The Trend in Firm Profitability and the Cross-Section of Stock Returns

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Contents

1.Introduction

Background

- The level of a firm's profitability is a significant determinant of future stock returns;
- Models including "profitability" factor account for a number of well-documented anomalies, and offer promise in summarizing the cross-section of average stock returns (eg. FF5);
- In order to have an acceptable description of average returns, it is essential to develop a better understanding of expected future profitability.

1.Introduction

Literatures

- Novy-Marx (2013): firms with a high level of gross profits significantly outperform unprofitable firms;
- Fama and French (2006, 2015a, 2015b): the level of profitability is a proxy for expected future profitability and serves to predict future returns;
- Haugen and Baker (1996): more profitable firms have more potential for future growth(a positive correlation between firm profitability and future stock returns);

1.Introduction

Literatures

- Cohen, Gompers, and Vuolteenaho (2002): high past profitability and stock returns predict high future profitability;
- Asness, Frazzini, and Pedersen (2013): analyze six different measures of the ‘‘growth’’ component of a firm’s quality, one of which is the change in profitability over a five-year period

1.Introduction

Literatures

- The relation between earnings and stock returns depends on the persistence of earnings or earnings surprises (e.g., see Bernard and Thomas 1990; Foster et al. 1984; Ball and Bartov 1996)
- The trend in profitability is different from earnings streaks: a series of earnings outcomes may fluctuate around a trend regression line with an upward slope, yet they may not qualify as a continuous streak of increasing earnings.

1.Introduction

Motivations

- Since profitability gives an incomplete picture of future profitability and stock returns, can the trend in firm profitability achieve this goal?
  - Yes.
- What is the source of the return of ‘profitability trend’?
  - Mispricing.

1.Introduction

Contributions

- This study contributes to the literature by showing that the recent level of a firm's profitability gives an incomplete picture of the firm's prospects for future profitability and stock returns.
- This study specializes in 'profitability trend' first and proves that 'profitability trend' can effectively predict future earnings.

2.Data

Stock selection:

- common shares (share codes 10 and 11) for all NYSE, AMEX, and NASDAQ stocks from CRSP
- exclude financial and utility firms and firms with negative book-to-market ratios
- stock prices should be above one dollar
- January 1977-December 2012

2.Data

Factors:

- GPQ(quarterly gross profit):

$$\frac{quarterly\ sales\ (SALEQ) - quarterly\ cost\ of\ goods\ sold\ (COGSQ)}{total\ assets\ (ATQ)}$$

- PROFIT:

  the average GPQ over the most recent eight quarters

- TREND_PROFIT:

$$GPQ_{iq} = \alpha_{iq} + \boldsymbol{\beta_{iq}} t + \lambda_1 D_1 + \lambda_2 D_2 + \lambda_3 D_3 + e_{iq} \qquad t=1,2,3,4,5,6,7,8$$

2.Data

- The mean trend in gross profits (TREND_PROFIT) is close to zero, indicating that firms with positive and negative profit trends roughly offset each other

