Information in the Time-Series Dynamics of Earnings Management: Evidence from Insider Trading and Firm Returns

Yael V. Hochberg, Yigal S. Newman, and Michael A. Rierson

August 9, 2004

ABSTRACT

We demonstrate that the time-series dynamics of traditional measures of earnings management contain considerable information about the informativeness, or "quality," of reported corporate earnings. We find that both accruals and discretionary accruals exhibit negative serial autocorrelation. On the basis of this finding, we hypothesize that the longer a firm exhibits abnormally high earnings management, the less informative that firm's reported earnings are. Insider trading patterns and the patterns of ex-post firm equity returns confirm our hypothesis. We discuss implications for market rationality.

JEL classification: G14, G39, M41.

[†]Hochberg (corresponding author) is at the Johnson School of Management, Cornell University, Ithaca, New York. Newman is at Dimensional Fund Advisors, Santa Monica, California. Rierson is at CitiGroup's Global Equities, New York City, New York. Email addresses: yael.hochberg@johnson.cornell.edu, yigal.newman@dfafunds.com, and michael.a.rierson@citigroup.com. We thank Anat Admati, Mary Barth, Peter DeMarzo, Darrell Duffie, Steve Grenadier, Harrison Hong, Ming Huang, Ron Kasznik, Charles Lee, Paul Pfleiderer, Jeff Zwiebel, and seminar participants at Stanford University, Tel Aviv University and the Financial Management Association Annual Meetings for helpful comments. All remaining errors and omissions are our own. The views expressed herein are those of the authors, and do not necessarily represent the views of their respective employers. The bulk of this study was completed while all three authors were at the Graduate School of Business, Stanford University.

1. Introduction

Generally Accepted Accounting Principles, or GAAP, allow managers to adjust the accounting standards under which earnings are reported. The practice of adjusting accounting standards in order to guide reported earnings up or down is commonly referred to as "earnings management." A central task for investors is to understand how informative managed earnings are of the true economic state of the reporting firm. Existing literature tends to focus on static measures of earnings management. This paper demonstrates that these static measures may be biased, and that considerable information about the informativeness, or "quality," of corporate earnings is contained within the time-series dynamics of these traditional measures of earnings management. We conjecture that the number of consecutive quarters in which a firm aggressively manages its earnings upwards is a negative signal about the informativeness of its reported earnings. We find empirical support for this hypothesis in firms' *ex-post* excess equity returns and in the pattern of trades of the firms' insiders.

Beneish (2001) argues that accruals – the difference between a firm's reported earnings and its cash flows – is the component of earnings that is most sensitive to managerial discretion over accounting standards. Many models in the accounting literature proxy for a firm's level of earnings management by estimating the portion of its reported accruals resulting from managerial discretion. We follow the recent convention in this literature and estimate "discretionary accruals" using the modified Jones (1991) model. (See Appendix A.) These discretionary accruals proxy for the degree to which a firm manages its earnings up or down.[1] In contrast to most of this literature, we measure discretionary accruals on a quarterly, rather than annual, level. This yields a more precise reading of the time-series dynamics of earnings management, since the quarterly variation is not masked by annual aggregation.

[1]High levels of accruals are not necessarily evidence that managers are attempting to distort or inflate reported earnings. Accruals may be abnormally high in reflection of some positive development within the firm that has yet to be reflected in its cash flows.

To motivate our focus on time series, rather than on static levels, we argue in Section 3.1 that the basic mechanics of GAAP accounting induce negative autocorrelation in firm accruals. Over the long run, cumulative accruals and cumulative cash flows must reconcile, and thus cumulative accruals eventually must equal zero.[2] Positive changes in accruals must therefore be offset by future negative accruals, and negative changes in accruals must be offset by future positive accruals. Accruals can remain positive as long as the firm's growth rate generates a sufficiently large amount of incremental positive accruals each period. Most firms, however, cannot grow at accelerated rates forever. Eventually, cash flows overtake earnings, and the firm will book negative accruals. Negative autocorrelation is thereby inherent in accruals.

In Section 3.1, we demonstrate how the basic mechanics of accrual accounting, as stipulated by Generally Accepted Accounting Practices (GAAP), generate a negative autocorrelation in accruals. In Section 3.2, we confirm this observation empirically by estimating an autoregressive model of accruals. In Section 3.3, we use a reduced-form model that relates discretionary accruals to accruals to show that ignoring the negative autocorrelation component of accruals leads to measured discretionary accruals that are biased and negatively autocorrelated. (Nevertheless, the measured discretionary accruals are positively correlated with the "true" discretionary accruals.) In Section 3.2, we confirm this observation empirically by estimating an autoregressive model of discretionary accruals. Thus, it is reasonable to expect that considerable information can be extracted from examining the time-series dynamics of discretionary accruals, rather than through standard static measures.

For example, consider two firms, A and B, that begin operating in the same industry at the same time, and are of equal size. On the first quarter of their operation, firm A reports no discretionary accruals, while firm B reports discretionary accruals of 100 units. On the second quarter of their operation, both firms report discretionary accruals of 100 units. If discretionary accruals

[2] This statement does not suffer from survival bias. When a firm ceases to operate, it must write-off any accumulated accruals as part of "closing its books."

are negatively autocorrelated, it is likely to assume that, on the second quarter, managers in firm B managed their firm's earnings more than did the managers in firm A. The second-quarter accruals of firm B were subject to the negative "pull" of the 100 units of discretionary accruals that firm B booked in the first quarter. The second-quarter accruals of firm A (with no first-quarter discretionary accruals) were not subject to that negative "pull."

On the basis of this analysis, we conjecture that the longer a firm exhibits abnormally large positive measures of earnings management, the less informative are that firm's reported earnings. In order to test this hypothesis, we label a firm's accounting as "aggressive" in a particular quarter if that firm's discretionary accruals were ranked, in that quarter, in the top quintile of discretionary accruals for all firms in our sample. Firms in the lower four quintiles of discretionary accruals in any given quarter are labelled "normal." We count the number of consecutive quarters a firm engages in aggressive accounting. Firms that remain in the aggressive state for only one quarter, and then return to the normal state, are classified, on that quarter, as *Group-I* firms, while firms that remain aggressive for two or more consecutive quarters before returning to the normal state are classified, on those quarters, as *Group II*.[3] (Firms that are never "aggressive" remain unclassified.) We hypothesize that the earnings reported by Group-II firms convey less information about the true state of the firm than those reported by Group I.

This *ad-hoc* classification of aggressive firms into Group I and Group II can be justified by the following reasoning. Managers might, on occasion, use discretionary accruals to make a firm's reported earnings more reflective of the "true" state of the firm. That is, presumably, the rationale that led GAAP's designers to give managers the ability to manage their firm's earnings. For example, managers might use earnings management to convey information about a one-time event which would otherwise not be reported in this quarter, resulting in a temporarily undervalued stock. In contrast, consecutive observations of high discretionary accruals are less

[3]Group-II firms are likely to be those identified as having high levels of discretionary accruals in annual-frequency studies, such as Beneish and Vargus (2002) and Chan, Chan, Jegadeesh, and Lakonishok (2001).

likely to be due to a series of one-time events than to be due to concerted efforts by managers to distort the "true" state of the firm.

We conjecture that senior firm insiders, such as the firm's CEO, CFO, and other senior executives, guide the firm's accounting practices. Thus, these insiders are aware of the true nature of any earnings management and of the quality of the firm's reported earnings. We follow Beneish and Vargus (2002), and conjecture that high levels of sales of the firm's stock by insiders, in conjunction with high levels of discretionary accruals are indicative of "low-quality" earnings. (This is a statement about association, not causality.) Accordingly, we hypothesize that the increase in the level of insider sales during the aggressive accounting period will be higher for Group-II-firm insiders than for their Group I counterparts. To test this hypothesis, we calculate, for each "aggressive" firm and for each quarter in our sample period, the net number of shares sold by insiders and the net proceeds from those transactions, and investigate insider trading patterns before, during and after periods of aggressive accounting. In Section 4.1, we find that firms exhibiting high discretionary accruals for consecutive quarters (Group-II firms) experience increased insider sales during the periods of managed earnings, relative to levels of insider sales in previous, non-aggressive, quarters. In contrast, firms that exhibit a single quarter of high discretionary accruals (Group-I firms) have lower levels of insider sales during, and after, the quarter of aggressive earnings management, compared to the levels of trading by firm insiders in previous, non-aggressive periods.

The long-term effects of earnings management on stock prices can be significant. Chan, Chan, Jegadeesh, and Lakonishok (2001) consider high discretionary accruals a sign of "low-quality" earnings, and find that firms exhibiting high annual discretionary accruals have, on average, significantly lower excess equity returns over one to three-year holding periods. It is possible, however, for insiders to manage earnings upwards in order to make them more informative about the true state of the firm. Therefore, we hypothesize that Group-II firms exhibit lower long-run returns than their Group I counterparts. To test this hypothesis, we calculate size- and book-to-market-adjusted returns for the firms in both groups. We find that during the aggressive-earnings-management period, firms in both groups exhibit positive adjusted excess returns. However, once a firm's discretionary accruals drop to normal levels, Group-II firms, on average, experience negative long-horizon abnormal returns, while, surprisingly, Group-I firms experience positive ones. This analysis is described in Section 4.2.

Both the insider trading patterns and the patterns of *ex-post* equity returns that we observe in our sample are consistent with the hypothesis that the longer a firm reports "aggressive" discretionary accruals, the lower is the quality of its earnings. During aggressive periods, insiders in Group-I firms decrease their share sales relative to the most recent normal-accounting period by 13%, while Group-II insiders increase their share sales by as much as 47%. (See Section 4.1.) Group-I firms exhibit lower average quarterly excess equity returns during the aggressive period than do Group-II firms (1.4% versus 4.1%). The scene changes after the aggressive period, when Group-I firms significantly outperform Group-II firms (9.7% versus -11.1% excess returns over a three year holding period). (See Section 4.2.) These patterns suggest that the earnings of Group-II firms are of "low quality," and are not informative of true firm value. In contrast, the earnings of Group-I firms are of "high quality," and may convey positive information about their future prospects, although market prices may not yet fully capture this information.

