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AN ASSESSMENT OF THE FINANCIAL ACCOUNTING STANDARDS BOARD (FASB) ASSERTION CONCERNING THE PREDICTABILITY OF CASH FLOWS

by

Stephen Howard Spector

B. A. (Hons.), Simon Fraser University, 1978

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS
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of
Economics

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An Examination of the Financial Accounting Standards Board (FASB) Assertion Concerning the Predictability of Cash Flows

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ABSTRACT

The objectives of accounting have remained rather vague, while related disciplines have tried to formalize their goals. A special committee of the American Institute of Certified Public Accountants concluded, among other things, that "financial statements ought to be directed primarily to the needs of investors and creditors". This committee felt that one such 'need' was the ability to "predict, compare, and evaluate potential cash flows . . . in terms of amount, timing and related uncertainty". Moreover, the committee felt that reported accounting earnings should be used to predict these cash flows. Unfortunately, the committee neglected to detail how one could make these predictions.

This study assessed the contention that past reported accounting income (earnings) is a better predictor of future cash flows than are past cash flows. Moreover, it tried to determine what should constitute 'earnings' and 'cash flows'. The study also examined the issue of whether the relationship between income and cash flows, or cash flows and cash flows, is better served in nominal or real terms.

A sample of twenty-eight Canadian firms was utilized. These companies represented most of the types of firms that do business in Canada. The length of the time-series for each

company in the sample averaged thirty years, ranging from twenty years, to an extreme of seventy years for Cominco Ltd.

The examination process involved a series of regression models which tested both past cash flows and past reported accounting income as predictors of future cash flows. A comparison of the results from the regression models allowed us to determine that income is indeed a better predictor of future cash flows, and that the relationship is better served in nominal terms.

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I. The Trueblood Report and the FASB

Introduction

> Accounting is the art of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof.

The American Institute of Certified Public Accountants [AICPA] provided this definition of accounting in its Accounting Terminology Bulletin No. 1 in 1941. The period 1930 to 1970 saw many attempts to define accounting and it's objectives, and to prepare a cohesive, unified body of knowledge to be known as 'accounting theory'. The efforts of the 1930's were largely attempts to specify accounting principles. The fear of government regulation by the new Securities and Exchange Commission [SEC] helped lead to the AICPA co-ordinating its standard-setting output into Accounting Research Bulletins. In 1932, the AICPA asked George May to chair a committee to investigate means to improve accounting standards. After extensive effort, the SEC adopted most of the May Committee's recommendations, even though the AICPA did not. However, this effort did succeed in having the AICPA codify its accounting

rules, and it led to a switch from a principle-setting perspective to a rule-making perspective on the part of the AICPA.

The problem with the AICPA effort was its ad-hoc nature -- there was little continuity or co-ordination. As a result, the Accounting Principles Board [APB] was formed in 1959, with the objective (among others) of eliminating these complaints. Unfortunately, the same difficulties that doomed its predecessor also doomed the APB -- the ad-hoc approach, the continual rationalization, disregarding the research of its own staff, and its susceptability to outside pressure.

Paralleling the effort of the AICPA, the American Accounting Association [AAA] produced five statements during the period 1936 to 1966. These research monographs progressed from a mixture of principles and methods [1936] to concepts and standards [1948] to theory [1966]. An analysis by Reed Storey [1964: pp. 40-48] of both AICPA and AAA statements shows remarkable similarity between topics covered by each body, and their stated recommendations. But there was no official exchange between the two bodies, and the AICPA's abandonment of principle-setting in favour of rule-making actually led to an increase in the number of acceptable accounting alternatives. While this increase could be attributed to the increasing complexity of the accounting environment, and the growing diversity of business activities, the main consequence of this

increase in acceptable alternatives was a lack of confidence in the APB.

The start of the 1970's saw the demise of the rule-making perspective of the AICPA, in favour of standard-setting, with the dissolution of the APB, and the creation of the Financial Accounting Standards Board [FASB]. One of the last efforts of the APB was the publication in 1972 of Statement No. 4: Basic Concepts and Accounting Principles Underlying Financial Statements of Business Enterprises. When combined with the AICPA Study Group on the Objectives of Financial Statements, the recognition of the need for a conceptual framework was admitted. The charge to the Trueblood Committee[2] was four-fold:

1. Who needs financial statements?
2. What information do they need?
3. How much of the needed information can be provided by accountants?
4. What framework is required to provide the needed information?

The importance placed on a conceptual structure is apparent; the recommendations contained in the Trueblood Report [AICPA, 1973] initiated expansion of the horizons of the profession, and much of the literature of the last eight years has concerned itself with the issues raised by this Report.

One of the first tasks faced by the Financial Accounting Standards Board was the implementation of the recommendations of the Trueblood Report. Anton [1976] states that the Study Group

on the Objectives of Financial Statements [The Trueblood Report] "concluded that financial statements ought to be directed primarily to the needs of investors and creditors." The Objectives Study Group [AICPA, 1973: p. 20] felt that one of the prime concerns of investors, and creditors, was the ability to predict future cash flows.

> Objective 3: An objective of financial statements is to provide information useful . . . for predicting, comparing, and evaluating potential cash flows . . . in terms of amount, timing and related uncertainty.

The Statement of Financial Accounting Concepts No. 1 [FASB, 1978] integrated Trueblood's emphasis on cash flows into its objectives. Unfortunately, the FASB [para. 37-50] listed the benefits derived from predicting cash flows without providing any direction for effecting such predictions. Moreover, the FASB also assumed that past historical, reported earnings figures are better predictors of future cash flows than are past cash flows.

Therefore, the objective of this thesis is to examine the contention that past reported accounting earnings are indeed a better predictor of future cash flows than are past cash flows. In addition, the issue of whether measurement (of the variables) should be in nominal or real terms will be examined.

Cash Flows, Earnings Power, and Trueblood

The Trueblood Report [AICPA, 1973: p. 22] stated that "information about periodic earnings is more useful than information about current cash flows for predicting future cash flows." Trueblood considered cash flows essential for the evaluation of enterprise well-being; specifically, one should have "information about the cash consequences of decisions . . ." The Report [p. 23] defined earnings power as:

> . . . the enterprise's ability to be better off, to generate more cash, and to have earnings convertible into cash at some future date . . . Enterprise earning power has as its essence the notion of ability to generate cash in the future . . . earnings can only come from cash generated by operations; cash generating ability and earnings power are equivalent.

Earnings power had generally been considered to be the ability to generate additional net assets from sources other than owners, and not by the ability to generate future cash flows. Thus this reference to cash flows represented a shift in emphasis from a wide set of resources -- net assets -- to a narrower one of a single asset, cash.

Unfortunately, the Objectives Study Group did not detail how one makes the transition from 'periodic earnings' to 'future cash flows'. Moreover, they chose not to distinguish between the objectives and the functions of financial statements. Chambers

[1976] points out that the difference is not just one of semantics; there is danger in allowing "tolerable aims or ends" to become the functions of financial statements.

Cash Flows, Earnings, and the FASB

The FASB continued the work started by Trueblood, with the issuance of a discussion memorandum [FASB, 1974] to weigh the implications for standard setting. This 1974 study considered "whether the emphasis . . . on cash flow . . . and cash-generating ability . . . [is] a proper one . . ." [p. 6], but no consideration was given to the distinction between objectives and functions. It is apparent that the FASB did not feel the latter point worthy of discussion as Concepts Statement No. 1 [FASB, 1978] adopted almost intact much of Trueblood's stress on future cash flows, without any indication as to how to predict these future cash flows.

It required the Reporting Earnings Discussion Memorandum [FASB, 1979] to clarify the issue [p. 3]:

> . . . a study on earnings needs to consider the relationship between reports of information on earnings and assessments of cash flows. The relationship may be identified in a two-stage process for the assessment of future cash flows:

i. Reports of past earnings are used as a basis for assessments of future earnings.

ii. An adjustment is then made to the assessment of future earnings to derive an assessment of future cash flows.

The Board proceeded to define earnings [para. 11] as:

> . . . the increase in net assets or owners' equity from all transactions and other events and circumstances affecting the enterprise during the period, excluding the effects of certain transactions with owners . . .

It is clear that the assessments of future cash flows cannot be made using the above definition of earnings; the all-inclusive concept[3] of income as stated by paragraph 11 (above) contains too much "noise"[4] [FASB, 1979: para. 23]. However, the all-inclusive concept has the supposed advantage of removing inconsistencies arising from the artificial distinction between operating and non-operating categories. What may be operating expenses for one firm is non-operating for another. Even in the same firm, an item may be classified as non-operating in one period, and operating the next.

As usual, the Board 'hedged' its position; it seemed to be leaning towards the all-inclusive concept of income. While there was no explicit statement to that effect, Chapter 7 of the Reporting Earnings Discussion Memorandum clearly favoured a multi-step income statement, with the obvious hope that all

components of income would be shown -- in essence, the all-inclusive concept. The FASB then left the prediction issue 'on hold': as before, no mechanism was indicated for determining cash flows. Further indication of the Board's intentions were found in Chapter 9 of the Reporting Earnings Discussion Memorandum: examples for cash flow reconciliation explained the net change in cash over the year. Another possible explanation was that the Board preferred to see the Statement of Changes in Financial Position calculated on a cash basis rather than on a working capital basis, so as to provide data for cash flow predictions.

In fact, the Funds Flows Discussion Memorandum [FASB, 1980c] clarified the Board's intentions: Chapter 4 presents a 'direct' and an 'indirect' method[5] of reporting funds flows. The Board does not choose one method over the other, but it does report [para. 106] that virtually all respondents to the 1979 Accounting Trends and Techniques employed the indirect method. Moreover, the Board indicated that the usefulness of each method depends on the approach adopted by users for assessing future cash flows.

This thesis will present the issues in the following manner: a discussion of previous research and a detailed examination of FASB position vis-a-vis earnings and cash-flows will be provided. A model for testing predictive ability of both earnings and cash-flows, as well as the basis for their

derivation will then be presented. The time-series models will be described, followed by results, observations, and conclusions.

Notes

[1]George O. May was chairman of the 1932 AICPA Special Committee on Cooperation with Stock Exchanges. The Committee was charged with formulating improved accounting standards which might then be enforced through the Stock Exchange's listing requirements. [Chatfield, 1974: p. 288]

[2]Robert M. Trueblood was the chairman of the AICPA Objectives Study Group, and the resultant report is known as the 'Trueblood Report'.

[3]See Hendriksen [1977] pages 163-4 for a discussion of the all-inclusive concept of income.

[4]Earnings outside 'normal' activities: capital gains, legal settlements, foreign exchange adjustments or accounting changes. These items are [assumed to be] self-cancelling over time.

[5]The mechanics of the direct and indirect methods will be covered later.

II. Earnings and Cash Flows: Previous Research

Cash Flows or Funds Flows?

The term cash-flow is a misnomer -- it is neither cash nor a flow [Mason, 1961: p. 5]. Mason's study for the AICPA was intended to lead to a consistent application of the term 'cash flow'. He was quite certain [p. 42-3] that:

> In no sense can the amount of cash flow . . . be considered as a substitute for or an improvement upon the net income, properly determined, as an indication of the results of operations. . . . comments or statistics concerning cash flow should be avoided since they are generally meaningless and often misleading.

Mason viewed cash flow to be analogous to 'funds provided by operations' in a typical working capital statement. The introduction of a standarized 'Statement of Changes in Financial Position (on a Working Capital basis)' led Jaedicke and Sprouse [1965, p. 116] to consider cash flow to be "an approximation of net working capital from operations." However, they questioned the rationale for supplying cash flow figures [p. 117]:

> Presumably, the reason for the use of cash flow data is that net income is inadequate as a guide for determining the ability of the firm to pay dividends, finance additional assets, and repay debt from internal sources.

Jaedicke and Sprouse concluded that cash flow data was not superior to net income since cash flow is only one aspect of the firm's performance, and is not indicative of all components.

About the same time as Mason, Anton completed a study on Accounting for the Flow of Funds [1962], which paralleled Mason's effort in many ways. Anton's study, though, devoted more effort to the concept of 'funds', and attempted to develop a definition consistent with the then-basic accounting premises. He concluded that funds (in the context of the 'Funds Statement') should be pecuniary resources. Anton further stated that the Funds Statement should [p. 38]: " . . . offer that funds applied parallel expenditures, not disbursements; and funds provided imply a constructive, not actual, receipt." He did not feel that detailing changes in the cash account had any relevance, and he pointed out [p. 32] that few authors recommended the cash concept of funds in its 'pure' form.

Mason also developed a spectrum of meanings for 'funds flows'. He felt that all financial resources should be traced in the Funds Statement [p. 54]. Moreover, Mason criticized the narrower concepts -- cash and/or working capital -- for leading to ommission of items which may not directly affect cash or

working capital, but which are important items in the financial administration of the business [p. 54]. Mason's study had earlier noted that since net income is a construct computed on an accrual basis, adding back depreciation or other non-cash expenses would not convert net income to something called cash flow [p. 5]. In addition, Mason noted [p. 5] that:

> 'Working capital flow' or 'funds flow' would be an improvement in that the revenue-producing operations of a business in a large part affect or flow through the current assets and liabilities. The word flow, however, is inappropriate since the amount involved is the algebraic sum . . . of a flow of many transactions rather than a measure of the flow itself.

It is clear that both these studies objected to the term 'cash-flow', preferring instead the term 'funds flow' to describe the changes in a firm's financial position. Further work by Paton [1963] and Drebin [1964] re-iterated the weakness of concentrating on cash-flow.

Previous Studies

The literature of the late 1960's and early 1970's saw fairly extensive research into the ability to predict cash flows for investors' use. Ball and Brown [1968], Beaver [1970], Brooks and Buckmaster [1976], and Lookabill [1976] were primarily

concerned with returns to investors. These researchers concentrated on earnings and predictions in a finance context, primarily as evidence of the Efficient Markets Hypothesis.[1] Revsine [1970, 1971, 1973] concentrated on predicting resource flows, but in the context of replacement cost, using Edwards and Bell's current operating profit[2]. Many of the studies [e.g. Foster, 1977] dealt with quarterly data, rather than annual figures. Those studies using annual data [Ball and Watts, 1972, Lookabill, 1976, Beaver, 1970] moreover, examined the time-series properties of earnings on a cross-sectional basis.[3] Albrecht, Lookabill and McKeown [1977, p. 227] report that

> . . . the major conclusions of these [cross-sectional] studies have been that nondeflated earnings appear to follow either a random walk or a random walk with a drift pattern, while deflated earnings can best be characterized by a moving average or mean-reverting type model . . . most of those studies . . . [of] time-series characteristics on an individual-firm basis . . . have found evidence for both interfirm and interindustry difference.

