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Information in Balance Sheets for Future Stock Returns: Evidence from Net Operating Assets [*]

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Abstract: In this paper, we extend the work of Hirshleifer, Hou, Teoh and Zhang (2004) on the "sustainability effect" by directly linking the implications of NOA (net operating assets) and NOA components for the sustainability of current earnings performance with future stock returns. After controlling for current profitability, we find a strong negative relation of NOA with future stock returns. Moreover, the results indicate that this relation is associated with the sustainability implications of the underlying components of NOA. We also find that the hedge strategies on NOA and those NOA components that indicate low sustainability of current profitability generate positive abnormal returns and constitute statistical arbitrage opportunities. The findings on the sources of the NOA anomaly indicate a significant role for earnings management but no significant role for growth. However, it is found that the interaction of earnings management and growth is an important contributing factor in the anomaly. Overall, our evidence suggests that the interpretation of the NOA anomaly requires investor's limited attention on accounting distortions arising from earnings management.

Keywords: Net operating assets (NOA), sustainability effect, earnings management, growth.

1 Introduction

In this paper we investigate the relation of balance sheet information and future stock returns. We focus on one measure, the level of net operating assets (NOA, hereafter) that has recently gained attention as an important predictor related to equity valuation and earnings quality. NOA represents the cumulation over time of the difference between net operating income (accounting profitability) and free cash flow (cash profitability). In other words, NOA is equal to a cumulative measure of total accruals – a measure of balance sheet bloat. Callen and Segal (2004) derive an accounting based valuation model with time-varying discount rates using the definition of NOA to equity market value ratio. In follow up research, Hirshleifer, Hou, Teoh and Zhang (2004, "HHTZ 04", hereafter) find that NOA scaled by lagged total assets is a strong negative predictor of future stock returns for at least three years after balance sheet information is released. "HHTZ 04" call the above empirical regularity as "the sustainability effect" since high NOA is an indicator of a rising trend in current accounting profitability that is unlikely to be sustained in the future, causing investors with limited attention that focus in accounting income to make flawed decisions.[1] In particular, investors overvalue firms with high NOA and undervalue firms with low NOA. Furthermore, "HHTZ 04" argue also that since high NOA can reflect earnings management and/or adverse information about firm's business conditions (cumulative growth), their interpretation about the negative association of NOA with future stock returns accommodates but does not require earnings management.[2] Finally, they argue that NOA is a more comprehensive measure of investor's overoptimism about the sustainability of current earnings performance that captures information beyond than contained in accruals.[3]

In this paper we corroborate and extend "HHTZ 04" work on the relation of NOA and future stock returns in four ways. First, recognizing that NOA represents a measure of balance bloat, as well as a component of current profitability, we provide additional evidence on the sustainability effect by examining the relation of NOA with future stock returns, after controlling for current profitability. In other words, we investigate whether investors correctly anticipate the implications of NOA for current profitability, after controlling for the valuation

[1] Hirshleifer and Teoh (2003) suggest that information that is more salient or which requires less cognitive processing is used more by investors and as a result is impounded more fully in price.

[2] "HHTZ 04" in p. 299 argue: "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 be soon reversed, see Barton and Simko (2002). Alternatively, even if firms do not deliberately manage investor perceptions, investors with limited attention may fail to make full use of available information. Thus, the interpretation of net operating assets that we provide in this paper accommodates, but does not require earnings management."

[3] "HHTZ 04" in p.300, footnote 5 argue: "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."

implications of current profitability. Consistent with investor misperception of firms with bloated balance sheets, our findings indicate that there is a negative association of NOA with future stock returns, conditional on the current level of accounting profitability. Moreover, the stock return results from a hedge strategy based on the magnitude of NOA summarize the economic significance of the above finding. In particular, the return to a strategy taking a long (short) position in firms that report low (high) NOA is equal to (15.6%) and positive in 34 of 40 years examined. Note, that using an alternative definition of NOA that is based on selection of operating assets and operating liabilities we find a hedge portfolio return equal to (14%) and positive in 37 of 40 years examined.

Second, we examine whether stock prices behave as if investors anticipate the sustainability implications of the NOA components with a model predicting that there will be a negative relation between those NOA components that imply low sustainability for current earnings performance and future stock returns. In other words, we investigate whether the sustainability effect first documented in "HHTZ 04" applies to all NOA components. For this purpose, we use a comprehensive decomposition of NOA and assess each component of NOA according to its sustainability implications. Consistent with these assessments, our analysis confirm that only NOA components that indicate low sustainability for current earnings performance, generate significant hedge abnormal returns.

Third, we corroborate "HHTZ 04" behavioral conjecture of investor's limited attention by applying the statistical arbitrage test designed by Hogan, Jarrow, Teo and Warachka (2004, "HJTW 04" hereafter) to hedge strategies based on NOA and NOA components. This test circumvents the joint hypothesis dilemma of traditional market efficiency tests since its definition is not contingent upon a specific model for market returns (or model of risk adjustment). In particular, we test two implications of statistical arbitrage opportunities for each strategy: one, whether its mean annual incremental profit is positive and two, whether its time-averaged variance decreases over time. To the best of our knowledge, this is the first paper that tests whether strategies on NOA and NOA components constitute statistical arbitrage opportunities.[4] Our findings reveal, that the hedge strategies on NOA and those NOA components that indicate low sustainability of current profitability, constitute statistical arbitrage opportunities.

Fourth, we investigate the role of earnings management and growth in explaining the negative association of NOA with future stock returns. In particular, we investigate the relation of the sustainability effect and the book to market effect.[5] It is found, that the book to

[4] "HJTW 04" have applied the statistical arbitrage test to momentum and value/glamour strategies, while Zhang (2006) to industry accrual and NOA strategies.

[5] Some researchers in the finance literature (e.g. Lakonishok, Shleifer and Vishny 1994, "LSV 94" hereafter) argue that the book to market effect is attributable to investor's errors –in- expectations while other (e.g. Fama and French 1992, 1993, 1996) that it is a compensation for risk.

market ratio that measures prospective growth is significantly related with future returns, after controlling for NOA, and vice versa. We also show that the generated abnormal returns from a hedge strategy that combine information on NOA and book to market ratio are significantly higher than those from each variable alone. Then, using a modified version of the model of Chan, Chan, Jegadeesh and Lakonishok (2006, "CCJL 06", hereafter), NOA and NOA components are disaggregated into their discretionary and non discretionary portions. The discretionary portion captures the impact of managerial manipulation, while the non discretionary portion captures the impact of growth. Consistent with investor's limited attention on earnings management, we show a negative association of discretionary NOA with future stock returns, conditional on the current level of accounting profitability. In addition, we find that this negative association applies to the discretionary portions of those NOA components that indicate low sustainability for current profitability. On the other hand, given current profitability, there is no significant conditional relation between the non discretionary portions of NOA and NOA components with future stock returns, contrary to the hypothesis that the anomaly arises from investor's limited attention on firm's growth. However, at the same time we show that an interaction term between the discretionary and non discretionary portion of NOA contributes in this negative association.

Our findings have important implications for the existing literature in financial accounting. In particular, they directly link 'HHTZ 04" notion of sustainability with future stock returns. After controlling for current profitability, there is a strong negative relation of NOA with future stock returns. Moreover, the results suggest that this negative relation is associated with the implications of the underlying components of NOA for the sustainability of current earnings performance. They are also consistent the behavioral prediction based on limited investor attention. Our findings on the sources of the NOA anomaly indicate a significant role for earnings management but no significant role for growth. However, it is found that the interaction of earnings management and growth is an important contributing factor in the anomaly. As such, our evidence suggests that "HHTZ 04" interpretation about sustainability effect requires the existence of earnings management. Our main conjecture is that the NOA anomaly arises from investor's limited attention on managerial violation of accounting rules and/or managerial empire building incentives. Finally, the results suggest that investor's limited attention on firm's growth is a significant factor contributing only in the accrual anomaly.

The remainder of the paper is organized as follows: Section 2 provides a detailed description of our research design. In section 3 we present data, sample formation, variables measurement, while in section 4 we provide our empirical results. Section 5 summarizes and concludes the paper.

2 *Research Design*

Our research design builds on the work of "HHTZ 04" who argue that high NOA indicates a lack of sustainability of current earnings performance, causing investors with limited attention that focus on reported accounting income to make flawed decisions. To understand in greater depth "HHTZ 04" notion of sustainability it is useful to start with the definition of NOA. NOA represents the cumulation over time of the difference between net operating income (OI) and free cash flow (FCF):

$$NOA_t = \sum_0^t OI_t - \sum_0^t FCF_t \quad (1)$$

In other words, NOA is equal to a cumulative measure of total accruals (TACC); the sum of cumulative current operating accruals (CACC) and non current operating accruals (NCACC):

$$NOA_t = \sum_0^t TACC_t = \sum_0^t CACC_t + \sum_0^t NCACC_t \quad (2)$$

Recognizing that NOA captures a component of total accruals (recent annual change in NOA), we can alternatively define it through current operating income from the following expression:

$$NOA_t = OI_t - FCF_t + NOA_{t-1} \quad (3)$$

The key insight emerging from the above equations is that an accumulation of accounting income without an accumulation of free cash flows raises doubts about current profitability. "HHTZ 04" argue that high NOA indicates low sustainability of earnings performance, causing investors with limited attention that do not fully comprehend this low sustainability to overvalue firms with high NOA relative to those with low NOA. Consequently, this leads to a NOA anomaly whereby firms with high (low) NOA experience negative (positive) future abnormal stock returns.

"HTZZ 04"call the above empirical regularity as the sustainability effect and use two broad classes of behavioral explanations from existing research on the accrual anomaly to interpret it. According to the first explanation that is based on Sloan (1996) work, the sustainability effect is related with the existence of earnings management.[6] Earnings management can arise from the violation of accounting rules with respect to the nature, timing and magnitude of revenues and expenses recognition or from empire building incentives and agency problems. In the first case, NOA increases as managers book sales prematurely, delay writing off obsolete inventory and fixed assets and capitalize operating expenses as property, plant and equipment and intangibles. In the second case, NOA increases as managers invest

[6] Variants of this explanation are embraced in Xie (2001), De Fond and Park (2001), Kothari (2001), Beneish and Vargus (2002), Thomas and Zhang (2002), Dechow and Dichev (2002), Richardson, Sloan, Soliman and Tuna (2005, "RSST 05" hereafter), "CCJL 06, Papanastasopoulos Thomakos and Wang (2006) (2006, "PTW 06" hereafter).

more than what is required by the investment opportunities of the firm. Thus, in both cases high NOA provides a warning signal about the sustainability of current earnings performance. The second explanation that is based on Fairfield, Whisenant and Yohn (2003) ("FWY 03", hereafter) study, equates the sustainability effect with growth in the asset base of the firm that is not matched by growth in income.[7] In particular, it draws on the idea that in absence of earnings manipulation high NOA contains adverse information such as high levels of unpaid receivables, obsolete inventory, difficulties in generating sales, overproduction, lingering and diminishing marginal returns on increased investments. Thus, high NOA indicates that current earnings performance is unlikely to be sustained in the future. "HHTZ 04" conjecture that regardless of whether high NOA captures managerial discretion or contains adverse information of firm's growth or both, investors with limited attention that focus in accounting income and fail to discount for the low sustainability of current earnings performance will overvalue (undervalue) firms with high (low) NOA. Thus, their interpretation about the sustainability effect allows the existence of earnings management, but does not require it.

