Hirshleifer, David, Kewei Hou, Siew Hong Teoth, and Yinglei Zhang, 2004, "Do Investors Overvalue Firms with Bloated Balance Sheets?" *Journal of Accounting and Economics*, vol. 38, pp. 297-331

Abstract

- Net Operating Income(t) > Cumulative Free Cash Flow(t) ⇒ ΔEarnings(t+1) ▼
- Two different variables for investors

• Net Operating Income	• Cumulative Free Cash Flow
• Accounting Value Added	• Cash Value Added
• Accounting Profitability	• Cash Profitability

- Net Operating Assets := Cumulative Difference between Operating Income and Free Cash Flow (measures the extent to which reporting outcomes provoke over-optimism.)
- Sample period 1964-2002: net operating assets scaled by total assets is a strong negative predictor of long-run stock returns. (robust with either control variables and methods.)

1. Introduction

- Vast Information + Limited Attention = People simplify their judgments and decisions by using rules of thumb, and by processing only subsets of available information.
  - investors & financial professional: concentrate on a few salient stimuli
    - ✓ Fiske and Taylor (1991)
    - ✓ Libby et al. (2002)
  - ∴ Investor valuation: based on earnings performance, rather than complete analysis
- Limited investor attention & processing power → systematic errors → market price
  - fail to think: accounting rule changes, earnings management
  - Some outcomes highlight positive/negative aspects of performance more than others.
- This paper proposes the level of NET OPERATING ASSETS.
  - Measures the extent to which operating/reporting outcomes provoke excessive investor optimism.
  - A high level of net operating assets, scaled to control for firm size, indicates a lack of sustainability of recent earnings performance, and that investors do not fully discount for this fact.
- Net Operating Assets_T := $\sum$ $\text{Operating Income}_t$ − $\sum$ Free Cash Flow_t
  - ∴ NOA: cumulative difference between accounting value-added and cash value-added → 'balance sheet bloat'

- Accumulation of accounting earnings w/o a matching accumulation of FCF → doubs about futures profitability
  - high net operating assets → warning signal about the profitability of investment
- If investors fail to discount for the unsustainability of earnings growth
  - → firms with high net operating assets will be relatively overvalued.
  - NOA ▲ ⇒ long-run abnormal returns ▼
- Decomposition of Net Operating Income

$$\begin{aligned}\text{Net Oper. Assets}_T &= \sum\text{Oper. Income}_t - \sum(\text{Oper. CF}_t - \text{Investment}_t) \\ &= \sum(\text{Oper Income before Depreciation}_t - \text{Oper. CF}_t) \\ &\quad + \sum(\text{Investments}_t - \text{Depreciation}_t) \\ &= \sum(\text{영업행위에서의 회계손익과 현금손익의 차이}) \\ &\quad + \sum(\text{투자행위에서의 회계손익과 현금손익의 차이}) \\ &= \sum\text{Operating Accruals}_t + \sum\text{Investment}_t \qquad (1)\end{aligned}$$

  - ex. books a sale before receive actual cash flow ⇒ Net Operating Assets ▲
  - ex. records an expenditure as an investment rather than expense ⇒ NOA ▲
  - Both accounting profitability will not sustained in the future.
  - ∴ accounting-income-focusing investors ⇒ overvalue the firm
- Barton and Simko (2002): High level of NOA=earnings management=soon reversed
  - But Interpretation of NOA: does not require earnings managements
- more complete proxy for investor misperception than the used in past literature
  - NOA consists of the deviations between two variables, rather than correlated.
  - flow variable=only a partial indicator of the degree
    - ✓ to which operating/reporting outcomes provoke excessive investor optimism.
    - ✓ flow-variable accruals: found to have different explanatory ower for returns → Collins and Hribar (2002), Teoh et al. (1998a), Thomas and Zhang (2002)
    - ✓ single period slices in the past literatures: Richardson et al. (2003), Fairfield et al. (2003)
- NOA_t ▲ ⇒ Return_{t+1} ▼: sustainability effect (∵ unlikely in the future)
- Trading Strategy: Buy Low NOA + Sell High NOA ⇒ profitable 35/38 years
  - average equally-weighted monthly AR: 1.24%(1st yr.), 0.83%(2nd), 0.57%(3rd)
  - significant with Fama-MacBeth Regression Model with control variables
    - ✓ distinct from size & B/M effect (Fama and French, 1992)
    - ✓ monthly contrarian effect (Jegadeesh, 1990)
    - ✓ momentum effect (Jegadeesh and Titman, 1993)
    - ✓ long-run winner/loser reversal (DeBondt and Thaler, 1985)
- subsumed by neither the new issues puzzle of Loughran and Ritter (1995), nor by M&A related effects
- Abel and Mishkin (1983) test: consistent with investor overoptimism with high-NOA
- strong return predictor with recent operating accruals & changes in NOA: NOA contains information beyond the information contained in flow variables
- significant in all sub-sample: it seems that arbitrageurs were not fully alerted to NOA

