A COMPARATIVE EXAMINATION OF THE

EARNINGS EFFECTS OF ALTERNATIVE

TRANSLATION METHODS

By

PAUL EDWIN HOLT

Bachelor of Arts
University of Kansas
Lawrence, Kansas
1964

Master of Business Administration
Oklahoma City University
Oklahoma City, Oklahoma
1972

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Thesis Approved:

Dennis H. Patz
Thesis Adviser

Gary Meek

Edward Abbma III

Kevin M. Currier

Thomas C. Collins
Dean of the Graduate College

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CHAPTER I

INTRODUCTION TO THE STUDY

Virtually everyone--managers, market agents, accounting
policy makers, accounting academicians--appears to believe
that the choice among alternative foreign currency
translation methods matters. However, comparatively little
is actually known empirically regarding how and in what ways
it matters. Accounting academicians have generated a truly
massive literature debating the merits and demerits of
alternative translation methodologies. Yet notably absent
are any signs of theoretical closure or an empirical basis
for exercising choice between alternatives. Prior studies
indicate that managers behave as if policy choice matters.
Yet it remains unclear whether this behavior and the beliefs
that underlie it are rational in the absence of empirical
insight into the actual reporting effects of different
methods. Accounting policy makers have materially changed
generally accepted accounting principles (GAAP) in this
regard three times over the last three decades, each change
more contentious than the previous one. Thus it may well be
that weariness with the issue, rather than widespread

consensus over the efficacy of the SFAS #52 solution, best characterizes the present situation.

Lack of extensive insight into the reporting consequences of alternative translation methods is not altogether surprising once surrounding circumstances are considered. Companies use one translation method at a time, some methods have not been used for many years, some plausible methods have never been used, and but for the translation gain or loss the effects of translation are buried in the consolidated accounts. Disentangling these effects for a reasonable number of firms presents a daunting task. Moreover, obtaining the further temporally referenced item by item data required to construct comparable results under alternative methods would task the patience of the most cooperative of firms. For these reasons, no broadly comparative and temporally sustained study, involving reasonably large samples of real firm data, appears to be available. This study seeks to begin to fill this vacuum of empirical insight into the reporting consequences of alternative translation methods to the extent that the foregoing obstacles can be overcome.

Purpose of the Study

The purpose of this study is to identify, if and in what ways selected translation methods are in fact different or similar in the results they generate, periodically and over time, under representative relative exchange rate and price

level conditions. More specifically, the purpose of the study is to determine the impact choice between translation methods has upon the variables commonly relied upon in risk and return analysis by users:

1. Earnings

2. Earnings variability

3. Return on total assets and return on equity

Approach and Significance of the Study

The primary significance of the study derives from the significance of the translation policy issue itself which can be presumed to continue to increase in significance as the rate of foreign operations continues to increase. The foreign currency translation problem is typically accorded first order importance among international accounting issues, and almost certainly accounts for more extant international accounting literature than any other single topic. This literature suggests that policy choice can have material effects both on reported accounting values and upon the beliefs and behavior of users. In Chapter II, the empirical component of this literature is reviewed to more fully establish the significance of the translation issue and to present the limited evidence currently available regarding the nature and magnitude of policy choice consequences.

The fact that empirical evidence, particularly regarding the impact of policy choice in reported accounting variables, is quite limited imbues this study with heightened

significance. The empirical basis in terms of expected consequences for exercising policy choice regarding translation has been and remains scanty. In turn, this present research differs from previous work in several respects. A fairly wide range of alternative translation methodologies (eight) is considered. As noted above, there is no closure in the theoretical literature; an initially plausible theoretical basis exists for a number of translation methodologies. The nature and selection of those studied is considered in Chapter III. A comparatively lengthy ten year study period is used, such that periodic and sustained effects can be identified and distinguished. The study also employs accounting data for a fairly large number of actual firms (50), as well as actual exchange rate and price levels. That is, the data problem noted above is largely overcome by way of a methodological approach entailing two major features: (1) explicit recognition that, while any given company may not now be a foreign subsidiary, there is no reason why it could not become so tomorrow[1] and (2) recognition that techniques for estimating the temporal characteristics of account balances originally formulated for price level research may be modified and adapted to the translation setting.

The foregoing aspects of methodology are dealt with in Chapter IV and Appendices B and C. Chapter IV also specifies

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[1]The only other example of this "reverse" approach appears to be Troberg (1987).

the variables observed in the study, which include key
accounting ratios, a further unique feature for comparative
translation methodology research. Initial focus in the study
is upon reported earnings and earnings variability effects,
an issue which has tended to dominate discussion and beliefs
about alternative translation methodologies. Analysis and
results in this regard are reported in Chapter V. Focus then
shifts to an information perspective, and to the differential
effects of translation methodologies on accounting
measurement based profitability ratios, reflecting the notion
that differences in accounting measures of statistical
significance need not equate to information differences of
practical significance. Results in this respect are also
presented in Chapter V. Chapter VI summarizes the findings
and limitations of the study and implications for future
research.

CHAPTER II

SIGNIFICANCE AND EFFECTS OF THE TRANSLATION
METHOD POLICY CHOICE

In this chapter, evidence from the literature is presented to support and elaborate upon the proposition that the policy choice from among alternative translation methods matters. The studies reviewed are divided into four categories for presentation: (1) studies which are surveys of management perceptions and studies of changes in management behavior, (2) studies of the impact of alternative translation methods on financial statements, (3) market studies, and (4) studies which reveal preferences for translation methods by studying events such as early adoption of SFAS #52 and lobbying. These four categories represent an overview of the empirical literature, although two simulation studies, Duangploy (1979) and Rupp (1982) are also reviewed.

Studies of Manager Behavior and
Management Perceptions

SFAS #8 caused some discontent in the business community because of the requirement that currency translation gains

and losses be included in current income. Choi et al.'s (1979) survey showed that managers were unhappy with SFAS #8 but that there was significant support for the standard from auditors. Stanley and Block (1979a and 1979b) also found managers unhappy with SFAS #8. About half of the 195 senior financial executives surveyed by Cooper et al. (1978) reported changes in management practices, especially in foreign capital investment, as a result of perceived adverse affects of SFAS #8. These executives also reported replacing dollar debt with foreign debt, increasing hedging activity, and changing the timing of remittances.

Rodriguez (1980) surveyed 70 U.S. MNCs and found that managements were non-speculative, defensive with respect to exchange rate variations, and reluctant to report translation losses. As a result, they were willing to pay a hedging cost higher than the average exchange depreciation. Gernon's (1983) questionnaire showed that managers tend to integrate the FASB's standards into their internal reporting systems, specifically that translation methods influence the performance evaluation of foreign operations.

Houston (1986) found that managements decreased their financial exposure hedging when adopting SFAS #52. Further, companies which had lower proportions of dollar functional currency foreign subsidiaries were more likely to decrease hedging as a result of adopting SFAS #52.

In summary, the results of a number of surveys clearly indicate that many managers believe the choice of translation

method matters and that they claim to change their behavior as a result of applying different translation methods. Given the numerous ways in which managers could rationally modify their behavior, it seems probable that managers actually do modify their behavior in reaction to changes in translation method. Whether the beliefs and behavior are well founded and rational, however, remains unclear and dependent upon what initial and sustained effects in fact obtain with changes in accounting translation policy.

Studies of Impact on Financial Statements

Numerous articles criticize SFAS #8 on the basis of its alleged impact on financial statements. Aggarwal (1978), Biel (1976), Teck (1976), Porter (1983), and Selling and Sorter (1983) are examples of articles which expressed the opinion that the requirements of SFAS #8 resulted in greater volatility of earnings or that SFAS #52 reduced such volatility. Aggarwal (1978) and Reckers (1978) expressed the opinion that SFAS #8 resulted in financial statements that, in one way or another, did not reflect economic reality.

Choi et al. (1978) reviewed evidence that compliance with SFAS #8 results in huge translation adjustments. Allan (1976), Beresford (1976), Hershman (1976), Mattlin (1976), and Merjos (1977) give examples of companies which, under the provisions of SFAS #8, experienced greater volatility in reported income. But the number of examples was small, and there is no indication that a random sample was taken. The

real implication of these articles is only that some companies, not necessarily a majority or even a significant percentage, experienced greater volatility of reported earnings under SFAS #8. Indeed, Beaver and Wolfson (1984) indicate that the application of SFAS #52 does not necessarily result in less volatility of earnings than the application of SFAS #8. Inflation and exchange rates were seen to be the factors which determine the effect on volatility of reporting translation gains and losses directly in equity.

Rodriguez (1977) studied the earnings of MNCs for 1974 and 1975 in order to determine the impact of SFAS #8. Only 13 of the 70 companies in the sample had changes of more than 5% of net income, and therefore she concluded that SFAS #8 did not cause major fluctuations in earnings. Unfortunately, she did not control for the translation methods used prior to SFAS #8. A number of companies in her sample already included translation gains and losses in income before being forced to adopt SFAS #8.

A survey of 35 MNCs (Fantl, 1979) indicated that many of these companies had to change their translation procedures for inventories, deferred charges, long-term liabilities, deferred credits, and exchange gains and losses. A less significant number of companies reported changes in reference to equities. The sample was biased in that the companies were identified from magazine and newspaper articles in which the companies were reported to complain about the effects of

SFAS #8 or which showed an erratic effect on reported earnings. Because of this bias, it is not appropriate to allege that these results hold for the general population of MNCs.

Duangploy's (1979) simulation attempted to determine the validity of the criticism that SFAS #8 caused greater volatility in reported earnings per share (EPS) than other translation methods. Various hypothetical scenarios of changes in exchange rates were studied. The results showed that the degree of volatility of reported earnings is not determined entirely by translation method and that the temporal method of SFAS #8 did not always result in greater volatility of reported earnings.

In a simulation study, Rupp (1982) concluded that the temporal method of SFAS #8 was extremely sensitive to the proportion of debt in the capital structure. As the debt ratio rose, SFAS #8 began to generate translation losses when economic gains had occurred. Contrary to Duangploy's findings, Rupp found SFAS #8 to result in greater volatility of earnings.

Nance (1981) developed a mathematical model to estimate financial statements translated from dollars to deutschemarks and pounds using several translation methods, including current rate, current/noncurrent, and monetary/nonmonetary methods. The study found that differences in earnings, averaged over twelve years, were large and significant across translation methods.

In summary, numerous examples are given in the
literature of specific companies whose reported earnings were
substantially affected by the advent of SFAS #8. Not only is
variability of earnings affected by the choice of translation
method, but average earnings over a long period may be
different as well. It is clear that financial statement data
may be materially different as a result of using different
translation methods.

Market Studies

The previous two sections discussed how different
accounting methods for translating foreign accounts can
affect management behavior, managements' perceptions, and
firms' financial statements. If these effects influence the
market's perception of the riskiness of a company's
securities, it follows that the price of the company's
securities may change. To the extent that managers,
investors, and securities analysts and others are affected by
securities price changes, it matters, at least to them, which
translation method is used. This section reviews the studies
which attempt to determine if securities markets react to
changes in translation method.

Since SFAS #8 was perceived by managers and others as
adding to the volatility of reported earnings (Griffin and
Castanias, 1987), managers were motivated to enter the
currency futures markets to reduce the fluctuations in
reported translation gains and losses. This behavior, while

functional for managers, can be dysfunctional to the company since currency futures trading is costly. If the cost of currency futures trading is large enough, there will be a decrease in securities prices. A change from the provisions of SFAS #8 to the provisions of SFAS #52, which allows many gains and losses to be deferred (and shown in owners' equity), would, by the same reasoning, result in a decrease in this dysfunctional behavior and a potential increase in securities prices.

Bryant and Shank (1977) expected that such dysfunctional behavior would result in significant adverse market reaction to SFAS #8. Contrary to their expectations, however, they found no significant differences in the returns of companies which did not have to change their accounting method and those companies which did.

Dukes (1978) studied both the securities prices and the variability of returns of 479 MNCs before and after the issuance of SFAS #8. He found no significant differences in either, as a result of the issuance of SFAS #8. For the MNCs that had to change their accounting method, the market reaction was not significantly different from reactions of companies which were not affected.

Makin's (1978) study of securities prices before and after the exposure drafts and the issuance of SFAS #8 concentrated on three groups of firms (1) MNCs, (2) matched pairs of domestic companies, and (3) "sensitive" companies, defined as those which were expected to be affected

negatively by SFAS #8. His findings were consistent with those of Bryant and Shank (1977) and Dukes (1978) in that SFAS #8 did not have much effect on securities prices.

Shank et. al. (1979) did find a negative market reaction to MNC share prices during the period of change to the provisions of SFAS #8. However the significance of the observed reaction is questionable since companies already using the temporal method, and which were therefore not required to change methods, also experienced a negative market reaction.

Ziebart and Kim (1987) studied market reactions to ten events during the period of change to SFAS #8 and during the period of change to SFAS #52. All events which suggested the inception or continuance of SFAS #8 were expected to result in a negative market reaction. All events that suggested the end of SFAS #8 were expected to result in a positive market reaction. According to the authors, the study showed an overall, statistically significant negative reaction to SFAS #8, and a positive overall reaction to the end of SFAS #8 and the inception of SFAS #52. However, only half the events studied yielded a significant market reaction of the sign expected, three of the ten events did not result in a significant market reaction, and two of the events leading to the issuance of SFAS #52 were significant but with the wrong sign. At best, Ziebart and Kim (1987) present mixed evidence regarding the effects of SFAS #8 and SFAS #52 on securities prices.

Brown and Brandi (1986) compared the abnormal returns of 83 companies adopting SFAS #52 early with those of 103 companies electing not to do so. The authors claim that if the market is efficient in the semi-strong form there should be no significant difference in returns between these two groups. Since a significant difference was observed, the results suggest that the market does not always distinguish between changes in reported income that result from a change in standard and changes that result from economic events.

In summary, all but one of the studies produced since 1977 indicate that the aggregate market does not react to changes in translation method. Therefore, it is not possible to conclude that the choice of translation method matters to market agents. However, given that the effects of translation are mostly buried in consolidated accounts, if material and sustained reporting effects are the case, it is difficult to imagine the process by which market agents could form a reaction to change at the time of change. Of course, if effects are random and reversing over time, that is differences between methodologies do not persist over time, non-reaction here too would be a consistent finding.

Studies of Early Adoption and Lobbying

Since early adoption of SFAS #52 was a matter of choice for MNCs, it represented a preference for the new standard. If companies were indifferent between the use of SFAS #8 and SFAS #52 during the option period, the characteristics of

companies which adopted the new standard early should be substantially the same as the characteristics of those companies which did not. Findings which show differences are consistent with the notion that the choice of foreign currency translation method mattered to the managers who made the choice.

Ayres (1986) studied early adopters of SFAS #52 and found that they were smaller than those that deferred adoption, tended to have a decrease in earnings the year before adoption, had fewer shares of stock in the hands of management and directors, and were more constrained on dividend payout and interest coverage ratios. All of the tests in this study were based on the assumption that adoption of SFAS #52 in 1980 increased reported earnings, and that adoption of SFAS #52 would have increased earnings of those firms that did not adopt SFAS #52 that year. This assumption was not tested by the study. Berg (1987) also found that late adopters of SFAS #52 tended to be large, and that they had a higher magnitude of foreign operations and higher debt to equity ratios relative to early adopters.

Lobbying for or against a proposed translation standard is a clear indication that the choice of method matters, at least to those who lobby. Even stronger evidence is provided if it can be shown that companies which lobby for (or against) a proposed translation standard have characteristics systematically different from those companies that do not.

Griffin (1983) examined certain factors presumed to affect managers' welfare to predict management's decisions to lobby for or against, or not to respond, to the invitation to comment on proposed changes to SFAS #8. The models developed in this empirical study described management's decisions well, but the predictive ability was not much greater than naive prediction rules. Kelly (1985) found that both large size and low management ownership were significant factors in predicting whether a company would or would not lobby for changes to SFAS #8.

In summary, the results from this segment of the literature indicate that large companies with low management ownership are more likely to lobby than smaller companies with higher management ownership. Size was also a factor in the decision to defer adoption of SFAS #52 or adopt it early. These results are again consistent with the notion that the choice of foreign currency translation method matters to the managers.

Summary

Studies indicate that managers are not indifferent to translation methods as evidenced by the opportunities for early adoption of SFAS #52, and that they change their behavior in reference to translation method. The choice of translation method impacts financial statements, but it is not known whether the choice matters to investors in the sense that one method results in accounting numbers that have

more evaluative or predictive ability than accounting numbers resulting from other translation methods. There is little evidence that the choice of translation method matters to the aggregate market in the sense that change of method causes a significant market reaction at the time of change.

Principal Implications for the Study

It is apparent from the foregoing that most of the extant empirical literature is actually about beliefs and actions based on these beliefs, with relatively little insight having been provided to date regarding what different reporting consequences obtain under alternative translation regimes. The available evidence is fairly convincing that many users of accounting data, like accounting regulators, believe that which translation methodology is required matters, and that they act on these beliefs. The piecemeal empirical evidence regarding the effects on reported accounting values under alternative methodologies, principally SFAS #8 and SFAS #52, suggest that at least in some cases, at some times, under some conditions, material differences between methodologies can be observed. Beyond this, very little is actually known about the periodic and longer term behavior of accounting and accounting-related information variables under alternative methodologies within realistic and representative settings.

What is clear, however, is that earnings and earnings variability constitute principal matters of concern to users,

and since ratios feature commonly in internal and external decision making, these too are likely to be important in terms of behavioral effects and consequences. Moreover, while the studies reviewed indicate various <u>beliefs</u> about the behavior of such variables, the <u>actual</u> behavior of the variables remains highly uncertain.

CHAPTER III

ALTERNATIVE TRANSLATION METHODOLOGIES

This chapter reviews the nature of the translation
methodologies which might be taken to constitute the
plausible choice set when it comes to translation accounting
policy, and specifies the eight selected for examination in
this study. This choice set is considered to in fact be
quite large (30 methodologies). Though the theoretical
translation literature is indeed voluminous, it reveals
nothing resembling theoretical closure as to which of these
methodologies is best or even which if any might be safely
excluded from further investigation. Each can and has been
accorded some theoretical appeal, and each is subject to
significant criticism in the theoretical literature.

The Current-noncurrent Method (CNM)

This method was discussed in AICPA Bulletin No. 92
(1931), AICPA Bulletin No. 117 (1934), Accounting Research
Bulletin 4 (1939) and Accounting Research Bulletin 43 (1953).
Current assets and liabilities are translated at the exchange
rate at the balance sheet date. Noncurrent assets and
liabilities and the elements of owners' equity are translated

at the exchange rates in effect when those assets were acquired, the liabilities were incurred, or the owners' equity elements recorded. Depreciation and amortization expense are translated at historical rates applicable to the related assets. All other income statement items are translated at an average exchange rate for the accounting period. The objective of this method is to reflect the liquidity of the foreign entity by showing the working capital components in dollar equivalents.

The rationale of the current-noncurrent method is that noncurrent items are not affected by fluctuations in exchange rates. If the goal is to measure remittable currency, only the current items should be translated at the current exchange rate, and exchange gains and losses should depend on the working capital position of the company (Benjamin and Grossman, 1981). As a result, the parent company will experience a translation loss when the foreign currency is devalued and a gain when it is revalued, as long as the subsidiary maintains a positive working capital position. The results of applying the current-noncurrent method are not affected by the debt to equity ratio since both long-term debt and equity are translated at the historical rate.

The Monetary-nonmonetary Method (MNM)

This method was advocated by Hepworth (1956) and required in 1965 by Accounting Principles Board Opinion

No. 6. Assets and liabilities which represent contractual rights to receive or obligations to pay fixed amounts of currency (monetary items) are translated at the closing rate and all other balance sheet items are translated at the rate that was in effect at the time the asset was acquired, the liability incurred, or the owners' equity element recorded. Since receivables are reported at estimated net realizable value, Hepworth states that, ideally, receivables should be translated at the estimated exchange rate that would be in effect at the time cash is expected to be received. But since it is unrealistic, and a violation of the principle of objectivity, to attempt to predict future exchange rates for this purpose, MNM allows that receivables be translated at the current exchange rate. Conceptually, the current exchange rate is the best estimate of the future exchange rate.

Most companies maintain a net monetary liability position, primarily because of the existence of significant long-term debt. Under the monetary-nonmonetary method, it is the net monetary liability position that is translated at the current rate and which determines the translation gain or loss. A net monetary liability position results in a translation gain when the foreign currency is devalued and a loss when it is revalued. The debt to equity ratio does affect the translation gain or loss; the higher the debt to equity ratio, the greater the fluctuation in translation gains and losses.

The monetary-nonmonetary method has been criticized (for example, Barrett and Spero, 1975) because it requires inventory to be translated at historical exchange rates and sales at the average rate. As a result, cost of goods sold are not properly matched with revenues, especially when the last-in, first-out inventory method is used. Companies which maintain high inventories will often have a current asset minus inventories figure which is smaller than current liabilities. For such companies, a revaluation of the foreign currency results in a translation loss, and a devaluation results in a translation gain. Companies which maintain small inventories may experience the opposite effect.

The Temporal Rate Method (TRM)

TRM was required by SFAS #8 (1975). Cash, accounts receivable, inventories and investments carried at market, accounts payable and long-term debt are translated at the closing rate, whereas inventories and investments carried at cost, fixed and other assets, common and preferred stock are translated at the historical rate. Expenses, such as depreciation, which are recognized as a result of shifting amounts reported for an asset to an expense category are translated at the rate that is used to translate the asset. Revenues recognized by shifting deferred income to a revenue classification are translated at the rate that is used to

translate the deferred income. Other revenues and expenses are translated at the average exchange rate.

The objective of the method is to preserve the underlying accounting principles of historical cost so that consolidation is possible on a consistent basis (Demirag, 1987). The FASB selected the temporal method on the premise that it best preserved the qualitative characteristics of individual assets and liabilities.

The most common complaint concerning the temporal rate method as required by SFAS #8 is that it results in greater variability of earnings than other methodologies (Benjamin and Grossman, 1981). Those who opposed SFAS #8 argued that including translation gains and losses in current earnings results in earnings fluctuations that do not reflect economic reality, that significant translation gains or losses reported in one accounting period are likely to substantially reverse in subsequent periods. Those who defend SFAS #8 argue that these fluctuations do reflect international market realities, given the fact that exchange rates change.

Whether the TRM methodology of SFAS #8 actually results in greater variability of earnings than other methodologies is an empirical issue which has not been resolved. Duangploy (1979), in a simulation analysis, observed that the TRM methodology of SFAS #8 does not always result in greater volatility of earnings than other methodologies which have been used in practice which have been proposed. Beaver and Wolfson (1984) provides illustrations which demonstrate that

SFAS #52 does not necessarily result in less variability of earnings, by deferring translation gains and losses (and showing the accumulated gains and losses in owners' equity), than does the methodology of SFAS #8.

The Current Rate Method (CRM)

CRM is required by SFAS #52 (1981). In this method, all balance sheet items, with the exception of owners' equity, are translated at the closing rate. Owners' equity is translated at historic rates. Income statement items are translated at an average exchange rate for the accounting period. According to FASB #52, the objective of this method is to generate translated accounts which reflect the economic conditions and perspective of the local country and to provide information that is generally compatible with the expected economic effects of an exchange rate change on the enterprise's cash flow and equity.

A significant feature of the current rate method, in contrast to the other three exchange rate methods, is that numerous financial ratios are the same before and after translation. Another significant feature is that the full translation gain or loss arises in the accounting period that an exchange rate change occurs, since all assets and liabilities are translated at the current rate. Translations gains and losses are related to the net asset position. Because this number is potentially large, translation gains and losses under the current rate method may have a

significant impact on current income in CRM methodologies which require that such gains and losses not be deferred.

The Price Parity Method (PPM)

Each of the foregoing four exchange rate methods has its supporters and detractors, and none has been shown theoretically or empirically to be superior to the other three under all circumstances. Patz (1978) suggests this long-standing dilemma may result from the use of exchange rates themselves. There is no rigorous defense in existence for the use of exchange rates, and exchange rates are not related in any clear way to accounting measures. Indeed, in 1974, the Committee on International Accounting called for an investigation of a purchasing power parity (PPP) theory-based approach as a possible alternative to exchange rate methods. Such a PPP-based[2] theory of translation is developed in Patz (1977a) and the resulting Price Parity Method is described in full in Patz (1981, p. 210).

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[2]The PPP theory of exchange rates is summarized in Officer (1982) in three propositions: (1) PPP is the principal determinant of the long-run equilibrium exchange rate, (2) the short-run equilibrium exchange rate in any current period is a function of the long-run equilibrium exchange rate in the sense that the latter variable is the principal determinant of, and tends to be approached by, the former, (3) the short-run equilibrium exchange rate in any current period is determined principally by the PPP, with the former variable tending to equal the latter.

Briefly, the PPM theory of foreign currency translation assumes that the property to be measured is local command over goods and services as expressed by currency unit accounting measures. Under the PPM system, foreign accounts are restated in dollars, but using price parity relative purchasing power indices instead of exchange rates under a temporal method approach in an attempt to express command over goods and services with respect to the economy in which the entity functions. It is assumed that foreign subsidiaries do not exist solely for the purpose of generating dollar cash flows to the parent, but rather for the maximization of economic power which can be defined as the size of assets held (Churchman, 1961). The purpose of the existence of foreign subsidiaries is to maximize this command over goods and services.

Translation Methods vs. Methodologies

A useful distinction can be made between translation methods and translation methodologies, where the latter extends to particular treatments of translation gains and losses and to whether and how to adjust for price levels. The alternatives involved here are considered in this section.

Treatment of Translation

Gains and Losses

When translating the accounts of a foreign subsidiary
from a foreign currency into the domestic currency, the
resulting trial balance will not likely balance. This is
because exchange rates will probably change from accounting
period to accounting period. Accounts translated at the end
of the current accounting period using the current exchange
rate will therefore be translated by using a different number
than was used at the end of the previous accounting period.
The amount of the resulting imbalance is a translation gain
or loss.[3] Translation gains and losses may either be
included in the determination of current net income (as
required by SFAS #8) or deferred and shown in owners' equity
(as in SFAS #52). If translation gains and losses are shown
on the income statement, they add an element to current net
income which has been the subject of much debate, as
described in Chapter II. Deferral of translation gains and
losses may be achieved by taking them directly to retained
earnings or to a special cumulative foreign-exchange
translation adjustment account as is required by SFAS #52.
When the net investment in the foreign entity is sold or
liquidated, the cumulative translation adjustment is also

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[3]Translation gains and losses must be distinguished from
gains or losses on foreign currency transactions which
generally must be included in the current period's income
statement.

eliminated, thus resulting in an impact on the gain or loss from the sale or liquidation of the net investment on the income statement of the period in which the sale or liquidation occurs.

There is no theoretical closure on this issue, so that the disposition of translation gains and losses remains a major variable in the translation debate (Amernic and Galvin, 1982). For example, Lorensen advocated non-deferral of translation gains and losses with TRM. Accounting Research Study No. 12 argued that foreign exchange gains and losses should be recognized in the period they occur because deferral results in an artificial smoothing of net income that reduces the value of the information contained in the financial statements.

An argument against deferring translation gains and losses with CRM is presented by Beaver and Wolfson (1984). Foreign exchange traders typically expect future exchange rates to differ, sometimes significantly, from current rates. Some of the changes in exchange rates are therefore expected and are related to differences in the nominal interest rates in the two countries. The considerable research supporting the allegation that there is a relationship between relative interest rates and changes in exchange rates is reviewed by Feiger and Jacquillat (1981). Future exchange rates cannot be fully anticipated, however, even by analyzing relative interest rates. The translation gain or loss that is not anticipated is another source of earnings volatility.

Analysts must concern themselves with both the expected future earnings and with the volatility of that earnings series. Deferring translation gains and losses, according to Beaver and Wolfson, ignores a major element of the company's performance during the period.

The only fully-developed methodology for PPM is that described in Patz (1977a and 1981). This methodology allows that translation gains and losses may be taken directly to equity or they may be included in the determination of current earnings. Preference is indicated in Patz (1975) for non-deferral, however, particularly in the absence of price level adjustment.

Price Level Adjustment

Arguments and evidence in the accounting literature indicate that changes in the general price level in countries in which subsidiaries are located can often have significant effects on those subsidiaries and that a case for restatement exists (Rosenfield, 1972). If price level changes are to be accounted for when translating foreign accounts, a decision must be made between restate/translate (adjust the foreign accounts for foreign (local) country price level changes before translating to the parent currency) and translate/restate (adjust the accounts for parent country price level changes after they have been translated to the parent currency).

Four advantages for the restate/translate approach are listed by Choi (1975, p. 126).

