Information in Balance Sheets about Future Stock Returns: Evidence from Net Operating Assets

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Balance Sheets & Stock Returns

- ***Balance sheet ratios*** (Ou and Penman 1989, Holthausen and Larcker 1992, Lev and Thiagarajan 1993, Abarbanell and Bushee 1997 and Piotroski 2000).

- ***Accrual and accrual components*** (Sloan 1996, Fairfield et al. 2003a, Richardson et al. 2005, Chan et al. 2006, Cooper et al. 2008, Chan et al. 2008).

Net Operating Assets (NOA)

- The level of **net operating assets (NOA)** has recently gained attention as an important predictor related to earnings quality and equity valuation.

- ***Penman (2004)*** : NOA represents the cumulation over time of the difference between operating income and free cash flows; a cumulative measure of accruals (TACC) :

$$NOA_T = \sum_0^T Operating\ Iincome_t - \sum_0^T Free\ Cash\ Flows_t = \sum_0^T Total\ Accruals_t$$

Sustainability Effect

- ***Hirshleifer et al. (2004)***: NOA is a strong negative predictor of future stock returns.

- High NOA indicates low sustainability of current profitability.

- Investors with limited attention, do not comprehend this low sustainability and tend to overvalue firms with high NOA relative to those with low NOA.

- Firms with high (low) NOA experience negative (positive) future abnormal stock returns.

Sustainability Effect

- Opportunistic earnings management.

- Investors fail to use of available accounting information.

➤ *Hirshleifer et al. (2004)* : "Our interpretation of the NOA anomaly accommodates but does not require, earnings management"

Sustainability Effect

- ***Hirshleifer et al. (2004)*** : NOA captures information over and above accruals about investor's overoptimism of the sustainability of current earnings performance.

➢ NOA picks up all cumulative differences between accounting and cash profitability.

➢ Accruals is a fragmentary indicator of these differences.

Motivation

- Previous research has not focused on the whether different forms of net operating assets are related with future stock returns. Distinctions could be based on

  ➢ Business activities that NOA capture.

  ➢ Benefits and obligations that NOA represent.

Motivation

- Second, the interpretation of the NOA anomaly is still a controversial issue.

- **<u>Rational Interpretation</u>**: High NOA firms are less risky than low NOA firms, and thus earn lower risk premia.

- *Callen and Segal (2004)*: NOA can be used to derive a valuation models with time-varying discount rates.

- *Hirshleifer et al. (2006):* Missed risk factors could eliminate mispricing.

- *Khan (2008):* Firms with low working capital accruals exhibit distress risk characteristics.

Motivation

- The NOA anomaly can be also explained by a **behavioral interpretation.**

  ➢ *Opportunistic earnings management*: premature booking of sales, inflated inventory, capitalization of operating expenses, subjective write down decisions.

  ➢ *Slowdown in firm's business conditions*: difficulties in generating sales, overproduction, less efficient use of existing capital and pressures to extend credit terms.

  ➢ *Agency related overinvestment*: wasteful spending that serves manager's interests.

Motivation

- In all cases. high NOA provides a warning signal about the sustainability of current earnings performance.

- As such, investor's limited attention on the low sustainability could be an explanation for negative (positive) future abnormal stock returns of high (low) NOA firms.

Motivation

- High NOA are more likely to have high past growth in sales.

- *Extrapolation*: Lakonishok et al. (1994) argue that investors extrapolate past performance too far into the future.

- As such, investor's errors in expectations about future growth could also be an explanation for negative (positive) future abnormal stock returns of high (low) NOA firms.

Research Design

- First, we investigate the relation of NOA & NOA components with future stock returns, after controlling for TACC :

$$NOA_T = NWCA_T + NNCOA_T = \sum_0^T Operating \; Accruals_t + \sum_0^T Investing_t \; Accruals_t$$

$$NWCA_T = WCA_T - WCL_T = \sum_0^T Operating \; Asset \; Accruals_t - \sum_0^T Operating_t \; Liability \; Accruals_t$$

$$NNCOA_T = NCOA_T - NCOL_T = \sum_0^T Investing \; Asset \; Accruals_t - \sum_0^T Investing_t \; Liability \; Accruals_t$$

Research Design

- Second, we investigate whether the NOA anomaly reflects rational risk premium or market inefficiency.

➤ Abnormal returns of hedge strategies on NOA and NOA components.

❖ Joint hypothesis dilema of traditional market efficiency tests (Fama 1970, Ball 1978)

➤ Arbitrage opportunities of hedge strategies on NOA and NOA components.