Panel A: Summary Statistics

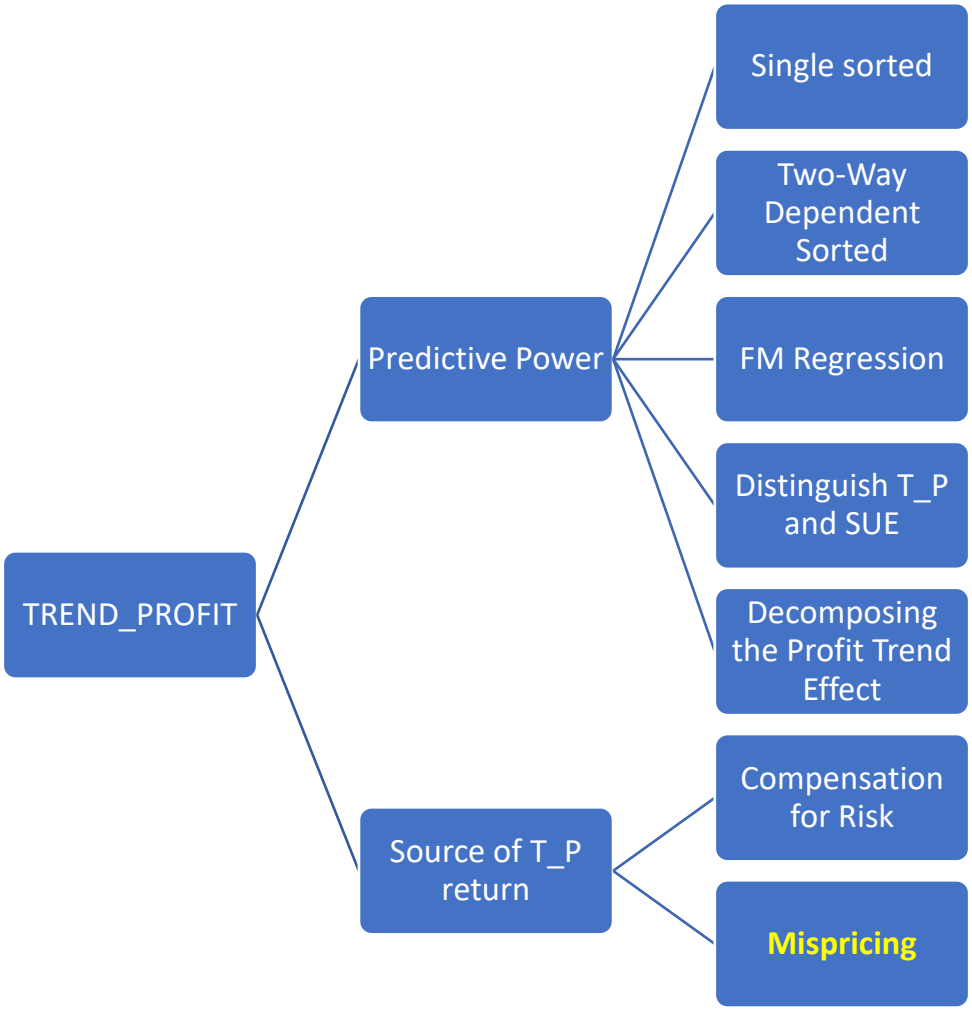
Variables	Mean	Median	Std.	Min.	Max.
TREND_PROFIT $\times 10^2$	0.035	−0.003	0.727	−2.201	2.915
GPQ	0.100	0.092	0.071	−0.086	0.329
PROFIT	0.100	0.093	0.068	−0.078	0.312

2.Data

	TREND_PROFIT	GPQ	PROFIT	PERSIST_EARN	STREAK_UPEARN
Spearman Correlations					
TREND_PROFIT	1.00	0.18	−0.04	−0.04	0.06
GPQ	0.18	1.00	0.91	−0.12	0.02
PROFIT	−0.04	0.91	1.00	−0.11	0.00
Pearson Correlations					
TREND_PROFIT	1.00	0.20	−0.05	−0.05	0.05
GPQ	0.20	1.00	0.91	−0.12	0.01
PROFIT	−0.05	0.91	1.00	−0.11	0.00

- The level of a firm's profits has little bearing on whether profits have been rising or falling;
- Earnings persistence has a significant, but small, negative correlation with the profit trend;
- For the subset of firms each quarter with a streak of consecutive quarterly earnings increases, there is only a small tendency for a higher trend in profits;
- Streak_Upearn: A dummy variable assigned a value of 1 if the firm has a streak of seven consecutive increases in earnings over the most recent eight quarters, from q-7 t o q, and 0 otherwise
- Persist_Earn: $EARNINGS_{iq} = \alpha_{iq} + \boldsymbol{b_{iq}} EARNINGS_{iq-1} + e_{iq}$