A more recent study by Lawson [1980] concentrated on cash returns to investors, but not on the prediction of cash flows in general. Ijiri [1978] argued in favour of cash-based financial statements. Beaver [1981] attempted to synthesize many viewpoints concerning earnings, cash flows, and predictions thereof, into a 'financial reporting revolution'.

In general, few studies have considered using earnings as a predictor of future cash flows. The main exceptions are Revsine [1971, 1973] and Greenball [1968a, 1968b], but these studies were intended to examine 'current-value' concepts rather than predict cash flows. A simulation by Simmons and Gray [1969] concluded that prediction models based on historical income yielded somewhat smaller forecast errors than did models based on current income, where 'current income' is the current value income of Edwards and Bell. However, the same shortcoming existed -- the model was predicting future earnings, not future cash flow.

Cash Flows It Is!

It fell to Trueblood to specifically restrict flows to cash, while at the same time expanding the boundaries of application: creditors, as well as investors were deemed interested in these flows. The Objectives Study Group recognized that it was not feasible to directly measure future cash flows, but the Report did maintain that "[t]he primary and continuing goal of every commercial enterprise is to increase its monetary wealth so that over time, it can return the maximum amount of cash to its owners." [AICPA, 1973: p. 21]. The Report further acknowledged the timing lag between expenditure/sacrifice and

revenue/benefit, but contended [p. 38-9] that:

> An objective [of financial reporting] is to provide a statement of financial activities useful for predicting, comparing, and evaluating enterprise earning power . . . This statement should report mainly on factual aspects of enterprise transactions having or expected to have significant cash consequences.

Again, the final emphasis is on cash, and not funds or other resource flows.

As stated, the FASB continued the process of formulating explicit objectives for financial statements [FASB 1974, 1976a, 1976b, 1978]. In addition, the Board appeared to eliminate its hesitancy over the appropriateness of the emphasis on cash flows [FASB, 1974: p. 6] inasmuch as the Statement of Financial Accounting Concepts No. 1 [FASB, 1978] repeated the importance of cash flow predictability [p. viii]:

> Financial reporting should provide information to help present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of prospective cash receipts from dividends or interest and the proceeds from the sale, redemption, or maturity of securities or loans. Since investors' and creditors' cash flows are related to enterprise cash flows, financial reporting should provide information to help investors, creditors, and others assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise.

Moreover the Statement went on . . . [p. ix]

> Information about enterprise earnings based on accrual accounting generally provides a better indication of an enterprise's present and continuing ability to generate favorable cash flows than information limited to the financial effects of cash receipts and payments.[4]

However, the FASB recognized, as did Trueblood, that direct cash prediction may not be possible [para. 41], and that information provided should concentrate on the economic resources of a firm, to permit indirect evaluation of cash flow potentials.

The Reporting Earnings Discussion Memorandum [FASB, 1979] further emphasized the indirect method, given that the Board acknowledged the fact that there are lags and leads between recognition in the income statement and timing of cash flows. Thus, any attempt at direct assessment of future cash flows based on past cash flows would tend to be suspect.

However, the Board also recognized the varying views held regarding earnings behaviour: namely, the dichotomy between the 'growth' model, and the 'random walk' hypothesis.[5] The Board then admitted [FASB, 1979: p. 7] that "[e]mpirical work does not yet support a definitive choice between the alternative characterizations of earnings behaviour over time."

Unfortunately, the emphasis of the Reporting Earnings Discussion Memorandum was not on cash flow predictability, but on issues related to reported earnings. This emphasis is important -- the ability to predict cash flows based on past earnings demands a concise and consistent definition of exactly

what constitutes 'earnings'. Moreover, the Reporting Earnings Discussion Memorandum detailed the need for increased disclosure of the components[6] of earnings, so as to permit evaluation of the constituents of earnings, and the lead/lag between cash flow and earnings recognition. As well, the distinction between irregular and non-operating components would permit reporting of a figure for 'operating earnings' in addition to 'regular earnings.'

Chapter 9 of the Reporting Earnings Discussion Memorandum [FASB, 1979], intended as a preview of the Funds Flows Discussion Memorandum [FASB, 1980c] provided an example [p. 98-9] of how one could reconcile cash flows and earnings, but it did not enhance the predictability criterion. The Board insisted that reconciliation was important "because of . . . relevance to the objectives of financial reporting" [p. 95].

The Funds Flows Discussion Memorandum marked a subtle shift in emphasis.[7] The Board maintained that . . . [p. 26]

> Reports of past funds flows may be used in several ways. Information about past receipts and payments, when combined with information about the activities of an enterprise, may be useful as a basis for making assessments of future funds flows (ultimately, cash flows).

The Board allowed that the main criterion for performance evaluation of an enterprise was the "accounting concept of

income". The Board further acknowledged that in the 'long-run', "total reported income (calculated on the historical cost basis) equals net cash receipts, excluding dividends and cash resulting from capital changes" [p. 26].

The FASB also recognized that there existed timing differences between receipt of cash and revenues, and outlay of cash and expenses [p. 27]. These differences were attributed to the increasing complexity of the business environment, and to the fact that, except for simple cases, the equality between income and cash rarely holds for periods as short as one year.[8] But, even though the FASB also noted that "[u]ncertainty pervades assessments of future cash flows" [p. 4], it was unwilling to abandon its emphasis on these cash flows. It contended that the benefits gained from providing data for future cash flow predictions would outweigh any difficulties inherent in providing such data:

> Information about past funds flows may be useful for making assessments of future cash flows. Knowledge of past funds flows from operations, for example, may assist in the assessment of future cash flows from operations. Information about past investment expenditures may be helpful in assessing the amount and timing of future investment expenditures.

Chapter 4 of the Funds Flows Discussion Memorandum [FASB, 1980c] proposes alternate presentation formats for highlighting funds flows. Moreover, justification is provided by paragraphs

94 and 95. The Board placed great emphasis on distinguishing between regular, or continuing earnings, as distinct from other components. Consequently, the Board insisted that funds flows [para. 94] be divided "into categories associated with operating, investing, and financing activities."[9]

The Board describes two methods of reporting funds flows from operations -- the direct[10] and indirect[11] methods. The FASB seems to favour the indirect method, and the Funds Flows Discussion Memorandum provides substantial justification. The Board notes that the indirect method provides a means of highlighting divergence between income and funds flows. It notes that the indirect method is necessary for those who wish to evaluate income as reported, and for those who will eventually use this figure (income) to predict future cash flows. The FASB further suggested that the indirect method could provide signals of changes in the environment of the firm.[12]

The FASB has devoted considerable effort [FASB, 1974, 1976a, 1976b, 1979, 1980c] towards extension of disclosure and evaluation of earnings and cash flows. But the Board has yet to specify precisely how one can actually make this assessment. It has continually re-iterated that . . . [FASB, 1980c: p. 2]:

> Information about past cash flows or other funds flows may help users of financial statements improve their understanding of the activities of an enterprise, understand the effects on funds flows of income-generating activities, and evaluate the investing

> and financing activities of an enterprise. In those and other ways the information may be used as a basis for making assessments of future cash flows associated with operating, investing, and financing activities.

It has been eight years since The Objectives Study Group first put forward the goal of cash flow prediction. Yet, we are no better able to make such predictions now than we were at that time. The FASB has attempted to improve the quality and quantity of information available for making the transformation, but there are no current empirical studies that confirm (or refute) the relationship between earnings and cash flows. Accordingly, this study tried to establish a causal link, rather than just confirm association.

Notes

[1]The Efficient Markets Hypothesis [EMH] states in effect that "an efficient capital market is defined as one in which security prices always fully reflect all publicly available information concerning the securities traded." [Lev, 1974: p. 212] Basically, the EMH deals with the equilibrium price of securities in a publicly traded market. A specific price may hold only until new information is impounded by the market. While the EMH recognizes that any one investor may not be sophisticated, it is generally accepted that the total market is quite sophisticated in its ability to absorb financial data. The impact of this fact is the inability -- generally -- of investors to 'beat the market'. For a more detailed description of the EMH and its implications for accounting, see Dyckman, Downes, and Magee [1975], Lev [1974] especially Chapters 14 and 15, and Beaver [1981].

[2]Current operating profit . . . indicates whether or not the current proceeds from the sale of product are sufficient to cover the current cost of the factors of production used in producing that product. . . Current operating profit, therefore, is essentially the long-run profit associated with the existing process of production carried on under existing conditions. [Revsine, 1973: p. 72] See also Edwards and Bell, Measurement of Business Income, University of California Press, 1961: pp. 98-99.

[3]See Albrecht, Lookabill, and McKeown, 1977 for further citations.

[4]For a more detailed elaboration on the importance of cash-flow prediction, refer to Statement of Financial Accounting Concepts No. 1 [FASB, 1978], paragraphs 44-49 and paragraphs 37-39 respectively.

[5]See Lev, 1974, especially pages 109-132.

[6]Regular revenues and expenses from the main activities of a firm plus any irregular gains, losses, revenues and expenses. As well, the issue of such distinctions was also raised.

Specifically, the question of "partitioning" the earnings statement, as there is no demonstrated evidence one way or the other as to the increased information content of such separation, or to the non-existence of management's deliberate attempts (income smoothing) to smooth income over time [Copeland, 1968; White, 1970; and Barnea, Ronen and Sadan, 1976], which obviates any point of such separation.

[7]This no doubt explained the 14 month delay in publication: the FASB was forced to modify its emphasis on cash flows, per se.

[8]In a simple enterprise, cash receipts from customers for any given year tend to approximate revenue recognized for that year. Similarly, cash payments to suppliers of goods and services tend to approximate expenses recorded for that period. Net income, therefore, tends to be a good surrogate for cash provided by profit directed activities. However, as credit terms become longer and more complex, as companies substitute more highly specialized and longer lasting plant and equipment for labor, as the planning horizons of companies become longer, and as the recognition of revenue becomes farther removed from the receipt of cash, the leads and lags between revenue and cash receipts and between expenses and cash outlays become longer and more pervasive. . . . As a result, net income may greatly exceed cash provided by profit directed activities in some years, and the reverse may occur in other years [FASB, 1980c: p. 26].

[9]Information about the funds flows associated with subsidiary categories of operating, investing, and financing activities may be useful for assessing future cash flows. For example, users may find it helpful to distinguish between funds provided by continuing operations and other funds provided by operations. That distinction would indicate the amounts of recurring funds flows separately from unusual or extraordinary funds flows. A similar distinction might be made between investments in assets required for operations and other investments. [FASB 1980c: para. 95]

[10]The direct method reports aggregates of individual funds transactions. If a cash concept of funds is adopted, the report would show, for example, cash received from customers and cash paid to suppliers. If a working capital concept of funds is adopted, the report would show revenues and expenses (exclusive of depreciation and other items that did not provide or use working capital during the period). [FASB 1980c: para. 100]

[11]The indirect method reports funds flows from operating activities by adjusting income for items that do not affect funds flows during the period. Because most enterprises use a

working capital concept of funds, the most common adjustments appearing in the reports are depreciation and amortization expense; deferred income taxes; gains and losses on the sale of property, plant, and equipment; and earnings not remitted by affiliated companies and nonconsolidated subsidiaries. [FASB 1980c: para. 101]

[12]The indirect method of reporting has the advantage of focusing on the differences between income and the flows of funds. An understanding of the differences may be important to people who wish to assess the "quality" of income and to those who use assessments of income as an intermediate step in assessing future cash flows. Some people may assess future cash flows by first assessing future income from reports of past income and then converting those assessments to cash flows by allowing for differences in timing between cash flows and income. Reports of similar differences in the past are likely to be helpful in that process [FASB 1980c: p. 50].

Another advantage of the indirect method is that a cash based funds statement emphasizes changes in the components of working capital. . . . those changes can have a considerable impact on the cash flows of an enterprise. Increases in investments in receivables and inventory, without a corresponding increase in volume, may indicate an unfavorable change in the operating environment -- a change that may be important for assessments of future cash flows [FASB, 1980c: p.53].

III. Testing the Relationship

Funds Flow Equations

Johnson [1966] and Corcoran and Kwang [1965] both provide detailed and explicit mathematical treatment of funds flow equations. Corcoran and Kwang used set notation to represent changes in assets and liabilities. Johnson on the other hand, used an algebraic model, so it would not be necessary to reclassify/regroup net changes in order to derive the funds statement. Furthermore, Johnson's model also provided a system for cash flow analysis. The main drawback to both studies was the implicit assumption that sufficient detail was available for incorporation into the model.

Specifically, changes in fixed assets must be detailed enough to provide the gain or loss on sale, and the related amount of accumulated depreciation reversed. Johnson conveniently avoids this issue by assuming no acquisition of plant and equipment, and by stating the gain on sale [p. 576]. Corcoran and Kwang [p. 214] provide a reconstruction of the property item account.

If one is preparing these statements as an 'insider', then it is likely that the information would be available. However, published financial statements contained in annual reports rarely provide sufficient detail to allow such calculations. Often, the Income Statement condenses expenses; details needed for the mathematical model are missing. Simmons and Gray [p. 758] note that

> . . . insufficient information concerning asset acquisition dates, accounting methods used, and similar essential information tends to force arbitrary adjustments. In using actual data one is also limited to the events which actually occurred.[1]

However, this shortcoming does not detract from the concept, and the equations can be modified to provide an approximation to the required figures.

Methodology

As stated, there is little published work from which to draw. Using the equations of Johnson [1966] as a starting point, and the more recent work by Lawson [1980, pp. 11-16], it is possible to derive a model to be utilized for testing based in part on funds flow equations and partly on the resulting analysis of changes in financial statement elements and

accounts. It is possible to test which flow -- income or cash -- is a better predictor of future cash flows: a proxy for cash flow from operations can be derived from the Statement of Changes in Financial Position for the period.

i. To income, add back depreciation and other non-cash items.

ii. Adjust for changes in current assets and liabilities, except cash itself.