Research Design

- Third, we distinguish between different behavioral hypotheses that can be put forward to interpret the NOA anomaly.

- Abnormal returns of hedge strategies on the expected and unexpected parts of NOA and NOA components.

- Abnormal returns of hedge strategy on NOA, after controlling for overinvestment.

Sample Formation

- The sample covers **all firm-year observations** with available financial statement data on Compustat annual database and stock return data on CRSP monthly files CRSP for the **period 1962-2003**.

- Financial companies are exclued because the discrimination between operating activities and financing activities is not clear for these firms.

- These criteria yield final sample sizes of 150.896 firm year observations with non-missing financial statement and stock return data.

NOA definition

- NWCA :

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

- NNCOA:

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

- NOA is defined as the difference non cash assets and non-debt liabilities :

$$NOA_t = \left(TA_t - C_t\right) - \left(TL_t - STD_t - LTD_t\right)$$

Alternative NOA definition

- NWCA:

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

- NNCOA:

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

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

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

Measurement of Stock Returns

- Raw stock returns (RET): compounded 12 month buy-hold returns inclusive of dividends and other distributions.

- Size-adjusted returns (SRET): deducting the value weighted average return for all firms in the same size-matched decile.

- Risk adjusted alphas are also considered from CAPM, Fama-French three factor (1995) model and Carhart four factor (1997) model.

NOA and Stock Returns

- Fama and MacBeth (1973) regressions of future raw stock returns on NOA and NOA components after controlling for TACC.

- That is, we examine directly whether NOA and NOA components can reflect additional information for future stock returns over and above than contained in TACC.

- Following Hirshleifer et al. (2004), we also use market capitalization and book to market ratio as asset pricing controls.

Table 3: Regressions of *RET* on *NOA*, *NOA* Components and *TACC*

Panel A: Regressions of *RET* on *NOA* and *TACC*

Intercept	$Ln(MV)$	$Ln(BV/MV)$	NOA	$TACC$
0.332	-0.019	0.033	-0.089	
(4.355)	(-2.3)	(2.943)	(-5.089)	
0.278	-0.02	0.026		-0.087
(3.875)	(-2.364)	(2.315)		(-5.191)
0.331	-0.019	0.034	-0.094	0.003
(3.938)	(-2.321)	(3.281)	(-2.233)	(0.066)

Panel B: Regressions of *RET* on *NOA* components (Initial Decomposition) and *TACC*

Intercept	$Ln(MV)$	$Ln(BV/MV)$	$NWCA$	$NNCOA$	$TACC$
0.29	-0.021	0.031	-0.064		
(4.081)	(-2.514)	(2.776)	(-2.355)		
0.291	-0.018	0.031		-0.054	
(3.86)	(-2.233)	(2.785)		(-2.712)	
0.332	-0.019	0.033	-0.102	-0.079	
(4.421)	(-2.394)	(2.886)	(-3.991)	(-3.977)	
0.333	-0.019	0.033	-0.108	-0.085	0.002
(4.011)	(-2.434)	(3.218)	(-2.603)	(-1.9)	(0.049)

Panel C: Regressions of *RET* on *NOA* components (Extended Decomposition) and *TACC*

Intercept	$Ln(MV)$	$Ln(BV/MV)$	WCA	$-WCL$	$NCOA$	$-NCOL$	$TACC$
0.297	-0.02	0.029	-0.049				
(4.22)	(-2.541)	(2.556)	(-2.322)				
0.28	-0.02	0.029		0.044			
(3.997)	(-2.396)	(2.523)		(1.439)			
0.288	-0.018	0.032			-0.047		
(3.835)	(-2.193)	(2.827)			(-2.479)		
0.269	-0.02	0.03				-0.047	
(3.756)	(-2.451)	(2.74)				(-0.916)	
0.336	-0.02	0.032	-0.103	-0.088	-0.084	-0.149	
(4.601)	(-2.522)	(2.811)	(-3.884)	(-2.509)	(-4.353)	(-3.064)	
0.34	-0.02	0.033	-0.112	-0.088	-0.096	-0.158	0.015
(4.193)	(-2.531)	(3.179)	(-2.495)	(-2.338)	(-2.111)	(-2.815)	(0.333)

Summary

- *NOA and NOA components could be incrementally informative since they capture all cumulative past changes between accounting profitability and cash profitability, rather the most recent change.*

Risk Premium or Market Inefficiency?

- The relation of NOA and NOA components with future stock returns could be explained under a rational interpretation.