In this paper we focus on the predictive power of NOA and NOA components for future stock returns. For this purpose, we provide a comprehensive decomposition of NOA along balance sheet categories and make qualitative assessments concerning the implications of each category about the sustainability of current earnings performance. Table 1 presents our complete balance sheet decomposition of NOA with the associated sustainability assessments for each NOA component.

Our initial balance sheet decomposition of NOA is based on the underlying business activity that they capture. Thus, we decompose NOA into the level of net working capital assets (NWCA, hereafter) that capture current operating activities and the level net non current operating assets (NNCOA, hereafter) that capture non current operating activities:

$$NOA_t = NWCA_t + NNCOA_t \quad (4)$$

In our extended decomposition we disaggregate NWCA and NNCOA into their underlying asset and liability components since we believe that they have significant different implications about the sustainability of current earnings performance. Thus, we decompose NWCA into the level of working capital assets (WCA, hereafter) and the level of working capital liabilities (WCL, hereafter) and NNCOA into the level of non current operating assets (NCOA, hereafter) and the level non current operating liabilities (NCOL, hereafter):

$$NWCA_t = WCA_t - WCL_t \quad (5)$$

$$NNCOA_t = NCOA_t - NCOL_t \quad (6)$$

[7] Variants of this explanation are embraced in, Titman, Wei and Xie (2003), Desai Rajgopal, and Venkatachalam (2004, "DRV 04" hereafter), Zach (2005), Ng (2005), Khan (2005), Cooper, Gulen and Schill (2005) and Anderson and Garcia-Feijoo (2006).

Starting with the underlying components of NWCA we postulate that WCA indicates low sustainability for current earnings performance since it is driven by assets such as accounts receivables (ARE, hereafter) and inventories (INV, hereafter). This low sustainability can arise from managerial discretion with respect to accounting rules or from managerial empire building incentives. In particular, high WCA may reflect high ARE as mangers book sales prematurely and high INV as managers delay writing off obsolete INV and allocate more overhead expenses to INV than to cost of goods sold. In addition, it may arise as overoptimistic managers build up inventories in anticipation of future sales. However, even if accounting principles are not violated and empire building tendencies are held fixed, high WCA indicates low sustainability for current earnings performance since it contains adverse information such as high levels of unpaid ARE, obsolete INV, difficulties in generating sales, overproduction and lingering. Thus, regardless the source of this low sustainability, we expect a strong negative relation between WCA and future stock returns. For WCL, we hypothesize a high sustainability since it is driven by liabilities such as accounts payable (AP, hereafter) that are not understated by managers as the firm has to pay them at their face value. Therefore, we do not expect a negative relation between WCL and future stock returns. Combining our sustainability assessments for the underlying components of NWCA and considering that it is driven by WCA, we predict that NWCA indicates low sustainability for current profitability of a firm and anticipate regardless the source of this low sustainability a strong negative association between NWCA and future stock returns.

Turning to the underlying components of NNCOA we postulate that NCOA indicates low sustainability for current earnings performance since it is driven by assets such as net property, plant and equipment (NPPE, hereafter) and intangibles (INT, hereafter). This low sustainability can arise from managerial discretion with respect to accounting principles or from managerial empire building incentives. In particular, high NCOA may reflect high NPPE and INT as managers capitalize operating costs or research and development costs and select depreciation and amortization schedules that are not based on their underlying useful and salvage values. Similarly, it may arise as managers delay writing off obsolete NPPE and INT. Furthermore, high NCOA may arise as overoptimistic managers invest heavily in fixed assets. However, even if accounting rules are not violated and empire building tendencies are held fixed, high NCOA indicates low sustainability for current earnings performance since it contains adverse information such as diminishing marginal returns on increased investments. Thus, regardless the source of this low sustainability, we expect a strong negative relation between NCOA and future stock returns. For NCOL, we predict a high sustainability since it is driven by liabilities such as long term payables and deferred taxes that are not understated by managers as the firm has to pay them at their face value. Therefore, we do not expect a negative relation between NCOL and future stock returns. Combining our sustainability

assessments for the underlying components of NNCOA and considering that it is driven by NCOA, we predict that NNCOA indicates low sustainability for current profitability of a firm and anticipate regardless the source of this low sustainability a strong negative association between NNCOA and future stock returns.

We organize our work along three dimensions. First, we examine whether stock prices act as if investors correctly anticipate the sustainability implications of NOA and NOA components with a model predicting that there will be a negative relation between those components of NOA that indicate low sustainability for current earnings performance and future stock returns. Second, we apply the statistical arbitrage test designed by "HJTW 04" to hedge strategies based on NOA and NOA components to corroborate "HHTZ 04" behavioral conjecture of investor's limited attention. Third, we investigate the role of earnings management and growth in explaining the negative association of NOA with future stock returns. In particular, we investigate the extent to which the NOA effect and the book to market effect overlap with or differ from each by considering control hedge, non-overlap hedge and joint hedge strategies. Then using a modified version of the model of "CCJL 06" we decompose NOA into their discretionary and non discretionary portions to examine whether investors correctly anticipate their sustainability implications. The discretionary portion captures the impact of managerial manipulation, while the non discretionary portion captures the impact of growth. However, we investigate also the relation of an interaction term between the two portions of NOA with stock returns, since we recognize that the two explanations could be not mutually exclusive and probably co-exist.[8] Finally, using the same model we also decompose NOA components into their discretionary and non discretionary portions to investigate whether investors correctly anticipate their sustainability implications.

3 Data, Sample Formation and Variable Measurement

Our empirical tests are conducted using data from two sources. Financial statement data are obtained from the Compustat annual database and monthly stock return data are obtained from CRSP monthly files. The CRSP file provides data on NYSE and AMEX firms from 1926, while the Compustat database provides data on a similar population from 1950. However, we eliminate pre-1962 observations since the Compustat data prior 1962 suffers from survivorship bias (Fama and French 1992, Sloan 1996) and therefore, our sample covers all firm-year with available data on Compustat and CRSP for the period 1962-2003. Moreover, we exclude all firm year observations with SIC codes in the range 6000-6999 (financial companies) because the discrimination between operating activities and financing

[8] "CCJL 06" and "PTW 06" document that they are unable to rule out a potentially important role for the interaction of earnings management and growth in explaining the accrual anomaly

activities is not clear for these firms. Furthermore, we require as in Vuolteenaho (2002) all firms to have a December fiscal year end, in order to align accounting variables across firms and obtain tradable investment strategies for our subsequent portfolio assignments. Finally, we eliminate firm-year observations with insufficient data on Compustat to compute the primary financial statement variables used in our tests[9]. These criteria yield final sample sizes of 150.896 firm year observations with non-missing financial statement and stock return data.

As mentioned in the previous section we need NOA, NWCA, NNCOA, WCA, WCL, NCOA and NCOL to conduct empirical tests. Our variable definitions follow "PTW 06". NWCA is defined as the difference between WCA (current assets minus cash and cash equivalents) and WCL (current liabilities minus short term debt):

$$NWCA_t = WCA_t - WCL_t = (CA_t - C_t) - (CL_t - STD_t)$$

where:

- CA_t : Current assets (Compustat data item 4).
- C_t : Cash and cash equivalents (data item 1).
- CL_t : Current liabilities (data item 5).
- STD_t : Short term debt (data item 34).

NNCOA is defined as the difference between NCOA (total assets minus current assets) and NCOL (total liabilities minus current liabilities minus long term debt):

$$NNCOA_t = NCOA_t - NCOL_t = (TA_t - CA_t) - (TL_t - CL_t - LTD_t)$$

where:

- TA_t : Total assets (data item 6).
- TL_t : Total liabilities (data item 181).
- LTD_t : Long term debt (data item 9).

Thus, NOA is defined as the difference non cash assets (total assets minus cash and cash equivalents) and non-debt liabilities (total liabilities minus short and long term debt)[10]:

$$NOA_t = (TA_t - C_t) - (TL_t - STD_t - LTD_t)$$

Earnings are defined as one-year ahead operating income after depreciation (data item 178). Consistent with previous research, we deflate earnings by lagged total assets, which

[9] Specifically, we require availability of Compustat data items 1, 4, 5, 6 and 181 in both the current and previous year and data item 18 in the current year in order to keep a firm-year in the sample. If data items 9, 34, are missing, we set them equal to zero rather than eliminating the observation. The results are qualitatively similar if we instead eliminate these observations..

[10] The definition of NOA in "PTW 06" slightly differs from "HTTZ 04" in that it uses directly total liabilities for the calculation of operating liabilities.

converts them into return on assets (ROA) invested at the beginning of the period (an income measure to a profitability measure).[11] Moreover, we deflate NOA and NOA components by lagged total assets. Furthermore, in our regression analysis we winsorize earnings and their components at +1 and –1 in order to eliminate the influence of extreme outliers.[12] Recall also, that in our tests we also consider annual sales SA (data item 12) and the book to market ratio (BV/MV) that is defined as the ratio of the fiscal year end book value of equity (item 6 – item 181) to the market value of equity.[13] Market value of equity is measured at the beginning of the portfolio formation month. Note that we require at least a four-month gap between the portfolio formation month and the fiscal year end to ensure that investors have financial statement data prior to forming portfolios.[14]

Following "FWY 03" and "HHTZ 04" we also consider an alternative definition of NOA that is based on selection of operating assets and operating liabilities, to check for robustness in our hedge portfolio stock return tests. According to this definition, NWCA is defined as the difference WCA (account receivables plus inventories plus other current assets) and WCL (accounts payable plus other current liabilities):

$$NWCA_t = WCA_t - WCL_t = \left(ARE_t + INV_t + OCA_t\right) - \left(AP_t + OCL_t\right)$$

where:

- ARE_t : Accounts receivables (data item 2).
- INV_t : Inventories (data item 3).
- OCA_t : Other current assets (data item 68).
- AP_t : Accounts Payable (data item 70).
- OCL_t : Other current liabilities (data item 72)

Similarly, NNCOA is defined as the difference between NCOA (net property, plant and equipment plus intangibles plus other long term assets) and NCOL (other long term liabilities):

$$NNCOA_t = NCOA_t - NCOL_t = \left(NPPE_t + INT_t + OLA_t\right) - OLTL_t$$

where:

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[11] Barth and Kallapur (1996) show that deflation can introduce biases into regression coefficients when the deflator measures the true underlying scale variable with error. Such biases may be present in our analysis. However, we have no reason to believe that any such biases would differentially affect the relation of NOA and NOA components with future stock returns.