(1) It enables statement readers to assess ordinary operating results in terms of local currency as well as the effect of foreign inflation on these results.

(2) It enables management to better gauge the performance of a subsidiary after providing for "maintenance" of affiliate assets.

(3) It enables management to evaluate the performance of a subsidiary in terms of the environment in which the subsidiary's assets are domiciled.

(4) It enables management to ascertain the effect of currency devaluation on a subsidiary's operating results.

In addition, the restate/translate method is arguably preferable to translate/restate from the viewpoint of emphasizing the importance of the "functional currency" concept of SFAS #52. That is, the price indices used to adjust the functional currency are associated with the same environment in which the subsidiary operates (Grossman et. al. 1983). Indeed, in the exposure draft that led to Statement No. 70, the FASB selected the restate/translate method as the method which best meets the objectives of SFAS #52. However, the exposure draft resulted in complaints by MNCs that the restate/translate method is more costly to apply than translate/restate, especially if the MNC has subsidiaries in a number of countries, thus requiring dealing with a number of different functional currencies and price level changes.

A further argument against the restate/translate method is that different units of measure are used on the same set of financial statements (Choi, 1977). According to Lorensen and Rosenfield (1974), when the various accounts are merged into consolidated accounts, the resulting numbers have no theoretical meaning and are not comparable. These standards of measurement are based on foreign purchasing power of the monetary unit, and Lorensen and Rosenfield question whether such a standard is appropriate for a U.S. company.

Methodologies Studied

Of the 30 conceivable translation methodologies implied by the foregoing--five methods, two deferral options, three restatement options--eight were included in the study. As to methods, data availability precluded inclusion of the Temporal Rate Method in pure form. Exclusion is not the case in substance, however, since the MNM can be expected to generate the same or extremely similar results to the TRM in practice. The principal difference between the two procedurally lies with treatment of components of inventories and investments carried at market under lower of cost or market valuation, which are components of balances which cannot readily be distinguished from available data. The TRM employs current rates for those balance elements whereas the MNM employs historic rates. However, these components in general can be expected to be relatively immaterial and/or

the turnover period involved sufficiently short so as to render the differential rate change effects immaterial.

With deferral versus non-deferral, if one accepts the distinction between measurement and restatement orientations in translation theory and methods (Patz 1977b), then deferral would be taken as inconsistent with the CNM, MNM and TRM, and consistent with the CRM (as rationalized in SFAS #52) and the PPM. The CNM and MNM never did involve deferral in practice. The TRM under SFAS #8 also did not involve deferral, yet the most common complaint in its regard was that it resulted in greater variability of earnings than other methodologies (e.g. Benjamin and Grossman (1981), creating fluctuations in income which were argued not to reflect economic reality. Deferral of translation gains and losses, and showing these cumulative gains and losses in owners' equity, in turn does feature in SFAS #52. However, Beaver and Wolfson (1984) argue that deferring translation gains and losses ignores a major element of a company's performance. Thus methodologies involving both deferral and non-deferral were examined for all methods.[4]

In contrast, no methodologies involving price level adjustment were included for study. Price level adjustment has not characterized past translation practice, but this of course does not itself render the methodologies

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[4]With deferral methodologies, translation gains and losses are not shown in current earnings, but are accumulated as a cumulative translation adjustment in the owners' equity section of the balance sheet.

uninteresting. However, price level restatement does introduce an entirely new dimension to the translation process which confounds and complicates comparative analysis across methodologies. Accordingly, consideration of these translation methodologies was deferred to a later date. The methodologies encompassed by the study were therefore as follows, where DEF designates deferral and NDF designates non-deferral of translation gains and losses:

M1 = CNM/NDF	M5 = CNM/DEF
M2 = MNM(TRM)/NDF	M6 = MNM(TRM)/DEF
M3 = CRM/NDF	M7 = CRM/DEF
M4 = PPM/NDF	M8 = PPM/DEF

CHAPTER IV

METHODOLOGY

The purpose of this chapter is to present the principal components of the methodology employed in pursuit of the purpose of this study. That purpose, in general terms, is to identify if and in what ways different translation methodologies produce different or similar results under realistic conditions. Pursuit of this purpose, in turn, is motivated by the notion that policy choice of translation methodology is likely to matter to the extent that different methodologies result in different financial statement numbers, such as earnings, total assets, etc. This is reasonable since financial statement numbers are used in numerous decision contexts. Some of those contexts were made apparent in Chapter II. A further example is the use of financial statement numbers or accounting ratios by lenders to monitor debt covenants (Smith and Warner, 1979 and Leftwich, 1981). Numbers from published financial statements may therefore place certain restrictions on the actions of management. These restrictions may significantly affect, or even dictate, managements' decisions concerning dividends, share repurchases, maintenance of working capital, merger

activity, investments in other companies, disposition of assets, and incurring additional debt.

Realization of an appropriate methodology accordingly consists principally of generating realistic and representative pre-translation accounting data, affecting realistic and representative post-translation results under the translation methodologies selected (Chapter III), and selecting accounting related variables for measurement for which differences are likely to matter in the above sense. These principal features of the methodology employed are presented in this chapter. Consideration of specific statistical procedures is deferred to Chapter V.

Sample Firms and Study Period

Obtaining a meaningfully large sample of the financial statements of foreign subsidiaries prior to their translation and consolidation with the accounts of their U.S. parents is not practical. In this study, U.S. companies were used as hypothetical subsidiaries of a British parent, under the notion that there is no reason to conclude that they could not become so. Several advantages attach to this approach beyond generating a sample sufficiently large to support generalization. U.S. GAAP is already the standard for the hypothetical subsidiaries. The effects of transactions between parent and subsidiary which must be eliminated in translation and consolidation are not present. Also, any effects the actual use of a specific translation methodology

might have in real parent/foreign subsidiary settings on management financing and operating decisions are avoided.

Fifty U.S. companies were selected at random from Moody's Industrial Manuals to build a data base of pre-translation financial statements, under the inclusion criterion that financial statement data had to be available in Moodys' manuals for 20 consecutive years ending in 1985. This criterion insured the availability of the considerable information needed for this study that was not readily available from other sources, such as the cost of fixed assets acquired and retired.[5] Although the study period was the ten years 1976-1985, financial data for 1966-1975 were needed to estimate the temporal characteristics of various accounts accurately for the 10 study period years. The resulting sample is representative of a wide range of firms in terms of industry, size, capital structure, profitability, etc. The firms included in the study are identified in Appendix A, where the range of industry representation should be fairly apparent. That they display a quite wide range of

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[5]If possible, another inclusion criterion would have been applied: that no company in the sample engaged in foreign operations. A perusal of the Moody's manuals resulted in an initial selection of 104 companies which appeared to have the necessary financial statement numbers for the 20 years required by the study. Of these, 11 were eliminated for various reasons. For example, some firms acquired or disposed of large subsidiaries during the study period, a factor which would render the accuracy of the estimation of temporal charateristics questionable. Of the remaining 93, fewer than 10 were known to have no foreign operations.

TABLE I

PRE-TRANSLATION AVERAGE ACCOUNTING VALUES
1976-85, MILLIONS OF $

COMPANY	INV	CA	FA	CL	LTD	REV	EARN
1	369	1,062	1,002	485	622	2,574	90
2	1,228	1,964	1,168	1,196	673	6,101	324
3	476	1,216	1,724	708	819	3,802	86
4	505	1,422	2,346	743	612	3,062	160
5	399	715	625	621	395	2,917	-60
6	361	907	983	500	390	2,220	87
7	32	64	42	30	28	163	4
8	333	889	662	479	307	2,316	177
9	696	1,523	7,077	987	1,885	5,865	-50
10	320	657	461	276	224	1,200	32
11	494	1,675	911	688	128	3,223	311
12	253	505	509	214	230	1,141	72
13	999	2,097	1,686	1,076	482	2,078	200
14	455	824	1,314	387	231	2,698	143
15	1,507	2,877	4,896	1,493	1,330	2,867	228
16	374	1,041	3,125	591	798	3,000	117
17	681	1,794	2,128	1,154	597	5,117	474
18	59	354	838	208	135	1,214	85
19	4,753	11,176	15,401	9,892	4,610	41,497	944
20	155	382	358	184	221	639	24
21	3,173	9,874	11,442	7,378	2,834	23,706	1,628
22	2	6	10	3	2	19	1
23	353	719	1,795	360	525	2,305	129
24	800	1,514	954	627	469	2,542	94
25	393	1,314	4,455	655	1,476	4,338	277
26	34	72	43	32	33	104	2
27	790	1,986	1,888	748	357	4,778	406
28	405	770	3,232	527	940	3,035	145
29	523	1,445	1,236	713	621	3,057	116
30	428	1,229	1,228	596	702	3,217	121
31	25	85	251	48	119	370	27
32	317	711	1,218	373	480	1,686	78
33	254	618	1,461	339	429	1,610	46
34	193	605	1,471	360	427	2,277	89
35	142	601	3,722	384	1,297	1,911	174
36	237	543	240	217	101	879	54
37	658	2,967	10,738	2,715	4,745	11,994	707
38	68	181	533	90	163	762	31
39	732	1,236	2,775	664	1,247	3,143	48
40	108	238	147	101	96	454	12
41	290	560	392	251	213	1,521	33
42	454	976	772	620	407	2,476	39
43	245	440	368	169	183	549	5
44	26	84	353	57	154	245	23
45	435	786	1,389	588	646	6,232	100
46	94	167	120	43	13	304	15
47	169	809	1,144	454	687	2,525	146
48	1,619	3,479	9,414	1,792	2,864	8,716	345
49	292	739	488	292	100	2,411	131
50	214	495	260	295	162	1,230	39

"INV" = inventory; "CA" = current assets; "FA" = fixed
assets; "CL" = current liabilities; "LTD" = long-term
debt; "REV" = revenue; "EARN" = earnings

financial characteristics is evidenced in Table I which presents selected pre-translation averages for several asset and liability categories and for revenue and earnigns for the 10 year study period.

The 1976-1985 study period and the United Kingdom translation perspective were selected for several reasons. Direct foreign investment by both countries is highest in the other. As Figure 1 illustrates, the study period encompasses periods of both increasing and decreasing economic activity, as reflected in the behavior of the average earnings for the 50 sample firms. In both the U.S. and the U.K., interest rates rose from 1976 to highs at the beginning of the 1980's, then generally declined through 1985, and different relative levels of interest rates were experienced during this period. During 1976-1985 the exchange rate of British pounds per U.S. dollar was a low as .4 and as high as .9. Consumer prices generally rose in both countries, but often at quite different relative rates. Interest rates and interest rate parity, price levels and purchasing power parity and exchange rates are all interrelated,[6] as well as interwoven within the fabric of alternative translation theories, particularly as regards the economic meanings of translation results under alternative methodologies (see e.g., Stickney and Aliber, 1975 and Wyman, 1976).

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[6]For reviews of considerable research evidence in this regard, see e.g. Feiger and Jacquillat (1982) (relative interest rates) and Officer (1982) (relative price levels).

YEARS	1	2	3	4	5	6	7	8	9	10
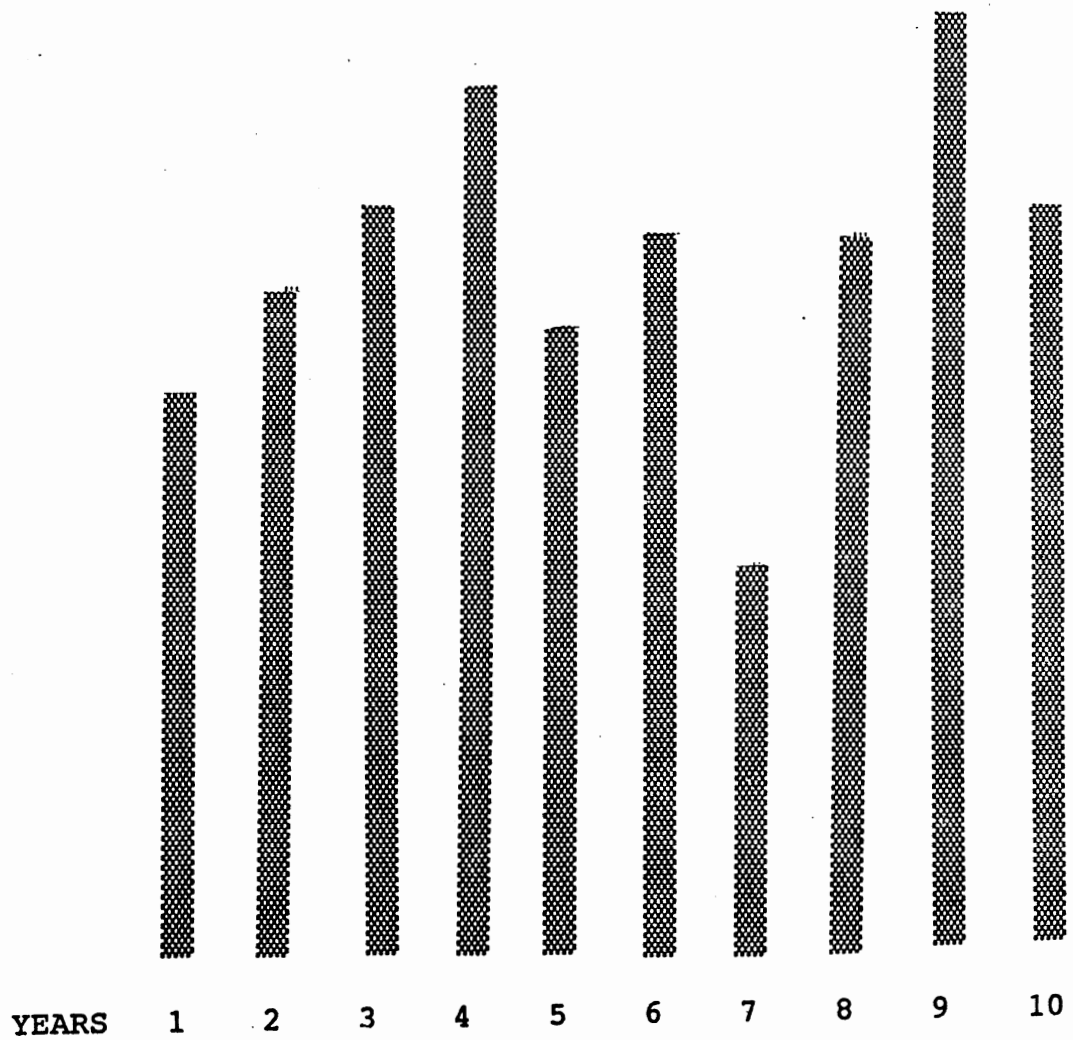
YEAR	50-COMPANY AVERAGES
1	134.0
2	165.6
3	184.5
4	205.7
5	150.8
6	176.0
7	98.0
8	174.9
9	232.6
10	179.4

Figure 1.   Pre-translation average earnings, 1976-1985

Estimation of Temporal Characteristics

All translation methodologies require that certain
accounts be translated at the "historical rate," the exchange
rate that was in effect at the point in time an asset was
acquired, a liability was incurred, a revenue or expense was
recognized, or an element of owners' equity was recorded.
Such a "point in time" is referred to in the present study as
a temporal reference. Since some account balances (such as
fixed assets and long-term debt) are the result of numerous
transactions over a considerable period of time, such account
balances are made up of components, each consisting of a
dollar amount and a temporal reference. The set of all such
components is referred to in the present study as the
temporal characteristics of the account balance. This set
thus represents and describes a distribution of ages and
related dollar amounts of the account balance.

In order to translate the financial statements of the
sample companies, it is necessary to determine the temporal
characteristics of the reported accounting numbers.
Obtaining this information directly from the companies
selected for the sample, for all the years studied, is
obviously impossible. Therefore, it was necessary to
estimate these characteristics. The existing methods for
estimating the temporal characteristics of financial
statement numbers are described below.

Three studies, relevant to the estimation of temporal characteristics, are Petersen (1971), Davidson and Weil (1976), and Parker (1977). The purpose of these models is to generate estimated general price level data, a process which requires estimation of the temporal characteristics of financial statement numbers. Ketz (1977) provided detailed explanations of these three models, and Ketz (1978) tested their validity. He concluded that there is no significant difference in results among the three models and that each of the three models is sufficiently accurate for research purposes.

The three models tested by Ketz are limited in that they estimate only the average ages of assets and liabilities so that the temporal characteristics of these account balances are assumed to consist of a single component.

For the purposes of the present study, an accurate method of estimating the temporal characteristics of inventory, fixed assets, and long-term debt was critical. Other accounts were either immaterial (such as prepaid items) or translated the same under all methodologies (such as common and preferred stock), and simple heuristics--described in Appendix B--were used to estimate the temporal characteristics of and/or translate these accounts. Some account balances, such as fixed assets, consist of a large number of components since large companies may acquire and dispose of fixed assets often. Since the exchange rates between U.S. dollars and British pounds, used in the present

study, do not change significantly from day to day, the only temporal references used in the present study were month-end points in time.

In order to estimate the temporal characteristics of certain accounts, the financial statements for the companies used in the sample were analyzed over the twenty-year period 1966-1985, with 1966 referred to as the "base year." The reasons for these additional 10 years of required data are described below.

Inventories

The method of estimating the temporal characteristics of inventory depends on the cost flow assumption adopted by the individual firm. The current year's purchases (cost of goods sold minus the beginning inventory plus the ending inventory) were assumed to have occurred at mid-year. For those firms using FIFO or LIFO, the cost of goods sold were subtracted from the goods available for sale in either FIFO fashion or LIFO fashion to determine the temporal characteristics of the ending inventory. The dates of acquisition of components of inventory are not relevant to the weighted average inventory valuation method, so the temporal reference were assumed to be the middle of the particular year for those firms using the weighted average method.

Fixed Assets

The information needed to determine the temporal characteristics of fixed assets include (1) the ending total balance reported each year on the balance sheet for fixed assets, (2) the cost of acquisitions each year, (3) the temporal references of acquisitions in each year, (4) the cost of retirements each year, (5) the temporal references of the retirements each year, and (6) the temporal characteristics of the fixed assets at the end of the base year. Factors (1), (2) and (4) were known from the data provided in Moody's Industrial Manuals, and factor (3) was provided to the nearest year by the Manuals, but factors (5) and (6) were not known and had to be estimated.

In order to estimate factors (5) and (6), it was assumed that plant assets were retired on a FIFO basis. The account balance in the base year (1966) was assumed to be made up of twenty equal-sized components with temporal references distributed over the previous twenty years (1947-1966). Generating ten years of data prior to the study period—discussed above—minimizes the impact of this assumption.

In each subsequent year, additions were assumed to have occurred at the middle of the current year, an assumption that allows a maximum of only a six month error in the temporal reference of any given addition, since the Manuals provide the temporal reference by years rather than by months. Retirements were assumed to occur in FIFO fashion.

Although it seems reasonable that companies are more likely
to retire older assets than newer ones, this does not always
occur, and errors in the estimation of the temporal
references are possible. The significance of such potential
errors is tested in Appendix C.

The footnotes to the financial statements in Moody's
Industrial Manuals usually divide fixed assets into
categories such as Land, Buildings, and Machinery and
Equipment. The estimation method described above was applied
to each of these categories to achieve greater accuracy.
However, since the Manuals disclose additions and retirements
for total fixed assets only, rather than for the categories,
allocation among the categories was necessary.[7]

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[7]An increase in the balance of a given category between
balance sheet dates represents the minimum amount of
additions to that category during the current period, and a
decrease represents the minimum amount of retirements from
the category. The amount of addition allocated among
categories is therefore

$$AA = TA - MA_1 - MA_2 - \ldots - MA_i$$

where AA = allocable additions,
    TA = total additions for fixed assets, and
    MA = minimnum additions for categories 1 through i.

AA was allocated among the categories proportional to the
relative balances in the various categories on the current
balance sheet date. The amount of retirements for each
category were calculated as follows:

$$R_i = B_i + MA_i + A_i - E_i$$

where R_i = the retirements for category i,
    B_i = the beginning balance of category i,
    MA_i = the minimum addition to category i,
    A_i = the allocated addition to category i, and
    E_i = the ending balance of category i.

Long-Term Debt

The footnotes of the financial statements in Moody's Industrial Manuals divide long-term debt into categories, such as various bond issues, term notes, lease obligations, and miscellaneous. The method of estimating the temporal characteristics in the present study made use of the following information: (1) the amount of debt by category, (2) the date(s) debt was incurred (the temporal reference), (3) the temporal reference of new debt, and (4) the temporal reference(s) of debt retired. For some categories of long-term debt, notably bond issues, factors (1) and (2) were nearly always provided, so that the temporal characteristics of those categories were usually known.

For categories other than bonds, factor (2), temporal references, were often not given. To determine these temporal references, it was necessary to know factors (3) and (4). Factor (3) was estimated by assuming that new debt (when the exact date was not given) was incurred at mid-year. To estimate factor (4), it was assumed that the oldest debt was retired first.

Since it was not necessarily true that the oldest debt was retired first, there was a potential for error in the estimation of temporal characteristics and therefore of the translated balance. The significance of such potential errors was tested, and validation results relating to the foregoing estimation techniques are presented in Appendix C.

These results suggest that estimation error is not likely to be a serious problem, particularly in comparative analysis where each firm effectively serves as its own control.

Exchange Rates and Price Parity Indices

Monthly spot exchange rates, drawn from various volumes of "International Financial Statistics" published by the International Monetary Fund, Bureau of Statistics, were used to translate the financial statements of the 50 sample companies under the various exchange rate based methodologies examined. The price (purchasing power) parity indices needed for translation under the PPM were calculated as follows:

$$PP_t = PP_b(CPI_{tk}/CPI_{ts})$$

where PP_t = the price parity index for point in time t,

PP_b = an exchange rate assumed to approximate purchasing power parity at the point in time b, (b = 8/31/1971),

CPI_{tk} = consumer price index for the U.K. at time t, standardized to base period b = 100,

CPI_{ts} = consumer price index for the U.S. at time t, standardized to base period b = 100.

The foregoing represents the simplest of the practical approaches suggested by Patz (1981) for obtaining a price parity index time series for translation purposes, i.e. the "constructed rate" approach using an exchange rate as a base for extrapolation. While it is probably unreasonable to expect any exchange rate to be a perfectly accurate measure of relative purchasing power, some exchange rates are likely to be better than others. A case in point is the exchange

rate used as PP_b, that at August 31, 1971, during the period
of relatively "uncoordinated" floating exchange rates (see
Patz, 1981, p. 214). As analysis is comparative and, over
time, any misspecification of base period purchasing power
parity would not be expected to materially affect results
obtained. Choice also arises with respect to the price level
index series to be used, where a case can be made for use of
a wholesale price index instead of a consumer price index.
As Aliber and Stickney (1975) note, economists have
extensively debated which should be used to measure relative
price changes without reaching consensus. They use both in
computing purchasing power parity deviations for 48
countries, and for only one (Japan) was a significant
difference found. Since wholesale and consumer prices tend
to be highly correlated, choice here too would not be
expected to affect materially the results obtained in
comparative analysis.

Figure 2 presents in graphical form the comparative
monthly behavior of the exchange rate time series and the
price parity index time series obtained for the 10 year study
period. In this figure, time moves from top to bottom; low
exchange rate and price parity numbers are to the left and
high numbers are to the right. From Figure 2 it is readily
evident that the study period encompasses periods of both
positive and negative purchasing power parity deviations for
the dollar/pound exchange rate. Moreover, deviations of both
relatively long and short duration are observable. Of
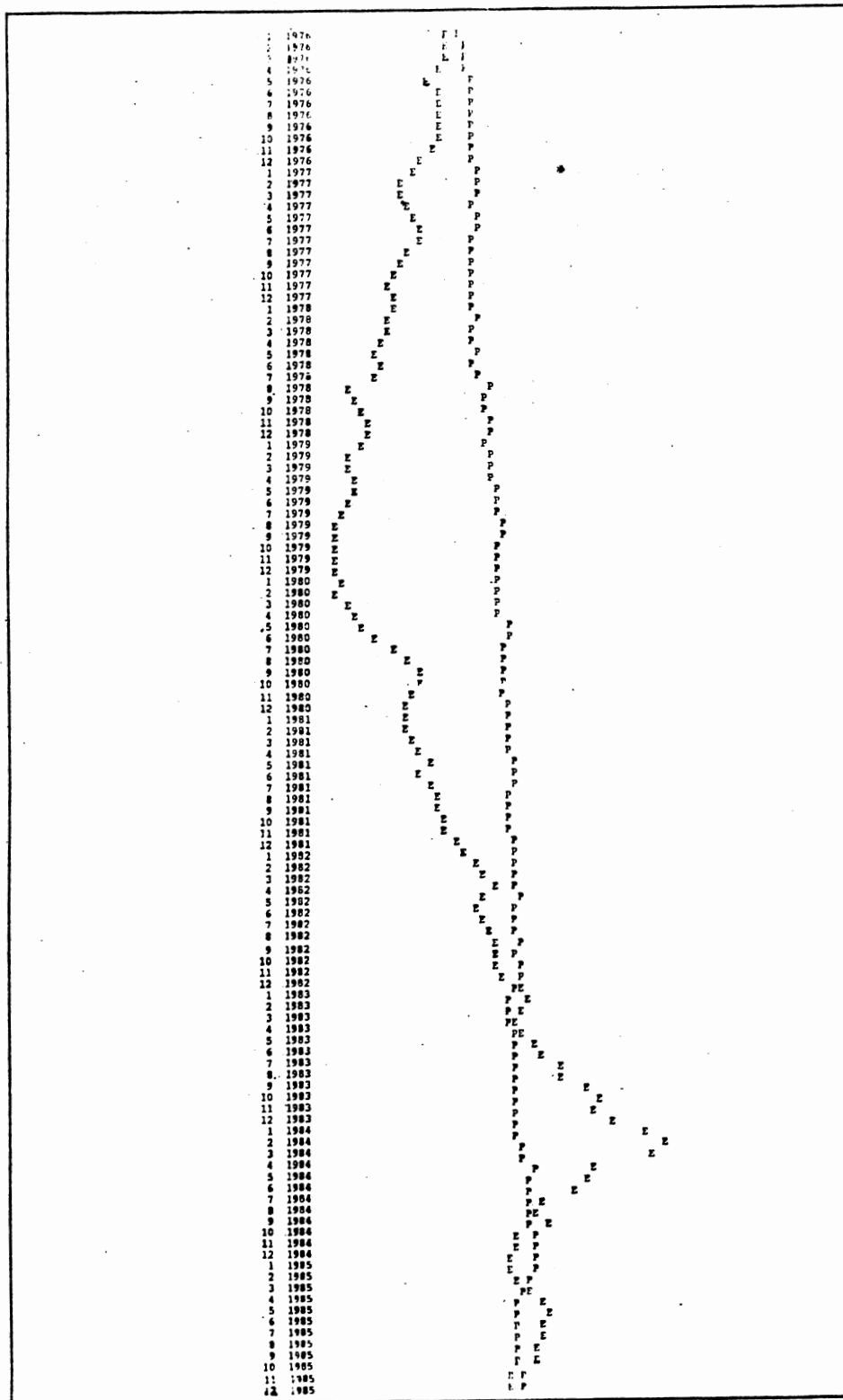
Figure 2.   Price parity index and exchange rate
time series monthly, 1976-85

further note perhaps is that it is these deviations which PPM
theorists see as "noise" when it comes to accounting for
foreign operations which have separate entity, going-concern
operating characteristics, that is, where the foreign
currency is indexed the "functional currency."

Study Variables

Translation, applying monthly exchange rates, generated
for any given financial statement item, a 50 by 10 (firms by
years) matrix of post translation accounting values for each
of the eight methodologies studied. Any such post
translation value may thus be denoted as the matrix element
x_{mit} where:

> m = translation methodology, m = 1 to 8
> (denotes pre-translation),
>
> i = sample firm, i = 1 to 50,
>
> t = financial statement year, t = 1 to 10

The Moodys' data employed in this study were
sufficiently detailed so as to make possible comparative
analysis of a large number of financial statement items and
measures derivable from these. Given the breadth of the
study in terms of sample size, sample period and translation
methodologies, manageability, dictated restrictions in terms
of the number of accounting-related variables to be observed
in the present study.

