

Properties of Accrual Income, Cash Flow and Security Return: An Interpretive Exercise

The objective of this exercise is to illustrate some inherent benefits of accrual accounting. The assignment examines the smoothing and aggregation properties of accrual income and shows how these properties relate accrual income to cash flows and market returns. The exercise helps demonstrate that accrual income has lower variance, higher correlation with returns and higher predictive ability for returns than cash flow from operations. The analysis also highlights the aggregation property—over long time periods, aggregate accrual income, cash flow and returns capture the same total information. After completing this exercise, you should have some appreciation for the benefits of accrual accounting income. These benefits may explain why accrual accounting continues to be so extensively used. While the exercise analyzes the data for Kmart, it is important to note that the results and conclusions are representative of the population of firms listed on the New York and American Stock Exchanges (see, for example, Easton et al. [1992] and Fellingham et al. [1995]).

Overview

An objective of financial accounting is to provide decision makers with useful information to assess the amount, timing and uncertainty of future cash flows (see Statement of Financial Accounting concepts No.1, Objectives of Financial Reporting by Business Enterprises, FASB [1978]). Income measurement is central to achieving this objective. Accrual accounting principles of realization and matching are used to obtain an income number that matches effort (expense) and accomplishment (revenue). Traditional accounting academics believe that accrual accounting income provides more useful information about a firm's current as well as future performance relative to cash flow information. On the other hand, many finance practitioners and academics regard cash flow information as more meaningful and relevant in measuring value. Accrual accounting is criticized for its inherent subjectivity and potential for manipulation caused by the recognition, estimation and measurement criteria used in income determination.

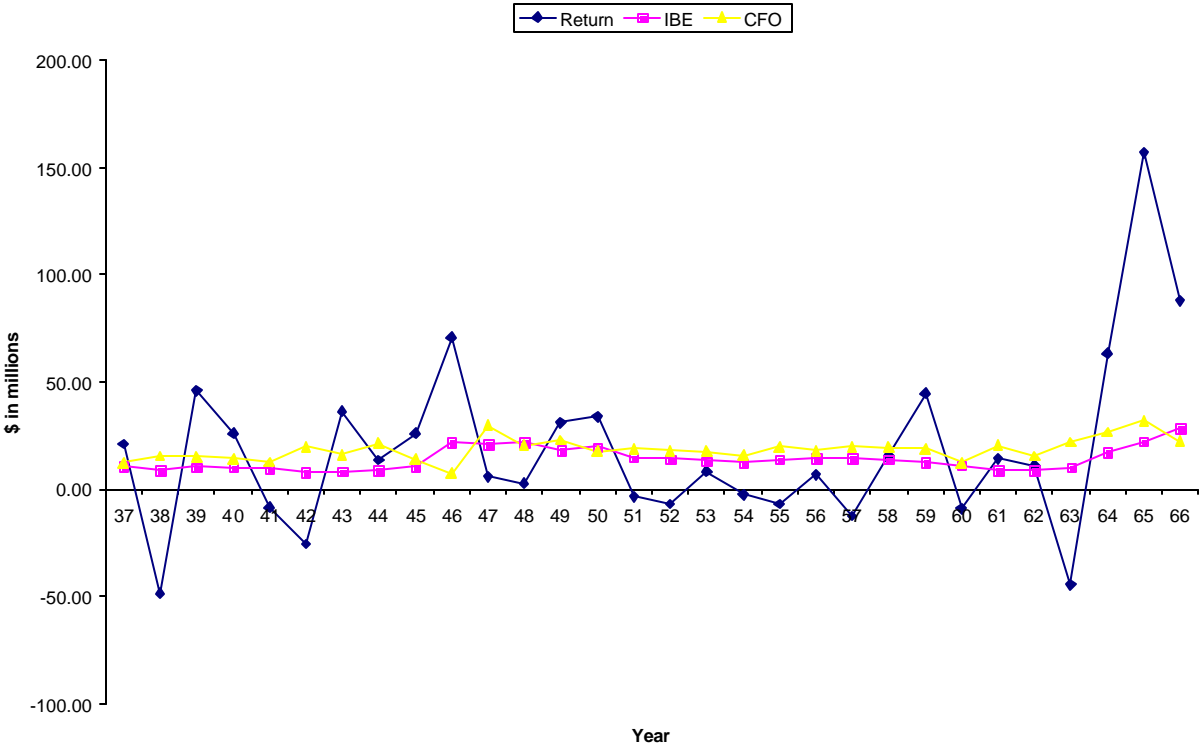
Despite its susceptibility to bias and manipulation, accrual accounting has stood the test of time as a useful income determination method. This is further evidenced by the fact that financial analysts generally forecast accrual income and not cash flow. The analysis of Kmart data is intended to shed some light on why accrual accounting may be so popular.