2. Motivation and Hypothesis

- premise of hypothesis: Investors have limited attention and cognitive processing power.
  - Hirshleifer and Teoh (2003): more salient, less cognitive processing-required information is used by more investors, impounded more fully into prices.
  - reports highlights favorable aspects of the available information set → overpricing, thus negative subsequent abnormal stock returns.
- Ho and Michaely (1988): republication of obscure but publicly available information → provided in a more salient or easily accessed form → stock price reaction
- Hirshleifer and Teoh (2003): stocks with high disclosed but unrecognized employee stock option expenses → negative long-run abnormal returns
  - As firms with large (+) deviations between disclosed pro forma vs. GAAP earnings.
    - ✓ confirmation: Doyle et al. (2003), Garvey and Milbourn (2004)
- investors' limited attention → treat an information category uniformly
  - "functional fixation" despite of meaning variation with different accntng. treatments
  - mechanical use of information → will affect on investors' valuation on stocks
    - ✓ Kothari (2001): empirical evidence from tests is mixed.
- Sloan (1996): operating accruals anomaly
  - natural implication of limited attention
  - cannot explain why investors focus on only earnings rather than cash flow
- Dechow(1994): because of the information of operating accruals, earnings have higher correlation than cash-flow, i.e. earnings is better than cash-flow for the only one.
  - Nevertheless, cash-flow should be determined to avoid systematic error.
- excess of earnings over FCF → adverse information about future changes in earnings
  - If ignore, then investors will overvalue the firm with high level NOA.
- no assumption on relative importance between accruals and cash-flows.
  - Only-needed argument is that cumulative FCF contain some incremental information about the firm's prospects that is not subsumed by cumulative earnings.
    - ✓ reason 1: accruals and cashflows have different persistence. (Dechow, 1994)
      - ☞ high-level NOA→noise→won't be viewed as proxy for future performance
      - ☞ Even if this is not a result from earnings management, high NOA will contain an bad information about future earnings.
      - ☞ w/o these information, investors' will overvalue (undervalue) stocks.
      - ☞ Thus, subsequent abnormal return will be negative for the stocks.
    - ✓ reason 2: FCF → information in investment levels → future firm performance
      - ☞ High level investments can be both good and bad signal for the firm. (many investment opportunity, Empire-building agency problems)
      - ☞ Possible reason for a high cumulative investment level is that certain expenditures that are unlikely to provide long-term payoffs are classified as investments rather than as expenses.

- High Earnings mean good business conditions and growth opportunities.
- However, high net operating assets firms are selected not by earnings growth per se, but by relative shortfall between FCF and earnings.
  - If ignore the overinvestments, then investor will overvalue the firm.
- High Net Operating Assets firm=Low cumulative depreciation+high cumulative investments+non-depreciation accruals

3. Sample Selection, Variable Measurement, and Data Description

- NYSE+AMEX+NASDAQ firms & COMPUSTAT+CRSP
  - T=462 months (July 1964 – December 2002)
  - Sufficient financial data should be needed: 1,625,570 Firm-Month observations were used to compute accruals, NOAs, etc.
- NOA_t := scaled net operating assets

$$:= \frac{\text{Operating Assets}_t - \text{Operating Liabilities}_t}{\text{Total Assets}_{t-1}}$$