Consistent with the extant literature, reviewed in
Chapter II, earnings (E) and earnings variability were

included as study variables since they appear to be the principal focus of attention for users and researchers alike. However, because of differences in scale across sample firms, cross-sectional analysis in terms of E_{mit} could produce summary statistics which could be misleading in terms of distorting the differential effects of alternative translation methodologies. Therefore deflated and standardized earnings variables were also used, specifically $E_{mit}/E_{oit} = DE_{mit}$, where E_{oit} is the corresponding pre-translation earnings for firm i in period t, and SE_{mit}, where each earnings observation for any given firm for any given period is rendered equivalent to a z-score, with scaling in standard deviation units relative to the mean of the distribution of earnings values across comparable methodologies.[8]

A number of financial ratios are computed using reported earnings. Models which attempt to predict earnings, business failure, share market prices, etc. and decisions rules used by managers, lenders, and investors make use of ratios. For example, the decision to make a loan may depend on a cut-off rule; companies with a debt to total assets ratio greater than a certain amount may not be eligible for additional financing from a particular source. These cut-off rules are

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[8] $SE_{mit} = (E_{mit} - E_{mit}/n)/s_{mit}$, where s = the standard deviation of E_{mit}, and where n = methodologies m1 = m8.

based on lenders' past experiences with the distributions of ratio values and the rank orderings of companies within the distribution.

Accordingly, two profitability ratios were selected on the basis of their frequency of appearance in textbooks and in prior research generally, return on equity (RE_{mit}) and return on total assets (RA_{mit}). Description of the types of analyses and tests performed on these two earnings related variables is deferred for presentation along with the results they generated.

Questions Addressed

The purpose of this study is to determine whether different translation methodologies produce materially different results under representative firm and economic conditions. Thus the study is essentially descriptive in character. In a context of many possible questions and a famine of answers regarding the comparative behavior of accounting results under alternative methodologies, the data set generated presents a "movable feast" of analytical opportunities. As with variables to be focused upon, manageability dictates further restriction regarding the specific questions to be addressed by the study. Thus questions such as why the results differ, and questions such as which methodologies might in some empirical sense be

judged "better" than others, are not addressed to any meaningful extent.

To make a difference, accounting values generated under alternative methods have to be different in an absolute sense. However, for the differences to matter, they must be informationally different. The variables selected for observation in the study were selected on the basis that absolute and relative differences are likely to matter to users and others as suggested by the extant literature, particularly that reviewed in Chapter II. In turn, differences between the results which obtain under alternative translation methodologies are likely to matter informationally depending upon the empirical properties they exhibit. This suggests four fundamental questions which are directly amenable to descriptive analysis at the individual firm and across firms levels, periodically and across time:

(1) Are observed differences "material?"

(2) Are they systematic?

(3) Are they sustained over time?

(4) Do they correspond with explicit or implied beliefs as suggested by prior empirical and simulation research?

The analysis conducted and the results obtained relating to these questions are the subject matter of the next chapter.

CHAPTER V

ANALYSIS AND RESULTS

Introduction

Reported earnings, variability of earnings and two profitability ratios (return on total assets and return on equity) were selected for study because differences in these variables across translation methodologies are likely to matter to users of financial statements. In turn, differences between the results which obtain under alternative translation methodologies are likely to matter informationally depending upon the empirical properties they exhibit. In this chapter, the four fundamental questions presented in the previous chapter are expanded in reference to earnings, variability of earnings, return on total assets, and return on equity. Analysis is conducted and results are obtained.

Reported Earnings Effects

The question of whether reported earnings are significantly different when different translation methodologies are used is hardly addressed in the translation

literature. Most of the extant empirical literature is about beliefs and contains little insight regarding what differences occur under alternative translation methodologies.

The literature that purports to demonstrate earnings effects of different translation methodologies is piecemeal. For example, Rodriguez (1977) concluded that SFAS #8 did not cause major differences in earnings. Nance (1981) found that differences in earnings, averaged over 12 years, were large and significant across translation methods. Ayres (1986) found that early adopters of SFAS #52 tended to have a decrease in earnings the year before adoption. Although the number of reported earnings studies is small and there is no closure concerning the effects on reported earnings across translation methodologies, it is clear from these and other studies that earnings constitute principal matters of concern to users. Yet the <u>actual</u> behavior of the reported earnings remains uncertain.

Questions Addressed

The specific questions to be addressed in this chapter relevant to reported earnings are:

(1) Are reported earnings often significantly different across firms, at the firm level, and over time when different methodologies are used? As observed by Nance (1981), if different translation methodologies generate significantly

different average reported earnings numbers over several years, multinational corporations may appear more (or less) attractive to investors of capital depending on methodology used. As in the Nance study, the 10-year period of the present study represents a significant period of time to an investor. If different methodologies do result in significantly different reported average earnings over time, investors' decisions could be affected by translation methodologies. Further, if investors compare the returns on investments in foreign assets with returns on investments in domestic assets, the policy choice of translation methodology may affect the international allocation of investment capital.

(2) What methodology results in the highest/lowest reported earnings, across firms, at the firm level, and over time? The answer to this question is of interest to managers and financial market analysts. For example, the compensation of managers is often related to reported earnings figures. If translation methodology choice has a significant impact on reported earnings, especially over a long-term, managers would not be indifferent about which methodology is used.

The impact of translation on consolidated earnings depends not only on the methodology used, but on the size of foreign operations compared to domestic operations. It is not known to what extent financial markets could be affected by different translation methodologies. If the difference in reported earnings that is due solely to different

methodologies is known to the market, an efficient market would not likely react to the difference. But the difference in reported earnings across methodologies is not easily determined by financial analysts. To calculate the difference, an analyst would need the temporal characteristics of various accounts, information which is not readily available. Therefore, a significant difference in reported earnings has the potential to alter stock prices.

(3) Does the deferral of translation gains and losses significantly affect reported earnings across firms, at the firm level, and over time? For the same reasons listed above for questions (1) and (2), analysts, managers, and other users of consolidated financial statements would not be indifferent between deferral and non-deferral methodologies if deferral results in higher/lower reported earnings.

(4) Does any one non-deferral methodology (M1-M4) result in consistently higher/lower reported earnings over time? The answer to this question would be meaningful to managers whose evaluation and compensation is related to reported earnings.

(5) Does any one deferral methodology (M5-M8) result in consistently higher/lower reported earnings over time?

(6) Do any non-deferral methodologies result in total average earnings that are similar over time?

(7) Do any deferral methodologies result in total average earnings that are similar over time?

(8) Do the SFAS #8 or SFAS #52 methodologies (M2 and M7) generate substantially different reported earnings numbers, and does either methodology consistently generate larger earnings than the other over time? The comparison of these two methodologies is of special interest since they represent the last two official choices for GAAP.

The analysis in the following sections excludes two outliers, Companies 9 and 43. These firms generated outliers in the sense that the coefficient of variation or the deflated earnings numbers were enormous and meaningless compared with the other companies in the sample. For example, an extreme reported earnings number, for a single year, could distort the mean and the coefficient of variation beyond meaning. Likewise, extremely low pre-translation numbers, in any year, could result is enormous deflated earnings numbers.

Across-Firms Earnings Effects

Total and average earnings. Table II displays across firm statistics by methodology. The means of reported earnings of the 50 sample companies over the 10-year study period are often substantially different depending on methodology used. The total E_{mit} (total earnings) and average E_{mit} (average earnings) numbers suggest that earnings under M8 are generally higher than for other methodologies such as M2 or M7. But the mean earnings under M3 (125 million pounds) is not much different from the mean earnings

under M5 (124 million pounds). These general observations are consistent with Nance (1981) who found that differences in earnings, averaged over 12 years, were large and significant across translation methods. These observations are not consistent with Rodriguez (1977), however, which concluded that SFAS #8 (M2) did not cause major differences in earnings. M2, in fact, has the lowest deflated earnings across methodologies relative to firm size (DE_{mit}) as well as the lowest standardized earnings (SE_{mit}) relative to the other methodologies, and the average earnings under M2 ($E_{mit}/50$) is clearly different from the average earnings under M1, M3, M5, M6, and M8, using Rodriguez' 5% difference measure.

The t scores for SE_{mit} indicate that, at the 95% level of confidence, M8 (PPM/DEF) produces mean standardized earnings higher than the mean standardized earnings of any of the other seven methodologies studied. The signs of the deflated earnings t scores also indicate higher means for M8, but the t scores are significant at the 95% level of confidence for M8 comparisons with M4 and M7 only.

Deferral vs. non-deferral. A comparison of average reported earnings (average E_{mit}) under the non-deferral methodologies (M1-M4) with their deferral counterparts (M5-M8) reveals differences that appear to be significant. However, the differences in E_{mit} may be driven by a small number of large firms.

TABLE II

ACROSS FIRM STATISTICS BY METHODOLOGY
N=50

	M1	M2	M3	M4	M5	M6	M7	M8
Total E_{mit}	56207	51714	62710	59679	62059	60563	55683	64247
Total DE_{mit}	345	320	390	334	361	365	329	391
Total SE_{mit}	-30.9	-102.1	34.6	63.1	- 2.7	-12.6	-86.9	137.4
Average E_{mit}	112	103	125	119	124	121	111	129
Average DE_{mit}	.691	.641	.780	.668	.721	.731	.658	.783
Average SE_{mit}	-.062	-.204	.069	.126	-.005	-.025	-.174	.274
Average CV_{mit}[1]	1.14	1.44	1.51	.91	1.05	.93	1.17	.78

T-statistics:
$$CV_{mit}^{2}$$
$$SE_{mit}$$

	M1	M2	M3	M4	M5	M6	M7	M8
M1	--	-2.19	-5.37	4.48	-2.01	3.77	.09*	5.86
M2	-1.84*	--	- .91*	4.93	3.03	4.34	1.83*	5.07
M3	2.44	2.34	--	8.93	10.51	10.71	5.91	10.75
M4	3.09	6.00	.60*	--	-2.04	.38*	-3.26	3.23
M5	1.70*	2.55	-1.41*	-2.20	--	4.73	-3.18	4.96
M6	.69*	3.25	-1.19*	-2.84	- .53*	--	-4.75	2.24
M7	-3.45	.39*	-4.44	-5.36	-16.87	-3.89	--	5.16
M8	5.06	8.14	2.14	4.99	4.92	6.20	8.43	--

TABLE II (Continued)

	M1	M2	M3	M4	M5	M6	M7	M8
DE_{mit}								
M1								
M2	- .52*							
M3	1.99	1.05*						
M4	- .38*	.28*	-1.40*					
M5	.87*	.71*	-1.38*	1.00*				
M6	.67*	-1.38*	- .57*	.82*	.15*			
M7	- .87*	.16*	-2.72	-.20*	-5.45	-1.01*		
M8	1.56*	1.52*	.04*	3.23	1.26*	.78*	2.66	

[1]Excluding outliers, Comany 9 and 43. There firms generated outliers in the sense that the coefficient of variation or the deflated earnings numbers were normous and meaningless compared with the other companies in the sample. For example, an extreme reported earnings number, for a single year, could distort the mean and the coefficient of variation beyond meaning. Likewise, extremely low pre-translation numbers, in any year, could result in enormous deflated earnings numbers.

[2]Values to the left of the diagonal relate to mean differences on SE_{mit}, to the right CV_{mit}; * indicates not significant at the .05 level.

More precise information concerning differences in
average E_{mit} across translation methodology can be obtained
from t scores based on paired comparisons of average earnings
for each of the 50 companies in the sample. Table II
presents these t scores for the means of SE_{mit} (standardized
earnings) and the means of DE_{mit} (deflated earnings). T
scores for the means of SE_{mit} and the means of DE_{mit} are used
because t scores based on E_{mit} would be meaningless due to
scale. The 50 companies in the sample are of different
sizes, and pretranslation earnings (Table I in Chapter IV)
are substantially different due to firm size alone, and any t
score based on non-deflated or non-standardized earnings
would be driven by the larger companies.

The t score comparison of the no deferral methodologies
(M1-M4) with their deferral counterparts (M5-M8) suggests
that, at the 95% level of confidence, deferral or non-
deferral does not result in significant differences in
average standardized or deflated earnings for the current-
noncurrent method. Average standardized earnings are greater
for the monetary-nonmonetary method when gains and losses are
deferred than when they are not (M2 and M6) but there is no
significant difference in average deflated earnings as a
result of deferring or not deferring gains and losses. The
current rate method results in higher average standardized
earnings and deflated earnings when gains and losses are not
deferred than when they are deferred (M3 > M7), although the

opposite is observed for the price parity method (M8 > M4).

These observations are summarized below:

Method	Mean Standardized E_{mit}	Mean Deflated E_{mit}
Current-noncurrent	NSD	NSD
Monetary-nonmonetary	DEF > NDF	NSD
Current rate	NDF > DEF	NDF > DEF
Price parity	DEF > NDF	DEF > NDF

where NSD = no significant difference.

Total annual earnings effects. From Figure 3, it is
clear that no one non-deferral methodology (M1-M4) always
results in higher (or lower) reported earnings in each of the
ten years than all of the other three non-deferral
methodologies. Nor does any one non-deferral methodology
always result in higher reported earnings than any one of the
other three. With the exception of M4, each of the non-
deferral methodologies results in occasional large jumps and
drops, especially in the latter years of the study period.
Such drastic changes are not desired by managers whose
compensation is related to reported earnings, nor to
conservative investors who perceive such changes as
indicators of higher risk.

Figure 4 presents the same picture and allows the same
observations regarding total deflated earnings for the non-
deferral methodologies.

Figures 5 and 6 present a similar picture for the
deferral methodologies (M5-M8), except that there is
considerable similarity or parallelism between M5 (CNM/DEF)

M1   IS PLOTTED WITH AN '1'
M2   IS PLOTTED WITH AN '2'
M3   IS PLOTTED WITH AN '3'
M4   IS PLOTTED WITH AN '4'
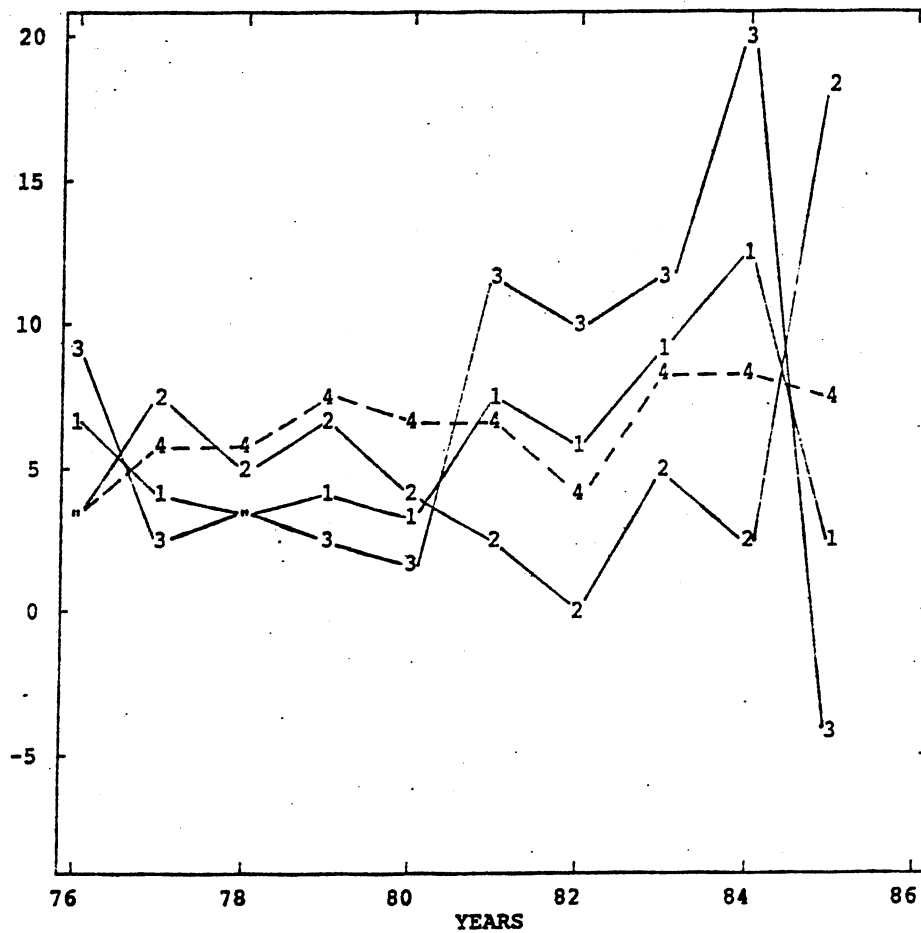
Figure 3. Total earnings (E_{mit}) without deferral, methodologies 1-4, billions of pounds, 1976-1985

M1   IS PLOTTED WITH AN '1'
M2   IS PLOTTED WITH AN '2'
M3   IS PLOTTED WITH AN '3'
M4   IS PLOTTED WITH AN '4'
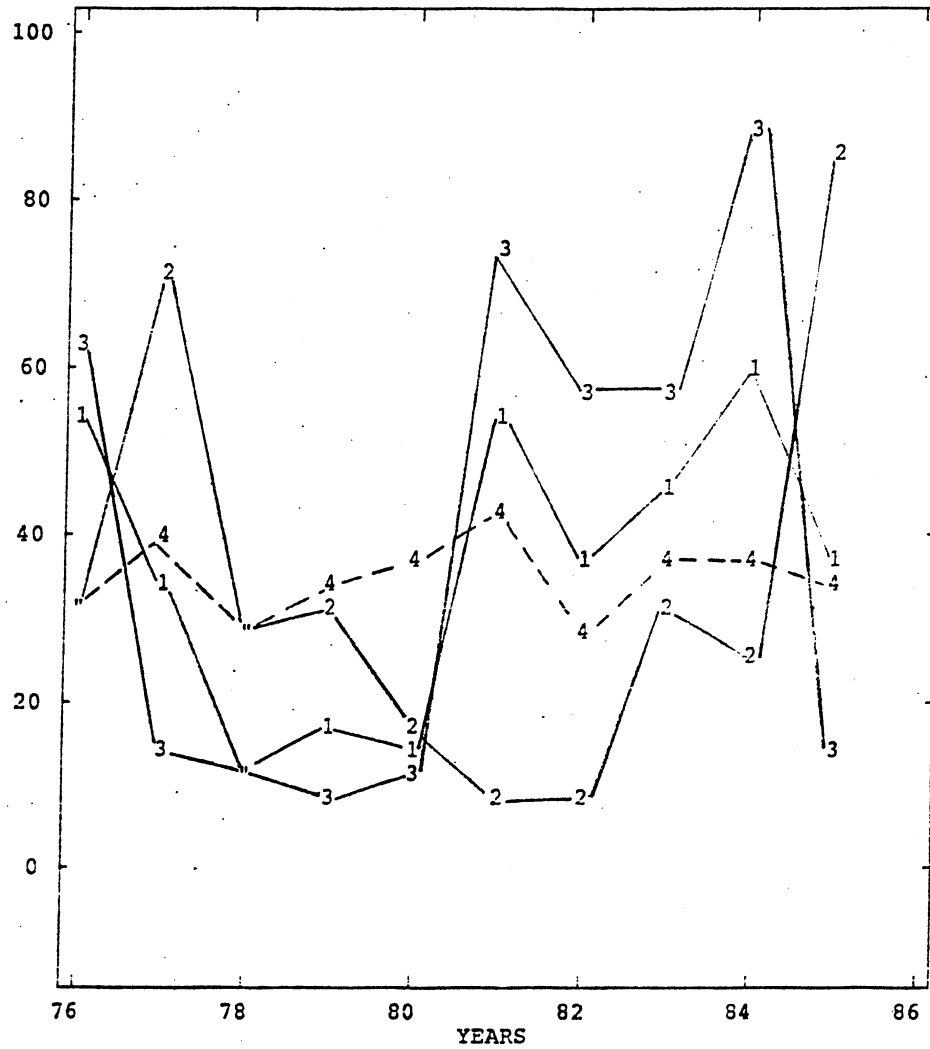
Figure 4.   Total deflated earnings (DE_{mit}) without deferral, methodologies 1-4, 1976-1985

and M7 (CRM/DEF). A major similarity between these two methodologies is the use of the current exchange rate for the translation of inventories which in turn are major factors in determining the cost of goods sold and earnings. All current items are translated with the current exchange rate under both these methodologies, the main difference being the translation of non-current assets and liabilities. Although this difference has the potential of generating substantially different exchange gains and losses, these gains and losses are deferred under M5 and M7. This similarity between the reported earnings of M5 and M7 may be contrasted with the substantial differences, from year to year, between M1 and M3, the non-deferral counterparts of M5 and M7 (see Figure 3).

Figure 7 graphs total earnings (E_{mit}) of all eight methodologies studied and is a combination of Figures 3 and 5. Figure 8 graphs total deflated earnings (DE_{mit}) of the eight methodologies and is a combination of Figures 4 and 6. The two graphs are highly similar, except for scale.

Clearly, no methodology consistently results in the highest total earnings over the 10-year study period, and no methodology consistently results in the lowest. With the exception of methodologies M5 and M7, and possibly methodologies M1 and M7, no two methodologies consistently result in the same total earnings over the 10 years. All methodologies, with the exception of the two price parity methodologies (M4 and M8) result in total earnings numbers
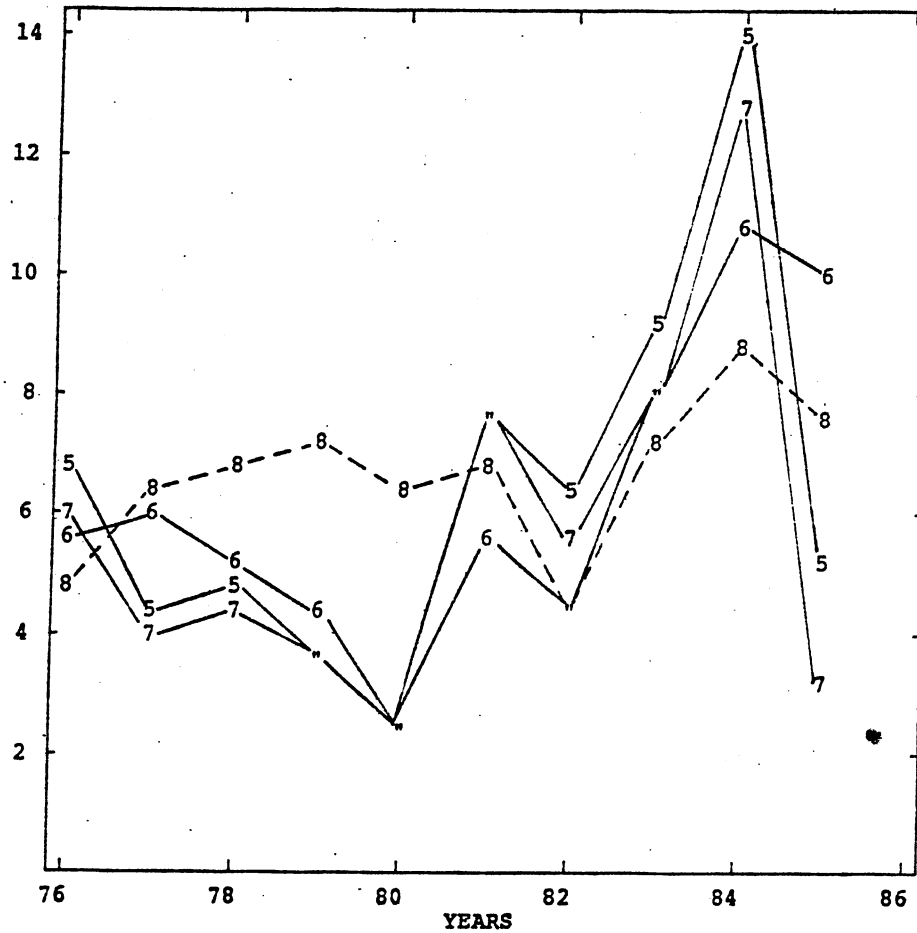
Figure 5.   Total earnings (E_{mit}) with deferral,
            methodologies 5-8, billions
            of pounds, 1976-1985
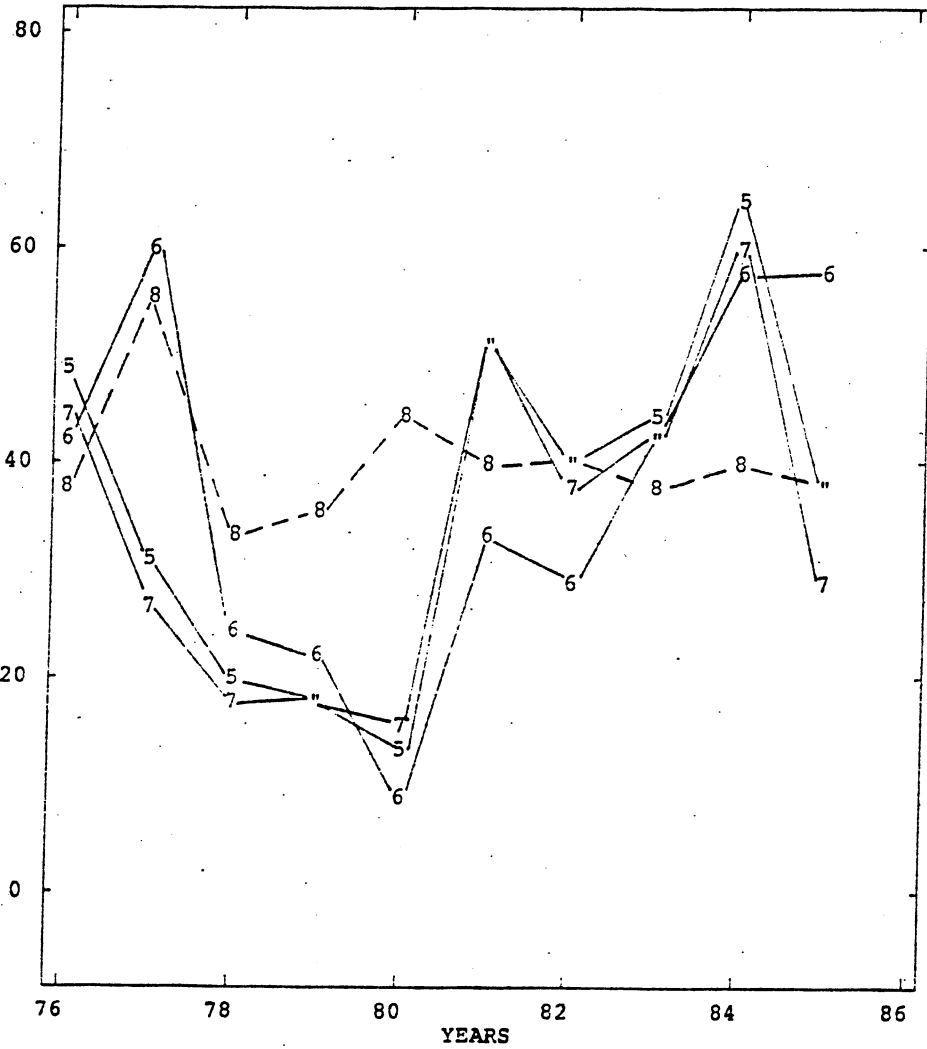
Figure 6.   Total deflated earnings (DE_{mit}) with
            deferral, methodologies 5-8,
            1976-1985

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M1      IS PLOTTED WITH AN '1'
M2      IS PLOTTED WITH AN '2'
M3      IS PLOTTED WITH AN '3'
M4      IS PLOTTED WITH AN '4'
M5      IS PLOTTED WITH AN '5'
M6      IS PLOTTED WITH AN '6'
M7      IS PLOTTED WITH AN '7'
M8      IS PLOTTED WITH AN '8'
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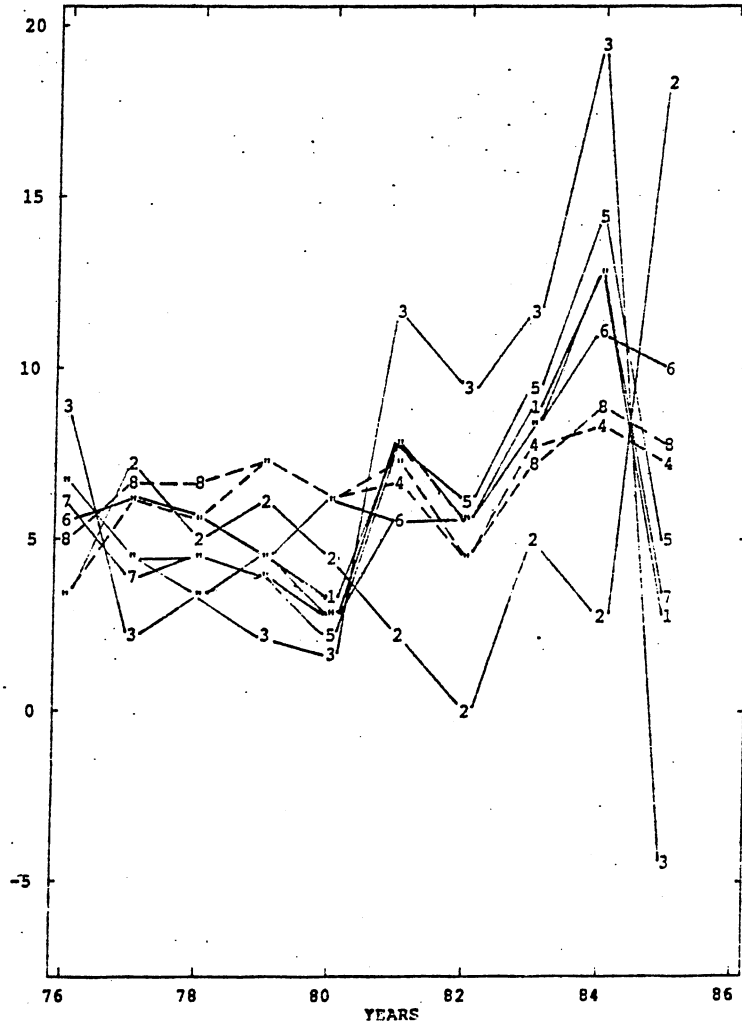

