DO INVESTORS OVERVALUE FIRMS

WITH BLOATED BALANCE SHEETS?

David Hirshleifer*

Kewei Hou*

Siew Hng Teoh*

Yinglei Zhang*

*Fisher College of Business, Ohio State University.
Hirshleifer: hirshleifer_2@cob.osu.edu, http://fisher.osu.edu/fin/faculty/hirshleifer/;
Hou: hou.28@osu.edu, http://fisher.osu.edu/fin/faculty/hou/;
Teoh: teoh_2@cob.osu.edu; Zhang: zhang.246@osu.edu

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When cumulative net operating income (accounting value-added) outstrips cumulative free cash flow (cash value-added), subsequent earnings growth is weak. If investors with limited attention focus on accounting profitability, and neglect information about cash profitability, then net operating assets, the cumulation of the discrepancies between the two, measures the extent to which reporting outcomes provoke over-optimism. During the 1964-2002 sample period, net operating assets scaled by total assets is a strong negative predictor of long-run stock returns. Predictability is robust with respect to an extensive set of controls and testing methods.

1. Introduction

Information is vast, and attention limited. People therefore simplify their judgments and decisions by using rules of thumb, and by processing only subsets of available information. Experimental psychologists and accountants document that individuals, including investors and financial professionals, concentrate on a few salient stimuli (see e.g., the surveys of Fiske and Taylor (1991) and Libby, Bloomfield, Nelson (2002)). Doing so is a cognitively frugal way of making good, though suboptimal decisions. An investor who values a firm based on its earnings performance rather than performing a complete analysis of financial variables is following such a strategy.

Several authors have argued that limited investor attention and processing power cause systematic errors that affect market prices.[1] Systematic errors may derive from a failure to think through the implications of accounting rule changes or earnings management. However, even if accounting rules and firms' discretionary accounting choices are held fixed, some operating/reporting outcomes will highlight positive or negative aspects of performance more than others.

In this paper, we propose that the level of net operating assets — defined as the difference on the balance sheet between all operating assets and all operating liabilities — measures the extent to which operating/reporting outcomes provoke excessive investor optimism. We will argue that the financial position of a firm with high net operating assets is less attractive than superficial appearances suggest. In other words, a high level

[1] See, e.g., Hirshleifer and Teoh (2003), Hirshleifer, Lim and Teoh (2003), Hong, Torous, and Valkanov (2003), Hong and Stein (2003), Pollet (2003), Della Vigna and Pollet (2003), and the review of Daniel, Hirshleifer and Teoh (2002).

of net operating assets, scaled to control for firm size, indicates a lack of sustainability of recent earnings performance.

A basic accounting identity states that a firm's net operating assets are equal to the cumulation over time of the difference between net operating income and free cash flow (see Penman (2004), p.230 for the identity in change form):

$$Net\ Operating\ Assets_T = \sum_0^T Operating\ Income_t - \sum_0^T Free\ Cash\ Flow_t \qquad (1)$$

Thus, net operating assets are a cumulative measure of the deviation between accounting value added and cash value added — 'balance sheet bloat'.

An accumulation of accounting earnings without a commensurate accumulation of free cash flows raises doubts about future profitability. In fact, we document that high normalized net operating assets (indicating relative weakness of cumulative free cash flow relative to cumulative earnings) is associated with a rising trend in earnings that is not subsequently sustained. Furthermore, as argued in more detail in Section 2, high net operating assets may provide a warning signal about the profitability of investment.

If investors have limited attention and fail to discount for the unsustainability of earnings growth, then firms with high net operating assets will be overvalued relative to those with low net operating assets. In the long run, such mispricing will on average be corrected. This implies that firms with high net operating assets will on average earn negative long-run abnormal returns, and those with low net operating assets will earn positive long-run abnormal returns.

To understand the determinants of investor perceptions in greater depth, we can alternatively decompose net operating assets as follows. Since free cash flow is the difference between cash flow from operations and investment, we obtain:

$$\begin{aligned} \textit{Net Operating Assets}_T &= \sum_0^T \textit{Operating Income}_t - \sum_0^T (\textit{Operating Cash Flow}_t - \textit{Investment}_t) \\ &= \sum_0^T (\textit{Operating Income Before Depreciation}_t - \textit{Operating Cash Flow}_t) \\ &\quad + \sum_0^T (\textit{Investment}_t - \textit{Depreciation}_t). \end{aligned} \tag{2}$$

Equation (2) indicates that net operating assets is the sum of two cumulative differences between accounting and cash value added: (Operating Income Before Depreciation − Operating Cash Flow), and (Investment − Depreciation). Thus, firms with high net operating assets have high cumulative deviation between accounting and cash profitability derived from both operating and investing activities. Simplifying (2) yields

$$\textit{Net Operating Assets}_T = \sum_0^T \textit{Operating Accruals}_t + \sum_0^T \textit{Investment}_t, \tag{3}$$

which expresses net operating assets as the sum of cumulative operating accruals, and cumulative investment.

Two simple examples illustrate how a transaction can increase accounting profitability relative to cash basis profitability, contributing to balance sheet bloat (Section 2 describes the range of possible cases more fully). First, when a firm books a sale as a receivable before it has received the actual cash inflow, its net operating assets increase. Second, when a firm records an expenditure as an investment rather than an expense, its net operating assets increase. In both these cases, current accounting profitability may not be sustained in the future, so investors who focus on accounting income may overvalue the firm.

A possible reason why high net operating assets may be followed by disappointment is that the high level is a result of an extended pattern of earnings management that must soon be reversed; see Barton and Simko (2002).[2] Alternatively, even if firms do not deliberately manage investor perceptions, investors with limited attention may fail to make full use of available accounting information. Thus, the interpretation of net operating assets that we provide in this paper accommodates, but does not require, earnings management.[3]

Net operating assets can provide a more complete proxy for investor misperceptions than the measures used in past literature for two reasons. First, net operating assets by definition consist of the deviations between cash and accounting profitability, rather than merely being correlated with these deviations.[4]

Second, under our hypothesis, flow variables such as accruals provide only a fragmentary indicator of the degree to which operating/reporting outcomes provoke excessive investor optimism. As equations (1) and (2) indicate, net operating assets reflect the full history of flows. If investors with limited attention do not make full use of balance sheet information, then net operating assets is potentially a more comprehensive

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[2] If investors overvalue a firm that manages earnings upward, the price will tend to correct downward when further earnings management becomes infeasible. Barton and Simko provide evidence from 1993-1999 that the level of net operating assets inversely predicts a firm's ability to meet analysts' forecasts. Barton and Simko's perspective further suggests that low net operating assets constrain firms' ability to manage earnings downward (in order to take a big bath or create 'rainy day' reserves; see DeFond (2002)). Choy (2003) documents that the Barton and Simko (2002) finding derives from industry variations in net operating assets.

[3] A branch of the accruals literature provides evidence that managers take advantage of investor naiveté about accruals to manage perceptions of auditors, analysts, and investors. See, e.g., Teoh, Welch, and Wong (1998a, b), Rangan (1998), Ali, Hwang and Trombley (2000), Bradshaw, Richardson, and Sloan (2000), Xie (2001), and Teoh and Wong (2002).

[4] For example, current-period operating accruals are negative predictors of stock returns for up to two years ahead (Sloan (1996)). Our hypothesis that investor misperceptions result from deviations between accounting and cash profitability suggests that an index of misperceptions should reflect both working capital accruals and the deviation between investment and depreciation (see equation (2)). By incorporating depreciation but not investment, operating accruals do not fully capture the latter deviation.

return predictor than the single-period slices considered in past literature.[5] Alternative measures of accruals, a flow variable, have been found to have different explanatory power for returns (see, e.g., Collins and Hribar (2002), Teoh, Welch, and Wong (1998a, b), and Thomas and Zhang (2002)). Richardson, Sloan, Soliman, and Tuna (2003) and Fairfield, Whisenant and Yohn (2003) report evidence of one-year-ahead stock return predictability based upon the most recent period operating and investing accruals. We document here that the level of normalized net operating assets has greater power, over a longer horizon, to predict returns than the associated flow variables.

To test for investor misperceptions of firms with bloated balance sheets, we measure stock returns subsequent to the reporting of net operating assets. The level of net operating assets scaled by beginning total assets (hereafter NOA) is a strong and robust negative predictor of future stock returns for at least three years after balance sheet information is released. We call this the *sustainability effect*, because high NOA is an indicator that past accounting performance has been good but that equally good performance is unlikely to be sustained in the future; and that investors with limited attention will overestimate the sustainability of accounting performance.

A trading strategy based upon buying the lowest NOA decile and selling short the highest NOA decile is profitable in 35 out of the 38 years in the sample, and averages equally-weighted monthly abnormal returns of 1.24 %, 0.83% and 0.57%, all highly significant, in the first, second and third year, respectively, after the release of the balance sheet information. The effect remains strong with value weights, and further risk adjustments using factor models.

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[5] A stock measure is also simpler, as it derives from the current year balance sheet, whereas a flow measure is calculated as a difference across years in balance sheet numbers.

The effect also remains strong after including various past return measures and current-period operating accruals in Fama and MacBeth (1973) cross-sectional regressions. The coefficient on NOA is highly statistically significant, indicating that the sustainability effect is distinct from the monthly contrarian effect (Jegadeesh (1990)), the momentum effect (Jegadeesh and Titman 1993), the long-run winner/loser effect (DeBondt and Thaler (1985), and the accruals anomaly (Sloan (1996)). In addition, since book-to-market and past returns are measures of past and prospective growth, these controls suggest that the findings are not a risk premium effect associated with the firm's growth rate. Furthermore, the ability of NOA to predict returns is robust with respect to the scaling variable, and to eliminating from the sample firms with equity issuance or M&A activity exceeding 10% of total assets.

The evidence from the negative relation between NOA and subsequent returns suggests that investors do not optimally use the information contained in NOA to assess the sustainability of performance. A Mishkin (1983) test that includes accruals, cash flows, and NOA as forecasting variables of future earnings and returns is consistent with investor overoptimism about the earnings prospects of high-NOA firms.

Further tests indicate that NOA remains a strong return predictor after additionally controlling for the sum of the last three years' operating accruals, and the latest change in NOA. These findings suggest that NOA provides a cumulative measure of investor misperceptions about the sustainability of financial performance that captures information beyond that contained in flow variables such as operating accruals or the latest change in NOA.

Finally, we find that the sustainability effect has continued to be strong during the most recent 5 years. The sustainability effect was strongest in 1999 coinciding with the recent boom market, and the predictive power of NOA is robust to the exclusion of this year. The predictive effect of NOA remained strong even during the market downturn in 2000. Thus, it seems that arbitrageurs were not, in our sample, fully alerted to NOA as a return predictor.

2. Motivation and Hypotheses

A premise of our hypothesis is that investors have limited attention and cognitive processing power. Theory predicts that limited attention will affect market prices and trades in systematic ways. In the model of Hirshleifer and Teoh (2003), information that is more salient or which requires less cognitive processing is used by more investors, and as a result is impounded more fully into price. Investors' valuations of a firm therefore depend on how transactions are categorized and presented, holding information content constant. Reporting, disclosure, and news outcomes that highlight favorable aspects of the available information set imply overpricing, and therefore negative subsequent abnormal stock returns. Similarly, outcomes that highlight adverse aspects imply undervaluation, and positive long-run abnormal stock returns.