[12] The results are qualitatively similar without winsorization. However, the winsorized results have lower standard errors.

[13] Consistent with previous research, only in these tests we consider firms with positive book value of equity since negative book to market ratios do not lead to intuitive interpretations in terms of the prospective growth. However, our results are qualitatively similar with inclusion of such firms.

[14] Alford , Jones and Zmijewski (1994) argue that four months after the fiscal year end, all firm's financial statement data are publicly available.

- $NPPE_t$: Net property plant and equipment (data item 8).
- INT_t : Intangibles (data item 33).
- OLA_t : Other long term assets (data item 69).
- $OLTL_t$: Other long term liabilities (data item 75)

Thus, NOA is defined as the difference between operating assets and operating liabilities:

$$NOA_t = \left(ARE_t + INV_t + OCA_t + NPPE_t + INT_t + OLA_t\right) - \left(AP_t - OCL_t - OLTL_t\right)$$

The annual one-year ahead raw stock returns RET are measured using compounded 12-month buy-hold returns inclusive of dividends and other distributions from the CRSP monthly files. Then, size-adjusted returns $ARET$ are calculated by deducting the value weighted average return for all firms in the same size-matched decile, where size is measured as the market capitalization at the beginning of the return cumulation period. The size portfolios are formed by CRSP and are based on size deciles of NYSE and AMEX firms. If a firm is delisted during our future return window, then the CRSP's delisting return is considered for the calculation of the one-year ahead raw stock return, and any remaining proceeds are re-invested in the CRSP value-weighted market index. This mitigates concerns with potential survivorship biases. If a firm is delisted during our future return window as a result of poor performance (delisting codes 500 and 520-584) and the delisting return is coded as missing by CRSP, then a delisting return of -100% is assumed.[15]

4 Results

4.1. Descriptive Statistics

In table 1, we report univariate statistics for NOA and NOA components. The mean values of NOA, NWCA and NNCOA are (0.629), (0.189) and (0.44), respectively. Moreover, the median values of NOA, NWCA and NNCOA are (0.683), (0.163) and (0.426), respectively. These mean and median values indicate that firms have more NNCOA than NWCA during our sample period. Turning to the extended decomposition, we see that the mean values WCA, WCL, NCOA and NCOL are (0.394), (0.205), (0.505) and (0.065), respectively. We also see that the median values of WCA, WCL, NCOA and NCOL are (0.383), (0.181), (0.484) and (0.037), respectively. These mean and median values indicate that firms invest more in NCOA than WCA, but have less NCOL than WCL during our sample period. They

[15] Note that we replicate all results by eliminating these firms from the sample or following Shumway (1997) and assuming delisting return of -30% or assuming a zero delisting return. Our results remain qualitatively similar with respect to these three alternative procedures.

also reveal that firms have more operating assets than operating liabilities, suggesting that a large part of these operating assets are funded through financial liabilities. Focusing on the standard deviations of the components of initial decomposition of NOA we see that NNCOA has the highest standard deviation (0.224) followed by NWCA (0.208). Hence, we can argue that these two components represent important sources of variation in total NOA. Turning to the extended decomposition, we see that the standard deviations of WCA, WCL, NCOA, and NCOL are (0.238), (0.129), (0.248) and (0.084), respectively. Thus, we can argue that the total variation in NWCA is driven by WCA and that the total variation in NNCOA is driven by NCOA. Furthermore, this finding corroborates our low sustainability assignments for NWCA and NNCOA categories, despite the high sustainability of their underlying liability WCL and NCOL components, since they are driven from the low sustainability of their underlying asset WCA and NCOA components. Finally, we see that total variation in NOA is driven by their underlying asset WCA and NCOA components.

Table 2 presents pair wise correlations (Pearson) for NOA and NOA components. We see that the correlation of NOA with NWCA (0.491) does not differ much with that of NNCOA (0.589) suggesting that these two components represent important sources of the total variation in total NOA. Moreover, we see that the correlation NOA with NCOA (0.499) is higher than that of WCA (0.28) confirming again, that firms invest more in NCOA than WCA. In addition, we see that NOA is more negatively correlated with WCL (-0.278) than with NCOL (-0.098) confirming again, that firms have more WCL than NCOL. Furthermore, we see that WCA and NCOA are strong positively correlated with WCL and NCOL respectively, indicating that operating liabilities provide a significant source of financing for operating assets. We also see, that NWCA is highly positively correlated with WCA (0.841) and negatively correlated with WCL (-0.063). This finding indicates again that the total variation in NWCA is driven by WCA and supports our low sustainability assignment for these categories. Finally, we see that the correlation of NNCOA with NCOA (0.942) is much higher than that of NCOL (0.116) confirming again, that the total variation in NNCOA is driven by NCOA and explaining our low sustainability assignments for these categories.

4.2. Pricing Results

In this section we examine whether stock prices act as if investors understand the sustainability effects of NOA and NOA components. It is straightforward that if investors correctly anticipate the implications of NOA and NOA components for the sustainability of current earnings performance, then there should be no relation between NOA and NOA components with future stock returns. Recognizing, that NOA represents a measure of balance bloat, as well as a component of current profitability, we provide evidence on the

sustainability effect by examining the relation of NOA with future stock returns, after controlling for current profitability ROA. For example, to examine the sustainability effect of NOA, we estimate the following regression model:

$$ARET_{t+1} = a_0 + a_1 ROA_t + a_2 NOA_t + u_{t+1} \quad (7)$$

Using this regression model[16], the hypothesis that investors naively fail to anticipate the low sustainability implications of NOA for current earnings performance, predicts a negative relation between NOA and future abnormal stock returns $(a_2 < 0)$. In other words, the model predicts that for firms with similar profitability, firms with higher current NOA, experience lower future abnormal stock returns. In order, to investigate whether stock prices act as if investors anticipate the sustainability implications of NOA components, we conduct univariate regression analysis using the same model. For example, to examine the sustainability effect of NWCA, we estimate the following regression model:

$$ARET_{t+1} = a_0 + a_1 ROA_t + a_2 NWCA_t + u_{t+1} \quad (8)$$

Thus, the naïve investor hypothesis, predicts now a negative relation between those NOA components that indicate low sustainability for current earnings performance and future abnormal stock returns. Recall in the table 1 we present our complete balance sheet decomposition of NOA with the associated sustainability assessments. Finally, to allow for statistical tests of differences in the sustainability implications of NOA components, we conduct multivariate regression analysis using the same model. Thus, for our initial and extended decompositions of NOA, we estimate the following regression models:

$$ARET_{t+1} = a_0 + a_1 ROA_t + a_2 NWCA_t + a_3 NNCOA_t + u_{t+1} \quad (9)$$

$$ARET_{t+1} = a_0 + a_1 ROA_t + a_2 WCA_t - a_3 WCL + a_5 NCOA_t - a_6 NCOL + u_{t+1} \quad (10)$$

Table 4 presents our regression results for NOA and NOA components based on the initial and extended balance sheet decompositions. We conduct all of our regression analysis following the Fama and McBeth (1973) procedure of estimating annual cross-sectional regressions for our sample period from 1962 to 2002 and reporting the time series averages of the resulting parameter coefficients.[17] The reported t-statistics in parenthesis are based on the means and standard deviations of the parameter coefficients obtained in the annual cross sectional regressions. From the first row in panel A of table 4, we see consistent with "RSST 05" no significant relation between future abnormal stock returns and current profitability. Turning to the second row that presents the estimation results of the regression of future

[16] This model was adopted in "FWY 03", "RSST 05" studies to examine the lower persistence and mispricing of the accrual component of earnings.

[17] To check for robustness, we replicate the above analysis using the alternative definition of NOA described in the data section and find that the results remain similar with respect to this definition. The results are available from the authors upon request.

abnormal stock returns on NOA, conditional on current profitability, we see a strong negative coefficient on NOA (-0.147) and statistically significant (t=-5.158). Thus, there is a negative relation of NOA with future stock returns, after controlling for current profitability. In other words, for firms with similar profitability, firms with higher current NOA, experience lower future abnormal stock returns. This finding is consistent "HHTZ 04"main conclusion that high NOA indicates low sustainability for current earnings performance, causing investors with limited attention that do not fully comprehend this low sustainability to overvalue (undervalue) firms with high (low) NOA.

Panel B of table 4 reports results of estimating the regression of future abnormal stock returns on NOA components, based on our initial decomposition, after controlling current profitability. Recall from table 1, that NWCA and NNCOA are assessed to indicate low sustainability for current earnings performance and so we expect a strong negative relation between these NOA components and future stock returns. From the first two rows of panel B of table 4 we see that the coefficients on NWCA and NNCOA are consistent with our sustainability assessments and the naïve investor hypothesis in each of the univariate regressions. In particular, the coefficient on NWCA is -0.054 (t=-1.92), while on NNCOA is -0.083 (t=-2.448). Similarly, from the final row of panel B of table 4 we see again that the coefficients on NWCA and NNCOA are consistent with our sustainability assessments and the naïve investor hypothesis in the multivariate regression. In particular, the coefficient on NWCA is -0.143 (t=-4.997), while on NNCOA is -0.151 (t=-4.297). Note that the coefficients of all NOA components fall sharply from the univariate regressions to the multivariate regression. We believe that the differences in the magnitude of the coefficients depend on the correlations between NOA components. Thus, we can argue that high NWCA (NNCOA) indicates low sustainability about current profitability, causing investors with limited attention that do not fully comprehend this low sustainability to overvalue firms with high NWCA (NNCOA) relative to those with low NWCA (NNCOA). Finally, an untabulated test indicate that there are no significant differences in the coefficients of NWCA and NNCOA (t=0.245), indicating that after controlling for current profitability, stock prices act as if investors do not distinguish and similarly overweight the sustainability implications of NWCA and NNCOA.

Panel C of table 4 reports results of estimating the regression of future abnormal stock returns on NOA components, based on our extended decomposition, after controlling current profitability. Recall from table 1 that the underlying asset WCA and NCOA components are assessed to indicate low sustainability for current earnings performance and so we expect a strong negative relation between these NOA components and future stock returns. From the first and the third row of panel C of table 4 we that the coefficients on WCA and NCOA are consistent with our sustainability assessments and the naïve investor hypothesis in each of the univariate regressions. In particular, the coefficient on WCA is -0.040 (t=-1.938), while on

NCOA is -0.076 (t=-2.215). However, from the second and the fourth row of panel C of table 4, we find no significant relation between the underlying WCL and NCOL liability components that are assessed to have high sustainability and future stock returns. Similarly, from the final row of panel B of table 4, we see again that the coefficients on WCA and NCOA are again consistent with our sustainability assessments and the naïve investor hypothesis in the multivariate regression. In particular, the coefficient on WCA is -0.186 (t=-5.199), while on NCOA is -0.187 (t=-5.538). Turning to liability components, we see that the coefficient on WCL is -0.066 (t=-1.835), while on NCOL is -0.043 (t=-0.752). Note that the coefficients of all NOA components fall sharply from the univariate regressions to the multivariate regression. We believe that the differences in the magnitude of the coefficients depend on the correlations between NOA components. Thus, we can argue that high WCA (NCOA) indicates low sustainability about current profitability, causing investors with limited attention that do not fully comprehend this low sustainability to overvalue firms with high WCA (NCOA) relative to those with low WCA (NCOA). In contrary, we can also argue that there is no significant relation of the underlying WCL and NCOL liability components with future stock returns. Finally, an untabulated test indicate that there are no significant differences in the coefficients of WCA and NCOA (t=0.025), indicating that after controlling for current profitability, stock prices behave as if investors do not distinguish and similarly overvalue the sustainability implications of WCA and NCOA.