These findings indicate a potential trading strategy: assume a short position in the stock of Group-II firms and a long position in the stock of Group-I firms, when both exit the aggressive-accounting period. The timing of the revelation of earnings information, however, makes it difficult for investors to execute this trading strategy. First, we cannot observe the length of a firm's stay in the aggressive state until after it has recorded a quarter of non-aggressive accounting; this makes aggressiveness an *ex-post* classification. Second, firms' fiscal year-ends do not all fall in the same calendar quarters. After a firm reports its quarterly earnings, up to eleven months may pass before all firms have reported their earnings for that same fiscal quarter and the firm can be properly classified as aggressive or not. Nevertheless, In Section 5 we present preliminary evidence that there may be profitable trading strategies based on our analysis, even after allowing for delays in portfolio formation.

To the best of our knowledge, this study is the first to explore the information contained in the time-series dynamics of quarterly accruals. Our findings suggest that a quarterly time-series approach may be more accurate than the static annual measures used in much of the financial literature. In addition, accruals-based measures of earnings management (such as the modified Jones (1991) model) could be improved by comparing the current accruals level to a forecast based on past accruals, that is relative to the existing level of "overhang" accruals. Such an improved measure of earnings management, however, is beyond the scope of this study.

The remainder of the paper is organized as follows. Section 2 reviews the recent literature on earnings management. Section 3 demonstrates, theoretically and empirically, that both accruals and discretionary accruals exhibit negative serial autocorrelation. In Section 4, we use a data set of insider trading and equity returns to demonstrate that the information embedded in the time-series dynamics of discretionary accruals is indicative of the quality of the firm's earnings. Section 5 discusses the implications of our findings for market rationality. Section 6 concludes.

2. Earnings Management

The notion of the "quality of earnings" – the degree to which reported earnings reflect the true operational health of a business – has long been a concern among both academics and financial practitioners. Under the accruals-based accounting system defined by GAAP, firms are allowed considerable latitude in constructing their financial statements. See, for example, Horngren, Sumdem, and Elliott (2002).

Reported earnings is the sum of cash flows from operations and accounting adjustments that are called accruals. Positive accruals imply that the firm records earnings that are larger than the cash flow generated by its operations. Beneish (2001) claims that the effect of any earnings management is most likely to occur in the accruals (rather than cash flow) component of earnings. Earnings management can occur through a variety of managerial choices. For example, changing the depreciation schedule, delaying the recognition of expenses, and accelerating the recognition of revenues, while all legitimate, can generate accruals and boost earnings.

Accruals are not, however, in and of themselves *prima facie* evidence of earnings management. GAAP require that firms, even those seeking to present transparent and informative financial statements, record certain assets and liabilities so as to generate accruals. Additionally, cyclical variation in a firm's industry, or changes in its lines of business, alter the firm's working-capital needs and generate positive accruals that need not be due to earnings management.

Detecting earnings management requires separating the non-discretionary component of accruals (the portion of accruals that is required under GAAP) from the discretionary component (the portion of accruals that is due to managerial discretion). Dechow, Sloan, and Sweeney (1996) and Guay, Kothari, and Watts (1996) find that a modified version of the Jones (1991) model is the most statistically powerful model for detecting earnings management. Subsequent authors, such as Dechow, Sloan, and Sweeney (1995), Teoh, Welch, and Wong (1998a), Teoh, Welch, and Wong (1998b), and Gao and Shrieves (2002), adopt the modified Jones (1991) model as the discretionary-accruals model of choice, and we follow this convention. We provide a technical description of this model in Appendix A.

There is considerable empirical evidence of earnings management. Bagnoli and Watts (2000) suggest that relative-performance evaluation leads firms to manage earnings if they expect competitors to do so. Similar arguments are found in Erickson and Wang (1999) in the context of mergers, and Shivrakumar (2000) in the context of seasoned equity offerings. Incentives for managing earnings upwards include raising stock prices prior to seasoned equity offerings [Rangan (1998), Teoh, Welch, and Wong (1998a)], at initial public offerings [Teoh, Welch, and Wong (1998b), DuCharme and Sefcik (2000)], and before stock-financed acquisitions [Erickson and Wang (1999)]. Additionally, managers may raise earnings to meet analysts' expectations [Kasznik (1997), Burghstahler and Eames (1998), and DeGeorge, Patel, and Zeckhauser (1999)], to avoid debt-covenant violations [DeFond and Jiambalvo (1994), Parker (2000)], or to smooth earnings [Kirschenheiter and Melumad (2004)]. In a recent speech,[4] former SEC chairman Arthur Levitt claimed that earnings management is common among companies under pressure to meet analyst expectations.

3. Time-Series Dynamics of Accruals

In this section, we motivate our perception about the importance of the time-series of accruals and discretionary accruals. Using a simple example, we demonstrate how GAAP creates a component of accruals that is negatively autocorrelated. As a result, we show, in a reduced-form model, that discretionary accruals are also negatively autocorrelated. Finally, we show empirically that both accruals and discretionary accruals exhibit negative autocorrelation. This analysis will motivate our conjecture that considerable information about the informativeness, or "quality," of corporate earnings is contained within the time-series dynamics of discretionary accruals.

3.1. The Autoregressive Nature of Accruals: An Example

Consider a firm that purchases an asset at a price P, using straight-line depreciation over three years. We assume that the firm generates no additional accruals other than those resulting from the purchase of this asset, and has zero discretionary accruals. In the first year, the firm has a cash

[4] Levitt delivered his speech, entitled "The Numbers Game," at The NYU Center for Law and Business, September 28, 1998.

outflow of $-P$ and records a depreciation of $P/3$. The firm also records accruals of $+P$ due to the associated change in Plant, Property, and Equipment (PPE). Depreciation nets against the change in PPE to produce total first-year accruals of $2P/3$. Additional depreciation expenses of $P/3$ are incurred over the following two years. Thus, $ACC_3 = ACC_2 = -P/3 = -ACC_1/2$. The resulting cash flows, recorded accruals, and recorded earnings of the firm in this example are displayed in Table I.

Table I
Time Dynamics of Accruals - A Simple Example.

Year	1	2	3	Cumulative Effect
Cash Flow	$-P$	0	0	$-P$
Accruals	$\frac{2}{3}P$	$-\frac{1}{3}P$	$-\frac{1}{3}P$	0
Earnings	$-\frac{1}{3}P$	$-\frac{1}{3}P$	$-\frac{1}{3}P$	$-P$

A simple example of the negative-autocorrelation component of accruals. A firm purchases as asset and depreciates it over three years. The time series of accruals ensuing from this transaction exhibit negative autocorrelation.

As a result, the basic mechanics of GAAP accounting induce a negative autocorrelation in the time series of recorded accruals. Over the long run, cumulative earnings and cumulative cash flow must reconcile, and thus cumulative accruals must equal zero. Any positive (negative) change in accruals is offset by future series of negative (positive) accruals. This negative autocorrelation will not be evident if the firm books the same amount of accruals in every quarter, for example because of a constant growth rate. It is unlikely, however, that accruals can be made smooth enough to overcome the impact of the negative autocorrelation inherent in cumulative accruals.

3.2. Time-Series Models of Accruals

In order to provide empirical support to our claim about a component of accruals that is negatively autocorrelated, we estimate an autoregressive moving-average (ARMA) model for the observed time series of scaled accruals for the firms in our sample. Our sample consists of all firms, excluding financial firms (SIC codes 6000-6999), in the CRSP/COMPUSTAT merged database between the years 1990-2000, inclusive.

We follow standard practice in the accounting literature [for example, Sloan (1996)], and calculate quarterly accruals as changes in the balance-sheet working-capital accounts, so that

$$ACC_t = \Delta CA_t - \Delta CL_t - DEP_t, \tag{1}$$

where ΔCA is the quarterly change in non-cash current assets, calculated by taking the quarterly change in current total assets (COMPUSTAT item[5] 40) minus the quarterly change in cash (item 36). The quarterly change in current liabilities not due to short-term debt and payable taxes, ΔCL, is given by the quarterly change in current total liabilities (item 49) minus the quarterly change in debt in current liabilities (item 45) and minus the quarterly change in payable income taxes (item 47). Finally, DEP is quarterly depreciation and amortization (item 5). We scale accruals by TA_{t-1}, the firm's assets at the beginning of the fiscal quarter (item 44).

Accounting data are highly seasonal. Many items are reconciled only at fiscal year-ends. Items like sales or capital expenditures may exhibit seasonal quarterly fluctuations. In order to allow for seasonality, we incorporate four lags of both autoregressive and moving-average terms in our model. (While some accounting choices may influence accruals over a longer period, we choose not to add additional lags in order to maintain a parsimonious model.) Let ACC_t^f and TA_t^f be the time-t accruals and total book assets, respectively. The resulting ARMA(4,4)[6] model is

[5] Data item numbers refer to the quarterly version of the CRSP/COMPUSTAT merged database.

[6] Autoregressive moving-average models are traditionally classified as ARMA(p,q) models, where p and q are the number of autoregressive and moving-average lagged terms, respectively.

$$\frac{ACC_t^f}{TA_{t-1}^f} = c + \phi(L)\frac{ACC_t^f}{TA_{t-1}^f} + (1+\theta(L))\varepsilon_t^f, \tag{2}$$

where $\phi(L)$ and $\theta(L)$ are lag polynomials of the form

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4 \tag{3}$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4, \tag{4}$$

respectively, and L is the lag operator ($L\,\Delta_t^f = \Delta_{t-1}^f$). The innovations ε_t^f are taken to be of mean zero and normally distributed with common variance σ^2. We test the null hypothesis of zero or positive autocorrelation, $H_0 : \phi_1 \geq 0$, against the alternative of negative autocorrelation, $H_1 : \phi_1 < 0$.

There are ten parameters in our model: c, ϕ_1, ϕ_2, ϕ_3, ϕ_4, θ_1, θ_2, θ_3, θ_4, and σ. We estimate these parameters using the method of maximum likelihood. The associated standard errors are estimated by the usual "delta method," based on the outer product of the numerically-computed gradient of the likelihood function. If our model is correctly specified, these estimates are consistent and asymptotically efficient, under technical conditions [See Green (2000)].

The four-lag autoregressive structure of our model requires at least five quarters of consecutive accrual observations for each firm included in the estimation. This restriction may introduce survival bias in our sample. Also, some firms in our dataset have over a year of reported accruals on COMPUSTAT, but they do not have a complete history of *consecutive* accruals. The gaps in these firms' accrual histories prevented them from being included in the estimation. The resulting dataset contains 35,459 observations over a total of 1,330 unique firms.

