971). Using segment-based earnings forecast models, Collins hypothesized that an investor could have earned abnormal returns with the previously non-public, segment-based data.

The empirical results indicated that hypothetical investors with the non-public information could have better anticipated changes in earnings (creating abnormal returns) than they could have without the non-public information. This study, like Kochanek (1974), provided some evidence of the usefulness of LOB segment data in the evaluation of a firm's stock.

The purpose of Horwitz and Kolodny (1977) was to determine whether or not the systematic risk (beta) of firms changed significantly when the previously undisclosed information (LOB data) became public after December 31, 1970. A greater shift in beta was expected for firms disclosing LOB segments than for non-disclosing firms, given the newly available information changed the perceived riskiness of disclosing firms. They indicated that this change in beta might occur if the LOB data indicated that a company's growth potential was more (less) attributable to the overall economy than previously expected. The results of the empirical tests indicated that changes in systematic risk were no different for firms which disclosed LOB segment revenues and earnings than for firms which were not affected by the SEC-mandated disclosures.

Horwitz and Kolodny also attempted to measure the unexpected returns that were realized on the securities of LOB segment disclosing firms. The basis for this part of their study was that LOB segment data could lead to a

revaluation of securities at the time of disclosure. Using the market model, the specific hypothesis tested was that if the disclosure affected security prices, the absolute value of the residuals (from the market model) would be greater, in the months surrounding disclosure, for disclosing firms than for nondisclosing firms. Additionally, if investors systematically interpreted the data as good news (bad news), the values of the residuals would be positive (negative). The results indicated no apparent differences in the residuals for disclosing or nondisclosing firms.

Horwitz and Kolodny explained that their results may have been caused by the information having been obtained from sources other than financial reports (SEC 10-Ks), and thus the LOB segment data could have already been impounded in market prices. One possible scenario for how early LOB segment data could have been made available was that, once management of a diversified company thought the SEC's LOB segment data were going to be required, managers released the information early. Collins and Simonds (1979) indicated that it was this early disclosure of LOB segment data by the treatment firms that biased Horwitz and Kolodny against finding any significant shift in market beta. Another explanation for Horwitz and Kolodny's results was that they used signed, risk-adjusted returns, which assumes that the segment data had either a consistently positive or consistently negative impact on security prices. According

to Swaminathan (1991), if the LOB segment data had both positive and negative impact on security prices, the signed, risk-adjusted returns were likely to cancel each other out across firms, thus potentially resulting in insignificant results. Finally, Horwitz and Kolodny did not identify the exact date when the LOB data were released; instead, they computed the residuals over a long period before and after the mandated disclosures were released. This also could explain the lack of significant results, assuming that the impact on security prices occurs on (or closely around) the exact date of release.

Collins and Simonds (1979) examined the effect of SEC LOB disclosure requirements had on an investor's assessment of the riskiness of a multi-segment firm. To accomplish this, Collins and Simonds attempted to detect a shift in market beta. They expected that multi-segment firms would be less risky after reporting the LOB data, since there would be less uncertainty surrounding the firm. They therefore expected a general downward shift in beta. Collins and Simonds did find an indication of a negative portfolio-level shift occurring at or about the time of the passage of LOB regulations. The methodology used to detect a shift in beta was the analysis-of-covariance (Chow) test. This study, unlike Horwitz and Kolodny's, provided evidence of the usefulness of LOB data to investors in assessing the riskiness of firms diversified in more than one line of business.

In a final study, Swaminathan (1991) used the market model to investigate the impact of line-of-business segment disclosures on security prices. Swaminathan computed squared return residuals on the exact dates on which the 10-k reports were released. The results indicated a significant increase in price variability for treatment firms.

In addition, Swaminathan investigated the impact of the SEC line-of-business disclosures on the divergence of beliefs of financial analysts' forecasts of earnings. Utilizing a minimum of three financial analysts' forecasts of earnings, Swaminathan found for treatment firms (but not for control firms) a lower divergence among analysts' forecasts of earnings.

These studies, with the exception of the research by Horwitz and Kolodny, provide evidence of the usefulness of segment data to investors. This support for the use of LOB segment data supports disaggregation theory in general, thus conditioning the expectations for the current study.

Studies Assessing the Impact of GEO Segment Data on Security Prices

Only two studies, Prodhan (1986) and Prodhan and Harris (1989), have assessed the impact of geographic segment data on security price variability. These studies are relevant because they support not only disaggregation theory, but

also the use of geographic segment data in particular. The first empirical research specifically assessing the impact of geographical segment disclosures on security prices was conducted in the U.K. by Prodhan (1986). Specifically, Prodhan (1986) investigated whether moving betas (systematic risk) differed between firms which disclosed geographical segment data before and after December 31, 1977, and firms which only disclosed geographical segment data after December 31, 1977. The results indicated that systematic risk and geographical segment disclosures were associated, in that a shift in beta was found to be associated with firms that disclosed segmental data. This research was done under U.K. disclosure requirements which differ from those of SFAS 14 in that, in the U.K., "there is both greater flexibility in the application of regulations governing geographic disclosures as well as reduced scope in terms of the amount of information to be disclosed" (Gray and Radebaugh, 1984, p. 354).

Tests were first performed on two groups of firms, one group of 15 firms that disclosed geographical data prior to and after December 31, 1977 (control) and one group of 21 firms that only disclosed geographical data after December 31, 1977 (treatment). These tests investigated whether the betas for individual companies were stable. Stability was determined by computing the slope of moving regression betas. If the slope remained constant over time then the

betas were assumed to be stable. The results of this test indicated that 25 of the 36 firms had unstable betas (16 of 21 (76%) from the treatment group and 9 of 15 (60%) from the control group). Utilizing a Kolmogorov-Smirnov two-sample test, Prodhan concluded that the treatment group was significantly different from the control group in terms of the frequency of unstable betas.

Next, Prodhan investigated differences in average betas for the treatment and control groups before and after the change in disclosure practice. The results indicated that in the predisclosure period, the average betas for the treatment firms were significantly different from those of the control firms. In the postdisclosure period, no significant differences in average betas were found between the treatment and control groups for any of the subgroups. These results constitute additional evidence that after December 31, 1977, the perceived riskiness of the treatment group and the control groups changed (became more similar).

Finally, Prodhan and Harris (1989) investigated the impact of geographic disclosures on market beta (systematic risk) for U.S. multinational companies. Utilizing 40 treatment firms and 42 multinational control firms, the general hypothesis tested was that if geographic segment disclosures contained information, then firms first disclosing geographic segment data (treatment firms) would show a reduction of systematic risk as compared to firms

that had consistently disclosed geographic segment data (control firms). Using a methodology similar to Prodhan (1986), Prodhan and Harris analyzed betas over three time periods in order to determine if a change occurred. The results indicated that, for the U.S. multinational treatment companies, predisclosure betas were higher than postdisclosure betas, consistent with the proposition that SFAS 14 geographic disclosures do contain information which affects market risk assessments.

These studies, Prodhan (1986) and Prodhan and Harris (1989), are important to the current study because they provided evidence of the usefulness of geographic segment data. In addition, their sample was utilized as a source of sample firms for the current study.

Studies Assessing the Impact LOB Segment Data on Model-Sourced Forecasts

Prior research investigated whether LOB-segment-based earnings forecast models were more accurate in predicting earnings than models based on aggregate earnings (e.g. Kinney, 1971; and Collins, 1976). These studies found that the LOB segment-based-forecast models were generally more accurate than the total-earnings-based models. These studies use methodologies involving mathematical forecasting models rather than analysts' forecasts (as in the current study), but they do support the use of segment data.

The first research assessing the impact of LOB segment data on earnings prediction models was performed by Kinney (1971). He tested the hypothesis that LOB-segment-based earnings prediction models would result in better earnings predictions than aggregate-earnings-based prediction models. The aggregated earnings models consisted of one model based on previous years' actual earnings multiplied by Business and Defense Services Administration's predicted increase in Gross National Product. Another consolidated-earnings-based model predicted earnings using double exponential smoothing to estimate a linear trend in consolidated earnings.

The first step in creating the LOB Segment-based models consisted of identifying the LOB segments from data disclosed in annual reports. The U.S. Industry Outlook was then used to estimate the predicted change for each of a company's LOB segments. The LOB segments were then added together to predict a company's consolidated earnings. The results indicated that predictions using segment earnings were generally more accurate than predictions based on aggregate earnings. A limitation of Kinney's study was that only firms which voluntarily disclosed LOB data were used. This could have resulted in self-selection bias. Something unique about firms which did or did not voluntarily disclose segment data prior to 1970 could have been the reason for the improved earnings predictions.

An extension of Kinney's study was performed by Collins (1976). Collins' study, unlike Kinney's, used firms which

did not voluntarily disclose LOB segment revenue or earnings prior to 1970. The 94 firms were randomly selected from firms which disclosed LOB segment data as required by the SEC. Collins also used five additional consolidated-earnings-based prediction models which were supported by previous research (Beaver, 1970; Ball and Watts, 1972): a linear regression model, a pure random walk model, a random walk model with drift, a pure mean reversion model, a moving average model of a pure mean reverting process model, a double exponential smoothing model, and a GNP model. The results were consistent with Kinney's earlier findings: predictions using segment earnings were generally more accurate than predictions based on aggregate earnings.

Studies Assessing the Impact of Geographic Segment Data on Model-Sourced Forecasts

Prior research has also investigated whether geographic segment-based earnings forecast models were more accurate in predicting earnings than models based on aggregate earnings (i.e., Roberts, 1989; and Balakrishnan, Harris and Sen, 1990). These studies provide evidence supporting the usefulness of not just segment data, but also geographic segment data.

Roberts (1989) investigated whether geographic segment-based earnings forecast models were more accurate in predicting sales and earnings than models based on aggregated data only. Four different segment-based models

were utilized. Model 1 utilized the expected real change in GNP of a geographic segment in predicting sales or earnings for a future period. Model 2, adjusting only the UK segment forecast for the expected UK inflation, utilized the expected real change in GNP of a geographic segment in predicting sales or earnings for a future period. Model 3 utilized the expected real change in GNP of a geographic segment in predicting sales or earnings for a future period, after adjusting the forecasts for all geographic segments for the expected UK inflation. Finally, Model 4 utilized the expected real change in GNP of a geographic segment in predicting sales or earnings for a future period, after adjusting all geographic segment forecasts for the expected inflation in each geographic area. The consolidated models used were the random walk model and a percentage change model, which was a random walk model with a trend component. The trend component was the average change over the previous four-year period. Forecast error was measured by taking the difference between actual and expected earnings (sales) and dividing by forecast earnings (sales). The absolute value of forecast error and the squared value were used as the measurements of prediction error. Comparison between forecasts from models utilizing consolidated data and forecasts from models utilizing segmented data was made using a t-test. The results, while not conclusive, did support the hypothesis that segment based models were more accurate than aggregate earnings based models.