Several empirical findings address these propositions. There is evidence that stock prices react to the republication of obscure but publicly available information when provided in a more salient or easily processed form.[6] Furthermore, there is evidence that market prices do not reflect long-term information implicit in demographic data for future

[6] See Ho and Michaely (1988); the empirical tests and debate of the 'extended functional fixation hypothesis' in Hand (1990, 1991) and Ball and Kothari (1991); and Huberman and Regev (2001).

industry product demand (Della Vigna and Pollet (2003)), and that a shock arising in a specific industry takes time to be impounded in the stocks of firms in other industries.[7]

Hirshleifer and Teoh (2003) predict that stocks with high disclosed but unrecognized employee stock option expenses should on average earn negative long-run abnormal returns, as should firms with large positive discrepancies between disclosed pro forma versus GAAP definitions of earnings. Subsequent tests confirm these implications (Doyle, Lundholm and Soliman (2003), Garvey and Milbourn (2004)).

If attention is sufficiently limited, investors will tend to treat an information category such as earnings uniformly, i.e., functional fixation, even when, owing to different accounting treatments, its meaning varies. Several empirical studies examine the effects of accounting rules or discretionary accounting choices by the firm on market valuations. Since such treatments affect earnings, they will affect the valuations of investors who use earnings mechanically, even if the information content provided to observers is held constant. As discussed in the review of Kothari (2001), the empirical evidence from tests of such 'functional fixation' is mixed.

The operating accruals anomaly of Sloan (1996) is a natural implication of limited attention; more processing is required to examine each of the cash flow and operating accrual pieces of earnings separately than to examine earnings alone. However, this argument does not explain why investors focus on earnings alone rather than cash flow alone.

If scarce investor attention is to be assigned to a single flow measure of value-added, the earnings may be the better choice. Past research shows that there is information in

[7] Recent tests identify industry lead-lags effects in stock returns lasting for up to two months (Hong, Torous, and Valkanov (2003) and Pollet (2003)); the mispricing identified in our study is more persistent.

operating accruals that makes earnings more highly correlated than cash flow with contemporaneous stock returns (Dechow (1994)). This may explain why in practice, valuation based on earnings comparables (such as P/E and PEG ratios) is common. Nevertheless, a pure focus on earnings leads to systematic errors, as it neglects the incremental information contained in cash flow value-added.

The level of net operating assets can help identify those operating/reporting outcomes that highlight the more positive versus negative aspects of performance, thereby provoking investor errors. As discussed in the introduction, it does so by providing a cumulative measure of the difference over time between accounting value added (earnings) and cash value added (free cash flow). Cumulative net operating income measures the success of the firm over time in generating value after covering all operating expenses, including depreciation. Similarly, cumulative free cash flow measures the success of the firm over time in generating cash flow in excess of capital expenditures.

If past free cash flow deserves positive weight, along with past earnings, in a rational forecast of the firm's future earnings, then the deviation between the two (the excess of earnings over free cash flow) will contain adverse information about future changes in earnings incremental to the information contained in past earnings. An investor who naively forms valuations based upon the information in past earnings will tend to esteem a firm with high net operating assets for its strong earnings stream, without discounting adequately for the firm's relative weakness in generating free cash flow.

This argument does not require that cumulative free cash flow be a more accurate measure of value added than cumulative earnings, nor that accounting accruals be largely noise. Even if earnings is as good or better a predictor of future profits as free cash flow, there can be mispricing so long as investors overweight earnings. What the argument does require is that cumulative free cash flows contain some incremental information about the firm's prospects that is not subsumed by cumulative earnings.

There are at least two reasons why cumulative free cash flow is incrementally informative beyond cumulative earnings about future prospects. First, since accruals and cash flows have different persistence (Dechow (1994)), information about the separate pieces provides better forecasting power than knowing earnings alone. Second, free cash flow additionally reflects the information embodied in cumulative investment levels, which can be correlated with future firm performance both directly, and in interaction with operating accruals.[8]

With regard to the first point (the predictive power of the split of earnings between cash flow and operating accruals), if high cumulative accruals derive from earnings management, then these adjustments may not accurately reflect the economic condition of the firm. Even if accruals are informative, such noise reduces the optimal weight that a rational forecaster should place on past earnings versus cash flows in predicting future performance.

Even if managers do not manage earnings, certain types of problems in the firm's operations will tend to increase net operating assets, such as high levels of lingering,

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[8] Since our focus is on the difference between accounting value-added versus cash value-added, it is most helpful to think of the above two reasons, and the detailed support arguments that follow, as referring to cumulative non-depreciation operating accruals, and to investment in excess of depreciation (as in the decomposition in equation (2)). However, since previous literature has focused on accruals, for convenient brevity we refer simply to cumulative operating accruals and cumulative investment.

unpaid receivables.[9] To the extent that high receivables may not be fully realized in cash, they contain adverse incremental information (beyond that in past earnings) about future earnings. Therefore, when high cumulative working capital accruals increase net operating assets, an investor who fails to discount for adverse information about low quality receivables will overvalue the firm.

A mirror image of this reasoning applies to firms with high cumulative deferred revenues. Customer cash advances not yet recognized as revenues on the income statement increase cash flow relative to earnings, and so decrease net operating assets. If high deferred revenues are indicative of future earnings to come, deferred revenues contain favorable incremental information (beyond that in past earnings) about future earnings. So when high cumulative cash advances decrease net operating assets, an investor who fails to take into account the favorable information contained in the high deferred revenues will tend to undervalue the firm.

Combining these elements, we see that high cumulative working capital accruals that derive, for example, from high unpaid receivables or low deferred revenues increase net operating assets, contain adverse information about future earnings prospects. Such working capital accruals will encourage investors with limited attention to overvalue the firm.[10] This implies that high net operating assets are associated with low subsequent stock returns.

[9] Although receivables are short-term, the worst receivables will tend to linger, stretching the period during which accruals accumulate. Furthermore, if the lingering of receivables today is indicative of a high failure rate on new receivables in the next year, the problem telescopes forward. Such chaining of bad receivables will tend to elongate the period during which mispricing corrects out.

[10] High net operating assets firms have high past earnings and earnings growth, which on average predicts higher future earnings as well. So we do not argue that future earnings will be lower for high net operating assets firms than for low net operating assets firms, but that the earnings of

We now turn to the second point, that the investment piece of cumulative free cash flow may provide information about future performance (incremental to the information contained in earnings). As equation (3) makes clear, even a firm that has zero operating accruals can have high net operating assets. High cumulative investment can be a favorable indicator about investment opportunities, but can also indicate low future profitability if this level results from empire-building agency problems or managerial overoptimism. Even investment with positive net present value may be associated with low future profits if this investment is a result of obsolescence of the firm's fixed assets.

Regardless of whether high investment is associated with high or low future profitability, if investors are over-optimistic about the relation between investment and future profitability, they will overvalue high-investment firms. For example, if investors with limited attention focus on earnings without conditioning on investment, then they will not fully discount for the fact that high investment today is associated with earnings-reducing depreciation in the future. Furthermore, a possible reason for a high cumulative investment level is that certain expenditures that are not certain of providing long-term payoffs are classified as investments rather than as expenses (possibly, though not necessarily, because of earnings management). If investors fail to discount fully for this possibility, they will tend to overvalue firms with high investment levels.

Furthermore, cumulative investment and cumulative accruals can interact as forecasters of earnings. We have argued that a high level of cumulative accruals is a warning signal that investors may be too optimistic about the firm's future prospects. In

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high net operating assets firms will on average decline, whereas the earnings of low net operating assets firms will increase. Our discussion below concerns the adverse information about firm prospects contained in the investment piece of free cash flow, which is incremental to the favorable information contained in past earnings growth.

such a circumstance, high cumulative investment tends to be a further indicator of overvaluation, because it indicates that the firm is investing heavily at a time when investors are overoptimistic about prospects for profitable growth.

Again, such investment could be a result of managerial agency problems and bias. Alternatively, as mentioned before, even positive net present value investment may be correlated with low future profits if the need for investment is a result of obsolescence of the firm's fixed assets (consistent with low unbooked sales). For example, when customer advances decline, new investment in production facilities may be necessary to maintain product quality and market share, and hence the preexisting level of the net cash flow stream. Finally, even if the investment is associated with substantial payoffs, investors who do not attend to adverse balance sheet information about operations may overestimate the return on investment. These possibilities all suggest that the combination of high cumulative operating accruals and high cumulative investment is an indication that the firm is unlikely to sustain investor expectations about profit increases.

Selecting firms based on high net operating assets reflects both positive and adverse aspects of accruals and investment. [11] Rising cumulative accruals can reflect growth and cash to come, but can also indicate lingering problems in converting accruals into actual cash flow. High cumulative investment can reflect strong investment opportunities, but can also reflect overinvestment, a need to replace obsolescent fixed assets, or that the accounting system has classified some expenditure with short-term payoff as long-term investment.

[11] Net operating assets can be high even though either cumulative investment or cumulative accruals is low. However, since high net operating assets is the sum of cumulative investment and accruals, statistically it will be associated with high levels of both.

High earnings and earnings growth per se are indicators of good business conditions and growth opportunities, and may be associated with high accruals and investment. If strong earnings are in large part corroborated by strong cash flow, then business conditions are more likely to be good, high accruals are more likely to be converted into future cash flow, and investment may add substantial value.

However, high net operating assets firms are selected not by earnings growth per se, but by the relative shortfall between free cash flow and earnings. When this shortfall is large, the favorable cumulative earnings performance receives relatively little corroboration from cash flow net of investment expenditures. This situation calls forth the dark side of accruals and investment—at least relative to investors' optimistic forecasts. Investors with limited attention do not put sufficient weight on the possibility that the high cumulative investment of these firms represents either overinvestment, replacement of obsolescent fixed assets, or investment with relatively transient payoff. They will therefore overvalue firms with high net operating assets and undervalue firms with low net operating assets.

Reinforcing intuition is provided by equation (2). The last two terms reflect the difference between cumulative investment and cumulative depreciation. For a firm in a zero-nominal-growth steady state, current investment is equal to current depreciation, so the latest change in net operating assets is equal to the non-depreciation operating accruals. Thus, a firm with high net operating assets is likely to have had high growth, in the sense that cumulative investment has been higher than cumulative depreciation, and to have had high non-depreciation accruals. This decomposition confirms the intuition discussed earlier that scaled net operating assets proxies both for misinterpretations relating to investment activity and to operating accruals.[12]

Finally, by equation (3), firms with high net operating assets will tend to have high cumulative past investment. If the investment exceeded internally generated cash, they must have financed some of this investment through external finance. It is therefore useful to verify whether any relation between scaled net operating assets and subsequent stock returns is incremental to the new issues puzzle of Loughran and Ritter (1995). We describe such tests in Subsection 4.2.

3. Sample Selection, Variable Measurement, and Data Description

Starting with all NYSE/AMEX and NASDAQ firms in the intersection of the 2002 COMPUSTAT and CRSP tapes, the sample period spans 462 months from July 1964 through December 2002. To be included in the analysis, all firms are required to have sufficient financial data to compute accruals, net operating asset, firm size, and book-to-market ratio. This results in an initial sample of 1,625,570 firm-month observations. Further restrictions are imposed for some of our tests.