The parameter estimates and the associated t-Statistics can be found in Table II. The null hypothesis of zero or positive autocorrelation is rejected at the 5% significance level. The first-lag autoregressive term, ϕ_1, is negative and significant, indicating negative autocorrelation in scaled accruals from quarter to quarter. However, the coefficient estimates associated with the fourth-lag autoregressive and fourth-lag moving-average terms are both positive and highly significant. These positive estimates may be due to seasonal variation in accruals.

In order to better account for seasonality, we model the dynamics of year-over-year changes in scaled accruals. This year-over-year differencing should eliminate much of the seasonal variation in accruals. We estimate the ARMA(4,4) model

$$\left(\frac{ACC_t^f}{TA_{t-1}^f} - \frac{ACC_{t-4}^f}{TA_{t-5}^f}\right) = c + \phi(L)\left(\frac{ACC_t^f}{TA_{t-1}^f} - \frac{ACC_{t-4}^f}{TA_{t-5}^f}\right) + (1+\theta(L))\,\varepsilon_t^f, \tag{5}$$

where the lag polynomials $\phi(L)$ and $\theta(L)$ and the innovation terms ε_t^f are as defined previously. This model specification requires at least nine consecutive quarters of reported accruals for each firm for each firm included in the estimation. This restriction reduces our sample size to 29,738 observations distributed over only 1,153 distinct firms, and may introduce additional survival bias into our model.

Estimates are reported in Table III. We find strong evidence of negative autocorrelation. Our coefficient estimate for ϕ_4, the fourth-lag autoregressive term, is highly significant and is the largest autocorrelation term in absolute magnitude. Additionally, we find a large, significant, and negative four-quarter-lag moving average term, θ_4. Under these estimates, higher-than-normal levels of accruals in a given quarter will, all else equal, lead to lower-than-normal accruals in future periods. Also, the coefficient estimates $\hat{\theta}_4$ and $\hat{\phi}_4$ for the fourth-lag of the moving-average and autoregressive terms, respectively, are roughly an order of magnitude larger than the respective first-lag terms. For robustness, we also estimate a variant of (5) with quarterly changes in scaled accruals. The results remain qualitatively similar, in that all four autoregressive coefficients are negative and highly significant. The estimated parameters for this specification are presented in Table IV.

Figure 1 displays the reaction to a positive, one-standard-deviation shock to each of our three models: levels, year-over-year changes, and quarter-over-quarter changes in scaled accruals. In all three cases, the dependent variable returns to a steady-state value (indicated by the dashed line) within twelve quarters.

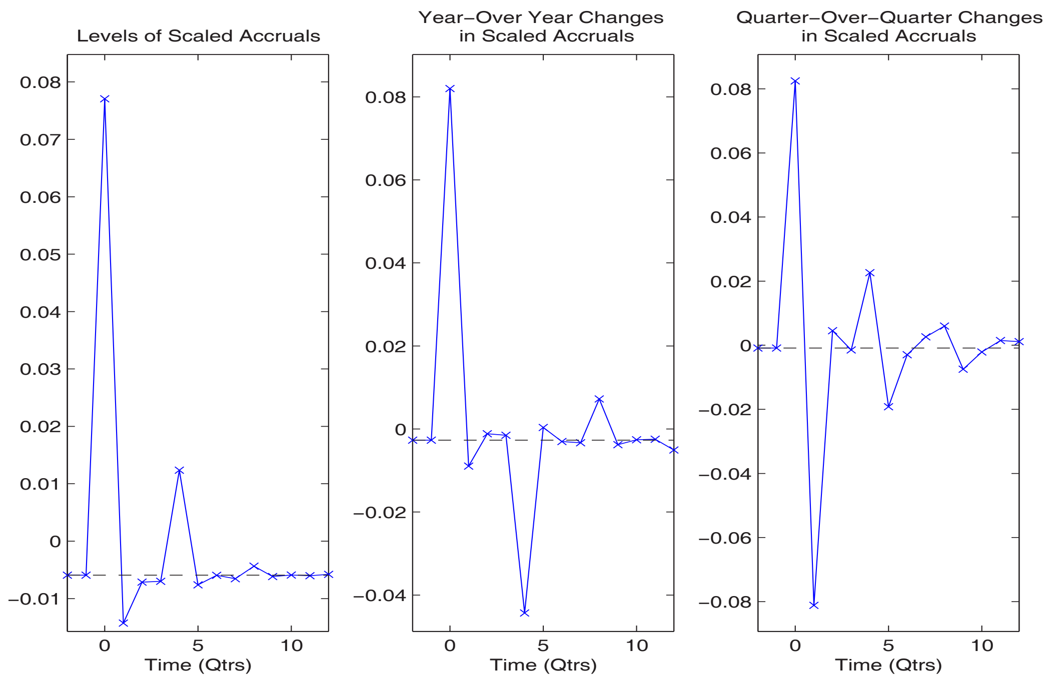

Figure 1. Impulse Responses for ARMA Models of Scaled Accruals

This figure plots the reaction to a one-standard-deviation shock to the dependent variable in the following three models of the time series of scaled accruals:

$$\frac{ACC_t^f}{TA_{t-1}^f} = c+\phi(L)\frac{ACC_t^f}{TA_{t-1}^f}+(1+\theta(L))\varepsilon_t^f,$$

$$\left(\frac{ACC_t^f}{TA_{t-1}^f}-\frac{ACC_{t-4}^f}{TA_{t-5}^f}\right) = c+\phi(L)\left(\frac{ACC_t^f}{TA_{t-1}^f}-\frac{ACC_{t-4}^f}{TA_{t-5}^f}\right)+(1+\theta(L))\varepsilon_t^f,$$

$$\left(\frac{ACC_t^f}{TA_{t-1}^f}-\frac{ACC_{t-1}^f}{TA_{t-2}^f}\right) = c+\phi(L)\left(\frac{ACC_t^f}{TA_{t-1}^f}-\frac{ACC_{t-1}^f}{TA_{t-2}^f}\right)+(1+\theta(L))\varepsilon_t^f,$$

where L is the lag operator and $\phi(L)$ and $\theta(L)$ are fourth-order lag polynomials. Time-t accruals and total book assets are denoted ACC_t^f and TA_t^f, respectively. The innovations ε_t^f are taken to be mean-zero, normally-distributed error terms with common variance σ^2. Impulse responses are computed using the parameter estimates presented in Tables II, III, and IV. The dashed line indicates the estimated steady state for each model.

3.3. The Autoregressive Nature of Discretionary Accruals

We now show that discretionary-accruals models that do not recognize that accruals are negatively autocorrelated may lead to biased estimates of discretionary accruals.

Most discretionary-accruals models treat a firm's accruals in period t, ACC_t, as a function of the observed state of the firm, X_t, and of an unobserved discretionary accruals component, $DACC_t$. The state vector X_t comprises of current and possibly lagged values of variables describing the firm.[7] The functional mapping from the state vector, X_t, and the discretionary accruals component, $DACC_t$, to the accruals variable, ACC_t, is usually assumed to be linear. The linear coefficients, β, are estimated via a regression of ACC_t on X_t, using either the historical time series of ACC_t and X_t for a given firm, or the cross-sectional values of ACC_t and X_t.

Consider the following simple model of a firm's accruals, ACC_t. We assume that the state vector, X_t, is exogenous and stationary, and that the discretionary portion of accruals, $DACC_t$, is of zero mean and uncorrelated with its own lags and with the state variables. Accruals are represented as the sum of (i) a first-order autoregressive term with a coefficient of $-\delta$, for $0 < \delta < 1$, (ii) a linear function of the state variables X_t, and (iii) managerial discretion, $DACC_t$, so that

$$ACC_t = -\delta ACC_{t-1} + \theta X_t + DACC_t. \tag{6}$$

Suppose that an econometrician ignores this autoregression, and models discretionary accruals mistakenly as

$$ACC_t = \theta X_t + DACC_t. \tag{7}$$

[7] For instance, in the modified Jones (1991) model, X_t comprises the change in sales less the change in net receivables, and the level of plant, property and equipment.

He estimates the level of discretionary accruals by regressing ACC on X to obtain an estimate $\hat{\theta}$ of θ. His estimate for the period-t level of discretionary accruals, $\widehat{DACC}_t$, is the t-th residual from his regression, in that

$$\widehat{DACC}_t = ACC_t - \hat{\theta}X_t. \tag{8}$$

We insert (7) into (8), and obtain

$$\widehat{DACC}_t = DACC_t + (\theta - \hat{\theta})X_t - \delta ACC_{t-1}. \tag{9}$$

In (9), measured discretionary accruals, $\widehat{DACC}_t$, is equal to true discretionary accruals, $DACC_t$, plus the sum of a "measurement-error" term $(\theta - \hat{\theta})X_t$ and a "model mis-specification" term $-\delta ACC_{t-1}$. Since $DACC_t$ and X_t are uncorrelated, $\hat{\theta}$ is an unbiased estimate of θ under standard OLS assumptions. Thus, the "measurement-error" term has zero expectation and vanishes as we obtain more data and construct more precise estimates of θ. The mis-specification of the accruals model in (7), however, leads to a biased discretionary accruals measure. The "model-mis-specification" term does not disappear no matter how much data we accumulate.

We insert (7) into (9), and rearrange terms to get

$$\widehat{DACC}_t = (\theta - \hat{\theta})X_t + DACC_t - \delta\widehat{DACC}_{t-1} - \delta\hat{\theta}X_{t-1}. \tag{10}$$

Note that $DACC_t$ and $\widehat{DACC}_t$ are positively correlated. Thus, our econometrician is at least directionally correct, in that higher levels of earnings management (higher $DACC_t$) are associated with higher levels of measured discretionary accruals $\widehat{DACC}_t$.

The model's mis-specification, however, introduces negative autocorrelation in $\widehat{DACC}_t$, in that aggressive earnings management in period t is associated with a rise in $\widehat{DACC}_t$ and a likely fall in $\widehat{DACC}_{t+1}$. Even if $DACC_t$ is always identically zero (no earnings management), and if we measure unknown parameters exactly ($\theta = \hat{\theta}$), we would still obtain a nonzero estimate $\widehat{DACC}$ of discretionary accruals. In particular,

$$\widehat{DACC}_t = -\delta\widehat{DACC}_{t-1} - \delta\theta X_{t-1} = -\frac{\delta L}{1+\delta L} X_t \tag{11}$$

where L is the time-series lag operator ($LX_t = X_{t-1}$). Thus

$$E[\widehat{DACC}_t] = -\frac{\delta}{1+\delta} E[X_t], \tag{12}$$

which need not be zero.