The resulting figure can be used as an approximation of cash flow from regular earnings. From the Income Statement we can find 'net income before extraordinary items', as well as 'net income after extraordinary items'. It is necessary to utilize both measures of income, since we do not know where the impact of extraordinary items will be felt. We can present the change in cash (as reported on the Balance Sheet) in the following identity:

Change in Cash = amounts arising from dealings with owners (investors)

+ amounts arising from dealings with long-term creditors

+ amounts arising from dealings in long-term assets

+ amounts arising from operations.

The question of articulation is not at issue here; it can be shown that the figures derived for 'cash flow' will articulate with a figure derived as follows:

i. Using the actual change in cash, add back dividends, and either add reduction in share capital, or deduct increases in share capital. This resultant figure represents the cash flow 'pool' available before investor transactions.

ii. From the figure derived in (i) above, subtract the net change in long-term debt. This amount is the cash flow 'pool' before transactions with both investors and creditors.

iii. Take the figure from (ii), and account for changes in fixed and other long-term assets. This figure then, should articulate with the amount designated as 'cash flow from operations' by means of the working capital adjustment method.

As mentioned earlier, the major issue is which cash flow(s) should be predicted? Are we primarily concerned with the investor group? If so, then the figure from (i) would be the appropriate surrogate. On the other hand, it has been argued that we wish to examine the cash flow to both creditors and investors (Trueblood Report), and so the figure derived in (ii) should be used. Finally, the FASB seems to favour a term -- without definition -- cash flow from regular operations, which might be considered as (iii) above.

It is less difficult to decide what earnings figure should be used: there are only two basic figures of interest: earnings before extraordinary items, and earnings after extraordinary items. Moreover, it is clear that the latter figure is the

proverbial 'bottom line', and represents the amount available to the investors. However, for predicting cash flows to groups other than investors, earnings before extraordinary items would appear to be a more appropriate variable.

Variable Specification

One major difficulty in evaluating the FASB contention lies in the formulation of the variables. Moreover, the form of the model itself is unclear: there is no official pronouncement as to what the model should be. The FASB implies that earnings, based on accrual accounting, will be a 'better' predictor of future cash flows than past cash flows.[2] But the Board does not state how to prepare this forecast, nor is (as previously stated) one even shown how to make this transition from earnings to cash flow.

Although we attempt to isolate the impact of operations to satisfy the FASB's emphasis on 'regular earnings', it can be argued that cash inflows and outflows for the purchase of long-lived assets should be part of 'regular earnings' cash flows. In general, these items contribute to the generation of earnings from operations, and thus should be included. Also, the exclusion of cash raised through long-term financing may be questioned: these funds are used for purposes that may

contribute to earnings from operations, and in any case, the cost of debt service is an operating charge.

Another shortcoming is the estimator for cash flow.[3] We are trying to estimate three different cash flows, starting with the disclosure of cash balances in the financial statements. But many companies do not disclose 'Cash and only Cash' as a separate line item. Furthermore, there is no easy way (if any) to determine whether the impact of extraordinary items is isolated in the proper cash flow figure, and even more basic, if we have the 'correct' value for our desired cash flow. Consequently, estimates for these desired cash flows will be needed.

Nominal or Constant Dollars

Another issue to be resolved is whether measurement of the variables should be in nominal dollars or constant dollars. Since cash is a monetary item, it would seem logical to examine the data in constant terms. In this context, the Gross National Expenditure [GNE] implicit price deflator will be used.

However, when a business decision is made, the potential investor or creditor may not always look at constant dollars, but at the amount to be received in the future. Furthermore, the expectation of continued inflation will lead to expectation of

larger nominal amounts of cash being received: inflation fuels itself, so to speak, and fuels the expectations of continually-increasing cash flows. In essence, the historical cost model implies dollars of constant scale, and a time preference rate of zero. Inasmuch as reported figures are in nominal, and not real, terms, this would also support a contention of zero time preference rate. Consequently, the predictive ability of reported earnings will be examined in both real and nominal terms.

The Models

There were three basic relationships[4] to be be tested; moreover, there were two permutations of each model as it was necessary to determine which dollar should be 'used' -- literal (nominal) dollars, or uniform (constant) dollars.

1. Test net income before extraordinary items:
   - i. against the cash flow pool available to investors, including the effects of extraordinary items on cash flows:
     - a) in real terms
     - b) in nominal terms.
   - ii. against the cash flow pool available to investors and creditors, including the effects of extraordinary items on cash flows:
     - a) in real terms

b) in nominal terms.

iii. against the all-inclusive cash basis of net income, which represents cash flow from operations

a) in real terms

b) in nominal terms.

2. Test net income after extraordinary items:

i. against the cash flow pool available to investors, including the effects of extraordinary items on cash flows:

a) in real terms

b) in nominal terms.

ii. against the cash flow pool available to investors and creditors, including the effects of extraordinary items on cash flows:

a) in real terms

b) in nominal terms.

iii. against the all-inclusive cash basis of net income, which represents cash flow from operations

a) in real terms

b) in nominal terms.

3. Test past cash flows available to investors, which includes the impact of extraordinary items, against the cash flow pool available to investors, including the effects of extraordinary items on cash flows:

a) in real terms

b) in nominal terms.

4. Test past cash flows available to both investors and creditors, which includes the impact of extraordinary items, against the cash flow pool available to investors and creditors, including the effects of extraordinary items on cash flows:

    a) in real terms

    b) in nominal terms.

5. Test past cash flows from operations, representing the all-inclusive cash basis of income, against the all-inclusive cash basis of net income, which represents cash flow from operations

    a) in real terms

    b) in nominal terms.

The two basic hypotheses are as follows:

H_0: There will be no statistical difference between the predictions made using past accounting income, and those made using past cash flows.

H_1: There will be statistical difference between the predictions made using past accounting income, and those made using past cash flows.

H_0: There will be no statistical difference between the results obtained using nominal figures, and those obtained from models stated in real terms.

H_1: There will be statistical difference between the results obtained using nominal figures, and those obtained from models stated in real terms.

The alternate hypothesis for both tests is two-tailed: we have no a priori expectations concerning the alternative hypotheses.

Sample Size

The last question to be resolved was one of sample size. The sample size was severly limited by the inability to obtain published financial statements -- annual reports -- that covered a long enough time period. A minimum of twenty observations for each company was desired so that sufficient degrees of freedom remained after lagging operations. At present, data are available from twenty-eight companies (see Appendix I), with each company contributing on average thirty observations. There is one company [Inco Limited] for which forty-five observations are available, and one [Cominco Ltd.] where seventy observations were obtained. The sample itself is not strictly random, as firms whose time-series did not extend at least twenty years were excluded. Nonetheless, the sample examines most types of firms, with the main exception being the retail merchandising industry. Manufacturing, mining, oil and gas, forestry, and regulated (pipelines) industries were available. As to the extent of the sample -- twenty-eight companies -- it was decided that such a number was sufficient for purposes of this study.

For purposes of comparison, a Box-Jenkins[5] test was considered for the lagged endogenous model using Cominco Ltd. and possibly on Inco Limited as well. However, this procedure was abandoned. The larger the sample, the more likely there is

to be a structural change in the model. The underlying assumption needed for a Box-Jenkins model to be valid, is one of 'stationary process'. Watts and Leftwich [1977, p: 255] contend that:

> . . . extension of the time period increases the likelihood of structural change, since there is a greater opportunity for the time series of earnings to change from one stationary process to another, because of some real event, such as a merger.

Basically, the trade-off is between reduction of the sampling error, and increasing the possibility of structural change.

However, the least-squares technique is also not without criticism. Watts and Leftwich [p. 254] report that previous researchers determined that auto-regressive moving-average [ARMA] or moving-average [MA] processes tended to be biased downwards, and that the true null hypothesis would be rejected too often when the sample size was thirty observations.

Finally, the sample data itself would be less than perfect: given the ex post nature of the earnings figure presented in annual reports, one must consider the issue of 'income smoothing'. Income smoothing is not a recent phenomenon. Chatfield [p. 117] notes that in 1931, a British court case -- Rex vs. Kylsant -- dealt with the firm's admitted practice of turning operating losses into apparent profits by crediting portions of a tax reserve to the profit and loss account.

Chatfield further notes [p. 117] that the auditor's defense was that " . . . management had the right to smooth income; that in fact such conservative practice was needed to stabilize dividends and promote investor confidence." Ball and Watts [1972, p. 664] noted that " . . . [income] smoothing is an attempt to reduce the variance of income around its expectation." They further stated that . . .

> . . . sources imply that the expectation of income is a function of time or is constant. Smoothing implies a return to good times, on average, after bad times, during which income decreases are artificially reduced by smoothing practices. It implies that many increases in income are also temporary, and can therefore be smoothed in order to avoid the impression of permanence.

Ronen and Sadan [1981] note that the issue of income smoothing has been discussed as far back as 1953, and that the mid-60's saw an intensive investigation of the means and consequences of income smoothing. It can be argued that the objective of income smoothing is beneficial: by reducing the variance of reported income about some hypothetical mean, it could improve the predictive ability of income. There is a strong management disincentive to wide income fluctuation. Such occurrences are perceived as signals of 'trouble', and can lead to a lack of investor confidence (downward fluctuations), or an increase in government interference (monopoly perceived). Ronen and Sadan conclude that there is [p. 77] empirical evidence that

smoothing does occur.

The implication for accounting research and prediction is significant. Income smoothing implies a 'mean-reverting' basis for earnings streams, although in the context of predicting future earnings. If the underlying structure is mean-reverting, this fact would enhance predictability of income. It is less certain if it would have any impact on the predictability of future cash flows.

Notes

[1]Lev [1974, p. 114] notes that simulation studies, such as those conducted by Simmons and Gray are also quite restricted, since it is difficult to generalize results beyond the conditions assumed in the simulation process.

[2]FASB 1978, paragraph 43.

[3]First differences provides a measure of the change in cash from year to year: i.e. cash flow.

[4]There are in fact six relationships and twelve models, inasmuch as both earnings vs. cash flow, and cash flow vs. cash flow will be examined for predictive ability, in real and nominal terms.

[5]See Box, George E., and Gwilym Jenkins, Time Series Analysis, Forecasting and Control, revised edition, Holden-Day, Inc. San Francisco, 1976. Basically, the Box-Jenkins method is a complex mathematically sophisticated technique for time-series analysis. The model systematically eliminates inappropriate models until the most suitable one is left for the data being considered. A three-step procedure of identification, estimation, and diagnostic checking is used to arrive at a specific model. Thus, one can function with complex data patterns, and the forecaster is not forced to initially describe these data patterns. [Sullivan and Claycombe, 1977: p. 223]

IV. The Time-Series Models

Structural Form

The same basic form was used for all linear regression models, namely

$$Y = \alpha + \beta X + \epsilon$$

where 'X' represents the vector of independent variables. There were two sets of equations used -- one in 'real' terms, and the second in 'nominal' terms. Moreover, the independent variable was income (both before and after extraordinary items) in one version, and cash flow -- the endogenous variable with suitable lags -- in a second grouping. An examination of Appendix II provides a listing of the four models used to test the cash flow potential available to investors. The same procedure was utilized to test the relationships for cash flow to investors and creditors (as a group), and cash flow from operations.

The models were tested using an ordinary least squares [OLS] procedure, and no correction was attempted for serial correlation. This 'ommission' was deliberate, and deemed necessary, to maintain consistency in the examination process. Moreover, such action allowed comparability between results

obtained from the models using lagged independent variables, and the set of lagged endogenous models. Durbin and Watson [1950, p. 410] state "[the tests] do not . . . apply to autoregressive schemes and . . . models in which lagged values of the dependent variable occur as independent variables." They further note [p. 410] that ". . . the tests are valid only if the independent variables in the regression can be regarded as 'fixed'." Consequently, using the Durbin-Watson statistic as an indicator of serial correlation may be valid for models where the independent variables are lagged, but it is inappropriate when lagged endogenous variables are the regressors.

However, the objective of this study was to determine whether cash flow is better predicted by past cash flows, or by past reported accounting income. The study was not designed to actually predict these forecasted cash flows. Correcting for serial correlation is not appropriate in this case. The equations are no longer specified in terms of past income when corrected using generalized least squares, but are transformed into a function of past income and past cash flows. We have in effect changed the models, and thus cannot compare the results of ordinary least squares and the corrections made using generalized least squares. In addition, there is evidence that some firms[1] follow an autocorrelation pattern that is higher than first-order. The first-order autocorrelation co-efficient may be significant, but the Durbin-Watson statistic test is

meant only for first-order detection.

Specification Error

One reason that autocorrelation can be present in results obtained from a regression model is the failure to correctly specify that model. The covariance of the error term is usually expected to be zero:

$$E[UiUj] = 0 \text{ when } i \neq j$$

But, if the model omits a variable, or it is not correctly specified, then the results may exhibit serial correlation. It is likely that both errors have occurred in certain applications of the models in this study, although not necessarily at the same time.

The variables being treated as dependent variables -- cash flows -- are not known with certainty. They are endogenously determined in the context of the models, and there is no 'true' value against which they can be compared. Consider the method of determination: we have proposed two alternative schemes to determine cash flow from operations. One method [CF3 in the example following] utilizes a 'layer' type of approach. We use the actual change in cash over one year as a starting point, and then adjust for dealings with owners, creditors, and others. The remainder should be 'cash flow from operations'. The second

method adopted utilizes in essence a change in financial position on a cash basis analysis to extract the same remainder -- cash flow from operations [WCF in the example following]. But there is no way to determine whether the intermediate steps are correct. That is, the values obtained for cash flow pool for investors [CF1], and cash flow pool for investors and creditors [CF2] have no counterpart in the latter analysis.

A comparison between the two alternative 'cash flow from operations' values was made for each company in the sample. A rough rule of thumb was then utilized: if the difference[2] between the two values was less than $\pm 3 \times 10^3$, then it was assumed that the two methods articulated, and the variables were 'correct'. However, this still did not guarantee that the values ascribed to CF1 and CF2 were correct. Moreover, the goal of articulation required, in many cases, the inclusion of extraordinary items in the latter method [WCF].