3.1 Measurement of NOA, Earnings, Cash Flows, and Accruals

Scaled net operating assets (NOA) are calculated as the difference between operating assets and operating liabilities, scaled by lagged total assets, as:

$$NOA_t = (Operating\ Assets_t - Operating\ Liabilities_t) / Total\ Assets_{t-1} \quad (4)$$

[12] In the decomposition of equation (2) the latest change in net operating assets is equal to the sum of current operating accruals and current investment. To the extent that net operating assets is a proxy for growth, any ability of scaled net operating assets to predict returns can reflect risk rather than market inefficiency. It is therefore important in empirical testing to control for growth-related risk measures.

Operating assets are calculated as the residual from total assets after subtracting financial assets, and operating liabilities are the residual amount from total assets after subtracting financial liabilities and equity, as follows:

$$Operating\ Assets_t = Total\ Assets_t - Cash\ and\ Short\text{-}Term\ Investment_t \quad (5)$$

$$Operating\ Liabilities_t = Total\ Assets_t - Short\text{-}Term\ Debt_t - Long\text{-}Term\ Debt_t - Minority\ Interest_t - Preferred\ Stock_t - Common\ Equity_t\,. \quad (6)$$

Table 1 provides the associated Compustat item numbers. We also consider an alternative net operating asset calculation in subsection 4.1.3 because some items are inherently difficult to classify as either operating or financing.

The accounting firm performance variables, *Earnings* and *Cash Flows*, are defined respectively as income from continuing operations (Compustat#178)/lagged total assets, and as *Earnings – Accruals.* The latter variable is operating accruals, and is calculated using the indirect balance sheet method as the change in non-cash current assets less the change in current liabilities excluding the change in short-term debt and the change in taxes payable minus depreciation and amortization expense, deflated by lagged total assets,

$$Accruals_t = [(\Delta Current\ Assets_t - \Delta Cash_t) - (\Delta Current\ Liabilities_t - \Delta Short\text{-}term\ Debt_t - \Delta Taxes\ Payable_t) - Depreciation\ and\ Amortization\ Expense_t]/Total\ Assets_{t-1}. \quad (7)$$

As in previous studies using operating accruals prior to SFAS #95 in 1988, we use this method to ensure consistency of the measure over time, and for comparability of results with the past studies. We include Accruals and the most recent change in NOA scaled by beginning total assets as control variables to evaluate whether NOA provides incremental predictive power for returns.

When calculating net operating assets and operating accruals, if short-term debt, taxes payable, long-term debt, minority interest, or preferred stock has missing values, we treat these values as zeroes to avoid unnecessary loss of observations. Because we scale by lagged assets, the Earnings variable reflects a return on assets invested at the beginning of the period. The stock return predictability that we document remains significant when we scale by ending instead of beginning total assets, scale by current or lagged sales, and impose a number of robustness data screens such as excluding firms in the bottom size deciles or stock price less than 5 dollars.

3.2 Measurement of Asset Pricing Control Variables

We employ a number of known cross-sectional determinants of stock returns in our tests of return predictability. Size is the market value of common equity (in millions of dollars) measured as the closing price at fiscal year end multiplied by the number of common shares outstanding. The book-to-market ratio is the book value of common equity divided by the market value of common equity, both measured at fiscal year end.

In addition to these two variables, we also include a number of past return proxies to control for the one month-reversal, 12-month momentum, and three-year reversal effect, all measured relative to the test month *t* of returns. Ret(-1:-1) is the return on the stock in month *t-1*. Ret(-12:-2) is the cumulative return from month *t-12* through month *t-2*. Finally, Ret(-36:-13) is the cumulative return from month *t-36* through month *t-12*. Thus, the return control variables are updated each month. The NOA, Accruals, Size and Book-to-market variables, however, are only updated every 12 months.

3.3 Summary Statistics

Table 1 reports the mean and median values for selected characteristics of NOA deciles, where firms are ranked annually by NOA and sorted into ten portfolios. Net operating assets vary from about a median of 26% of lagged total assets in the lowest NOA decile to about 145% in the highest NOA decile. This suggests that high NOA firms are likely to have experienced recent very rapid growth,[13] which opens the possibility that investors may have misperceived the sustainability of this growth.

Table 1 reports that Low NOA firms in the ranking year experience poor earnings performance while high NOA firms experience good earnings performance; earnings vary monotonically from a median of 0% for NOA decile 1 to 13.6% for NOA decile 10. This difference in performance is driven by large differences in Accruals across NOA deciles. Accruals increase monotonically across NOA deciles for both mean and median measures; from -9.1% median for NOA decile 1 to +13.4% median for NOA decile 10. Operating Cash Flows do not vary monotonically across deciles. NOA decile 10, however, has significantly lower Cash Flows than all other deciles. NOA decile 1's Cash Flows are similar to those of NOA decile 8 and 9, and are slightly lower than the Cash Flows in deciles 2 through 7, which are quite similar to each other.

The high level of Earnings for NOA decile 10 despite its extreme low level of Cash Flows reflects the extremely high Accruals in NOA decile 10 (see the discussion of M&A activity above). Similarly, the extreme negative accruals for NOA decile 1 contribute to the portfolio's low Earnings despite its moderate level of Cash Flows.

Turning to stock market characteristics, Table 1 indicates that extreme (both high

[13] Equations (2) and (3) suggest that new investments and M&A activity are likely to have contributed to the high growth in the top NOA decile. M&A, however, is not necessarily the cause of the relation between NOA and returns that we report in later sections. As we will discuss, the effects we describe are not limited to the extreme NOA deciles, and NOA predicts future returns even after excluding firms with M&A activity exceeding 10% of total assets.

and low) NOA firms have the smallest size measured by either book value of equity or market value of equity; the lowest book-to-market ratios;[14] and the highest betas. Thus, the extreme deciles seem to be small, possibly high growth orientated or overvalued, and risky firms. It is therefore essential to control carefully for risk in measuring abnormal returns.

Put Table 1 about here.

Table 2 reports the correlations between NOA, the variable of interest, and various performance measures and firm characteristics. NOA is persistent; the correlation between NOA and lagged NOA is positive and significant. As might be expected from equation (3), NOA and Accruals are positively correlated. Also consistent with Table 1 findings, the Spearman correlations indicate that NOA is positively correlated with Earnings and with Cash Flows.[15] While Table 1 shows similar characteristics in terms of size, beta, and book-to-market for extreme levels of NOA relative to the middle deciles, the correlations indicate that NOA is negatively correlated with beta, and positively correlated with firm size, measured as book value or market value, and with book-to-market.

Put Table 2 about here.

3.4 Industry Distribution Across NOA Deciles

Table 3 reports the industry distribution of our sample across NOA deciles pooled

[14] The mean book-to-market ratios in deciles 2 and 8 are similar to median measures after trimming extreme values at the 0.5% level.

[15] Because of outliers, the Pearson and Spearman correlations are of the opposite sign for NOA with Earnings and with Cash Flows. After trimming the extremes at 0.5% the sign of Pearson correlations match the sign of the Spearman correlations. The non-monotonicity of Cash Flows in Table 1 may also contribute to the inconsistent signs between Pearson and Spearman correlations between NOA and Cash Flows.

across all sample years. Following Barth, Beaver, and Landsman (1998), 4-digit SIC industries are grouped into fourteen industry groups. Panel A reports the percentage of firms in each industry group for each NOA decile. Comparing between extreme NOA deciles 1 and 10, there is relatively lower presence in the Agriculture, Mining and Construction, Food, and Chemicals industry groups. The extreme NOA deciles have a higher presence in Durable Manufacturers, Computers, Retail, and Services industry groups. In addition, NOA decile 1 has a relatively high presence in the Pharmaceuticals and Financial groups, and a relatively lower presence in the Extractive and Utilities groups.[16] NOA decile 10 has a relatively higher presence in the Extractive and Utilities industry groups.

Panel B reports the percentage of firms in each NOA decile within each industry group. Looking across NOA deciles, the extreme NOA deciles (1 and 10) have a relatively larger presence in Mining and Construction, Financial, and Services industry groups. Low NOA deciles additionally have a larger presence among Pharmaceuticals, and Computers, and high NOA deciles have a larger presence among Agriculture, Extractive, and Transportation industry groups. Given the industry variation in NOA noted here, our main findings remain strong with industry-demeaned NOA; see also Zhang (2004) for an analysis of the relation between industry NOA, firm deviation from the industry NOA, and future returns.

Put Table 3 about here.

4. The Sustainability Effect

[16] We include the financial industry in our tests (4-digit SIC codes from 6000-6999). Excluding it does not change the qualitative nature of our results.

We have hypothesized that a high level of net operating assets is an indicator of strong past earnings performance, but also of deteriorating future financial prospects. We have also hypothesized that investors with limited attention neglect this adverse indicator, leading to stock return predictability. We first evaluate these hypotheses by presenting the time profile of accounting and stock return performance in the periods surrounding the ranking year for NOA deciles. We then test the ability of NOA to predict stock returns controlling for standard asset pricing variables and accounting flow variables.

4.1 Time Trends in Earnings and Returns for Extreme NOA Deciles

Figure 1 describes the time series means of Earnings and annual raw buy-and-hold stock returns for the extreme NOA deciles 1 and 10. Earnings for high NOA firms hit a peak—and for low NOA firms a trough—in the ranking year. High NOA is associated with upward trending Earnings over the previous several years. This upward trend sharply reverses after the ranking year, creating a continuing downward average trend in Earnings. Low NOA firms have a mirror-image trend pattern. From five years prior to the ranking year, average Earnings uniformly trends down. From the ranking year onwards, average Earnings uniformly trends upwards.

In general, behavioral accounts of over-extrapolation of earnings or sales growth trends involve a failure to recognize the regression phenomenon, so that forecasts of future earnings are sub-optimal conditional on the past time series of earnings. We see here that conditional on high NOA, Earnings (earnings normalized by lagged total assets) drops sharply. Regardless of whether there is any propensity to over-extrapolate earnings, an investor who, owing to limited attention, neglects the information contained in NOA for future earnings is in for a rude surprise.

Average Earnings is uniformly higher for high NOA firms than for low NOA firms, which reflects the respective glory or disgrace of their past. As a result, even though high NOA predicts a sharp drop in earnings, *cross-sectionally* high NOA need not predict lower future Earnings. This depends on the balance between the time-series and the cross-sectional effect.

Do high NOA firms, as hypothesized, earn low subsequent returns? The annual raw returns of high NOA versus low NOA firms display a dramatic cross-over pattern through the ranking year. High NOA firms earn higher returns than low NOA firms before the event year, and lower returns after. As the event year approaches, the (non-cumulative) annual returns of high NOA firms climb to about 45% in year –1, but the mean returns are under 5% in year +1. Low NOA firms somewhat less markedly switch from doing poorly in year –1 to well in year +1.[17] Even as far as 5 years after the event year, high NOA firms are averaging annual returns lower than those of low NOA firms.

Put Figure 1 about here.