In conclusion, ignoring the negative autocorrelation in accruals (as do existing implementations of the Jones (1991) model) may lead to estimated discretionary accruals that are biased, negatively autocorrelated, and positively correlated with true discretionary accruals. As a result, we gain information by examining the time-series dynamics of accruals. For illustration, we can rewrite (10) as

$$DACC_t = (\hat{\theta} - \theta) X_t + \widehat{DACC}_t + \delta\widehat{DACC}_{t-1} + \delta\hat{\theta} X_{t-1}. \tag{13}$$

Suppose that we observe a firm with two consecutive high levels of (mis)measured discretionary accruals, $\widehat{DACC}_{t-1}$ and $\widehat{DACC}_t$. The true level of earnings management in period t is likely to be larger than normal, since both $\widehat{DACC}_t$ and $\widehat{DACC}_{t-1}$ enter positively on the right-hand side of (13). In other words, in order to observe a large, positive $\widehat{DACC}_t$, the true discretionaly accruals $DACC_t$ must be large enough to overcome the "drag" of $-\delta\widehat{DACC}_{t-1}$ in (10). Similarly, observing a large positive $\widehat{DACC}_t$ after a large negative $\widehat{DACC}_{t-1}$ is less indicative of aggressive earnings management, since $\widehat{DACC}_t$ gets a "boost" from the presence of $-\delta\widehat{DACC}_{t-1}$ in (11).

To demonstrate this point empirically, we proceed to estimate a time-series model of discretionary accruals. We find negative and significant coefficients for the dependence of discretionary accruals on its lags for a variety of model specifications.

3.4. Time-Series Models of Discretionary Accruals

In Section 3.2, we estimated an autoregressive moving-average (ARMA) model of accruals. That analysis demonstrated that scaled accruals are negatively autocorrelated at both quarterly and annual frequencies. Based on the results of the previous sub-section, it is natural to assume that a discretionary-accruals model that does not recognize this autocorrelation in accruals leads to negative autocorrelation in discretionary accruals. We test this conjecture by estimating an ARMA model of the observed time series of discretionary accruals for the firms in our sample.

We estimate discretionary accruals for the firms in our sample using the modified Jones (1991) model (see Appendix A). We omit, in the estimation of (16) (found in the Appendix), firms for which crucial data items are missing and industry quarters with less than seven firm-observations. We use the Fama-French 48-industry classification for the cross-sectional estimation of (16).

In order to test for the presence of negative autocorrelation in discretionary accruals, we re-estimate each of our previous ARMA(4,4) models with discretionary accruals in place of scaled accruals:

$$DACC_t^f = c + \phi(L)\,DACC_t^f + (1+\theta(L))\,\varepsilon_t^f \quad (14)$$

$$(DACC_t^f - DACC_{t-4}^f) = c + \phi(L)\,(DACC_t^f - DACC_{t-4}^f) + (1+\theta(L))\,\varepsilon_t^f, \quad (15)$$

where $DACC_t^f$ is the level of discretionary accruals, computed via the modified Jones (1991) method, for firm f in fiscal quarter t. As before, $\phi(L)$ and $\theta(L)$ are fourth-order lag polynomials, and the ε_t^f innovations are assumed to be of mean zero and normally distributed with common variance σ^2. Maximum-likelihood estimates for each of these models are presented in Tables V and VI, respectively.

We find evidence of negative autocorrelation in discretionary accruals at both quarterly and annual frequencies. For (14), the model of levels of discretionary accruals, the estimated coefficient $\hat{\phi}_1$ of the first-lag term is negative and significant; the estimated coefficients for all other autoregressive lags were positive and insignificant. For (15), the model of year-over-year changes in discretionary accruals, the coefficient estimates of all four autoregressive terms are negative and significant.

Table VII presents the estimated coefficients for a model of quarter-over-quarter changes in discretionary accruals, which is added for robustness.

Figure 2 displays the impulse response to a positive, one-standard-deviation shock to the right-hand-side variables of each model. In all three cases, the dependent variable returns to a steady state (indicated by a dashed line) within twelve quarters. These estimates are robust to using quarterly-specific constants.

Suppose that we interpret ε_t, the time-t discretionary-accruals innovations, as the discretion exercised by management in reporting earnings. Our results suggest that if we observe several quarters of high discretionary accruals, the implied values of ε_t must be growing larger and larger in order to make up for the influence of the negative autocorrelation and moving-average terms. Thus, observing a series of higher-than-normal discretionary accruals implies a greater degree of managerial discretion than would be associated with observing only a single such observation. This motivates our subsequent analysis, in which we examine the implications of observing consecutive periods of high discretionary accruals for insider trading and firm returns.

4. Empirical Evidence of Earnings Quality

As discussed in Section 3.3, the negative serial autocorrelation inherent in accruals lends additional credibility to repeated observations of high levels of discretionary accruals. Additionally,

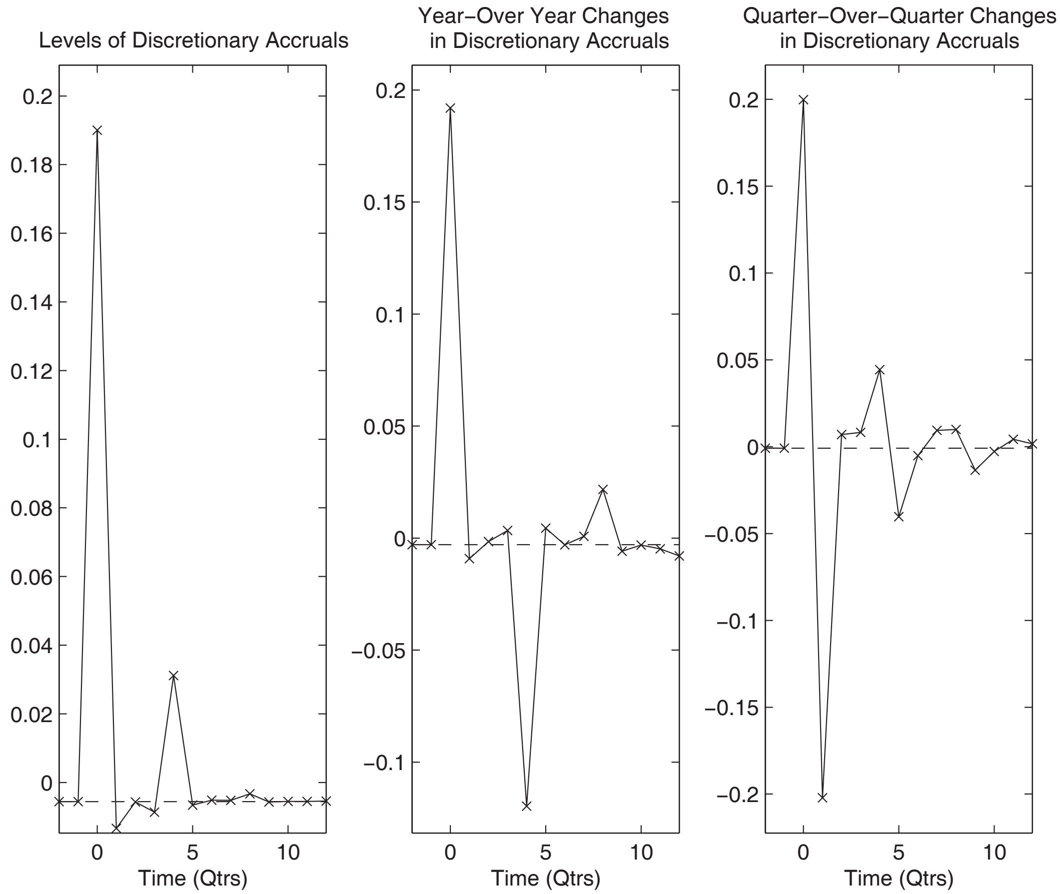

Figure 2. Impulse Responses for ARMA Models of Discretionary Accruals

This figure plots the reaction to a one-standard-deviation shock to the dependent variable in the following three models of the time series of discretionary accruals:

$$DACC_t^f = c + \phi(L) DACC_t^f + (1 + \theta(L))\varepsilon_t^f,$$

$$(DACC_t^f - DACC_{t-4}^f) = c + \phi(L)(DACC_t^f - DACC_{t-4}^f) + (1 + \theta(L))\varepsilon_t^f,$$

$$(DACC_t^f - DACC_{t-1}^f) = c + \phi(L)(DACC_t^f - DACC_{t-1}^f) + (1 + \theta(L))\varepsilon_t^f,$$

where $DACC_t^f$ is the level of discretionary accruals, computed via the modified Jones (1991) method and scaled relative to the prior-quarter book value of firm assets, for firm f in fiscal quarter t, L is the lag operator, and $\phi(L)$ and $\theta(L)$ are fourth-degree lag polynomials. The innovations ε_t^f are taken to be mean-zero, normally-distributed error terms with common variance σ^2. Impulse responses are computed using the parameter estimates presented in Tables V, VI, and VII. The dashed line is the estimated steady state for each model.

some observations of high levels of discretionary accruals may be due to one-time positive event for the firm or random measurement error in the modified Jones (1991) model. These low-frequency, random events, however, are unlikely to cause a series of high discretionary accruals. Consequently, we hypothesize that observing high discretionary accruals for consecutive quarters is a stronger signal of low-quality earnings than is observing a single quarter alone, since the former is less likely to be the result of the autoregressive nature of discretionary accruals.

To explore this hypothesis, we label firms as being "aggressive" for a given fiscal quarter if that firm's discretionary accruals were ranked, in that quarter, in the top quintile of discretionary accruals for all firms in our sample. Firms in the other four quintiles are labelled "normal."[8] We classify aggressive firms by the number of consecutive quarters in which they exhibit such high levels of discretionary accruals. Firms that remain in the aggressive state for one quarter only, and then return to the "normal" state, are classified as Group-I firms during their quarter of aggression. Firms that remain in the aggressive state for more than two consecutive quarters before returning to the normal state are classified, on those quarters, as Group II. (Firms that are never "aggressive" remain unclassified.) After a firm returns to normal accounting, it can potentially enter either group in future quarters. In this manner, the same firm may appear multiple (non-overlapping) times in both groups. Our data set contains 7,160 firm-quarters in Group I, and 1,817 in Group II. Group II comprises 1414, 304, and 99 separate instances of firms being aggressive for exactly two, three, and four quarters, respectively. We label these three subsets of Group II as SubGroup 2, SubGroup 3, and SubGroup 4, respectively.