Alcan Aluminium Limited is a typical[3] example. Table 1 shows that the two alternative 'cash flow from operations' values did not articulate prior to the inclusion of extraordinary items. Note that Table 1 starts in 1950, with -2859×10^3 being the difference in 1950, -564×10^3 being the difference in 1951, -2854×10^3 the difference for 1952, and so on. While this may not be alarming in the context of an analysis of changes in financial position on a cash basis, it does not tell us <u>where</u> the impact of those extraordinary items belongs.

Does this impact belong to CF1? Is it CF2? Or, does it manifest itself in cash flow from operations?

An examination of Table 2 shows that the variance has been virtually eliminated by the inclusion of extraordinary items. Table 3 clearly shows that there are only two years when articulation was apparently not possible. However, an examination of the underlying circumstances reveals that in 1969, Alcan changed its reporting procedures from Canadian to United States dollars. Furthermore, in 1980, the firm switched from dropping three zeros (reporting in thousands of dollars) to dropping six zeros (reporting in millions of dollars). These changes created irreconcilable differences.

Consequently, we are faced with acceptance of a model where variable specification is somewhat suspect. It is likely that the existance of serial correlation is partially attributable to this situation.

Table 1

ALCAN:DIFF -- In Dollars

Annual Data From 1950 To 1980

Comparison of Alternative Methods of Determining Cash Flow from Operations Prior to the Inclusion of Extraordinary Items

1950	-2859×10^3	-564×10^3	-2854×10^3
1953	-22942×10^3	221×10^3	-867×10^3
1956	400×10^3	291×10^3	454×10^3
1959	1894×10^3	1622×10^3	24371×10^3
1962	-8989×10^3	-1254×10^3	-17694×10^3
1965	0	-12300×10^3	-1×10^3
1968	1×10^3	37653×10^3	-9029×10^3
1971	-7142×10^3	0	0
1974	-27364×10^3	-12430×10^3	6293×10^3
1977	0	-28760×10^3	-21509×10^3
1980	-30×10^3		

Table 2

ALCAN:DIFFEI -- In Dollars

Annual Data From 1950 To 1980

Comparison of Alternative Methods of Determining Cash Flow from Operations After the Inclusion of Extraordinary Items

1950	0	2×10^3	1×10^3
1953	-2×10^3	0	0
1956	2×10^3	0	2×10^3
1959	-2×10^3	2×10^3	0
1962	0	0	1×10^3
1965	0	0	-1×10^3
1968	1×10^3	37653×10^3	0
1971	0	0	0
1974	0	0	0
1977	0	0	0
1980	-30×10^3		

Table 3

ALCAN:ERREI -- In Dollars

Annual Data From 1950 To 1980

Years When the Two Alternative Methods Did Not Articulate

1950	0	0	0
1953	0	0	0
1956	0	0	0
1959	0	0	0
1962	0	0	0
1965	0	0	0
1968	0	37653×10^3	0
1971	0	0	0
1974	0	0	0
1977	0	0	0
1980	-30×10^3		

Heteroscedasticity and Multicollinearity

Heteroscedasticity occurs when the assumption of constant variance of the disturbances is violated. In general

$$E[UiUj] = \sigma^2 \text{ for } i = j$$

Moreover, the variance of the disturbances should not be related

either directly or inversely to changes in the regressors. However, the assumption of constant variance can also be violated if the model fails to include all relevant regressors. Dutta [p. 127] notes that "[i]t is relatively safe to assume homoscedasticity [exists] . . . in studies based on aggregative time-series data, since the variables are of a similar magnitude for successive time-period observations."

If we were interested in individual variables for this study, the existance of heteroscedasticity would be quite troublesome. The values for 'β' in the regression equations determined by the ordinary least squares procedure would exhibit larger variance than if they were determined with the generalized least squares procedure. However, an examination of the residuals[4] implies that heteroscedasticity is not evident.

The existence of multicollinearity in a regression model is not as damaging as that of serial correlation. The results from the regression equations were sampled (refer to the footnote concerning the testing for heteroscedasticity), and it is likely that any multicollinearity that exists is not consistent. There are cases where multicollinearity is not present, and there are instances where the presence of multicollinearity is strongly indicated.

However, the implications of multicollinearity for this study are minimal. This is a forecasting model, and no inferences are being drawn from the individual parameters.

Although the standard errors, and the co-efficients themselves change when the bounds of the regressions are altered, the extent of this change is not substantial. Finally, it is expected that if multicollinearity does exist, then the pattern will continue into the future, and forecasting will impound this condition. As well, there is no way to correct for multicollinearity in the context of this study. We cannot get additional data elements; we cannot add another independent variable without changing the structural form, and we cannot transform the variables, since there is no readily apparent form to utilize.

Notes

[1]TransCanada PipeLines Limited and Interprovincial Pipe Lines Limited seem to follow a higher than first-order serial correlation pattern, in that correction via generalized least squares specifying second order serial correlation [GLS Auto 2] improves the results obtained from the ordinary least squares procedure, by reducing the standard error of the estimate.

[2]A difference of ±3 was assumed immaterial, due to possible rounding errors in the original data collection process. The data collection process dropped the last three digits from amounts in the financial statements, so the difference really is $\pm 3 \times 10^3$.

[3]Tables 1, 2, and 3 were generated through TROLL's output options, and then saved. Note that ALCAN:WCF refers to cash flow from operations generated by the financial position changes method, while ALCAN:CF3 refers to this value determined via the 'layer' method. Note also that ALCAN:WCFEI refers to the first method with the inclusion of extraordinary items. Refer to Appendix II for a fuller discussion on TROLL itself.

[4]The residuals were examined on a random basis. There were twelve equations in three models for twenty-eight companies, or 1,008 equations when income was the independent variable, and an equal 1,008 when income was examined in real terms. There were exactly half that many equations when cash flows served as the independent variable. In total, there were 3,024 equations, and an examination of the residuals for heteroscedasticity would have been counterproductive, given the likelihood of heteroscedasticity actually being present in in a form strong enough to influence the results from this study.

V. Observations and Results

Criteria for Comparison

We are concerned with comparing two sets of forecasting models, and then testing our original hypothesis. Therefore, we have adopted two measures as criteria for comparison. The first measure is the 'R^2' from the regression models. The second measure is the standard error of the estimate. It should be noted that there are instances where these two measures are inconsistent with each other. That is, we would expect that the equation generating the lower standard error of the estimate in each pair should also generate the higher R^2. This condition does not always obtain. However, the number of cases is not significant, and the absolute magnitude of the difference is also relatively immaterial. Kennedy [1979: pp. 147-9] discusses some of the difficulties present in evaluating forecasting models, and notes [p.149] that "[t]here is little concensus on the meaning of 'better' for forecasting purposes . . . choose the predictor with the smallest mean square error."

Observations

Each cash flow was tested in the fashion outlined in Appendix II. The equation that gave the smallest standard error of the estimate was chosen as the 'best' for each alternative. That is, each comparison was made in nominal terms, and in real terms, as well as for both alternatives: once with past cash flows as the independent variable, and secondly, with past accounting income as the independent variable. These results were then compared 'cash flow' to 'cash flow' to determine which alternative is a 'better' predictor. The results are summarized in Appendix III.

Consider first the twelve equations using past reported accounting income as the independent variable. Table 4 provides an indication of the frequency with which each equation was chosen as 'best' for each of the three postulated cash flows. In addition, an examination of Figure 1, which provides a histograph of the 168 results, shows that there was no readily discernable pattern as to which equation performed as the 'best' predictor, when accounting income served as the independent variable.

Table 4

Equation Chosen as Best Predictor

When Income is the Independent Variable

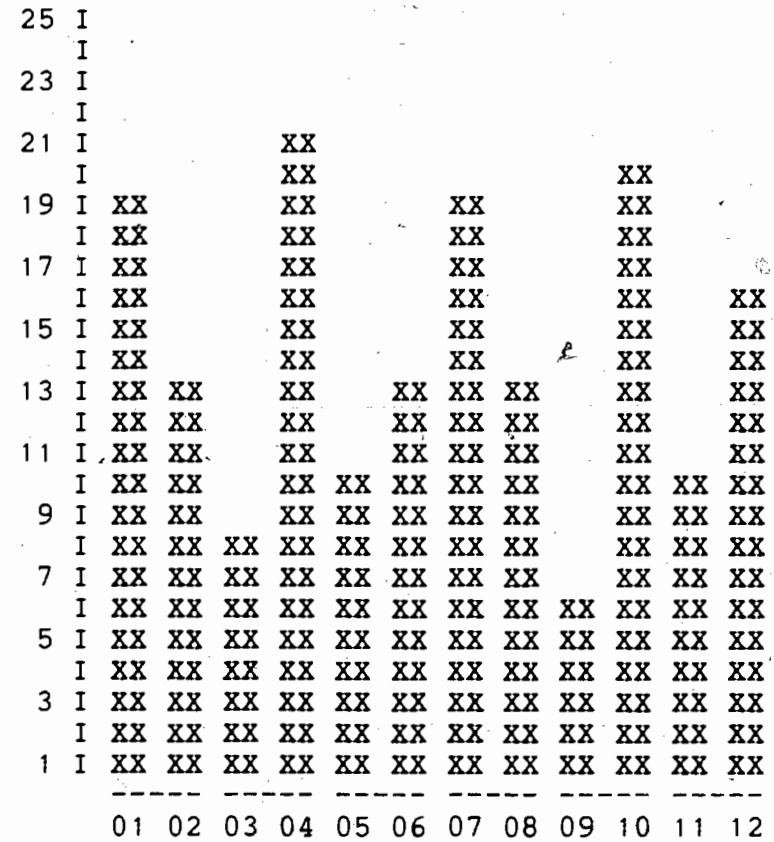
		Cash Flow CF1	Cash Flow CF2	Cash Flow CF3	All Cash Flows
Equation Number Chosen in Nominal Terms	01	3	2	2	7
	02	2	2	2	6
	03	1	0	1	2
	04	6	3	4	13
	05	2	2	1	5
	06	4	4	2	10
	07	1	4	1	6
	08	2	3	1	6
	09	1	1	2	4
	10	4	4	7	15
	11	0	0	3	3
	12	2	3	2	7
Equation Number Chosen in Real Terms	01	6	1	5	12
	02	3	3	1	7
	03	2	1	3	6
	04	2	2	4	8
	05	1	2	2	5
	06	2	1	0	3
	07	4	6	3	13
	08	1	5	1	7
	09	1	1	0	2
	10	1	2	2	5
	11	1	2	4	7
	12	4	2	3	9
Equation Number Chosen Real and Nominal Terms	01	9	3	7	19
	02	5	5	3	13
	03	3	1	4	8
	04	8	5	8	21
	05	3	4	3	10
	06	6	5	2	13
	07	5	10	4	19
	08	3	8	2	13
	09	2	2	2	6
	10	5	6	9	20
	11	1	2	7	10

Figure 1

'Best' Equation for Predicting Cash Flows

Income as the Independent Variable

In both Real and Nominal Terms



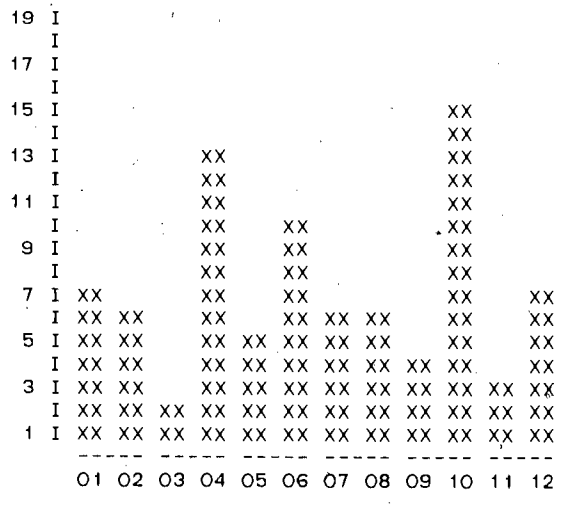
Equation Number

Figure 2

'Best' Equation for Predicting Cash Flows

Income as the Independent Variable

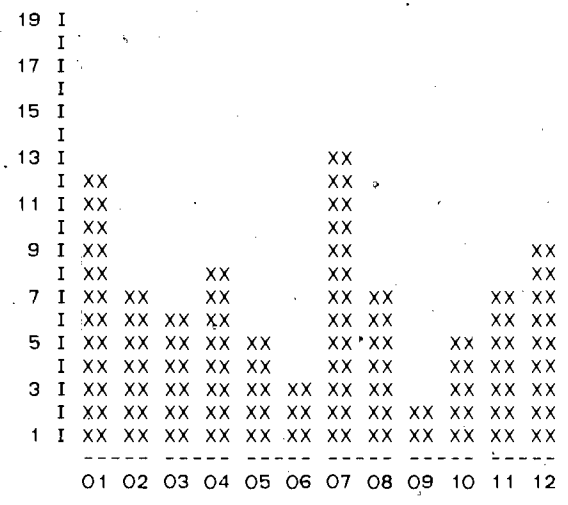
In Nominal Terms



Equation Number

Income as the Independent Variable

In Real Terms



Equation Number

Although there is no pattern, it is clear that there is a 'preference' to certain of the twelve equations as evidenced in Figure 1.

1. Equation 1 occurs 19 times or 11.3% of the time. This equation simply says that next year's cash flow is a function of last year's income before extraordinary items.

2. Equation 4 occurs 21 times -- the most often -- and it says that 12.5% of the time, next year's cash flow is a function of the last three year's income before extraordinary items.

3. Equation 7 occurs 19 times or 11.3% of the time. It is a modification of equation 1: namely, last year's income before extraordinary items, but the model includes a trend factor.

4. Equation 10 occurs 20 times, or 11.9% of the time. It also is a modified version of equation 4: namely, the inclusion of a trend factor to the three years of lagged income.

Overall, there is no real choice emerging from the analysis. Of the 168 equations examined, 82, or just under one-half require a trend factor, while 86 of them do not. Moreover, an examination of Figure 2, which disaggregates the results of Figure 1, into nominal and real terms, shows that the preference of the model for equations 4, 7 and 10 is borne out. In nominal terms, equations 4 and 10 are 'best' most often, while in real terms, equation 7 stands out.