4.3. Stock Returns Results

In table 5 we present stock return results from portfolio trading strategies on NOA and NOA components. "HHTZ 04" provide evidence that abnormal stock returns can be generated by exploiting investor's overvaluation of the implications of NOA for the sustainability of current earnings performance. In particular, a trading strategy taking a long (short) position in firms that report low (high) NOA should generate positive abnormal returns. The results from the previous section suggest a negative relation between those NOA components that indicate low sustainability for current earnings performance and future abnormal stock returns. Therefore, the economic significance of these results can be assessed by investigating the returns of trading strategies based on the magnitude of these NOA components. For this purpose we rank firms annually on each NOA component and then allocate them into ten equally-sized portfolios (deciles) based on these ranks. Then, we compute separate future equally weighted annual abnormal (size-adjusted) returns for each portfolio for each of the 40 years in our sample. Finally, we compute the hedge portfolio returns consisting of a long (short) position in the lowest (highest) decile to provide a measure of the economic magnitude of the mispricing for each NOA component.

The first column in panel A of table 5, reports the average of the 40 annual abnormal returns for each portfolio based on the magnitude of NOA, and for a hedging portfolio strategy consisting of a long (short) position in the lowest (highest) portfolio. Consistent with prior results from our pricing tests and with "HHTZ 04" evidence, we find that the hedge portfolio return for NOA is 15.6% (t=4.07) and positive in 34 of the 40 years examined as depicted in figure 1, suggesting that the relation is fairly stable over time. The results for the initial decomposition of NOA are presented in the second and the third column in panel A of table 5 and provide evidence on the source of the NOA hedge return. Consistent with prior evidence from our pricing tests and with our sustainability assessments, we find that the trading strategies taking a long (short) position in firms that report low (high) NWCA and NNCOA generate positive abnormal returns. In particular, the hedge portfolio return for NWCA is positive 6.2% (t=2.56), while for NNCOA is 11.7% (t=3.254). Finally, in unreported test we find that there are no significant differences between the abnormal returns generated from the hedge portfolio strategies based on magnitude of NWCA and NNCOA (t=1.463), indicating that, stock prices behave as if investors do not distinguish and similarly overweight the sustainability implications of NWCA and NNCOA.

In panel B of table 5 we report the hedge portfolio returns for the extended decomposition of NOA. Consistent with prior results from our pricing tests and with our sustainability assessments, we find that the trading strategies taking a long (short) position in firms that report low (high) WCA and NCOA generate positive abnormal returns. In particular, the hedge portfolio return for WCA is 6.8% (t=2.341), while for NCOA 10.7% (t=2.77). Furthermore, in unreported test we find that there are no significant differences between the abnormal returns generated from the hedge portfolio strategies based on magnitude of WCA and NCOA (t=0.951), indicating that, stock prices behave as if investors do not distinguish and similarly overvalue the sustainability implications of WCA and NCOA. Finally, we find no significant hedge abnormal stock returns for the underlying WCL and NCOL liability components. Thus, the overall picture emerges from table 5, confirms that the NOA anomaly is driven by the asset NOA components that imply low sustainability for current profitability.

To check for robustness in our hedge portfolio stock return tests, we consider an alternative definition of NOA that is based on selection of operating assets and operating liabilities. The results in panels A and B of table 6 indicate that the two measures of NOA are very similar. The hedge portfolio strategy for NOA is 14% (t=5.878) and positive in 37 of the 40 years examined suggesting again that the relation is fairly stable over time. Turning to the components of the initial decomposition of NOA, we see that the hedge portfolio returns for NWCA and NNCOA are 5.5% (t=2.281) and 10.1% (t=3.665), respectively. Note, that from an untabulated test, we find that there are no significant differences between the abnormal returns generated from the hedge strategies based on magnitude of NWCA and NNCOA

(t=1.215), indicating again that stock prices act as if investors do not distinguish and similarly overvalue the implications of NWCA and NNCOA about the sustainability of current earnings performance. Furthermore, from the extended decomposition of NOA, we see significant abnormal returns for the hedge strategies on the underlying WCA and NCOA asset components, while no significant abnormal returns for the hedge strategies on the underlying WCL and NCOL liability components. In particular, the hedge portfolio returns for WCA and NCOA are 6.1% (t=2.158) and 10.5% (t=3.257), respectively. Finally, from an untabulated test, we find that there are no significant differences between the abnormal returns generated from the hedge strategies based on magnitude of WCA and NCOA (t=1.061), indicating again that stock prices act as if investors do not distinguish and similarly overweight the implications of WCA and NCOA about the sustainability of current earnings performance.

In panel C of table 6 we provide the hedge portfolio returns for the operating assets and operating liabilities that are considered in the alternative definition of NOA. Turning to WCA components we see that we see that the hedge portfolio returns for ARE and INV are 5.3% (t=2.022) and 5% (t=2.159), respectively. Note, that from an untabulated test, we find that there are no significant differences between the abnormal returns generated from the hedge portfolio strategies based on magnitude of ARE and INV (t=0.103). However, we find no significant hedge portfolio returns for other current assets (OCA). Thus, we can argue that the negative relation of WCA with future stock returns is driven by ARE and INV. Moreover, turning to WCL we see that the hedge portfolio return for AP is -5% (t=-2.495) and no significant hedge portfolio return for other current liabilities (OCL). For NCOA we see that the hedge portfolio returns for NPPE and INT are 6.9% (t=2.264) and 4.4% (t=2.21), respectively. Note, that from an untabulated test, we find that there are no significant differences between the abnormal returns generated from the hedge portfolio strategies based on magnitude of NPPE and INT (t=0.631). However, we find no significant hedge portfolio returns for other long term assets (OLA) and other long term liabilities (OLT). Thus, we can argue that the negative relation of NCOA with future stock returns is entirely attributable to NPPE and INT. Overall the results from table 6 confirm again that the NOA anomaly is driven by the asset NOA components that imply low sustainability for current profitability.

4.4. Statistical Arbitrage Tests

In this section, we attempt to corroborate "HTTZ 04" behavioral (mispricing) conjecture of investor's limited attention for the interpretation of the sustainability effect.[18] However, an immediate question in any debate over mispricing is whether the model of market returns (or

[18] Hirshleifer, Hou, Teoh and Zhang (2006) present evidence consistent with the behavioral (mispricing) conjecture of investor's limited attention for the NOA and the accrual effect.

model of risk adjustment) with respect to which mispricing is documented is valid. Fama (1970) was among the first to observe that tests of market efficiency are joint tests of mispricing and the equilibrium asset pricing model. Thus, the abnormal returns from trading strategies don't necessarily imply the rejection of market efficiency, since they could be due to mismeasured risk if the model of market returns is invalid. In order to avoid this joint hypothesis dilemma of traditional market efficiency tests, we apply the statistical arbitrage test that is designed by "HJTW 04" and defined without reference to a specific model for equilibrium returns, to hedge strategies based on NOA and NOA components. [19]

By definition a trading strategy that constitutes statistical arbitrage opportunities must have a zero initial cost (self financing), positive expected discounted profits, a probability of a loss converging to zero and a time-averaged variance converging to zero if the probability of a loss does not become zero in finite time. In economics terms, the last condition associated with the time-averaged variance implies that a statistical arbitrage opportunity eventually produces riskless incremental profit, with an associated "Sharpe" ratio increasing monotonically through time. Note, that the concept of statistical arbitrage opportunity is similar to the limiting arbitrage opportunity used to construct Ross' APT (1976). The difference between the two concepts is that a statistical arbitrage is a limiting condition across time, while Ross' APT is a cross-sectional limit at a point in time. Therefore, just as Ross' APT is appropriate in an economy with a "large" number of assets, "HJTW 04" methodology is appropriate for "long" time horizons. Finally, the definition of statistical arbitrage is not contingent upon a specific asset pricing model for equilibrium returns and therefore, its existence is inconsistent with market equilibrium, and by inference, with market efficiency.

The zero initial cost (self financing) condition in these tests is enforced by is enforced by investing (borrowing) trading profits (losses) generated by each trading strategy at the risk free rate. Specifically, time series of annual hedge (raw) returns $RET\left(t_i\right)$ are first generated from hedge strategies on hedge strategies on NOA and NOA components. Then, the trading profits $V\left(t_i\right)$ of each trading strategy accumulate at the risk free rate $r\left(t_i\right)$ to yield cumulative trading profits (with $V\left(t_0\right)=0$):

$$V\left(t_i\right)=RET\left(t_i\right)+e^{r\left(t_{i-1}\right)}\cdot V\left(t_{i-1}\right) \tag{11}$$

This cumulative trading profit is then discounted each period by $e^{\sum_{i=1}^{n}\Sigma r(t_i)}$ to construct discounted cumulative trading profits $v\left(t_i\right)$ for each trading strategy. Let

[19] Cochrane and Saa-Requejo (2000) , Bernardo and Ledoit (2000) and Carr, Geman and Madan (2001) have also conducted similar tests without specifying a particular model of market returns.