3.Methods


TREND_PROFIT
Predictive Power
Single sorted
Two-Way Dependent Sorted
FM Regression
Distinguish T_P and SUE
Decomposing the Profit Trend Effect
Source of T_P return
Compensation for Risk
Mispricing

4.Results

1. The relationship between TREND_PROFIT and the future returns

Panel A: One-Way Sorting Based on the Firm's Profit Trend (*TREND_PROFIT*)

TREND_PROFIT Decile	Low	2	3	4	5	6	7	8	9	High	H − L
Equally Weighted Average Returns											
Average Raw Return	0.75	1.10	1.15	1.27	1.29	1.26	1.41	1.51	1.63	1.77	1.02***
	(2.91)	(5.51)	(5.61)	(6.93)	(6.26)	(5.99)	(6.77)	(7.30)	(7.17)	(6.38)	(9.04)
Fama-French Five-Factor α	−0.27	−0.10	−0.11	−0.05	0.01	−0.02	0.08	0.22	0.33	0.64	0.91***
	(−1.87)	(−0.95)	(−1.26)	(−0.58)	(0.12)	(−0.28)	(0.99)	(3.16)	(3.71)	(5.20)	(8.17)
MKT_RF	1.04	1.03	1.03	1.03	1.01	1.00	1.03	1.03	1.06	1.08	0.04
	(33.79)	(35.26)	(38.09)	(47.55)	(47.96)	(49.40)	(53.60)	(48.63)	(41.92)	(44.79)	(1.09)
SMB	0.94	0.83	0.76	0.73	0.68	0.72	0.71	0.76	0.82	0.97	0.03
	(18.40)	(17.49)	(18.04)	(22.44)	(21.81)	(20.42)	(20.42)	(17.40)	(12.48)	(13.66)	(0.63)
HML	−0.02	0.19	0.21	0.20	0.22	0.17	0.23	0.12	0.12	−0.10	−0.08
	(−0.40)	(2.63)	(2.70)	(3.87)	(3.85)	(2.86)	(3.99)	(1.97)	(1.76)	(−1.76)	(−1.39)
RMW	−0.46	−0.16	0.01	0.12	0.10	0.09	0.13	0.11	0.10	−0.31	0.15***
	(−7.39)	(−2.59)	(0.07)	(2.16)	(1.79)	(1.54)	(2.00)	(1.78)	(1.52)	(−5.18)	(2.77)
CMA	−0.13	−0.03	0.00	0.10	0.03	0.09	0.08	0.04	−0.01	0.00	0.13*
	(−1.24)	(−0.27)	(0.05)	(1.62)	(0.48)	(1.63)	(1.18)	(0.56)	(−0.07)	(0.03)	(1.71)
Value-Weighted Average Returns											
Average Raw Return	0.83	0.95	1.03	1.15	1.10	1.09	1.08	1.08	1.09	1.27	0.43***
	(3.61)	(4.23)	(4.91)	(7.00)	(5.55)	(5.60)	(4.85)	(5.47)	(5.88)	(5.21)	(3.41)
Fama-French Five-Factor α	−0.04	−0.03	−0.08	0.04	−0.05	−0.02	−0.05	−0.08	−0.04	0.20	0.24*
	(−0.32)	(−0.33)	(−0.91)	(0.30)	(−0.56)	(−0.32)	(−0.84)	(−0.91)	(−0.46)	(2.23)	(1.84)
MKT_RF	1.05	1.01	1.03	1.02	1.02	0.99	1.01	1.02	1.07	1.11	0.06
	(27.93)	(43.44)	(32.58)	(50.54)	(57.85)	(50.21)	(44.02)	(43.06)	(39.26)	(35.71)	(0.98)
SMB	0.28	0.10	0.08	0.05	0.02	−0.01	0.06	0.05	0.10	0.27	−0.02
	(5.83)	(1.94)	(2.03)	(1.38)	(0.53)	(−0.39)	(1.91)	(1.44)	(2.94)	(6.64)	(−0.20)
HML	−0.11	−0.11	0.01	0.03	0.05	−0.04	0.01	−0.08	−0.22	−0.29	−0.18*
	(−1.60)	(−2.36)	(0.31)	(0.77)	(1.18)	(−0.83)	(0.18)	(−1.79)	(−3.89)	(−4.69)	(−1.72)
RMW	−0.24	−0.03	0.12	0.12	0.23	0.19	0.20	0.28	0.20	0.04	0.28***
	(−4.14)	(−0.66)	(2.71)	(3.12)	(4.39)	(3.04)	(5.08)	(3.54)	(3.89)	(0.56)	(3.27)
CMA	−0.28	0.02	0.12	0.17	0.14	0.25	0.15	0.20	0.24	0.07	0.35***
	(−3.36)	(0.20)	(1.69)	(1.88)	(4.25)	(4.77)	(1.47)	(2.29)	(3.87)	(0.81)	(2.78)