Figure 7.   Total earnings (E_{mit}),
            methodologies 1-8,
            billions of pounds,
            1976-1985

```
M1      IS PLOTTED WITH AN '1'
M2      IS PLOTTED WITH AN '2'
M3      IS PLOTTED WITH AN '3'
M4   .  IS PLOTTED WITH AN '4'
M5.     IS PLOTTED WITH AN '5'
M6      IS PLOTTED WITH AN '6'
M7      IS PLOTTED WITH AN '7'.
M8      IS PLOTTED WITH AN '8'
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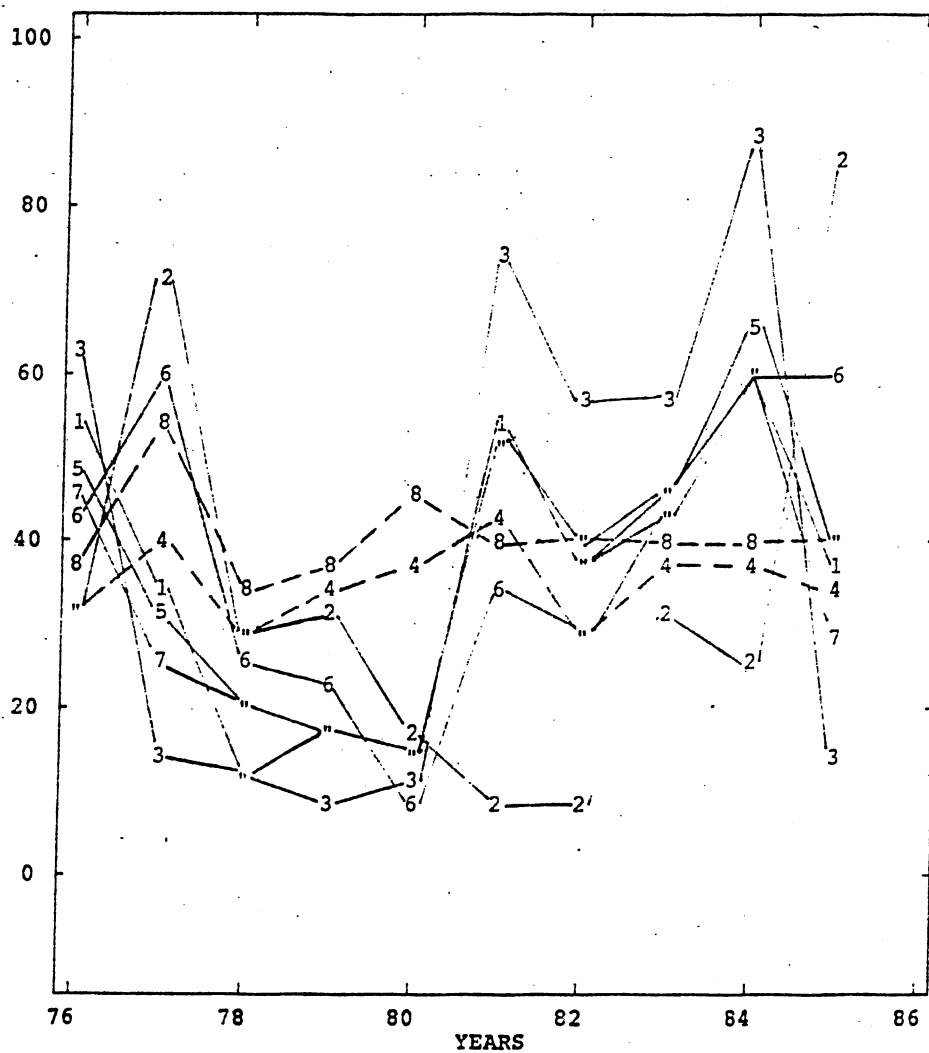

Figure 8.   Total deflated earnings (DE_{mit}), methodologies 1-8, 1976-1985

that often jump or drop drastically from one year to the next.

SFAS #8 vs. SFAS #52. Figures 9 and 10 present total earnings and total deflated earnings for M2 (SFAS #8) vs. M7 (SFAS #52). The two graphs are highly similar except for a difference in scale. The comparison of these two methodologies is of special interest since they represent the last two official choices for GAAP. Although the translation literature indicates that managers and analysts were unhappy with SFAS #8 and lobbied for its demise, the literature does not provide any closure on the question of how earnings may be different across time between SFAS #8 and its replacement, SFAS #52.

From these figures, it is clear that the two methodologies generate substantially different reported earnings numbers, a result that is not consistent with Rodriguez (1977) which concluded that SFAS #8 did not cause major differences in earnings, and that neither methodology consistently generates larger earnings numbers than the other. In fact, total earnings (deflated or not) were higher under M2 (SFAS #8) than under M7 (SFAS #52) for exactly five of the 10 years in the study period.

Choi et al. (1978) reviewed evidence that compliance with SFAS #8 results in huge translation adjustments. Because SFAS #8 does not defer these translation gains or

M2   IS PLOTTED WITH AN '2'
M7   IS PLOTTED WITH AN '7'
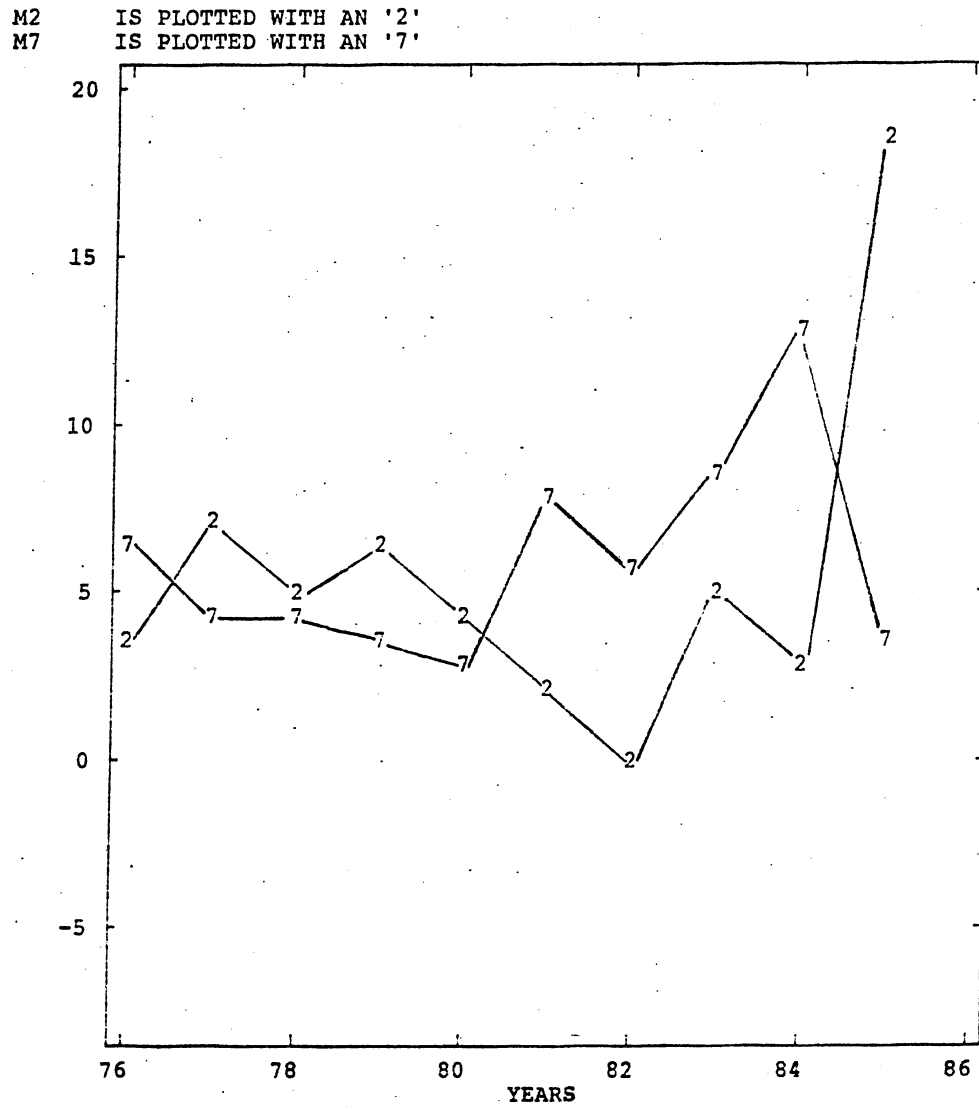
Figure 9.   Total earnings (E_{mit}) SFAS #8 and
            SFAS #52, methodologies 2 and 7,
            1976-1985
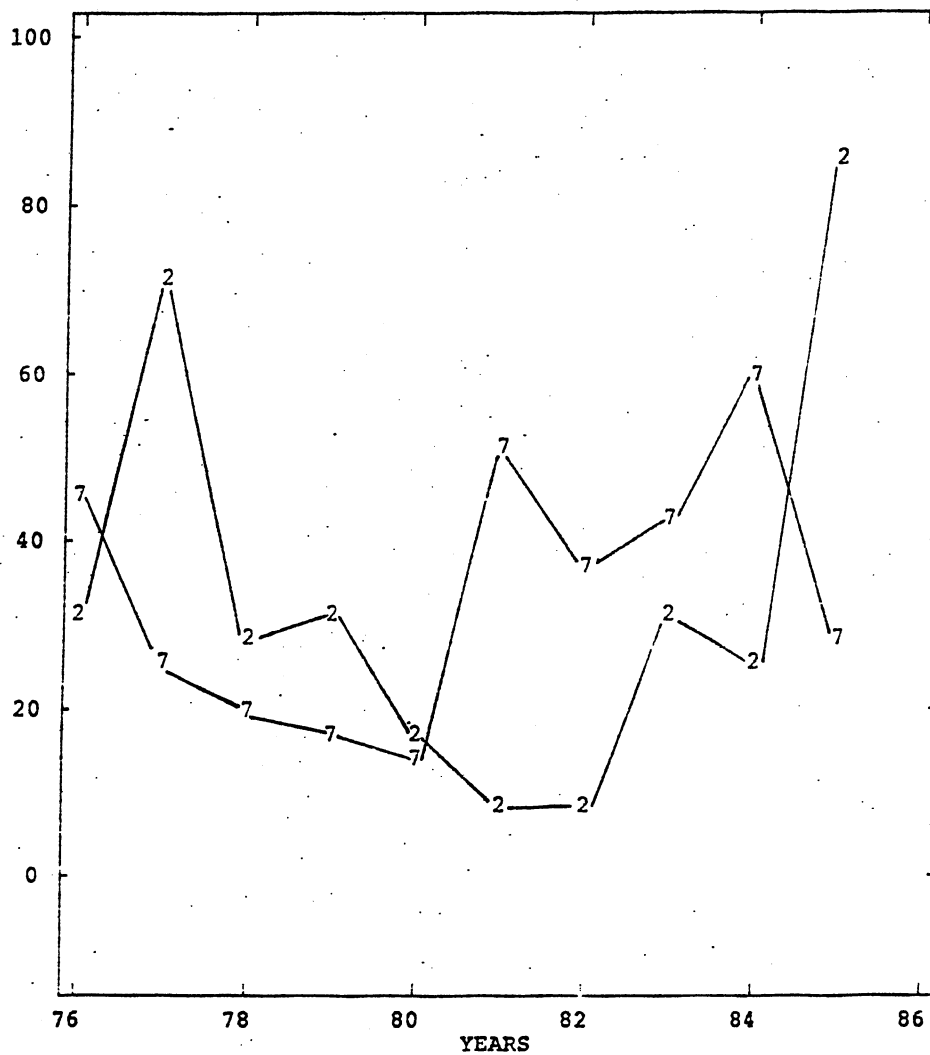
Figure 10.   Total deflated earnings (DE_{mit}) SFAS #8
             and SFAS #52, methodologies 2 and 7,
             1976-1985

losses, and because exchange rate changes in one year may reverse in a subsequent year, managers, researchers, and others believed that SFAS #8 would result in greater jumps and drops in reported earnings from year to year as compared with other methodologies. Although SFAS #52 defers translation gains and losses, it is not apparent from Figure 9 that SFAS #52 results in less drastic changes from year to year than SFAS #8.

Figures 9 and 10, studied in conjunction with Figure 2, suggest a possible relationship between reported earnings under various methodologies and the exchange rate and price parity movements. Figure 2 shows the pound generally gaining in reference to the dollar during 1976-1979, losing during the period 1980-1984, then gaining again during 1984-1985. Reported earnings under SFAS #8 appear to be greater than reported earnings under SFAS #52 when the pound is gaining against the dollar and lower when the pound is losing. Although these relationships between reported earnings under various methodologies compared with exchange rate and price parity movements are not analyzed in depth in the present study, they may be of significance to the accounting profession in the translation methodology choice and should be the subject of future research.

Although SFAS #8 and SFAS #52 total earnings tend to move together in some years (for example, 1977 to 1978, and

1982 to 1983), they often move in opposite directions and in significant amounts (for example, 1976 to 1977, 1980 to 1981, and 1983 to 1984 to 1985). Not only do the two methodologies often result in significantly different total earnings numbers, the difference in changes from year to year appear unpredictable.

The change from SFAS #8 to SFAS #52 appears to have resulted in total reported earnings numbers that are often substantially different, and it is not clear, insofar as total reported earnings is concerned, what was achieved by the change in policy.

Firm-Level Earnings Effects

Table III presents earnings at the firm level for three companies (company 23, chemicals and plastics, company 28, energy, and company 36, analytical instruments) of the 50 in the study sample, under each of the eight translation methodologies. These three companies were selected for firm level observations because of differences in size, capitalization, and industry. The diversity of the three companies assists in identifying potential differences between firm-level earnings effects and the across firm earnings effects described in the previous section. In Table III, the methodologies are displayed in two groups, non-deferral methodologies (M1-M4) and deferral methodologies

TABLE III

FIRM-LEVEL EARNINGS EFFECTS
(MILLIONS OF POUNDS)

	1976	'77	'78	'79	'80	'81	'82	'83	'84	1985	TTL	AVG
Company 23												
M1	104	24	44	69	37	108	104	155	219	12	875	88
M2	39	66	77	105	58	24	22	127	80	212	811	81
M3	130	-9	27	39	23	166	155	209	340	-112	966	97
M4	55	33	77	108	71	86	78	174	143	112	938	94
RANGE	92	75	50	70	48	142	133	81	259	325	155	16
M5	97	31	56	69	38	108	105	160	224	63	950	95
M6	74	48	67	84	47	73	71	133	164	128	890	89
M7	84	17	45	66	40	104	92	141	203	39	827	83
M8	71	51	81	122	92	106	85	133	147	105	993	99
RANGE	26	34	22	56	55	34	33	27	77	89	166	16
Company 28												
M1	86	44	69	65	86	102	163	125	106	57	903	90
M2	70	102	83	95	100	21	20	23	-82	353	787	79
M3	163	12	25	18	44	245	273	218	312	-208	1100	110
M4	61	80	85	92	136	125	152	94	51	59	934	93
RANGE	102	90	60	77	92	223	253	194	393	561	313	31
M5	108	65	61	62	63	149	189	171	189	102	1160	116
M6	114	83	61	57	57	139	171	172	152	213	1219	122
M7	99	55	55	62	69	143	170	118	127	26	924	92
M8	93	98	84	112	149	163	173	119	74	140	1207	121
RANGE	22	43	43	55	92	24	20	53	115	187	295	30
Company 36												
M1	24	19	10	5	21	80	51	62	91	52	415	42
M2	18	26	9	30	14	24	64	65	68	142	460	46
M3	29	19	7	2	21	84	54	70	102	46	434	43
M4	19	24	25	30	46	61	48	38	48	56	395	40
RANGE	11	8	18	28	32	60	16	32	55	96	65	6
M5	21	19	12	9	23	63	48	60	85	67	406	41
M6	17	26	10	25	14	26	67	67	74	144	470	47
M7	20	18	11	9	24	65	44	53	78	53	376	38
M8	19	23	25	32	48	58	52	40	50	64	412	41
RANGE	4	8	14	23	34	38	23	27	35	90	94	9

(M5-M8). This separation facilitates the comparison of deferral and non-deferral effects at the firm level and the contrasting of these effects with those across firms discussed in the previous section.

For each of the three companies, reported earnings are often substantially different in a given year depending on translation methodology used. Some of the differences are striking. For example, for company 23, M2 results in 212 million pounds in earnings in year 10 (1985) while M3 results in a loss of 112. In Year 9 (1984) the earnings for company 28 under M3 is more than six times the earnings under M4. For Company 36, earnings for year 4 (1979) was 25 million pounds under M6 and only nine under M5. The ranges of reported earnings for any given year are often enormous. Differences in averages over the ten-year study period are also often very large. For example, company 28's average earnings under M2 was 79 million pounds compared with 110 under M3. In fact, close similarities in reported periodic earnings across methodologies (such as 61 million pounds under both M5 and M6 for company 28 in year 3) are rare. Earnings at the firm level are clearly often substantially different depending on translation methodology, both for given years and when averaged over 10 years.

However, it is not correct to state that earnings at the firm level are consistently higher under one methodology than under another over the study period. For example, for

company 23, M1 generated earnings greater than the earnings
under M2 for five of the ten years, M3 greater than M4 for
four years, M5 greater than M6 for five years, and M7 greater
than M8 for four of the 10 years. Similar observations can
be made for companies 28 and 36. Faced with a change in
policy concerning translation methodology, forecasting the
effect on earnings numbers would be difficult. These results
suggest that if individual companies were allowed the choice
of translation methodology, the company would have little
basis for predicting which methodology would yield the
highest (or lowest) reported earnings in future years.
Likewise, if companies are required to use a specific
translation methodology, that which is currently GAAP,
individual companies seem to have little basis, at least as
far as level of reported earnings is concerned, on which to
lobby for or against any proposed change in GAAP.

Consider the change in GAAP from SFAS #8 (M2) to SFAS
#52 (M7). SFAS #52 was required for all fiscal years
beginning after December 15, 1982. Prior to this date
managements might perceive it to be to their advantage to
lobby for or against the change, based on the assumption that
one or the other methodology would result in higher reported
earnings. Consider the firm level earnings statistics for
company 23 on Table III. For the three years ended
December 31, 1982, total earnings restated for SFAS #52
requirements (M7) would have been 233 million pounds compared

with 104 under the then existing requirement of SFAS #8 (M2).
The management of company 23 might therefore conclude that
earnings under SFAS #52 are likely to be very substantially
higher than under SFAS #8. But for the three years following
1982, the opposite occurs: total earnings under SFAS #52 are
383 million pounds compared with 419 under SFAS #8.

Company 28's management would have a similar experience.
During the three years ending December 31, 1982, SFAS #8
produced total earnings of 141 million pounds compared to 382
under SFAS #52. In the following three years, however, total
earnings under SFAS #52 were 271 million pounds compared with
294 under SFAS #8.

Company 36, however, would experience more consistency.
For the three years prior to December 31, 1982, SFAS #8
generated total earnings of 382 million pounds compared to
133 under SFAS #52. The suspicion that SFAS #8 therefore
generated substantially higher earnings than SFAS #52 would
be confirmed for company 36's management in the following
three years during which SFAS #8 generated total earnings of
275 million pounds compared with 184 under SFAS #52.

Table IV, Table V, and Table VI are also relevant to the
observation that a given methodology does not, at the firm
level, consistently generate higher earnings than another
methodology. These tables present average and total earnings
for the first and second five years of the study period for

TABLE IV

FIRM LEVEL EARNINGS (E_{mit}) STATISTICS
COMPANY 23

Average Earnings	M1	M2	M3	M4	M5	M6	M7	M8
(1976-1980)	56	69	42	69	58	64	50	84
(1981-1985)	199	93	151	119	132	114	115	115
(1976-1985)	88	81	97	94	95	89	83	99
Total Earnings	M1	M2	M3	M4	M5	M6	M7	M8
(1976-1980)	279	344	210	344	291	320	252	418
(1981-1985)	597	466	757	593	660	570	575	576
(1976-1985)	875	811	966	938	950	890	827	993

TABLE V

FIRM LEVEL EARNINGS (E_{mit}) STATISTICS
COMPANY 28

Average Earnings	M1	M2	M3	M4	M5	M6	M7	M8
(1976-1980)	70	90	52	91	72	74	68	107
(1981-1985)	111	67	168	96	160	169	117	134
(1976-1985)	90	79	110	93	116	122	92	121
Total Earnings	M1	M2	M3	M4	M5	M6	M7	M8
(1976-1980)	350	451	262	454	359	372	340	537
(1981-1985)	554	336	839	481	801	847	584	670
(1976-1985)	903	787	1100	934	1160	1219	924	1207

TABLE VI

FIRM LEVEL EARNINGS (E_{mit}) STATISTICS
COMPANY 36

Average Earnings	M1	M2	M3	M4	M5	M6	M7	M8
(1976-1980)	16	19	16	29	17	18	16	30
(1981-1985)	67	73	71	50	64	76	59	53
(1976-1985)	42	46	43	40	41	47	38	41
Total Earnings	M1	M2	M3	M4	M5	M6	M7	M8
(1976-1980)	79	97	78	145	84	92	82	148
(1981-1985)	336	364	356	251	322	378	294	263
(1976-1985)	415	460	434	395	406	470	376	412

each of the eight methodologies. In Table IV (company 23),
for many methodology pairs, it can be observed that earnings
levels are higher during the first five years for one
methodology compared with the other, but the relative size of
earnings reverses in the second five years (M1-M2, M2-M3,
M3-M4, M3-M8, M5-M6 and several other pairs). Similar
inconsistences are shown in Table V (company 28) and Table VI
(company 36).

At the firm level then, the relative size of earnings
depending on methodology is not consistent over the 10 years
of the study period (see Table VII). Further, which
methodology generates higher earnings in a given year or
higher earnings averaged over 10 years is not consistent from
firm to firm. Although differences in reported earnings
depending on methodology are often substantial, there is no
consistency to these differences from year to year or from
firm to firm. The differences in reported earnings resulting
from applying different translation methodologies are firm
specific to a considerable degree, and unpredictable.
Managers, therefore, cannot be expected to accurately project
which methodology will result in higher reported earnings
than another, irrespective of past experience and
restatements. If managers wish to lobby for or against given
methodologies, based solely on relative reported earnings,
there appears to be no basis for any specific lobbying
position.

TABLE VII

AVERAGE EARNINGS (E_{mit}) BY METHODOLOGY
MILLIONS OF POUNDS/1976-1985

	M1	M2	M3	M4	M5	M6	M7	M8
1	73	23	82	53	77	56	73	64
2	197	211	228	216	228	246	218	250
3	57	56	67	73	63	60	60	66
4	109	93	119	107	117	108	101	125
5	-28	-26	-28	-34	-22	-14	-24	-32
6	58	55	61	62	58	54	53	64
7	3	2	3	3	4	3	3	3
8	111	103	116	119	105	100	103	116
9	-18	-41	-0	-26	15	6	-25	15
10	29	21	28	24	22	17	17	22
11	206	215	220	221	206	213	201	221
12	48	42	49	50	50	47	47	53
13	157	172	157	170	160	176	144	152
14	103	86	111	97	100	89	97	97
15	132	103	173	141	182	160	142	184
16	76	61	84	77	90	82	78	96
17	295	285	322	325	309	297	299	326
18	54	52	62	57	59	59	53	63
19	696	682	739	725	833	896	729	802
20	18	20	18	23	21	23	19	22
21	1063	958	1148	1105	1120	1070	1035	1161
22	0	2	0	1	0	2	0	1
23	88	81	97	94	95	89	83	99
24	72	52	73	63	75	62	67	70
25	219	197	206	204	169	162	158	197
26	2	2	2	2	2	2	2	2
27	274	251	283	284	274	256	262	279
28	90	79	110	93	116	122	92	121
29	82	81	85	91	77	83	70	89
30	93	67	117	85	99	90	94	93
31	17	17	20	18	18	19	17	20
32	50	41	56	59	51	47	43	58
33	38	35	38	38	36	39	27	42
34	53	48	63	54	65	64	55	70
35	107	90	115	116	126	123	99	139
36	42	46	43	40	41	47	38	41
37	273	313	448	469	470	457	416	504
38	21	19	22	21	22	20	19	23
39	58	29	44	42	40	29	32	41
40	11	14	12	11	13	15	12	12
41	30	23	29	23	30	23	29	24
42	33	39	31	35	38	44	34	39
43	9	4	8	4	4	-1	0	2
44	16	14	16	17	15	15	14	17
45	87	76	74	72	71	64	70	69
46	11	12	11	12	11	12	10	12
47	108	103	105	107	95	93	90	100
48	183	151	274	204	238	212	201	269
49	88	85	94	92	85	81	83	91
50	27	29	29	30	31	34	28	33

Conclusions

By way of conclusion, an attempt is made to provide answers to the questions posed at the beginning of this section.

(1) Are reported earnings often significantly different across firms, at the firm level, and over time when different methodologies are used? Across firms and across time, reported earnings are usually significantly different depending on methodology. Although reported earnings are also often different at the firm level, the patterns of difference vary from firm to firm and do not necessarily reflect differences across firms.

(2) What methodology results in the highest/lowest reported earnings, across firms, at the firm level, and over time? Across firms and across time, M8 results in the highest reported earnings. But this is not true for all years, nor is it always true at the firm level.

(3) Does the deferral of translation gains and losses significantly affect reported earnings across firms, at the firm level, and over time? For the CNM methodologies (M1 and M5) deferral does not appear to make a significant difference across firms. For the monetary-nonmonetary (M2 and M6) and price parity (M4 and M8) methodologies, deferral generally results in higher earnings, but for the current rate methodologies (M3 and M7) deferral generally results in lower earnings.

(4) Does any one non-deferral methodology (M1-M4) result in consistently higher/lower reported earnings over time? M3 (CRM/NDF) often results in higher reported earnings than the other three non-deferral methodologies, but not for all years nor for all firms.

(5) Does any one deferral methodology (M5-M8) result in consistently higher/lower reported earnings over time? M8 (PPM/DEF) often results in higher reported earnings than the other three deferral methodologies, but not for all years nor for all firms.

(6) Do any non-deferral methodologies result in total earnings that are similar over time? Although there are occasional similarities in the earnings results obtained from any two of the four non-deferral methodologies, there is no consistency across firms, across time, or at the firm level.

(7) Do any deferral methodologies result in total earnings that are similar over time? M5 (CNM/DEF) and M7 (CRM/DEF) result in similar total earnings numbers and tend to move together over time across firms. At the firm level, however, there are often substantial differences.

(8) Do the SFAS #8 or SFAS #52 methodologies (M2 and M7) generate substantially different reported earnings numbers, and does either methodology consistently generate larger earnings than the other over time? Total earnings across firms are often substantially different between M2 and M7, and neither methodology results in consistently higher total earnings across firms over time. At the firm level, there is

also no consistency and no perceived predictability. In any given year, M2 is as likely to result in higher earnings as M7, and which methodology results in higher earnings in a given year appears to be unrelated to results in previous years.

Variability of Earnings

A substantial portion of the translation literature deals with the variability of earnings. Specifically, SFAS #8 (M2) was perceived by many, especially managers, to result in greater variability of earnings than other methodologies (Allan, 1976; Beresford, 1976; Biel, 1976; Herschman, 1976; Mattlin, 1976; Teck, 1976; Merjos, 1977; Aggarwal, 1978; Porter, 1983; Selling and Sorter, 1983). At the time SFAS #8 was issued, previous GAAP had required CNM and MNM, but did not require non-deferral of translation gains and losses. Because translation gains and losses in one accounting period might effectively reverse in a subsequent accounting period, as a result of changes in the exchange rate, the variability of earnings was perceived to be potentially greater under SFAS #8.

Reported earnings variability is an indicator of the degree of risk associated with the earnings series. Analysis focuses on consolidated earnings, not the stand alone earnings of subsidiaries. Material differences in variability of subsidiary earnings of earnings across

translation methodologies does matter to assessment of earnings risk. Under such circumstances, the impact of translation methodologies on the variability of consolidated earnings would still depend on what portion of the consolidated entity's operations are conducted by foreign subsidiaries. Managers can be expected to prefer that their company be perceived as less risky rather than more risky. Companies with significant foreign operations could therefore be expected to prefer translation methodologies that result in lower variability of translated subsidiary earnings which would result in lower variability of consolidated earnings. Policy makers and analysts might prefer less variability if that variability could be ascribed to noise, rather than to the riskiness of the earnings series.

Questions Addressed

The specific questions to be addressed in this chapter relevant to variability of reported earnings are:

(1) Are subsidiary reported earnings more variable under one translation methodology than under others, and are differences in variability consistent in different time periods? Differences in variability of subsidiary earnings are not necessarily systematic; although one methodology may result in greater variability of earnings during one period than another methodology, the relationship may reverse in a subsequent period. Translation methodology choice matters, to firm managers and financial analysts to the extent that

variability relates to securities prices and manager
compensation, and to lenders who perceive high variability to
reflect risk and instability of the firm, if it can be shown
that different companies' reported earnings variabilities are
affected differently by different translation methodologies.
Likewise, if the differences are not consistent from period
to period, it is more difficult for managers, analysts, and
lenders to have a preference from among possible
methodologies and to lobby for or against any particular
methodology.

(2) Does deferral of translation gains and losses reduce
the variability of subsidiary reported earnings? To the
extent that deferral of translation gains and losses
materially affect variability of reported earnings, deferral
is a major translation issue. FASB changed GAAP from SFAS
#8, a non-deferral methodology, to SFAS #52, a deferral
methodology, suggesting that to FASB deferral is an issue.
As indicated in the literature review (Chapter II), managers
and others perceived that non-deferral of translation gains
and losses resulted in higher variability of earnings, a
result which, as described above, is of concern at least to
some managers. But the literature does not answer the
question as to whether deferral actually reduces variability
of earnings.

(3) What translation methodology results in the lowest
coefficient of variability of reported subsidiary earnings
for the 50 sample firms taken together and at the firm level?

The answer to this question is of importance to managers and others who perceive low variability of earnings as the normative criterion by which to select the best translation methodology.

(4) Do subsidiary reported earnings under the eight translation methodologies studied, taken together, appear to converge to the reported subsidiary earnings under any one of the translation methodologies? Because short-term exchange rate changes may be random rather than informational, each of the six exchange rate methodologies studied may produce a reported earnings series that contains an element of variability that does not assist in decision making. As observed in the previous section on reported earnings, different methodologies clearly result in earnings series which are significantly different, suggesting that the size and direction of the variability contained in the earnings series under one methodology is not the same as that contained in the series of another methodology.

Across-Firms Variability of
Earnings Effects

The average coefficients of variation of the 50 companies, rank-ordered by size are shown in Table VIII. These average coefficients of variation may be used in conjunction with Figure 3, 4, and 5 of the previous section to analyze across firm variability of earnings.

TABLE VIII

AVERAGE COEFFICIENTS OF VARIATION ACROSS FIRMS, 1976-1985

Methodology	Average Coefficient of Variation	Rank
M1 (CNM/NDF)	1.144	4
M2 (MNM/NDF)	1.438	2
M3 (CRM/NDF)	1.505	1
M4 (PPM/NDF)	0.906	7
M5 (CNM/DEF)	1.054	5
M6 (MNM/DEF)	0.932	6
M7 (CRM/DEF)	1.170	3
M8 (PPM/DEF)	0.784	8

Figure 3 is a graphical presentation of total earnings under the four non-deferral methodologies, methodologies M1-M4, over the 10 years of the study period, for the 50 sample companies taken together. Not only do the four methodologies result in reported earnings that are often substantially different, but the variability of earnings is different as well.

CRM results in the highest average variability of earnings and PPM the lowest among the non-deferral methodologies, as reflected by the coefficients of variation averaged for the 48 study companies (two outliers). Figure 3 does not indicate that this conclusion is necessarily valid for all firms in the sample.

Figure 4 is a graphical presentation of total earnings under the four deferral methodologies, methodologies M5-M8, over the 10 years of the study period, for the 50 sample companies taken together. Again, not only do the four methodologies result in reported earnings that are often substantially different, but the variability of earnings is different as well.

CRM results in the highest average variability of earnings and PPM the lowest among the four deferral methodologies, as was the case among the four non-deferral methodologies (Figure 3), as reflected by the coefficients of variation averaged for the 48 study companies. Figure 4 does not indicate that this conclusion is necessarily valid for all firms in the sample.