Finally, Balakrishnan, Harris, and Sen (1990), using U.S. companies, investigated if geographic-segment-based earnings forecast models were more accurate in predicting sales and earnings then models based only on aggregate data. Two prediction models were used, a random walk and a nominal gross national product (NGNP) model. For the NGNP aggregate models, the NGNP of the U.S. was used as a proxy for growth. For the segmented forecasts, a region-specific NGNP growth factor was used in addition to the expected rate of change in the exchange rate for each region. Two sample periods were used: one sample period included the effective date of SFAS 52 (the standard applicable to foreign currency translation) and a second period which used only post-SFAS 52 data. Two sample periods were used because of the expectation that SFAS 52 reduced the variability of earnings, thus improving the accuracy of total earnings forecasts. The results of the study provided evidence that using geographic segment data improved the accuracy of model-sourced earnings and sales forecasts relative to aggregate data based models. In addition, it was found that SFAS 52 only marginally improved the predictive ability of aggregate data.

Studies assessing the impact of LOB or geographic segment data on the accuracy of model-sourced forecasts indicated model-based forecasts using disaggregate data were superior to model-based forecasts using aggregate data.

This is significant not only from the aspect of providing support for the use of geographic segment data in general, but also that it supports the use of geographic segment data specifically in model-based forecasts of earnings. Evidence regarding analysts' forecasts, the subject of the present study, is considered in the next section.

Studies Assessing the Impact of LOB and SFAS 14's Disclosures on Analysts' Forecast of Earnings

Several studies have assessed the impact of the SEC LOB and SFAS 14 mandated disclosures on analysts' forecasts of earnings (i.e., Barefield, Comiskey and Snyir, 1979; and Baldwin, 1984). Beyond providing evidence regarding the value of disaggregated data, dealing with analyst forecasts, these studies also have methodological implications for the current study. These implications are discussed in detail in Chapter III.

Barefield, Comiskey and Snyir (1979) wanted to determine if using SEC LOB disclosures (industry segment and profit) allowed financial analysts to improve their forecasts. Research by Kinney (1971) and Collins (1976) indicated that the disclosure of LOB segment revenue improved accuracy of mechanical forecasting procedures while the addition of LOB segment profits did not. According to Barefield et al., those studies were based on a small set of simple forecasting procedures and the usefulness of LOB

segment data needed to be further investigated using analysts' forecasts. Thus the following hypotheses were tested:

1. The presence of segment revenue in the analysts' data set does result in improved forecasts of earnings per share.

2. The presence of segment profit in the analysts' data set does result in improved forecasts of earnings per share.

Kruskal-Wallis and median tests (non-parametric) were used to test these hypotheses since the distribution of forecast errors was highly skewed from normal. The results of the tests provided no evidence to support the hypothesis that LOB mandated disclosures of segment revenues or sales improved analysts' forecasts of earnings.

Barefield et al. indicated that companies which should have benefitted from LOB segment disclosure might already have done so; therefore, there would have been no improvement in accuracy or consensus. The informational benefits would have been derived from other multiproduct companies which voluntarily disclosed LOB segment data.

Another reason Barefield et al. gave for lack of support for the mandated disclosures is that analysts might have developed their own data for the companies which did not voluntarily disclose LOB revenue and earnings data. Finally, Barefield's lack of support for the mandated disclosures may have been caused by the data not being useful to analysts because of their lack of knowledge about companies' cost allocation procedures and transfer pricing

policies and/or a lack of consistency between companies on LOB segment definitions.

Baldwin (1984) also sought evidence of the use of SEC LOB data in business reporting by forecasters. The purpose of Baldwin's study was to determine if LOB segment data enabled analysts to better predict earnings per share. Baldwin used multivariate analysis of variance (MANOVA) with repeated measures on forecast accuracy (FA) as the dependent variable (absolute value of the forecasted earnings per share less actual earnings per share divided by actual earnings per share). The repeated measures design has the following general form: subjects are measured with respect to some behavior (FA); an experimental intervention is carried out e.g. (SEC mandated LOB segment disclosures); and then each subject is measured again with respect to the same behavior (Bock, 1975). According to Baldwin, the repeated measures design is an extension of the paired t-test and if only two periods of data were studied, in the absence of any control variables, the repeated measures test and the paired t-test would be identical.

The main factor in the sampling design was firm type with three levels which included:

multisegment, no prior earnings disclosure treatment firms;

multisegment, prior earnings disclosure control firms; and

single segment control firms.

The following model was used:

$$FA = FT + RM + Y + FT*RM + FT*Y$$

where FA = Forecast Accuracy,
FT = Firm Type,
RM = Reporting Method, and
Y = Year of Forecast.

Each firm type was analyzed as to source of variation (reporting method and year). The "reporting method" had two levels (aggregated and segmented). The "year" factor had four levels (1969, 1970, 1972, and 1973), and was included to control for general economic conditions. In the multivariate approach to repeated measures, the variables of interest (reporting method, firm type, and year) are created by the use of contrasts (or matrices) from the repeated measure (forecast accuracy). Using the repeated measurements, Baldwin created his differences of interest in the following manner,

Y1 = FA69,
Y2 = FA70,
Y3 = FA72, and
Y4 = FA73.

From these four variables, the following variables of interest were created:

Firm Type Main Effect = FA69 + FA70 + FA72 FA73,

Reporting Method Main Effect = (FA69 + FA70) - (FA72 + FA73), and

Year Main Effect = FA69 - FA70, FA72 - FA73.

A problem exists with Baldwin's methodology. The "year" factor was nested within levels of "reporting method" (the variable of interest). The result of having a nested variable in a model is that it is not possible to disentangle the interaction effect of these two variables (year and reporting method) (Neter, Wasserman, and Kutner, 1990). The results indicated the factors FT, RM and Year were significant (p-value less than .10), thus Baldwin concluded that LOB segment data improved analysts' ability to forecast earnings. However, interaction existed between the variable "firm type" and "reporting method." This interaction suggests that the factors "firm type" and "reporting method" are not independent of each other. Therefore with the nested variable and interaction, interpreting the effect of the individual factors (FT, RM and Year) is difficult if not impossible.

Few studies have tested the usefulness of SFAS 14 disclosures. Sayers (1985) investigated their impact on security analysts forecasts. The specific hypothesis tested was that analysts' forecast accuracy for firms that previously did not disclose segment data should be more accurate in the two-year period after SFAS 14 was implemented than in a two-year period before it was implemented. This study, however, did not really assess the impact of geographic segment data per se on analysts' forecasts of earnings, because Sayer's research design did not differentiate between those firms diversified by LOB and

those diversified by geographic regions. Sayer's 44 treatment firms were firms that before SFAS 14 did not disclose segment data, but after SFAS 14 disclosed either LOB segment data, geographic segment data or both LOB and geographic segment data. Sayers' measure of forecast accuracy was the same as used by Baldwin.

Sayers used multiple regression in order to analyze changes in forecast accuracy during the test period. For the treatment group Sayer used the following model,

FA = RM + GNP,

where FA = Forecast Accuracy,
RM = Reporting Method, (multi-segment or singl segment), and
GNP = Gross National Product.

For the control group Sayer used the following model,

FA = RM + GNP + I,

where I = Industry Effect (dummy variable).

Sayers' 52 control firms were all either banks or utility companies; thus dummy variables UTIL and BANK were added.

The variable GNP was included in the model as a proxy for general economic conditions. According to Sayers, earnings are more difficult to predict during times of recession than during stable economic times; therefore economic conditions can be a factor in forecasting earnings.

Where Baldwin used the year of the forecast as a proxy for economic conditions, Sayers used gross national product (GNP). According to Sayers, GNP was the best available measure of overall economic condition.

Sayers concluded that there was an association between improved forecasts and the disclosure of SFAS 14 data. However, Sayers' study revealed a high correlation (.89) between the independent variables Reporting Method and GNP. The correlation implies that a change in value of Reporting Method is associated with an increase in GNP and according to Neter, Wasserman, and Kutner (1990, p. 300), ". . . the simple interpretation of the regression coefficients as measuring marginal effects is often unwarranted with highly correlated independent variables."

Implication of Prior Research

Prior research has provided some evidence to support disaggregation theory. Specifically, segment prediction models (both LOB and geographic) have outperformed consolidated or aggregate models (Kinney, 1971; Collins, 1976; and Roberts, 1989). Additionally, prior studies of the impact of segment disclosures on security price variability have found, in some instances, an association between systematic risk and the disclosure of segment data, implying that segment disclosures contain some information content (Kochanek, 1974; Collins, 1975; Collins and Simonds, 1979; Prodhan, 1986; and Prodhan and Harris, 1989).

Finally, while the results are mixed, some evidence has been found to indicate the possibility that analysts' ability to forecast earnings improved as a result of segment data (Baldwin, 1984; and Sayers, 1985). Thus disaggregation theory and prior research on segment disclosures, lead to the expectation that analysts' ability to forecast earnings improved as a result of geographic segment disclosures.

In addition to conditioning the expectations of the current research, possible sample firms were determined from Prodhan and Harris (1989) and Sayers (1985). Finally, studies by Baldwin (1984) and Sayers (1985) identified methodological choices to be made. Both Sayers and Baldwin controlled for general economic conditions and made reporting method (segmented or consolidated) their variable of interest. While Sayers controlled for the effect of a firms industry on the ability of analysts' to forecast earnings by use of dummy variables. Baldwin allowed the sample firms to be their own control for not only the effect of industry on the ability of analysts' to forecast earnings but also for the effect of the age and size of the firm, and the variability of earnings as well. The next section describes the methodology used in the current study.

CHAPTER III

METHODOLOGY

The research question is whether the geographic segment information required by SFAS 14 improved analysts' earnings forecasts for multinational firms. The answer to this question invokes a number of methodological issues of measurement and control regarding the empirical tractability of the "improve" construct, and of attributing "improvement" to SFAS 14 geographical disclosures. The purpose of this chapter is to report how these issues were dealt with and the testable hypotheses and tests which resulted.

Measurement

Sample Forecasts and Earnings Measures

Sample forecasts were obtained from only one forecast service in order to reduce the impact of different forecasters. Use of the same forecasting service does not assure that the same forecaster will make the earnings forecast for each year for each firm. However, it is more likely that forecasters in the same service will employ similar methods to forecast earnings each year for each

firm, therefore reducing the chance of differences in forecasts caused by using different forecasting techniques. The forecaster used in Sayers' study was Investment Brokers Estimate System (IBES). Where Baldwin used Value Line Investment Survey, Sayers used IBES because they publish a consensus as opposed to a single forecast (like Value Line) which may not represent the consensus. Sayers cites support for using a consensus forecast from current literature. The problem with using IBES over Value Line was that IBES only reported forecasts for 586 firms compared to over 1600 by Value Line.

The forecast service used in this study was Value Line. This service was used because it covers more firms in the years of interest than the other frequently used service, Investment Brokers Estimate System (IBES), and more importantly IBES was not readily available for the early years of the current study. Value Line Investment Survey reports actual and forecasted earnings per share on a regular basis (every 13 weeks) for 1600 firms in 1976, compared to only 586 firms on IBES. Although Value Line is published weekly, the forecasts are not updated every week. Only 1/13th of the 1600 companies (approximately 130) are updated each week, but each company is updated once each quarter; thus the time from an analyst's forecast to fiscal year end (futurity) is different across firms. Because the forecast is revised for each company the same week of each

quarter, the futurity will be the same for each company across time.