- This smaller value-weighted hedge portfolio return suggests that the profit trend effect tends to be smaller for larger firms;
- The non-monotonic pattern in portfolio returns is not due to differences in factor loadings for the different decile portfolios based on the profit trend.

4.Results

2.Portfolio Approach: Two-Way Dependent Sorting Analysis

- PROFIT×TREND_PROFIT
  - The trend in profits provides significant incremental predictive information about future returns beyond that given by the level of profits.
- SIZE×TREND_PROFIT
  - The non-monotonic patterns in VW returns across the decile portfolios are driven by stocks with the largest market capitalizations that appear in the middle deciles when sorted by TREND_PROFIT.

4.Results

Equally Weighted	*TREND_PROFIT* Quintile	*PROFIT* Tercile: Low	2	High	H − L
Average Raw Return *RET*(+1)	Low	0.75	0.82	1.03	0.27**
		(2.66)	(3.59)	(4.75)	(2.08)
	2	0.97	1.17	1.33	0.36**
		(4.03)	(6.38)	(6.92)	(2.45)
	3	1.07	1.28	1.51	0.45***
		(4.48)	(6.47)	(8.07)	(3.64)
	4	1.24	1.50	1.67	0.43***
		(4.64)	(8.01)	(8.19)	(2.80)
	High	1.37	1.65	2.00	0.63***
		(4.81)	(7.18)	(7.64)	(5.43)
	H − L	0.62***	0.83***	0.97***	
		(6.29)	(7.11)	(7.83)	

Equally Weighted	*TREND_PROFIT* Quintile	*SIZE* Tercile: Low	2	High	H − L
Average Raw Return *RET*(+1)	Low	0.86	0.95	1.01	0.14
		(3.27)	(4.56)	(4.93)	(0.63)
	2	1.19	1.26	1.08	−0.10
		(4.93)	(6.95)	(6.31)	(−0.49)
	3	1.42	1.33	1.13	−0.29
		(5.83)	(6.74)	(6.30)	(−1.51)
	4	1.65	1.43	1.11	−0.54**
		(6.38)	(7.53)	(5.39)	(−2.51)
	High	1.86	1.44	1.24	−0.63***
		(6.35)	(6.43)	(6.01)	(−2.67)
	H − L	1.00***	0.49***	0.23***	
		(8.77)	(4.49)	(2.70)	

4.Results

3. Fama-MacBeth Regression Approach

- $\mathrm{RET}(+1)_{it} = \beta_0 + \beta_1 \mathrm{TREND\_PROFIT}_{it} + \beta_2 \mathrm{PROFIT}_{it} + \beta_3 \mathrm{SIZE}_{it} + \beta_4 \mathrm{BM}_{it} + \beta_5 \mathrm{RET}(-6,-1)_{it} + \beta_6 \mathrm{RET}(-36,-7)_{it} + \beta_7 \mathrm{STDRET}_{it} + \beta_8 \mathrm{TURN}_{it} + \beta_9 \mathrm{ILLQ}_{it} + \beta_{10} \mathrm{ATGROWTH}_{it} + e_{it}$
- Both the trend and the level of profits provide incremental predictive information about future returns;
- Firms with a higher profit trend outperform those with a lower trend, and this effect is not subsumed by other well-known predictors of stock returns.