4.1 Are High- NOA Firms Overvalued? Abnormal Returns Tests

4.1.1 Abnormal Returns by NOA Deciles

To test the sustainability hypothesis, it is important to control for risk and other known determinants of expected returns. Table 4 reports the average returns of portfolios sorted on NOA. Every month, stocks are ranked by NOA, placed into deciles, and the equal-weighted and value-weighted monthly raw and abnormal returns are computed. We

[17] Since there is a lag of between 4 to 16 months between the accounting numbers and the stock returns they are matched against, the year 0 returns may partly reflect the beginning of correction of prior misvaluation.

require at least a four-month gap between the portfolio formation month and the fiscal year end to ensure that investors have the financial statement data prior to forming portfolios. The average raw and abnormal returns and t-statistics on these portfolios, as well as the difference in returns between decile portfolio 1 (lowest ranked) and 10 (highest ranked), are reported.

We calculate abnormal returns using a characteristic-based benchmark to control for return premia associated with size, book-to-market and momentum. Whether these known return effects derive from risk or mispricing is debated in the literature; in either case, we test for an effect that is incremental to these known determinants.[18]

The benchmark portfolio is based on the matching procedure used in Daniel, Grinblatt, Titman, and Wermers (1997). All firms in our sample are first sorted each month into size quintiles, and then within each size quintile further sorted into book-to-market quintiles (excluding negative book value firms).[19] Stocks are then further sorted within each of these 25 groups into quintiles based on the firm's past 12-month returns, skipping the most recent month (e.g., cumulative return from t-12 to t-2). Stocks are weighted both equally and according to their market capitalizations within each of these 125 groups. The equal-weighted benchmarks are employed against equal-weighted portfolios, and the value-weighted benchmarks are employed against value-weighted portfolios. To form a size, book-to-market, and momentum-hedged return for any stock,

[18] The book-to-market control may be especially important, because high- or low-NOA firms potentially have different growth characteristics from other firms. Book-to-market is a standard inverse proxy for a firm's growth opportunities, since, in an efficient market, a firm's stock price reflects the value of its growth opportunities.

[19] Our requirement of valid NOA data tilts our sample toward larger firms. Employing all CRSP-listed firms (with available size, book-to-market, and past twelve-month returns) to construct the benchmarks yielded similar, if not stronger, results for both value-weighted and equal-weighted portfolios.

we simply subtract the return of the benchmark portfolio to which that stock belongs from the return of the stock. The expected value of this return is zero if size, book-to-market, and past year return are the only attributes that affect the cross-section of expected stock returns.

Using the characteristic adjustment method, Table 4 indicates that there is a strong and robust relation between a firm's NOA and its subsequent abnormal stock returns for at least 3 years after NOA is measured: In year t+1, the average monthly adjusted equally weighted return spread between lowest and highest NOA deciles is 1.24% per month (t = 10.31); in year t+2 the effect is also strong, 0.83% per month (t = 7.66), and remains highly significant in year t+3, 0.57% per month (t = 5.44).[20] The average profit of a NOA hedge strategy (by taking a long position in NOA decile 1 and a short position in NOA decile 10) is more than 88% larger than that based on operating accruals (operating accruals divided by beginning total assets; not included in table) in year t+1, a difference that grows to over 138% in year t+3.

Put Table 4 about here.

The return spreads after we further control for various asset pricing factors are generally quite similar to those basic characteristics-adjusted hedge returns. In this procedure, we estimate time series regressions with the raw or characteristic-adjusted returns of the NOA hedge portfolio as dependent variables. The independent variables are either: (1) the excess return of the market portfolio (proxied by the value-weight CRSP portfolio), (2) the Fama-French three factor model, which contains the market excess returns and returns on two factor-mimicking portfolios associated with the size

[20] These returns correspond to a trading strategy that is implementable in the sense that we do not use any ex post information to form portfolios.

effect (SMB) and the book-to-market effect (HML), or (3) a four-factor model which includes returns on a momentum factor-mimicking portfolio in addition to the previous factors.

We report the intercepts from these time-series regressions. As is commonly the case, the results are stronger using equal weights than value weights, but all intercepts are highly significant. The strong predictability of stock returns based upon NOA is consistent with the sustainability hypothesis.

These abnormal returns seem to offer a profitable arbitrage opportunity. Potential gains are larger on the short side than the long side: Mean abnormal returns tend to be larger in absolute value for the highest NOA decile (-0.73%, -0.54%, and -0.30%, all highly significant, in years t+1, t+2 and t+3 respectively) than for the lowest decile (0.51%, 0.29%, and 0.27%, all highly significant in years t+1, t+2 and t+3 respectively). However, even for an investor who is limited to long positions, substantial profits are achievable based upon the sustainability effect. In year t+1 and t+2, there are significantly positive abnormal returns associated with the five lowest ranking NOA portfolios. Significant abnormal returns are achievable using the four lowest ranked NOA portfolios in year t+3 as well. In contrast (results not reported), in this sample pure long trading is not profitable based upon the operating accruals anomaly.

Figure 2 Panel A graphs the equally-weighted profits from the NOA trading strategy broken down by year. The strategy is consistently profitable (35 out of 38 years), with the loss years occurring prior to 1973. The sustainability effect is robust with respect to the removal of the strongest year, 1999. The general conclusions for value-weighted returns in Panel B are similar, though not as uniformly consistent. In both panels, the abnormal profits are substantially larger in recent years.

Put Figure 2 about here.

The NOA profits compare favorably with those from a strategy based on going long in the lowest operating accruals decile and taking a short position in the highest operating accruals decile. For example (not reported in tables), the equally-weighted profits from an NOA strategy beat the profits from an operating accruals strategy in 28 out of 38 years. The number of years of higher profits is more evenly split for value-weighted profits. However, for both equal and value-weighted results, NOA performs much better than Accruals during the last 5 years — the accruals strategy yields significant losses in 2000, 2001, and 2002.

The greater predictive power of NOA suggests, as proposed in Section 2, that it is a better proxy for investor misperceptions, because it reflects balance sheet bloat more fully. In particular, NOA reflects a cumulative effect rather than just the current-period flow; and, reflects past investment as well as past accruals. It thereby provides a more complete measure of the deviation between past accounting value added and cash value added.

4.1.2 Fama-MacBeth Monthly Cross-Sectional Regression

In studies that try to document how investor psychology affects stock prices, there is always the question of whether the results derive from some omitted risk factor, and how independent the findings are from known anomalies. By applying the Fama-MacBeth (1973) regressions, we evaluate the relation between NOA and subsequent returns with an expanded set of controls, which consist of ln(size), and ln(B/M) (negative book value firms are excluded), and returns over past 1 month (to control for the short-term one-month contrarian effect), past 1 year (medium-term momentum effect), and past three years (long-term winner/loser effect).

Table 5 Panels A, B, and C respectively presents the Fama-MacBeth coefficients when individual stock returns are regressed on NOA measured one year, two years and three years ago. Model 1 includes standard asset pricing controls, and Model 2 additionally includes the operating accruals variable. The coefficients confirm the conclusion of past literature that these variables predict future returns.

Put Table 5 about here.

In the Model 3 regressions, NOA in each of the panels is highly significantly negatively related to cross-sectional stock returns, confirming the sustainability effect. The *t*-statistics on NOA in Model 3 are -8.98, -4.53 and –3.39 in Panels A, B and C respectively. When both Accruals and NOA are included in the Model 4 regressions, the NOA coefficients remain highly significant. These findings confirm that the ability of NOA to predict returns is incremental to other well-known predictive variables. Panel C also indicates that the NOA effect is more persistent that the Accruals effect. The NOA t+3 result remains statistically significant whereas the Accruals t+3 result becomes insignificant.

4.1.3 Robustness of the Sustainability Effect

NOA in Tables 4 and 5 is measured using the residual from total assets after subtracting selected financial assets to obtain operating assets and the residual from total assets after subtracting equity and financial liability items to obtain operating liabilities. This may inadvertently omit operating items or include financing items. For example, operating cash is often lumped together with short-term investments and so is omitted from our NOA measure. Some items could be viewed as either operating or financing. For example, long-term marketable securities can be sold in the short-term if a cash need arises, and therefore can behave like a financing rather than an operating item.[21] As a robustness check, we consider an alternative measure, NOA_alt, in which we specifically select for operating asset and operating liability items. Following Fairfield, Whisenant and Yohn (2003), operating assets include: accounts receivables, inventory, other current assets, property, plant and equipment, intangibles, and other long-term assets. Operating liabilities include accounts payable, other current liabilities, and other long-term liabilities. Table 6 notes contain the specific Compustat item numbers.

Put Table 6 about here.

Panel A of Table 6 indicates that the two measures of NOA are very similar. The means, medians, and standard deviations are almost identical, and their correlations with each other are very high. Thus, not surprisingly, all the results of Tables 4 and 5 are confirmed using NOA_alt in Table 6 Panels B and C.

Panel B reports the hedge profits from the NOA_alt trading strategy calculated from raw and characteristics-adjusted returns, and intercepts from regressing them on CAPM, the Fama-French 3-factor, or 4-factor models. For brevity, only the year +1 results are reported. All the equally-weighted and value-weighted numbers are statistically significantly positive, confirming the robustness of Table 4 findings. Similarly, Panel C Fama-Macbeth regression results confirm that NOA is a robust predictor of abnormal returns, and the NOA effect is incremental to the operating accruals effect and other asset pricing anomalies.

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[21] Goodwill can be viewed as either an operating accrual or an investment. NOA includes both operating accruals and investment, so we include goodwill as part of NOA.

4.2 Does NOA Return Predictability Derive from Other Sources?

An alternative to the sustainability hypothesis is that the NOA captures some known anomaly distinct from the return predictors we have controlled for in previous tests. For example, the predictive power of NOA might derive from current period operating accruals (Sloan (1996)), or from the issuance of new equity. To investigate these and other possibilities, in Table 7 we examine the predictive power of different components of NOA for one-year-ahead returns using Fama-Macbeth regressions.

NOA is the cumulative sum of operating accruals and cumulative investment (equation 3). Thus in addition to current period operating accruals, NOA contains the current period investment, and all past operating accruals and investment. Table 7, Panel A indicates that NOA remains highly significant as a return predictor even after controlling for Accruals in the regression. The sustainability effect is not subsumed by the accruals anomaly. This implies that investment levels and past operating accruals matter, not just the most recent operating accruals.

To verify whether it is NOA that matters, or just its latest change, Panel B reports results from regressions that consider the latest change in NOA in addition to Accruals, NOA, and the asset pricing controls. The first two regressions indicate that the coefficient on the latest change in NOA is highly statistically significant with or without Accruals in the regression. This finding is consistent with Fairfield, Whisenant, and Yohn (2003).

The next two regressions indicate that when NOA is included in the regression, regardless of whether Accruals is included, the latest change in NOA is no longer statistically significant. The NOA variable, however, is highly statistically significant. Recalling equation (3), this indicates that the cumulative total of past investment and operating accruals matters, not just the latest investment and operating accruals. Thus, there is no indication that investor misperceptions are more sensitive to current period than past period accruals and investment.