  - $\text{Operating Assets}_t$:= Total Assets_t − $\text{Cash and Short-Term Investments}_t$
  - $\text{Operating Liabilities}_t$:= Total Assets_t−Short-Term Debt_t−Long-Term Debt_t −$\text{Minority Interest}_t$−$\text{Preferred Stock}_t$−$\text{Common Equity}_t$
- Accounting Firm Performance Variables
  - $\text{Earnings}_t := \frac{\text{Income from Continuing Operations}_t}{\text{Total Assets}_{t-1}}$
  - Cash Flows_t := Earnings_t − Accruals_t
  - $\text{Accruals}_t := \frac{(\Delta\text{Current Assets}_t - \Delta\text{Cash}_t)}{\text{Total Assets}_{t-1}}$

$$- \frac{(\Delta\text{Current Liabilities}_t - \Delta\text{Shortterm Debt}_t - \Delta\text{Taxes Payable}_t)}{\text{Total Assets}_{t-1}}$$

$$- \frac{\text{Depreciation and Amortization Expense}_t}{\text{Total Assets}_{t-1}}$$

  - Accruals/Total Assets & the most recent change in NOA/Total Assets were included as control variables to evaluate whether NOA has incremental information.
  - When Calculating NOA and Operating Accruals, to avoid unnecessary loss of observation, the missing value of short-term debt, taxes payable, long-term debt, minority interest, preferred stock were treated as zeroes.
  - To check the robustness of their researches, the authors checked below.
    - ✓ scaled by both Total Asset_t and Total Asset_{t-1}
    - ✓ scaled by both Sales_t and Sales_{t-1}
    - ✓ excluding firms in the bottom size deciles
    - ✓ excluding firms whose stock price less than $5

Table 1
Mean (*Median*) values of selected characteristics for decile portfolios sorted by NOA

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

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

- Equation (1): new investment and M&A → high growth in top NOA decile
  - i.e. high NOA group: experienced rapid growth
- monotonic relationship between NOA and earnings
  - driven by large differences in accruals across NOA deciles.
  - Operating CF do not vary monotonically across deciles.
- NOA decile 10: significantly lower Cash Flows than all other deciles.
  - Which means they have extremely high Accruals.
  - Similarly, extremely negative Accruals for decile 1 contribute to the portfolio's low Earnings despite its moderate level of Cash Flows.
- extreme NOA decile (1 and 10)
  - low Book-value, low Market-value, low B/M ratios, high Betas
  - seems to be small, possibly high growth oriented, overvalued, risky firms

Table 2
Pearson (Spearman) correlation coefficients between NOA and other characteristics

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

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

- NOA is persistent.
  - The correlation between NOA_t and NOA_{t-1} is positive and significant.
- positive correlation between NOA and Accruals
- positive correlation between NOA and Earnings
  - Negative Correlation with Pearson Correlation? can be eliminated with trimming the extreme at 0.5%: the sign is matching with Spearman Correlation
- negative correlation between NOA and Beta
- positive correlation between NOA and the size of the firm
- positive correlation between NOA and B/M ratio

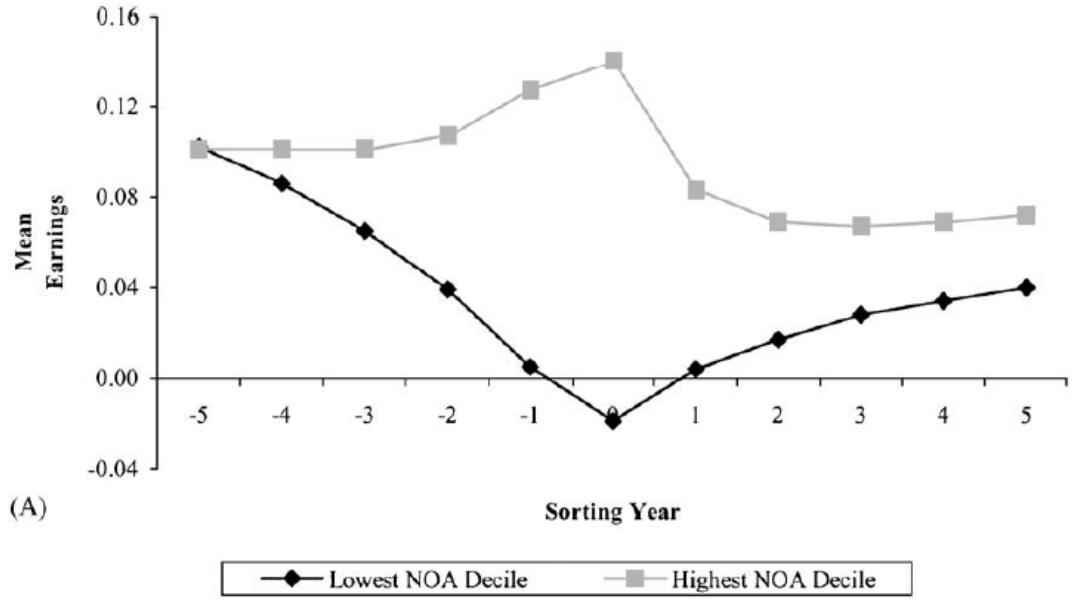
Table 3
Industry composition for decile portfolios sorted by NOA