Now consider the six equations wherein past cash flows served as the independent variable. Table 5 provides an indication of the frequency with which each equation was chosen as 'best' for each of the three postulated cash flows. In

addition, Figure 3 provides a histograph of the equation chosen 'best' for the three postulated cash flows. Moreover, there is no artificial distinction between 'income before extraordinary items' and 'income after extraordinary items', since we cannot tell where the impact of those extraordinary items will be felt. We cannot determine which cash flow is affected, and so cash flow is always after extraordinary items.

Table 5

Equation Chosen as Best Predictor

When Cash Flow is the Independent Variable

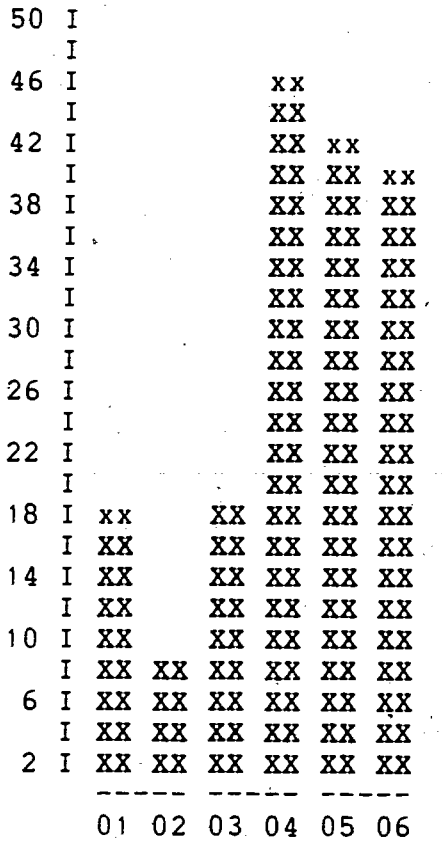
		Cash Flow CF1	Cash Flow CF2	Cash Flow CF3	All Cash Flows
Equation Number Chosen in Nominal Terms	01	1	4	0	5
	02	0	2	1	3
	03	1	3	5	9
	04	7	8	5	20
	05	9	4	9	22
	06	10	7	8	25
Equation Number Chosen in Real Terms	01	2	8	2	12
	02	3	2	0	5
	03	3	3	3	9
	04	10	5	10	25
	05	6	7	6	19
	06	4	3	7	14
Equation Number Chosen Real and Nominal Terms	01	3	12	2	17
	02	3	4	1	8
	03	4	6	8	18
	04	17	13	15	45
	05	15	11	15	41
	06	14	10	15	39

Figure 3

'Best' Equation for Predicting Cash Flows

Cash Flows as the Independent Variable

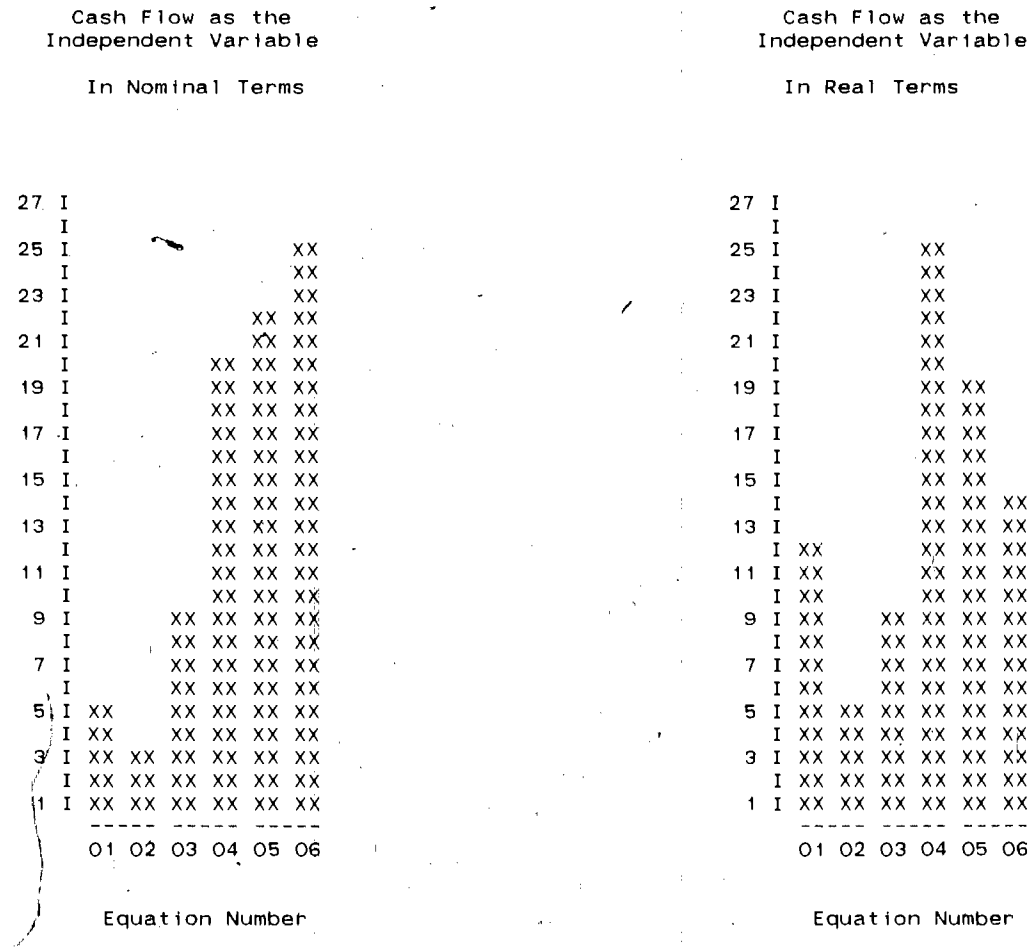
In both Real and Nominal Terms



Equation Number

Figure 4

'Best' Equation for Predicting Cash Flows



There clearly is a pattern, as shown in Figure 3, when cash flow is regressed on itself. The pattern is fairy consistent, regardless of whether we are examining the results in real terms, or in nominal terms. Figure 4 gives the disaggregated results of Figure 3, for the models using past cash flows as the independent variables.

1. Equation 4 is chosen as 'best' 45 times. This is 26.8% of the time, and it is interesting to note that this equation is the analog of equation 7 in the income models. Specifically, next year's cash flow is a function of last year's cash flow and a trend factor.

2. Equation 5 occurs 41 times; that is, 24.4% of the results indicate a preference for this model. This equation states that we need a trend factor and two years of lagged past cash flows to determine next year's forecast.

3. Finally, equation 6 is chosen 39 times out of 168 opportunities, or 23.2% of the time. This version requires a trend factor, and three years of lagged cash flows to predict next year's figure.

In total, the cash flow models require a trend variable in 125 of the 168 equations, or 74.41% of the time. An examination of Figure 4 shows that the trend variable is needed in both alternatives, although there is some variance between the real and nominal terms.

If we now consider the results for both alternatives, we find that although we cannot draw many conclusions as to which form of the model is 'best', there is evidence that certain of the cash flows are more readily forecasted using a regression model. Specifically, Table 6 provides an indication of the

relative efficacy of the two alternative independent variables. Figure 5 provides a histograph of the results, showing that cash flow from operations is most likely to be forecast using the linear regression model.

Table 6

Relative Efficiency of Income and

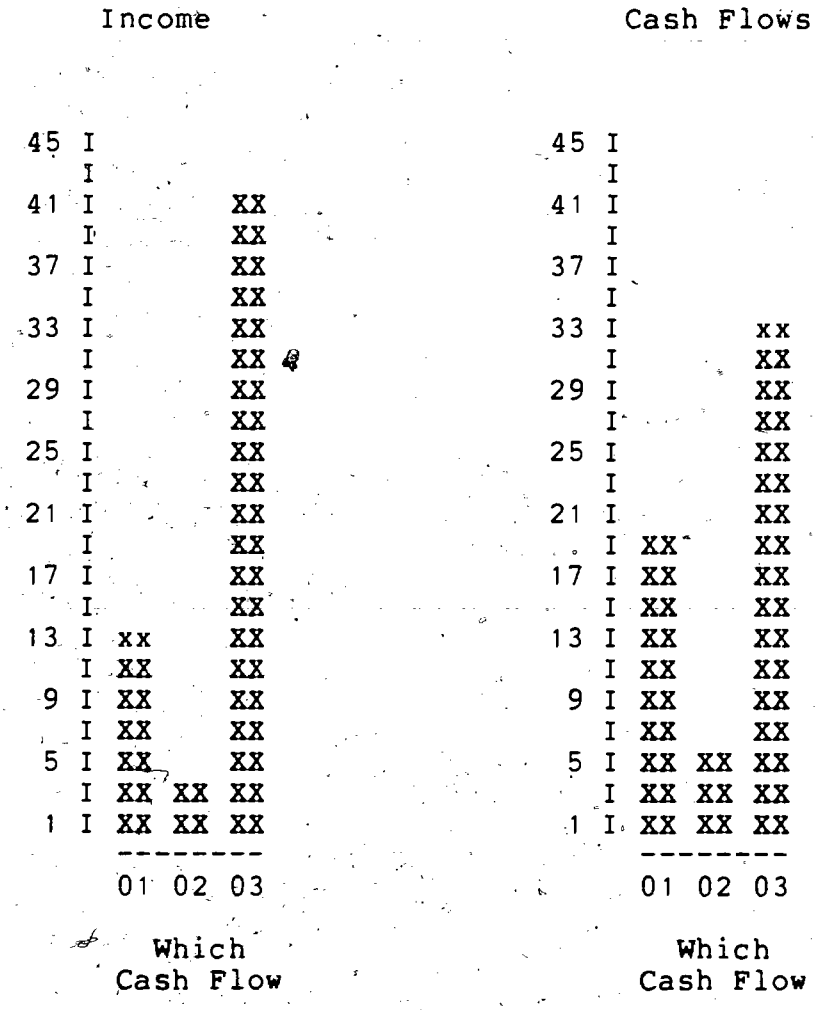
Cash Flows as Predictors of Future Cash Flows

		Predictor is Income	Predictor is Cash Flow	Combined: Income & Cash Flow
Cash Flows in Nominal Terms	CF1	6	10	16
	CF2	1	2	3
	CF3	21	16	37
Cash Flows in Real Terms	CF1	6	9	15
	CF2	2	3	5
	CF3	20	16	36
Cash Flows Nominal & Real Terms	CF1	12	19	31
	CF2	3	5	8
	CF3	41	32	73

Figure 5

'Best' Predicted Cash Flows

When the Independent Variable is



Figures 6 and 7 expand upon Figure 5: the cash flow predicted most often is given in nominal, and real terms, for both the lagged independent variable, and the lagged endogenous

variable. Figure 6 shows that there is virtually no difference in the results obtained with income as the lagged independent variable in nominal terms, and real terms. Using nominal terms, twenty-one of twenty-eight firms, or exactly 75% of the companies tested have cash flow from operations best predicted by the regression model. Even in real terms, there is only a slight difference: twenty firms, rather than twenty-one, have cash flow from operations best predicted by the regression model.

In cases where we utilized past cash flows as the independent variable, there is the same type of pattern. Figure 7 provides the disaggregated results. Here we see that cash flow from operations is best predicted sixteen times in both nominal and real terms, but cash flow to investors is chosen ten times in nominal terms, and nine times in real terms. These differences, like the differences observed when income is the independent variable are insignificant when we compare 'nominal' results with 'real' results.