In the remainder of this section we hypothesize, motivated by our conjecture (based on the arguments of Section 3.3) that the earnings of Group-II firms are of lower quality than those of Group I firms, about the differences between the firms in Group I and the firms in Group II, and test these hypotheses. In Subsection 4.1, we consider the trades executed by insiders in these

[8]We also classify a firm as having "conservative" accounting for a given fiscal quarter when it falls in the bottom quintile of discretionary accruals. Only a small number of firms were conservative for consecutive periods. This lack of data precluded any meaningful analysis of these firms.

firms during their firms' stay in the aggressive state. In Subsection 4.2, we consider the equity returns of these firms.

4.1. Insider Trading as a Signal of Earnings Quality

We conjecture that senior firm insiders, such as the firm's CEO, CFO, and other senior executives, guide the firm's accounting practices and are aware of the true nature of any earnings management and of the quality of the firm's reported earnings. Insiders may also possess private information about the state of the firm and the quality of its reported earnings. If a firm reports "low-quality" earnings that overstate the firm's value, insiders may anticipate that the market will eventually learn their firm's true state and that their shares will fall in value. (This does not necessitate a market inefficiency, only insiders' belief in it). These insiders should, in the absence of regulatory or institutional constraints, unload their shares in advance of the anticipated market correction. In contrast, if a firm reports earnings with high levels of accruals that are reflective of future positive cash flows, or an attempt to smooth the firm's reported earnings, insiders will not anticipate a future devaluation of their firm's equity and will have no incentive to dump their shares. Based on our conjecture that the earnings of Group-II firms are of lower quality than those of Group I firms, we hypothesize that Group-II firm insiders would sell, during the aggressive accounting period, relatively more of their firm's stock than their Group-I counterparts.

We obtain insider trading data from the Thomson Financial First Call Insiders Database. We restrict ourselves to open-market trades of directly-held[9] stock reported to the SEC on Form 4. We associate insider trades with fiscal quarters by the transaction date reported to the SEC. For every firm and on every fiscal quarter, we compute both the dollar value of net proceeds and the net number of shares sold.

[9]Stocks may be held both directly and indirectly by insiders. For example, an executive may set up a trust to hold shares for estate-planning purposes; the trust and the executive count as direct and indirect shareholders, respectively, of those shares. Each trade is reported once for each direct and indirect shareholder. We restrict ourselves to direct-holdings trades to avoid double-counting.

We present the average quarterly net-dollar proceeds from sales and the net-unit sales around aggressive accounting periods, by group, in Panel A of Tables VIII and IX, respectively. Net-unit sales is the difference between the number of shares sold and bought by firm insiders during the period; net-dollar proceeds are the total dollar value of sales less the total dollar value of purchases during this period. We report these figures for the last quarter prior to the aggressive period, for the duration of the aggressive period, and for the first quarter of normal (non-aggressive) accounting immediately following the aggressive period.

On average, insiders across all groups sell more than they buy, in terms of unit sales and dollar proceeds. This is consistent with previous literature on insider trading, for example Jaffe (1974), Finnerty (1976), Seyhun (1986), Lin and Howe (1990), Lee, Mikkelson, and Partch (1992), and Beneish and Vargus (2002). Firm insiders likely have significant portions of their wealth tied up in the shares of their own firm, and, as a result, are motivated to continually sell their holdings for reasons such as portfolio rebalancing, tax planning, estate planning, and periodic liquidity needs.

The rate of portfolio sales differs dramatically for insiders in each group. In particular, during the aggressive period, insiders in Group I decreased their share sales relative to the most recent normal-accounting period (selling \$3.0 million of shares in the aggressive period relative to \$3.6 million in the previous period, a reduction of 13%). In contrast, Group-II insiders increased their net dollar sales by as much as 47% during their aggressive periods. The same pattern holds for the net number of shares sold; Group I insiders decreased the number of shares they sold by 11% while Group II insiders accelerated their sales by 20% (SubGroup 2) to 77% (SubGroup 3), all relative to the last quarter of normal accounting. Moreover, with the exception of SubGroup 4 (which has the smallest sample size of all categories), the amount by which the insiders accelerated their average quarterly sales (relative to the last period of normal accounting) is monotonically increasing in the number of quarters the firm remained in the aggressive accounting state. After exiting the aggressive accounting state, managers in all groups generally reduced their sales relative to the most recent period of normal accounting. This trading behavior is consistent with our hypothesis that Group-II earnings are more likely to be of "low quality" than those of Group I, and that Group-II managers are aware of the low quality of the earnings they report.

For comparison, we include (in Panel B of Tables VIII and IX) the insider-trading behavior of firms in the middle quintile of discretionary accruals ("benchmark" firms). We match each observation of firm-quarters in Groups I and II (and in each SubGroup) to an observation of the average benchmark firm for the same time period. For instance, if we include an observation of insider net-dollar sales for firm "X" in the second fiscal quarter of 2000 in the "Group I, Before" category in panel A, then we assign an observation of the average proceeds for middle quintile firms in that quarter to the "Group I, Before" category in panel B. If market-wide, systematic factors drive the patterns of insider sales for Group-I and Group-II firms, then we should observe similar patterns for the insider sales of the time-matched benchmark firms.

Insider selling for these benchmark firms, however, changed little during the aggressive periods for their time-matched Group-I and Group-II firms. The only benchmark firms to significantly change their share sales relative to the last quarter prior to the aggressive period for their Group-I and Group-II counterparts were those matched to Group I and SubGroup 2 of Group-II firms. In both cases, the benchmark change was opposite in sign to that of the aggressive firms. After the aggressive period, there was a statistically significant change in the number of shares sold only for those benchmark firms matched with Group I; all other groups were insignificant. These results indicate that the insider trading patterns we observe for aggressive firms are not the result of systematic, market-wide shifts in insider trading behavior.

Cheng and Warfield (2003) report that stock-based compensation may lead to incentives for earnings management. If stock grants are correlated with discretionary accruals, then any observed trading patterns for Group-I and Group-II insiders may be due more to portfolio rebalancing than to insider information. Unfortunately, we have been unable to find a reliable, market-wide database of stock grants. Our analysis, however, relies on comparison of same-firm trading behavior across consecutive quarters, and we believe that portfolio stock inflows are, for the most part, stationary.

We do not control for firm size in our analysis. Larger firms may naturally have a greater volume (both in terms of unit sales and dollar value of proceeds) of net shares sold. As a result, we cannot directly compare net sales for Group-I and Group-II firms since we do not know how average size varies across these populations of firms. For comparison across groups, the right halves of Tables VIII and IX present the percentage change in net proceeds and net number of shares in each period relative to the corresponding value from the most recent quarter of normal accounting (denoted "Before" in the tables). Even if firms in some categories are systematically large or small, these relative changes should be unaffected.

4.2. Discretionary Accruals and Firm Returns

Prior studies document significant long-term effects of earnings management on stock prices. Sloan (1996) finds evidence that investors value the accruals and cash flow components of earnings equally. Since accruals are less persistent than cash flows, firms whose earnings are predominantly accruals-based are overvalued and experience negative equity returns over one-year horizons. Xie (2001) finds that investors most overvalue the portion of earnings due to discretionary accruals, and suggests that the return patterns documented by Sloan (1996) arise chiefly from that portion of earnings. Similarly, Chan, Chan, Jegadeesh, and Lakonishok (2001) find that firms that exhibit high discretionary accruals on the annual level have, on average, significantly lower excess equity returns over one- to three-year holding periods.

A common interpretation of the documented association between high levels of discretionary accruals and patterns of short-term positive returns and long-term negative returns is that investors fail to recognize the lower persistence of abnormally high accruals components of earnings; rather, they accept these reported earnings at face value and adjust stock prices accordingly, resulting in an initial positive abnormal return. According to this explanation, the accruals reverse over time, the firm's true financial situation becomes clear to investors, and share prices fall.[10]

Chan, Chan, Jegadeesh, and Lakonishok (2001) consider high discretionary accruals to be a sign of "low quality" earnings. It is possible, however, for insiders to manage earnings upwards in order to make them more informative about the true state of the firm. A one-time good event for the firm, a change in the company's line of business, or newly negotiated contracts or partnerships may have positive impacts on future cash flows that are not immediately realized in current, unmanaged earnings. Managers may use their discretion over accounting standards to recognize some of the cash-flow benefit in advance as current earnings and, in doing so, make reported earnings more informative. In this sense, earnings can still be "high quality," even if they are due in part to high levels of positive discretionary accruals.[11]

Having conjectured that the earnings of Group-II firms are less informative than those of Group I firms, we expect that the association of lower equity returns with higher levels of discretionary accruals, which Chan, Chan, Jegadeesh, and Lakonishok (2001) and Xie (2001) document, will be more pronounced for Group-II firms than for Group-I firms. As a test of this hypothesis, we compute excess equity returns for both Group-I and Group-II firms during each period of aggressive accounting and over subsequent multi-year holding periods.

[10]Several authors have argued that limited information-processing power by investors cause systematic errors in the market's valuation of firms. See, for example, Hirshleifer and Teoh (2003), Hong, Touros, and Valkanov (2003), and Hong and Stein (2003).

[11]For comparison with previous literature, we estimate long-horizon excess equity returns for each quintile of our measure of discretionary accruals. Specifically, we compute the average size- and book-to-market-adjusted excess equity returns over subsequent holding periods of one quarter and one, two, and three years. We replicate the findings of Chan, Chan, Jegadeesh, and Lakonishok (2001) and Xie (2001), in that excess equity returns are generally monotonically decreasing across discretionary-accruals quintiles. In particular, the lowest (highest) quintile has the highest (lowest) mean excess equity return across all holding periods. The annualized difference between returns for the lowest and highest deciles decreased monotonically from 8.00% for one-quarter holding periods to 4.61% for three-quarter ones.