The analysis reveals that the accrual process produces a consistently smoother income number which is a better measure of economic income than cash flow, and which is also a better predictor of future performance than cash flow. The smoothing property encompasses the characteristics of relevance, predictive ability, and representational faithfulness identified by the Statement of Financial Accounting concepts No.2, Qualitative Characteristics of Accounting Information (FASB 1980). The exercise also focuses on the aggregation property of accounting: aggregating accrual income and cash flows over long time periods increases their correlation with aggregate economic income. Underlying this property is the inherent conservatism in accounting that allows economic events to be recognized only when the transaction is complete, and thus creates a lag in income measurement relative to market returns. When accrual income, cash flows and economic income (market return) are aggregated over long time periods, the recognition lags become relatively less important and accounting numbers better match economic income.

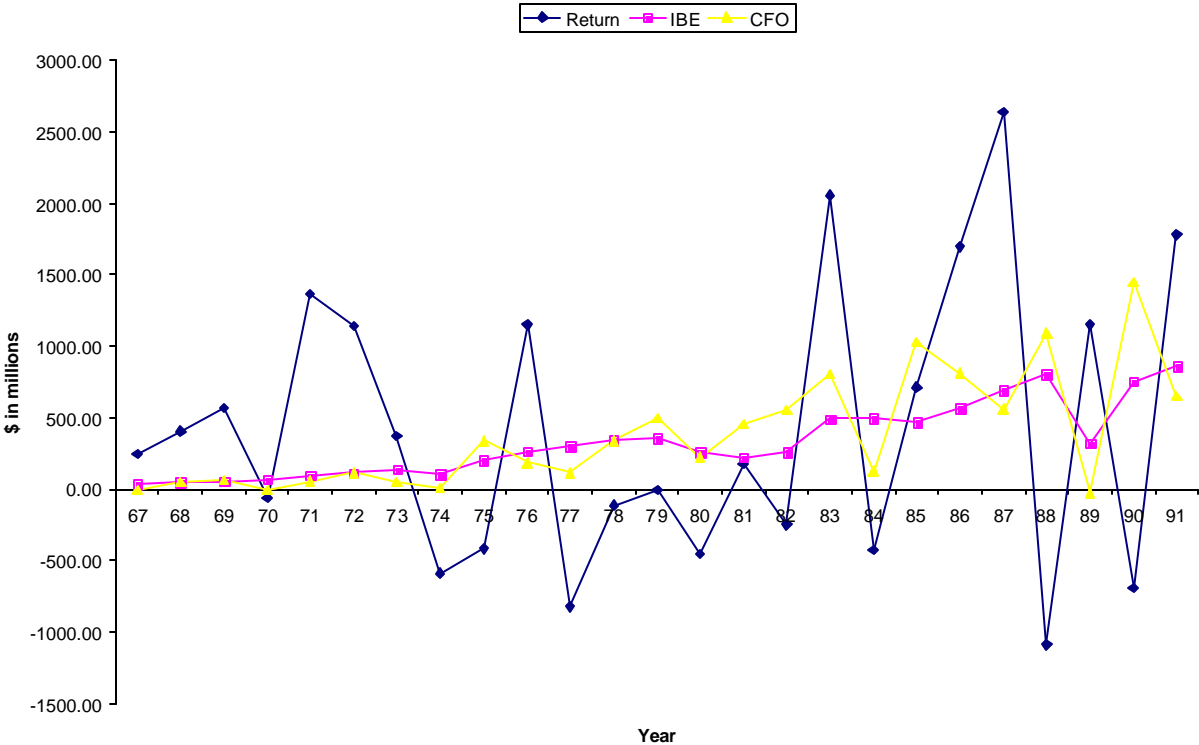
While the inherent characteristics of accrual income make it a more relevant measure of operating performance in general, the cash flow number has its own role to play as a quality check on the income number. The trend in operating cash flows can be a useful indicator of future performance. In particular, trends in accrual income and cash flow in opposite directions may raise a red flag warranting more in-depth analysis. Thus, the accrual income number and the cash flow number complement each other in providing a useful measurement of performance and future value prediction.