Figure 6
'Best' Predicted Cash Flows

Income as the Independent Variable

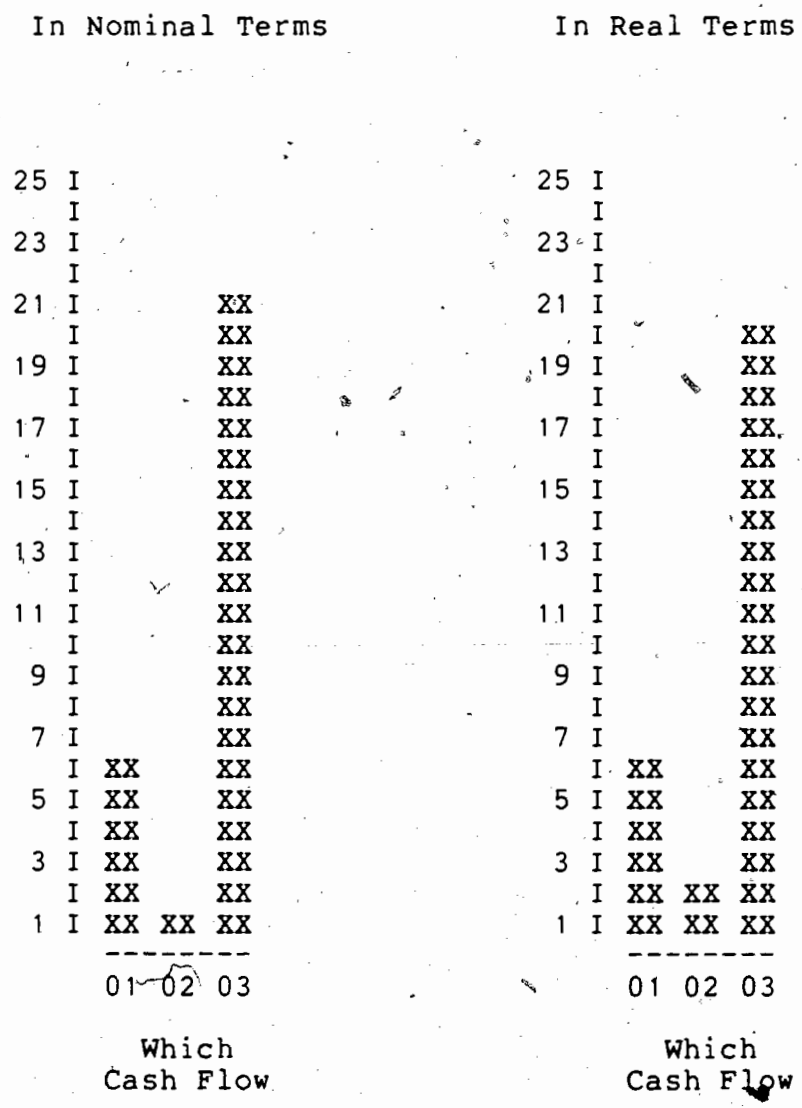
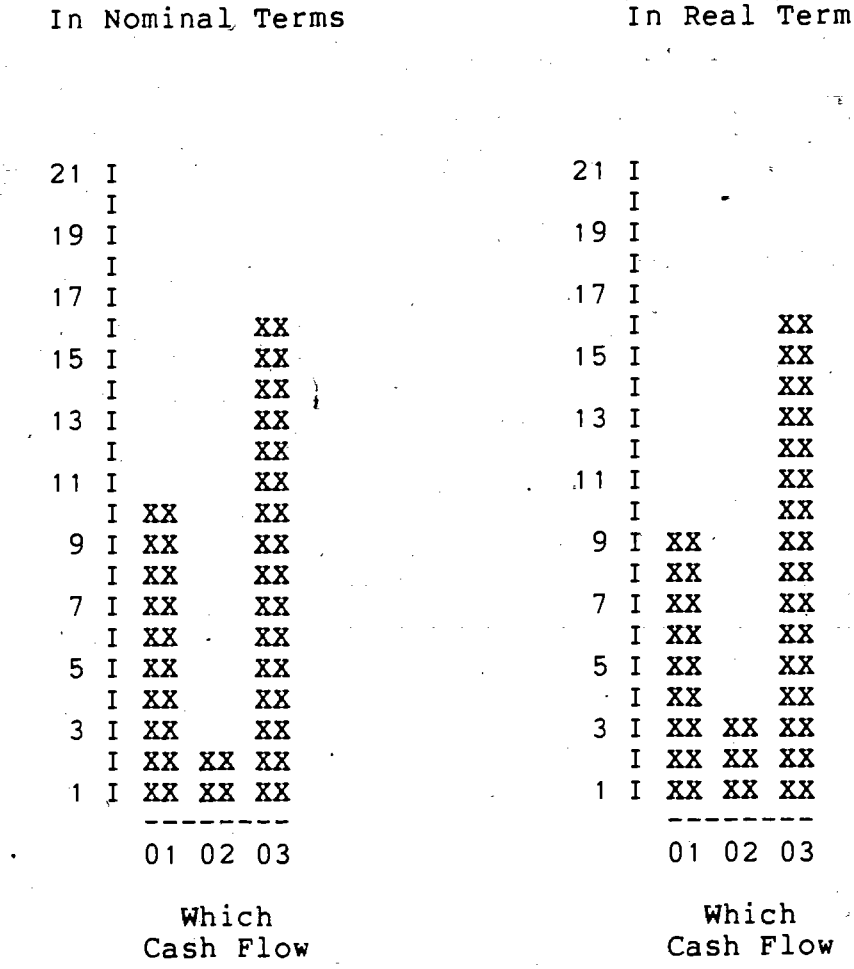


Figure 7

'Best' Predicted Cash Flows

Cash Flow as the Independent Variable



If we examine the aggregate ability to predict cash flows using income as the independent variable, and compare these results to those obtained with past cash flows as the independent variable, there is some variation between the

outcomes. But, the regression model is most successful as a forecasting method when we are examining cash flow from operations.

Results

The results obtained from this study can be used to test the two hypotheses advanced in Chapter 3 of this thesis. The main objective of the study was to provide data to assess the contention that past reported accounting income was a better predictor of future cash flows than was past cash flows. A secondary objective was to determine whether variable specification should be in nominal or real terms.

A test statistic can be developed using the normal approximation to the binomial theorem. Recall that the standardized normal distribution utilizes a 'z-value' for comparison, and is of the form

$$Z = (x - \mu)/\sigma$$

The binomial approximation is of the form

$$Z = (x - np)/(npq)^{0.5}$$

To examine the first of the hypotheses, we calculate the 'z-value' using the results from the study.

i. We are testing a contention that there will be no difference between results obtained utilizing past accounting income as the independent variable, and past cash flows as the independent variable. Therefore, 'p' = 0.5, which will also be the value of 'q'.

ii. There were 168 observations, comprising 28 companies in three models, in both nominal and real terms. Therefore, 'n' = 168.

iii. We observed that 120 of the 168 paired comparisons have future cash flows better predicted by past reported accounting income, than by past cash flows. Therefore, 'x' = 120. See Appendix III for further details.

iv. Given that there were 168 observations (trials), and that the probability of success is set at one-half, we find that the expected value of 'np' will be 84; that is, the mean of the distribution will be 84 observations.

v. Finally, we can approximate the standard deviation by taking the square root of 'npq', where n=168, p = q = 0.5, and thus equals the square root of 42, or 6.48

Thus, we obtain a 'z-value' of 5.55, which means there is virtually no probability of observing 120 successes' in 168 trials, given that we assume the probability of success if one-half. Therefore, we reject the null hypothesis, and conclude that past reported accounting income is indeed a better predictor of future cash flows than are past cash flows.

Following the format for the first hypothesis, we can also determine whether there is any difference in real or nominal term specification. The only change will be in the observed random variable, which was 120 in the first test. In this case, we observe that 144 of the 168 pairs obtained 'better' results

(higher R^2 and lower standard error of the estimate) when nominal terms were specified. Thus we obtain a 'z-value' of 9.26 which means there is virtually no probability of observing 144 successes in 168 trials, given that we assume the probability of success is one-half. Therefore, we reject the null hypothesis, and conclude that variable specification should be in nominal, rather than real terms.

It is more difficult to draw inferences from the fact that the models seem able to forecast cash flow from operations with consistency. We did not a priori expect that any one cash flow would be easier to predict, or that any one cash flow would be predicted 'best' most often. However, it is clear that the success of the model in predicting cash flow from operations is non-random, since 73 of 112 cases, or 65.18% of the total, provides 'best' results for cash flow from operations.

Notes

[1]No correction was made for the fact that the binomial theorem refers to discrete phenomena, while the normal distribution is intended to evaluate continuous phenomena. The size of the sample, and the overwhelming size of the 'z-value' indicate that the half-unit correction would have no impact on our acceptance or rejection of the null hypothesis.

VI. Conclusions

Analysis

An analysis of the results and observations reveals some interesting points. We can conclude that our original intentions have been realized, and we have demonstrated that past reported accounting income is indeed a better predictor of future cash flows than are past cash flows. Moreover, we have also revealed that the variable specification for a linear regression form is better suited in nominal terms.

However, the analysis also reveals some problems with the entire issue of cash flow prediction. We have utilized linear regression models for testing, and in certain instances, this form is undoubtably suitable. For example, we are able to obtain an R^2 of 0.96650 when we examine Calgary Power Ltd., and predict cash flow from operations. But, for other companies, the results from the regressions indicate that there is no 'fit'. It is not clear whether this failure is a consequence of the regression form, or whether there just is no fit. For instance, when examining cash flow to investors, we observe that for Dominion Foundries and Steel, Limited the 'best' of the twelve equations

(see Appendix III) yields an R^2 of only 0.06516; the 'F-statistic' is similarly poor: it is less than 2.00. Refer to Table 5 for a comparison of the R^2's for the 'best' equations in the models. This table gives the highest R^2 obtained as well as the lowest, and provides some indication as to the relative efficacy of the regression models in predicting future cash flows.

Table 7

Relative Efficacy of Predictors

As Evidenced by the R^2 Obtained

Which Cash Flow	Predictor is Income: Highest 'Best' R-square	Predictor is Income: Lowest 'Best' R-square	Predictor is Cash Flow: Highest 'Best' R-square	Predictor is Cash Flow: Lowest 'Best' R-square
CF1	0.94354	0.06516	0.96504	-0.03891
CF2	0.66991	-0.04764	0.67452	-0.03448
CF3	0.96650	0.20556	0.95045	-0.11433
CF1/P	0.77716	0.03727	0.83507	-0.03444
CF2/P	0.52387	-0.03254	0.60807	-0.05451
CF3/P	0.92739	-0.01340	0.83753	-0.03978

Another difficulty in a forecasting context is the likelihood that the models are mis-specified. It is very unrealistic to expect that we can predict cash flows based

solely on either past reported accounting income, or past cash flows. It is likely that the correct model is some combination of these flows, or even more probable, there will be additional exogenous variable required for many firms.

Moreover, even if we assume that the linear regression form is acceptable for testing purposes, we must resolve the issue of variable specification. Chapter 4 of this thesis alludes to the very real difficulty of using an autoregressive form for testing. Although serial correlation is the main problem, we cannot ignore the existance of heteroscedasticity and multicollinearity. While it is true that neither condition appears to be present in a form strong enough to influence this study, there exists the possibility that the correct specification of either variables and/or the models, may generate these conditions.

The above issues relate to the testing of the assertion of cash flow predictibility. The Financial Accounting Standards Board has acknowledged that consideration must be given to the underlying issues by circulating for comment two discussion memoranda: the Reporting Earnings Discussion Memorandum [FASB, 1979], and the Funds Flows Discussion Memorandum [FASB, 1980c]. It should be obvious that the more crucial of the two is the former. Any model that specifies income as the independent variable requires that the definition of income be clear and unambiguous.

The FASB has carefully avoided defining what might be called 'predictive ability' in its pursuit of forecasting cash flows. One might view such a term as embracing the concept of a lead indicator and extrapolation. The study by Simmons and Gray [1969], and those of Greenball [1968a, 1968b] have addressed this concept of 'predictive ability'. But the naive models that we have examined have not considered this concept. The issue of 'better' in our context is simply determining which of the two alternative independent variables provides a better 'fit' in the realm of the regression models. Nowhere have we attempted to evaluate what constitutes a 'better' predictor. It is beyond the scope of this study to actually predict the future cash flows. This aspect must be left to future researchers.

Notwithstanding the foregoing, we observed that of the three postulated cash flows, cash flow from operations tended to be the one that was most effectively forecast. This particular flow may be characterized as one depending on 'regular earnings', and the FASB [1979] feels that effort should be expended on segregating regular from irregular components of earnings. The Board also admits that they are not sure what (if any) changes to the format of the Income Statement would be necessary to elicit the desired data.

A further examination of the earnings (or income) issue requires consideration of what is known as 'functional fixation'. Ashton [1976], Chang and Birnberg [1977], and

Abdel-khalik and Keller [1979] are some of the recent studies on how this factor affects perception of accounting numbers. Basically, functional fixation is a notion that evolved in the literature of psychology. It deals with the inability of a decision-maker to adjust his views even when he knows that there has been a change in the underlying construct that generates 'net income', or other such accounting numbers. It is argued that past experience continues to be given a large weight in a decision, even when the circumstances that would support such experience no longer obtain. Ashton's article attempts to point out that the accounting impact of functional fixation is not clearly indicated, as there must be a distinction between function and use. Chang and Birnberg elaborate by saying that the accounting analog of functional fixity must be in fact 'data fixity'. They argue that the problem is the persistence of decision makers in reacting to data in historical ways, even though such action is no longer appropriate [p. 302]:

> . . . two types of situations afford decision makers the opportunity to exhibit this inflexibility. One is the decision makers' inability to respond to changes in the methodology for calculating a data input. The other is when the same method is used to calculate a data input, but new numbers are obtained.

The study by Abdel-khalik and Keller further supports the notion of data fixity, and provides a detailed listing [pp.

53-57] of the literature. They note [p. 52] that " . . . . some informed persons are unable to adopt readily new information or changes in measurement rules relating to some variables which they have consistently relied upon . . . in the past." They further state [p. 52] that

> . . . accountants will probably be unsuccessful in devising ways of communicating the impact of accounting changes . . . without an improved understanding of how users <u>in fact</u> assimilate and utilize accounting numbers . . .

The implications for this study, and of cash flow predictions in general are significant. Most accountants recognize that there are many ways to arrive at net income, all of them acceptable, and all according to generally accepted accounting principles [GAAP]. Most of the American studies of this issue have dealt with changes in inventory methods (LIFO-FIFO), or other significant changes in accounting methods. But in a Canadian context, the inventory issue is not applicable, since few firms use LIFO for reporting purposes. However, we can point to some structural changes in accounting methods that occur in Canada.

1. In 1968, the Canadian Institute of Chartered Accountants mandated comprehensive tax allocation as the only acceptable basis for reporting. There were a few exceptions, whereby the flow-through method could be retained. These companies were mainly regulated utilities that could not pass these costs on to their customers, and so the calculation of the rate base was on a flow-through method. Therefore, the

Institute allowed these firms to utilize the flow-through method for reporting purposes. But in 1977, all firms were forced to utilize the comprehensive allocation method. This is one instance of a possible data fixity problem.

2. Many firms adjust their depreciation rates periodically. While these rates may not change by much, the magnitude of depreciation expense, and any resultant tax deferral, must not be overlooked.

3. Even more significant than a change in depreciation rates is a change in depreciation methods. For instance, the British Columbia Resources Investment Corporation [BCRIC] changed its method of depreciation in 1981.

4. A switch in accounting for oil and gas ventures will also create a possible data fixity. That is, if a firm has been using the successful-effort method to account for their explorations, and it changes to a full-cost method, the impact on reported net income could be substantial.

There are likely other areas where data fixity can arise. The key point to recognize is that all accounting changes affect reported income. They are very unlikely to affect cash flow. An exception might be a change in effective tax rates, which requires a larger tax payment, but that particular change will probably be recognized. Recall that one model uses past reported accounting income as the predictor. If there has been a structural change in the manner of determination of that net income, there will likely be an impact in its ability to predict future cash flows. Consequently, we should consider whether the issue might better be served by providing a range of possible cash flows, rather than a single number.

Studies on the time-series properties of reported net income have characterized the earnings process as a stochastic

process, and thus, there is some probability distribution which applies to expected earnings for a period. Therefore, earnings can be viewed as a random variable, and the expected value of the distribution is the figure for earnings that is most likely to obtain. That does not mean that we actually observe these results. Circumstances can change, or there may be a poor 'sample', which results in a value for earnings deviating from the expected value.