$\Delta v_i = v(t_i) - v(t_{i-1})$, denote the increments of the discounted cumulative profits with mean μ, growth rate of mean θ, standard deviation σ and growth rate of standard deviation λ. Assume also that Δv_i evolve according to the following stochastic process:

$$\Delta v_i = \mu \cdot i^{\theta} + \sigma \cdot i^{\lambda} \cdot z_i \tag{12}$$

where i=1,2,…..n, z_i are $i.i.d\ N(0,1)$ random variables with $z_0 = 0$, $v(t_0)$ and Δv_0 are equal to zero. Under the above assumed stochastic process, the discounted cumulative profits v_t are distributed as

$$v(t_n) = \sum_{i=1}^{n} \Delta v_i \sim N\left(\mu \sum_{i=1}^{n} i^{\theta}, \sigma^2 \sum_{i=1}^{n} i^{2\lambda} \right) \tag{13}$$

and have the following log likelihood function.

$$\log L\left(\mu, \sigma^2, \theta, \lambda \middle| \Delta v\right) = -\frac{1}{2} \sum_{i=1}^{n} \log\left(\sigma^2 i^{2\lambda}\right) - \frac{1}{2\sigma^2} \sum_{i=1}^{n} \frac{1}{i^{2\lambda}} \left(\Delta v_i - \mu \cdot i^{\theta}\right)^2 \tag{14}$$

The parameters $\mu, \theta, \sigma, \lambda$ can be estimated through the maximum likelihood estimation method and the associated score equations are provided in the appendix.[20] Then, assuming that $\theta = 0$, one can conduct constraint mean tests of statistical arbitrage. In particular, under these tests a trading strategy generates statistical arbitrage with $1-\alpha$ percent confidence if the following conditions are satisfied[21]:

H1: $\mu > 0$

H2: $\lambda < 0$

The first hypothesis tests whether the mean annual incremental profit of a trading strategy is positive (second condition for statistical arbitrage) and the second, whether its time-averaged variance decreases over time (fourth condition of statistical arbitrage). Thus, a single t-test on incremental trading profits is not a valid test for statistical arbitrage since it focuses only on the second condition but ignores the fourth condition. The two parameters are tested individually with the Bonferroni inequality accounting for the combined nature of the hypothesis test. The Bonferroni inequality stipulates that the sum of the p-values from the individual tests becomes the upper bound for the type I error of the statistical arbitrage tests. Note, that standards errors for the above parameters may be extracted from the Hessian matrix to produce the required corresponding p-values.[22]

[20] It is well known that the maximum likelihood estimators are consistent and asymptotically efficient (they achieve Cramer-Rao lower bound).

[21] See in the appendix the appropriate conditions for statistical arbitrage under the unconstraint mean tests and in "HJTW 04" for further details on the differences between the constraint and unconstraint tests of statistical arbitrage.

[22] The authors thank M. Warachka for providing them the Hessian matrix.

In table 7 we report the results from statistical arbitrage tests on hedge portfolio strategies based on the magnitude of NOA and NOA components. In the first column we provide t-statistics of the mean annual discounted incremental profits for each trading strategy for comparative purposes. Starting with the strategy on NOA we see that it has a mean annual discounted incremental profit (μ) equal 3.9% (p=0.000), and a growth rate of standard deviation (λ) equal to -0.366 (p=0.007). Thus, the strategy constitutes statistical arbitrage opportunities at the 1% level. Turning, to the components of initial decomposition of NOA, we see that the hedge strategy on NWCA survives the statistical arbitrage test at the 5% level, while on NNCOA at the 1% level. In particular, the mean annual discounted incremental profit (μ) for the strategy on NWCA is equal to 1.2 % (p=0.015), while for the strategy NNCOA is equal to 3.3 % (p=0.000) with estimated growth rates of standard deviation (λ) equal to -0.447 (p=0.003) and -0.489 (p=0.000), respectively. Similarly, turning to the asset components of extended NOA decomposition we see that the hedge strategy on WCA strategy constitutes statistical arbitrage opportunities at the 5% level, while on NCOA at the 1% level. On the other hand, it is found that the hedge strategies on WCL and NCOL components do not survive the statistical arbitrage test. Overall, our findings indicate that the strategies on NOA and those NOA components that imply low sustainability for current profitability converge to riskless arbitrages with decreasing time averaged variance. Thus, these findings are difficult to reconcile with the notion of market efficiency and provide support on "HTTZ 04" behavioral conjecture of investor's limited attention to interpret the NOA effect.

4.5. Relation of the NOA Anomaly with the Book to Market Anomaly

In this section we investigate the relation of the NOA effect and the book to market effect. Note, that both effects represent reversal of prior returns linked to similar accounting data (the book value of equity is equal to net operating assets and net financial assets). The NOA anomaly could be consistent with investor's limited attention on earnings management and/or firm's growth. On the other hand, the book to market anomaly, could be consistent with investor's errors –in- expectations about future growth ("LSV 94") or a risk premium associated with firm's growth rate (Fama and French 1992, 1993, 1996). Recently, "DRV 04" find evidence consistent with Beaver's (2002) conjecture that accrual anomaly may be the value/glamour phenomenon in disguise. In order to assess this possibility, we investigate the extent to which the anomaly on NOA (accrual proxy) and the anomaly on the book to market ratio (value/glamour) proxy overlap with or differ from each other by considering control

hedge, non-overlap hedge and joint hedge strategies.[23] To implement these two-dimensional strategies, we sort stocks into three groups, the bottom 20 percent (Group 1), middle 60 percent (Group 2), and top 20 percent (Group 3) for both NOA and book to market ratio. Thus, firms are assigned into three final quintiles based on NOA (NOA(1), NOA(2), NOA(3)) and book to market ratio (BV/MV(1),BV/MV(2), BV/MV(3))[24].

Panel A of Table 8 shows that the unconditional hedge return (based on quintile analysis) on NOA is equal to 12% (t=3.848), while on book to market ratio is equal to 8% and statistically significant (t=3.26). In Panel B of Table 8 we report the abnormal returns for the control hedge strategies on net operating assets and book to market ratio. Under these strategies, we assess whether the NOA effect survives after holding the book to market effect constant and vice-versa. We see, that the generated abnormal returns from the strategy on NOA are 8.5% (t=3.01), 13.1% (t=3.813) and 15.3% (t=3.305) across firms with low, medium and high levels of book to market ratio**,** respectively**.** Thus, the strategy on NOA is profitable, after controlling for the book to market ratio. On the other hand, that the generated abnormal returns from the strategy on the book to market ratio are 12.8% (t=4.341), 7.9% (t=3.32) and 6% (t=1.585) across firms with low, medium and high levels of NOA**,** respectively**.** Thus, the book to market effect is not present across high NOA firms. Note also, that information in the book to market ratio can be combined to refine the strategy on NOA and vice versa. In particular, the strategy on NOA can be refined by excluding firms with low levels of book to market ratio from the portfolio NOA(1) portfolio, while the strategy on book to market ratio can be refined by excluding firms with high levels of NOA from the BV/MV(3) portfolio.

Panel C of table 8 reports the abnormal returns to non-overlap hedge strategies on NOA and book to market ratio. Under these strategies, we assess whether the sustainability effect survives over the book to market effect and vice-versa, after eliminating firms in convergent extreme intersections (NOA(1), BVMV(3) & NOA(3), BV/MV(1)) where the two effects have the same prediction. We see that the abnormal return earned from the non-overlap hedge strategy on NOA is equal to 9.7% (t=3.047), while on the book to market ratio is equal to 5% (t=1.859). Thus, the predictive power of NOA for future returns is not mitigated in the presence of the book to market ratio and vice versa.

Furthermore, from panel D we see that the abnormal return from a joint hedge strategy taking a long position in the (NOA(1), BV/MV(3)) intersection and a short position in the

[23] Collins and Hribar (2002) and "DRV 04" have used this approach to investigate the relation of the accrual anomaly with the post announcement drift anomaly and the value/glamour anomaly, respectively.

[24]Using quintile analysis leads to lower standard errors in t-statistics for hedge returns across two-dimensional strategies than decile analysis. This approach has been also used by other studies in the accounting and the finance literature. However, the results are qualitatively similar with decile analysis.

intersection (NOA(3), BV/MV(1)) is equal to 21.2% (t=5.224). The difference between the abnormal return obtained from the joint hedge strategy with that from the strategy on NOA is 9.2% (t=3.194), while with that from the strategy on the book to market ratio is 13.2% (t=3.329). Thus, the joint hedge strategy that combines information on both the sustainability and the book to market effect generates abnormal returns in excess of those based on each effect alone. In figure 2, we plot these annual hedge portfolio abnormal returns generated from the joint strategy and the pure strategies on NOA and book to market ratio. The strategy on NOA is profitable in 32 out of 40 years, on book to market ratio in 27 out of 40 years, while the joint strategy in 35 out of 38 years. Note, that in unreported tests we find that this joint strategy constitutes statistical arbitrage opportunities at the 1% level.[25] Thus, there does not appear to be significant additional risk with this combined strategy in terms of magnitude or frequency of losses and terms of statistical arbitrage.

In summary, the above results suggest that the sustainability effect and the book to market effect represent unrelated asset pricing regularities, that in combination they generate higher abnormal returns than from each effect in isolation. Taken together that the NOA strategy constitute statistical arbitrage opportunities, our evidence raises interesting questions on the behavioural conjecture of investor's limited attention on growth and suggests a more prominent role for the conjecture of investor's limited attention on earnings management in interpreting the NOA anomaly. Finally, they contradict Beaver's (2002) conjecture that the accrual anomaly is the value/glamour phenomenon in disguise.

4.6. Discretionary and Non-Discretionary NOA and NOA components.

As we already mentioned, the negative relation of NOA, is consistent with investor's limited attention on earnings management and/or growth. In order to distinguish between these two competing explanations, we decompose NOA into their discretionary and non discretionary portions to examine whether investors correctly anticipate their sustainability implications.[26] The discretionary portion captures the impact of earnings management while the non discretionary portion captures the impact of growth. The decomposition will be made using a modified version of the model of "CCJL 06" that is based on sales growth. Thus, if the NOA anomaly is attributable to earnings management, then only discretionary portion (unrelated to sales growth) should be negatively associated with future returns. On the other

[25] The results are available from the authors on request.

[26] The method of decomposing earnings into their discretionary and non discretionary portions is often used in the accounting literature to detect earnings management (see Jones, 1991). However, it is a controversial issue since any misspecification in the decomposition introduces measurement errors in each estimated portion (see, Dechow, Sloan and Sweeney, 1995, Guay, Kothari and Watts, 1996 and Kothari, Leone and Wasley 2005).

hand, if the NOA anomaly is attributable to growth, then only non discretionary portion (related to sales growth) should be negatively associated with future returns.[27] However, we investigate also the relation of an interaction term between the two portions of NOA with stock returns, since we recognize that the two explanations could be not mutually exclusive and probably co-exist. Finally, using the same model we also decompose NOA components into their discretionary and non discretionary portions to investigate whether investors correctly anticipate their sustainability implications.

This modified version of the model of "CCJL 06"[28] that is based on the idea that the expected level of each component of NOA for a firm is closely related to the level of current sales S_t as follows:

$$E_t(NOA_t) = \frac{\sum_{k=1}^{5}(NOA)_{t-k}}{\sum_{k=1}^{5} S_{t-k}} S_t \tag{15}$$

In this model, the level of each componet of NOA is assumed to be stable proportion of firm sales. To smooth out transitory fluctuations we estimate this proportion as the ratio of a moving average of the past five years of the actual level of each componet of NOA to a moving average of the past five years of sales. Then, the non discretionary portion of each componet of NOA that reflects firm's growth is defined as its expected level:

$$NDNOA_t = E_t(NOA_t) \tag{16}$$

The discretionary portion of each componet of NOA that captures earnings management is then defined as the difference between the actual level of each componet of NOA and its corresponding non discretionary portion (expected level):

$$DNOA_t = NOA_t - NDNOA_t \tag{17}$$

In table 9 we report the estimation results from regressions of future abnormal stock returns on the discretionary portion, non discretionary portion and an interaction term between the two portions of NOA, after controlling for current profitability. We conduct all of our regression analysis following the Fama and McBeth (1973) procedure of estimating annual cross-sectional regressions for our sample period and reporting the time series averages of the resulting parameter coefficients. The reported t-statistics in parenthesis are based on the means and standard deviations of the parameter coefficients obtained in the annual cross sectional regressions. Note that the sample for these tests consists of firms for a

[27] A potential limitation of this decomposition is that the non discretionary portion could be affected by managerial violation of sales (e.g. overstatement of accounts receivables). Thus, we cannot argue that the properties of the non discretionary portion are entirely attributable to growth. However, we can argue that the properties of the discretionary portion are entirely attributable to earnings management.