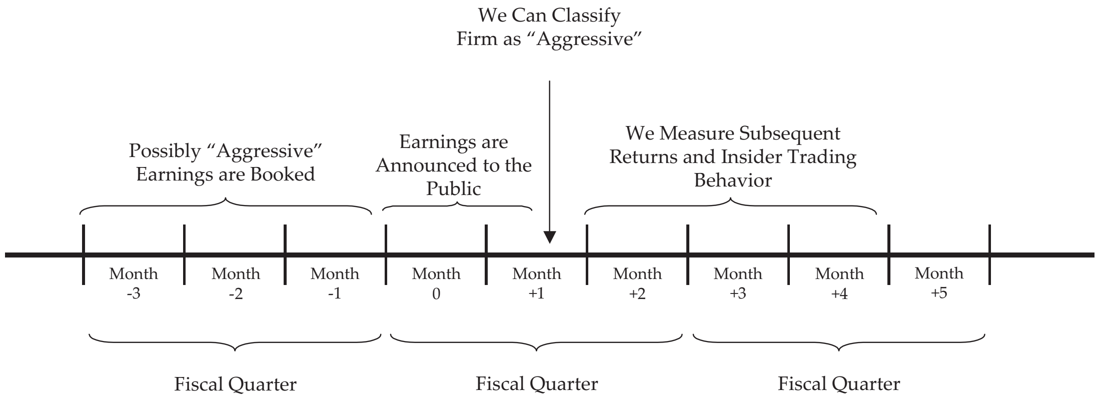

Figure 3. The Timing of the Measurement of Earnings Management, Equity Returns, and Insider-Trading Patterns

The timing of our calculations is as follows: Let month 0 represent the beginning of a new fiscal quarter. Earnings and accruals data are obtained from COMPUSTAT for the previous fiscal quarter, which comprises months -1, -2, -3. Sometime in either month 0 or month 1, the firm announces its prior fiscal quarter earnings. We measure returns and insider trading starting at the end of month 1, to ensure earnings have already been announced.

For each firm-quarter in our sample, we measure returns starting from two months after the end of the fiscal quarter. This ensures that returns are measured subsequent to earnings announcements, since firms can report their earnings up to 45 days past the end of the financial quarter. We use breakpoints based on NYSE firms to compute size- and book-to-market-adjusted returns for horizons of one quarter through three years. The timing of information revelation and our measurement of long-horizon equity returns is described in Figure 3.

By transitioning back and forth between aggressive and normal accounting, a firm may appear multiple times in both Group I and Group II. The associated holding-period return windows are different for each appearance. The firm's returns during its stay in a given group are measured starting two months after the end of the first quarter of aggressive discretionary accruals. Similarly, the firm's returns after exiting the aggressive state are measured starting two months after the end of the last aggressive quarter. This ensures that the relevant announcements of earnings have reached the market before our returns measurements begin.

Table X presents our findings. Panel A shows that, on average, Group-I firms exhibit lower excess returns during the aggressive period than firms in Group II. Panel B shows that following the aggressive period, long-horizon excess returns are positive for Group-I firms and negative for Group-II firms. Returns during the aggressive accounting period increase in the length of that period, and long-term returns subsequent to the aggressive period decrease in the length of that period. These findings are consistent with our hypothesis that the longer a firm uses aggressive accounting, the less informative are its earnings and the more severe is the market's eventual negative reaction. Interestingly, Group-I firms experience positive long-horizon excess returns. If Group-I managers adjust earnings to signal positive information to the market, the market's response to this signal seems to be delayed. Alternatively, the positive long-term excess returns on Group I firms could be due to these firms' repeated use of discretionary accruals to convey favorable information to the market.

The insider-trading patterns presented in Section 4.1 can now be re-interpreted, in light of the return patterns that we have just described. The reduced sales of insiders in Group-I firms and the positive excess returns of those firms are consistent with insiders who are aware of "good news" about the firm, and thus manage earnings upward as a signal of these news and increase their portfolio holdings to benefit from the expected appreciation in share values. The negative equity returns of Group-II firms and their accelerated insider sales are consistent with insiders who manage earnings upward to prop up share prices while they reduce their holdings.

5. Implications for Market Rationality

If equity markets are efficient, investors recognize earnings management and appropriately price the equity of Group-I and Group-II firms given all publicly available information. If markets are inefficient, however, one may be able to develop a profitable trading strategy that takes advantage of our findings. One strategy would be to construct a portfolio of long positions in Group-I firms and short positions in those of Group II during the first observed period of aggressive accounting.

The timing of information revelation, however, prevents such *ex-ante* portfolio construction. In particular, we can only classify a firm as aggressive after observing at least one quarter of abnormally high discretionary accruals. Similarly, we can only categorize aggressive firms as being in Group I or Group II after observing an additional quarter. Classification to SubGroups 2, 3, and 4 requires additional quarterly observations. Furthermore, even after observing a firm's reported earnings, we may not be able to immediately estimate the modified Jones (1991) model which requires knowing the previous-fiscal-quarter accruals of all firms in a given industry, since fiscal periods do not align for all firms. Therefore, the portfolio returns that we presented in the previous section should not be interpreted as returns that are achievable by investors, since it is not clear that investors know, *ex-ante*, how to properly form these portfolios.

Our results indicate that Group-II firms have negative excess returns for up to three years after returning to normal accounting, and conversely for Group-I firms. Thus, even if investors could form "long Group I, short Group II" portfolios only one year after the firms' final quarter of aggressive accounting, the associated returns would still be significantly positive, as indicated in Table X. For example, a portfolio of short positions in SubGroup-3 firms offers, on average, excess returns of roughly 28% over the second year after the return to normal accounting.

Admittedly, some of the reported excess equity returns in Table X are suspiciously high. Aggressive firms may face unknown risk factors not captured by size or book-to-market. Also, the highest-magnitude abnormal returns were SubGroup-3 and SubGroup-4 firms. These firms account for only 4% of the total number of observed aggressive periods. Thus, creating these trading strategies may be profitable, but the most profitable trading opportunities – shorting SubGroups 3 and 4 – rarely occur. Group-II equity may be highly illiquid or difficult to short.

Nevertheless, our findings suggest that there may be profitable trading strategies based on classification of firms into Groups I and II. This is consistent with an inefficient equity market in which investors do not fully comprehend the differences between the accrual and cash-flow components of earnings and, as a result, are misled by earnings management. An investor's inability to determine the quality of reported financial statements may reduce his ability to distinguish between well-run firms with favorable growth prospects and firms with un-informative earnings. Indeed, Bernard and Thomas (1989) and Chan, Jegadeesh, and Lakonishok (1996) find that investors respond to new earnings announcements with a slight delay, possibly due to the time-consuming and intellectually challenging task of processing accounting data.

6. Conclusion

In this paper, we demonstrate that considerable information is contained in the time-series dynamics of the portion of earnings driven by managerial discretion. We show, for U.S. firms between 1990 and 2000, that both accruals and discretionary accruals exhibit negative autocorrelation, and demonstrate how this autocorrelation can bias static accrual-based measures of earnings management.

We hypothesize that the number of consecutive quarters in which a firm engages in aggressive earnings management is a negative signal of the informativeness and quality of its reported earnings. We find that firms exhibiting high discretionary accruals for consecutive quarters (Group-II firms) experience increased insider net sales during the periods of managed earnings, relative to levels of net insider sales in previous, non-aggressive, periods. Additionally, these firms experience negative long-horizon abnormal returns once the firm's discretionary accruals drop to normal levels. In contrast, firms that exhibit a single quarter of high discretionary accruals (Group-I firms) exhibit a decrease in net insider sales during the quarter of aggressive earnings. These firms, on average, experience positive long-run excess equity returns subsequent to the aggressive-earnings-management period. These results are consistent with our hypothesis that the longer a firm reports "aggressive" discretionary accruals, the more likely that these earnings are of “low quality.” These results also suggest that earnings reported by Group-I managers may incorporate positive information, previously unknown to the market, that will be reflected in future cash flows.

To the best of our knowledge, this study is the first to explore the information contained in the time-series dynamics of quarterly accruals. Our findings suggest that a quarterly time-series approach may be more accurate than the static annual measures used in much of the financial literature. In addition, accruals-based measures of earnings management (such as the modified Jones (1991) model) could be improved by comparing the current accruals level to a forecast based on past accruals, that is relative to the existing level of “overhang” accruals. Such an improved measure of earnings management, however, is beyond the scope of this study.

References

Bagnoli, M., and S. G. Watts, 2000, The Effect of Relative Performance Evaluation on Earnings Management: A Game-theoretic Approach, *Journal of Accounting and Public Policy* 19, 377–397.

Bartov, E., F. A. Gul, and J. S. L. Tsui, 2000, Discretionary Accruals Models and Audit Qualifications, *Journal of Accounting and Economics* 30, 421–452.

Beneish, M. D., 2001, Earning Management: A Perspective, *Managerial Finance* 27, 3–17.

Beneish, M. D., and M. E. Vargus, 2002, Insider Trading, Earnings Quality and Accrual Mispricing, *Accounting Review* 30, 421–452.

Bernard, V. L., and J. K. Thomas, 1989, Post-Earnings Announcement Drift: Delayed Price Repsonse or Risk Premium?, *Journal of Accounting Research* 27, 1–36.

Burghstahler, D., and M. Eames, 1998, Management of Earnings and Analysts' Forecasts, Working paper, University of Washington.

Chan, K., L. K. C. Chan, N. Jegadeesh, and J. Lakonishok, 2001, Earnings Quality and Stock Returns, NBER Working paper #8308.

Chan, L. K. C., N. Jegadeesh, and J. Lakonishok, 1996, Momentum Strategies, *Journal of Finance* 51, 1681–1713.

Cheng, Q., and T. Warfield, 2003, Stock-based Compensation, Insider Trading, and Earnings Management, Working Paper, University of British Columbia and University of Wisconsin.

Dechow, P., R. Sloan, and A. Sweeney, 1995, Detecting Earnings Management, *Accounting Review* 70, 193–226.

Dechow, P., R. Sloan, and A. Sweeney, 1996, Causes and Consequences of Earning Manipulation: An Analysis of Firms Subject to Enforcement Actions by the SEC, *Contemporary Accounting Research* 13, 1–36.

DeFond, M. L., and J. Jiambalvo, 1994, Debt Covenant Violation and Manipulation of Accruals, *Journal of Accounting and Economics* 17, 145–176.