Figure 5 allows a comparison of the average variability of earnings depending on whether or not translation gains and losses were deferred. Deferral of gains and losses clearly results in a lower average of coefficients of variation, as shown in Table VIII. CRM results in the highest average coefficient of variation and PPM the lowest whether translation gains and losses are deferred or not deferred. Of the eight methodologies studied, CRM/NDF results in the highest average coefficient of variation and PPM/DEF the lowest.

The methodologies that result in the least coefficients of variation are M8 and M4, both PPM methodologies. This result is not unexpected since the time series of price

parity numbers clearly varies less than the time series of exchange rates (see Figure 2 in Chapter IV). Figures 3, 4 and 5 show that the PPM methodologies result in smoother reported earnings than the exchange rate methodologies. In Figures 3 and 4, the PPM numbers appear to be a rough average of the four methodologies. According to the PPP theory, described in Chapter III, the price parity time series represents an equilibrium exchange rate, that exchange rate which maintains the balance of payments in equilibrium without any net change in the international reserve. Actual exchange rates theoretically result from the pressures of international balances of payments and other market factors, but in the short term are affected by numerous disturbances. Translations based on exchange rates reflect these short-term variations which may or may not have any economic significance that needs to be reflected on translated financial statements.

Figures 3, 4 and 5 suggest that the variability of earnings implied by the greater variability of exchange rates, compared with price parity numbers, does exist. For those who severely criticized SFAS #8 because of the perceived greater variability of earnings, a PPM methodology may present an agreeable alternative.

Firm-Level Variability of Earnings Effects

Table IX presents firm-level earnings effects, including

the coefficients of variation across translation methodologies for three of the sample companies. For all three of these companies, the coefficient of variation is less for M4 (PPM/DEF) than for the other three non-deferral methodologies and less for M8 (PPM/DEF) than for the other three deferral methodologies. M8 results in the lowest coefficient of variation of the eight methodologies for each of the three firms, but M3 (CRM/NDF) results in the highest coefficient of the eight methodologies for companies 23 and 28 only; for company 36, the highest coefficient results from M6, a deferral methodology. This last observation indicates that the conclusions that may be drawn from Figures 3, 4, and 5, and Table 9 for the 50 sample companies taken together are not always valid at the firm level.

Table X, shows the coefficients of variations of 48 of the 50 sample companies (two outliers omitted) resulting from each of the eight translation methodologies. Although it is generally true that deferral methodologies result in higher variability of reported earnings than their non-deferral counterparts, this is not true for all firms. Although M3 generally results in the highest variability of reported earnings of all the eight methodologies studied and M8 the lowest, this also is not true for all firms.

TABLE IX

FIRM-LEVEL EARNINGS EFFECTS AND
COEFFICIENTS OF VARIATION (CV)
(MILLIONS OF POUNDS)

	1976	'77	'78	'79	'80	'81	'82	'83	'84	1985	TTL	AVG	CV
Company 23													
M1	104	24	44	69	37	108	104	155	219	12	875	88	.736
M2	39	66	77	105	58	24	22	127	80	212	811	81	.702
M3	130	-9	27	39	23	166	155	209	340	-112	966	97	1.334
M4	55	33	77	108	71	86	78	174	143	112	938	94	.446
RANGE	92	75	50	70	48	142	133	81	259	325	155	16	
M5	97	31	56	69	38	108	105	160	224	63	950	95	.624
M6	74	48	67	84	47	73	71	133	164	128	890	89	.442
M7	84	17	45	66	40	104	92	141	203	39	827	83	.673
M8	71	51	81	122	92	106	85	133	147	105	993	99	.294
RANGE	26	34	22	56	55	34	33	27	77	89	166	16	
Company 28													
M1	86	44	69	65	86	102	163	125	106	57	903	90	.391
M2	70	102	83	95	100	21	20	23	-82	353	787	79	1.417
M3	163	12	25	18	44	245	273	218	312	-208	1100	110	1.455
M4	61	80	85	92	136	125	152	94	51	59	934	93	.365
RANGE	102	90	60	77	92	223	253	194	393	561	313	31	
M5	108	65	61	62	63	149	189	171	189	102	1160	116	.467
M6	114	83	61	57	57	139	171	172	152	213	1219	122	.459
M7	99	55	55	62	69	143	170	118	127	26	924	92	.498
M8	93	98	84	112	149	163	173	119	74	140	1207	121	.284
RANGE	22	43	43	55	92	24	20	53	115	187	295	30	
Company 36													
M1	24	19	10	5	21	80	51	62	91	52	415	42	.722
M2	18	26	9	30	14	24	64	65	68	142	460	46	.878
M3	29	19	7	2	21	84	54	70	102	46	434	43	.777
M4	19	24	25	30	46	61	48	38	48	56	395	40	.364
RANGE	11	8	18	28	32	60	16	32	55	96	65	6	
M5	21	19	12	9	23	63	48	60	85	67	406	41	.663
M6	17	26	10	25	14	26	67	67	74	144	470	47	.884
M7	20	18	11	9	24	65	44	53	78	53	376	38	.646
M8	19	23	25	32	48	58	52	40	50	64	412	41	.377
RANGE	4	8	14	23	34	38	23	27	35	90	94	9	

TABLE X

COEFFICIENTS OF VARIATION
(N=48)

	M1	M2	M3	M4	M5	M6	M7	M8
1	0.955	1.525	0.944	0.581	0.819	0.528	0.809	0.351
2	0.590	0.725	0.977	0.420	0.680	0.573	0.690	0.330
3	1.129	1.926	1.635	0.903	0.860	0.948	0.848	0.801
4	1.100	0.863	1.467	0.765	0.621	0.355	0.655	0.200
5	1.656	3.152	2.001	1.842	2.627	2.969	2.455	1.931
6	1.013	0.976	1.535	0.419	0.824	0.299	0.905	0.388
7	1.418	2.101	1.166	0.595	1.096	0.494	1.139	0.403
8	0.562	0.349	1.135	0.517	0.724	0.502	0.753	0.505
10	2.028	1.437	2.953	2.229	3.330	3.198	4.612	2.560
11	0.731	0.665	0.962	0.468	0.622	0.651	0.607	0.455
12	0.942	0.788	1.167	0.725	0.885	0.762	0.919	0.656
13	0.769	0.748	1.358	0.364	0.764	0.569	0.766	0.278
14	0.522	0.642	0.771	0.316	0.620	0.602	0.544	0.304
15	1.479	3.283	1.389	1.860	0.885	1.180	1.361	1.358
16	0.871	1.494	1.329	0.552	0.659	0.729	0.599	0.499
17	0.448	0.716	0.781	0.352	0.494	0.489	0.479	0.335
18	0.803	0.885	1.140	0.651	0.668	0.676	0.623	0.478
19	1.427	2.103	1.620	1.402	1.278	1.301	1.343	1.273
20	3.753	2.897	3.688	3.188	3.094	2.821	3.408	3.519
21	0.567	0.673	0.977	0.409	0.554	0.504	0.540	0.335
22	1.399	1.061	2.380	0.424	1.225	1.098	1.578	0.409
23	0.736	0.702	1.334	0.446	0.624	0.442	0.673	0.294
24	1.079	1.129	1.384	0.803	0.978	0.619	1.108	0.765
25	0.829	0.899	1.533	0.900	0.422	0.356	0.471	0.497
26	1.656	2.451	1.954	2.420	1.961	1.615	2.077	2.561
27	0.580	0.496	0.905	0.341	0.553	0.518	0.529	0.368
28	0.391	1.417	1.455	0.365	0.467	0.459	0.498	0.284
29	1.719	0.818	2.648	1.255	1.868	1.427	2.062	1.286
30	0.770	0.595	1.021	0.526	0.880	0.797	0.863	0.380
31	0.498	1.128	1.276	0.358	0.529	0.534	0.515	0.354
32	1.478	1.888	1.853	1.476	1.437	1.401	1.895	1.536
33	1.696	0.515	3.114	1.117	2.035	1.428	2.728	1.262
34	0.926	1.509	1.057	0.839	0.557	0.566	0.521	0.347
35	0.371	1.623	0.937	0.516	0.286	0.248	0.291	0.312
36	0.722	0.878	0.777	0.364	0.663	0.884	0.646	0.377
37	1.831	2.771	0.630	0.365	0.337	0.274	0.349	0.292
38	0.422	1.209	1.003	0.292	0.457	0.487	0.390	0.292
39	3.126	5.955	4.152	3.718	3.558	3.148	4.548	2.502
40	1.565	1.741	1.568	1.479	1.361	1.502	1.406	1.154
41	1.308	1.794	1.151	1.272	1.059	1.023	1.104	0.756
42	1.274	1.658	1.608	1.080	1.353	1.244	1.481	1.006
44	0.663	1.712	1.322	0.660	0.791	0.769	0.800	0.676
45	0.895	1.892	1.299	0.567	1.097	0.787	1.111	0.598
46	0.902	0.514	1.313	0.438	0.737	0.477	0.801	0.338
47	0.664	0.903	0.998	0.340	0.534	0.531	0.481	0.367
48	3.001	2.585	2.306	1.850	1.253	0.884	1.668	0.965
49	0.724	0.455	1.051	0.299	0.607	0.524	0.575	0.338
50	0.931	0.831	1.194	0.436	0.854	0.553	0.929	0.375
AVG	1.144	1.439	1.505	0.906	1.054	0.932	1.170	0.784

A perusal of Table X reveals the following (out of 48 companies) concerning coefficients of variation:

For CNM, DEF < NDF for 31 companies
For MNM, DEF < NDF for 39 companies
For CRM, DEF < NDF for 43 companies
For PPM, DEF < NDF for 35 companies

M3 results in the highest coefficient of variation for 22 companies, M2 for 17; M8 results in the lowest for 28 companies; M4 is the lowest of the four non-deferral methodologies for 38 companies, and M8 is the lowest of the deferral methodologies for 37 companies.

These observations indicate that the differences in variability of reported earnings across methodologies, despite certain generalizations for all sample firms taken together, noted above, are not systematic and are firm specific. For example, it is possible to find firms for which all four non-deferral methodologies result in lower variability of earnings than their deferral counterparts (company 10); for which M8 results in the highest variability of all eight methodologies (company 26); and for which M2 results in the least variability of all eight methodologies (companies 8, 10, and 33).

Table XI shows the variability of earnings for two five-year periods (1976-1980 and 1981-1985), as well as for the entire 10-year period. Table XI reveals that, at the firm level, the differences in variability of reported earnings across methodologies are not consistent across time periods.

TABLE XI

TRANSLATION METHODOLOGY RANK ORDERINGS
BY EARNINGS VARIABILITY

Rank	1976–1980	1981–1985	1976–1985
Company 23			
1	M3	M3	M3
2	M1	M2	M1
3	M4	M1	M5
4	M5	M5	M2
5	M8	M7	M7
6	M7	M6	M4
7	M2	M4	M6
8	M6	M8	M8
Company 28			
1	M3	M3	M3
2	M4	M2	M2
3	M8	M7	M6
4	M6	M4	M5
5	M5	M8	M7
6	M7	M1	M1
7	M1	M5	M8
8	M2	M6	M4
Company 36			
1	M8	M2	M6
2	M3	M6	M2
3	M4	M3	M3
4	M2	M1	M1
5	M1	M5	M5
6	M6	M7	M7
7	M7	M8	M8
8	M5	M4	M4

As reflected in the literature, many managers criticized SFAS #8 for perceived greater variability of earnings. Such managers presumably would lobby for SFAS #52. For company 36, M2 (SFAS #8) resulted in higher variability of earnings than M7 (SFAS #52) for each of the two five-year periods and for the entire 10-year period. If the management of company 36 chose to lobby for or against SFAS #52 in 1980, it might do so based on recalculation of its earnings variability for the previous five years using the proposed standard and use the results to predict that SFAS #8 would result in greater earnings variability. The management of company 36 might well then lobby for SFAS #52 in 1980, and do so based upon well-founded expectations.

The managements of companies 23 and 28 however, after restating the first five years under the methodology of SFAS #52 would presumably believe that the new standard would make matters worse by causing variability of reported earnings to be higher than under SFAS #8. Yet the results indicate these beliefs would be ill-founded. Both companies would experience lower variability of earnings in the second five-year period (and over the entire 10-year period) under SFAS #52.

For each of the three companies, one given methodology often results in higher variability of earnings during the first five years than another given methodology, while the opposite results in the second five years. For company 23, such reversing occurs for these methodology pairs: M1 vs. M2,

M2 vs. M4, M2 vs. M5, M2 vs. M7, M2 vs. M8, M4 vs. M5, M4 vs. M6, M4 vs. M7, M6 vs. M8, and M7 vs. M8. For company 28, reversals occur for M1 vs. M2, M1 vs. M5, M1 vs. M6, M2 vs. M4, M2 vs. M5, M2 vs. M6, M2 vs. M7, M2 vs. M8, M4 vs. M7, M5 vs. M6, M5 vs. M7, M6 vs. M7, and M7 vs. M8. For company 36, reversals occur for M1 vs. M4, M1 vs. M6, M1 vs. M8, M2 vs. M3, M2 vs. M4, M2 vs. M8, M3 vs. M6, M3 vs. M8, M4 vs. M5, M4 vs. M6, M4 vs. M7, M5 vs. M7, M5 vs. M8, M6 vs. M8, and M7 vs. M8.

The management of company 36 would find then that, although M8 resulted in the highest variability of earnings of all eight methodologies in the first five years and M5 the lowest, M5 variability was greater than M8 variability in the second five years. The set of methodology pairs for which reversing occurs for company 23 is not the same set for company 28 which, in turn, is not the same as for company 36, indicating that these reversals are caused, at least in part, by firm specific factors.

At the firm level then, it may be difficult to predict which methodologies result in higher variability of earnings than others, even when past years' earnings are restated and compared. Which methodologies result in greater variability of earnings over any given period is influenced by firm specific factors.

Conclusions

By way of conclusion, an attempt is made to provide

answers to the four questions posed at the beginning of this section.

(1) Are subsidiary reported earnings more variable under one translation methodology than under others, and are differences in variability consistent in different time periods? For the sample companies, M3 (CRM/NDF) results in the highest average variability of earnings and M2 (MNM/NDF) the second highest. At the firm level, 22 of 48 companies would have experienced higher variability of earnings under M3 than under any of the other seven methodologies. Further, 17 companies would have experienced the highest variability under M2, and 15 companies of the 48 compared had higher coefficients of variation under SFAS #52 than under SFAS #8, a result that is consistent with Beaver's and Wolfson's (1984) allegation that SFAS #8 is not likely to always result in higher volatility of earnings than SFAS #52, and is consistent as well with Duangploy's (1979) simulation which showed similar non-systematic effects.

A vast amount of translation literature deals with management concerns that SFAS #8 (M2) results in higher variability of earnings than other methodologies. Although there is some general foundation for this concern, clearly M2 does not always result in higher variability of earnings than other methodologies for all firms. Further, although the methodology of SFAS #8 may result in higher variability of earnings for some firms over a period of several years than some other given methodology, the relationship may reverse in

subsequent periods. The instability of relative variability of reported earnings across methodologies and time periods at the firm level is demonstrated dramatically by the relative variabilities of company 28 (Table V) for which M2 resulted in the lowest variability of the first five year period and the second highest for the second five year period. In order for firm managers to intelligently lobby for or against the methodology of SFAS #8, based on perceptions of variability of earnings, it would be necessary to determine what firm specific factors would cause variability of earnings to be different under SFAS #8 than under other methodologies and to determine whether the differences would be consistent over time.

(2) Does deferral of translation gains and losses reduce the variability of subsidiary reported earnings? For CNM, MNM, CRM, and PPM, deferring translation gains and losses results in lower average variability of earnings. This occurs at the firm level for most firms, but certainly not for all. For 24 of the sample companies (of 48 companies shown on Table X), at least one of the four non-deferral methodologies resulted in higher variability of earnings than the deferral counterpart. Although it is generally true that deferral methodologies result in lower variability of reported earnings than non-deferral methodologies, there are notable exceptions at the firm level, and the effect of deferral/non-deferral on variability of reported earnings is highly firm specific.

If variability of earnings is relevant to policy makers, then the deferral issue is a major one. For example, M3, that is the methodology of SFAS #52 with non-deferral instead of deferral of gains and losses, results in higher average variability of earnings for the sample companies than M2, the methodology of SFAS #8. In fact, if the SFAS #8 methodology required deferral, and the SFAS #52 methodology had required non-deferral, SFAS #8 would have resulted in lower average variability of earnings (M6 vs. M3). Although these differences are not observed for all companies, as described above, they suggest that managers who expressed concern about SFAS #8 because they preferred lower variability of reported earnings were perhaps focused on the non-deferral issue rather than the question of which exchange rate should be used to translate various accounts.

While deferral is a major policy issue, it is not the only major issue. The current study suggests that deferral may be a means of variability reduction, but this descriptive study cannot meaningfully address the issue of what variation is noise and what has economic information content.

(3) What translation methodology results in the lowest coefficient of variability of reported subsidiary earnings for the sample firms taken together and at the firm level? M8 (PPM/DEF) results in the lowest average variability of earnings, and the next lowest average variability results from the use of M4 (PPM/NDF). This is not true for all companies, although most of the 48 companies shown

on Table X had the lowest variability under M8. Among the
four non-deferral methodologies, M4 (PPM/NDF) resulted in the
lowest variability for 38 of the sample firms. Managers may
see high variability of reported earnings as undesirable
because they may perceive it to indicate higher risk, to
result in lower market prices, and to result in lower
management compensation. Some managers may therefore prefer
M4 or M8 due to lower variability without reference to any
other factor. But high or low variability is not in itself
necessarily bad or good. Future research may attempt to
associate differences in variability with other measures of
economic variability, to address the issue of what variation
is noise and what has economic information content.

(4) Do subsidiary reported earnings under the eight
translation methodologies studied, taken together, appear to
converge to the reported subsidiary earnings under any one of
the translation methodologies? The four non-deferral
methodologies, as a group, appear to converge toward the
earnings numbers generated by M4 (PPM/NDF), and the four
deferral methodologies, as a group, appear to converge toward
M8 (PPM/DEF). This convergence is the result of the use of
PPM numbers as opposed to exchange rates. Exchange rates are
more variable than price parity numbers and, in the long term
at least, appear to be driven substantially by relative price
levels (the price parity theory). The short-term differences
between the reported earnings obtained from exchange rate
methods and price parity methods are caused by short-term

variations in the exchange rate itself, variations which result from factors which are quite possibly of no analytical significance to individual firms which are going concerns.

PPM methodologies therefore appear to eliminate much of the variability that is a substantial element of the time series of reported earnings resulting from the use of exchange rate methodologies.

Profitability Ratios

Financial ratios are used in a number of decision rules, often in conjunction with other ratios and other information, by managers, investors, lenders, and other analysts. For example, information concerning a company's future profitability, compared to past years or to the company's industry, is relevant to investment and disinvestment decisions because profitability relates to market values and the ability of the company to pay dividends. Profitability information is also of value to lenders who must make lending decisions based on the ability of the borrower to generate funds for payment of principle and interest. Trends in profitability as evidenced by past measures are useful in predicting future profitability.

The most commonly used profitability ratios are return on total assets and return on equity. In previous sections, it has been demonstrated that reported earnings numbers are often substantially different across translation methodologies and across accounting periods. Variability of

earnings is also often substantially different across methodologies and across time periods. Further, differences in reported earnings and variability of earnings that can be observed for the 50 sample firms taken together are often not reflected at the individual firm level. Because reported earnings is a major component of both return on total assets and return on equity, it may be anticipated that these ratios may also be quite different across methodologies, across time, and across firms.

But differences in these ratios across methodologies do not necessarily relate to differences in information content. For example, one methodology may consistently result in a higher return on total assets than another methodology, yet both methodologies may rank order companies the same, a fact that would imply similar information content.

Questions Addressed

Four questions are posed in this section, two each for return on total assets and return on total equity, concerning the information content, represented by rank ordering of companies, of the profitability numbers generated from different translation methodologies.

(1) Do different methodologies materially affect the comparative rankings of firms in terms of profitability as measured by return on total assets, (a) across firms, (b) at the firm level, and (c) across periods?

(2) Do some methodologies rank firms <u>similarly</u> in terms of return on total assets; do some methodologies appear to be informationally equivalent?

(3) Do different methodologies materially affect the comparative rankings of firms in terms of profitability as measured by return on total equity, (a) across firms, (b) at the firm level, and (c) across periods?

(4) Do some methodologies rank firms <u>similarly</u> in terms of return on total equity; do some methodologies appear to be informationally equivalent?

<u>Return on Total Assets</u>

<u>Across firms effects</u>. Table XII displays the Spearman rank correlation coefficients (R) for each of the nine years of the study period and the nine-year average[9].

The average Spearman R's are high enough to indicate a significant relationship between the rank orderings of the 50 sample companies across translation methodologies, a result that is not unexpected[10]. Because translated return

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[9]Although translated data were generated for the 10-year period 1976-1985, return on total assets was calculated using average total assets, and return on equity was calculated using average equity, resulting in nine years of ratios, 1977-1985.

[10]The lowest average Spearman R in Table XII is .67 for M2 (MNM/NDF) and M7 (CRM/DEF). The related test statistic, $t_s = R\{(n-2)(1-R^2)\}^{1/2}$, is 6.25. For a Spearman R of .47, the lowest average observed for return on equity, $t_s = 3.69$. Each of these t_s figures indicate alphas of less than .001. Clearly, with a high degree of confidence, all translation methodology pairs generate rank orderings which are significantly related.

TABLE XII

SPEARMAN R'S BASED ON RETURNS ON
TOTAL ASSETS, 1977-1985

Methodology Pairs	1977	78	79	80	81	82	83	84	85	Average
M1 vs. M2	.77	.75	.71	.93	.74	.81	.91	.76	.56	.77
M1 vs. M3	.80	.80	.62	.89	.85	.87	.82	.86	.84	.82
M1 vs. M4	.76	.84	.80	.93	.79	.81	.90	.80	.80	.82
M1 vs. M5	.82	.87	.73	.90	.85	.89	.79	.86	.91	.85
M1 vs. M6	.68	.76	.56	.84	.67	.78	.74	.73	.82	.73
M1 vs. M7	.81	.89	.71	.88	.84	.91	.83	.85	.91	.85
M1 vs. M8	.60	.78	.61	.87	.73	.79	.76	.81	.83	.75
M2 vs. M3	.54	.70	.42	.81	.74	.70	.83	.82	.53	.68
M2 vs. M4	.86	.87	.84	.91	.89	.84	.82	.74	.59	.82
M2 vs. M5	.57	.73	.41	.82	.61	.79	.78	.76	.54	.67
M2 vs. M6	.61	.84	.76	.90	.83	.88	.80	.85	.62	.79
M2 vs. M7	.57	.72	.40	.80	.58	.82	.80	.80	.52	.67
M2 vs. M8	.64	.79	.63	.87	.80	.78	.70	.73	.64	.73
M3 vs. M4	.64	.84	.58	.89	.80	.78	.81	.82	.72	.76
M3 vs. M5	.87	.89	.87	.96	.84	.91	.92	.86	.85	.89
M3 vs. M6	.79	.76	.65	.88	.82	.79	.89	.86	.75	.80
M3 vs. M7	.90	.93	.85	.97	.83	.89	.90	.80	.87	.88
M3 vs. M8	.73	.87	.73	.91	.89	.87	.89	.86	.75	.83
M4 vs. M5	.67	.82	.64	.89	.65	.84	.79	.86	.83	.78
M4 vs. M6	.77	.80	.78	.88	.78	.86	.72	.84	.94	.82
M4 vs. M7	.70	.83	.63	.88	.62	.83	.79	.85	.84	.78
M4 vs. M8	.79	.92	.79	.94	.86	.91	.85	.95	.96	.88
M5 vs. M6	.88	.89	.71	.90	.74	.92	.95	.90	.87	.86
M5 vs. M7	.98	.97	.98	.99	.98	.99	.97	.95	.99	.98
M5 vs. M8	.83	.91	.83	.92	.77	.93	.92	.91	.88	.88
M6 vs. M7	.88	.86	.70	.90	.70	.91	.90	.83	.86	.84
M6 vs. M8	.95	.90	.92	.93	.89	.92	.88	.89	.96	.92
M7 vs. M8	.84	.90	.82	.92	.73	.90	.88	.86	.89	.86

on total assets numbers may be used for a variety of decisions, it is not possible to determine what Spearman R's are significantly high enough to prompt the same lending, investing, and other decisions. However, Table XII indicates which translation methodology pairs result in the highest correlation of rank orderings.

The highest average correlation of rank orderings occurs between M5 (CNM/DEF) and M7 (CRM/DEF), and this very high correlation is maintained consistently during each of the nine years. Very high correlations of rank orderings and consistencies in correlation over the nine years are also observed for the methodology pair M6 (MNM/DEF) and M8 (PPM/DEF) and for M3 (CRM/NDF) and M5 (CNM/DEF).