[28] In our work we do not use the Jones (1991) model and follow the approach of "CCJL 06", since we recognize that few firms have sufficiently long time series to ensure a reliable estimation of a regression model to extract the discretionary and non discretionary portion of each component of NOA.

36-year period from 1967 to 2002 due to the data requirements for the estimation of non-discretionary and discretionary portions of NOA and NOA components. Consistent with the investor's limited attention on earnings management, we find a negative coefficient on discretionary NOA (-0.07) and statistically significant (t=-3.95). Thus, there is a negative relation of discretionary NOA with future stock returns, after controlling for current profitability. In other words, for firms with similar profitability, firms with higher current NOA due to earning management, experience lower future abnormal stock returns. This finding suggest, that the NOA anomaly is driven from investors with limited attention that do not fully comprehend that high NOA that arises from managerial discretion with respect to accounting rules or from managerial empire building incentives indicates low sustainability for current earnings performance. In contrary, with investor's limited attention on growth, we find that the coefficient on non discretionary NOA is statistically insignificant. Thus, there is no significant relation between non discretionary NOA and future stock returns, after controlling for current profitability. Furthermore, we see that the coefficient on the interaction term between the discretionary and non discretionary portion of NOA is -0.038 (t=-2.702), suggesting a significant role for investor's limited attention on the interaction of earnings management and firm's growth in explaining the NOA anomaly. Thus, we can argue that is some cases the two explanations could not be mutually exclusive and probably co-exist.

In table 10 we present stock return results from hedge strategies on the discretionary, non-discretionary portions of NOA and the interaction term to assess the economic significance of above results on the source of the sustainability effect. In particular, the hedge return on the discretionary NOA is 8.7% (t=4.885), while on non discretionary NOA is statistically insignificant. From figure 3 that plots the hedge abnormal returns generated from discretionary NOA, we see that the strategy is positive in 30 out of 36 years. On the other hand, the hedge abnormal return on the interaction term is 8.1% (t=4.415) and positive in 28 out of 36 years, as depicted in figure 4.

In table 11 we report the estimation results from the regressions of future abnormal stock returns on the discretionary portion and non discretionary portions of NOA components based on our initial and extended decomposition, after controlling for current profitability. From panel A, we see that the coefficient on discretionary NWCA is equal to -0.101 (t=-2.743), while on discretionary NNCOA is equal to -0.075 (t=-3.868). Turning, to the asset components of extended NOA decomposition we find that the coefficient on discretionary WCA is equal to -0.111 (t=-3.074), while on discretionary NCOA is equal to -0.074 (t=-4.161). Thus these findings suggest, that the negative association of asset NOA components with future stock returns, is driven from investors with limited attention that fail to discount that their high levels due to earnings management indicates low sustainability for current earnings performance. On the other hand, we do not find significant coefficients for the

discretionary portions of WCL and NCOL liability components. Furthermore, from panel B we see that the coefficients on the non discretionary portions of asset and liability NOA components based on our initial and extended decomposition are statistical insignificant. Thus, these findings suggest again no important role for investor's limited attention on growth, in interpreting the sustainability effect.

In table 12 we report stock return results from hedge strategies on the discretionary and non discretionary portions of NOA components based on initial and extended balance sheet decompositions. From panel A we see that the hedge return on the discretionary portion of NWCA is 5.1% (t=3.443), while on the discretionary portion of NNCOA is 8.1% (t=4.561). Turning, to the asset components of extended NOA decomposition we find that the hedge return on the discretionary portion of WCA is 6.5% (t= 3.669), while on the discretionary portion of NCOA is 8.5% (t= 4.542). On the other hand, we do not find significant hedge returns for the discretionary portions of WCL and NCOL components. Finally, from panel B we see that the hedge strategies, on the non discretionary portions of asset and liability NOA components based on our initial and extended decomposition, are not profitable.

In summary, our finding on the source of the NOA anomaly are consistent with investor's limited attention on managerial violation of accounting principles and/or managerial empire building incentives, but in contrary with investor's limited attention on firm's growth. However, it is found that the interaction of earnings management and growth is an important contributing factor in the anomaly. As such, they suggest that "HHTZ 04" interpretation of the sustainability effect requires earnings management.

5 Conclusions

"HHTZ 04" first document that that the level of NOA is a strong negative predictor of future stock returns for at least three years after balance sheet information is released. "HHTZ 04" interpret this result as "the sustainability effect" since a high level of NOA indicates a lack of sustainability of current profitability causing, investors with limited attention on earnings management and/or growth to overvalue (undervalue) firms with high (low) NOA.

In this paper we directly "HHTZ 04" notion of sustainability with future stock returns. We find that, after controlling for current profitability, there is a negative relation of the level of NOA with future stock returns. Moreover, the results indicate that this relation is associated with the sustainability implications of the underlying components of NOA. We also find that the hedge strategies on NOA and those NOA components that indicate low sustainability of current earnings performance generate positive hedge abnormal returns. It is also found, that these strategies constitute statistical arbitrage opportunities, a finding that is difficult to reconcile with the notion of market efficiency for any model of market returns.

Our findings, on the source of the sustainability effect indicate that it is unrelated with the book to market effect. Note that the generated abnormal returns from a hedge strategy that combine information on NOA and book to market ratio are significantly higher than those from each variable alone. Consistent with investor's limited attention on earnings management, we also show that discretionary portion of NOA is negatively associated with future stock returns and this negative association applies to the discretionary portions of those NOA components that indicate low sustainability for current profitability. On the other hand, there is no significant relation between the non discretionary portion of NOA with future stock returns, contrary to the hypothesis that the anomaly arises from investor's limited attention on firm's growth. However, it is found that an interaction of earnings management and growth is an important contributing factor in the NOA anomaly. Overall, our evidence suggests that "HHTZ 04" interpretation about the NOA anomaly requires investor's limited attention on accounting distortions arising from earnings management.

Appendix

A. Parameters Estimates for the Statistical Arbitrages Tests

The parameters $\mu, \theta, \sigma, \lambda$ are estimated from the following system of four equations with four unknowns:

$$\frac{\partial \log L\left(\mu,\sigma^2,\theta,\lambda\middle|\Delta v\right)}{\partial \mu}:\ \mu=\frac{\sum_{i=1}^{n}\Delta v_i i^{\theta-2\lambda}}{\sum_{i=1}^{n} i^{2(\theta-\lambda)}} \tag{1}$$

$$\frac{\partial \log L\left(\mu,\sigma^2,\theta,\lambda\middle|\Delta v\right)}{\partial \sigma^2}:\ \sigma^2=\frac{1}{n}\sum_{i=1}^{n}\frac{1}{i^{2\lambda}}\left(\Delta v_i-\mu i^{\theta}\right)^2 \tag{2}$$

$$\frac{\partial \log L\left(\mu,\sigma^2,\theta,\lambda\middle|\Delta v\right)}{\partial \theta}:\ \sum_{i=1}^{n}\Delta v_i \log(i) i^{\theta-2\lambda}=\mu\sum_{i=1}^{n}\log(i) i^{2(\theta-\lambda)} \tag{3}$$

$$\frac{\partial \log L\left(\mu,\sigma^2,\theta,\lambda\middle|\Delta v\right)}{\partial \lambda}:\ \sigma^2\sum_{i=1}^{n}\log(i)=\sum_{i=1}^{n}\frac{\log(i)}{i^{2\lambda}}\left(\Delta v_i-\mu i^{\theta}\right)^2 \tag{4}$$

Note that by assuming, $\theta=0$ and $\lambda=0$ we get the standard MLE estimators of the mean and the variance of the incremental trading profits of each strategy:

$$\mu=\frac{1}{n}\sum_{i=1}^{n}\Delta v_i \ \text{ and } \ \sigma^2=\frac{1}{n}\sum_{i=1}^{n}\left(\Delta v_i-\mu\right)^2$$

B. Unconstraint Mean Test of Statistical Arbitrage

Under the unconstraint mean test, a trading strategy generates statistical arbitrage with $1-\alpha$ percent confidence if the following conditions are satisfied:

H1: $\mu>0$

H2: $\lambda<0$

H3: $\theta>\max\left\{\lambda-\frac{1}{2},-1\right\}$

with the sum of p values for the individual tests forming an upper bound for the type I error a.

Note that by assuming $\theta=0$ the unconstraint mean test of statistical arbitrage is reduced to a constraint mean test, while by assuming $\theta=0$ and $\lambda=0$ it is reduced to a single t-test.