Since NOA reflects the history of past operating accruals, the preceding tests do not preclude the possibility that investment doesn't matter, so that the effect of NOA is a consequence of a simple additive impact of the history of past operating accruals. The regressions in Panel C include the sum of past three years operating accruals as an independent variable. The major remaining orthogonal component in NOA after controlling for the effects of cumulative accruals is cumulative past investment. NOA remains highly statistically significant, which indicates that cumulative investment does play a role in the strong predictive power of NOA. Comparing Panels A and B, we see that the inclusion of the sum of past three-year operating accruals instead of just the single year's lagged operating accruals barely changes the magnitude of the NOA coefficient, whereas the statistical significance of NOA increases.

The results in Panels A, B, and C together suggest that current period operating accruals, current period investment, and past period operating accruals and investment all contribute to the ability of NOA to predict returns. The sustainability effect derives from investor misperception about the ability of high operating accruals and high investments in all past periods to generate high future firm performance.

As a sensitivity analysis, we have also examined whether the NOA effect is related to the well-known new issues financing anomaly (Loughran and Ritter (1995)) by decomposing NOA into equity, debt, and cash equivalents. We have found (in unreported results) that all three components of NOA predict returns with statistical significance.

Furthermore, the ability of NOA to predict returns is robust to eliminating from the sample firms with equity issuance exceeding 10% of total assets. These findings suggest that the predictive power of NOA goes beyond that of the new issues anomaly. We have also verified that the NOA predictability for returns is robust to excluding firms with M&A activity exceeding 10% of total assets.

An earlier draft of this paper explored the interaction between NOA and single-period operating accruals using an interactive variable in a cross-sectional regression, as well as two-way portfolio sorts by NOA and accruals. The multiplicative variable was not statistically significant in the regression, but the two-way sorts suggested that there might exist a more subtle non-linear interaction. A thorough investigation of interactive effects is left for future research.

4.3 Mishkin Test of Rationality of Investor Forecasts

To provide an intuitive description of how investors employ the information in NOA to forecast future performance, we extend the Mishkin approach to test whether the market efficiently weights NOA in addition to operating accruals and cash flows in predicting one-year-ahead future earnings (see Abel and Mishkin (1983) and Sloan (1996)). A Mishkin test attributes the incremental ability of NOA to forecast future returns to investor misperceptions about the ability of NOA and other variables to forecast future earnings.

Iterative weighted non-linear least squares regressions are estimated jointly every year for the following system of equations:

$$Earnings_{t+1} = \gamma_0 + \gamma_1 Accruals_t + \gamma_2 NOA_t + \gamma_3\, Cash\ Flows_t + v_{t+1} \qquad (8)$$

$$Abnormal\ Ret_{t+1}=\beta(Earnings_{t+1} - \gamma_0 - \gamma_1^* Accruals_t - \gamma_2^* NOA_t - \gamma_3^* Cash\ Flows_t)+\varepsilon_{t+1}, \quad (9)$$

where Abnormal Ret_{t+1} is the raw return on security minus the return on the size, book-to-market, and momentum matched portfolio benchmark for the year beginning four months after the end of the fiscal year for which operating accruals and cash flows from operations are measured. Earnings and Cash Flows are deflated by beginning period total assets for consistency with Accruals.

The forecasting equation (8) describes the rational relation between predictors and future earnings. It estimates the optimal weights on Accruals, NOA, and Cash Flows in predicting future earnings. The second equation (9) relates abnormal returns to the earnings `surprise' from the perspective of investors who do not necessarily place the rational weights on the predictors. This equation simultaneously estimates the weights that investors place on Accruals, NOA, and Cash Flows in predicting Earnings, optimizing the ability of the surprise to predict future returns. If the market is efficient and the model specification is correct, then the weights assigned by investors would not be statistically different from the weights assigned by the rational model for forecasting earnings. In this case, $\gamma_1=\gamma_1^*$, $\gamma_2=\gamma_2^*$, and $\gamma_3=\gamma_3^*$.

Because we use annual data to estimate the system of equations, we impose a minimum four-month gap between the fiscal year end and the start of the return cumulation. The CRSP returns data ends in December 2002, so the sample for the Mishkin test runs from fiscal year 1965 through fiscal year 2000. We have an initial 141,254 firm-year observations with sufficient returns and financial data during this period. The sample is further reduced by the requirement that observations have one-year ahead earnings from COMPUSTAT for the forecasting equation in the Mishkin test to

138,483 observations. After deleting the smallest and largest 0.5% of all pooled observations on the financial and return variables to avoid extreme outlier effects, the final sample for the Mishkin test contains 130,468 firm-year observations.[22]

If we were to pool firm-year observations into a single pair of nonlinear regressions, the high ratio of firms to the number of time series observations could introduce residual cross-correlation. We therefore run the nonlinear system for each year separately, and then apply a Fama-MacBeth method by estimating the times series of the difference between the estimated coefficients from the forecast and market equations to test for market efficiency.[23]

Table 8 reports the time series averages of the annual coefficient estimates along with the time-series t-statistics. The statistically optimal weight, on NOA in forecasting future earnings, γ_2, is an insignificant -0.004. This reflects a balance of two effects. On the one hand, as can be seen by comparing the earnings of high- versus low-NOA firms in Figure 1a, firms with high NOA contemporaneously tend to be high-earnings firms. On the other hand, the earnings of high NOA firms decrease subsequent to the conditioning date. The low coefficient is therefore consistent with the sustainability hypothesis.

Most importantly, $\gamma_2^* > \gamma_2$, implying that investors weight NOA much too

[22] The estimation of the annual nonlinear Mishkin system is sensitive to extreme outliers in three of the 36 years in the sample period we examine. However, trimming extreme values can induce bias in tests of market efficiency (see Kothari, Sabino, and Zach (2004)). We do not trim the data in any of the tests based upon portfolios or upon Fama-MacBeth cross-sectional regressions, so our inferences about the predictability of long-run returns do not rely on trimming. The additional insight from the Mishkin test concerns the extent to which return predictability derives from investor errors in forecasting future earnings from accruals or NOA. When we trim the Mishkin test sample at 0.25% level instead of 0.5% level in the Mishkin test in Table 8, the results are similar.

[23] Kothari, Sabino and Zach (2004) apply Fama-Macbeth averaging of the estimated coefficients across simulated independent samples in their Mishkin tests.

positively in forecasting future earnings. The investors' weight on NOA, 0.043, is highly significant and has the opposite sign from the point estimate of the statistically optimal weight. This overoptimistic perception of NOA is significantly larger than the over-weighting of Accruals. When NOA is included in the system, the point estimate indicates that investors still overweight Accruals ($\gamma_1^* > \gamma_1$), as in past research, but the difference here is marginally insignificant (t=1.82). (The significant underweighting of cash flows by investors is also consistent with past research.) Thus, the test indicates that investors view NOA much too positively in forecasting future earnings; the overweighting of NOA does not derive solely from current operating accruals. The result that investors view NOA too positively is robust to using Sum_Accruals or change in NOA in place of Accruals.

Put Table 8 about here.

5. Conclusion

If investors have limited attention, then accounting outcomes that saliently highlight positive aspects of a firm's performance will encourage higher market valuations. When cumulative accounting value added (net operating income) over time outstrips cumulative cash value added (free cash flow), we argue that it becomes hard for the firm to sustain further earnings growth. We further argue that investors with limited attention tend to overvalue firm whose balance sheets are 'bloated' in this fashion. Similarly, investors tend to undervalue firms when accounting value added falls short of cash value added.

The level of net operating assets, which is the difference between cumulative earnings and cumulative free cash flow over time, is therefore a measure of the extent to which operating/reporting outcomes provoke excessive investor optimism. As such, net operating assets should negatively predict subsequent stock returns. This argument allows for the possibility of earnings management, but does not require it.

In our 1964-2002 sample, net operating assets do contain important information about the long-term sustainability of the firm's financial performance. Firms with high net operating assets normalized by beginning total assets (NOA) have high and growing earnings prior to the conditioning date, but declining earnings subsequent to that date.

Furthermore, NOA is a strong and highly robust negative predictor of abnormal stock returns for at least three years after NOA is measured. This evidence suggests that market prices do not fully reflect the information contained in NOA for future financial performance. We call this phenomenon the sustainability effect.

The predictive power of NOA remains strong after controlling for a wide range of known return predictors and asset pricing controls. NOA has stronger and more persistent predictive power than flow components of NOA such as operating accruals or the latest change in NOA. This evidence suggests that there is a cumulative effect on investor misperceptions of discrepancies between accounting and cash value added. Net operating assets therefore provide a parsimonious balance sheet measure of the degree to which investors overestimate the sustainability of accounting performance.

A previous literature has documented that balance sheet ratios can be used to predict future stock returns.[24] This literature develops weighting schemes that combine various ratios to maximize predictive power, presumably by sweeping together a mixture of economic sources of predictability. In the absence of a prior conceptual framework for determining optimal weights, it is not clear whether the weights will remain stable across samples and time periods.

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[24] See, e.g., Ou and Penman (1989), Holthausen and Larcker (1992), Lev and Thiagarajan (1993), Abarbanell and Bushee (1997), and Piotroski (2000).

A distinctive feature of this paper is that we employ a simple and parsimonious aggregate balance sheet measure, net operating assets, whose predictive power is motivated by a very simple psychological hypothesis. This hypothesis is that investors have limited attention; that they allocate this attention to an important indicator of value added, historical earnings; and that this comes at the cost of neglecting the incremental information contained in cash flow measures of value added.

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FIGURE 1A: Mean Earnings of NOA Sorted Portfolios

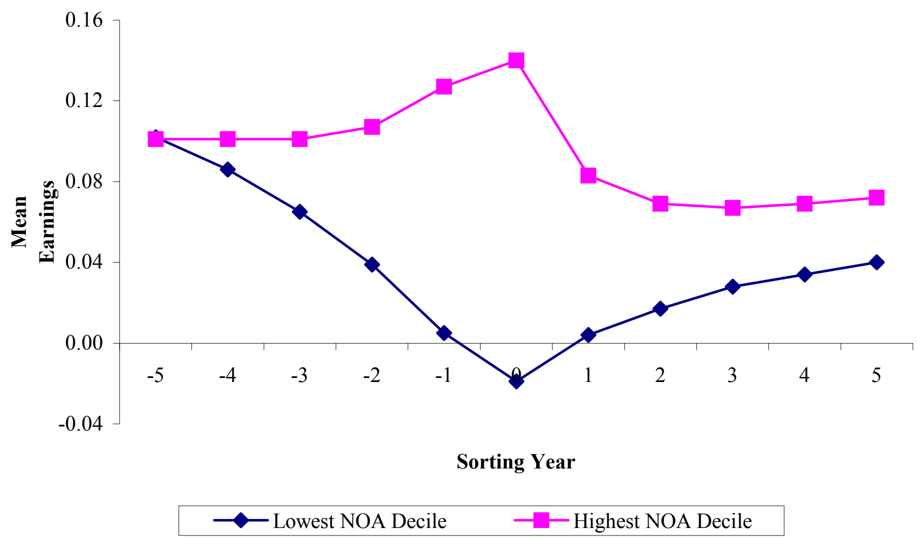
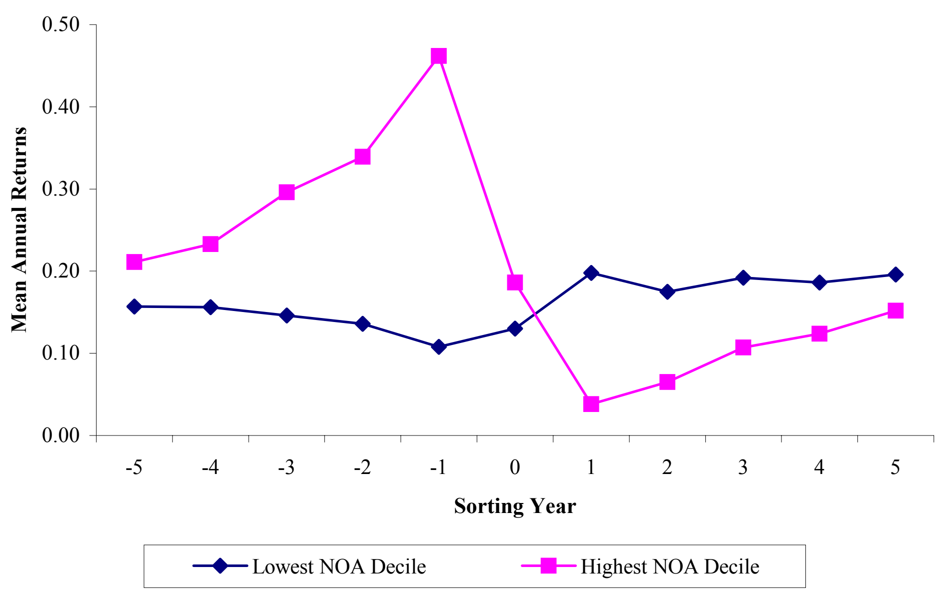