4.Results

	Model (1)	Model (2)	Model (3)
TREND_PROFIT	0.414***	0.427***	0.360***
	(6.42)	(6.84)	(6.84)
PROFIT		0.030***	0.028***
		(3.77)	(3.15)
SIZE $\times 10^{-2}$			−0.226***
			(−4.95)
BM			0.002*
			(1.85)
RET(−6, −1)			0.006**
			(2.37)
RET(−36, −7)			−0.001
			(−0.83)
STD_RET			−0.304***
			(−8.07)
TURN $\times 10^{-2}$			0.314***
			(4.77)
ILLIQ $\times 10^{5}$			0.003***
			(3.53)
AT_GROWTH			0.008***
			(2.92)

4.Results

4. The Trend in Profitability and Standardized Unexpected Earnings (SUE)

- SUE_FOS(Foster et al. 1984):

$$\frac{EPS_{i,q} - EPS_{i,q-4}}{\sigma_{q-7,q}}$$

- SUE_BT(Bernard and Thomas 1990):

$$\frac{EPS_{i,q} - EPS_{i,q-4} - \mu_{q-7,q}}{\sigma_{q-7,q}}$$

The Profit Trend, Standardized Unexpected Earnings, and Stock Returns

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
TREND_PROFIT	0.353***				0.212***	0.259***		
	(6.79)				(5.21)	(5.97)		
tTREND_PROFIT		0.082***					0.047***	0.059***
		(8.40)					(5.59)	(6.91)
SUE_FOS			0.004***		0.003***		0.003***	
			(11.67)		(12.20)		(11.67)	
SUE_BT				0.004***		0.004***		0.004***
				(11.60)		(11.58)		(11.39)