The last Value Line issue for each quarter was used in order to insure that all companies had an updated forecast relative to the quarter and fiscal year end. Value Line's forecasts of annual primary earnings per share before extraordinary items and discontinued operations were made with a futurity of approximately six months. In addition, the earnings numbers have been adjusted for stock splits and stock dividends.

Compustat was used to access actual earnings per share for the sample firms because of availability and it reports the same earning per share (EPS) figure that is forecasted by Value Line Investment survey (primary EPS before extraordinary items and discontinued operations).

Measurement of Forecast Accuracy

Measurement of the forecast accuracy (FA) of any analyst's forecast for any firm i with respect to any earnings period t may take on two general relative (%) forms to be additive across firms and samples as follows (excluding subscripts):

$$FA = \frac{F - A}{A} \quad \text{and} \quad FA = \frac{F - A}{F}$$

where FA = forecast accuracy,
F = forecasted earnings per share, and
A = actual earnings per share.

These error measures may be used as is in signed terms, but more typically are employed either in absolute terms or squared terms (valuing large errors more highly) which avoids the cancellation of opposite signed errors in aggregate computations. Dividing the forecast error (F - A) by either actual or forecast earnings results in a relative percentage measurement which is then additive across firms and samples. Problems remain with both approaches however. Using forecasted earnings as a base is theoretically unappealing, measuring the extent reality failed to match expectations rather than the extent to which the predictor failed to predict reality. Using actual earnings as a base can result in methodological shortcomings in the form of extreme error values or "outliers" (herein defined as error measures in excess of 100%) when actual earnings are at or near zero. This problem can be mitigated somewhat by repeating tests after dropping outliers.

In this study, the measure of forecast accuracy used was absolute percentage error of actual earnings per share, as follows:

$$FA = \left| \frac{F - A}{A} \right| .$$

Previous studies have also used absolute percentage error (Baldwin, 1984; and Sayers, 1985). The division by actual error instead of forecast error was used because it measures the ability of analysts to forecast actual earnings

per share instead of how well actual results matched predictions. In addition the tests were performed both before and after dropping "outliers," where an outlier was defined as an error exceeding 100%.

Test Metric

This study examined differences in mean accuracy for absolute percentage error between treatment and control firms. The measurement of change in mean accuracy had the following form:

$$CMA = \frac{\sum_{i=1}^{n} (FA_i - FA_i)}{n}$$

where CMA = change in mean accuracy around the implementation of SFAS 14,
FA = Forecast accuracy for a sample firm i prior to SFAS 14,
FA' = Forecast accuracy for the same sample firm i after SFAS 14, and
n = number of sample firms.

In other words, CMA measured the change in mean accuracy for absolute percentage forecast error over two test periods for each firm. The test periods in the study will be the years surrounding SFAS 14's implementation.

Controls

Sources of Variation in the Analysts' Forecasts of Earnings

Attribution of change in accuracy in analysts' forecasts requires either controls or direct measurement or both of sources of variation other than geographic segment disclosures. Albrecht, Johnson, Lookabill and Watson (1977) identify generally the factors that may affect forecast accuracy by way of the model

$$FA = f(a,A,S,D,I,T,Y,Z),$$

where
- a = earnings variability,
- A = corporation's age,
- S = corporation's size,
- D = detail of information,
- I = corporation's industry,
- T = lead time of forecast to date of earnings announcement,
- Y = calendar year of the forecast or general economic conditions, and
- Z = the forecaster.

As previously stated, factors T and Z were held constant by way of the particular forecasts selected. Using the same sample firms during the periods over which change in accuracy is assessed can control for, that is effectively hold constant, the size (S), industry (I) and age (A) variables, as these can in general be expected not to change significantly over reasonably short periods. Thus potentially substantive control problems with respect to attributing change in accuracy to geographic disclosure may

arise in particular with changes in earnings variability (a), changes in the general economic setting of earnings prediction (Y) and changes in detail of information other than geographic disclosure levels (D).

In the particular context of this study, the partial yet finer model below more directly reveals the substantive control attribution problems confronted:

$$FA = f(e, LOB, GEC, GEO),$$

where e = change in earnings variability, hence in earnings predictability,[1] due to the incidence of SFAS 8 in particular,

LOB = change in level of disclosure of operations by line of business coincidental with the advent of SFAS 14,

GEC = change in the general economic and informational aspects of the temporal setting of prediction, and hence the possible earnings predictability, and

GEO = change in level of disclosure of operations by geographic segment occasioned by the incidence of SFAS 14, i.e. the phenomena of interest; however, pre-test disclosure prior to SFAS 14 is also possible.

Controls were also sought regarding three of the four previously mentioned phenomena, change in earnings variability, change in level of disclosure of operations by line of business coincidental with the advent of SFAS 14, and change in the general economic conditions. The fourth phenomenon, change in level of disclosure of operations by

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[1] SFAS 8 became effective for periods beginning after January 1, 1976, changing the translation reporting regime materially in pre-test/post-test sense. SFAS 8 was widely reported to increase the variability of firms' earnings (Rupp, 1982; and Griffin and Castanias, 1987).

geographic segment, is the variable of interest. The principle means by which this study controlled for extraneous sources of variation in forecast accuracy was classification of sample firms by type and the matching of types of firms for testing purposes.

Sample Firms and Study Periods

Data collection began with selecting firms for the sample and classifying the firms as to type (see the following section). It would be difficult to forecast earnings for firms less than five years old because of the lack of historical data. Although Baldwin (1984) or Sayers (1985) specifically addressed the age factor, in this study only firms which had been in existence for at least five years as of the effective date of SFAS 14 were included.

Annual reports and 10-k reports for four years (1976, 1977, 1978 and 1979) were analyzed in order to select and classify firms by type. These years represent the years before (1976 and 1977) and after (1978 and 1979) SFAS 14 was actually implemented by companies. Annual reports and 10-k reports were located for 409 firms.

In addition, companies with fiscal year-ends not between October 31 and December 31 were excluded from the study. Limiting fiscal year-ends to a three month period ensured that the general economic conditions were similar for all firms when the forecasts were made. Collecting sample sizes of not fewer than 20 per firm type was intended to accommodate the statistical tests.

Several sources were used to identify treatment firms. One source consisted of sample firms from previous studies: Sayers (1985), Prodhan and Harris (1989) and Baldwin (1984).

Sayers' sample consisted of 96 firms, 44 treatment firms and 52 control firms. Treatment firms were those that reported as a single segment firm prior to SFAS 14 but reported segment (LOB and geographic) revenues, profits, and other segment data for the first time after SFAS 14 became effective. The 52 control firms reported as a single segment firm both before and after SFAS 14 became effective. Prodhan and Harris' sample consisted of 82 firms, 40 treatment and 42 control. Treatment firms were those which disclosed LOB data continuously from 1968-1983, started disclosing geographic sales and profits in December 1977, and continued disclosing geographic data through 1983. Control firms were those which consistently disclosed both LOB data and geographic data from 1968 through 1983. Baldwin's sample consisted of 108 firms, 54 treatment and 54 control firms. The treatment firms consisted of 54 companies that reported line-of-business sales and earnings after 1970. The control group reported only consolidated information before and after 1970.

Another source of sample firms was an April 18, 1986 Business Week article which listed the 150 largest international firms ranked according to foreign sales. The final source of potential sample firms was a list of 353

firms paying more than $10,000 in foreign taxes in 1977, generated from the Compustat data base.

An initial sample of LOB diversified firms was identified from the treatment sample firms from Baldwin (1984). Additional firms were identified from the control sample firms in Prodhan and Harris (1989). Single segment firms were identified from the sample control firms in studies by Sayers (1985) and Baldwin (1984). These potential sample firms were then identified as to their respective firm type.

When the sample selection process was completed, of the original 409 firms for which 10-k and annual reports were located, 35 were eliminated because they were not listed on Compustat, 84 were eliminated because actual EPS was not available for the entire test period (1974-1981), and 46 were eliminated because forecasted EPS was not available in Value Line. Of the remaining 244 sample firms, 39 multinational companies were eliminated because they were not diversified in more than one specifically identified geographic region. The sample firms, their four-digit SIC code and industry are listed in Appendix B.

Types of Sample Firms

The primary focus of this study was to determine whether the geographic segment information required by FASB #14 made it possible for financial analysts to improve their

earnings forecasts for multinational companies. In constructing a methodology for answering this question, nine relevant types of firms were considered in data gathering. However, due to insufficient sample sizes only four groupings of the nine types of firms were ultimately considered (see Table I). Six of these nine firm types related to multinational companies.

First there were multinational companies (MNCs) not diversified in terms of lines of business. These will be denoted as MNC/NLB firms. Moreover, firms were further distinguished as to those that did not disclose geographic data (sales, profit and assets by geographic area) until mandated to do so by SFAS 14 (MNC/NLB/ngd), and those that did so prior to SFAS 14 (MNC/NLB/pgd). Second, there were firms that were diversified by more than one line-of-business and by more than one geographic area (MNC/LOB). Of the MNC/LOB firms that did disclose LOB as mandated by the SEC, some did not disclose subentity geographic data until mandated to do so by SFAS 14 (MNC/LOB/ngd/plb), while others voluntarily disclosed geographic data prior to SFAS 14 (MNC/LOB/pgd/plb). With respect to multinational companies, it would be possible to have a set of MNC/LOB companies which did not disclose LOB data prior to SFAS 14 (MNC/LOB/pgd/nlb and MNC/LOB/ngd/nlb).

The remaining three types of firms were those with only domestic operations (DOM). Here companies that were diversified by industry only can be denoted as either firms

which disclosed subentity data prior to SFAS 14 or those which did not (DOM/LOB/plb and DOM/LOB/nlb). The final type was a firm which was not diversified by industry (DOM/NLB).

As stated previously, a treatment firm by definition is a MNC with no prior geographic segment disclosure. A firm was classified as a MNC if it reported segment data (sales, operating profit and assets as a minimum for each geographic segment) for two or more geographic areas. In the case of a firm which only reported segment data for two segments, the non-U.S. segment had to be a geographic area as opposed to a non-specific geographic area such as "other." A firm was classified as an MNC/ngd if an MNC reported segment data for 1977 and 1978 but did not report segment data for 1975 and 1976. A firm was classified as a MNC/pgd if the MNC reported segment data for all four years. A firm was classified as an LOB if it reported segment data for two or more lines of business. In the case of a firm's reporting segment data for only two segments, both segments had to be specific industries, where a specific industry segment, as defined by FASB, was a component of a company engaged in providing a product or service or a group of related products and services to unaffiliated customers for profit.

A firm was classified as an LOB/nlb if an LOB diversified firm reported segment data for 1977 and 1978 but did not report segment data for 1975 and 1976. A firm was classified as a LOB/plb if the MNC reported segment data for all four years. A firm was classified as a single segment

firm (DOM/NLB) if it did not disclose sales, operating profit, or assets by geographic area or line-of-business for the years 1976, 1977, 1978, and 1979.

Table I presents the initial sample sizes by type discussed above realized through data gathering procedures described in the previous section.