FIGURE 1B: Mean Returns of NOA Sorted Portfolios



Notes:
NOA and Earnings are defined in Table I. Returns are annual raw buy and hold returns starting four months after fiscal year end. Year 0 is the year in which firms are ranked and assigned into decile portfolios based on their NOA. Earnings and returns are first averaged within each decile and then across time.

FIGURE 2A: Hedge Portfolio Returns (Equal-Weighted) Based on NOA Strategy

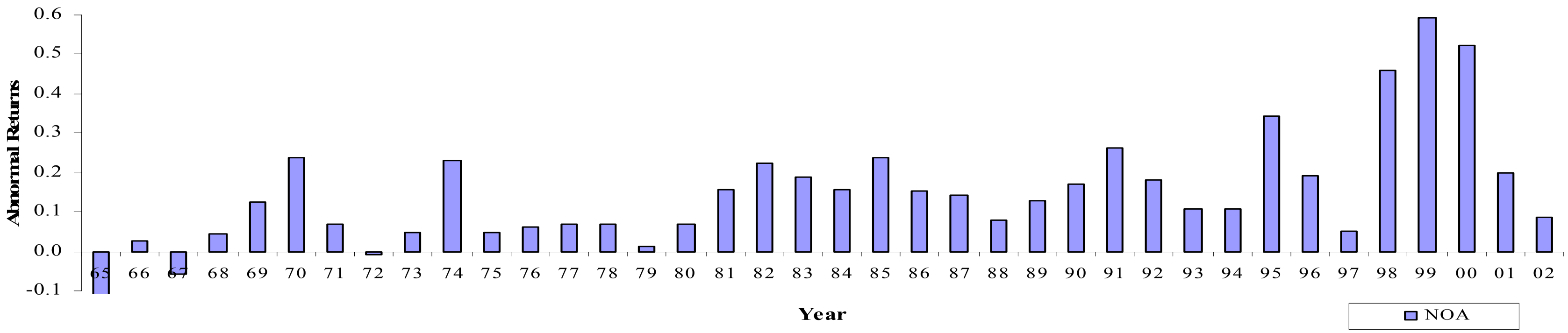
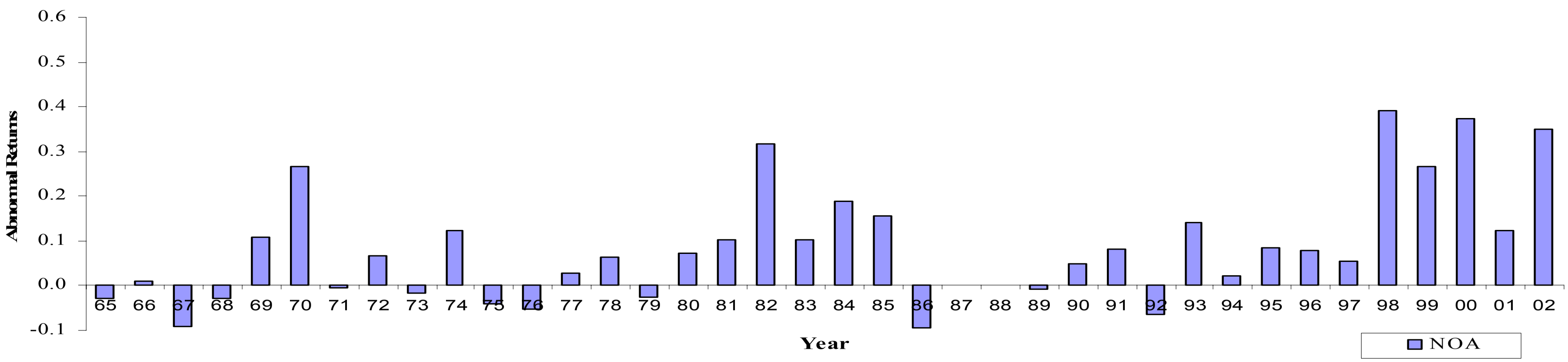


FIGURE 2B: Hedge Portfolio Returns (Value-Weighted) Based on NOA Strategy



Notes:
NOA is defined in Table 1. Portfolios are formed monthly by assigning firms to deciles based on their NOA in the previous fiscal year, with a minimal 4 month lag between the fiscal year end and the returns it is matched against. The monthly abnormal return for any individual stock is calculated by subtracting the equal-weighted (value-weighted) return of a benchmark portfolio matched by size, book-to-market and momentum (past one year return) from its raw return. It is then averaged within each NOA decile monthly. The annual abnormal returns are calculated as the sum of the monthly abnormal returns for each calendar year between 1965 and 2002. The hedging portfolio consists of a long position in the lowest NOA decile and an offsetting short position in the highest NOA decile.

TABLE 1
Mean (*Median*) Values of Selected Characteristics for Decile Portfolios Sorted by NOA

	Portfolio NOA Ranking									
	Lowest	2	3	4	5	6	7	8	9	Highest
Panel A: Accounting Variables										
NOA	0.247	0.485	0.587	0.656	0.710	0.758	0.808	0.867	0.966	1.596
	0.260	*0.492*	*0.577*	*0.642*	*0.692*	*0.737*	*0.798*	*0.868*	*0.960*	*1.448*
Earnings	-0.042	0.032	0.068	0.084	0.092	0.100	0.105	0.110	0.116	0.084
	0.000	*0.049*	*0.067*	*0.074*	*0.089*	*0.098*	*0.090*	*0.108*	*0.115*	*0.136*
Accruals	-0.084	-0.057	-0.046	-0.039	-0.031	-0.022	-0.012	0.002	0.030	0.131
	-0.091	*-0.062*	*-0.052*	*-0.043*	*-0.035*	*-0.023*	*-0.010*	*0.001*	*0.035*	*0.134*
Cash Flows	0.042	0.090	0.114	0.123	0.123	0.122	0.118	0.108	0.086	-0.048
	0.105	*0.120*	*0.124*	*0.122*	*0.125*	*0.123*	*0.117*	*0.109*	*0.092*	*-0.034*
BV ($m)	106	247	356	476	412	379	365	316	272	202
	82	*228*	*321*	*382*	*316*	*275*	*337*	*261*	*201*	*112*
Panel B: Asset Pricing Variables										
MV ($m)	404	621	937	1202	1015	885	746	667	587	509
	248	*520*	*577*	*572*	*580*	*446*	*488*	*416*	*317*	*207*
B/M	0.423	1.927	0.892	0.919	0.957	0.949	0.931	4.670	0.798	0.612
	0.439	*0.695*	*0.747*	*0.800*	*0.838*	*0.849*	*0.870*	*0.821*	*0.736*	*0.580*
Beta	1.251	1.213	1.170	1.144	1.112	1.090	1.086	1.110	1.131	1.225
	1.245	*1.194*	*1.148*	*1.152*	*1.099*	*1.107*	*1.093*	*1.087*	*1.102*	*1.183*

Notes: The sample consists of a maximum of 1.63 million firm-month observations covering NYSE, AMEX and Nasdaq firms with available data from July 1964 to December 2002, and a total of 141,254 firm-year observations from fiscal year 1963 to 2000.

Variable Measurement

Raw NOA = Operating Assets (OA)-Operating Liabilities (OL), where
- OA = Total Assets (Compustat #6) – Cash and Short Term Investment (Compustat #1)
- OL = Total Assets – STD – LTD – MI – PS - CE
- STD = Debt included in current liabilities (Compustat #34)
- LTD = Long Term Debt (Compustat #9)
- MI = Minority Interests (Compustat #38)
- PS = Preferred Stocks (Compustat #130)
- CE = Common Equity (Compustat #60)

NOA = Raw NOA /Lagged Total Assets
Earnings = Income From Continuing Operations (Compustat#178)/Lagged Total Assets
Raw Accruals = (ΔCA-ΔCash)-(ΔCL-ΔSTD-ΔTP)-Dep, where Δ refers to annual change, and
- CA = Current Assets (Compustat #4)
- CL = Current Liabilities (Compustat #5)
- TP = Income Tax Payable (Compustat #71)
- Dep = Depreciation and Amortization (Compustat #14)

Accruals = Raw Accruals / Lagged Total Assets
Cash Flows = Earnings - Accruals (as defined above)
MV = Fiscal Year End Closing Price*Shares Outstanding (Compustat #199*#25)
BV = Book Value of Common Equity (Compustat #60), measured at fiscal year end
B/M = BV / MV (as defined above)
Beta = Estimated from a regression of monthly raw returns on the CRSP NYSE/AMEX equal weighted monthly return index, using 60 months' return data ending four months after each firm's fiscal year end.