1. Plots of Time Series – Figure 1

(A) 1937-1966



(B) 1967-1991



2. Accrual Income vs. Operating Cash Flow

Data for returns are shown here, although not required. The means are provided as a benchmark.

	Δ RETURN	Δ IBE	Δ CFO
Mean	32.63	15.71	11.83
Standard Deviation	1,016.83	100.88	341.29
Variance	1,033,943.42	10,175.85	116,480.99

The variance of change in accrual income is lower than the variance of change in operating cash flow. This highlights the smoothing property of accrual accounting. By applying the matching principle, accrual accounting produces a smoother series, as opposed to peaks and troughs produced by cash accounting. The graph plotted in question 1 also demonstrates the smoothing attribute of accrual accounting income.

Further, figure 1 shows that when accrual income and cash flows diverge in one period, they tend to move toward each other in the next period. This convergence phenomenon makes sense when one considers the major components that make up the difference between accrual income and operating cash flows. While depreciation remains relatively constant over time, the difference caused by changes in current assets and current liabilities tends to vary considerably from year to year. Operating cash flow and accrual income move toward each other as changes in current accruals reverse in subsequent periods.

The smoothing property (and the convergence attribute) that is evident in Kmart's data, holds for the majority of NYSE, AMEX and OTC firms. This property is both theoretically derived and empirically verified by Fellingham et al. (1995).

3. Net Income and Returns vs. Operating Cash Flow and Returns

a. The difference between accrual income and returns is less than the difference between cash flow and returns (in absolute terms) 34 out of 55 times or for 61.8 percent of the observations. This percentage is significantly higher (at the 10 percent level) than what one would obtain by chance (that is, 50 percent). (Using a normal approximation of the binomial probabilities, the implied t-statistic (of 1.75) is calculated as $(34 - .5N) / .5 \sqrt{N}$, where N is the number of observations.)

b. Correlations: (55 observations)

Pearson (Spearman rank) correlation reported above (below) the diagonal.

	RETURN	IBE	CFO
RETURN	1.00	.32	.18
IBE	.14	1.00	.86
CFO	.09	.70	1.00

IBE has a higher correlation with RETURN than CFO. The results in (a) and (b) suggest that accrual income may be a better predictor of market returns than operating cash flow.

c. Accrual accounting income has lower variance than returns (standard deviation of 231.18 vs. 686.31). The low variance property has implications for predictions of future income and returns.

4. Predictions

a. Univariate time-series predictions:

	RETURN	IBE	CFO
Random Walk Model			
Actual realizations (1991)	1,783	859	651
Prediction (1990 numbers)	-691	756	1,449
Prediction error ^a			
(Actual — predicted)	2,474	103	-798
%error (Actual—predicted)/Actual	139%	12%	-123%
Random Walk Plus Drift Model			
Actual realizations (1991)	1,783	859	651
Prediction:			
1990 numbers	-691	756	1,449
Drift (average change in variable over last 5 years)	-281	57	84
	-972	813	1,533
Prediction error ^a	2,755	46	-882
% error	155%	5%	-136%

^a Positive (negative) errors are under- (over-) estimates.