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Table 1: Summary of Sustainability Assessment by NOA Components

NOA Category	Decomposition Level	Sustainability Assessment
Working Capital Assets (WCA)	Extended	Low
Working Capital Liabilities (WCL)	Extended	High
Net Working Capital Assets (NWCA)	Initial	Low
Non Current Operating Assets (NCOA)	Extended	Low
Non Current Operating Liabilities (NCOL)	Extended	High
Net Non Current Operating Assets (NCOA)	Initial	Low

Table 2: Univariate Statistics for *NOA* , *NOA* Components and *ROA*

Parameter	Mean	Median	Std. Dev.	Skewness	Kurtosis
NOA	0.629	0.683	0.234	-1.16	4.399
NWCA	0.189	0.163	0.208	0.252	2.98
NNCOA	0.44	0.426	0.224	0.096	2.457
WCA	0.394	0.383	0.238	0.282	2.191
WCL	0.205	0.181	0.129	1.681	7.522
NCOA	0.505	0.484	0.248	0.139	2.061
NCOL	0.065	0.037	0.084	2.812	16.69
ROA	0.06	0.086	0.182	-1.691	9.371

Table 3: Pearson Correlations among *NOA* , *NOA* Components and *ROA*

Parameter	*NOA*	*NWCA*	*NNCOA*	*WCA*	*WCL*	*NCOA*	*NCOL*	*ROA*
NOA	1	0.491	0.589	0.28	-0.278	0.499	-0.098	0.417
NWCA	0.491	1	-0.414	0.841	-0.063	-0.453	-0.236	0.294
NNCOA	0.589	-0.414	1	-0.488	-0.232	0.942	0.116	0.163
WCA	0.28	0.841	-0.488	1	0.487	-0.527	-0.255	0.321
WCL	-0.278	-0.063	-0.232	0.487	1	-0.24	-0.09	0.118
NCOA	0.499	-0.453	0.942	-0.527	-0.24	1	0.442	0.178
NCOL	-0.098	-0.236	0.116	-0.255	-0.09	0.442	1	0.09
ROA	0.417	0.294	0.163	0.321	0.118	0.178	0.09	1

Table 4: Results from Regressions of *ARET* on *NOA* and *NOA* Components After Controlling for *ROA*

Panel A: OLS Regression on Total *NOA*						
Constant	*ROA*	*NOA*				**Adj. R^2**
0.019	0.093					0.011
(2.041)	(1.525)					
0.111	0.136	-0.147				0.015
(5.118)	(2.42)	(-5.158)				
Panel B: OLS Regressions on Initial Decomposition of *NOA*						
Constant	*ROA*	*NWCA*	*NNCOA*			**Adj. R^2**
0.027	0.108	-0.054				0.014
(2.447)	(1.843)	(-1.92)				
0.054	0.105		-0.083			0.016
(2.848)	(1.836)		(-2.448)			
0.112	0.138	-0.143	-0.151			0.019
(4.992)	(2.497)	(-4.997)	(-4.297)			
Panel C: OLS Regressions on Extended Decomposition of *NOA*						
Constant	*ROA*	*WCA*	$-WCL$	*NCOA*	$-NCOL$	**Adj. R^2**
0.033	0.110	-0.040				0.016
(2.164)	(1.859)	(-1.938)				
0.018	0.091		-0.0002			0.014
(1.573)	(1.489)		(-0.006)			
0.056	0.111			-0.076		0.016
(2.590)	(1.978)			(-2.215)		
0.023	0.100				0.054	0.013
(1.874)	(1.713)				(0.694)	
0.170	0.170	-0.186	-0.066	-0.187	-0.043	0.023
(5.452)	(3.278)	(-5.199)	(-1.835)	(-5.538)	(-0.752)	

Notes: The regressions are conducted following the Fama and McBeth (1973) procedure of estimating annual cross-sectional regressions for the sample period from 1963 to 2002 and reporting the time series averages of the resulting parameter coefficients and adjusted R^2. The reported t-statistics in parenthesis are based on the means and standard deviations of the parameter coefficients obtained in the annual cross sectional regressions.

Table 5: Stock Return Results

Panel A: Abnormal Returns for Portfolios sorted by Components on Initial Decomposition of *NOA*			
Deciles	*NOA*	*NWCA*	*NNCOA*
1st Decile	0.081	0.022	0.061
2nd Decile	0.058	0.026	0.034
3rd Decile	0.035	0.029	0.032
4th Decile	0.033	0.024	0.037
5th Decile	0.029	0.017	0.015
6th Decile	0.021	0.023	0.016
7th Decile	0.022	0.023	0.02
8th Decile	-0.019	0.019	0.002
9th Decile	-0.026	0.016	-0.004
10th Decile	-0.075	-0.04	-0.056
Hedge	0.156	0.062	0.117
t-statistic	4.07	2.56	3.254

Panel B: Abnormal Returns for Portfolios sorted by Components on Extended Decomposition of *NOA*				
Deciles	*WCA*	$-WCL$	*NCOA*	$-NCOL$
1st Decile	0.022	-0.011	0.062	0.009
2nd Decile	0.024	0.011	0.035	0.009
3rd Decile	0.023	0.016	0.04	0.01
4th Decile	0.022	0.022	0.025	0.012
5th Decile	0.042	0.015	0.014	0.012
6th Decile	0.025	0.019	0.03	0.019
7th Decile	0.026	0.016	0.006	0.023
8th Decile	0.016	0.025	0.002	0.026
9th Decile	0.005	0.021	-0.009	0.008
10th Decile	-0.047	0.025	-0.045	0.03
Hedge	0.068	-0.036	0.107	-0.021
t-statistic	2.341	-1.625	2.77	-0.597

Table 6: Stock Return Results based on Alternative *NOA* Definition

Panel A: Abnormal Returns for Portfolios sorted by Components on Initial Decomposition of *NOA*			
Deciles	*NOA*	*NWCA*	*NNCOA*
1st Decile	0.066	0.008	0.044
2nd Decile	0.059	0.026	0.049
3rd Decile	0.04	0.024	0.029
4th Decile	0.018	0.038	0.017
5th Decile	0.05	0.015	0.019
6th Decile	0.01	0.022	8E-04
7th Decile	0.012	0.018	0.023
8th Decile	-0.019	0.011	0.009
9th Decile	-0.027	0.017	0.001
10th Decile	-0.074	-0.046	-0.057
Hedge	0.14	0.055	0.101
t-statistic	5.878	2.281	3.665

Panel B: Abnormal Returns for Portfolios sorted by Components on Extended Decomposition of *NOA*				
Deciles	*WCA*	$-WCL$	*NCOA*	$-NCOL$
1st Decile	0.017	-0.012	0.053	0.012
2nd Decile	0.012	0.0235	0.034	0.005
3rd Decile	0.028	0.017	0.046	0.007
4th Decile	0.027	0.0049	0.01	0.014
5th Decile	0.036	0.0093	0.017	0.01
6th Decile	0.012	0.0225	0.018	-0.003
7th Decile	0.028	0.0176	0.009	-0.01
8th Decile	0.011	0.01	7E-04	0.046
9th Decile	0.006	0.016	-0.002	0.04
10th Decile	-0.044	0.023	-0.052	0.011
Hedge	0.061	-0.035	0.105	0.001
t-statistic	2.158	-1.499	3.257	-0.007

Table 6: Stock Return Results based on Alternative *NOA* Definition

Panel C: Abnormal Returns for Portfolios sorted by Components of *NWCA*					
Deciles	*ARE*	*INV*	*OCA*	*− AP*	*− OCL*
1st Decile	0.038	0.019	0.006	-0.024	0.024
2nd Decile	-0.008	0.004	0.022	0.014	0.01
3rd Decile	0.009	0.008	0.018	0.0004	0.015
4th Decile	0.024	0.03	0.035	-0.005	0.003
5th Decile	0.046	0.021	0.02	0.03	0.019
6th Decile	0.026	0.033	0.006	0.022	0.004
7th Decile	0.018	0.02	0.019	0.021	0.012
8th Decile	-0.003	0.022	0.002	0.026	0.005
9th Decile	-0.002	0.007	0.007	0.021	0.006
10th Decile	-0.015	-0.031	-0.004	0.026	0.035
HEDGE	0.053	0.05	0.01	-0.05	-0.011
t-statistic	2.022	2.159	0.399	-2.495	-0.375

Panel D: Abnormal Returns for Portfolios sorted by Components of *NNCOA*				
Deciles	*NPPE*	*INT*	*OLA*	*− OLTL*
1st Decile	0.027	0.02	0.032	0.012
2nd Decile	0.036	0.042	0.019	0.005
3rd Decile	0.025	0.024	0.014	0.007
4th Decile	0.035	0.018	0.024	0.014
5th Decile	0.014	0.019	0.006	0.01
6th Decile	0.005	0.007	0.011	-0.003
7th Decile	0.024	0.02	0.01	-0.01
8th Decile	0.006	0.003	0.009	0.046
9th Decile	0.002	0.002	0.012	0.04
10th Decile	-0.042	-0.023	-0.005	0.011
HEDGE	0.069	0.044	0.037	0.001
t-statistic	2.264	2.21	1.622	-0.007

Table 7: Statistical Arbitrage Tests for *NOA* and *NOA* components

Strategy	t-stat.	μ (mean)	λ (growth rate of st.dev.)	H1 (μ>0)	H2 (λ<0)	Sum (H1+H2)	Statistical Arbitrage
NOA	4.824	0.039	-0.366	0.000	0.007	0.007	Yes
NWCA	1.964	0.012	-0.447	0.015	0.003	0.018	Yes
NNCOA	3.51	0.033	-0.489	0.000	0.000	0.000	Yes
WCA	1.055	0.013	-0.583	0.034	0.000	0.034	Yes
$-WCL$	-0.935	-0.006	-0.819	0.087	0.000	0.087	No
NCOA	3.07	0.030	-0.366	0.000	0.008	0.008	Yes
$-NCOL$	-1.931	-0.010	-0.209	0.092	0.055	0.147	No

Table 8: Sustainability Effect vs. Book to Market Effect

Panel A: Quintiles based NOA and $BVMV$

$NOA(1)$	0.07 (2.77)	$BVMV(1)$	-0.021 (-1.269)
$NOA(2)$	0.02 (3.105)	$BVMV(2)$	0.014 (2.276)
$NOA(3)$	-0.05 (-4.878)	$BVMV(3)$	0.059 (4.267)
Hedge (NOA)	0.12 (3.848)	**Hedge ($BVMV$)**	0.08 (3.26)

Panel B: Intersection of Quintiles based on NOA and BV/MV

Quintiles	$BV/MV(1)$	$BV/MV(2)$	$BV/MV(3)$	**Control Hedge (BV/MV)**
$NOA(1)$	0.002 (0.08)	0.077 (2.67)	0.13 (3.935)	0.128 (4.341)
$NOA(2)$	-0.022 (2.595)	0.017 (3.731)	0.057 (-3.786)	0.079 (3.32)
$NOA(3)$	-0.083 (-5.549)	-0.054 (-0.937)	-0.023 (3.014)	0.06 (1.585)
Control Hedge (NOA)	0.085 (3.01)	0.131 (3.813)	0.153 (3.305)	

Panel C: Test- Statistics of Non-Overlap Hedge Portfolio Strategies

Long Weighted Average of $\{NOA(1), BV/MV(1)\}$ & $\{NOA(1), BV/MV(2)\}$	0.051 (2.06)
Short Weighted Average of $\{NOA(3), BV/MV(2)\}$ & $\{NOA(3), BV/MV(3)\}$	-0.046 (-4.097)
Hedge (NOA) Non-Overlap Strategy	0.097 (3.047)
Long Weighted Average of $\{BV/MV(3), NOA(2)\}$ & $\{BV/MV(3), NOA(3)\}$	0.039 (2.716)
Short Weighted Average of $\{BV/MV(1), NOA(1)\}$ & $\{BV/MV(1), NOA(2)\}$	-0.011 (-0.61)
Hedge (BV/MV) Non-Overlap Strategy	0.05 (1.859)

Panel D: Test-Statistics of a Joint $(NOA, BV/MV)$ Hedge Portfolio Strategy

Long on $\{NOA(1), BV/MV(3)\}$ **& Short on** $\{NOA(3), BV/MV(1)\}$	0.212 (5.224)
Difference between $(NOA, BV/MV)$ **and** NOA **Hedge Portfolio Strategy**	0.092 (3.194)
Difference between $(NOA, BV/MV)$ **and** BV/MV **Hedge Portfolio Strategy**	0.132 (3.329)