DeGeorge, F., J. Patel, and R. Zeckhauser, 1999, Earnings Management to Exceed Thresholds, *Journal of Business* 72, 1–33.

DuCharme, L. L. P. H. Malatesta, and S. E. Sefcik, 2000, Earnings Management: IPO Valuation and Subsequent Performance, Working paper, University of Washington.

Erickson, M., and S. Wang, 1999, Earnings Management by Acquiring Firms in Stock for Stock Mergers, *Journal of Accounting and Economics* 27, 149–176.

Finnerty, J., 1976, Insiders and Market Efficiency, *Journal of Finance* 31, 1141–1148.

Gao, P., and R. E. Shrieves, 2002, Earnings Management and Executive Compensation: A Case of Overdose of Option and Underdose of Salary?, Working Paper, University of Tennessee.

Green, W. H., 2000, *Econometric Analysis*. (Prentice Hall, Upper Saddle River, NJ).

Guay, W., S. P. Kothari, and R. L. Watts, 1996, A Market-based Evaluation of Discretionary Accruals Models, *Journal of Accounting Research, Supplement:* 50, 83–105.

Hirshleifer, D., and S. H. Teoh, 2003, Limited Attention, Information Disclosure, and Financial reporting, Working Paper, The Ohio State University.

Hong, H., and J. Stein, 2003, Simple Forecasts and paradigm Shifts, Working Paper, Harvard University.

Hong, H., W. Touros, and R. Valkanov, 2003, Do Industries Lead Stock Markets?, Working Paper, Princeton University.

Horngren, C. T., G. L. Sumdem, and W. O. Elliott, 2002, *Introduction to Financial Accounting*. (Prentice Hall, Upper Saddle River, NJ).

Jaffe, J. F., 1974, Special Information and Insider Trading, *Journal of Business* 47, 410–428.

Jones, J. J., 1991, Earning Management During Import Relief Investigations, *Journal of Accounting Research* 29, 193–228.

Kasznik, Ron, 1997, On the Association between Voluntary Disclosure and Earnings Management, *Journal of Accounting Research* 37, 57–82.

Kirschenheiter, M., and N. Melumad, 2004, Can Big Bath and Earnings Smoothing Coexist as Equilibrium Financial Reporting Strategies?, Working Paper, Columbia University.

Lee, D. S., W. H. Mikkelson, and M. M. Partch, 1992, Manager's Trading Around Stock Repurchases, *Journal of Finance* 47, 1947–1961.

Lin, J., and J. Howe, 1990, Insider Trading in the OTC Market, *Journal of Finance* 45, 1273–1874.

Parker, S., 2000, The Association between Audit Committee Characteristics and the Conservatism of Financial Reporting, Working paper, Santa Clara University.

Rangan, S., 1998, Earnings Management and the Performance of Seasoned Equity Offerings, *Journal of Financial Economics* 50, 101–122.

Seyhun, H. N., 1986, Insider Profits, Costs of Trading, and Market Efficiency, *Journal of Financial Economics* 16, 189–212.

Shivrakumar, L., 2000, Do firms mislead investors by overstating earnings before seasoned equity offerings?, *Journal of Accounting and Economics* 29, 339–370.

Sloan, R. G., 1996, Do Stock Prices Fully Reflect Information in Accruals and Cash Flows About Future Earnings?, *Accounting Review* 71, 289–315.

Subramanyan, K. R., 1996, The Pricing of Discretionary Accruals, *Journal of Accounting and Economics* 22, 249–282.

Teoh, S. H., I. Welch, and T. J. Wong, 1998a, Earnings Management and the Long-Run Performance of Initial Public Offerings, *Journal of Finance* 53, 1935–1974.

Teoh, S. H., I. Welch, and T. J. Wong, 1998b, Earnings Management and the Underperformance of Seasoned Equity Offerings, *Journal of Financial Economics* 50, 63–99.

Xie, Hong, 2001, The Mispricing of Abnormal Accruals, *Accounting Review* 76, 357–373.

Appendices

A. The Modified Jones (1991) Model

The modified Jones (1991) model is given by:

$$\frac{ACC_t}{TA_{t-1}} = \beta_1 \left(\frac{1}{TA_{t-1}}\right) + \beta_2 \left(\frac{\Delta S_t - \Delta Rec_t}{TA_{t-1}}\right) + \beta_3 \left(\frac{PPE_t}{TA_{t-1}}\right) + \varepsilon_t, \tag{16}$$

where ACC_t are the firm's accruals at time t, TA_{t-1} are the firm's assets at time $t-1$ (item 44), and S_t, Rec_t, and PPE_t are the firm's sales (item 2), net receivables (item 37) and the property, plant, and equipment at time t (item 42), respectively.

We estimate the industry-specific coefficients β_1, β_2, and β_3 cross-sectionally. Non-discretionary accruals (NDA_t) are the contemporaneous forecasted levels of scaled accruals, using the industry-specific coefficients β_1, β_2, and β_3 and the firm's current-period accounting line items (S_t, Rec_t, and PPE_t):

$$\frac{NDA_t}{TA_{t-1}} = \hat{\beta}_1 \left(\frac{1}{TA_{t-1}}\right) + \hat{\beta}_2 \left(\frac{\Delta S_t - \Delta Rec_t}{TA_{t-1}}\right) + \hat{\beta}_3 \left(\frac{PPE_t}{TA_{t-1}}\right). \tag{17}$$

Discretionary accruals are the difference between scaled accruals (ACC_t/TA_{t-1}) and scaled non-discretionary accruals (NDA_t/TA_{t-1}):

$$DACC_t = \frac{ACC_t}{TA_{t-1}} - \frac{NDA_t}{TA_{t-1}}. \tag{18}$$

An alternative approach is to estimate firm-specific coefficients β_1, β_2, and β_3. Here, the coefficients are obtained from estimating (16) using past values of the firm's accruals, total assets, sales, receivables, and PPE. We opt for the cross-sectional approach, following Bartov, Gul, and Tsui (2000) and Subramanyan (1996), who point out that the cross-sectional version of the modified Jones model is superior, *ex-ante*, to the time-series version. First, the number of observations used in each estimation is considerably higher in the cross-sectional version, which increases the precision of the resulting coefficient estimates. Second, by not requiring lengthy historical data, the cross-sectional model is less subject to survival bias and allows the inclusion of firms with short histories. Third, non-stationarity is much less of a concern for the cross-sectional version than it is for the time-series version.

Table II
ARMA(4,4) Estimates for Scaled Accruals.

Parameter	Estimate	t-Statistic
c	-0.0060	11.82
ϕ_1	-0.0572	12.07
ϕ_2	-0.0027	0.53
ϕ_3	-0.0286	6.00
ϕ_4	0.0809	80.05
θ_1	-0.0434	8.24
θ_2	-0.0178	2.87
θ_3	0.0145	2.48
θ_4	0.1357	86.17
σ	0.0830	3219.29

This table presents parameter estimates for the ARMA(4,4) model of scaled accruals:

$$\frac{ACC_t^f}{TA_{t-1}^f} = c + \phi(L)\frac{ACC_t^f}{TA_{t-1}^f} + (1+\theta(L))\,\varepsilon_t^f,$$

where L is the lag operator, and $\phi(L)$ and $\theta(L)$ are lag polynomials of the form

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4,$$

respectively. The variables ACC_t^f and TA_t^f are the period-t accruals and total book assets reported for firm f, respectively. The ε_t^f terms are taken to be of zero mean and normally distributed with common variance σ^2. Parameters are estimated using the method of maximum likelihood. Standard errors are calculated by taking the outer-product of the numerically-computed gradient of the likelihood function. We obtained a total of 35,459 observations corresponding to 1,330 unique firms.

Table III
ARMA(4,4) Estimates for Annual Changes in Scaled Accruals

Parameter	Estimate	t-Statistic
c	-0.0034	8.08
ϕ_1	-0.0376	7.62
ϕ_2	-0.0035	0.76
ϕ_3	0.0083	2.81
ϕ_4	-0.2373	736
θ_1	-0.0362	6.62
θ_2	0.0190	3.27
θ_3	0.0058	1.10
θ_4	-0.2531	257
σ	0.0847	1610

The table reports parameter estimates for the ARMA(4,4) model of year-over-year changes in scaled accruals:

$$\Delta_t^f = c + \phi(L)\Delta_t^f + (1 + \theta(L))\varepsilon_t^f.$$

The year-over-year change in scaled accruals for firm f, Δ_t^f, is defined as:

$$\Delta_t^f \equiv \frac{ACC_t^f}{TA_{t-1}^f} - \frac{ACC_{t-4}^f}{TA_{t-5}^f},$$

where ACC_t^f and TA_t^f are the period-t accruals and total book assets reported for firm f, respectively. The ε_t^f terms are taken to be of zero mean and normally distributed with common variance σ^2. The lag polynomials $\phi(L)$ and $\theta(L)$ are of the form:

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4,$$

respectively. Parameters are estimated using the method of maximum likelihood. Standard errors are calculated by taking the outer-product of the numerically-computed gradient of the likelihood function. We obtained a total of 23,738 observations corresponding to 1,153 unique firms.

Table IV
ARMA(4,4) Estimates for Quarterly Changes in Scaled Accruals

Parameter	Estimate	t-Statistic
c	-0.0029	8.93
ϕ_1	-0.9051	913.65
ϕ_2	-0.7907	677.78
ϕ_3	-0.5478	482.85
ϕ_4	-0.0687	73.19
θ_1	-0.0580	22.09
θ_2	-0.0159	5.01
θ_3	-0.1617	59.68
θ_4	-0.1314	56.73
σ	-0.0833	1214.20

The table reports parameter estimates for the ARMA(4,4) model of quarter-over-quarter changes in scaled accruals:

$$\left(\frac{ACC_t^f}{TA_{t-1}^f} - \frac{ACC_{t-1}^f}{TA_{t-2}^f}\right) = c + \phi(L)\left(\frac{ACC_t^f}{TA_{t-1}^f} - \frac{ACC_{t-1}^f}{TA_{t-2}^f}\right) + (1+\theta(L))\varepsilon_t^f.$$

The variables ACC_t^f and TA_t^f are the period-t accruals and total book assets reported for firm f, respectively. The ε_t^f terms are taken to be of zero mean and normally distributed with common variance σ^2. The lag polynomials $\phi(L)$ and $\theta(L)$ are of the form:

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4,$$

respectively. Parameters are estimated using the method of maximum likelihood. Standard errors are calculated by taking the outer-product of the numerically-computed gradient of the likelihood function. We obtained a total of 33,915 observations corresponding to 1,284 unique firms.