Using either the random walk or the random walk plus drift models, the prediction error is the lowest for accrual income. Again, this emphasizes that the smoother the series, the easier it is to predict.

b. Using Value Line analysts' forecast of earnings at the beginning of 1991, the prediction error for accrual income is \$89 (10 percent) [\$859 (actual) - \$770 (predicted)]. This percentage is comparable to the prediction errors from naive models like the random walk or the random walk plus drift. The Value Line cash flow forecast at the beginning of 1991 is \$1,310, which results in a prediction error of -\$659 (-101 percent). The percentage of analysts' prediction error for cash flow is also comparable to prediction errors from the two naive models reported above. Again, even using analysts' forecasts, the prediction errors are significantly lower for accrual income than they are for cash flow.

c. Accrual Income as Predictor of Operating Cash Flow and Returns:

If 1990 accrual income is used to predict returns of 1991, the prediction error for RETURN is \$1,027 (58 percent) [\$1,783 (actual) - \$756 (predicted)], considerably lower than the 139 percent error obtained when current returns were used as predictors of future returns. Similarly, if 1990 accrual income is used to predict operating cash flow of 1991, the prediction error for cash flow

is -\$105 (-16 percent) [\$651 (actual) - \$756 (predicted)], considerably lower than the -123 percent error obtained when current operating cash flow was used as a predictor of future cash flow. This highlights the value of accrual accounting income in predicting future cash flows and returns. This result is consistent with a study by Finger (1994) who demonstrates the superior predictive ability of accrual income for future earnings and operating cash flows for 50 *Fortune* 500 firms.'

5. Correlations of Aggregate Data

a. Correlations of annual series: (55 observations)

Pearson (Spearman) correlation reported above (below) the diagonal.

	RETURN	CI	FCF
RETURN	1.00	.27	.10
CI	.12	1.00	.54
FCF	.16	.23	1.00

b.

(i) Correlations of 5-year aggregates: (11 groups of 5 years)

Pearson (Spearman) correlation reported above (below) the diagonal.

	RETURN	CI	FCF
RETURN	1.00	.64	.79
CI	.57	1.00	.83
FCF	.46	.69	1.00

(ii) Correlations of 11-year aggregates: (5 groups of 11 years)

Pearson (Spearman) correlation reported above (below) the diagonal.

	RETURN	CI	FCF
RETURN	1.00	.95	.98
CI	.90	1.00	.94
FCF	.90	.70	1.00

These indicate that the correlation of comprehensive accrual income with returns and free cash flow increases as the variables are aggregated over longer periods. This highlights the aggregation property of accrual accounting. Comprehensive income (CI) is used instead of IBE to demonstrate the aggregation property, since CI accounts for all changes in operating assets and liabilities as income (even if these items are directly adjusted to owners' equity, for example, foreign currency translation adjustments). Over the lifetime of the firm, lifetime accounting

earnings are measured by CI not IBE. Similarly, we use free cash flow (FCF) instead of operating cash flow, because operating cash flow excludes investment flows that must be expensed over the lifetime of the firm.

Consider the correlation between accrual income and returns. Timing differences in accounting recognition of events distorts the relation between accrual income and returns. The accounting process records economic events only when transactions are completed, whereas security prices reflect events as soon as they occur. Hence, the inherent conservatism in accounting leads to lags in accounting recognition of income (or timing differences). As earnings are aggregated, the effect of timing differences diminishes, until, for very large aggregation periods (and surely over the lifetime of a firm), they match perfectly with returns.

Consider the correlation between accrual income and free cash flow. The difference between the two variables is accounting accruals. As the aggregation period increases the effect of accruals diminishes and accrual income and free cash flow get closer. This point is clear when one considers noncurrent accruals. Over the useful life of a fixed asset, accrual income accounts for the full depreciation on the asset, which has already been reduced from free cash flow at the time the investment is made. In the case of current accruals, changes in current assets and current liabilities fluctuate considerably from year to year, but average out over time, thus closing the gap between aggregate accrual income and aggregate free cash flow.

The above is intuitively obvious—when one looks at a sufficiently long time period, cash is the only thing that matters. Earnings, returns and cash flows are all equivalent.