TABLE 2
Pearson (Spearman) Correlation Coefficients between NOA and Other Characteristics

	NOA	NOA_1	Earnings	Accruals	Cash Flows	BV	MV	B/M	Beta
NOA	1.000	**0.114**	**-0.182**	**0.060**	**-0.213**	**0.052**	**0.020**	0.002	**-0.013**
		<.0001	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*0.451*	*<.0001*
NOA_1	**0.620**	1.000	**0.138**	**0.033**	**0.092**	**0.090**	**0.022**	**0.125**	**0.009**
	<.0001		*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*0.006*
Earnings	**0.290**	**0.018**	1.000	**0.253**	**0.845**	**0.020**	**0.026**	0.000	**-0.043**
	<.0001	*<.0001*		*<.0001*	*<.0001*	*<.0001*	*<.0001*	*0.903*	*<.0001*
Accruals	**0.324**	**-0.009**	**0.313**	1.000	**-0.303**	**-0.029**	**-0.022**	0.000	**0.026**
	<.0001	*0.0010*	*<.0001*		*<.0001*	*<.0001*	*<.0001*	*0.956*	*<.0001*
Cash Flows	**0.012**	**0.023**	**0.673**	**-0.351**	1.000	**0.036**	**0.038**	0.000	**-0.056**
	<.0001	*<.0001*	*<.0001*	*<.0001*		*<.0001*	*<.0001*	*0.880*	*<.0001*
BV	**0.105**	**0.036**	**0.267**	**-0.011**	**0.279**	1.000	**0.698**	0.000	**-0.065**
	<.0001	*<.0001*	*<.0001*	*<.0001*	*<.0001*		*<.0001*	*0.874*	*<.0001*
MV	**0.056**	0.003	**0.291**	-0.002	**0.275**	**0.870**	1.000	-0.001	**-0.039**
	<.0001	*0.378*	*<.0001*	*0.496*	*<.0001*	*<.0001*		*0.742*	*<.0001*
B/M	**0.080**	0.004	**-0.126**	**-0.029**	**-0.057**	**0.092**	**-0.344**	1.000	**-0.004**
	<.0001	*0.889*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*		*0.226*
Beta	**-0.012**	**0.008**	**0.013**	**0.050**	**-0.038**	**-0.057**	**-0.014**	**-0.088**	1.000
	0.0001	*0.018*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	

Notes: NOA_1 is 1-year lagged NOA. All other variables are as defined in Table 1. The upper (lower) diagonal terms report the Pearson (Spearman) correlation coefficients. The p-values are in italic. Bold numbers indicate significance at less than 5% level (2-tailed).

TABLE 3
Industry Composition for Decile Portfolios Sorted by NOA

	Portfolio NOA Ranking									
Industry Groups	Lowest	2	3	4	5	6	7	8	9	Highest
Panel A: Percentage of the firms in each industry group for each NOA decile (Column)										
Agriculture (0-999)	0.4	0.3	0.3	0.4	0.3	0.3	0.5	0.6	0.6	0.4
Mining & Construction (1000-1299, 1400-1999)	3.1	2.7	2.7	2.3	2.3	2.4	2.6	2.7	3.5	3.8
Food (2000-2111)	1.6	2.6	3.4	3.8	3.9	3.7	3.7	3.2	3.1	2.5
Textiles and Printing/Publishing (2200-2790)	4.6	6.1	6.2	7.5	8.0	**9.2**	**10.3**	**9.9**	8.6	5.8
Chemicals (2800-2824, 2840-2899)	1.9	2.6	3.4	3.9	4.3	4.0	3.5	2.9	2.3	1.8
Pharmaceuticals (2830-2836)	12.0	4.9	3.4	2.8	2.5	2.2	2.2	2.0	2.2	2.4
Extractive (1300-1399, 2900-2999)	3.0	3.9	5.0	5.1	5.1	4.6	5.0	5.7	6.8	8.8
Durable Manufacturers (3000-3569, 3580-3669, 3680-3999)	**20.2**	**26.2**	**30.3**	**31.2**	**31.8**	**31.3**	**30.1**	**29.1**	**26.0**	**22.1**
Computers (3570-3579, 3670-3679, 7370-7379)	**18.5**	**19.5**	**14.6**	**11.4**	**9.1**	8.3	7.2	7.5	8.0	**11.7**
Transportation (4000-4899)	3.8	4.2	4.4	5.1	4.6	4.8	5.5	5.7	6.5	7.4
Utilities (4900-4999)	0.8	1.2	1.9	3.2	5.0	7.0	8.0	7.2	7.0	5.0
Retail (5000-5999)	8.8	**12.9**	**13.3**	**13.5**	**13.5**	**13.1**	**12.1**	**12.4**	**12.5**	11.6
Financial and other (6000-6999, 2111-2199)	7.8	3.4	2.9	2.8	2.1	2.2	1.9	2.5	3.2	3.7
Services (7000-7369, 7380-9999)	**13.5**	9.5	8.2	7.0	7.5	6.9	7.4	8.6	**9.7**	**13.0**
Panel B: Percentage of the firms in each NOA decile for each industry group (Row)										
Agriculture (0-999)	9.8	7.3	7.3	9.8	7.3	7.3	12.2	**14.6**	**14.6**	**9.8**
Mining & Construction (1000-1299, 1400-1999)	**11.0**	9.6	9.6	8.2	8.2	8.5	9.3	9.6	**12.5**	**13.5**
Food (2000-2111)	5.1	8.3	10.8	**12.1**	**12.4**	**11.7**	11.7	10.2	9.8	7.9
Textiles and Printing/Publishing (2200-2790)	6.0	8.0	8.1	9.8	10.5	**12.1**	**13.5**	**13.0**	11.3	7.6
Chemicals (2800-2824, 2840-2899)	6.2	8.5	11.1	**12.7**	**14.1**	**13.1**	11.4	9.5	7.5	5.9
Pharmaceuticals (2830-2836)	**32.8**	**13.4**	**9.3**	7.7	6.8	6.0	6.0	5.5	6.0	6.6
Extractive (1300-1399, 2900-2999)	5.7	7.4	9.4	9.6	9.6	8.7	9.4	**10.8**	**12.8**	**16.6**
Durable Manufacturers (3000-3569, 3580-3669, 3680-3999)	7.3	9.4	10.9	**11.2**	**11.4**	**11.2**	10.8	10.5	9.3	7.9
Computers (3570-3579, 3670-3679, 7370-7379)	**16.0**	**16.8**	**12.6**	9.8	7.9	7.2	6.2	6.5	6.9	10.1
Transportation (4000-4899)	7.3	8.1	8.5	9.8	8.8	9.2	10.6	**11.0**	**12.5**	**14.2**
Utilities (4900-4999)	1.7	2.6	4.1	6.9	10.8	**15.1**	**17.3**	**15.6**	**15.1**	10.8
Retail (5000-5999)	7.1	10.4	**10.8**	**10.9**	**10.9**	10.6	9.8	10.0	10.1	9.4
Financial and other (6000-6999, 2111-2199)	**24.0**	**10.5**	8.9	8.6	6.5	6.8	5.8	7.7	9.8	**11.4**
Services (7000-7369, 7380-9999)	**14.8**	10.4	9.0	7.7	8.2	7.6	8.1	9.4	10.6	**14.2**

Notes: NOA is defined in Table 1. The reported percentiles are the averages across all sample years. The bold numbers in Panel A are the top three biggest industry groups represented within each NOA decile. The bold numbers in Panel B are the top three NOA deciles represented within each industry group.

TABLE 4
Average Monthly Abnormal Returns for NOA Decile Portfolios
One, Two and Three Years after Portfolio Formation

	Equal Weighted				***Value Weighted***			
Portfolio Ranking	*raw_ew t+1*	*adj_ew t+1*	*adj_ew t+2*	*adj_ew T+3*	*raw_vw t+1*	*adj_vw t+1*	*adj_vw t+2*	*adj_vw t+3*
Lowest	0.0179	0.0051	0.0029	0.0027	0.0106	0.0022	0.0012	0.0015
	4.87	***6.14***	***3.64***	***3.25***	***3.77***	***2.35***	*1.28*	*1.41*
2	0.0168	0.0032	0.0014	0.0012	0.0107	0.0021	0.0004	0.0011
	5.09	***5.70***	***2.66***	***2.47***	***4.17***	***2.81***	*0.58*	*1.64*
3	0.0157	0.0015	0.0012	0.0012	0.0113	0.0017	0.0009	0.0008
	5.25	***3.76***	***3.06***	***3.06***	***4.82***	***2.96***	*1.50*	*1.39*
4	0.0146	0.0012	0.0013	0.0014	0.0091	0.0007	0.0013	0.0003
	5.15	***3.03***	***3.40***	***3.15***	***4.20***	*1.31*	***2.70***	*0.55*
5	0.0146	0.0012	0.0009	0.0008	0.0094	0.0005	0.0007	0.0001
	5.42	***3.14***	***2.13***	*1.75*	***4.41***	*0.98*	1.33	*0.15*
6	0.0135	0.0000	0.0006	-0.0003	0.0087	-0.0005	-0.0000	-0.0001
	5.13	*0.03*	*1.48*	*-0.60*	***4.02***	*-0.96*	*-0.03*	*-0.21*
7	0.0133	0.0002	-0.0005	-0.0000	0.0089	-0.0004	-0.0012	-0.0008
	5.12	*0.38*	*-1.15*	*-0.01*	***4.01***	*-0.68*	***-2.16***	*-1.31*
8	0.0106	-0.0022	-0.008	-0.0008	0.0074	-0.0013	-0.0013	-0.0003
	4.00	***-5.50***	*-1.90*	*-1.75*	***3.22***	***-2.13***	***-2.30***	*-0.52*
9	0.0093	-0.0028	-0.0016	-0.0015	0.0072	-0.0017	-0.0011	-0.0011
	3.41	***-6.34***	***-3.60***	***-3.37***	***3.17***	***-2.76***	*-1.63*	*-1.58*
Highest	0.0031	-0.0073	-0.0054	-0.0030	0.0030	-0.0047	-0.0047	-0.0035
	0.95	***-12.22***	***-8.42***	***-4.85***	*1.01*	***-5.65***	***-4.45***	***-4.02***
Hedge(L-H)	0.0148	0.0124	0.0083	0.0057	0.0076	0.0069	0.0060	0.0049
	8.45	***10.31***	***7.66***	***5.44***	***4.18***	***5.24***	***4.34***	***3.73***
CAPM α	0.0153	0.0127	0.0086	0.0063	0.0075	0.0068	0.0063	0.0053
	8.63	***10.45***	***7.75***	***5.99***	***4.21***	***5.52***	***4.88***	***3.91***
Three Factor α	0.0165	0.0134	0.0095	0.0074	0.0094	0.0075	0.0069	0.0063
	10.00	***11.17***	***8.65***	***7.16***	***5.40***	***5.95***	***5.30***	***4.64***
Four Factor α	0.0140	0.0126	0.0088	0.0067	0.0074	0.0061	0.0054	0.0058
	8.32	***10.08***	***7.66***	***6.22***	***3.93***	***4.70***	***4.06***	***4.10***

Notes: NOA is defined in Table 1. Decile portfolios are formed monthly from July 1964 to December 2002 based on NOA of the previous fiscal year, with a minimum 4 month lag between the fiscal year end and the portfolio formation month.
The monthly equal-weighted (value-weighted) abnormal return for any individual stock is calculated by subtracting the equal-weighted return of a benchmark portfolio matched by size, book-to-market and momentum from the return of the stock. It is then averaged within each decile. The hedge portfolio consists of a long position in the lowest ranked NOA portfolio and an offsetting short position in the highest ranked NOA portfolio. Reported are the time series averages of the monthly portfolio returns along with their t-statistics. In addition, the intercepts, α, from time-series regressions of the raw returns or characteristics adjusted returns of the hedge portfolio on the CAPM model which employs excess return of the market portfolio, the Fama-French three factor model, which contains the market portfolio and two factor-mimicking portfolios associated with the size effect (SMB) and the book-to-market effect (HML), and a four factor model which adds a momentum factor-mimicking portfolio to the previous factors, are reported.
Bold numbers indicate significance at less than 5% level (2-tailed t-test).