4.Results

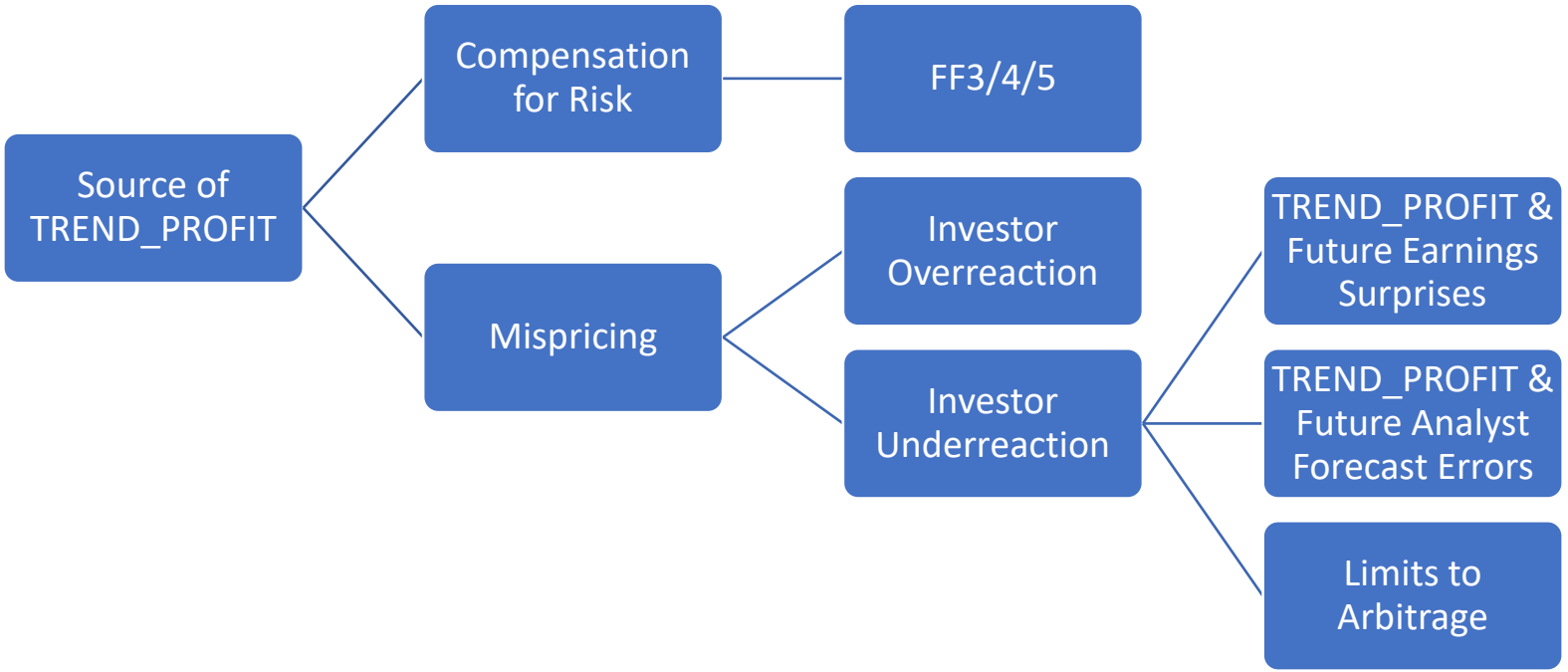
5. Decomposing the Profit Trend Effect

- Novy-Marx (2013) and Soliman (2008):
- Gross Profit $= \frac{\text{Sales} - \text{Cost of Goods Sold}}{\text{Total Assets}}$
- $= \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Sales} - \text{Cost of Goods Sold}}{\text{Sales}} = \text{ATTO} \times \text{GM}$

	(1)	(2)	(3)	(4)	(5)	(6)
ATTO	0.005				0.005*	
	(1.63)				(1.90)	
GM			0.003**		0.004***	
			(2.40)		(3.39)	
PROFIT		0.029***		0.027***		0.030***
		(3.26)		(3.08)		(3.42)
TREND_ATTO	0.212***	0.217***			0.210***	0.214***
	(12.36)	(12.35)			(12.38)	(12.53)
TREND_GM			0.058***	0.053***	0.049***	0.045***
			(3.38)	(3.32)	(3.10)	(2.99)

4.Results

6.The source of TREND_PROFIT



4.Results

Compensation for Risk as an Explanation for the Profit Trend Effect

- The relation between the trend in profitability and future returns remains robust after controlling for the risk embodied in the sensitivities of returns to these various factors.

4.Results

Investor Overreaction as an Explanation for the Profit Trend Effect

- If investors overreact to the information in the profit trend, then they may push the stock price too far in the same direction as the profit trend and away from the firm's fundamentals:
- an initial substantive positive relation between the profit trend and near-term future returns + a return reversal in the subsequent months after two years, back toward a valuation consistent with the firm's fundamentals.

4.Results

- The profit trend predicts stock returns up to two years following portfolio formation, with no tendency for a subsequent return reversal after two years.
- This evidence is not consistent with mispricing due to investor overreaction as an explanation for the profit trend effect.

	Dependent Variable				
	***RET*(2, 12)**	***RET*(13, 24)**	***RET*(25, 36)**	***RET*(37, 48)**	***RET*(49, 60)**
TREND_PROFIT	1.685***	1.634***	0.909	0.188	0.114
	(3.13)	(3.66)	(1.18)	(0.30)	(0.26)

4.Results

Investor Underreaction as an Explanation for the Profit Trend Effect

- Investors may be conservative and slow in updating their beliefs in the face of new evidence (Edwards 1968), or they may discount public signals (Daniel, Hirshleifer, and Subrahmanyam 1998), or ignore news (Hong and Stein 1999; Hirshleifer, Lim, and Teoh 2011).
- The positive relation between the trend in profitability and future returns over the next two years may be due to investor underreaction to the future performance signaled by the profit trend.

4.Results

The trend in profitability and future earnings surprises.