Table 9: Results from Regressions of *ARET* on the Discretionary, Non Discretionary Portion and the Interaction Term of *NOA* after controlling for *ROA*

Constant	*ROA*	*DNOA*	*NDNOA*	*DNOA* × *NDNOA*	Adj. R^2
0.02	0.089	-0.07			0.014
(1.948)	(1.184)	(-3.95)			
0.013	0.091		0.012		0.012
(1.028)	(1.239)		(0.946)		
0.019	0.09			-0.038	0.013
(1.992)	(1.199)			(-2.702)	

Table 10: Stock Return Results on the Discretionary, Non Discretionary Portion and the Interaction Term of *NOA*

Deciles	*DNOA*	*NDNOA*	*DNOA* × *NDNOA*
1st Decile	0.063	0.028	0.058
2nd Decile	0.061	0.03	0.049
3rd Decile	0.055	0.03	0.059
4th Decile	0.034	0.021	0.044
5th Decile	0.045	0.037	0.054
6th Decile	0.035	0.038	0.031
7th Decile	0.029	0.026	0.024
8th Decile	0.004	0.018	0.009
9th Decile	0.004	0.033	0.004
10th Decile	-0.024	0.044	-0.023
Hedge	0.087	-0.016	0.081
t-statistic	4.885	-0.545	4.415

Notes: The regressions are conducted following the Fama and McBeth (1973) procedure of estimating annual cross-sectional regressions for the sample period from 1967 to 2002 and reporting the time series averages of the resulting parameter coefficients and adjusted R^2. The reported t-statistics in parenthesis are based on the means and standard deviations of the parameter coefficients obtained in the annual cross sectional regressions.

Table 11: Results from Regressions of *ARET* on the Discretionary and Non Discretionary Portions of *NOA* Components after controlling for *ROA*

Panel A: OLS Regressions on Discretionary *NOA* Components

Constant	*ROA*	*NWCA*	*NNCOA*	*WCA*	*−WCL*	*NCOA*	*−NCOL*	Adj. R^2
0.02	0.098	-0.101						0.013
(2.008)	(1.304)	(-2.743)						
0.021	0.089		-0.075					0.014
(2.098)	(1.175)		(-3.868)					
0.021	0.093			-0.111				0.013
(2.082)	(1.244)			(-3.074)				
0.022	0.094				0.052			0.012
(2.217)	(1.252)				(0.990)			
0.022	0.088					-0.074		0.014
(2.199)	(1.175)					(-4.161)		
0.022	0.093						0.040	0.013
(2.267)	(1.238)						(0.777)	

Panel B: OLS Regressions on Non Discretionary *NOA* Components

Constant	*ROA*	*NWCA*	*NNCOA*	*WCA*	*−WCL*	*NCOA*	*−NCOL*	Adj. R^2
0.023	0.096	-0.007						0.015
(1.916)	(1.312)	(-0.243)						
0.013	0.098		0.017					0.015
(1.073)	(1.306)		(1.068)					
0.021	0.092			0.004				0.018
(1.326)	(1.222)			(0.139)				
0.013	0.091				-0.039			0.014
(0.995)	(1.216)				(-1.018)			
0.012	0.098					0.018		0.015
(0.924)	(1.298)					(1.186)		
0.018	0.094						-0.068	0.014
(1.708)	(1.256)						(-1.298)	

Notes: The regressions are conducted following the Fama and McBeth (1973) procedure of estimating annual cross-sectional regressions for the sample period from 1967 to 2002 and reporting the time series averages of the resulting parameter coefficients and adjusted R^2. The reported t-statistics in parenthesis are based on the means and standard deviations of the parameter coefficients obtained in the annual cross sectional regressions.

Table 12: Stock Return Results on the Discretionary and Non Discretionary Portions of *NOA* and *NOA* Components.

Panel A: Abnormal Returns for Portfolios Sorted by Discretionary *NOA* components						
Deciles	*NWCA*	*NNCOA*	*WCA*	$-WCL$	*NCOA*	$-NCOL$
1st Decile	0.052	0.056	0.05	0.043	0.061	0.009
2nd Decile	0.042	0.054	0.055	0.035	0.057	0.025
3rd Decile	0.05	0.054	0.052	0.011	0.042	0.027
4th Decile	0.032	0.036	0.033	0.026	0.044	0.023
5th Decile	0.032	0.036	0.033	0.024	0.04	0.058
6th Decile	0.026	0.03	0.038	0.027	0.022	0.039
7th Decile	0.02	0.031	0.029	0.024	0.031	0.029
8th Decile	0.026	0.018	0.016	0.032	0.023	0.044
9th Decile	0.021	0.017	0.013	0.027	0.009	0.019
10th Decile	0.002	-0.025	-0.015	0.054	-0.024	0.032
Hedge	0.05	0.081	0.065	-0.011	0.085	-0.023
t-statistic	3.443	4.561	3.669	-0.779	4.542	-1.652

Panel B: Abnormal Returns for Portfolios Sorted by Non Discretionary *NOA* components						
Deciles	*NWCA*	*NNCOA*	*WCA*	$-WCL$	*NCOA*	$-NCOL$
1st Decile	0.046	0.019	0.019	0.039	0.017	0.024
2nd Decile	0.025	0.035	0.02	0.031	0.042	0.015
3rd Decile	0.031	0.034	0.032	0.042	0.034	0.024
4th Decile	0.029	0.03	0.035	0.036	0.034	0.025
5th Decile	0.023	0.029	0.047	0.045	0.027	0.025
6th Decile	0.045	0.028	0.044	0.04	0.033	0.036
7th Decile	0.022	0.032	0.019	0.025	0.031	0.04
8th Decile	0.038	0.027	0.028	0.014	0.015	0.031
9th Decile	0.013	0.028	0.035	0.02	0.03	0.034
10th Decile	0.033	0.043	0.025	0.012	0.042	0.05
Hedge	0.013	-0.024	-0.006	0.027	-0.025	-0.026
t-statistic	0.532	-0.914	-0.23	1.159	-0.763	-0.708

Figure 1: Hedge Portfolio Returns on NOA (Decile Analysis)

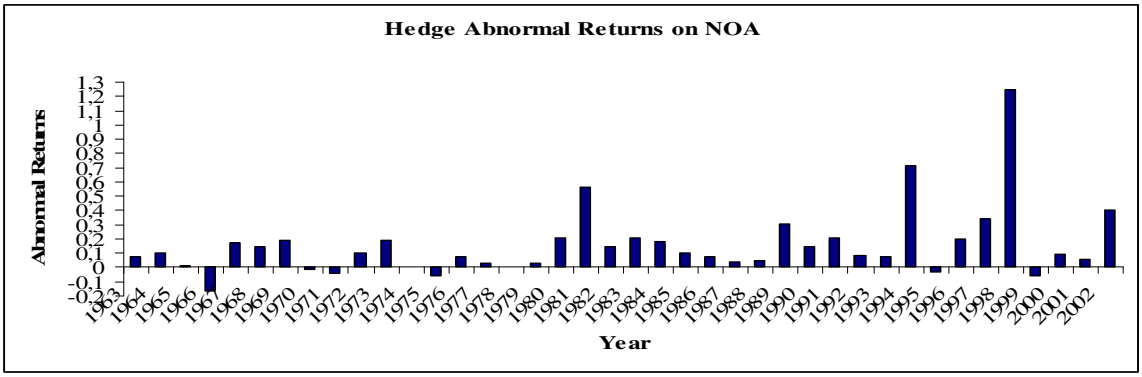

Figure 2: Comparison of Abnormal Returns Based on a Joint $(NOA, BV/MV)$, a Basic NOA and a Basic BV/MV Hedge Portfolio (Quintile Analysis)

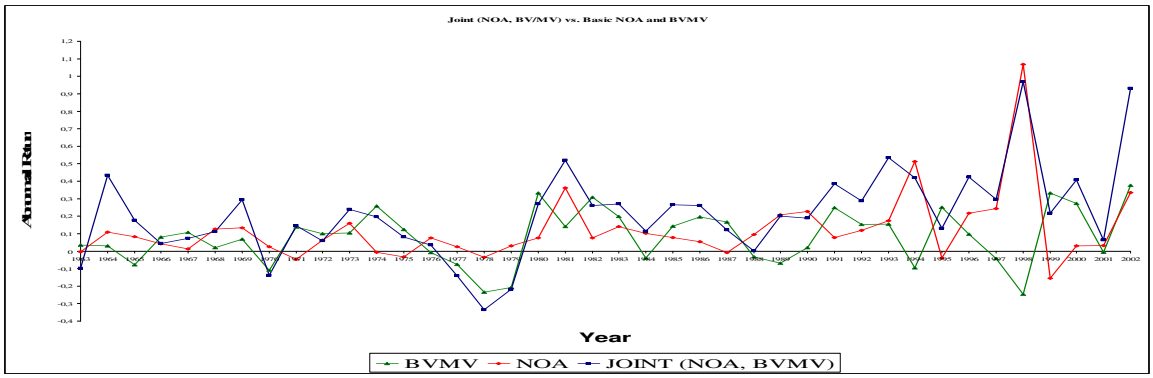

Figure 3: Hedge Portfolio Returns on Discretionary NOA (Decile Analysis)

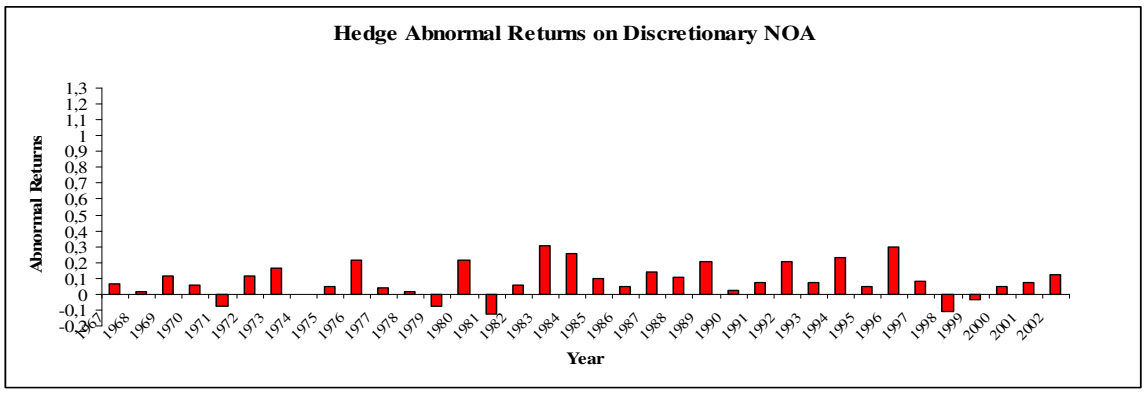

Figure 4: Hedge Portfolio Returns on the Interaction Term of NOA (Decile Analysis)