TABLE I

INITIAL SAMPLE SIZES BY TYPE

	# of Firms
TREATMENT FIRMS	
MNC/ngd	
1. MNC/NLB/ngd	15
2. MNC/LOB/ngd/plb	65
3. MNC/LOB/ngd/nlb	19
Total of MNC/ngd Treatment Firms -	99
CONTROL FIRMS	
Dom	
4. DOM/NLB	25
5. DOM/LOB/plb	50
6. DOM/LOB/nlb	9
Total of DOM Control Firms -	84
MNC/pgd	
7. MNC/NLB/pgd	2
8. MNC.LOB/pgd/plb	16
9. MNC/LOB/pgd/nlb	3
Total of MNC/pgd Control Firms -	21
Total Number of CONTROL Firms -	105
Total Number of Sample Firms -	204

Of the initial nine firm types, firms (types 3, 6 and 9) that were diversified by LOB but previously did not disclose LOB segment data were excluded from the study. These firms were excluded because the sample sizes, (15, 9 and 3, respectively) were too small to effectively separate the effect of the previously undisclosed LOB data prior to SFAS 14 from the effect that previously undisclosed geographic segment data had on the accuracy of analysts' forecasts.

The remaining sample firms represented by six firm types were combined to create three logical groupings of the firms. These combinations were necessary because of insufficient firm size in all but two of the initial nine types of firms (types 2 and 5). The first logical grouping (types 1 and 2) consisted of multinational companies that previously did not disclose geographic data (MNC/ngd). The next grouping of firm types (types 7 and 8) were multinational companies that previously disclosed geographic segment data (MNC/pgd). The final grouping of firm types (types 4 and 5) were domestic companies that were either not diversified by LOB or if they were, previously disclosed the LOB segment data prior to SFAS 14 (DOM). Therefore, the following five groups of firm types were created from the initial nine firm type(s):

Treatment firms
MNC/LOB/ngd/plb (type 2)
MNC/ngd (types 1 & 2)

Control firms
DOM/LOB/plb (type 2)
DOM (types 4 & 5)
MNC/pgd (types 7 & 8).

Control for the effect of general economic conditions by the use of firm types. According to Sayers (1985), earnings may be more difficult to predict during times of recession than during stable economic times, and economic conditions could therefore be a factor in forecasting earnings. Two controls were used regarding the effect of changes in general economic conditions on comparisons of change in forecast accuracy between treatment and control firms, comparing mean forecast error by firm type and matching firms on industry.

This study is concerned with the effect of geographic segment disclosures; thus, treatment firms by definition were MNC with no prior geographical segment disclosures, (MNC/ngd). Treatment firms of the general type MNC/ngd were denoted as Type 1 and Type 2 firms:

MNC/NLB/ngd = Type 1
MNC/LOB/ngd/plb = Type 2

The effect of general economic conditions was somewhat mitigated by comparing mean forecast error between treatment firms of the type MNC/LOB/ngd/plb (type 2) and control firms of the type DOM/LOB/ngd/nlb (type 5) and treatment firms of the general type MNC/ngd to control firms of the general

type DOM. Control firms of the general type DOM were denoted as DOM/NLB (type 4) and DOM/LOB/ngd/plb (type 5). Economic conditions that affected all firms would be interest rates charged on long-term borrowing, consumer confidence in the economy and costs of raw materials (such as steel) used in the manufacturing process. To some extent these phenomena are the same whether a company operates in many geographic areas or in only one. Change in mean forecast error between treatment firms and control firms was compared in the following research design:

Treatment Firms		Control Firms
Type 2	compared with	Type 5
Types 1 & 2	compared with	Types 4 & 5

Comparing change in mean forecast error of the treatment firms to control firms of the type MNC/pgd firms (which were not matched on industry) controlled for the effect of changes in general economic conditions affecting all MNC type firms. One such phenomena was SFAS 8. SFAS 8 only effected multinational companies, therefore by matching treatment MNC companies with control MNC companies, the effect of this phenomena is mitigated. These control firms, with the general type MNC/pgd were denoted as type 7 and type 8 were compared as follows:

Treatment Firms		Control Firms
Types 1 & 2	compared with	Types 7 & 8

Second, firms were matched on industry in order to reduce the possibility of attributing change in mean accuracy between the treatment firms and the control firms to changes in economic conditions within a specific industry. Firms were matched on 4-digit industry code provided by Compustat. Matching was accomplished on 44 treatment firms of types 1 and 2 with 44 control firms of types 4 and 5. Of the 44 firms, 24 were matched on 4 digits, 3 were matched on 3 digits, and 17 were matched on 2 digits. In addition 17 treatment firms of types 1 and 2 were matched with 17 control firms of types 8 and 9. Of the 17 matches, 15 were 4-digit matches and 2 were 2-digit matches.

The effect of industry and size on accuracy comparisons was mitigated since the same sample firms were used during all periods under study. It was assumed that a firm's size and industry did not significantly change over the 8-year test period. Therefore if industry or size affected the variation on earnings, the effect should be insignificant as long as the sample firms' industry and size did not significantly change.

Change in the level of disclosure of operations by LOB. The change in the level of disclosure of operations of line of business firms that coincided with the advent of SFAS 14 could affect the accuracy of analysts' forecasts. As shown previously by Baldwin (1984), LOB information is useful to

analysts in predicting earnings. In order to mitigate the effect this change in level of disclosure of LOB data might have on analysts' ability to forecast earnings, treatment firms without prior LOB disclosure were eliminated as sample firms. These firms were excluded because the sample sizes were too small to effectively separate the effect that this change in level of disclosure might have on analysts' ability to forecast earnings. Thus the effect of change in level of disclosure of operations of line of business coincidental with the advent of SFAS 14 on the overall results should have been mitigated.

Control for Earnings Variability

Earnings variability could affect comparisons of forecast accuracy between the firms because, according to Baldwin (1984), firms with low earnings variability are easier to forecast than firms with higher earnings variability. If no other factor affects the ability of the analysts' to forecast earnings changes over time except earnings variability increasing over time, then one would expect mean forecast error to also increase over time. The test metric, change in mean forecast accuracy would be less than zero.

As shown in Table II the variability in earnings changed during the test period for both the treatment and control firms. Sample firms went from a period of low earnings variability to a period of high earnings

variability, thus one would expect a decrease in the accuracy of analysts' forecasts. One reason for the concern about increased variability in earnings was SFAS 8. SFAS 8 may have increased the variability in earnings for multinational companies, thus making it more difficult for analysts to forecast earnings for these firms in relation to domestic companies.

TABLE II

STANDARD DEVIATION OF EARNINGS BEFORE AND AFTER SFAS 8

Treatment Firms	N	Mean Std Dev Prior to SFAS 8	Mean Std Dev After SFAS 8
2	59	36,526	99,752
1,2	70	35,351	106,716
Control Firms	**N**	**Mean Std Dev Prior to SFAS 8**	**Mean Std Dev After SFAS 8**
5	43	14,173	50,401
4,5	62	12,604	43,603
7,8	13	166,358	389,453

Treatment Firm Type

1 - MNC/NLB/ngd
2 - MNC/LOB/ngd/plb

Control Firm Type

4 - DOM/NLB
5 - DOM/LOB/plb
7 - MNC/NLB/pgd
8 - MNC/LOB/pgd/plb

Note: The standard deviation of earnings was calculated for an eight year period before SFAS 8 became effective and for an eight year period after SFAS 8 became effective. Income before extraordinary items and discontinued operations was used as a proxy for earnings.

In 1975 the FASB issued SFAS 8, "Accounting for the Translation of Foreign Currency Transactions and Foreign Currency Financial Statements," which upon implementation affected earnings variability of MNCs. This statement was pertinent to the current study because SFAS 8 became effective for fiscal years beginning on or after January 1, 1976 (SFAS 14 became effective December 15, 1976) and because foreign currency translations primarily affect MNCs. This statement required immediate recognition of translation gains and losses, which may have increased the volatility of reported income (Rupp, 1982; and Griffin and Castanias, 1987). If SFAS 8 increased the earnings volatility of MNCs, then the ability of analysts' to forecast earnings of the sample firms may have been adversely affected. This would then bias the present study against finding results that indicate that analysts' forecasts of earnings improved significantly more for MNCs than for DOMs. That is, observed changes in forecast accuracy for MNCs may have been due in part to changes in the forecast environment (increased volatility of earnings) and not due to the intervention of SFAS 14.

In order to control for the effect of a change in earnings variability on the change in accuracy of analysts' forecasts, deflator variable, Z, was included in the test metric. A measure of variability of earnings was calculated by computing the standard deviation for each firm over six two-year periods. A deflator variable was calculated for

each two-year period before the fiscal year-end forecasted. For example the forecast of earnings for the year 1976, the two-year period was 1975 and 1976. A two-year period was used in computing the deflator variables to exclude the confounding effects of SFAS 8 from the current study. Because SFAS 8 went into effect January, 1976 this leaves only a two-year time period after SFAS 8 became effective and before SFAS 14 became effective. Since the forecast environment before SFAS 8 became effective was assumed to be different from the forecast environment after SFAS 8 became effective, no more than a two-year period could be used prior to SFAS 14 becoming effective. In order to maintain comparability in the deflator variables, only two year periods were used for the measurement periods after SFAS 14 went into effect. The deflator variable was calculated for the following six periods:

Fiscal year Forecasted	Deflator Variable	Measurement Period	Years
1976	Z56	1	1975 & 1976
1977	Z67	2	1976 & 1977
1978	Z78	3	1977 & 1978
1979	Z89	4	1978 & 1979
1980	Z90	5	1979 & 1980
1981	Z01	6	1980 & 1981

The deflator variable was calculated as follows: (shown in terms of treatment firms of type 2 and years 1976 and 1977.)

$$Z67_{12}=\sqrt{\frac{\sum_{i=1976}^{1977}(eps_{i_{12}}-\overline{eps}_{12})^2}{n-1}}$$

where

$Z67_{12}$= standard deviation of earnings per share for firm 1 of firm type 2 for the years 1976 and 1977,

$eps_{i_{12}}$= actual earnings per share for firm 1 of firm type 2 for year i,

$$\overline{eps}_{12}=\sum_{i=1976}^{1977}\frac{eps_{i_{12}}}{n},$$

where

i= year of actual earnings per share, and

n= 2, (1976 and 1977).

This deflator variable was used in the test metric as follows:

$$CMAA_{2_{1-2}}=\frac{\sum_{i=1}^{n}\left(\left(\frac{FA_{76_{2i}}}{Z56_{2i}}+\frac{FA_{77_{2i}}}{Z67_{2i}}\right)-\left(\frac{FA_{78_{2i}}}{Z78_{2i}}+\frac{FA_{79_{2i}}}{Z89_{2i}}\right)\right)}{n}$$

where

$CMAA_{2_{t-t'}}$ = change in mean adjusted accuracy between measurement periods 1976, 1977 and 1978, 1979 for firms 1 to n of firm type 2,

i = firm 1 through n of firm type 2,

n = number of firms of firm type 2.