- $RET(+1)_{it}$→The three-day cumulative abnormal return $CAR(+a)_{it}$ around the subsequent earnings announcement in quarter q+a, where a=1~8

	CAR(+1)	*CAR*(+2)	*CAR*(+3)	*CAR*(+4)	*CAR*(+5)	*CAR*(+6)	*CAR*(+7)	*CAR*(+8)
TREND_PROFIT	3.287**	0.764	−1.309	−2.093*	0.273	−0.071	−0.715	−0.982

- Investors tend to be positively (or negatively) surprised at the next earnings announcement immediately following the quarter in which a higher (or lower) profit trend is measured, but not over the subsequent quarters.

4.Results

The trend in profitability and future analyst forecast errors

- The underreaction by analysts to the information of TREND_PROFIT would result in a positive relation between the trend in profitability measured at the end of year T, and the subsequent monthly analyst forecast errors throughout year T+1.
  - $AFE_{i,s,T+1} = \frac{E_{i,T+1} - AF_{i,s,T+1}}{P_{i,s=1}}$
  - $E_{i,T+1}$: realized annual earnings for firm i in fiscal year T+1
  - $AF_{i,s,T+1}$: median analyst forecast of annual earnings for firm i in fiscal year T+1, reported in month s (=1–12) of the year prior to release of annual earnings in year T+1

4.Results

- $\mathbf{AFE_{i,s,T+1}} = \beta_0 + \beta_1 \mathbf{TREND\_PROFIT\_RK_{it}} + \beta_2 \mathrm{PROFIT}_{it} + \beta_3 \mathrm{SIZE}_{it} + \beta_4 \mathrm{BM}_{it} + \beta_5 \mathrm{RET}(-6,-1)_{it} + \beta_6 \mathrm{RET}(-36,-7)_{it} + \beta_7 \mathrm{STDRET}_{it} + \beta_8 \mathrm{TURN}_{it} + \beta_9 \mathrm{ILLQ}_{it} + \beta_{10} \mathrm{ATGROWTH}_{it} + e_{it}$

Month	β_0	$t(\beta_0)$	β_1	$t(\beta_1)$	R^2	n
1	−0.0642	−10.0***	0.0189	8.8***	0.061	51,571
2	−0.0451	−4.7***	0.0166	8.5***	0.068	51,487
3	−0.0539	−11.9***	0.0151	7.9***	0.063	51,381
4	−0.0459	−8.0***	0.0129	6.8***	0.058	51,154
5	−0.0370	−7.1***	0.0110	6.1***	0.057	50,718
6	−0.0252	−5.3***	0.0093	5.3***	0.052	50,079
7	−0.0180	−3.1***	0.0072	4.4***	0.049	49,757
8	−0.0175	−4.1***	0.0070	4.5***	0.052	49,602
9	−0.0085	−1.9*	0.0046	3.8***	0.048	49,327
10	−0.0052	−1.5	0.0032	2.7***	0.045	49,104
11	−0.0044	−1.2	0.0030	2.7***	0.039	48,129
12	−0.0031	−0.5	0.0046	2.7***	0.064	23,736

4.Results

Limits to arbitrage and the profit trend effect

- Double sorting analysis(Amihud.2002)
  - illiquidity (a measure of trading costs)
  - return volatility (a proxy for arbitrage risk)
  - institutional ownership (a proxy for short selling costs)

	L	2	H	H – L
ILLIQ				
Raw Return	0.32***	0.53***	1.02***	0.70***
STD_RET				
Raw Return	0.50***	0.58***	1.00***	0.50***
IO				
Raw Return	1.04***	0.39***	0.25**	–0.79***
	(10.18)	(2.78)	(2.03)	(–6.64)

5.Conclusions

- The trend in a firm’s gross profits predicts the firm’s future profitability and stock returns;
- The profit trend effect cannot be fully explained by well-known risk factors;
- The predictive relation between the profit trend and future returns is associated with irrational mispricing(underreaction).