It is also apparent that the highest correlations and the greatest consistency generally occur when comparing two deferral methodologies. This is not surprising since it has already been established in a previous section that deferral methodologies result in significantly lower variability of reported earnings. Although two methodologies might each result in high variability of reported earnings and yet rank order companies the same based on earnings and profitability ratios, this phenomenon is not likely considering the observation made in previous sections that the patterns of reported earnings over time are not the same or even particularly similar across translation methodology; for example, reported earnings under one methodology may increase

substantially in a given year while reported earnings under another methodology decrease substantially.

Among the exchange rate methodologies, the deferral methodologies eliminate some of the variability that results from the short-term variation in exchange rates (as described in the previous section on variability of earnings in which it was observed that deferral methodologies generally result in lower variability of earnings than their non-deferral counterparts). High Spearman R's are therefore observed for the six deferral methodology pairs, relative to other pairings. Of the 28 pairings, the six deferral pairings all rank in the top 11 by average Spearman R's and occupy the top two positions, M5 (CNM/DEF) vs. M7 (CRM/DEF) and M6 (MNM/DEF) vs. M8 (PPM/DEF).

The two methodologies which result in the lowest average Spearman R are the methodologies required by SFAS #8 and SFAS #52. When FASB made the change in GAAP from SFAS #8 to SFAS #52, it made the biggest change possible from among the eight methodologies studied as far as information content based on the rank ordering of companies by return on total assets. At the same time, the change from SFAS #8 to SFAS #52 brought GAAP closer to the current-non current method, M5 (CNM/DEF) than to any of the other methodologies studied. Ironically, M5 (CNM/DEF) was the earliest methodology required by accounting GAAP.

The earnings variability effect of short-term variations in exchange rates can be seen in Figure 7 which shows the average profitability ratios across non-deferral methodologies (M1-M4) for nine years of the study period. The exchange rate methodologies (M1-M3), as a group, appear to converge toward the PPM methodology (M4). The lower variability of return on total assets under M4 (PPM/NDF) is apparent on the graph without calculating average variances or coefficients of variation; the M4 (PPM/NDF) line is simply flatter than the three exchange rate lines. During the first few years, the exchange rate methodologies generated generally lower return on total assets numbers than the PPM methodology. During the later years, however, the exchange rate methodologies generally resulted in higher averages of return on total assets than the PPM methodology. The average variability under the exchange rate methodologies is clearly greater than for the PPM methodology, especially during the last five years of the study period. From 1980 to 1981 to 1982 and from 1984 to 1985, the averages under exchange rate methodologies change drastically while the changes in averages under M4 (PPM/NDF) are not particularly greater for those years than for other years.

Higher variability of profitability measures imply higher risk. Therefore, this smoothing under M4 (PPM/NDF) of the profitability measure may be preferred by managers whose performance is partially evaluated by the degree of risk associated with the firm. Less variability of profitability

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M1      IS PLOTTED WITH AN '1'
M2      IS PLOTTED WITH AN '2'
M3      IS PLOTTED WITH AN '3'
M4      IS PLOTTED WITH AN '4'
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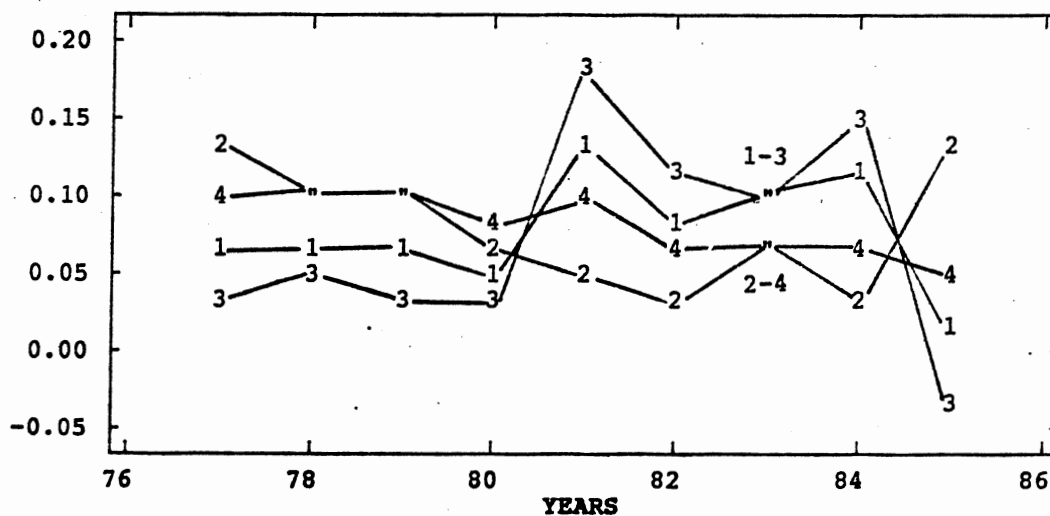

Figure 11.   Average return on total assets across
non-deferral methodologies

may also be preferred by financial analysts who perceive that the greater the variability the more difficult it is to predict future performance.

Figure 8 is a graphical presentation of the average return on total assets across the deferral methodologies (M5-M8). The deferral of translation gains and losses eliminates some of the variation in reported earnings and therefore some of the variation in return on total assets. Therefore, the lines in Figure 8 are somewhat flatter than those in Figure 7 although the scales used in the two figures are about the same. The major jumps and drops on the graph in Figure 8 are similar to those of Figure 7, although generally in lesser amounts, despite the deferral of translation gains and losses. This is at least partially due to the fact that reported income is affected by beginning and ending inventory figures. These potentially significant differences in inventory numbers across translation methodologies result in translation gains and losses which, even under deferral methodologies, affect cost of goods sold in the current period.

In Figure 8, it is again the PPM methodology (M8) that results in the flattest line, the least variability of averages. Although some of the variation generated by the exchange rate methodologies (M5-M7) is deferred, some of it remains.
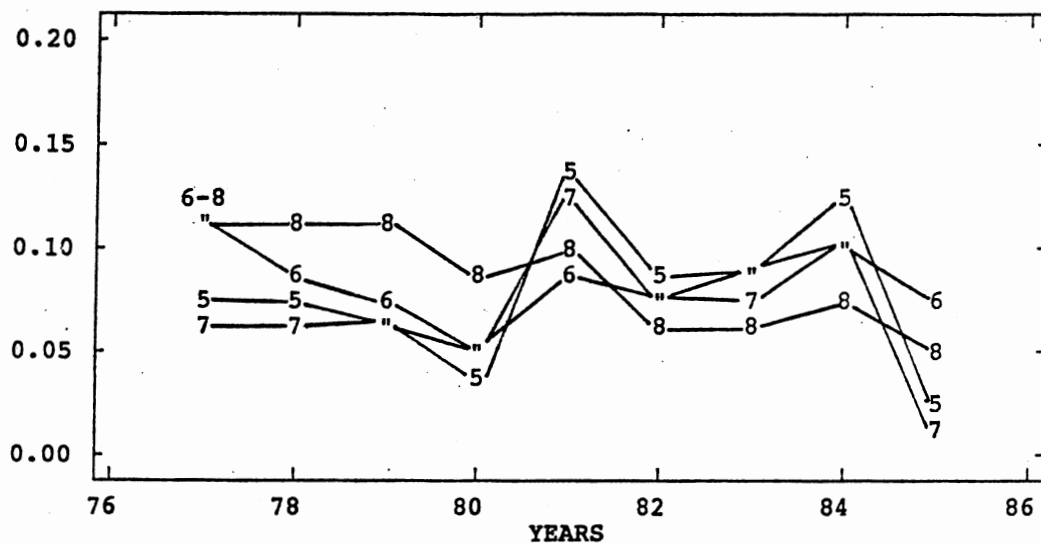
Figure 12. Average return on total assets across deferral methodologies

Table XIII shows the quintile changes across firms for return on total assets for 1977 and for 1984. An examination of quintile changes for two years, instead of for only one year, is done in order to determine what differences might occur over time. 1977 and 1984 are selected arbitrarily, although they are separated by several years. For the purpose of this study, a company changes quintiles as a result of applying two different methodologies if the rank of the company under one methodology differs by at least 10 from its rank under another methodology. Two quintile changes occur if the ranks differ by at least 20, but less than 30, three quintile changes if the ranks differ by at least 30 but less than 40, and four quintile changes if the ranks differ by at least 40.

Quintile changes imply significant differences in information signals. If a company is ranked 15th under one translation methodology and sixteenth under another, there is a difference in information signals between the two methodologies, but the difference may be of little if any importance in most decisions. However, a change from 15th position to 25th, for the purpose of this study, is defined as a significant difference in information signals across translation methodologies. The use of quintiles instead of quartiles or sextiles is arbitrary and is based on the number of companies in the sample (50).

TABLE XIII

QUINTILE CHANGES ACROSS FIRMS
RETURN ON TOTAL ASSETS
1977 AND 1984

Methodology Pairs	Quintile Changes									
	1977					1984				
	0	1	2	3	4	0	1	2	3	4
M1 vs. M2	40	8	0	2	0	43	4	1	2	0
M1 vs. M3	38	10	1	1	0	43	5	2	0	0
M1 vs. M4	39	7	2	2	0	40	8	1	1	0
M1 vs. M5	44	3	2	1	0	42	6	2	0	0
M1 vs. M6	40	5	3	2	0	38	8	2	2	0
M1 vs. M7	43	4	3	0	0	40	8	1	1	0
M1 vs. M8	36	8	2	4	0	37	11	1	1	0
M2 vs. M3	38	5	4	1	2	36	12	2	0	0
M2 vs. M4	42	6	2	0	0	38	10	0	2	0
M2 vs. M5	38	4	4	3	1	32	14	3	1	0
M2 vs. M6	32	11	4	2	1	37	12	1	0	0
M2 vs. M7	32	10	4	3	1	39	8	2	1	0
M2 vs. M8	38	6	2	3	1	36	10	3	1	0
M3 vs. M4	39	4	5	1	1	39	9	1	1	0
M3 vs. M5	42	7	1	0	0	41	8	1	0	0
M3 vs. M6	39	9	1	1	0	39	10	1	0	0
M3 vs. M7	44	6	0	0	0	38	11	1	0	0
M3 vs. M8	38	9	1	2	0	39	9	2	0	0
M4 vs. M5	35	7	7	1	0	41	8	1	0	0
M4 vs. M6	41	5	2	2	0	44	4	1	1	0
M4 vs. M7	38	7	4	1	0	40	9	1	0	0
M4 vs. M8	44	2	2	2	0	46	4	0	0	0
M5 vs. M6	45	3	2	0	0	47	2	1	0	0
M5 vs. M7	50	0	0	0	0	47	3	0	0	0
M5 vs. M8	42	5	3	0	0	43	7	0	0	0
M6 vs. M7	46	2	2	0	0	41	7	2	0	0
M6 vs. M8	46	4	0	0	0	44	5	0	1	0
M7 vs. M8	41	6	3	0	0	40	10	0	0	0

The question 'Does a specified number of quintile changes mean that two methodologies generally result in different information signals based on rank ordering of companies?' is not precisely answered in this study. Further, no attempt is made to determine how much more serious for decision-making a two quintile change is than a single quintile change. The answer to these questions are no doubt different in different decision contexts.

But Table XIII allows some generalizations concerning differences in information signals, based on the rank ordering of companies by return on total assets, across methodologies and across time.

In 1977, all methodology pairs with the exception of M5 (CNM/DEF) and M7 (CRM/DEF) result in at least some quintile changes. The vast majority of such changes are of one quintile only. Since a single quintile change represents a significantly different information signal, a small number of quintile changes cannot be dismissed as trivial. For example, the M6 (MNM/DEF) vs. M7 (CRM/DEF) and M6 (MNM/DEF) vs. M8 (PPM/DEF) pairs result in only four quintile changes, but such a difference could be significant to an investor who rank orders companies by return on total assets as a part of the investment decision. The four quintile changes could lead the investor to significantly different investment decisions.

With the exception of the M5 (CNM/DEF) vs. M7 (CRM/DEF) pair, all pairings result in a few quintile changes in 1977, as many as 18 for the M2 (MNM/NDF, the methodology of SFAS #8) vs. M6 (MNM/DEF) and M2 (MNM/NDF) vs. M7 (CRM/DEF) pairs. In 1977, the methodology that is the least compatible with the other seven methodologies in terms of information content based on return on total assets orderings is M2 (MNM/NDF) which resulted in a total of 90 quintile changes in seven pairings. The most compatible methodologies were M5 (CNM/DEF) and M7 (CRM/DEF) which had no quintile changes between them.

Considering that it has already been observed in previous sections that reported earnings across methodologies are not only often different in given years but that the differences are not consistent from year to year, there is no reason to anticipate that the number of quintile changes in 1984 would be the same as in 1977. There are differences in the number of quintile changes in 1984 compared with 1977, and the number of changes is neither generally greater or smaller. However, the general patterns remain the same: M2 (MNM/NDF, the methodology of SFAS #8) appears to be the methodology which is the least compatible with the others, and M5 (CNM/DEF) and M7 (CRM/DEF) the most compatible with one another.

Firm-level effects. Table XIV, shows the return on total assets over nine years, for each of the eight

methodologies, for companies 23, 28, and 36 respectively.
Clearly, return on total asset numbers are different for
different methodologies, and the range is substantial. No
two methodologies result in numbers that are consistently
close over the nine-year study period.

Tables XV, XVI, and XVII show firm level quintile
changes and Spearman rank correlation coefficients for pairs
of methodologies based on return on total assets. For
company 23 (Table 15), there are few quintile changes as a
result of applying any two translation methodologies, never
more than one over the nine years of the study period. This
means that in most years the information signal resulting
from the rank order of company 23 is not significantly
different depending on translation methodology.

The manager, investor, or lender who uses ranking
according to return on total assets for decisions may be led
to believe that, for company 23, it never matters what
translation methodology is used. Such an assumption could
result in uninformed decisions since differences in
translation methodology do at least occasionally matter. For
example, during the period 1977 through 1983, there appear to
be no significant differences in information signals between
M1 (CNM/NDF) and M2 (MNM/NDF). The manager, investor,
lender, or other analyst who assumes this will be true in
year nine as well as all other years could become complacent
as to methodology choice when clearly the choice matters in

TABLE XIV

RETURN ON TOTAL ASSETS AT THE FIRM LEVEL
1977-1985

Year	M1	M2	M3	M4	M5	M6	M7	M8	Range
Company 23									
1977	.034	.099	-.011	.048	.044	.072	.021	.074	.110
1978	.061	.110	.034	.102	.077	.096	.056	.106	.076
1979	.089	.138	.048	.126	.089	.111	.082	.141	.093
1980	.046	.071	.028	.073	.047	.057	.050	.095	.067
1981	.120	.028	.179	.082	.120	.083	.109	.100	.151
1982	.103	.023	.136	.070	.104	.074	.081	.076	.113
1983	.133	.117	.152	.143	.137	.122	.102	.110	.049
1984	.154	.061	.193	.103	.157	.126	.115	.106	.131
1985	.007	.141	-.058	.071	.039	.085	.020	.067	.200
Mean	.083	.088	.078	.091	.090	.092	.071	.097	.027
Company 28									
1977	.052	.121	.012	.091	.078	.098	.057	.112	.109
1978	.074	.088	.025	.083	.066	.065	.055	.083	.064
1979	.063	.091	.018	.078	.059	.055	.059	.095	.077
1980	.072	.083	.039	.093	.053	.048	.061	.102	.063
1981	.069	.014	.164	.068	.100	.094	.096	.089	.149
1982	.089	.011	.133	.069	.104	.095	.082	.079	.122
1983	.061	.012	.087	.040	.084	.085	.048	.051	.076
1984	.049	-.038	.107	.022	.086	.071	.043	.031	.145
1985	.026	.162	-.073	.025	.047	.098	.009	.060	.234
Mean	.062	.061	.057	.063	.075	.079	.057	.078	.022
Company 36									
1977	.113	.162	.110	.142	.112	.159	.100	.136	.062
1978	.051	.043	.033	.111	.058	.048	.054	.112	.079
1979	.022	.122	.010	.101	.040	.104	.039	.108	.113
1980	.073	.048	.075	.114	.080	.047	.084	.118	.072
1981	.213	.067	.223	.120	.169	.074	.172	.115	.156
1982	.111	.150	.115	.086	.105	.156	.095	.094	.070
1983	.121	.129	.129	.065	.117	.133	.097	.068	.068
1984	.144	.109	.150	.074	.133	.119	.115	.077	.077
1985	.070	.183	.057	.076	.089	.185	.066	.086	.128
Mean	.102	.113	.100	.099	.100	.114	.091	.102	.023

TABLE XV

FIRM LEVEL QUINTILE CHANGES, COMPANY 23
RETURN ON TOTAL ASSETS

Methodology Pairs	Years									
	1977	78	79	80	81	82	83	84	85	Total*
M1 vs. M2	0	0	0	0	0	0	0	1	0	1
M1 vs. M3	1	0	0	0	0	0	0	0	0	1
M1 vs. M4	0	0	0	0	0	0	0	1	0	1
M1 vs. M5	0	0	0	0	0	0	0	0	0	0
M1 vs. M6	0	0	0	0	0	0	0	0	0	0
M1 vs. M7	0	0	0	0	0	0	0	0	0	0
M1 vs. M8	0	0	0	0	0	0	0	0	0	0
M2 vs. M3	0	0	0	0	0	0	0	1	0	1
M2 vs. M4	0	0	0	0	0	0	0	0	0	0
M2 vs. M5	0	0	0	0	0	0	0	1	0	1
M2 vs. M6	0	0	0	0	0	0	0	0	0	0
M2 vs. M7	0	0	0	0	0	0	0	0	0	0
M2 vs. M8	0	0	0	0	0	0	0	0	0	0
M3 vs. M4	0	0	0	0	0	0	0	0	1	1
M3 vs. M5	1	0	0	0	0	0	0	0	0	1
M3 vs. M6	0	0	0	0	0	0	0	0	0	0
M3 vs. M7	0	0	0	0	0	0	0	0	0	0
M3 vs. M8	0	0	0	0	0	0	0	0	0	0
M4 vs. M5	0	0	0	0	0	0	0	0	0	0
M4 vs. M6	0	0	0	0	0	0	0	0	0	0
M4 vs. M7	0	0	0	0	0	0	0	0	0	0
M4 vs. M8	0	0	0	0	0	0	0	0	0	0
M5 vs. M6	0	0	0	0	0	0	0	0	0	0
M5 vs. M7	0	0	0	0	0	0	0	0	0	0
M5 vs. M8	0	0	0	0	0	0	0	0	0	0
M6 vs. M7	0	0	0	0	0	0	0	0	0	0
M6 vs. M8	0	0	0	0	0	0	0	0	0	0
M7 vs. M8	0	0	0	0	0	0	0	0	0	0

*The number of years in which a quintile change occurred.

TABLE XVI

FIRM LEVEL QUINTILE CHANGES, COMPANY 28
RETURN ON TOTAL ASSETS

Methodology	Years									
Pairs	1977	78	79	80	81	82	83	84	85	Total*
M1 vs. M2	0	1	0	0	1	0	0	0	0	2
M1 vs. M3	0	1	1	0	1	0	0	0	1	4
M1 vs. M4	0	1	1	0	0	0	0	0	1	3
M1 vs. M5	0	0	0	0	0	0	0	0	0	0
M1 vs. M6	0	2	1	0	2	0	0	0	0	3
M1 vs. M7	0	1	0	0	0	0	0	0	0	1
M1 vs. M8	1	2	1	0	1	0	0	0	0	4
M2 vs. M3	0	0	0	0	0	0	0	0	1	1
M2 vs. M4	0	0	0	0	0	0	0	0	1	1
M2 vs. M5	0	0	0	0	0	1	0	0	0	1
M2 vs. M6	0	0	0	0	1	1	1	0	0	3
M2 vs. M7	0	0	0	0	0	0	0	0	0	0
M2 vs. M8	0	0	0	0	0	1	0	0	0	1
M3 vs. M4	0	0	0	0	0	0	0	0	0	0
M3 vs. M5	0	0	1	0	0	0	0	0	1	2
M3 vs. M6	0	0	0	0	1	0	0	0	1	2
M3 vs. M7	0	0	1	0	0	0	0	0	0	1
M3 vs. M8	1	0	0	0	0	0	0	0	0	1
M4 vs. M5	0	0	0	0	0	0	0	0	1	1
M4 vs. M6	0	0	0	0	1	0	1	0	1	3
M4 vs. M7	0	0	0	0	0	0	0	0	1	1
M4 vs. M8	0	0	0	0	1	0	0	0	1	2
M5 vs. M6	0	1	1	0	1	0	0	0	0	3
M5 vs. M7	0	0	0	0	0	0	0	0	0	0
M5 vs. M8	0	1	0	0	0	0	0	0	0	1
M6 vs. M7	0	1	1	0	1	0	1	0	0	4
M6 vs. M8	0	0	0	0	0	0	0	0	0	0
M7 vs. M8	0	1	0	0	0	0	0	0	0	1

*The number of years in which a quintile change
occurred.

TABLE XVII

FIRM LEVEL QUINTILE CHANGES, COMPANY 36
RETURN ON TOTAL ASSETS

Methodology	Years									
Pairs	1977	78	79	80	81	82	83	84	85	Total*
M1 vs. M2	0	1	2	1	1	1	0	0	0	5
M1 vs. M3	0	0	0	1	0	1	0	0	0	2
M1 vs. M4	0	1	2	0	0	0	1	0	0	3
M1 vs. M5	0	0	0	0	0	0	0	0	0	0
M1 vs. M6	0	1	2	1	2	1	0	0	0	5
M1 vs. M7	0	0	0	0	0	0	0	0	0	0
M1 vs. M8	0	1	1	0	1	0	0	0	0	3
M2 vs. M3	0	1	2	2	0	2	0	1	0	5
M2 vs. M4	0	2	0	1	0	1	1	1	0	5
M2 vs. M5	0	1	2	2	0	1	0	1	0	5
M2 vs. M6	0	0	0	0	1	0	0	1	0	2
M2 vs. M7	0	1	2	2	0	1	0	0	0	4
M2 vs. M8	0	2	0	1	0	1	1	1	0	5
M3 vs. M4	0	1	1	0	0	1	1	0	1	5
M3 vs. M5	0	0	0	0	0	0	0	0	0	0
M3 vs. M6	0	1	2	2	1	2	0	0	0	5
M3 vs. M7	0	0	0	0	0	0	0	0	0	0
M3 vs. M8	0	1	1	0	0	1	0	0	0	3
M4 vs. M5	0	1	1	0	0	0	1	0	0	3
M4 vs. M6	0	2	0	1	1	1	1	0	1	6
M4 vs. M7	0	1	1	0	0	0	1	0	0	3
M4 vs. M8	0	0	0	0	0	0	0	0	0	0
M5 vs. M6	0	1	2	1	1	1	0	0	0	5
M5 vs. M7	0	0	0	0	0	0	0	0	0	0
M5 vs. M8	0	1	1	0	0	0	0	0	0	2
M6 vs. M7	0	1	2	1	2	1	0	0	0	5
M6 vs. M8	0	2	1	1	1	1	1	0	1	7
M7 vs. M8	0	1	1	0	0	0	0	0	0	2

*The number of years in which a quintile change
occurred.

year nine. Users of financial statements could make very different decisions in year nine depending on translation methodology if their decisions depend on rank orderings based on return on total assets. The same scenario could occur when comparing other methodology pairs, for example M2 (MNM/NDF) with M3 (CRM/NDF) and M2 (MNM/NDF) with M5 (CNM/DEF).

Although M2 (MNM/NDF) appears to be the least compatible with other methodologies when all 50 sample firms are considered together, such incompatibility may not be seen for certain individual firms. For company 23, for example, no quintile changes occur in any of the nine study years when the rank orderings under M2 (MNM/NDF) are compared with those under M4 (PPM/NDF), M6 (MNM/DEF), M7 (CRM/DEF), and M8 (PPM/DEF).

Company 28 (Table XVI) also does not experience quintile changes in most years when applying different methodologies. However, the number of years in which a quintile change occurs suggests that company 28's information signals based on rank orderings by return on total assets are more sensitive to methodology differences than are those of company 23. Again there is no consistency over the study period. In year 1979, for example, an analyst might review the rank orderings of company 28 under M1 (CNM/NDF) and M8 (PPM/DEF) and conclude that these two methodologies will nearly always result in significantly different information

signals. But during the following six years there is seldom much difference in this information signal.

The information signals based on rank orderings by return on total assets are also more sensitive to methodology changes for company 36 (Table XVII) than for company 23. For all methodology pairs, there are at least some years in which there is no quintile change, but for no methodology pair is company 36 always ranked significantly different. The greatest sensitivity for company 36 seems to be between M6 (MNM/DEF) and M8 (PPM/DEF) (seven quintile changes in nine years). For companies 23 and 28, there were no quintile changes between M6 (MNM/DEF) and M8 (PPM/DEF) in any of the nine years studied.

Different firms therefore have different experiences with rank ordering by return on total assets with the same methodology pairs. Further, the number of quintile changes, for any methodology pair, is not consistent from year to year at the firm level. Quintile changes, representing significant differences in information signals based on rank orderings by return on total assets are highly firm specific.

SFAS #8 vs. SFAS #52. Table XVIII shows the rank orderings of each of the 50 sample companies in 1984 under SFAS #8 (M2) and SFAS #52 (M7) along with the related quintile changes. The Spearman R of .797 indicates some differences in rank ordering. Although many companies had no quintile change between SFAS #8 and SFAS #52, differences are

TABLE XVIII

RETURN ON TOTAL ASSETS, 1984
SFAS #8 vs. SFAS #52
(SPEARMAN R = .797)

Co	SFAS #8	#52	QC*	Co	SFAS #8	#52	QC*
1	18	21	0	26	10	1	0
2	42	49	0	27	46	48	0
3	9	11	0	28	30	17	1
4	19	27	0	29	23	29	0
5	2	2	0	30	17	25	0
6	34	14	2	31	44	38	0
7	13	37	2	32	37	4	3
8	50	31	1	33	7	16	0
9	12	6	0	34	14	26	1
10	28	32	0	35	47	20	2
11	49	50	0	36	40	36	0
12	5	42	3	37	45	18	2
13	8	30	2	38	15	33	1
14	31	44	1	39	22	7	1
15	36	5	3	40	4	40	3
16	20	15	0	41	11	28	1
17	48	45	0	42	6	12	0
18	41	46	0	43	38	3	3
19	3	39	3	44	43	35	0
20	1	9	0	45	16	22	0
21	35	41	0	46	24	19	0
22	33	34	0	47	26	23	0
23	27	43	1	48	39	10	2
24	21	8	1	49	32	47	1
25	29	13	1	50	25	24	0

*QC = number of quintile changes.

often considerable. For example, companies 12, 19, and 40 experienced three quintile differences. Again, differences in information signals based on rank orderings by return on total assets is highly firm specific.

Additional evidence of the firm specific characteristic of differences in returns on total assets between SFAS #8 and SFAS #52 is reflected in Table XIX. The nine-year column indicates that the return on total assets, averaged over nine years, is often very similar between SFAS #8 and SFAS #52 for certain individual firms (for example, companies 4 and 11). For other companies, the nine-year averages are clearly materially different (for example, companies 9, 25, and 43). Within individual companies, the differences under either SFAS #8 or SFAS #52 may differ substantially between the first four years of the study period and the last five years (for example, companies 1, 3, and 9), while other companies may have similar numbers in both time periods (for example, companies 30 and 41 under SFAS #8; and companies 11 and 13 under SFAS #52).

Return on Equity

In this section, differences in the information content based on rank orderings of companies by return on total equity numbers, are examined in a manner similar to that of the previous section on return on total assets. In addition, the results for return on total equity are compared and contrasted with those for return on total assets.

TABLE XIX

RETURN ON TOTAL ASSETS AVERAGES
SFAS #8 vs. SFAS #52

	SFAS #8			SFAS #52		
	1977 to 1980	1981 to 1985	1977 to 1985	1977 to 1980	1981 to 1985	1977 to 1985
Co						
1	.028	.063	.047	.059	.081	.071
2	.144	.103	.121	.102	.098	.100
3	.101	.021	.057	.039	.030	.034
4	.103	.070	.085	.105	.061	.080
5	.063	-.087	-.020	-.030	-.037	-.034
6	.116	.078	.095	.111	.042	.073
7	.112	.059	.082	.059	.048	.053
8	.168	.130	.147	.171	.085	.123
9	.115	-.027	.036	.057	-.071	-.014
10	.074	.050	.061	.111	.007	.053
11	.169	.137	.151	.142	.149	.146
12	.130	.097	.111	.059	.118	.091
13	.133	.049	.086	.063	.061	.062
14	.159	.090	.121	.077	.110	.095
15	.109	.052	.077	.121	-.002	.053
16	.099	.041	.067	.071	.041	.054
17	.187	.143	.162	.155	.128	.140
18	.144	.121	.131	.093	.118	.107
19	.158	-.002	.069	.000	.077	.043
20	.100	.055	.075	.056	.065	.061
21	.141	.099	.117	.097	.097	.097
22	.065	.041	.052	.070	.024	.044
23	.123	.096	.108	.085	.072	.078
24	.096	.050	.070	.091	.017	.050
25	.081	.098	.090	.073	.039	.054
26	.089	-.002	.039	.053	.014	.032
27	.172	.131	.149	.148	.125	.135
28	.116	.064	.087	.063	.055	.059
29	.083	.044	.062	.045	.040	.042
30	.066	.066	.066	.053	.097	.077
31	.145	.105	.123	.103	.086	.093
32	.071	.079	.075	.100	.003	.046
33	.079	.042	.059	.042	.026	.033
34	.151	.055	.098	.064	.074	.070
35	.119	.089	.102	.104	.061	.080

TABLE XIX (Continued)

Co	SFAS #8				SFAS #52		
	1977 to 1980	1981 to 1985	1977 to 1985		1977 to 1980	1981 to 1985	1977 to 1985
36	.137	.092	.112		.095	.103	.100
37	.146	.088	.114		.105	.065	.083
38	.124	.071	.095		.065	.072	.069
39	.017	.066	.044		.012	-.011	-.001
40	.095	.061	.076		.067	.110	.091
41	.051	.053	.052		.015	.059	.039
42	.112	.001	.051		.014	.039	.028
43	.031	.074	.055		.126	-.057	.024
44	.134	.108	.120		.132	.066	.096
45	.148	.062	.100		.055	.052	,053
46	.124	.057	.087		.086	.056	.069
47	.139	.064	.097		.072	.081	.077
48	.033	.066	.051		.036	.016	.025
49	.154	.121	.136		.113	.122	.118
50	.095	.065	.079		.085	.059	.070
Spearman	.624	.704	.668		.624	.704	.668

Across firms effects. Table XX shows the Spearman rank correlation coefficients for each of the nine years and the nine-year average. The average Spearman R's are lower for return on equity observations than for return on total assets for each of the methodology pairs. This may be explained by the fact that equity is affected by the total amount of cumulative translation gains and losses in any given year, whether the translation methodology defers such gains or losses from recognition in current earnings or not. For some companies at least, this impact of translation gains and losses on equity results in greater variability of return on equity which in turn has the potential to cause greater differences in rank orderings between methodologies over the study period.

As was observed for return on total assets, the highest correlation of rank orderings based on return on equity occurs between M5 (CNM/DEF) and M7 (CRM/DEF), and this very high correlation is maintained consistently during each of the nine years. The comparisons of deferral methodologies reveal high correlations and consistency relative to comparisons of deferral with non-deferral methodologies and to comparisons of two non-deferral methodologies.

As with return on total assets, the two methodologies which result in the lowest average Spearman R as well as the least consistency over the nine years are the methodologies required by SFAS #8 and SFAS #52. When FASB made the change in GAAP from SFAS #8 to SFAS #52, it made the biggest change

TABLE XX