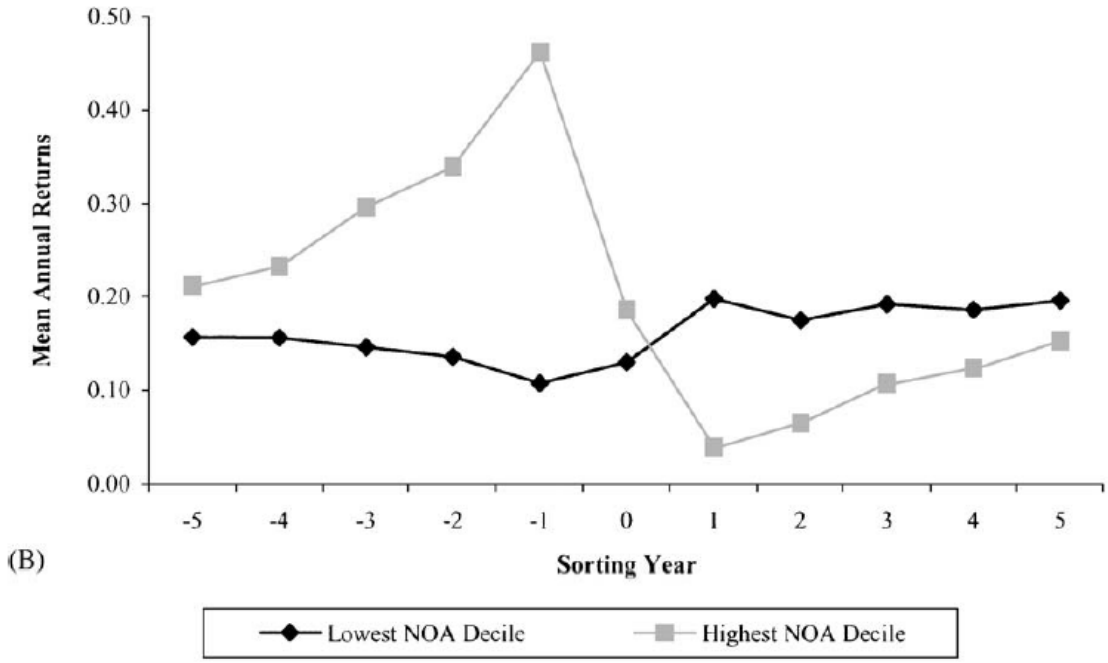
Industry groups	Portfolio NOA ranking									
	Lowest	2	3	4	5	6	7	8	9	Highest
Panel A: *Percentage of the firms in each industry group for each NOA decile* (*Column*)										
Agriculture (0–999)	0.4	0.3	0.3	0.4	0.3	0.3	0.5	0.6	0.6	0.4
Mining & Construction (1000–1299, 1400–1999)	3.1	2.7	2.7	2.3	2.3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

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

- for each NOA decile
  - Higher Presence: Durable Manufacturers, Computers, Retail, Services
  - for NOA 1 decile: (higher) Pharmaceutical, Financial (lower) extractive, utility
- for each industry
  - extreme decile: Mining & Construction, Financial, Services
  - Low NOA: Pharmaceuticals, Computers
  - High NOA: Extractive, Transportation