- To assess this possibility, we investigate abnormal returns of hedge strategies based on NOA components.

- Firms are ranked annually on each NOA component and then allocated into ten equally-sized portfolios (deciles).

- Time series averages of size-adjusted returns for each portfolio and hedge strategies on NOA components are computed.

Table 4: *SRET* for Portfolios on *NOA* and *NOA* components

Panel A: *SRET* 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: *SRET* 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 5: *SRET* for Portfolios on *NOA* and *NOA* components

Panel A: *SRET* 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: *SRET* 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	0.001	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 5: *SRET* for Portfolios on *NOA* and *NOA* components

Panel C: *SRET* 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: *SRET* 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

Risk Premium or Market Inefficiency?

- In order to distinguish more properly between rational and irrational interpretations, it is useful to incorporate in our analysis other potential controls for risk.

- For this purpose, we conduct time series regressions of one-year ahead raw stock returns for hedge strategies based on NOA and NOA components on the CAPM model, the Fama-French (1995) three factor model and the Carhart (1997) four factor model

Risk Premium or Market Inefficiency?

- Fama (1970) was among the first to observe that tests of market efficiency are joint tests of mispricing and the model of market returns (or model of risk adjustment).

- In order to avoid the joint hypothesis dilemma, we apply the statistical arbitrage test designed by Hogan et al. (2004) to hedge strategies based on NOA and NOA components.

Risk Premium or Market Inefficiency?

- In particular, we test two implications of statistical arbitrage opportunities for each strategy:

  - whether its mean annual incremental profit is positive.
  - whether its time-averaged variance decreases over time.

- A strategy generates statistical arbitrage with $1-\alpha$ percent confidence if :

$$H1 : \mu > 0 \quad \& \quad H2 : \lambda < 0$$

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Table 6

Alphas from Factor Models and Statistical Arbitrage Opportunities for Hedge Strategies on *NOA* and *NOA* components

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Panel A: Alphas from Factor Models for Hedge Strategies on *NOA* and *NOA* components

Model	*NOA*	*NWCA*	*NNCOA*	*WCA*	*– WCL*	*NCOA*	*– NCOL*
CAPM	0.176 (4.176)	0.069 (1.996)	0.168 (4.001)	0.058 (1.867)	-0.019 (-0.804)	0.164 (0.046)	-0.073 (-1.684)
Fama-French	0.223 (4.103)	0.102 (3.444)	0.207 (3.686)	0.094 (2.289)	-0.030 (-0.948)	0.215 (3.517)	-0.155 (-2.786)
Carhart	0.196 (2.899)	0.093 (2.495)	0.170 (2.448)	0.069 (1.937)	-0.003 (0.090)	0.166 (2.203)	-0.127 (-1.837)

Panel B: Statistical Arbitrage Opportunities for Hedge Strategies on *NOA* and *NOA* components

Parameter	*NOA*	*NWCA*	*NNCOA*	*WCA*	*– WCL*	*NCOA*	*– NCOL*
μ (mean)	0.039	0.012	0.033	0.013	-0.006	0.03	-0.01
λ (growth rate of st.dev.)	-0.366	-0.447	-0.489	-0.583	-0.819	-0.366	-0.209
H1 (μ>0)	0.000	0.015	0.000	0.034	0.097	0.000	0.092
H2 (λ<0)	0.007	0.003	0.000	0.000	0.000	0.008	0.055
Sum (H1+H2)	0.007	0.018	0.000	0.034	0.097	0.008	0.147
Statistical Arbitrage	Yes	Yes	Yes	Yes	No	Yes	No

Summary

- *The NOA anomaly is driven by the asset NOA components.*

- *It corroborates Hirshleifer et al. (2004) investor's misperception of firms with bloated balance sheets.*

Expected and Unexpected NOA

- The expected part of NOA is estimated by a modified version of the model of Chan et al. (2006) that is based on sales growth:

$$E_t(NOA_t) = \frac{\sum_{k=1}^{5} NOA_{t-k}}{\sum_{k=1}^{5} SA_{t-k}} SA_t$$

- The unexpected part of NOA is then given by: $U_t(NOA_t) = NOA_t - E_t(NOA_t)$

- Abnormal returns of hedge strategies on the expected and unexpected parts of NOA and NOA components.

Table 7: *SRET* for Portfolios on the Expected and Unexpected Parts of *NOA* and *ΔNOA* Components.