TABLE 5

Fama-MacBeth Monthly Regressions of Stock Returns on NOA and Other Characteristics

	LnSize	LnB/M	Ret(-1:-1)	Ret(-12:-2)	Ret(-36:-13)	Accruals	NOA
Panel A: One Year Lagged Accruals and NOA							
Model 1	-0.0011	0.0027	-0.0719	0.0058	-0.0027		
	-2.42	***3.78***	***-16.37***	***3.44***	***-3.93***		
Model 2	-0.0012	0.0026	-0.0723	0.0056	-0.0023	-0.0129	
	-2.50	***3.64***	***-16.50***	***3.34***	***-3.42***	***-6.91***	
Model 3	-0.0011	0.0028	-0.0723	0.0056	-0.0023		-0.0069
	-2.28	***4.09***	***-16.52***	***3.34***	***-3.52***		***-8.98***
Model 4	-0.0011	0.0028	-0.0727	0.0055	-0.0021	-0.0079	-0.0058
	-2.37	***3.97***	***-16.63***	***3.26***	***-3.24***	***-3.73***	***-6.67***
Panel B: Two Year Lagged Accruals and NOA							
Model 1	-0.0011	0.0027	-0.0719	0.0058	-0.0027		
	-2.42	***3.78***	***-16.37***	***3.44***	***-3.93***		
Model 2	-0.0011	0.0026	-0.0723	0.0056	-0.0025	-0.0093	
	-2.44	***3.76***	***-16.46***	***3.35***	***-3.77***	***-5.37***	
Model 3	-0.0011	0.0028	-0.0720	0.0057	-0.0026		-0.0033
	-2.34	***3.97***	***-16.41***	***3.41***	***-3.93***		***-4.53***
Model 4	-0.0011	0.0027	-0.0723	0.0056	-0.0026	-0.0062	-0.0023
	-2.38	***3.94***	***-16.43***	***3.37***	***-3.85***	***-3.13***	***-2.68***
Panel C: Three Year Lagged Accruals and NOA							
Model 1	-0.0011	0.0027	-0.0719	0.0058	-0.0027		
	-2.42	***3.78***	***-16.37***	***3.44***	***-3.93***		
Model 2	-0.0011	0.0026	-0.0720	0.0057	-0.0027	-0.0049	
	-2.45	***3.71***	***-16.43***	***3.40***	***-4.07***	***-2.97***	
Model 3	-0.0011	0.0028	-0.0721	0.0057	-0.0027		-0.0027
	-2.34	***3.94***	***-16.40***	***3.40***	***-4.05***		***-3.39***
Model 4	-0.0011	0.0027	-0.0721	0.0056	-0.0027	-0.0019	-0.0024
	-2.38	***3.90***	***-16.44***	***3.38***	***-4.11***	*-1.01*	***-2.72***

Notes:
Accruals and NOA are defined in Table 1. The Fama-MacBeth procedure is as follows: Every month between July, 1966 and December, 2002, the cross-section of stock returns is regressed on LnSize where size is defined as the log of the firm's market capitalization, Ln(B/M) which is the log of the book-to-market ratio, the previous month's return on the stock, denoted Ret(-1: -1), the previous year's return on the stock from month t -12 to t –2, denoted Ret (-12: -2), the return on the stock starting from month t -36 to t-13, denoted Ret(-36: -13), and Accruals and/or NOA lagged either one, two or three years. There is a minimum 4 month gap between the fiscal year end and month t. The time-series average of the monthly coefficient estimates and their associated time-series t-statistics (in italics) are reported. Bold numbers indicate significance at less than 5% level (2-tailed t-test).

TABLE 6
Additional Results Based on Alternative NOA Definition

Panel A: Summary Statistics

	Mean	Median	Standard deviation	Pearson correlation	Spearman correlation
				NOA_alt	NOA_alt
NOA	0.9427	0.7254	22.21	0.92	0.87
NOA_alt	0.9407	0.7374	22.71	.	.

Panel B: Hedge Returns based on Alternative NOA decile portfolios one year after portfolio formation

	raw_ew_{t+1}	adj_ew_{t+1}	raw_vw_{t+1}	adj_vw_{t+1}
Hedge(L-H)	0.0135	0.0116	0.0066	0.0058
	7.30	***9.32***	***3.25***	***4.03***
CAPM α	0.0136	0.0117	0.0069	0.0062
	7.32	***9.43***	***3.38***	***4.34***
Three Factor α	0.0143	0.0122	0.0084	0.0067
	8.20	***9.96***	***4.09***	***4.59***
Four Factor α	0.0134	0.0118	0.007	0.0056
	7.47	***9.36***	***3.32***	***3.77***

Panel C: Fama-Macbeth Monthly Regressions

	LnSize	LnB/M	Ret(-1:-1)	Ret(-12:-2)	Ret(-36:-13)	Accruals	NOA_alt
Model 1	-0.0011	0.0027	-0.0719	0.0058	-0.0027		
	-2.41	***3.79***	***-16.38***	***3.44***	***-3.93***		
Model 2	-0.0012	0.0026	-0.0723	0.0056	-0.0023	-0.0130	
	-2.50	***3.65***	***-16.51***	***3.35***	***-3.42***	***-6.88***	
Model 3	-0.0010	0.0029	-0.0722	0.0057	-0.0023		-0.0066
	-2.24	***4.15***	***-16.53***	***3.36***	***-3.47***		***-8.92***
Model 4	-0.0011	0.0028	-0.0726	0.0055	-0.0021	-0.0078	-0.0057
	-2.32	***4.07***	***-16.64***	***3.30***	***-3.21***	***-3.77***	***-6.93***

Note:
NOA_alt = (AR+INV+OTHERCA+PPE+INTANG+OTHERLTA-AP-OTHERCL-OTHERLTL)/Lagged Total Assets
where:

AR	=	Account Receivable (Compustat#2)
INV	=	Inventory (Compustat#3)
OTHERCA	=	Other Current Assets (Compustat #68)
PPE	=	Net Property, Plant And Equipment (Compustat#8)
INTANG	=	Intangibles (Compustat#33)
OTHERLTA	=	Other Long Term Assets (Compustat#69)
AP	=	Account Payable (Compustat#70)
OTHERCL	=	Other Current Liabilities (Compustat#72)
OTHERLTL	=	Other Long Term Liabilities (Compustat#75)

Accruals is defined in Table 1. See Table 4 for details on the portfolio formation procedure and the calculation of hedge returns, CAPM α, three-factor α and four-factor α. LnSize, Ln(B/M), Ret(-1:-1), Ret(-12:-2) and Ret(-36,-13) are defined in Table 5 The Fama-MacBeth procedure is the same as in Table 5. Bold numbers indicate significance at less than 5% level (2-tailed t-test).

TABLE 7

Fama-MacBeth Monthly Regressions of Stock Returns on NOA, Change in NOA, Accruals, Sum of Lagged Accruals, and Other Characteristics

Panel A: NOA and Accruals (Same as Model 4 of Panel A, Table 5)

LnSize	LnB/M	Ret(-1:-1)	Ret(-12:-2)	Ret(-36:-13)	Accruals	NOA
-0.0011	0.0028	-0.0727	0.0055	-0.0021	-0.0079	-0.0058
-2.37	***3.97***	***-16.63***	***3.26***	***-3.24***	***-3.73***	***-6.67***

Panel B: NOA, Change in NOA, and Accruals

LnSize	LnB/M	Ret(-1:-1)	Ret(-12:-2)	Ret(-36:-13)	Accruals	NOA	ΔNOA
-0.0011	0.0024	-0.0723	0.0056	-0.0023			-0.0078
-2.36	***3.46***	***-16.51***	***3.34***	***-3.39***			***-8.85***
-0.0011	0.0023	-0.0726	0.0055	-0.0021	-0.0071		-0.0063
-2.41	***3.41***	***-16.63***	***3.29***	***-3.23***	***-3.10***		***-5.56***
-0.0011	0.0029	-0.0725	0.0055	-0.0022		-0.0068	-0.0017
-2.29	***4.41***	***-16.64***	***3.30***	***-3.36***		***-3.89***	*-0.88*
-0.0011	0.0029	-0.0728	0.0054	-0.0021	-0.0072	-0.0070	0.0003
-2.33	***4.38***	***-16.76***	***3.25***	***-3.21***	***-3.11***	***-4.04***	*0.17*

Panel C: NOA and Sum of Lagged Accruals

LnSize	LnB/M	Ret(-1:-1)	Ret(-12:-2)	Ret(-36:-13)	NOA	SumAccruals
-0.0011	0.0026	-0.0723	0.0056	-0.0024		-0.0072
-2.39	***3.73***	***-16.52***	***3.33***	***-3.60***		***-6.15***
-0.0011	0.0028	-0.0727	0.0055	-0.0022	-0.0058	-0.0052
-2.28	***4.03***	***-16.65***	***3.28***	***-3.35***	***-7.20***	***-4.21***

*Note:*Accruals and NOA are defined in Table 1. LnSize, Ln(B/M), Ret(-1:-1), Ret(-12:-2) and Ret(-36,-13) are defined in Table 5. SumAccruals = the sum of past 3 years' raw Accruals scaled by lagged total asset. ΔNOA= change in raw NOA scaled by lagged total assets.
The Fama-MacBeth procedure is described in Table 5. Associated time-series t-statistics (in italics) are reported. Bold numbers indicate significance at less than 5% level (2-tailed t-test).

TABLE 8
Annual Nonlinear Generalized Least Square Regressions (Mishkin Test) of Rational and Market Forecasting of Firm Returns and One-Year Ahead Earnings

$$Earnings_{t+1}=\gamma_0+\gamma_1 Accruals_t+\gamma_2 NOA_t+\gamma_3 Cash\ Flows_{\ t}+ v_{t+1}$$

$$Abnormal\ Returns_{t+1}=\beta(Earnings_{t+1}-\gamma_0-\gamma_1^* Accruals_t-\gamma_2^* NOA_t-\gamma_3^* Cash\ Flows_t)+\varepsilon_{t+1}$$

Parameters		***Mean Estimate***	***T-statistics***
Accruals	γ_1	0.557	***3.60***
	γ_1^*	0.628	***14.57***
NOA	γ_2	-0.004	*-0.57*
	γ_2^*	0.043	***3.10***
Cash Flows	γ_3	0.663	***41.99***
	γ_3^*	0.552	***16.43***
	β	1.506	***13.96***

Test of Market Efficiency:		*T-test*	# of years when $\gamma_n<\gamma_n^*$ (36 years total)
Accruals	$\gamma_1=\gamma_1^*$	*1.82*	22
NOA	$\gamma_2=\gamma_2^*$	***4.18***	28
Cash Flows	$\gamma_3=\gamma_3^*$	***-4.18***	11

Notes: Due to the limited annual observations before fiscal year 1965, the sample consists of firm-year observations from fiscal year 1965 to 2000. Accruals, NOA, Earnings and Cash Flows are defined in Table 1. The annual abnormal return for any individual stock is calculated by subtracting the equal-weighted return of a benchmark portfolio matched by size, book-to-market and momentum from the annual raw buy and hold return of the stock. Returns are measured starting four months after fiscal year end. The system of equation is estimated annually using non-linear generalized least squares. The time-series average of the annual coefficients estimates and their associated t-statistics (in italics) for $\gamma_n^*= \gamma_n$ are reported. Bold numbers indicate significance at less than 5% level (2-tail t-test).