4. The Sustainability Effect





- Returns are annual raw buy & hold returns starting 4 months after fiscal year end.
- Earnings for high NOA firms hit a peak in the ranking year, vice versa.
- High NOA is associated with upward trending Earnings over the previous years.
- Upward trend sharply reverses after the ranking year, creating continuing downward average trend in Earnings: a mirror-image trend pattern for Low NOA firms.
  - over-extrapolation of earnings or wales growth trends → failure to recognize the regression phenomenon. ∴ forecast based-on earnings=sub-optimal

Table 4
Average monthly abnormal returns for NOA decile portfolios 1, 2 and 3 years after portfolio formation

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

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

- Benchmark portfolio: matching procedure used in Daniel et al. (1997)
  - Size-B/M-past returns sorted 125 groups
  - subtract the return of the benchmark portfolio to which that stock belongs from the return of the stock. (expected return should be zero.)
- Strong relation between a firm's NOA and its subsequent abnormal stock returns for at least 3 years after NOA is measured.
- Intercepts from time-series regression: all coefficients are significant
  - The results are more stronger in equal-weights than value-weights.
  - consistent with sustainability hypothesis
- Sharpe Ratio: 1.36 for equal-weight raw return, 1.66, 1.23, 0.88 for equal-weight characteristic adjusted, 0.84, 0.70, 0.60 for value-weight corresponding.
  - greater than Sharpe ratio for MKT (0.36), SMB (0.22), HML (0.48), MOM (0.77)