Panel A: *SRET* for Portfolios Sorted by Expected Parts of *NOA* and *ΔNOA* components						
Deciles	*NOA*	*NWCA*	*NNCOA*	*WCA*	*− WCL*	*NCOA*	*− NCOL*
1st Decile	0.028	0.046	0.019	0.019	0.039	0.017	0.024
2nd Decile	0.03	0.025	0.035	0.02	0.031	0.042	0.015
3rd Decile	0.03	0.031	0.034	0.032	0.042	0.034	0.024
4th Decile	0.021	0.029	0.03	0.035	0.036	0.034	0.025
5th Decile	0.037	0.023	0.029	0.047	0.045	0.027	0.025
6th Decile	0.038	0.045	0.028	0.044	0.04	0.033	0.036
7th Decile	0.026	0.022	0.032	0.019	0.025	0.031	0.04
8th Decile	0.018	0.038	0.027	0.028	0.014	0.015	0.031
9th Decile	0.033	0.013	0.028	0.035	0.02	0.03	0.034
10th Decile	0.044	0.033	0.043	0.025	0.012	0.042	0.05
Hedge	-0.016	0.013	-0.024	-0.006	0.027	-0.025	-0.026
t-statistic	-0.545	0.532	-0.914	-0.23	1.159	-0.763	-0.708

Panel B: *SRET* for Portfolios Sorted by Unexpected Parts of *NOA* and *ΔNOA* components						
Deciles	*NOA*	*NWCA*	*NNCOA*	*WCA*	*− WCL*	*NCOA*	*− NCOL*
1st Decile	0.063	0.052	0.056	0.05	0.043	0.061	0.009
2nd Decile	0.061	0.042	0.054	0.055	0.035	0.057	0.025
3rd Decile	0.055	0.05	0.054	0.052	0.011	0.042	0.027
4th Decile	0.034	0.032	0.036	0.033	0.026	0.044	0.023
5th Decile	0.045	0.032	0.036	0.033	0.024	0.04	0.058
6th Decile	0.035	0.026	0.03	0.038	0.027	0.022	0.039
7th Decile	0.029	0.02	0.031	0.029	0.024	0.031	0.029
8th Decile	0.004	0.026	0.018	0.016	0.032	0.023	0.044
9th Decile	0.004	0.021	0.017	0.013	0.027	0.009	0.019
10th Decile	-0.024	0.002	-0.025	-0.015	0.054	-0.024	0.032
Hedge	0.087	0.05	0.081	0.065	-0.011	0.085	-0.023
t-statistic	4.885	3.443	4.561	3.669	-0.779	4.542	-1.652

Summary

- *It does not seem to be the case, investor's extrapolation of past performance, is the culprit of the NOA anomaly.*

- *Opportunistic earnings management and/or slowdown in firm's business conditions could explain partially the NOA anomaly on the asset side.*

Overinvestment

- Chan et al. (2008) argue that past return on equity (ROE) can be used as an indicator of managerial discretion to use profits from past investment to increase shareholder wealth.

- Past ROE is measured as as the ratio of annual net income averaged over the five years prior to portfolio formation to the fiscal year end book value of equity.

- Abnormal returns of hedge strategy on NOA, after controlling for past ROE.

Table 8: *SRET* **for Portfolios on** *NOA* **after controlling for** *ROE*

Groups	Pure Portfolios	Interacted Portfolios		
		$ROE(1)$	$ROE(2-4)$	$ROE(5)$
$NOA(1)$	0.069 (2.823)	0.068 (1.278)	0.071 (3.159)	0.068 (2.975)
$NOA(2-9)$	0.023 (3.588)	0.028 (2.529)	0.023 (2.972)	0.019 (2.162)
$NOA(10)$	-0.053 (-4.16)	-0.092 (-4.825)	-0.053 (-3.674)	-0.011 (-0.645)
Hedge	0.122 (3.682)	0.16 (2.919)	0.124 (3.827)	0.079 (2.521)
Joint Strategy : Long on $\{NOA(1), ROE(5)\}$ **& Short on** $\{NOA(10), ROE(1)\}$				0.16 (4.882)
Difference: Joint Strategy and *NOA* **strategy**				0.038 (1.178)

Summary

- *Overinvestment could also have a potentially important role in explaining investor's misperceptions of firms with bloated balance sheets.*

Conclusions

- Investors naively fail to anticipate that high levels of operating assets imply low sustainability of current profitability, leading to significant security mispricing.

- Opportunistic earnings management and/or slowdown in firm's business conditions could explain only partially explain the sustainability effect. Agency related overinvestment could also have a potential important role.

- Overall, our evidence suggests that the above hypotheses should be treated as supplementary in the interpretation the NOA anomaly.