Table V
ARMA(4,4) Estimates for *DACC*.

Parameter	Estimate	t-Statistic
c	-0.0052	4.01
ϕ_1	-0.0128	8.73
ϕ_2	0.0124	0.50
ϕ_3	0.0155	0.90
ϕ_4	0.0625	0.76
θ_1	-0.0270	1.57
θ_2	-0.0135	0.52
θ_3	-0.0307	1.70
θ_4	0.1257	10.46
σ	-0.1956	9723.68

The table reports parameter estimates for the ARMA(4,4) model of the undifferenced level of scaled discretionary accruals:

$$DACC_t^f = c + \phi(L)DACC_t^f + (1+\theta(L))\varepsilon_t^f,$$

where $DACC_t^f$ is the level of discretionary accruals, computed via the modified Jones method and scaled relative to the prior-quarter value of the book-value of firm assets, for firm f in fiscal period t. The ε_t^f terms are taken to be of zero mean and normally distributed with common variance σ^2. The lag polynomials $\phi(L)$ and $\theta(L)$ are of the form:

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4,$$

respectively. Parameters are estimated using the method of maximum likelihood. Standard errors are calculated by taking the outer-product of the numerically-computed gradient of the likelihood function. We obtained a total of 35,459 observations corresponding to 1,330 unique firms.

Table VI
ARMA(4,4) Estimates for Annual Changes in *DACC*

Parameter	Estimate	t-Statistic
c	-0.0039	3.23
ϕ_1	-0.0523	7.17
ϕ_2	-0.0077	0.41
ϕ_3	-0.0439	3.71
ϕ_4	-0.2153	105.08
θ_1	0.0203	2.04
θ_2	0.0132	0.76
θ_3	0.0765	5.27
θ_4	-0.3833	76.84
σ	-0.1949	7037.39

The table reports parameter estimates for the ARMA(4,4) model of year-over-year changes in scaled discretionary accruals:

$$\Delta DACC_t^f = c + \phi(L)\Delta DACC_t^f + (1+\theta(L))\varepsilon_t^f.$$

The year-over-year change in scaled accruals for firm f, $\Delta DACC_t^f$, is defined as:

$$\Delta DACC_t^f \equiv DACC_t^f - DACC_{t-4}^f,$$

where $DACC_t^f$ is the level of discretionary accruals, computed via the modified Jones method and scaled relative to the prior-quarter value of the book-value of firm assets, for firm f in fiscal period t. The ε_t^f terms are taken to be of zero mean and normally distributed with common variance σ^2. The lag polynomials $\phi(L)$ and $\theta(L)$ are of the form:

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4,$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4,$$

respectively. Parameters are estimated using the method of maximum likelihood. Standard errors are calculated by taking the outer-product of the numerically-computed gradient of the likelihood function. We obtained a total of 23,738 observations corresponding to 1,153 unique firms.

Table VII
ARMA(4,4) Estimates for Quarterly Changes in *DACC*

Parameter	Estimate	t-Statistic
c	-0.0026	4.28
ϕ_1	-0.8098	108.02
ϕ_2	-0.7017	88.09
ϕ_3	-0.4523	66.32
ϕ_4	-0.0360	6.14
θ_1	-0.1935	23.61
θ_2	-0.0718	14.87
θ_3	-0.1745	15.58
θ_4	-0.1278	12.47
σ	0.2006	11654.01

The table reports parameter estimates for the ARMA(4,4) model of quarter-over-quarter changes in discretionary accruals:

$$(DACC_t^f - DACC_{t-1}^f) = c + \phi(L)(DACC_t^f - DACC_{t-1}^f) + (1 + \theta(L))\varepsilon_t^f,$$

where $DACC_t^f$ is the level of discretionary accruals, computed via the modified Jones method and scaled relative to the prior-quarter value of the book-value of firm assets, for firm f in fiscal period t. The ε_t^f terms are taken to be of zero mean and normally distributed with common variance σ^2. The lag polynomials $\phi(L)$ and $\theta(L)$ are of the form:

$$\phi(L) = \phi_1 L + \phi_2 L^2 + \phi_3 L^3 + \phi_4 L^4$$

and

$$\theta(L) = \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \theta_4 L^4,$$

respectively. Parameters are estimated using the method of maximum likelihood. Standard errors are calculated by taking the outer-product of the numerically-computed gradient of the likelihood function. We obtained a total of 33,915 observations corresponding to 1,284 unique firms.

Table VIII
Insider Trading Around Aggressive Accounting Periods (1)

Panel A: Average Net Proceeds from Insider Trading

	Group I	Group II			Group I	Group II		
Period Length	1	2	3	4	1	2	3	4
	In Thousands of Dollars				As % of "Before" Period			
Before	3584	3028	1568	3106	0%	0%	0%	0%
During	2999	3862	2309	3700	–13.3% ‡	27.5% ‡	47.3% ‡	19.1% §
After	2784	3333	1141	2121	–22.3% ‡	10.1% ‡	–28.3% ‡	–32.7% §

Panel B: Benchmark-Firm Net Proceeds from Insider Trading

	Group I	Group II			Group I	Group II		
Period Length	1	2	3	4	1	2	3	4
	In Thousands of Dollars				As % of "Before" Period			
Before	3701	3644	3344	3799	0%	0%	0%	0%
During	4075	3782	3465	3703	10.1% †	3.8%	3.6%	–2.5%
After	3947	3693	3233	3971	6.6% †	1.4%	–3.3%	4.5%

This table presents insider-trading patterns for firms in Groups I and II. Group-I firms exhibited "aggressive" (top quintile) levels of discretionary accruals for exactly one quarter. Group-II firms exhibited aggressive levels of discretionary accruals for two or more quarters.

Panel A presents average quarterly net proceeds from insider sales, in thousands of dollars (left) and as a percentage of the net-dollar sales in the "Before" period (right), of Group-I and Group-II firms in the quarter prior to the aggressive-accounting period ("Before"), during the aggressive-accounting period ("During"), and in the quarter that follows the aggressive-accounting period ("After").

For comparison, we include the trading behavior of firms in the middle quintile of discretionary accruals. For instance, if we include an observation of trading proceeds for firm "X" in the second quarter of 2000 in the "Group I, Before" category in Panel A, then we place an observation of the average proceeds for the middle quintile firms in that quarter into the "Group I, Before" category in panel B. We average the middle-quintile observations in each category to form the "Benchmark" values reported in panel B. The signs §, †, and ‡ represent significance at the 10%, 5%, and 1% levels, respectively.

Table IX
Insider Trading Around Aggressive Accounting Periods (2)

Panel A: Net Number of Shares Traded by Insiders

	Group I	Group II			Group I	Group II		
Period Length	1	2	3	4	1	2	3	4
	In Thousands of Shares				Change from "Before" Period, in %			
Before	108.1	90.1	42.0	107.2	0%	0%	0%	0%
During	95.2	107.8	74.4	163.3	−11.3% ‡	19.6% ‡	77.1% †	52.3%
After	66.9	78.5	25.9	65.2	−38.1% ‡	−12.9% ‡	−30.3% †	−39.8%

Panel B: Net Number of Shares Traded by Benchmark-Firm Insiders

	Group I	Group II			Group I	Group II		
Period Length	1	2	3	4	1	2	3	4
	In Thousands of Shares				Change from "Before" Period, in %			
Before	177.3	187.8	182.4	166.1	0%	0%	0%	0%
During	184.3	176.9	181.3	170.9	3.9% §	−5.8% †	−0.5%	2.9%
After	163.4	180.6	177.8	165.5	−7.8% †	−2.8%	−2.5%	−0.4%

This table presents insider-trading patterns for firms in Groups I and II. Group-I firms exhibited "aggressive" (top quintile) levels of discretionary accruals for exactly one quarter. Group-II firms exhibited aggressive levels of discretionary accruals for two or more quarters.

Panel A presents the quarterly average net number of shares sold by insiders, in thousands of shares (left) and as a percentage of the net-shares sales in the "Before" period (right), of Group-I and Group-II firms in the quarter prior to the aggressive-accounting period ("Before"), during the aggressive-accounting period ("During"), and in the quarter immediately after the aggressive accounting period ("After").

For comparison, we include the trading behavior of firms in the middle quintile of discretionary accruals. For instance, if we include an observation of net sales for firm "X" in the second quarter of 2000 in the "Group I, Before" category in Panel A, then we place an observation of the average net sales for the middle quintile firms in that quarter into the "Group I, Before" category in panel B. We average the middle-quintile observations in each category to form the "Benchmark" values reported in panel B. The signs §, †, and ‡ represent significance at the 10%, 5%, and 1% levels, respectively.

Table X
Aggressive Accounting and Stock Returns

Panel A:
Average Book-to-Market and Size-Adjusted Quarterly Returns
During Aggressive Accounting Periods

	Group I	Group II		
Period Length (In Quarters)	1	2	3	4
Number of Firms	7160	1414	304	99
Avg. Quarterly Returns	1.41%	3.13%	3.18%	4.09%
1st Quarter	1.41%	5.44%	6.81%	11.97%
2nd Quarter		0.82%	5.14%	12.08%
3rd Quarter			−2.41%	0.32%
4th Quarter				−7.98%

Panel B:
Long-Horizon Book-to-Market and Size-Adjusted Returns
Following Aggressive Accounting Periods

	Aggressive-Period Length			
	Group I	Group II		
Holding Period	1	2	3	4
1 Year	4.33%	−0.35%	− 5.06%	−24.69%
2 Years	4.16%	−0.96%	−33.93%	−32.22%
3 Years	9.68%	−1.45%	−52.60%	−21.72%

This table presents book-to-market and size-adjusted returns for Group-I and Group-II firms. Group-I firms exhibited "aggressive" (top quintile) levels of discretionary accruals for exactly one quarter. Group-II firms exhibited aggressive levels of discretionary accruals for two or more quarters.

Panel A presents the average quarterly book-to-market and size-adjusted returns during aggressive accounting period. Panel B displays the book-to-market and size-adjusted returns over the one-, two- and three-years following consecutive periods of aggressive accounting. Returns are calculated starting with the first quarter following the "aggressive period".