If one accepts this view, then the task of financial statement users, and those interested in predicting cash flows, is not to actually choose some value for these variables, but to examine this postulated probability distribution to obtain parameter estimates. Thus, we would expect to get some mean and variance of the expected earnings figure, and utilize these values in our estimate of cash flows. However, the models used to determine net income, or earnings, do not permit a probabilistic approach. They generate one value: income (or earnings). Therefore, we must consider the issue of income smoothing.

If we accept the notion of income smoothing, then management attempts to reduce the variance of this income distribution. As mentioned in Chapter 3, Ronen and Sadan [1981] have concluded that income smoothing does in fact take place. Koch [1981] found that reduction of the variability of income can raise the price of a security by reducing the systematic

risk of that security [p. 574]. Koch discussed income smoothing in the context of trade-offs. He found that the higher the cost of smoothing, the less likely it was to occur. Nonetheless, his experiment did add further support to the contention that income smoothing does take place.

If income is mean-reverting (as income smoothing would have it be), it would enhance the predictive ability of income when it was being used to predict itself. It is less certain that such a pattern would have any impact when income was not the dependent variable. However, when we attempt to correct the problem of serial correlation of the test results, by means of generalized least squares, some insights were provided. Using GLS, a correction was made by means of an AR1 (autoregressive process) correction, and a MA1 (moving-average process) correction. While it is difficult to compare the results with each other, two facts stood out. Any serial correlation that existed was of a negative nature: the Durbin-Watson statistic was usually greater than 2.00, and the value for rho -- the autocorrelation co-efficient -- was usually negative for the AR1 process, and positive for the MA1 process. Secondly, apparent correction was almost always 'better' when a moving average process was assumed: the value obtained for the standard error of the estimate almost always was lower than the standard error of the estimate obtained using an AR1 correction; both processes usually yielded a smaller standard error of the estimate than

the uncorrected regression results. This observation would be consistent with a mean-reverting process.

Summary

As shown in Chapter 5, the two basic hypotheses have been rejected. We conclude that past reported accounting income is a better predictor of future cash flows than are past cash flows. We further note that the variable specification, at least for the linear regression model, should be in nominal terms. This latter point implies that there is a trend in the nominal numbers that the regression form is tracking. However, inclusion of an explicit trend factor does not resolve the issue. Either the specified trend factor is wrong, or there is some other trend being followed. In view of the fact that the models specified in real terms require a trend factor, we can conclude that some other trend is likely being followed. Another alternative may be that the form should be non-linear.

A second point to consider is the independence of the firms in the sample. No cross-sectional testing was attempted. It is clear from the results that the actual model that will predict future cash flows is firm-specific. Although the standard error of the estimate is in the same general order -- between 10^3 and 10^5 -- we cannot combine firms, and still have anything

meaningful from the regression results.

Furthermore, the degree of interlocking relationships makes cross-sectioning somehat awkward. It is difficult to isolate the sector or industry under study. For example, Dome Mines Limited owns approximately 22% of Dome Petroleum Limited, which in turn owns 12.5% of TransCanada PipeLines Limited. Moreover, calling Noranda Mines Limited, for instance, a 'mining, or resource company' is a gross misrepresentation. Noranda is heavily diversified, with substantial interest in the forestry sector: it owns almost 50% of MacMillan Bloedel Limited.

One last point to explore is the linear form and its relation to the results. Regression models are not very successful if the slope of the independent variable is very close to either 0° or 90°. Removal of the trend by dealing in real terms may have biased the results such that we reject the null hypothesis when in fact we ought to accept it. Unfortunately, there is no way to evaluate the possibility of a Type-I error. Nonetheless, this possibility should not be overlooked in considering the results of this study.

Appendix I: Sample Participants

This study was undertaken with the aim of examining the cash flow contention in a Canadian context. Although most research of this type has taken place in the United States, it appears that any findings that apply in the U. S. are likely to apply in Canada. The generally accepted accounting principles [GAAP] of both countries are substantially the same, and it would be expected that the results of an empirical study would be applicable to companies in both countries. However, as this thesis was undertaken in Canada, the sample chosen was Canadian in origin.

The sample consisted of twenty-eight companies. As stated in the text, it was not strictly random, as any firm whose time-series did not extend at least twenty-two years into the past was excluded. However, it does provide a reasonably good cross-section of the types of firms that exist in Canada. The average length of the time-series was thirty years, although data was available from Inco Limited commencing in 1934, while Cominco Ltd. supplied seventy observations: annual reports were available from the fifth year of operation - 1911.

Table 8

List of Companies in the Sample,

and the Range of Observations Provided

Alcan Aluminium Limited	1949 to 1980
Brascan Limited	1947 to 1979
Calgary Power Ltd.	1949 to 1980
Canada Packers Inc.	1945 to 1981
Canadian Utilities Limited	1951 to 1980
Canron Inc.	1948 to 1980
C-I-L Inc.	1949 to 1980
Cominco Ltd.	1911 to 1980
The Consumers' Gas Company	1951 to 1979
Dome Mines Limited	1953 to 1980
Dominion Bridge Company, Limited	1951 to 1980
Dominion Foundries & Steel, Limited	1948 to 1980
Domtar, Inc.	1948 to 1980
Great Lakes Forest Products Limited	1951 to 1980
Hudson Bay Mining & Smelting Ltd.	1949 to 1980
Hudson Bay Oil & Gas Company Ltd.	1957 to 1980
Imperial Oil Limited	1943 to 1979
Inco Limited	1934 to 1980
Inland Natural Gas Co. Ltd.	1951 to 1980
Interprovincial Pipe Line Limited	1951 to 1980
MacMillan Bloedel Limited	1945 to 1980
Moore Corporation Limited	1950 to 1980
Noranda Mines Limited	1951 to 1980
Stelco Inc.	1949 to 1980
Texaco Canada Inc.	1956 to 1980
TransCanada PipeLines Limited	1956 to 1980
Trans Mountain Pipe Line Co. Ltd.	1951 to 1980
Westcoast Transmission Company Ltd.	1952 to 1980

Appendix II: The TROLL Models

The models used to test the hypotheses were formulated using TROLL (Time-Shared Reactive On-Line Laboratory), an econometrics package developed at the Massachusetts Institute of Technology (MIT). It is designed to allow general-type models to be developed (such as follows), and exact variables can be assigned or linked, to permit individual companies to be tested, within the same overall framework. Each of the models described shows the equations used to test the relationship of income and cash flows to 'CF1' -- the cash flow potential available for investors. It should be obvious that the remaining eight models were exactly the same; merely substitute 'CF2' and 'CF3' in the appropriate place to generate tests for the cash flow potential available to both investors and creditors (CF2) and the cash flow from operations (CF3) respectively. It should also be noted that the results detailed as Appendix III reference the equation number as designated herein.

MODEL: FLOWCF1

This model will test the linear form of cash flow flow prediction. It examines the cash flow potential to investors (CF1) using income before and after extraordinary items as the independent variable. As well, a trend factor (TRND) is introduced.

SYMBOL DECLARATIONS

ENDOGENOUS:
CF1

EXOGENOUS:
EI INC TRND

COEFFICIENT:
A1 B1 B2 B3 B4

EQUATIONS

```
1:    CF1 = A1 + B1 * INC(-1)

2:    CF1 = A1 + B1 * (INC(-1) + EI(-1))

3:    CF1 = A1 + B1 * INC(-1)  + B2 * INC(-2)

4:    CF1 = A1 + B1 * INC(-1)  + B2 * INC(-2)
               + B3 * INC(-3)

5:    CF1 = A1 + B1 * (INC(-1) + EI(-1))
               + B2 * (INC(-2) + EI(-2))

6:    CF1 = A1 + B1 * (INC(-1) + EI(-1))
               + B2 * (INC(-2) + EI(-2))
               + B3 * (INC(-3) + EI(-3))

7:    CF1 = A1 + B1 * INC(-1)  + B4 * TRND
```

```
 8:      CF1 = A1 + B1 * (INC(-1) + EI(-1))
                  + B4 * TRND

 9:      CF1 = A1 + B1 * INC(-1) + B2 * INC(-2)
                  + B4 * TRND

10:      CF1 = A1 + B1 * INC(-1) + B2 * INC(-2)
                  + B3 * INC(-3) + B4 * TRND

11:      CF1 = A1 + B1 * (INC(-1) + EI(-1))
                  + B2 * (INC(-2) + EI(-2))
                  + B4 * TRND

12:      CF1 = A1 + B1 * (INC(-1) + EI(-1))
                  + B2 * (INC(-2) + EI(-2))
                  + B3 * (INC(-3) + EI(-3))
                  + B4 * TRND
```

MODEL: CF1.REAL

This model will test the linear form of cash flow prediction. It examines the cash flow potential to investors (CF1) in real terms by means of the GNE Implicit Price Deflator. Income before and after extraordinary items serves as the independent variable. A trend factor (TRND) is introduced.

SYMBOL DECLARATIONS

ENDOGENOUS:
CF1

EXOGENOUS:
EI INC P TRND

COEFFICIENT:
A1 B1 B2 B3 B4

EQUATIONS

```
 1:    CF1/P = A1 + B1 * INC(-1)/P

 2:    CF1/P = A1 + B1 * (INC(-1)/P + EI(-1)/P)

 3:    CF1/P = A1 + B1 * INC(-1)/P
                  + B2 * INC(-2)/P

 4:    CF1/P = A1 + B1 * INC(-1)/P
                  + B2 * INC(-2)/P
                  + B3 * INC(-3)/P

 5:    CF1/P = A1 + B1 * (INC(-1)/P + EI(-1)/P)
                  + B2 * (INC(-2)/P + EI(-2)/P)

 6:    CF1/P = A1 + B1 * (INC(-1)/P + EI(-1)/P)
                  + B2 * (INC(-2)/P + EI(-2)/P)
                  + B3 * (INC(-3)/P + EI(-3)/P)

 7:    CF1/P = A1 + B1 * INC(-1)/P + B4 * TRND

 8:    CF1/P = A1 + B1 * (INC(-1)/P + EI(-1)/P)
                  + B4 * TRND

 9:    CF1/P = A1 + B1 * INC(-1)/P
                  + B2 * INC(-2)/P
                  + B4 * TRND

10:    CF1/P = A1 + B1 * INC(-1)/P
                  + B2 * INC(-2)/P
                  + B3 * INC(-3)/P + B4 * TRND

11:    CF1/P = A1 + B1 * (INC(-1)/P + EI(-1)/P)
                  + B2 * (INC(-2)/P + EI(-2)/P)
                  + B4 * TRND

12:    CF1/P = A1 + B1 * (INC(-1)/P + EI(-1)/P)
                  + B2 * (INC(-2)/P + EI(-2)/P)
                  + B3 * (INC(-3)/P + EI(-3)/P)
                  + B4 * TRND
```

MODEL: CASHCF1

This model will test the linear form of cash flow flow prediction. It examines the cash flow potential to investors (CF1) using the lagged endogenous variable - CF1 - as the 'independent' variable. As well, a trend factor (TRND) is introduced.

SYMBOL DECLARATIONS

ENDOGENOUS:
CF1

EXOGENOUS:
TRND

COEFFICIENT:
A1 B1 B2 B3 B4

EQUATIONS

```
1:    CF1 = A1 + B1 * CF1(-1)

2:    CF1 = A1 + B1 * CF1(-1) + B2 * CF1(-2)

3:    CF1 = A1 + B1 * CF1(-1) + B2 * CF1(-2)
               + B3 * CF1(-3)

4:    CF1 = A1 + B1 * CF1(-1) + B4 * TRND

5:    CF1 = A1 + B1 * CF1(-1) + B2 * CF1(-2)
               + B4 * TRND

6:    CF1 = A1 + B1 * CF1(-1) + B2 * CF1(-2)
               + B3 * CF1(-3) + B4 * TRND
```

MODEL: CASH1.RE

This model will test the linear form of cash flow prediction. It examines the cash flow potential to investors (CF1) in real terms by means of the GNE Implicit Price Deflator. It uses the lagged endogenous variable - CF1 - as the 'independent' variable. A trend factor (TRND) is introduced.

SYMBOL DECLARATIONS

ENDOGENOUS:
CF1

EXOGENOUS:
P TRND

COEFFICIENT:
A1 B1 B2 B3 B4

EQUATIONS

```
1:    CF1/P = A1 + B1 * CF1(-1)/P

2:    CF1/P = A1 + B1 * CF1(-1)/P
                 + B2 * CF1(-2)/P

3:    CF1/P = A1 + B1 * CF1(-1)/P
                 + B2 * CF1(-2)/P
                 + B3 * CF1(-3)/P

4:    CF1/P = A1 + B1 * CF1(-1)/P
                 + B4 * TRND

5:    CF1/P = A1 + B1 * CF1(-1)/P
                 + B2 * CF1(-2)/P
                 + B4 * TRND

6:    CF1/P = A1 + B1 * CF1(-1)/P
                 + B2 * CF1(-2)/P
                 + B3 * CF1(-3)/P
                 + B4 * TRND
```

Appendix III: Study Results

As detailed in Chapter 4 of this study, the results contained herein were obtained from a series of regression models that utilized an ordinary least squares procedure. No correction was made for serial correlation, and the results were compared in pairs: cash flow to cash flow, income to cash.

These results have been summarized and presented in the following tables. For each company, information provided includes the cash flow estimated, the equation number that best predicts this cash flow, the standard error of the estimate, and the R^2 for each regression.

Consider Alcan Aluminium Limited as an example. The estimation of CF1 (cash flow to investors) required that twelve equations be examined, wherein past reported accounting income served as the independent variable. Of these twelve, equation #4 exhibited the lowest standard error of the estimate. When this examination was repeated using past cash flows as the independent variable, six equation were used. Equation number four also (in this case) displayed the lowest standard error of the estimate.

The results for prediction of CF1 -- cash flow to investors -- were then compared, as the table reveals. We see that when income is the predictor, equation #4 'best' fullfills our needs, and the results yield an R^2 of 0.73051, and a standard error of the estimate of 3.01×10^4.

The results from the regression models that utilized past cash flows as the independent variable show that equation #4 'best' fullfills our needs, and the results yield an R^2 of 0.20691, and a standard error of the estimate of 5.46×10^4.