The assumption was made that the accuracy of analysts' forecasts would decrease as variability of earnings increased. In order to aid in the comparability of the analysts' ability to forecast earnings between treatment and control firms, forecast accuracy was divided by a measure of earnings variability for the time period leading up to the forecast of earnings. Without this deflator variable that adjusted forecast accuracy for change in level of earnings variability, conclusions drawn from comparisons of the change in mean forecast accuracy between treatment and control firms would not take into account the affect of differences in the forecast environment for the sample firms. For example, given two firms, A and B, and firm A experienced higher earnings variability then firm B, the expectation, all things being equal, would be that analysts' forecast of earnings for the firm B would be more accurate than that of firm A. Thus, any differences between the change in mean forecast accuracy between the two firms would

be attributable to the differences in the earnings variability experienced by the two firms.

Evidence that the forecast environment was different for treatment firms and control firms is found by analyzing a measure of earnings variability Z (Table III). Table IV shows the mean earnings variability for firms of type 2 and 5 for the years 1974-1975 through 1980-1981. The table indicates mean variability for both treatment firms and control firms increased after SFAS 14. It is for this change in forecast environment between treatment and control firms that the deflator variable, (Z), was used in order to allow meaningful comparisons between the change in mean forecast accuracy between treatment and control firms.

TABLE III

MEAN EARNINGS VARIABILITY INCLUDING "OUTLIERS"

	Type 2		Type 5	
Variable	N	Mean	N	Mean
Z45	60	0.88	48	1.24
Z56	60	1.32	48	1.82
Z67	65	0.84	50	3.23
Z78	65	3.21	50	8.69
Z89	65	2.57	50	3.65
Z90	65	2.57	50	3.43
Z01	65	4.19	50	0.96

Change in Level of Disclosure of Operations by Geographic Segment

Change in level of disclosure of operations by geographic segment, or detail of geographic information, also referred to as disaggregation of information in this study, was of course the variable of interest because of its anticipated effect on the accuracy of forecasts. The impact of disaggregation on forecast accuracy was measured in this study by comparing change in mean adjusted forecast accuracy between treatment and control firms. Since firms were classified by type of diversification (geographical or by LOB) and by presence of prior geographical or LOB segment information (no disclosure, prior disclosure), this research was able to detect differences in forecast accuracy which may have resulted from the implementation of SFAS #14.

Summary

The controls used in this study concerning the effects of change in earnings variability, change in level of disclosure of operations by line of business that coincided with the advent of SFAS 14, and change in the general economic conditions have been introduced. The change in earnings variability was controlled by the use of a deflator variable. The change in level of disclosure of operations by line of business was controlled for by excluding firms diversified by LOB that did not disclose LOB segment data

prior to SFAS 14. The change in the general economic conditions was controlled by comparing relevant treatment firms with control firms and matching treatment and control firms on industry. The focus of this study, the change in level of disclosure of operations by geographic segment, has been introduced as the variable of interest.

Hypotheses Tested

The general hypothesis tested was as follows (stated in alternative form):

> Ha: The accuracy of analysts' forecasts of treatment firms improved as a result of SFAS 14.

The primary purpose of this study was to test empirically the usefulness of geographic segment disclosures by attempting to determine if financial analysts' forecasts improved for MNCs which prior to SFAS 14 did not separately disclose the results of their foreign operations by geographic area. In order to determine if analysts' forecasts improved (as a result of SFAS 14's required geographic segment disclosures), the change in mean accuracy between the years before SFAS 14 went into effect and after it went into effect would need to be greater (a larger positive number, or a smaller negative number) for treatment firms than for control firms. The general hypothesis was tested for three pairings of firms not matched on industry and for two pairings of firms matched on industry for the three test periods. The three test periods were as follows:

Test Period	Years prior To SFAS 14	Years after SFAS 14
I	1976 & 1977	1978 & 1979
II	1976 & 1977	1979 & 1980
III	1976 & 1977	1980 & 1981

Three test periods were tested because it was possible that information from the early years of geographic segment disclosure contained many classification adjustments consistent with firms' learning how to present the new data. Thus in the first year of SFAS 14 geographic segment disclosures, the new data might not have been useful to analysts because of problems companies had in learning how to prepare the data and analysts had in putting it to use. Test Period II is essentially Test Period I excluding 1978 data. That is, the measurement period before SFAS 14 went into effect did not change, but the measurement period after SFAS 14 went into effect changed to 1979 and 1980, excluding the year of change, 1978, as the learning period for firms preparing the additional disclosures. In addition, a two year "learning period" was considered by dropping 1978 and 1979. Thus, for test period III the measurement period after SFAS went into effect were the years 1980 and 1981.

The following represents the specific hypothesis tested.

Ha: The change in mean forecast accuracy from the period before SFAS 14 went into effect to the period after SFAS 14 went into effect is significantly greater for treatment firms than for control firms.

The expectation for this hypothesis tested over the three test periods was that the change in mean accuracy for the treatment firms would be significantly greater than for paired and matched control firms in each case. The basis for this expectation was that the new geographic segment data for the treatment firms would have enabled analysts to better assess future profitability and thus enable more accurate forecasts.

Tests of Hypotheses

The primary purpose of this study was to test empirically the usefulness of geographic segment disclosures. The specific purpose of this study was to determine if financial analysts' forecasts improved for MNCs which did not separately disclose the results of their foreign operations by geographic area prior to SFAS 14.

Previous analyst forecast studies have used regression models (Sayers, 1986) or mulitvariate analysis of variance on repeated measurements (MANOVA) (Baldwin, 1984) to investigate similar questions. Sayers' used two regression models in order to assess forecast accuracy between firm types. One model was for multisegment firms and one model was for single segment firms. The firms that were classified as single segment firms were diversified in two industries, utilities or lending institutions. Since only two industries were represented in Sayers' control firms,

Sayers was able add dummy variables to control for the effect of industry on analysts' ability to forecast earnings. In the current study numerous industries are represented by the control firms, thus the use of dummy variables would be impractical. In the current study, a portion of the sample firms were matched on four-digit industry codes. Additionally by computing the change in adjusted forecast accuracy over time, the current study allows each sample firm to act as its own control.

Baldwin used a MANOVA on repeated measurements in order to investigate the ability of analysts' to forecast earnings. According to Baldwin, the MANOVA on repeated measurements is an extension of the paired t-test. In fact, Manova on repeated measurements comparing two means is equivalent to the paired t-test. Because the Manova on repeated measurements does not simultaneously test the effect of these variables on a dependent variable and in the current study only two means were compared at a time, the t-test for two independent samples and t-test for paired differences were utilized to determine if significant differences existed in the change in mean accuracy metrics between the treatment and control firms.

For the t-tests associated with independent samples and unequal variances (the t-test for equal variances, while not

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[2]In addition to the parametric t-test, nonparametric procedures were utilized to determine if the change in mean adjusted accuracy was statistically significant. The results from the nonparametric procedures (Kruscal-Wallis Rank Test and Median Test) were consistent with that of the parametric t-test.

shown, will be used if variances of the two samples are equal), t is defined as: (stated in terms of type 2 and type 5 firms)

$$t = \frac{CMAA_{2_{t-t'}} - CMAA_{5_{t-t'}}}{S(\overline{cmaa}_{2_{t-t'}} - \overline{cmaa}_{5_{t-t'}})}.$$

where

$CMAA_{2_{t-t'}}$ = change in mean adjusted accuracy between test periods t and t' for firms i to n of firm type 2,

$CMAA_{5_{t-t'}}$ = change in mean adjusted accuracy between test periods t and t' for firms i to n of firm type 5,

$S(\overline{cmaa}_{2_{t-t'}} - \overline{cmaa}_{5_{t-t'}})$ = standard deviation appropriate to a difference between two random means from a normal population.

where computationally,

$$S(\overline{cmaa}_{2_{t-t'}} - \overline{cmaa}_{5_{t-t'}}) = \sqrt{\frac{s^2_2}{n_2} + \frac{s^2_5}{n_5}}$$

and

$$s^2_2 = \frac{\sum_{i=1}^{n} (cmaa_{i2} - \overline{cmaa}_2)^2}{n_2 - 1}.$$

According to Steel and Torrie (1980), the above test statistic is not distributed strictly as a student t statistic. This is because of the assumption that the variances between the two independent samples (treatment firm type and control firm type) will be unequal. In order to compensate for the assumed unequal variances, the following effective d.f. was computed:

$$\textit{effective df} = \frac{\left(\frac{s^2_2}{n_2} + \frac{s^2_5}{n_5}\right)^2}{\left[\frac{\left(\frac{s^2_2}{n_2}\right)^2}{(n_2 - 1)}\right] + \left[\frac{\left(\frac{s^2_5}{n_5}\right)^2}{(n_5 - 1)}\right]}.$$

A paired difference experiment was used for the comparisons of change in adjusted mean accuracy of sample firms matched on industry. A paired difference experiment is appropriate when observations are meaningfully matched, as was accomplished in the current study by matching treatment firms of the general type MNC/ngd (types 1 and 2) to control firms of the general types DOM (types 4 and 5) and MNC/pgd (types 7 and 8) on four-digit industry codes. In a paired difference experiment t is defined as follows:

$$t = \frac{\overline{X}}{\frac{s_D}{\sqrt{n_D}}},$$

where

$\overline{X_D}$ = Mean of differences between change in mean adjusted accuracy for sample firms matched on industry,

S_D = Sample standard deviation of differences, and

n_d = Number of differences.

CHAPTER IV

RESULTS AND ANALYSIS

The purpose of this study was to test empirically the usefulness of geographic segment disclosures, specifically whether the disclosure required by SFAS 14 resulted in an improvement in financial analysts' forecasts for MNCs which prior to SFAS 14 did not separately disclose the results of their foreign operations by geographic area. The statistical method used to determine if analysts' forecasts improved as a result of SFAS 14's geographic segment disclosures was to test for a differences in mean adjusted accuracy between treatment and control firms. T-tests were used to determine the statistically significant difference in change in mean adjusted accuracy between sample firms. For the comparisons that were not matched on industry, t-tests for independent samples were used. T-tests for paired differences was used on the comparisons between sample firms that were matched on industry.

Results of the T-Tests

The hypothesis was empirically tested for each comparison of firms before and after having been matched on

industry and before and after adjusting for "outliers" over the following three test periods:

Test Period	Years Prior To SFAS 14		Years After SFAS 14
1	76 & 77	-	78 & 79
2	76 & 77	-	79 & 80
3	76 & 77	-	80 & 81

The three comparisons of treatment firms to control firms were as follows:

	Treatment firm(s)		Control firm(s)
1	MNC/LOB/ngd/plb (type 2)	with	DOM/lob/plb (type 5)
2	MNC/ngd (types 1 & 2)	with	DOM (types 4 & 5)
3	MNC/ngd (types 1 & 2)	with	MNC/pgd (types 7 & 8)

For convenience the results of the t-test on independent samples will be discussed first, before and after adjusting for "outliers." This discussion will be followed by the results of t-tests on paired differences, before and after excluding "outliers." The following was the hypothesis tested:

> Ha: The change in mean adjusted forecast accuracy from the period before SFAS 14 went into effect to the period after SFAS 14 went into effect is significantly greater for treatment firms of type 2 than for control firms of type 5.