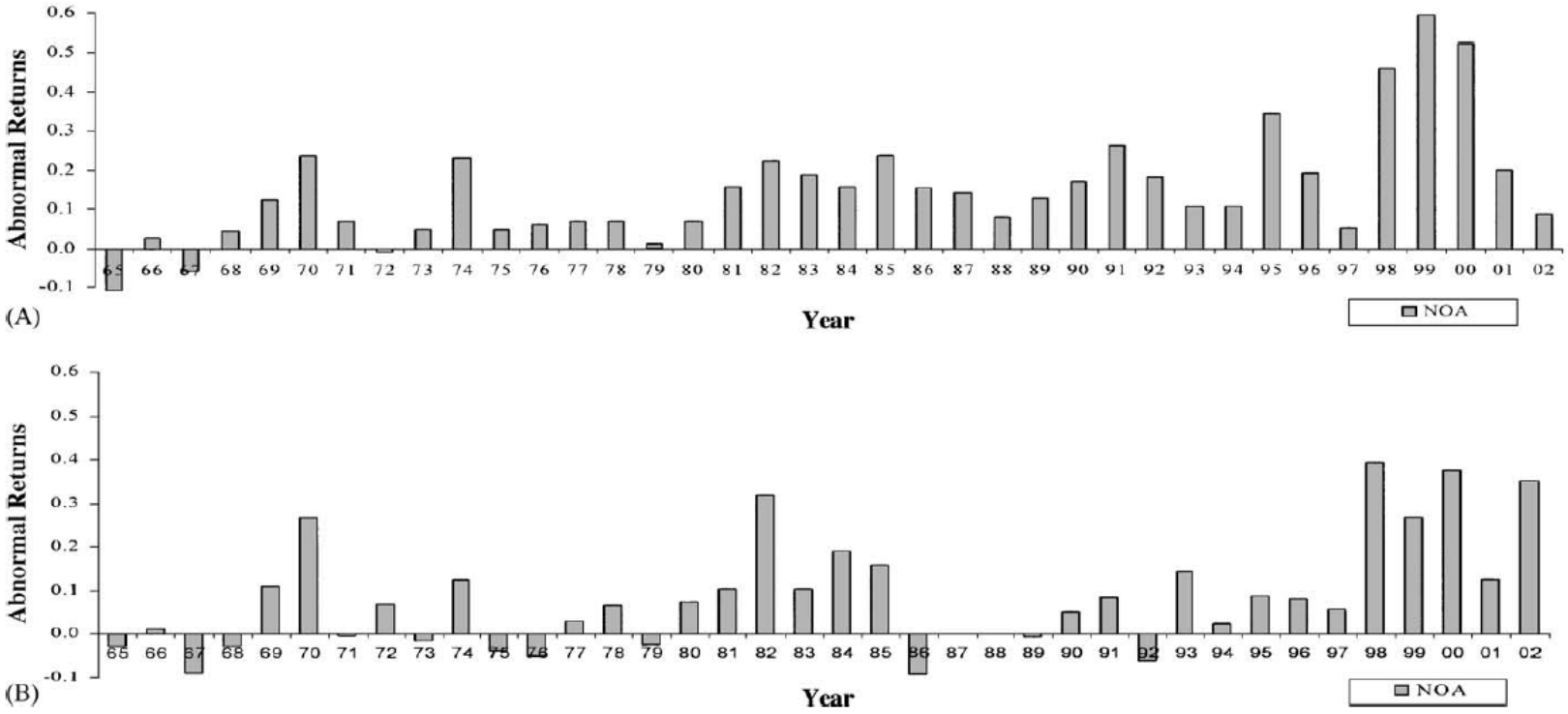


Fig. 2. (A) Hedge portfolio returns (equal-weighted) based on NOA strategy. (B) Hedge portfolio returns (value-weighted) based on NOA strategy. *Notes*: NOA is defined in Table 1. Portfolios are formed monthly by assigning firms to deciled based on their NOA in the previous fiscal year, with a minimal 4 month lag between the fiscal year end and the returns it is matched against. The monthly abnormal return for any individual stock is calculated by subtracting the equal-weighted (value-weighted) return of a benchmark portfolio matched by size, book-to-market and momentum (past one year return) from its raw return. It is then averaged within each NOA decile monthly. The annual abnormal returns are calculated as the sum of the monthly abnormal returns for each calendar year between 1965 and 2002. The hedging portfolio consists of a long position in the lowest NOA decline and an offsetting short position in the highest NOA decile.

Table 5
Fama–MacBeth monthly regressions of stock returns on NOA and other characteristics

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

Notes: Accruals and NOA are defined in Table 1. The Fama–MacBeth procedure is as follows: Every month between July, 1966 and December, 2002, the cross-section of stock returns is regressed on LnSize where size is defined as the log of the firm's market capitalization, Ln(B/M) which is the log of the book-to-market ratio, the previous month's return on the stock, denoted Ret(−1 : −1), the previous year's return on the stock from month $t-12$ to $t-2$, denoted Ret(−12 : −2), the return on the stock starting from month $t-36$ to $t-13$, denoted Ret(−36 : −13), and Accruals and/or NOA lagged either 1, 2 or 3 years. There is a minimum 4 month gap between the fiscal year end and month t. The time-series average of the monthly coefficient estimates and their associated time-series t-statistics (in italics) are reported. Bold numbers indicate significance at less than 5% level (2-tailed t-test).

- model 1: standard asset pricing controls
- model 2: additionally includes the operating accruals variable
  - Coefficients confirm past literature's conclusion that these variables predict returns.
- model 3: NOA is included instead of operating accruals variable
  - highly significantly negatively related to cross-sectional stock returns
- model 4: NOA and accruals variables are simultaneously used.
  - NOA coefficients remain highly significcant
  - ability of NOA to predict returns is incremental to other exist predictive variables.

Table 6
Additional results based on alternative NOA definition

Panel A: *Summary statistics*

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

Panel B: *Hedge returns based on alternative NOA decile portfolios one year after portfolio formation*

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

Panel C: *Fama–Macbeth monthly regressions*

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

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

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

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

- Following Fairfield et al. (2003)
- Panel B: identical procedure with Table 4 is used.
- Panel C: identical procedure with Table 5 is used.
- Almost same results were appeared in this table.