SPEARMAN R'S BASED ON RETURN ON
TOTAL ASSETS, 1977-1985

Methodology Pairs	1977	78	79	80	81	82	83	84	85	Average
M1 vs. M2	.30	.51	.63	.91	.42	.70	.86	.58	.25	.57
M1 vs. M3	.71	.71	.62	.89	.68	.81	.81	.85	.90	.78
M1 vs. M4	.70	.56	.74	.88	.44	.83	.79	.80	.84	.73
M1 vs. M5	.71	.73	.75	.91	.87	.93	.82	.77	.83	.81
M1 vs. M6	.37	.39	.52	.84	.53	.76	.51	.39	.66	.55
M1 vs. M7	.69	.75	.71	.87	.86	.91	.84	.75	.94	.81
M1 vs. M8	.26	.30	.57	.82	.45	.78	.62	.74	.84	.60
M2 vs. M3	.17	.54	.42	.78	.52	.60	.68	.58	.17	.50
M2 vs. M4	.53	.93	.88	.91	.75	.74	.75	.63	.35	.72
M2 vs. M5	.13	.61	.36	.81	.28	.65	.72	.50	.36	.49
M2 vs. M6	.50	.78	.76	.91	.66	.65	.53	.18	.61	.62
M2 vs. M7	.15	.60	.35	.77	.24	.66	.72	.53	.18	.47
M2 vs. M8	.53	.73	.72	.89	.60	.66	.53	.58	.40	.63
M3 vs. M4	.54	.61	.60	.81	.61	.81	.67	.91	.82	.71
M3 vs. M5	.85	.83	.85	.94	.74	.82	.94	.81	.77	.84
M3 vs. M6	.65	.59	.61	.86	.73	.77	.68	.57	.66	.68
M3 vs. M7	.90	.93	.86	.98	.74	.87	.94	.78	.90	.88
M3 vs. M8	.53	.51	.66	.78	.81	.89	.80	.86	.80	.74
M4 vs. M5	.51	.67	.58	.80	.32	.85	.67	.80	.76	.66
M4 vs. M6	.34	.73	.81	.84	.58	.82	.63	.61	.74	.68
M4 vs. M7	.45	.64	.53	.77	.32	.81	.65	.80	.86	.65
M4 vs. M8	.38	.77	.81	.95	.75	.91	.78	.93	.97	.81
M5 vs. M6	.71	.77	.62	.88	.67	.88	.73	.67	.81	.75
M5 vs. M7	.93	.93	.95	.95	.98	.96	.97	.93	.88	.94
M5 vs. M8	.63	.70	.66	.77	.56	.85	.77	.81	.78	.73
M6 vs. M7	.68	.67	.57	.86	.62	.90	.69	.58	.67	.69
M6 vs. M8	.92	.91	.87	.85	.77	.86	.86	.70	.80	.84
M7 vs. M8	.60	.55	.58	.75	.51	.85	.74	.74	.87	.69

possible from among the eight methodologies studied as far as information content based on the rank ordering of companies by return on equity.

Figure 13 shows the average return on equity for the four non-deferral methodologies (M1-M4) plotted over nine years. The effect of short-term variations in exchange rates is not as clear in Figure 13 for average return on equity as for average return on total assets (Figure 11). In fact, the results of applying M4 (PPM/NDF) actually appear more variable in the last four years than the exchange rate methodologies, a result that is not intuitive given the lower short-term variability of price parity numbers compared with exchange rates.

Figure 14 presents a similar graph for deferral methodologies (M5-M8). The graph is substantially the same as the graph in Figure 13, with M5 (CNM/DEF) in place of M1 (CNM/NDF), M6 (MNM/DEF) in place of M2 (MNM/NDF), etc.

Table XXI shows the quintile changes across firms for return on equity for 1977 and 1984. In 1977, all methodology pairs result in at least some quintile changes. The majority of such changes are of one quintile only. Since a single quintile change represents a significantly different information signal, at least concerning a specific company's ranking, a small number of quintile changes cannot be dismissed as trivial. For example, the M5 (CNM/DEF) vs. M7 (CRM/DEF) pair result in only five quintile changes, but such a difference could be significant to an investor who rank

M1   IS PLOTTED WITH AN '1'
M2   IS PLOTTED WITH AN '2'
M3   IS PLOTTED WITH AN '3'
M4   IS PLOTTED WITH AN '4'
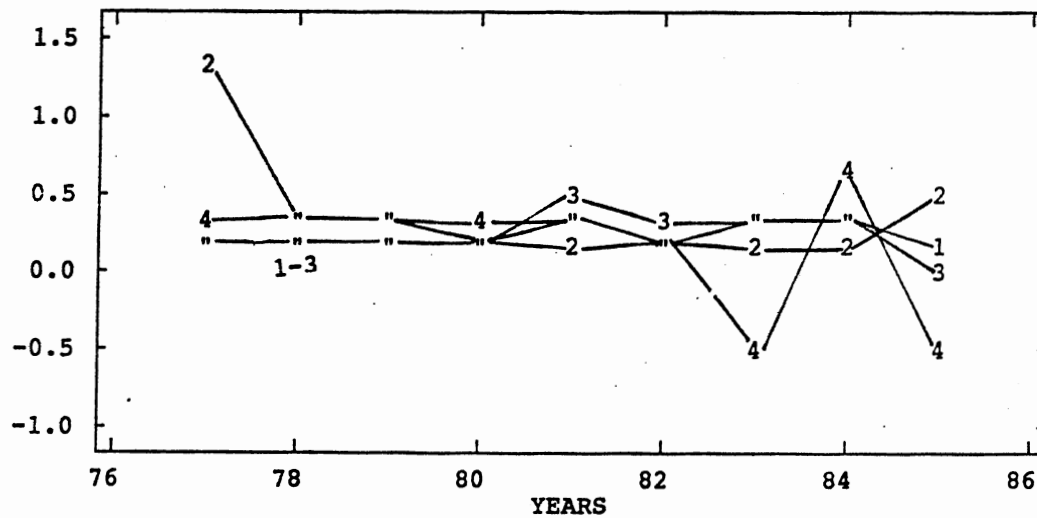
Figure 13.   Average return on equity across non-deferral
                    methodologies

M5   IS PLOTTED WITH AN '5'
M6   IS PLOTTED WITH AN '6'
M7   IS PLOTTED WITH AN '7'
M8   IS PLOTTED WITH AN '8'
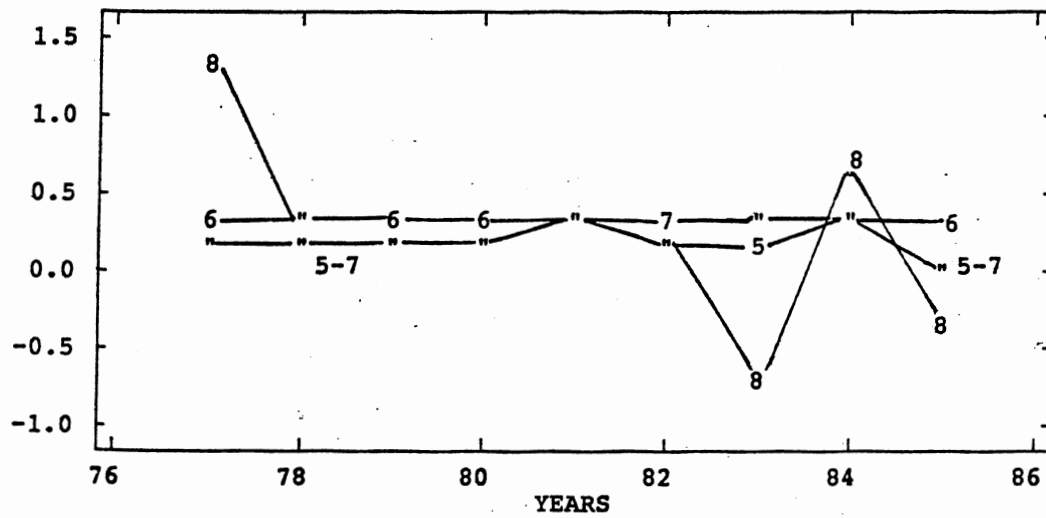
Figure 14.   Average return on equity across deferral
             methodologies

orders companies by return on equity as a part of the investment decision. The five quintile changes could lead the investor to significantly different investment decisions.

All pairings result in a few quintile changes in 1977, the largest number being thirty for the M2 (MNM/NDF) vs. M6 (MNM/DEF) pair. As with return on total assets, in 1977, the methodology that is the least compatible with the other seven methodologies in terms of information content based on return on equity orderings is M2 (MNM/NDF) which resulted in a total of 155 quintile changes in seven pairings. The most compatible methodologies were again M5 (CNM/DEF) and M7 (CRM/DEF) which had five quintile changes (as compared with no quintile changes for return on total assets in 1977).

There is no reason to anticipate that the number of quintile changes in 1984 would be the same as in 1977. There are differences in the number of quintile changes based on return on equity in 1984 compared with 1977, but the general patterns remain the same: M2 (MNM/NDF) appears to be the methodology which is the least compatible with the others, and M5 (CNM/DEF) and M7 (CRM/DEF) the two methodologies most compatible with one another.

In both years, the number of quintile changes is greater for nearly all methodology pairs for return on equity than for return on total assets. There are also generally more three and four quintile changes based on return on equity than on return on total assets. Translation gains and losses

TABLE XXI

QUINTILE CHANGES ACROSS FIRMS
RETURN ON EQUITY
1977 AND 1984

| Methodology | Quintile Changes | | | | | | | | | |
| Pairs | 1977 | | | | | 1984 | | | | |
	0	1	2	3	4	0	1	2	3	4
M1 vs. M2	24	16	4	4	2	37	5	6	1	1
M1 vs. M3	33	14	1	2	0	41	8	1	0	0
M1 vs. M4	37	8	3	2	0	39	8	2	1	0
M1 vs. M5	38	7	1	4	0	42	5	1	1	1
M1 vs. M6	31	7	5	5	2	37	9	3	1	0
M1 vs. M7	41	5	0	4	0	37	11	0	2	0
M1 vs. M8	33	8	4	3	2	26	19	0	3	2
M2 vs. M3	20	17	7	3	3	33	11	4	1	1
M2 vs. M4	31	12	5	1	1	35	8	6	0	1
M2 vs. M5	22	16	5	4	3	32	12	2	2	2
M2 vs. M6	34	7	5	3	1	35	5	9	0	1
M2 vs. M7	23	13	5	7	2	27	15	6	0	2
M2 vs. M8	32	9	4	4	1	27	10	7	2	4
M3 vs. M4	36	7	4	2	1	45	4	1	0	0
M3 vs. M5	42	8	0	0	0	37	8	4	1	0
M3 vs. M6	32	10	5	3	0	44	3	3	0	0
M3 vs. M7	37	12	1	0	0	37	10	3	0	0
M3 vs. M8	31	13	5	0	1	36	10	1	1	2
M4 vs. M5	31	10	5	2	2	39	9	1	1	0
M4 vs. M6	33	7	2	7	1	46	3	1	0	0
M4 vs. M7	33	10	3	3	1	38	10	1	1	0
M4 vs. M8	34	5	4	6	1	37	8	2	2	1
M5 vs. M6	29	14	4	3	0	36	12	1	1	0
M5 vs. M7	45	4	1	0	0	45	5	0	0	0
M5 vs. M8	34	12	3	1	0	33	11	4	0	2
M6 vs. M7	36	7	4	3	0	40	8	1	1	0
M6 vs. M8	45	4	1	0	0	41	6	1	1	1
M7 vs. M8	37	8	4	1	0	37	10	1	1	1

affect return on total assets only in the numerator, and only for non-deferral methodologies (M1-M4). But these gains and losses affect the denominator of return on equity for all methodologies, deferral and non-deferral. This factor has the potential of causing the return on equity numbers to be more variable, at least for some companies, which in turn has the potential of causing more quintile changes. For this reason, the variability in the six exchange rate methodologies caused by the short-term changes in exchange rates is likely to be greater in the return on equity numbers than in the return on total asset numbers. When using exchange rate methodologies, therefore, analysts may prefer return on total assets as a more direct and useful measure of profitability over return on equity.

Firm-level effects. Table XXII shows the return on equity over nine years, for each of the eight methodologies, for companies 23, 28, and 36 respectively. Clearly, as with the return on total asset numbers, the return on equity numbers are different for different methodologies, and the range is substantial. No two methodologies result in numbers that are consistently close over the nine-year study period.

Tables XXIII, XXIV, and XXV show firm level quintile changes and Spearman rank correlation coefficients for pairs of methodologies based on return on equity. For company 23 (Table XXIII), there are few quintile changes as a result of

TABLE XXII

RETURN ON EQUITY AT THE FIRM LEVEL
1977-1985

Year	M1	M2	M3	M4	M5	M6	M7	M8	Range

Company 23

Year	M1	M2	M3	M4	M5	M6	M7	M8	Range
1977	.065	.248	-.022	.125	.040	.194	.084	.180	.270
1978	.116	.247	.066	.262	.110	.274	.148	.216	.208
1979	.167	.276	.092	.301	.157	.339	.166	.222	.247
1980	.084	.131	.052	.169	.093	.221	.085	.106	.169
1981	.222	.054	.338	.192	.205	.235	.222	.164	.283
1982	.189	.052	.255	.163	.151	.177	.192	.166	.203
1983	.232	.257	.267	.294	.180	.225	.240	.268	.114
1984	.267	.141	.331	.199	.198	.204	.272	.290	.190
1985	.013	.321	-.104	.140	.036	.132	.071	.194	.425
Mean	.151	.192	.142	.205	.130	.222	.165	.201	.092

Company 28

Year	M1	M2	M3	M4	M5	M6	M7	M8	Range
1977	.099	.244	.022	.189	.100	.233	.147	.198	.222
1978	.141	.168	.044	.174	.099	.173	.127	.124	.130
1979	.122	.169	.033	.167	.110	.203	.115	.101	.171
1980	.146	.155	.076	.212	.120	.233	.106	.088	.157
1981	.152	.031	.349	.168	.204	.219	.222	.202	.318
1982	.207	.029	.289	.175	.179	.200	.241	.247	.260
1983	.138	.034	.186	.098	.101	.124	.189	.247	.214
1984	.108	-.130	.223	.051	.091	.075	.192	.241	.371
1985	.057	.499	-.150	.059	.019	.140	.101	.302	.648
Mean	.130	.133	.119	.144	.114	.178	.160	.194	.081

Company 36

Year	M1	M2	M3	M4	M5	M6	M7	M8	Range
1977	.176	.262	.170	.228	.155	.219	.175	.257	.107
1978	.087	.076	.057	.196	.091	.197	.099	.084	.141
1979	.043	.225	.018	.200	.073	.214	.077	.192	.207
1980	.146	.089	.146	.233	.165	.243	.161	.087	.156
1981	.408	.134	.424	.238	.327	.227	.324	.146	.290
1982	.202	.300	.211	.163	.174	.177	.190	.312	.149
1983	.211	.242	.228	.117	.171	.122	.203	.248	.131
1984	.254	.210	.268	.134	.206	.140	.235	.230	.134
1985	.127	.346	.104	.143	.122	.162	.161	.350	.245
Mean	.184	.209	.181	.183	.165	.189	.181	.212	.047

TABLE XXIII

FIRM LEVEL QUINTILE CHANGES, COMPANY 23
RETURN ON EQUITY

Methodology Pairs	Years									
	1977	78	79	80	81	82	83	84	85	Total*
M1 vs. M2	0	0	0	0	0	0	0	0	0	0
M1 vs. M3	0	0	0	0	0	0	0	0	0	0
M1 vs. M4	0	0	0	0	0	0	1	0	0	1
M1 vs. M5	0	0	0	0	0	0	0	0	0	0
M1 vs. M6	0	0	0	0	0	0	0	0	0	0
M1 vs. M7	0	0	0	0	0	0	0	0	0	0
M1 vs. M8	0	0	0	1	0	0	0	0	0	1
M2 vs. M3	1	0	0	0	0	0	0	0	0	1
M2 vs. M4	0	0	0	0	0	0	0	0	0	0
M2 vs. M5	0	0	0	0	0	0	0	0	0	0
M2 vs. M6	0	0	0	0	0	0	0	0	0	0
M2 vs. M7	0	0	0	0	0	0	0	0	0	0
M2 vs. M8	0	0	0	0	0	0	0	0	0	0
M3 vs. M4	0	0	0	0	0	0	0	0	0	0
M3 vs. M5	0	0	0	0	0	0	0	0	0	0
M3 vs. M6	0	0	0	0	0	0	0	0	0	0
M3 vs. M7	0	0	0	0	0	0	0	0	0	0
M3 vs. M8	0	0	0	0	0	0	0	0	0	0
M4 vs. M5	0	0	0	0	0	0	0	0	0	0
M4 vs. M6	0	0	0	0	0	0	0	0	0	0
M4 vs. M7	0	0	0	0	0	0	0	0	0	0
M4 vs. M8	0	0	0	0	0	0	0	0	0	0
M5 vs. M6	0	0	0	0	0	0	0	0	0	0
M5 vs. M7	0	0	0	0	0	0	0	0	0	0
M5 vs. M8	0	0	0	0	0	0	0	0	0	0
M6 vs. M7	0	0	0	0	0	0	0	0	0	0
M6 vs. M8	0	0	0	0	0	0	0	0	0	0
M7 vs. M8	0	0	0	0	0	0	0	0	0	0

TABLE XXIV

FIRM LEVEL QUINTILE CHANGES, COMPANY 28
RETURN ON EQUITY

Methodology	Years									
Pairs	1977	78	79	80	81	82	83	84	85	Total*
M1 vs. M2	0	0	0	0	0	0	0	0	0	0
M1 vs. M3	0	0	0	0	0	0	0	0	0	0
M1 vs. M4	0	0	0	0	0	0	1	0	0	1
M1 vs. M5	0	0	0	0	0	0	0	0	0	0
M1 vs. M6	0	0	1	0	0	0	0	0	0	1
M1 vs. M7	0	0	0	0	0	0	0	0	0	0
M1 vs. M8	0	0	1	0	1	0	0	0	0	2
M2 vs. M3	1	0	0	0	0	0	0	0	0	1
M2 vs. M4	0	0	1	0	0	0	0	0	0	1
M2 vs. M5	0	0	0	0	0	0	0	0	0	0
M2 vs. M6	0	0	1	0	0	0	0	0	0	1
M2 vs. M7	0	0	0	0	0	0	0	0	0	0
M2 vs. M8	0	0	0	0	1	0	0	0	0	0
M3 vs. M4	0	0	0	0	0	0	1	0	0	1
M3 vs. M5	1	0	0	0	0	0	0	0	0	1
M3 vs. M6	0	1	0	0	0	0	0	0	0	1
M3 vs. M7	0	0	0	0	0	0	0	0	0	0
M3 vs. M8	0	0	0	0	1	0	0	0	0	1
M4 vs. M5	0	0	0	0	0	0	1	0	0	1
M4 vs. M6	0	0	0	0	0	0	1	0	0	1
M4 vs. M7	0	0	0	0	0	0	1	1	0	2
M4 vs. M8	0	0	0	0	1	0	0	0	0	1
M5 vs. M6	0	0	0	0	0	0	0	0	0	0
M5 vs. M7	0	0	0	0	0	0	0	0	0	0
M5 vs. M8	0	0	0	0	0	0	0	0	0	0
M6 vs. M7	0	1	0	0	0	0	0	0	0	1
M6 vs. M8	0	0	0	0	0	0	0	0	0	0
M7 vs. M8	0	0	0	0	1	0	0	0	0	1

*The number of years in which a quintile change
occurred.

TABLE XXV

FIRM LEVEL QUINTILE CHANGES, COMPANY 36
RETURN ON EQUITY

Methodology Pairs	Years									
	1977	78	79	80	81	82	83	84	85	Total*
M1 vs. M2	0	0	0	0	0	0	0	0	0	0
M1 vs. M3	0	0	0	0	0	0	0	0	0	0
M1 vs. M4	0	0	0	0	0	0	1	0	0	1
M1 vs. M5	0	0	0	0	0	0	0	0	0	0
M1 vs. M6	0	0	1	0	0	0	0	0	0	1
M1 vs. M7	0	0	0	0	0	0	0	0	0	0
M1 vs. M8	0	0	1	0	1	0	0	0	0	2
M2 vs. M3	1	0	0	0	0	0	0	0	0	1
M2 vs. M4	0	0	1	0	0	0	0	0	0	1
M2 vs. M5	0	0	0	0	0	0	0	0	0	0
M2 vs. M6	0	0	1	0	0	0	0	0	0	1
M2 vs. M7	0	0	0	0	0	0	0	0	0	0
M2 vs. M8	0	0	0	0	1	0	0	0	0	1
M3 vs. M4	0	0	0	0	0	0	1	0	0	1
M3 vs. M5	1	0	0	0	0	0	0	0	0	1
M3 vs. M6	0	1	0	0	0	0	0	0	0	1
M3 vs. M7	0	0	0	0	0	0	0	0	0	0
M3 vs. M8	0	0	0	0	1	0	0	0	0	1
M4 vs. M5	0	0	0	0	0	0	1	0	0	1
M4 vs. M6	0	0	0	0	0	0	1	0	0	1
M4 vs. M7	0	0	0	0	0	0	1	1	0	2
M4 vs. M8	0	0	0	0	1	0	0	0	0	1
M5 vs. M6	0	0	0	0	0	0	0	0	0	0
M5 vs. M7	0	0	0	0	0	0	0	0	0	0
M5 vs. M8	0	0	0	0	0	0	0	0	0	0
M6 vs. M7	0	1	0	0	0	0	0	0	0	1
M6 vs. M8	0	0	0	0	0	0	0	0	0	0
M7 vs. M8	0	0	0	0	1	0	0	0	0	1

*The number of years in which a quintile change
occurred.

applying any two translation methodologies (although more than for return on total assets, Table XV), never more than three (M3 (CRM/NDF) vs. M8 (PPM/DEF)) over the nine years of the study period. This means that in most years the information signal resulting from the rank order of company 23 is not significantly different depending on translation methodology.

For company 23, during years 1977 through 1981, there appear to be no significant differences in information signals between M4 (PPM/NDF) and M7 (CRM/DEF). Yet in years 1983 and 1984, there is a quintile change, meaning that clearly different information signals are produced depending on whether M4 (PPM/NDF) or M7 (CRM/DEF) is used. Users of financial statements could make very different decisions in years 1983 and 1984 depending on translation methodology if their decisions depend on rank orderings based on return on equity.

Although M2 (MNM/NDF) appears to be the least compatible with other methodologies when all 50 sample firms are considered together, such incompatibility may not be seen for certain individual firms. For company 23, no quintile changes occur, in any of the nine study years, when the rank orderings under M2 (MNM/NDF) are compared with those under M1 (CNM/NDF), M5 (CNM/DEF), M6 (MNM/DEF), and M7 (CRM/DEF).

Company 28 (Table XXIV) also does not experience quintile changes in most years when applying different methodologies. However, just as with return on total assets,

the number of years in which a quintile change occurs
suggests that company 28's information signals based on rank
orderings by return on equity are more sensitive to
methodology differences than are those of company 23. But
there is no consistency over the study period, and the
observations for return on total assets do not necessarily
apply for return on equity. For example, in year 1979, using
return on total assets, an analyst might review the rank
orderings of company 28 under M1 (CNM/NDF) and M8 (PPM/DEF)
and conclude that these two methodologies will nearly always
result in significantly different information signals. But
during the following six years there is seldom much
difference in this information signal. A similar observation
may be made using return on equity. M1 (CNM/NDF) and M8
(PPM/DEF) result in quintile changes during the early years
of the study period, suggesting that the application of M1
(CNM/NDF) and M8 (PPM/DEF) would usually result in different
information signals. But during the last four years of the
study period no quintile changes occur for company 28 for the
M1 (CNM/NDF) and M8 (PPM/DEF) pair.

A perusal of Tables XXIV and Table XVI together lead to
the observation that there is a certain similarity. The
years in which there are quintile changes for given
methodology pairs tend to be the same on both tables,
although there are generally more years with quintile changes
for return on equity than for return on total assets. A
similar observation can be made for both companies 23 and 36.

The information signals based on rank orderings by return on equity are more sensitive to methodology changes for company 36 (Table XXV) than for company 23, just as was observed for return on total assets. For all methodology pairs, there are at least some years in which there is no quintile change, but for no methodology pair is company 36 always ranked significantly different. The greatest sensitivity for company 36 seems to be between M1 (CNM/NDF) and M2 (MNM/NDF), between M4 (PPM/NDF) and M6 (MNM/DEF), and between M6 (MNM/DEF) and M8 (PPM/DEF) (7 quintile changes in nine years). For company 23, there were no quintile changes over the nine years for the M1 (CNM/NDF) and M2 (MNM/NDF) pair or the M6 (MNM/DEF) and M8 (PPM/DEF) pair, and only one for the M4 (PPM/NDF) and M6 (MNM/DEF) pair. For company 28, there were only two quintile changes for the M6 (MNM/DEF) and M8 (PPM/DEF) pair.

The above observations lead to the conclusion that different firms have different experiences with rank orderings by return on equity with the same methodology pairs. The same conclusion was drawn in the previous section for return on total assets. Further, the number of quintile changes, for any methodology pair, is not consistent from year to year at the firm level. Quintile changes, representing significant differences in information signals based on rank orderings by return on equity are highly firm specific.

<u>SFAS #8 vs. SFAS #52</u>. Table XXVI shows the rank
orderings based on return on equity for each of the 50 sample
companies in 1984 under SFAS #8 (M2) and SFAS #52 (M7) along
with the related quintile changes. The Spearman R of .525
indicates more differences in rank ordering based on return
on equity than for return on assets. Although many companies
had no quintile change between SFAS #8 and SFAS #52,
differences are often considerable. For example, company 19
had four quintile changes, while companies 7, 12, and 40 had
three quintile changes, representing drastic differences in
information signals. As with return on total equity,
differences in information signals based on rank orderings by
return on equity are highly firm specific.

It is noticeable from a comparison of Tables XVIII and
XXVI that when return on equity results in at least one
quintile change, return on total assets often will also
result in at least one quintile change. But this is not
always true. For ten companies, at least one quintile change
occurs using one of the two profitability measures while no
quintile change occurs using the other. This indicates that,
at least for some companies and in some years, SFAS #8 and
SFAS #52 result in significantly different information
signals of profitability whether return on equity is the
measure of profitability or whether the measure is return on

TABLE XXVI

RETURN ON EQUITY, 1984
SFAS #8 vs. SFAS #52
(SPEARMAN R = .525)

Co	SFAS #8	#52	QC*	Co	SFAS #8	#52	QC*
1	16	44	2	26	10	2	0
2	43	46	0	27	37	34	0
3	9	13	0	28	30	21	0
4	26	19	0	29	18	27	0
5	2	1	0	30	20	31	1
6	47	16	3	31	39	29	1
7	13	47	3	32	36	4	3
8	48	24	2	33	7	15	0
9	11	5	0	34	12	30	1
10	28	20	0	35	50	26	2
11	46	41	0	36	42	25	1
12	5	40	3	37	45	50	0
13	8	22	1	38	15	28	1
14	24	35	0	39	29	7	2
15	35	6	2	40	4	43	3
16	17	14	0	41	33	48	1
17	44	42	0	42	6	23	1
18	34	38	0	43	40	3	3
19	3	49	4	44	49	37	1
20	1	10	0	45	19	36	1
21	41	45	0	46	14	12	0
22	31	17	1	47	25	18	0
23	23	33	1	48	38	9	2
24	22	8	1	49	27	32	0
25	21	11	1	50	32	39	0

*QC = number of quintile changes.

total assets (for example, company 19). Furthermore, the signal may be similar when using return on total assets and significantly different when using return on total equity (company 1); or similar using return on equity and different using return on total assets (company 37).

Additional evidence of the firm specific characteristic of differences in returns on equity between SFAS #8 and SFAS #52 is reflected in Table XXVII. The nine-year column indicates that the return on equity, averaged over nine years, is sometimes very similar between SFAS #8 and SFAS #52 for certain individual firms (for example, companies 4 and 41). For other companies, the nine-year averages are clearly materially different (for example, companies 37 and 40). Within individual companies, the differences under either SFAS #8 or SFAS #52 are often substantial between the first four years of the study period and the last five years (for example, companies 5, 26, 37 and 40), while other companies may have similar numbers in both time periods (for example, company 22 under SFAS #8; company 13 under SFAS #52; and company 11 under both SFAS #8 and SFAS #52). The differences in profitability between SFAS #8 and SFAS #52 as measured by return on equity, and as previously shown when measured by return on total assets, is highly firm specific.

TABLE XXVII

RETURN ON EQUITY AVERAGES
SFAS #8 vs. SFAS #52

	SFAS #8			SFAS #52		
Co	1977 to 1980	1981 to 1985	1977 to 1985	1977 to 1980	1981 to 1985	1977 to 1985
1	.058	.188	.130	.162	.292	.234
2	.322	.270	.293	.217	.223	.221
3	.248	.079	.154	.100	.090	.094
4	.213	.168	.188	.228	.141	.180
5	.469	-.405	-.017	-.078	-.212	-.152
6	.320	.276	.295	.399	.124	.246
7	.573	.210	.371	.147	.375	.273
8	.326	.247	.282	.302	.158	.222
9	-.037	-.142	-.096	.146	-.363	-.136
10	.132	.102	.116	.216	.005	.099
11	.257	.250	.253	.231	.234	.233
12	.309	.218	.258	.120	.310	.225
13	.232	.127	.174	.111	.117	.114
14	.260	.152	.200	.117	.206	.167
15	.302	.111	.196	.238	-.015	.097
16	.294	.114	.194	.155	.145	.150
17	.386	.260	.316	.247	.281	.266
18	.255	.216	.233	.141	.232	.191
19	.478	.074	.254	.002	.328	.183
20	.245	.362	.310	.330	.213	.265
21	.341	.261	.297	.241	.252	.247
22	.069	.071	.071	.125	.054	.086
23	.254	.216	.233	.177	.160	.168
24	.229	.116	.166	.196	.054	.117
25	.163	.204	.186	.129	.079	.102

TABLE XXVII (Continued)

Co	SFAS #8			SFAS #52		
	1977 to 1980	1981 to 1985	1977 to 1985	1977 to 1980	1981 to 1985	1977 to 1985
26	.228	−.032	.083	.135	.035	.079
27	.263	.209	.233	.215	.208	.211
28	.277	.173	.219	.129	.158	.145
29	.152	.128	.139	.085	.082	.083
30	.189	.178	.183	.156	.272	.221
31	.317	.210	.258	.177	.207	.194
32	.195	.176	.185	.212	.005	.097
33	.169	.119	.142	.086	.071	.078
34	.363	.150	.245	.136	.208	.176
35	.775	.329	.527	.330	.280	.303
36	.241	.166	.199	.178	.183	.181
37	−.003	−6.912	−3.841	.217	−.199	−.014
38	.298	.173	.228	.140	.180	.162
39	.139	.299	.228	−.166	.018	−.064
40	10.938	.167	4.954	.418	.236	.317
41	.081	.187	.140	.115	.167	.144
42	.426	.079	.233	.059	.165	.118
43	−.041	.138	.058	.214	−.193	−.012
44	.541	.310	.413	.365	.204	.276
45	.436	.192	.300	.151	.163	.158
46	.169	.121	.143	.118	.078	.096
47	.345	.145	.234	.155	.198	.179
48	.099	.165	.136	.038	.043	.041
49	.244	.195	.217	.175	.199	.189
50	.299	.223	.257	.247	.163	.201
Spearman	.467	.465	.466	.467	.465	.466

Conclusion

By way of conclusion, an attempt is made to provide answers to the four questions posed at the beginning of this section.

(1) Do different methodologies materially affect the comparative rankings of firms in terms of profitability as measured by return on total assets, (a) across firms, (b) at the firm level, and (c) across periods? Companies are clearly ranked differently by return on total assets depending on the translation methodology used. The two methodologies which rank order companies with the least correlation as well as with the least consistency over the nine year study period are M2 (MNM/NDF) and M7 (CRM/DEF), the methodologies of SFAS #8 and SFAS #52 respectively, although at the firm level rank orderings are often similar as evidenced by the lack of quintile changes for some companies.

For all methodology pairs, the Spearman R's indicate differences in rank orderings for all the sample firms taken together, and a perusal of the rank orderings of individual companies and the resulting quintile changes indicates that there are often significant differences in rank orderings at the firm level. Rank orderings and quintile changes for individual firms are highly firm specific, and differences in rank orderings are not consistent across periods.

(2) Do some methodologies rank firms similarly in terms of return on total assets; do some methodologies appear to be

informationally equivalent? The two methodologies which rank

order companies with the highest correlation as well as with

the highest consistence over the nine year study period are

M5 (CNM/DEF) and M7 (CRM/DEF), although at the firm level

there are sometimes significant differences as evidenced by a

small number of quintile changes for a small number of

companies during the nine year study period.

(3) Do different methodologies materially affect the

comparative rankings of firms in terms of profitability as

measured by return on equity, (a) across firms, (b) at the

firm level, and (c) across periods? The answers to these

questions are substantially the same as the answers to

question (1). However, the use of return on equity as a

measure of profitability instead of return on total assets

results in greater differences in rank orderings, as

evidenced by more quintile changes. Although the numerators

of return on total assets and return on equity are the same,

the denominator of return on equity contains the cumulative

effect of translation gains and losses whether the

methodology used is a deferral or a non-deferral methodology.

The cumulative translation gain or loss number, of course,

changes each period by the amount of the current gain or

loss. This factor has the potential to increase the

variability of return on equity, at least for some companies

and in some years. Because exchange rate fluctuations often

reverse in the short term, this factor adds to the

variability contained in return on equity when any of the six exchange rate methodologies is used.