The results of the tests of the above hypothesis, summarized in Table IV, indicate that the hypothesis can not be rejected in any of the comparisons. The lowest p-values were found in the comparisons between type 2 and type 5 firms (without removal of "outliers"). These p-values

TABLE IV

RESULTS OF T-TESTS--INDEPENDENT SAMPLES,
"OUTLIERS" INCLUDED

TREATMENT				CONTROL					Test		
Type	N	Mean	SDev	Type	N	Mean	SDev	Prd.	T-Stat	df	Pr>t
2	65	- 3.4	42.6	5	49	- 10.3	155.2	I	0.3010	54.5	0.382
2	65	-20.7	194.2	5	49	-124.0	689.2	II	1.0191	53.8	0.156
2	65	-22.8	186.3	5	49	-114.0	682.1	III	0.9109	53.4	0.183
1,2	80	2.3	59.6	4,5	73	49.1	499.7	I	-0.7956	73.9	0.786
1,2	80	-48.5	372.5	4,5	73	-26.0	749.7	II	-0.2315	103.3	0.591
1,2	80	-53.8	402.2	4,5	74	-10.2	729.2	III	-0.4539	111.7	0.675
1,2	80	2.3	59.6	7,8	17	529.0	2110.7	I	-1.0290	16.0	0.841
1,2	80	-48.5	372.5	7,8	17	528.0	2112.4	II	-1.1216	16.2	0.861
1,2	80	-53.8	402.2	7,8	17	498.8	2124.2	III	-1.0684	16.2	0.850

Types of Sample Firms	Test Period	Years prior To SFAS 14	Years after SFAS 14
1 - MNC/NLB/ngd	I	1976 & 1977	1978 & 1979
2 - MNC/LOB/ngd/plb	II	1976 & 1977	1979 & 1980
4 - DOM/NLB	III	1976 & 1977	1980 & 1981
5 - DOM/LOB/plb			
7 - MNC/NLB/pgd			
8 - MNC/LOB/pgd/plb			

"Outlier" - a mean adjusted accuracy measure greater than 100.

ranged from 0.156 to 0.382, with test period II having the lowest p-value. In the above three comparisons, analysts' forecast accuracy declined for the treatment firms, (the change in mean adjusted forecast accuracy for the treatment firms was less than zero). The mean change in the test metric for treatment firms ranged from -3.4 (test period I) to -22.8 (test period III). However, the accuracy of analysts' forecasts for the control firms in those comparisons declined even more, -10.3 (test period I) to -124.0 (test period III). Thus the differences between the mean change metrics were in the direction expected (treatment firms' mean change metric were less negative than control firms' mean change metric) but were not significant at the 0.10 level.

In the next three comparisons, the direction of the differences was opposite from the expected direction. The accuracy of analysts' forecasts improved more, or declined less for control firms as compared to treatment firms. For treatment firms, (MNC/ngd) the mean change metric ranging from a high of 2.3 in test period I to a low of -53.8 in test period III. For control firms, (DOM) had mean change metrics ranging from a high of 49.1 in test period I to a low of -26.0 in test period II. The results of these comparisons were p-values ranging from 0.591 in test period II to 0.786 in test period I.

Finally, in the comparisons of only multinational companies, MNC/ngd versus MNC/pgd, the p-values were the

largest thus far, 0.841 to 0.861 with the largest p-value found in test period II. Part of the reason for the large p-values could be found in the size of the mean change metric, for the control firms it ranged from 498.8 in test period III to 529.0 in test period I. While in all of above nine comparisons had relatively large standard deviations as compared to their means, the largest standard deviations were found in the comparisons between multinational companies. The standard deviations in the last three comparisons were the largest, ranging from 2110.7 to 2124.2. These results, especially the last three comparisons may have been driven by "outliers."

However the results of the tests of the hypothesis with "outliers" excluded (summarized in Table V) could not be rejected in any of the nine comparisons of the change in mean adjusted accuracy between treatment and control firms. Thus even with "outliers" excluded, no evidence was found to support the hypothesis that SFAS 14 improved the ability of analysts to forecast earnings of multinational companies.

The comparisons of the mean change metric between type 2 and type 5 firms, revealed a mean change metric of 3.4, 5.5, and 0.1 for treatment firms and 1.2, 6.6 and 4.6 for control firms in the test periods, I, II, and III, respectively. Unlike the same comparison (type 2 versus type 5 firms) with "outliers" included, only one (period I) of the three periods tested was the difference between treatment and control firms in the direction hypothesized.

TABLE V

RESULTS OF T-TESTS--INDEPENDENT SAMPLES,
"OUTLIERS" EXCLUDED

TREATMENT				CONTROL					Test		
Type	N	Mean	SDev	Type	N	Mean	SDev	Prd.	T-Stat	df	Pr>t
2	63	3.4	22.2	5	44	1.2	28.1	I	0.4355	78.2	0.332
2	63	5.5	20.7	5	43	6.6	21.8	II	-0.2510	104.0	0.598
2	64	0.1	28.0	5	42	4.6	20.9	III	-0.9464	102.2	0.827
1,2	76	2.1	22.0	4,5	64	2.1	24.9	I	-0.0508	138.0	0.520
1,2	75	3.7	21.1	4,5	64	3.7	21.4	II	-0.3540	137.0	0.638
1,2	76	-0.3	25.8	4,5	63	2.8	26.5	III	-0.6879	137.0	0.754
1,2	76	2.1	22.0	7,8	15	2.7	6.3	I	-0.2005	78.1	0.579
1,2	75	3.7	21.1	7,8	15	1.2	11.4	II	0.6678	36.6	0.254
1,2	76	-0.3	25.8	7,8	14	-0.4	10.2	III	-0.1616	49.6	0.564

Types of Sample Firms	Test Period	Years prior To SFAS 14	Years after SFAS 14
1 - MNC/NLB/ngd	I	1976 & 1977	1978 & 1979
2 - MNC/LOB/ngd/plb	II	1976 & 1977	1979 & 1980
4 - DOM/NLB	III	1976 & 1977	1980 & 1981
5 - DOM/LOB/plb			
7 - MNC/NLB/pgd			
8 - MNC/LOB/pgd/plb			

"Outlier" - a mean adjusted accuracy measure greater than 100.

Thus the p-values were larger than in the comparison including "outliers," ranging from 0.332 in period I to 0.827 in period III.

In the next three comparisons, (MNC/ngd versus DOM), the differences between change metrics were opposite of the expected results. Mean change metrics for test periods I and II were the same for treatment and control firms. In test period III the mean change metric for the treatment firms was -0.3 and 2.8 for control firms. P-values ranged from a low of .520 in test period I to a high of 0.754 in test period III.

Comparing the mean change metrics between MNC/ngd and MNC/pgd firms, revealed that only one of the three differences compared was as hypothesized. The mean change metric for treatment firms in period II was 3.7 compared to 1.2 for control firms in the same period. This comparison generated the lowest p-value (0.258) of the nine t-tests of the independent samples ("outliers" excluded).

In the t-tests on independent samples, before and after excluding "outliers," no evidence was found to support the hypothesis that the geographic segment disclosures mandated by SFAS 14 improved the ability of analysts' to forecast earnings.

The results of the tests of Ho, summarized in Table VI, indicate that Ho can not be rejected in any of the paired comparisons between treatment and control firms in which outliers were included. For the Paired comparisons made

TABLE VI

RESULTS OF T-TESTS--PAIRED COMPARISONS,
"OUTLIERS" INCLUDED

Types	N	Prd	Mean	Std Dev	DF	T	Pr > T
1,2 matched with 4,5	43	I	-4.3	93.5	42	-0.3001	0.617
1,2 matched with 4,5	43	II	35.1	237.8	42	0.9687	0.169
1,2 matched with 4,5	44	III	-34.4	547.3	43	-0.4173	0.661
1,2 matched with 7,8	16	I	-4.6	26.0	15	-0.7069	0.755
1,2 matched with 7,8	16	II	0.8	20.8	15	0.1500	0.441
1,2 matched with 7,8	15	III	27.1	142.5	14	0.7357	0.237

Types of Sample Firms	Test Period	Years prior To SFAS 14	Years after SFAS 14
1 - MNC/NLB/ngd	I	1976 & 1977	1978 & 1979
2 - MNC/LOB/ngd/plb	II	1976 & 1977	1979 & 1980
4 - DOM/NLB	III	1976 & 1977	1980 & 1981
5 - DOM/LOB/plb			
7 - MNC/NLB/pgd			
8 - MNC/LOB/pgd/plb			

between MNC/ngd treatment firms and DOM control firms the lowest p-value (0.169) was found in the mean difference for period II with a mean difference of 35.1. Mean differences between treatment and control firms for periods I and III were -4.3 and -34.4, respectively, generating p-values for these mean differences of 0.617 in period I and 0.661 in period III.

In the paired comparisons between multinational companies, (MNC/ngd versus MNC/pgd) the mean differences were -4.6, 0.78, and 27.07 for the test periods I, II, and III, respectively. P-values generated by those differences ranged from a low of 0.237 in period III to a high of 0.755 in period I.

Tests of the hypothesis on paired comparisons, excluding "outliers," are summarized in Table VII. As before, the hypothesis cannot be rejected in any of the six comparisons. P-values of 0.136 and 0.165 were generated from the differences of 4.0 and 3.3 in test periods I and II. The mean difference between matched change metrics in period III was -4.9 which generated a p-value of 0.929. Finally, the paired comparisons of multinational companies generated the results with the lowest p-value, 0.118. This p-value was generated from the differences in matched changed metrics in period II. However, in the paired comparisons in periods I and III the differences were in the opposite direction as hypothesized and generated p-values of 0.572 and 0.861, respectively. These results were

TABLE VII

RESULTS OF T-TESTS--PAIRED COMPARISONS,
"OUTLIERS" EXCLUDED

Types	N	Prd	Mean	Std Dev	DF	T	Pr > T
1,2 matched with 4,5	39	I	4.0	22.3	37	1.1149	0.136
1,2 matched with 4,5	38	II	3.3	20.9	37	0.9887	0.165
1,2 matched with 4,5	35	III	-4.9	19.1	34	-1.5045	0.929
1,2 matched with 7,8	14	I	-1.2	23.6	13	-0.1848	0.572
1,2 matched with 7,8	14	II	5.0	15.0	13	1.2405	0.118
1,2 matched with 7,8	13	III	-9.6	30.6	12	-1.1346	0.861

Types of Sample Firms	Test Period	Years prior To SFAS 14	Years after SFAS 14
1 - MNC/NLB/ngd	I	1976 & 1977	1978 & 1979
2 - MNC/LOB/ngd/plb	II	1976 & 1977	1979 & 1980
4 - DOM/NLB	III	1976 & 1977	1980 & 1981
5 - DOM/LOB/plb			
7 - MNC/NLB/pgd			
8 - MNC/LOB/pgd/plb			

consistent with the preceding comparisons. No support was found to support the hypothesis that analysts' forecasts of earnings improved as a result of SFAS 14's geographic segment data.