Therefore, we examine the results of our two prediction models. We observe that for CF1 and Alcan Aluminium Limited, past reported accounting income is a better predictor of future cash flows than is past cash flows. This process was repeated for all six postulated cash flows, and all twenty-eight companies.

Alcan Aluminium Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	3.01 E04	0.73051	04	5.46 E04	0.20691
CF2	08	6.30 E04	0.02753	01	6.51 E04	-0.03448
CF3	04	6.30 E04	0.79880	05	7.48 E04	0.72616
CF1/P	04	384.2990	0.29391	04	473.2160	-0.03115
CF2/P	08	655.0960	0.07099	04	655.8960	0.00349
CF3/P	03	596.8350	0.23274	04	652.9000	0.12904

Alcan Aluminium Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	3.01 E04	0.73051	04	5.46 E04	0.20691
CF2	08	6.30 E04	0.02753	01	6.51 E04	-0.03448
CF3	04	6.30 E04	0.79880	05	7.48 E04	0.72616
CF1/P	04	384.2990	0.29391	04	473.2160	-0.03115
CF2/P	08	655.0960	0.07099	04	655.8960	0.00349
CF3/P	03	596.8350	0.23274	04	652.9000	0.12904

Calgary Power Ltd.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	01	2.79 E04	0.56873	05	3.26 E04	0.42837
CF2	07	4.01 E04	0.57670	06	3.56 E04	0.67452
CF3	10	6.40 E03	0.98553	03	1.38 E04	0.93408
CF1/P	01	165.9810	0.44438	05	178.2530	0.37886
CF2/P	09	216.1440	0.52387	06	198.1460	0.60807
CF3/P	04	63.7166	0.92739	04	95.0860	0.83753

Brascan Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	06	2.38 E04	0.82512	06	3.11 E04	0.70961
CF2	01	2.31 E05	0.01858	02	2.20 E05	0.14031
CF3	03	1.57 E05	0.22637	03	1.71 E05	0.11433
CF1/P	11	205.1470	0.54664	05	268.0120	0.25377
CF2/P	02	1.34 E03	-0.03254	02	1.33 E03	0.00737
CF3/P	03	1.02 E03	0.04011	01	1.07 E03	-0.02639

Canada Packers Inc.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	2.00 E03	0.54588	04	2.29 E03	0.41096
CF2	12	2.84 E03	0.37342	04	3.35 E03	0.09694
CF3	11	3.06 E03	0.85945	04	4.44 E03	0.71088
CF1/P	02	21.0742	0.04665	04	22.1035	-0.01675
CF2/P	06	27.6874	0.38026	05	26.9983	0.12794
CF3/P	11	31.3455	0.43051	04	37.8876	0.18461

Canadian Utilities Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	02	1.54 E04	0.09800	06	1.36 E04	0.32083
CF2	02	3.33 E04	0.54935	06	3.95 E04	0.38425
CF3	06	1.43 E04	0.78296	03	1.71 E04	0.69694
CF1/P	07	123.9900	0.06842	06	112.0100	0.26852
CF2/P	08	317.7300	0.18742	05	315.3880	0.22522
CF3/P	11	111.3270	0.78296	05	118.7830	0.52090

C-I-L Inc.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	1.20 E04	0.40815	01	1.62 E04	-0.03891
CF2	06	1.74 E04	0.22134	05	1.92 E04	0.08502
CF3	02	1.36 E03	0.61933	04	1.74 E04	0.40014
CF1/P	04	118.0500	0.03727	04	124.3870	-0.03152
CF2/P	01	176.2050	0.03505	01	181.1020	0.01811
CF3/P	01	137.1990	0.11566	03	144.6720	0.00707

Canron Inc.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	05	3.19 E03	0.22898	06	3.16 E03	0.26721
CF2	01	6.02 E03	-0.02716	03	5.60 E03	0.13606
CF3	07	6.08 E03	0.20556	06	5.60 E03	0.34188
CF1/P	05	27.9100	0.10767	04	28.0519	0.12821
CF2/P	08	55.4495	0.02881	01	56.5037	0.01199
CF3/P	11	57.6754	-0.01340	04	59.0326	-0.02906

Cominco Ltd.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	10	2.05 E04	0.33426	06	2.06 E04	0.33261
CF2	10	2.57 E04	0.31856	03	3.00 E04	0.08338
CF3	10	3.02 E04	0.60956	06	2.92 E04	0.63882
CF1/P	02	190.8220	0.15602	02	201.6080	0.05850
CF2/P	11	285.3430	0.04437	04	276.6840	0.10797
CF3/P	08	246.4900	0.37616	04	256.8670	0.32252

The Consumers' Gas Company

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	06	1.61 E04	0.31131	04	1.79 E04	0.18603
CF2	06	2.24 E04	0.22256	04	2.40 E04	0.11731
CF3	05	1.75 E04	0.54747	06	1.57 E04	0.64208
CF1/P	10	139.3860	0.43995	04	175.8990	0.14378
CF2/P	12	222.8220	0.14468	03	227.9870	0.11253
CF3/P	05	170.0120	0.27629	06	156.6900	0.39655

Domes Mines Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	06	7.30 E03	0.78927	04	9.56 E03	0.65125
CF2	06	9.77 E03	0.27487	04	1.08 E04	0.14809
CF3	10	7.71 E03	0.96650	03	9.54 E03	0.95045
CF1/P	01	51.3592	0.59957	05	64.8426	0.38665
CF2/P	05	59.0269	0.15612	04	64.6914	0.02971
CF3/P	04	65.1168	0.89384	06	83.8893	0.82925

Dominion Foundries and Steel, Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	05	4.22 E04	0.06516	05	2.51 E04	0.68069
CF2	08	5.81 E04	0.02828	06	5.20 E04	0.24855
CF3	01	4.08 E04	0.43953	05	3.75 E04	0.53803
CF1/P	12	224.5920	0.10801	05	184.3130	0.41365
CF2/P	08	367.7660	0.03401	05	345.2810	0.17745
CF3/P	01	251.1380	0.29638	06	259.2980	0.27055

Dominion Bridge Company, Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	10	1.43 E04	0.36583	06	7.59 E03	0.82763
CF2	10	2.65 E04	0.34974	06	2.23 E04	0.55918
CF3	10	1.36 E04	0.41468	06	1.38 E04	0.41249
CF1/P	09	91.7256	0.12647	06	72.3668	0.47719
CF2/P	03	163.9710	0.14266	06	148.9100	0.31682
CF3/P	10	89.4608	0.16437	04	92.6879	0.13723

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Domtar Inc.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	02	2.03 E04	0.39758	06	2.34 E04	0.22076
CF2	07	2.94 E04	0.02174	04	3.02 E04	-0.00063
CF3	09	1.77 E04	0.73440	05	2.05 E04	0.64687
CF1/P	08	225.1530	0.14315	06	228.3250	0.14762
CF2/P	07	352.8080	0.02060	04	359.1560	0.01839
CF3/P	10	191.2510	0.41896	04	208.3880	0.31377

Great Lakes Forest Products Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	06	1.10 E04	0.50358	04	8.86 E03	0.69281
CF2	05	1.91 E04	0.26957	06	1.83 E04	0.35688
CF3	12	1.30 E04	0.73575	06	2.12 E04	0.31288
CF1/P	06	64.4068	0.31372	01	53.8168	0.53928
CF2/P	05	145.5900	0.01321	03	146.3894	0.03050
CF3/P	12	95.0147	0.53772	06	114.5870	0.29779

Hudson Bay Oil and Gas Company Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	1.00 E04	0.79774	05	1.53 E04	0.54007
CF2	02	2.69 E04	-0.04764	01	2.71 E04	-0.00815
CF3	09	3.13 E04	0.83960	03	3.64 E04	0.78858
CF1/P	01	87.9859	0.46670	04	90.7243	0.43809
CF2/P	07	235.6360	0.03128	01	240.0530	0.04238
CF3/P	01	267.1910	0.49444	06	283.9900	0.43401

Hudson Bay Mining and Smelting Co., Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	01	1.10 E04	-0.01333	05	1.08 E04	0.04528
CF2	07	3.08 E04	0.21572	05	2.93 E04	0.30937
CF3	10	2.84 E04	0.32060	06	3.02 E04	0.26032
CF1/P	07	77.8488	0.26323	05	79.7229	0.21619
CF2/P	07	203.5790	0.32154	05	189.9800	0.41626
CF3/P	03	198.0450	0.16955	03	214.8680	0.05693

Imperial Oil Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	10	3.42 E04	0.70468	05	3.51 E04	0.69150
CF2	10	5.57 E04	0.22573	01	6.53 E04	-0.03216
CF3	10	5.99 E04	0.78496	04	6.97 E04	0.70931
CF1/P	07	340.5270	0.49302	04	356.6880	0.44418
CF2/P	07	522.2380	0.14655	01	551.3510	0.07669
CF3/P	07	486.3990	0.57540	04	496.6940	0.55197

Inco Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	12	4.44 E04	0.37616	04	5.67 E04	0.00582
CF2	12	6.86 E04	0.49137	06	8.19 E04	0.29092
CF3	12	5.64 E04	0.62388	05	5.65 E04	0.62751
CF1/P	12	379.7700	0.24011	02	413.3230	0.04650
CF2/P	10	636.6460	0.26147	05	642.5774	0.02942
CF3/P	12	460.4530	0.37482	06	529.2610	0.25255

Inland Natural Gas Co. Ltd.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	01	2.68 E03	0.14451	06	2.69 E03	0.17216
CF2	07	6.19 E03	0.01824	04	6.30 E03	0.02043
CF3	04	3.24 E03	0.57896	05	3.43 E03	0.53582
CF1/P	02	21.8195	0.17927	04	23.0557	0.12138
CF2/P	02	80.7579	0.03633	04	82.2527	0.03875
CF3/P	04	25.1133	0.25427	06	24.5040	0.29131

Interprovincial Pipe Line Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	08	4.30 E03	0.88022	05	4.51 E03	0.86190
CF2	04	3.33 E04	0.35182	02	3.75 E04	0.18331
CF3	04	1.88 E04	0.62089	05	1.99 E04	0.58139
CF1/P	06	30.1810	0.74539	06	24.5205	0.79125
CF2/P	04	301.8740	0.15072	02	288.1040	0.18818
CF3/P	01	202.0690	0.17430	05	209.3160	0.14624

MacMillan Bloedel Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	2.55 E04	0.30925	04	3.15 E04	-0.02358
CF2	05	3.60 E04	-0.01450	01	3.71 E04	-0.01395
CF3	10	2.82 E04	0.68628	06	3.10 E04	0.62704
CF1/P	03	318.8520	0.20472	01	369.6380	-0.03444
CF2/P	02	446.7720	-0.03051	01	450.8840	0.02000
CF3/P	07	279.0730	0.49180	05	350.5810	0.20976

Moore Corporation Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	03	6.61 E03	0.77806	05	7.85 E03	0.69110
CF2	10	2.30 E04	0.25063	04	2.64 E04	0.05225
CF3	06	1.37 E04	0.76716	04	1.72 E04	0.55197
CF1/P	01	63.2128	0.46524	04	69.4123	0.36803
CF2/P	07	200.3150	-0.02223	01	204.5704	-0.02663
CF3/P	07	107.4490	0.44050	04	109.6340	0.40204

Noranda Mines Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	09	4.00 E04	0.25462	03	3.53 E04	0.44179
CF2	12	5.92 E04	0.48499	05	5.85 E04	0.51330
CF3	04	3.06 E04	0.87923	05	6.46 E04	0.47525
CF1/P	12	236.0060	0.35578	05	266.7270	0.20878
CF2/P	11	416.1660	0.39019	05	367.3970	0.54092
CF3/P	04	253.9310	0.68739	05	354.1230	0.40570

Stelco Inc.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	12	4.62 E04	0.23200	06	3.97 E04	0.45440
CF2	09	4.27 E04	0.66991	05	6.47 E04	0.26368
CF3	08	4.23 E04	0.41485	05	4.91 E04	0.22513
CF1/P	12	301.9780	0.11874	03	289.9290	0.21852
CF2/P	12	419.3760	0.18305	05	430.7550	0.15519
CF3/P	12	408.6200	0.03462	01	427.1730	-0.03978

Texaco Canada Inc.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	04	5.63 E03	0.94354	06	4.51 E03	0.96504
CF2	08	3.58 E04	0.11691	06	3.35 E04	0.26146
CF3	11	3.69 E04	0.79775	06	3.24 E04	0.85066
CF1/P	03	49.4981	0.77716	03	43.3258	0.83570
CF2/P	07	259.4170	0.04479	06	260.8470	0.08237
CF3/P	05	256.1670	0.59990	03	270.5810	0.57583

TransCanada PipeLines Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	10	3.34 E04	0.35014	05	4.09 E04	0.07297
CF2	04	1.09 E05	0.12723	03	1.03 E05	0.25961
CF3	11	1.11 E04	0.94672	05	1.50 E04	0.89831
CF1/P	01	355.8740	0.04380	04	370.6470	0.01406
CF2/P	08	821.1630	-0.01313	03	786.9224	0.07757
CF3/P	11	97.2383	0.85844	04	104.0510	0.78677

Trans Mountain Pipe Line Company Ltd.

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	08	2.38 E03	0.60438	05	2.49 E03	0.52370
CF2	06	8.10 E03	0.31772	04	7.34 E03	0.23992
CF3	02	5.28 E03	0.46633	02	4.22 E03	0.32330
CF1/P	01	35.3514	0.27529	02	35.7802	0.20994
CF2/P	04	107.1280	0.29030	01	101.5410	0.10904
CF3/P	02	72.2028	0.37985	05	55.7777	0.22273

Westcoast Transmission Company Limited

Which Cash Flow	Predictor is Income: Eq No	Standard Error of Estimate	R-square	Predictor: Cash Flow: Eq No	Standard Error of Estimate	R-square
CF1	07	1.78 E04	0.16814	06	1.93 E04	0.06758
CF2	04	3.91 E04	0.30908	04	4.65 E04	0.05154
CF3	01	2.29 E04	0.59136	04	2.57 E04	0.49364
CF1/P	07	138.1450	0.04325	03	142.1970	0.03096
CF2/P	10	285.3760	0.37992	01	376.9150	-0.05451
CF3/P	01	134.2470	0.48038	05	138.2810	0.45098

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