(4) Do some methodologies rank firms <u>similarly</u> in terms of return on total equity; do some methodologies appear to be informationally equivalent? As with return on total assets, the two methodologies which rank order companies with the highest correlation as well as with the highest consistency over the nine year study period are M5 (CNM/DEF) and M7 (CRM/DEF), although at the firm level there are sometimes significant differences as evidenced by quintile changes. Although the answer to this question is similar to the answer to (2), Spearman R's are consistently lower and there are usually more quintile changes when using return on equity instead of return on total assets.

CHAPTER VI

CONCLUSIONS AND LIMITATIONS OF THE STUDY

Summary of Principal Findings

Reported Earnings and Variability

At the individual firm level, periodic differences under alternative translation methodologies are generally quite material, though cumulative difference tends to diminish over time. Material periodic differences are consistent with the material computational differences in the methodologies themselves, and consistent with the large translation adjustments which can result. However, the pattern of differences at this level can be quite different than that for across firms generally, for all methodology pairs. That is, policy choice effects are not especially systematic, and are to a considerable extent firm specific.

Across firms and across time, reported earnings are usually substantially different depending on translation methodology. These results are consistent with Nance (1981) who found that differences in earnings, averaged over 12 years, were large and significant across translation methods. The single exception appears to be M5 (current-noncurrent)

and M7 (the methodology of SFAS #52), both deferral methodologies, which tend to parallel one another and move together over the 10 years of the study period. The reported earnings under the eight methodologies studied tend, as a group, to converge over the 10-year study period to the results generated by M4 and M8, the price parity methodologies.

The highest average reported earnings, across firms and over the 10-year study period was generated by M8 (PPM/DEF), although M8 resulted in the lowest variability of earnings. At the firm level, other methodologies often resulted in higher earnings that M8, but the lowest variability occurred with M8 for more companies (29 of 48 companies) than with any other methodology. This lower variability of earnings can be ascribed to the use of price parity numbers which have lower variability than exchange rates and to the fact that M8 is a deferral methodology. That is, it was found that deferral methodologies do in fact appear to generally result in lower variability of reported earnings than non-deferral methodologies. M4, which is M8 with non-deferral of translation gains and losses, results in the second lowest variability of earnings, which further evidences the joint effects.

Total earnings across firms are often substantially different between SFAS #8 (M2) and SFAS #52 (M7), and neither methodology results in consistently higher total earnings over time, either across firms or at the firm level.

Although much of the translation literature alleges that the methodology of SFAS #8, (M2) results in higher variability of earnings than other methodologies, the methodology of SFAS #52 (M7) resulted in higher variability of earnings for 15 of 48 companies, as compared with SFAS #8. This result is consistent with Beaver and Wolfson's (1984) conclusion that SFAS #8 does not always result in higher volatility of earnings than SFAS #52. The result is also consistent with Duangploy's (1979) simulation, and with the point above that methodology choice effects remain considerably firm specific.

For current-noncurrent methodologies, deferral does not appear to cause reported earnings to be significantly higher or lower than non-deferral. For monetary-nonmonetary and price parity methodologies, deferral generally resulted in higher reported earnings, but deferral generally resulted in lower reported earnings for current rate methodologies. Among the non-deferral methodologies, M3 (CRM/NDF) often resulted in higher reported earnings than the other three, but not for all years and not for all firms. Among the deferral methodologies, M8 (PPM/DEF) often resulted in higher reported earnings than the other three deferral methodologies, but not for all years nor for all firms.

Across firms, deferral of translation gains and losses usually results in lower variability of earnings for all the exchange rate methodologies studied and for the price parity method. Although this is generally true at the firm level, it is not true for all firms.

Profitability Ratios

Across firms, all methodology pairs resulted in differences in rank orderings by both of the profitability ratios (return on total assets and return on equity) studied. At the firm level, however, there were many firms for which the difference in rank orderings between any two methodologies was less than 10 (less than a quintile change).

The highest correlation of rank orderings, using either return on total assets or return on equity, was between the M5 (CNM/DEF) and M7 (CRM/DEF) pair. The two methodologies also resulted in the most consistently similar rank orderings over the nine-year study period. As noted above, these two methodologies also result in similar reported earnings numbers in most years and across firms. The two methodologies evidencing the least correlation, the least consistency in rankings, over the nine year study period, were M2 (MNM(TRM)/NDF) and M7 (CRM/DEF), the methodologies of SFAS #8 and SFAS #52.

Limitations of the Study

The pattern of behavior of the ratios observed, as between the six exchange rate methodologies and the two price parity index methodologies was found to be notably different. The latter indicated a slow but consistent downward trend in (British pound) profitability not otherwise apparent under the exchange rate methodologies. If inverse reasoning holds,

then the implicit upward trend in profitability would be consistent with the increased relative profitability of foreign operations over U.S. operations frequently cited as the motivation spurring the increased overseas investment and international diversification by U.S. firms which occurred during the study period.

A major element of the present study was the estimation of the temporal characteristics of financial statement numbers for the purpose of applying various translation methodologies. Although the work of Ketz (1978) and others indicate that existing methods of estimation are accurate enough for research purposes, and the improvements developed for the present study are tested in Appendix C, the actual temporal characteristics of the sample companies' financial statement numbers were not known.

The measurements were based on translations made from dollars to pounds. However, the time series of exchange rates between dollars and other currencies may be quite different from the series between dollars and pounds. It is not known to what extent the results might have been different if other currencies, such as Japanese yen or French francs had been used.

Because translations were made from dollars to pounds, the question arises as to whether the results would be similar if translation had been made from pounds to dollars. For example, if exchange rate translation methodology A results in consistently higher reported earnings than

exchange rate methodology B when translation are made from dollars to pounds, the reverse translation, using the inverse exchange rates, would result in consistently higher earnings under methodology B. Variability, in turn, is unaffected by direction of translation. For example, the low variability of earnings resulting from M4 and M8, the price parity methodologies, compared with the exchange rate methodologies holds whichever direction the translation is made. This is true because the price parity time series is constructed from ratios of price levels and will have lower variability than exchange rates whether the relative price levels are in terms of dollars or pounds. Thus the threat to inverse reasoning lies with differences between the structures and earnings behavior of U.S. firms vis-a-vis foreign subsidiaries. Given the results that methodological effects are somewhat firm specific, if U.S. firms structure their foreign subsidiaries comparable to host country firms, and these are generally and materially different, then the sample firms would not constitute a representative sample viewed from a U.S. parent standpoint.

The present study attempted to determine if and in what ways the choice of translation methodology matters in reference to significant differences in (1) reported earnings, averaged over several years, (2) the variability of reported earnings, and (3) the rank ordering of companies by measures of profitability. Numerous other empirical characteristics were not included, nor was an attempt made to

determine which translation methodology is "best" according to any normative criterion.

Although the study period included periods of rising and falling exchange rates between the U.S. dollar and the British pound, the study did not cover periods of more extreme fluctuations such as might have been considered if these data had been purely simulated.

Conclusions and Implications for

Future Research

Differences in translation methodologies often result in drastic differences in reported earnings across firms and at the firm level, differences which may reverse in different time periods. Variability of earnings is generally higher for exchange rate methodologies than for price parity methodologies, and the rank orderings of companies based on return on total assets and return on equity is potentially significantly different, at least for some companies and in some years.

The fact that the exchange rate methodologies, as a group, appear to converge toward the earnings results of the price parity methodologies over the study period suggests that earnings numbers under the exchange rate methodologies may contain more noise, caused by short-term, random changes in exchange rates which lack information content. But the present study, descriptive in character, does not determine what variations exhibited are noise and what variations are

"economically real". Only future research more normatively
directed can perhaps answer this policy choice relevant
question. Appeal here might be to association with other
economic variables outside the translation systems
themselves, toward assessing what trends and variations
evidenced by alternative methodologies appear to be "real."
A further approach might be to assess the related predictive
power of alterative methodologies.

The present study attempted to describe what happens to
reported earnings, earnings variability and two profitability
ratios when different translation methodologies are applied.
Much more descriptive research is needed before a full
understanding of the consequences of using different
translation methodologies is achieved.

What environmental variables explain the differences
between methodologies observed at the firm level, across
firms, and over time? What are the comparative effects of
alternative methodologies on other than earnings-related
results, for example other than key financial ratios? What
are the apparent effects of different accounting results
under different translation methodologies on the decision
making behavior of managers lenders, financial analysts and
others, and does such behavior appear to be rational? What
effect does introduction of price level adjustment to the
methodologies have on comparative results? What are the
"portfolio" effects of multiple locations and currencies
which typify translation in practice on the results obtained

under different methodologies? While the "reverse approach"
is operationally tractable, how reliable is it in fact, in
terms of inverse reasoning regarding domestic policy
questions? Alternatively put, how differently do important
foreign currencies behave, how differently are foreign
subsidiaries structured in important foreign locations
vis-a-vis U.S. firms, and then how sensitive is the "reverse
approach" to these differences as regards the external
validity of results obtained from a domestic perspective?

Thus numerous descriptive and normative questions remain
to be answered when it comes to assessing the reporting and
economic consequences of alternative translation
methodologies, and to developing a sound basis for exercising
policy choice between alternatives. The present study has
provided, however, some initial and tentative answers to some
of the descriptive questions, and as such some bases for
pursuing the normative ones. That is, some of the
methodologies appear sufficiently similar in the results they
produce (for example, M5, CNM/DEF and M7, CRM/DEF) so as to
suggest the policy choice set may be effectively reduced on
empirical grounds. On the other hand, others appear so
dissimilar (for example, M2, MNM/NDF and M7, CRM/DEF) in
terms of the results they produce as to suggest these warrant
the focus in future theoretical and empirical research.
Finally, one of the methodologies (M8, PPM/DEF) appears to
exhibit potentially appealing time series properties relative
to the others, others which at various times have all proved

contentious in practice in terms of economic interpretability under the various economic settings which can be experienced. Thus in a context where consensus across constituencies (theoreticians, producers, users) has proved historically to be especially elusive regarding the relative merit of any particular translation methodology, such a consensus might be realizable with this methodology or with a proxy for it.

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APPENDIXES

APPENDIX A

SAMPLE FIRMS

SAMPLE FIRMS

Company #	Industry	Name
1	Retail Stores	Allied Stores
2	Tobacco, Insurance	American Brands
3	Packaging	American Can
4	Drugs, chemicals	American Cyanamid
5	Vehicles	American Motors
6	Building products	American Standard
7	Apparel	Anthony Industries
8	Cosmetics	Avon Products
9	Steel	Bethlehem Steel
10	Power tools	Black and Decker
11	Pharmaceuticals	Bristol Myers
12	Marine, recreation	Brunswick
13	Information systems	Burroughs
14	Food	Campbell Soup
15	Heavy machinery	Caterpillar Tractor
16	Fibers, chemicals	Celanese
17	Soft drinks	Coca Cola
18	Printing	R. R. Donnelly
19	Vehicles	Ford Motor
20	Chemicals	GAF
21	Electrical products	General Electric
22	Electric components	GTI
23	Chemicals, plastics	Hercules
24	Machinery, equipment	Ingersoll Rand
25	Paper products	International Paper
26	Semiconductors	International Rectifier
27	Pharmaceuticals	Johnson and Johnson
28	Energy	Kerr McGee
29	Pharmaceuticals	Warner-Lambert
30	Retail stores	May Department Stores
31	Newspapers, TV	Media General
32	Chemicals	NL Industries
33	Chemicals, metals	Olin
34	Glass fiber products	Owens Corning Fiberglass
35	Oil and gas	Pennzoil
36	Analytical instruments	Perkin-Elmer
37	Oil and gas	Phillips Petroleum
38	Refining	Quaker State Oil Refining
39	Aluminum products	Reynolds
40	Jet engine assemblies	Rohr Industries

Company #	Industry	Name
41	Paint, wall coverings	Sherwin Williams
42	Sewing machines	Singer
43	Drilling equipment	Smith International
44	Cement	Southdown
45	Convenience stores	Southland
46	Manufacturing	Stewart-Warner
47	Publishing	Time
48	Petra chemicals	Union Carbide
49	Home appliances	Whirlpool
50	Electronic systems	Whittaker

APPENDIX B

ESTIMATION OF THE TEMPORAL CHARACTERISTICS

OF VARIOUS ACCOUNTS

ESTIMATION OF THE TEMPORAL CHARACTERISTICS
OF VARIOUS ACCOUNTS

Cash, Cash Equivalents, Accounts
Receivable, Accounts Payable,
and Accrued Liabilities

These account balances are translated using the current exchange rate under all exchange rate methodologies. Since temporal characteristics are needed only for translations using historical rates, it was not necessary to estimate the temporal characteristics of any of these accounts.

Other Current Assets

Because of the immateriality of the effect of translation of these accounts, all of these accounts were assumed to be one-half year old.

Other Long-term Assets

The information provided in the footnotes to financial statements varied considerably among companies. To the extent that the temporal references of other long-term assets were disclosed, they were used. However, when the temporal characteristics of long-term assets were not disclosed, the following heuristic was used: If the total of the components of other long-term assets for which temporal references were not known increased between balance sheet dates, a new

component equal to the increase was added. This new
component was assumed to have been added at mid-year and
therefore had a temporal reference of six months prior to the
balance sheet date. If the total of the components of other
long-term assets for which temporal references were not known
decreased between balance sheet dates, this amount was
subtracted from the component(s) with the oldest temporal
reference(s) in FIFO fashion.

Common and Preferred Stock, Additional
Paid-in Capital, and Treasury Stock

The temporal characteristics of these accounts was
estimated using the same general procedure used to estimate
the temporal characteristics of fixed assets. However, the
Moody's Manuals do not typically provide the amount of issues
and retirements of common or preferred stock, nor the amount
of treasury stock acquired, sold, or retired in any given
year. It was necessary therefore to rely on the current and
previous balance sheet figures to determine either a net
increase or decrease for the period. Increases were assumed
to have occurred at the middle of the current year.
Decreases were assumed to have occurred in FIFO style. This
lack of more precise information could lead to less accuracy
in the estimation of the temporal characteristics of these
accounts than in the estimation of the temporal
characteristics of fixed assets, but the effect of this
lesser accuracy in the present study was mitigated somewhat

by the fact that all methodologies studied translate these owners' equity accounts using historical rates. Any differences resulting from translating at current rates or average rates was therefore irrelevant.

Retained Earnings

Retained earnings is a residual, balancing figure, and therefore no temporal characteristics needed to be estimated.

APPENDIX C

VALIDATION OF THE METHOD OF ESTIMATING

TEMPORAL CHARACTERISTICS

VALIDATION OF THE METHOD OF ESTIMATING
TEMPORAL CHARACTERISTICS

Because the estimation of the temporal characteristics of financial statement numbers was critical to the present study, the ability of the chosen method to generate accurate data had to be validated. Since the temporal characteristics of the accounting numbers of financial statements were not readily available, the method used in the present study was tested with hypothetical companies possessing account balances which were assumed to have known temporal characteristics. Specifically tested was whether unknown random variations in temporal references result in significant errors in the translated numbers.

Fixed Assets

The six factors needed to determine the temporal characteristics of fixed assets are listed in Chapter VI. Of these six, factors (5) and (6), the temporal characteristics of retirements and of the fixed assets at the end of the base year were not known.

In order to compare the translated numbers resulting from the estimation method used in the present study with those of hypothetical companies, three companies were selected at random from Moody's Industrial Manuals (Hershey Foods, Hercules, Inc., and Ingersoll-Rand). Factors (1)

through (4) were noted for each company for each of 20
consecutive fiscal years (1966-1985). The temporal
characteristics of the plant assets were estimated using the
method of the present study, then the reported plant asset
numbers were translated from U.S. dollars to British pounds,
using the temporal principle. The process was repeated for
numerous hypothetical firms for which factors (1) through (4)
were the same as for the three randomly-selected companies
but for which factors (5) and (6) were selected at random as
described below.

Although the method for estimating the temporal
characteristics of fixed assets used in the present study
assumed that the oldest assets were retired first, the
hypothetical companies disposed of fixed assets randomly.
The method used in this study assumed (arbitrarily) that the
temporal characteristics of the plant assets in the base year
consisted of 20 equal-sized components whose temporal
references were the 20 fiscal year ends preceding the base
year. The original distribution was determined for the
hypothetical companies by dividing the base year figure into
100 equal parts which are spread randomly over 30 years.

Translations were performed, using actual exchange rates
and the resulting temporally-referenced data for the latter
10 years (1976-1985). Factors (5) and (6) were randomized
120 times (40 times for each of the three actual companies)
to provide 120 hypothetical companies and a total of 1,200

comparisons (120 hypothetical companies over 10 years). The results of the comparisons were as follows:

	Maximum Single % Error	Average % Error	Iterations
HERCULES INC.	11.37	3.02	400
HERSHEY FOODS	4.35	1.20	400
INGERSOLL-RAND	8.75	3.17	400
OVERALL	11.37	2.46	1,200

Eighteen percent of the estimates resulted in a translation error of less than 1%, 79% in errors of less than 5%, 99% in errors of less than 10%, and none of the estimates resulted in translation errors of more than 11.37%. All of the companies for which the larger observed translation errors occurred (for example 11.37% and 8.75% error) were hypothetical companies in which the hypothetical management usually retired fixed assets which had been acquired within the last one or two years, leaving the older assets in service, in effect a worst-case scenario. Since it is intuitive that the oldest plant assets are more likely to be retired than newer ones, it can be concluded that the method of estimating the temporal characteristics used in the present study would result in less overall error than observed for these 1,200 hypothetical firms. It is also intuitive that the effect of the original (1966) distribution on the 1976 and subsequent distributions is minimal. In fact, the purpose of the first ten years of unused data is to minimize this effect.

Long-term Debt

The method of estimating the temporal characteristics of
long-term debt used in the present study was also tested by
performing translations using actual exchange rates and the
resulting, estimated temporal characteristics, then comparing
the translated number with translated numbers of hypothetical
companies.

The temporal characteristics of the hypothetical
companies' long-term debt consisted of (1) those temporal
characteristics reported in Moody's Industrial Manuals for
Hercules, Hershey Foods, and Ingersoll-Rand and (2)
randomized temporal characteristics for the long-term debt
amounts for which temporal characteristics were not given in
Moody's Manuals. It was assumed that the long-term debt for
which the temporal characteristics could not be determined
from the footnotes may have been issued at any time over a
twenty-year period ending with the balance sheet date.

The results of these comparisons are as follows:

	Maximum Single % Error	Average % Error	Iterations
HERCULES INC.	17.86	6.01	400
HERSHEY FOODS	8.98	2.45	400
INGERSOLL-RAND	11.45	2.13	400
OVERALL	17.86	3.53	1,200

Three percent of the estimations resulted in less than a
1% error, 24% in less than 5% error; 50% in less than a 10%
error, 94% in less than 15% error, and no errors greater than

17.86% occurred. The hypothetical companies for which the greater estimation errors occurred were companies whose hypothetical managements consistently preferred to liquidate new debt instead of older debt, the worst case scenarios. Such action may be reasonable if newer debt carries higher interest rates, but old debt eventually matures and must be either paid or refinanced with new debt. For these reasons, it can be concluded that the overall error resulting from the application of the method of estimation used in the present study is somewhat less than observed in this test.

VITA γ

Paul Edwin Holt

Candidate for the Degree of

Doctor of Philosophy

Thesis: A COMPARATIVE EXAMINATION OF THE EARNINGS EFFECTS OF
ALTERNATIVE TRANSLATION METHODS

Major Field: Business Administration

Biographical:

Education: Bachelor of Arts, the University of Kansas,
1964; Master of Business Administration, Oklahoma
City University, 1972; completed requirements for
the Doctor of Philosophy degree at Oklahoma State
University, July, 1992.

Professional Experience: Public and private accounting
with various firms from 1965 to 1982; teaching at
the university level, 1972 to the present.