CHAPTER V

CONCLUSIONS

In 1976, The Financial Accounting Standards Board issued Statement of Financial Standards No. 14 which mandated line-of-business and geographic segment disclosures. The objective of this study was to empirically test the usefulness of geographic segment disclosures required by SFAS 14. The specific purpose of this study was to determine if financial analysts' forecasts improved for multinational companies as a result of the geographic segment disclosures required by SFAS 14. The significance of this study was that it provided a simultaneous test of validity of both SFAS 14 and general disaggregation theory.

Conclusions of the Study

The primary conclusion was that there is no evidence that financial analysts' forecasts improved as a result of the geographic segment disclosures required by SFAS 14. The basis for this conclusion lies in the results found in Chapter IV.

The change in mean adjusted accuracy for three pairings of firm types were compared over three time periods.

T-tests were used to determine the statistical significance of the differences in the change in mean adjusted accuracy between paired firm types.

The following were the time periods tested:

Test Period	Years Prior To SFAS 14		Years After SFAS 14
1	76 & 77	-	78 & 79
2	76 & 77	-	79 & 80
3	76 & 77	-	80 & 81

The treatment firms and control firms were compared as follows:

	Treatment firm(s)		Control firm(s)
1	MNC/LOB/ngd/plb (type 2)	with	DOM/lob/plb (type 5)
2	MNC/ngd (types 1 & 2)	with	DOM (types 4 & 5)
3	MNC/ngd (types 1 & 2)	with	MNC/pgd (types 7 & 8)

The hyothesis could not be rejected in any of the comparisons of treatment firms to control firms. In fact in many of the comparisons the direction of the difference in the change in mean adjusted accuracy between treatment and control firms was opposite that hypothesized.

Implications of the Results

The major finding of this study is that no evidence was found that the stated purpose of SFAS 14 was obtained, at least in terms of the required geographic segment disclosures. The stated purpose of SFAS 14 was to assist users of financial information by aiding in the evaluation

of risk and return and improving comparability among firms. However, one important user group, financial analysts, apparently did not find the SFAS 14 geographic segment disclosures useful for their intended purpose. The significance of this is that the additional costs imposed upon a firm through the additional disclosure requirements may not have been justified.

Another finding is that the results of this study are not consistent with previous studies, especially studies assessing the impact of SFAS 14 (Sayers, 1985; and Prodhan and Harris, 1989). Sayers investigated the impact of SFAS 14 disclosures on security analysts' forecasts and concluded that there was an association between improved forecasts and the disclosures of SFAS 14 data. Part of the difference in results could be attributed to the fact that Sayers did not differentiate the firms in his sample between those that were diversified by LOB, geographic region, or both because Sayers' research question did not differentiate between the mandated LOB and geographic segment reporting required by SFAS 14. In addition of Sayers' 44 treatment firms, only 12 were included in the 100 treatment firms used in this study and 14 were in the 105 control firms used in this study. These 14 firms were firms that were diversified by LOB but not diversified by geographic segments.

Prodhan and Harris investigated the impact of geographic disclosures on market beta for U.S. multinational companies. The results indicated that for U.S.

multinational companies predisclosure betas were higher than postdisclosure betas thus providing evidence that geographic segment data had information value. That study assessed market risk and its relation to information content; however, the current study investigated the actual use of geographic segment disclosures in forecasting earnings.

A secondary implication is that general disaggregation theory is flawed since in the current study disaggregated information (geographic segment data) did not improve the ability of analysts' to forecast earnings. However a more likely reason for SFAS 14's inability to improve analysts' ability to forecast earnings can be found in the disclosure requirements themselves. A potential flaw is that the guidelines for defining geographic segments are fairly general, with much of the choice of how geographic regions were grouped left up to the firms, thus resulting in seemingly unrelated geographic areas being grouped together.

In collecting data for this study several seemingly unrelated groupings of geographic areas and high level aggregations were noted, these included the following:

Japan, Australia and Far East,
Australia and Far East,
Canada and Latin America,
U.S., Canada and Puerto Rico,
Mexico and Canada,
North and South America (Not U.S.),
Africa and Far East,
Europe, Africa and Middle East,
Europe and Middle East,
Europe and Canada,
Americas and Far East,

Asia, Pacific, and Western Hemisphere (Not U.S.),
Canada and Pacific,
Asia, Pacific and Canada,
Other Eastern Hemisphere and Africa,
Other Eastern Hemisphere,
Mediterranean, Africa and Middle East,
Asia, Africa and Australia,
North Atlantic, Europe and Mediterranean, and
North and South America.

If the assumption is made that evaluation of the risk and future earnings of a company is affected by the economic and political climate by a geographic region in which a company operates, then one would assume that in order to evaluate a company in terms of risk and future earnings its geographic regions should be separately identifiable, or at least grouped with regions of similar economic and political climates. Thus if a companies geographic regions are not separately identifiable the ability of analysts' to assess the riskiness and future earnings may not be improved.

Suggestion for Further Research

One area for further research would be to investigate why analysts' ability to forecast earnings declined after SFAS 14 for multinational companies that did not disclose geographic segment data prior to SFAS 14. One possible cause could be the unrelated geographic groupings. This study's methodology could be used on a sample of multinational companies that had only seemingly related groupings of geographic areas. In addition, this research suggests to the FASB the need for stricter guidelines in

grouping foreign operations, thus adding to the effectiveness of SFAS 14.

Another area for further research would be to use this methodology and research design on other accounting disclosure changes besides geographic segment reporting. Such mandated changes found in SFAS 8 (Accounting for the Translation of Foreign Currency Transactions and Foreign Currency Financial Statements) and SFAS 95 (Statement of Cash Flows) could be investigated for their assumed usefulness using the research methodology found in the current study.

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APPENDIXES

APPENDIX A

SUMMARY OF STATEMENT OF ACCOUNTING STANDARDS NO. 14

The Financial Accounting Standards Board defines industry segment as a component of an enterprise engaged in providing a product or service or a group of related products and services to unaffiliated customers for profit. However, instead of specifying SIC industry codes (one-digit, two-digit, three-digit, or four-digit) or the Enterprise Standard Industrial Classification as the equivalent of industries, the board judged that this was not suitable. The board did indicate that the industry codes (SIC and ESIC) could be used as a guide in the grouping of a business' products and services by industry line, but the final determination of the groupings by industry must depend on the judgement of the management of the entity.

Information about foreign operations and export sales was also mandated by Statement 14. Foreign operations are defined as revenue-producing operations that are located outside the enterprise's home country and which are generating revenue either from sales to unaffiliated customers, intraenterprise sales or transfers between geographic areas. The information to be presented by (but not limited to) industry or geographic segment includes information about the entities' revenues, operating profits, and assets. The revenue reported includes sales to unaffiliated customers and to other segments of the company. Interest earned on sources outside the company and interest earned on intersegment trade receivables are included if the asset is listed as identifiable.

In determining the operating profit, operating expenses are to include general corporate expenses only when traceable or allocatable on a reasonable basis to a segment. Domestic and foreign income taxes and equity in income or loss of unconsolidated investees, gain or loss on discontinued operations, cumulative effect on change in accounting principle and extraordinary items are excluded in the determination of operating profit.

The assets reported include those tangible and intangible operating assets used exclusively by an industry segment. However, an allocated portion of the tangible and intangible operating assets used by two or more segments is also to be reported.

Other required information includes the aggregate of depreciation, depletion, and amortization expense from each segment. A reportable segment's equity in the net income of unconsolidated subsidiaries and other equity method investees whose operations are vertically integrated with the operations of that segment and the amount of each segment's additions to plant, property and equipment must be reported. The above information must be reported if one or more of the following conditions exist:

1) revenue is greater than or equal to 10% of combined revenue,

2) operating profit (loss) is greater than or equal to 10% of combined operating profit, or

3) identifiable assets are 10% or more of all other industry segments.

Additionally, combined revenue (not including intersegment sales) must be at least 75% of all combined revenue.

Information concerning a geographic segment should be reported if:

1) Revenue generated by the foreign operations from sales to unaffiliated customers is 10% or more of consolidated revenue (as reported in the income statement),

2) identifiable assets are 10% or more of the consolidated companies, total assets.

The information should be reported for each geographic region deemed significant (as defined above) and in the aggregate for all other foreign regions. In addition, a geographic area is determined by each company's individual circumstances. No single method of groupings is required. Factors to be considered include proximity, economic affinity, similarities in business environments, and the nature, scale, and degree of interrelationship of the enterprise's operations in various countries.

Finally, information about major customers should be disclosed if 10% or more of a company's revenue is from any single customer.

APPENDIX B

LIST OF SAMPLE FIRMS, SIC #'S, AND INDUSTRY

A.1. MNC/NMN/ngd

Name of Company	SIC #	Industry
American Greetings	2771	Greeting Card Publishing
Ford Motor Co.	3711	Motor Vehicles & Car Bodies
Gerber Products	2030	Canned-Preserved Fruits-Vegs
Heller (Walter)	6150	Business Credit Institutions
Intel Corp.	3674	Semiconductors & Rel Devices
Interpublic Grp.	7311	Serv-Advertising Agencies
Kellogg Co.	2000	Food & Kindred Products
Kroehler Mfg.	3820	Measuring & Controlling Inst
Lubrizol	2890	Misc Chemical Products
Mcdonald's Corp.	5812	Retail-Eating Places
Polaroid Corp.	3861	Photographic Equip & Suppl
Rubbermaid Inc.	3079	Misc Plastic Products
Thomas & Betts	3679	Electronics Components
Tootsie Roll Inc.	2065	Candy & Other Confectionery
Wrigley (Wm) Jr.	2065	Candy & Other Confectionery

A.2. MNC/LOB/ngd/plb

Name of Company	SIC #	Industry
Abbott Lab.	2830	Drugs
Allen Group	3825	Elec Meas & Test Instr
Aluminum Co of America	3330	Prim Smelt-Refin Nonfer Mtl
American Brands	2111	Cigarettes
American Cynamid	2800	Chemical & Allied Prods
American Express	6199	Finance Services
American Home Prod	2830	Drugs
AMP Inc.	3640	Electric Lighting-Wiring Eq
Barnes Group	3499	Fabricated Metal Prds N E C
Bausch & Lomb	3830	Optical Instruments & Lenses
Beatrice Foods	2000	Food & Kindred Products
Beneficial Corp.	6140	Personal Credit Institutions
Boise Cascade	2600	Paper & Allied Products
Borg Warner	3714	Motor Vehicle Parts-Acessor
Bristol Meyer	2830	Drugs
Burroughs J.P.	3573	Electronics Computing Equip
Champion Intl.	2600	Paper & Allied Products
Clarke Equip.	3537	Indl Trucks, Tractors, Trailrs
Coleman Co.	3940	Toys & Amusement Sport Goods
Combustion Eng.	3533	Oil Field Machinery
Cromption & Knowles	2860	Industrial Organic Chemicals
Dexter Corp.	2890	Misc Chemicals Products
Eastman Kodak	3861	Photographic Equip & Suppl
FMC Corp.	2800	Chemicals & Allied Prod
Foster Wheeler	1600	Construction-Not Bldg Constr
Fruehauf	3714	Motor Vehicle Parts-Acessor
Gen'l Elect.	3600	Elec & Electr Mach Eq & Supp
Gen'l Instr.	3670	Electronic Components & Acce
Halliburton	1600	Construction-Not Bldg Constr

A.2. MNC/LOB/ngd/plb (Cont.)