Table 7
Fama–MacBeth monthly regressions of stock returns on NOA, change in NOA, accruals, sum of lagged accruals, and financing characteristics

Panel A: *NOA and accruals* (*same as Model* 4 *of Panel A*, *Table* 5)

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

Panel B: *NOA, change in NOA, and accruals*

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

Panel C: *NOA and sum of lagged accruals*

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

Panel D: *decomposition of NOA into book value of equity, debt, and cash*

LnSize	LnB/M	Ret(−1 : −1)	Ret(−12 : −2)	Ret(−36 : −13)	Accruals	Equity	Debt	−Cash
−0.0011	0.0027	−0.0733	0.0053	−0.0022	−0.0077	−0.0050	−0.0066	−0.0073
−2.34	***4.06***	***−16.96***	***3.19***	***−3.47***	***−3.61***	***−4.24***	***−6.03***	***4.07***

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

- Table 7 examines the predictive power of different components of NOA for one-year-ahead returns using Fama-MacBeth Regressions.
- Panel A: NOA remains highly significant as a return predictor even after controlling for Accruals in the regression
  - Which means that "Sustainability Effect" is not subsumed by the "Accruals Anomaly," implies that investment levels and past operating accruals matter, not just the most recent operating accruals.
- Panel B: consider the latest change in NOA in addition to NOA and other controls
  - ΔNOA is statistically significant in first two model in Panel B: consistent with Fairfield et al. (2003)
  - If NOA is added, regardless of the existence of Accruals, ΔNOA is no longer statistically significant: which indicates that the cumulative total of past investment and operating accruals matters, not just the lates investment and operating accruals.
  - There is no indication that investor misperceptions are more sensitive to current period than past period accruals and investment.
- Panel C: remaining orthogonal component in NOA (cumulative past investment) plays a role in the strong predictive power of NOA.
- Panel D: NOA can be decomposed into Equity, Debt, −Cash and these variables simultaneously predict the subsequent stock returns.

Table 8
Annual non-linear generalized least square regressions (Mishkin Test) of rational and market forecasting of firm returns and 1-year ahead earnings

$$\text{Earnings}_{t+1} = \gamma_0 + \gamma_1 \text{Accruals}_t + \gamma_2 \text{NOA}_t + \gamma_3 \text{Cash Flows}_t + v_{t+1}$$
$$\text{Abnormal Returns}_{t+1} = \beta(\text{Earnings}_{t+1} - \gamma_0 - \gamma_1^* \text{Accruals}_t - \gamma_2^* \text{NOA}_t - \gamma_3^* \text{Cash Flows}_t) + \varepsilon_{t+1}$$

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

Test of market efficiency		*t*-test	# of years when $\gamma_n < \gamma_n^*$ (36 years total)
Accruals	$\gamma_1 = \gamma_1^*$	*1.82*	22
NOA	$\gamma_2 = \gamma_2^*$	***4.18***	28
Cash Flows	$\gamma_3 = \gamma_3^*$	***−4.18***	11

Notes: Due to the limited annual observations before fiscal year 1965, the sample consists of firm-year observations from fiscal year 1965 to 2000. Accruals, NOA, Earnings and Cash Flows are defined in Table 1. The annual abnormal return for any individual stock is calculated by subtracting the equal-weighted return of a benchmark portfolio matched by size, book-to-market and momentum from the annual raw buy and hold return of the stock. Returns are measured starting 4 months after fiscal year end. The system of equation is estimated annually using non-linear generalized least squares. The time-series average of the annual coefficients estimates and their associated *t*-statistics (in italics) for $\gamma_n^* = \gamma_n$ are reported. Bold numbers indicate significance at less than 5% level (2-tail *t*-test).

- To address the cross-correlation that can be appeared into firm-year data, this paper modified Mishkin test with Fama-MacBeth idea. (cross-section year-by-year approach)
- If the market is efficient and the model specification is correct, then the weights assigned by investors would not be statistically different from the weights assigned by the rational model for forecasting earnings.
- Significant underweighting of CF by investors: consistent with past research

5. Conclusion

- Investors' limited attention → focus on accounting profitability rather than cash profitability, overvaluation from "bloated balance sheets"
- The level of net operating assets is therefore the measure of the extent to which operating/reporting outcomes provoke excessive investor optimism.
  - Net operating assets should negatively predict subsequent stock returns.
- Futhermore, NOA is a strong and highly robust negative predictor of abnormal stock returns for at least three years after NOA is measured.
- The predictive power of NOA remains strong after controlling for a wide range of known return predictors and asset pricing controls.
- Employ simple and parsimonious aggregate balance sheet measure, NOA