Name of Company	SIC #	Industry
Helene Curtis	2844	Perfumes Cosmetics Toil Prep
Hercules	2800	Chemicals & Allied Products
Hughes Tool	3533	Oil Field Machinery & Equip
Inco Ltd.	1000	Metal Mining
Ingersoll-Rand	3560	General Industrial Mach & Eq
Interlake	3310	Blast Furnaces & Steel Works
ITT	3661	Tele & Telegraph Apparatus
Katy	200	Agriculture Produc-Livestock
Kimberly Clarke	2600	Paper & Allied Products
Libbey-Owens	3210	Flat Glass
Masco	3430	Heating Equip & Plumbing Fix
Mattel	3940	Toys & Amusement Sport Goods
3M	2649	Convert Paper-Paperbd Pd Nec
Mobil Corp.	2911	Petroleum Refining
Murphy Oil	2911	Petroleum Refining
Nashua Corp.	5080	Whsl-Machinery & Equipment
Norton Co.	3290	Abrasive Asbestos & Misc Min
Occidental Petroleum	2911	Petroleum Refining
Owens Illinois	3221	Glass Containers
Pfizer	2830	Drugs
Philip Morris	2111	Cigarettes
Phillips Petroleum	2911	Petroleum Refining
PPG Industries	2800	Chemicals & Allied Prods
RCA	3651	Radio-TV Receiving Sets
Revlon	2844	Perfumes Cosmetics Toil Prep
R.J. Reynolds	2111	Cigarettes
Sante Fe Ind.	4011	Railroads-Line Haul Operatng
Superior Oil	1311	Crude Petroleum & Natural Gs
Tenneco	4922	Natural Gas Transmission
TRW	3662	Radio-TV Transmttng Equip-Ap
U.S. Steel	3310	Blast Furnaces & Steel Works
United Technologies	3720	Aircraft & Parts
U.S. Gypsum	3270	Concrete Gypsum & Plaster
V.F. Corp.	2300	Apparel & Other Finished Pds
Warner-Lambert	2830	Drugs
Wilshire Oil	1311	Crude Petroleum & Natural Gs

A.3. MNC/LOB/ngd/nlb

Name of Company	SIC #	Industry
Avon Products	2844	Perfumes Cosmetics Toil Prep
Baxter Travenol	3841	Sug & Med Instruments & App
Caterpillar Tractor	3531	Consruction Machinery & Eqp
Champion Spark Plug	3699	Electrical Machy & Equip NEC
Chicago Pneumatic Tool	3540	Metalworking Machinery & Eqp
Coca Cola	2086	Bottled-Canned Soft Drinks
CPC Intl.	2000	Food & Kindred Products
Crown Cork & Seal	3410	Metal Cans & Shipping

A.3. MNC/LOB/ngd/nlb (Cont.)

Name of Company	SIC #	Industry
Fisher & Porter	3823	Industrial Measurement Instr
Goodyear Tire & Rubber	3000	Rubber & Misc Plastics Prods
Hubbell (Harvey) Inc.	3640	Electric Lighting-Wiring Eq
Illinois Tool Works	3452	Bolts-Nuts-Screws-Riv-Washrs
IBM	3573	Electronics Computing Equip
Int'l Flavors & Fragr	2844	Perfumes Cosmetics Toil Prep
Nalco Chemical	2890	Misc Chemical Products
Newmont Mining	1021	Copper Ores
Ocean Drill. & Expl.	1311	Crude Petroleum & Natural GS
Oneida Ltd.	3914	Silverware-Plateware
Rohms & Haas	2800	Chemicals & Allied Products
Texas Instruments	3674	Semicunductors &Rel Devices
Trane Co.	3580	Refrig & Service Ind Machine
Upjohn	2830	Drugs

B.4. NMN/NLB

Name of Company	SIC #	Industry
Anheusher-Busch	2082	Malt Beverages
Betz Laboratories	2890	Misc Chemical Products
Cummins Engine	3510	Engines & Turbines
Donnelley (R.R.)	2750	Commercial Printing
Dr. Pepper	2086	Bottled-Canned Soft Drinks
Fischer Foods	5411	Retail-Grocery Stores
Fort Howard Paper	2600	Paper & Allied Products
Gannett Co.	2711	Newspapers:Publishing-Print
Gilbraltar Financial	6120	Savings & Loan Associations
Great Atlantic & Pacific	5411	Retail-Grocery Stores
Great Western Financial	6120	Savings & Loan Associations
Hospital Corp of America	8060	Serv-Hospitals
House of Fabrics	5949	Retail-Sewing& Needlewrk Str
Lukens Inc.	3310	Blast Furnaces & Steel Works
Maytag Co.	3630	Household Appliances
Munsingwear	2250	Knitting Mills
Northwest Airlines	4511	Air Transportation-Certified
Oakite Products	2841	Soap & Other Detergents
Overnite Tranp.	4210	Trucking-Local&Long Distance
Pabst Brewing	2082	Malt Beverages
Tymshare	7374	Serv-Data Processing Svcs
Washington Post	2711	Newspaper:Publishing-Print
Wean United	3540	Metalworking Machinery & Eqp
Western Airlines	4511	Air Transportation-Certified
Zenith Electronics	3651	Radio-TV Receiving Sets

B.5. NMN/LOB/plb

Name of Company	SIC #	Industry
American Hospital Supply	3841	Surg & Med Instruments & Ap
American Broadcasting	4830	Radio-TV Broadcasters
Ameron	3270	Concrete Gypsum & Plaster
AMFAC	5099	Whsl-Durable Goods Nec

B.5. NMN/LOB/plb

Name of Company	SIC #	Industry
Ampco-Pittsburg	3560	General Industrial Mach & Eq
Angelica Corp	2300	Apparel & Other Finished Pds
Anchor-Hocking	3221	Glass Containers
Armada	3350	Rolling & Draw Nonfer Metal
ARMCO	3310	Blast Furnaces & Steel Works
Arvin	3714	Motor Vehicle Parts-Acessor
Badger Meter	3820	Measuring & Controlling Inst
Barry Wright	2520	Office Furniture
Bethlehem Steel	3310	Blast Furnaces & Steel Works
Bio-Rad Labs	3841	Surg & Med Instruments & App
Burlington Northern	4011	Railroads-Line Haul Operatng
Carlisle Cos.	3000	Rubber & Misc Plastics Prods
Certain-Teed	3290	Abrasive Asbestos & Misc Min
CharterCorp	6025	Natl Banks-Fed Reserve Sys
Computer Sciences	7372	Serv-Cmp Program & Software
Consolidated Freight	4210	Trucking-Local&Long Distance
Crane Co.	3310	Blast Furnaces & Steel Works
Di Georgio	5140	Whsl-Groceries & Related Pds
Diebold	3499	Fabricated Metal Pds N E C
Federal Signal	3662	Radio-TV Transmttng Equip-Ap
Gorman-Rupp	3560	General Industrial Mach & Eq
Handy & Harman	3350	Rolling & Draw Nonfer Metal
Hershey Foods Corp.	2065	Candy & Other Confectionery
Hillenbrand Industries	3990	Misc Manufacturing Industrie
Inland Steel Co.	3310	Blast Furnaces & Steel Works
Interco Inc.	2300	Apparel & Other Finished Pds
Kaiser Aluminum & Chem	3330	Prim Smelt-Refin Monfer Mtl
Koppers Co.	2860	Industrial Organic Chemicals
Lionel Corp.	5999	Retail-Stores N E C
Loews Corp.	6199	Finance-Services
Mapco	5980	Retail-Fuel & Ice Dealers
Mariott Corp.	5812	Retail-eating Places
Mead Corp.	2600	Paper & Allied Products
Media General	2711	Newspaper:Publishing-Print
Mitchell Energy	1311	Crude Petroleum & Natural Gs
National Gypsum	3270	Concrete Gypsum & Plaster
Pepsico Inc.	2086	Bottled-Canned Soft Drinks
Philips Ind.	3442	Mtl Doors,Frames,Mold & Trim
Pittson Corp.	5199	Whsl-Nondurable Goods N E C
Plymouth Rubber	3000	Rubber & Misc Plastic Prods
Portec Inc.	3531	Construction Machinery & Eqp
Quaker State Oil	2911	Petroleum Refining
Scott Paper	2600	Paper & Allied Products
Sherwin-Williams	2850	Paints-Varnishes-Lacquers
Stauffer Chemical	2800	Chemicals & Allied Prods
Stone & Webster	8911	Serv-Engineering & Architect
Sunshine Mining	1040	Gold & Siver Ores
Talley Ind.	3870	Watches Clocks & Parts

B.5. NMN/LOB/plb (Cont.)

Name of Company	SIC #	Industry
Teledyne Inc.	3825	Elec Meas & Test Instr
Thomas Ind.	3640	Electric Lighting-Wiring Eq
Times Mirror	2711	Newspapers:Publishing-Print
Union Pacific	2911	Petroleum Refining
United Energy Resource	4922	Natural Gas Transmission
Vulcan Materials Co.	1499	Misc Nonmetallic Minerals

B.6. NMN/LOB/nlb

Name of Company	SIC #	Industry
Great Northern Nekoosa	2600	Paper & Allied Products
Louisianna Land & Expl	2911	Petroleum Refining
Melville Corp.	5661	Retail-Shoe Stores
National Can	3410	Metal Cans & Shipping Cont
Owens-Corning	3290	Abrasive Asbestos & Misc Min
Panhandle Eastern	4922	Natural Gas Transmission
Phelps Dodge	1021	Copper Ores
Revere Copper & Brass	3350	Rolling & Draw Nonfer Metal
Teradyne	3825	Elec Meas & Test Instr

C.7. MNC/NLB/pgd

Name of Company	SIC #	Industry
General Motors	3711	Motor Vehicles & Car Bodies
NCR Corp.	3573	Electronics Computing Equip

C.8. MNC/LOB/pgd/plb

Name of Company	SIC #	Industry
Carter-Wallace	2844	Perfumes Cosmetics Toil Prep
Celanese	2820	Plastics Matr&Synthetic Resin
Chrysler	3711	Motor Vehicles & Car Bodies
Dow Chemical	2800	Chemicals & Allied Products
Eaton Corp.	3714	Motor Vehicles Parts-Acessor
Exxon	2911	Petroleum Refining
Ferro	2890	Misc Chemical Products
Gillette	3429	Hardware-N E C
Johnson & Johnson	2649	Convert Paper-Paperbd Pd NEC
Nabisco Brands Inc.	2000	Food & Kindred Products
Searle (G.D.)	2830	Drugs
Std. Oil-California	2911	Petroleum Refining
Std. Oil-Indiana	2911	Petroleum Refining
Texaco	2911	Petroleum Refining
Viacom Intl.	4890	Communications Services N E C
Warner Comm.	3651	Radio-TV Receiving Sets

C.9. MNC/LOB/pgd/nlb

Name of Company	SIC #	Industry
Int'l Paper	2600	Paper & Allied Products
Merck & Co.	2830	Drugs
Schlumberger	1389	Oil & Gas Field Services Nec

VITA

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