

The Role of Fundamental Analysis in Information Arbitrage: Evidence from Short Seller Recommendations

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Presentation Roadmap

- **Motivation** and Literature review
- **Dataset** of Short Seller Recommendations
- **Modeling** the trading behavior of Short Sellers.
 - Variables motivated by contextual analysis.
 - **Financial Statement** variables; **Valuation** indicators.
- **Out-of-sample predictability** of the short seller model
 - Short interest
 - Future Returns
- **Application**: “On Distinguishing between Valuation and Arbitrage Motivated Short Selling”.
- Related research on earnings quality.

Literature on Return Predictability

Valuation and Financial Statement indicators contain information that helps predict future returns.

- Fundamental-to-price ratio (B/M or P/E ratio); Prior return; Earnings quality / Accruals; Fundamental analysis etc.
- Studies: Lakonishok, Shleifer and Vishny (1994), Jegadeesh and Titman (1993), Sloan (1996), Abarbanell and Bushee (1997, 1998), Piotroski (2000), Beneish, Lee and Tarpley (2001), among others.
- Interpretation is unclear: Risk or market friction or methodology bias or mis-pricing?
- Research idea: Let us directly examine the trading behavior of information arbitrageurs. Do they exploit the information contained in fundamental and valuation signals?
 - Hurdle: Data availability.

Literature on Short Interest (1)

Short Sellers represent an important group of information arbitrageurs in financial markets.

- Institutional details of short selling makes it a costly endeavor.
- Theory: Short sellers tend to be informed investors, as costly short constraints disproportionately discourage uninformed investors from selling short (Diamond and Verrecchia (1987)).
- Empirics: Firms with high short interest experience poor future returns, both using monthly and daily data. (Asquith and Meolbrouck (1996), Desai et al (2002), Christophe et al (2004), Boehmer et al (2005), Diether et al (2005), among others).
- Research plan: Examine the trading behavior of short sellers.
 - Hurdle: No publicly available data with broad coverage on short seller recommendations or holdings. Fortunately, aggregate short interest data is available.

Literature on Short Interest (2)

Which stocks are difficult to borrow?: Proprietary stock loan data

- Small; Illiquid; Low institutional holding; High B/M ratio; momentum
- Studies: D'Avolio (2002), Jones and Lamont (2002); Geczy et al(2001).

The aggregate short interest is related to:

- Valuation multiples (Dechow et al (2001)); Accruals (Desai et al. (2006), Hirshleifer et al. (2005)); PEAD (Cao et al. (2006)).
- Assumption: Short interest proxies for short selling demand from informed traders targeting over-valued securities.

Reported Short Interest aggregates Valuation and Arbitrage Shorts

- Arbitrage strategies: Convertibles; Merger; Index (program trades)
- Implications for future returns differ (see Asquith et al. (2005))
- Concern: Dramatic increase in arbitrage related activities in recent years.

This paper

We examine an unique database of Short Sale recommendations made by an independent research firm for its institutional clients.

- **Advantage:** Recommendation motivated by perceived overvaluation. Provides a more precise signal of the demand of valuation shorts.
- Build an empirical model of the trading behavior of valuation shorts over 1997-2004 period (estimation period)
 - Accounting information plays a critical role in identifying targets: Significant growth in sales, SG&A, and gross margin, coupled with high accruals.
 - Target firms with low B/M ratio; high return momentum; high liquidity.
- **Implication:** Information arbitrageurs attempt to exploit the return predictability in valuation and fundamental signals.
- Validate the model during an out-of-sample period (1990-1996).
- Present an important application of the short interest model.

Testable Hypotheses

1. Do information arbitrageurs attempt to exploit the return predictability in fundamental and valuation signals?

H1: Short sellers use fundamental variables to identify target firms.

2. Does the model capture the trading behavior of a broader group of valuation motivated short sellers in an out-of-sample period?

H2: The short interest model should forecast short interest and abnormal returns in an out-of-sample period.

3. Can the model distinguish between high short interest firms that are valuation shorts versus those that are arbitrage shorts?

H3: (a) firms identified as valuation shorts should experience negative abnormal returns, and (b) firms identified as arbitrage shorts should exhibit characteristics that are associated with arbitrage strategies.

Short recommendations, the year after (Table I)

Panel A: Returns	Months (-12, -1)	Month 0	Months (+1, +12)
Raw returns (%)	77.90 *** (24.55) ***	-4.03 ** (-4.03) *	-9.71 (-18.32) **
Market-adjusted returns (%)	72.36 *** (31.85) ***	-4.89 ** (-3.57) **	-15.02 ** (-17.12) ***
Panel B: Summary of 'bad news' events in year +1			# Observations
Firms with 'bad news' reported			42
Reported lower than expected earnings			24
Lowered guidance on future earnings / sales			20
Analyst downgrade			23
Earnings restatement, earnings or audit delay, accounting concerns			7
Regulatory action, Lawsuit, SEC investigation			8
Firms with no 'bad news' reported			25

- **Sample: Every short recommendation** issued by the research firm **since its inception** in 1998 until June 2005. (N=67)
- Reports present arguments (often, related to accounting practices) detailing why the prior performance is expected to reverse.
- Note that not all firms in the short database subsequently underperformed.

Example – Rite Aid



Rite Aid Announces Preliminary Fourth Quarter Earnings Estimates

Camp Hill, PA (March 12, 1999) -- Rite Aid Corporation (RAD--NYSE, PSE) announced today that the company's preliminary estimates are that earnings for the fourth quarter will be approximately \$.30 to \$.32 per share on a fully diluted basis as compared to First Call analysts' consensus estimates of \$.52 per share. The company will announce results for the fourth quarter on March 29, 1999. During the year, the company opened 578 new and relocated stores. Thirty five percent of these units, or 206 stores, were opened in the last 45 days of the fourth quarter. The costs and expenses associated with the opening or relocation of those 206 stores accounted for approximately \$.07 of the shortfall, which includes \$.02 in greater than anticipated grand opening advertising expenses.

Empirical Model, Table III, Column (3)

Dependent variable: '1' for target,
'0' otherwise

Model (3)
Industry-adjusted

Intercept -6.9265 ***

Performance variables

BM -2.1931 ***

Prior year momentum 0.2768 **

Financial variables

DSRI 0.0128

GMI -0.2205 *

SGAI 0.8383 **

AQI -0.2929

SGI 0.5047 ***

DEPI -0.2141

LVGI -0.2058

OPACC 3.0838 ***

Firm characteristics

Size 0.0000

Turnover 57.0076 **

Pseudo R² (%) 10.1

Model: Logistical regression

Frequency: Annual (snapshot of explanatory variables available every September).

Sample period: 1997-2004.

Financial variables from Beneish (1999) being related to earnings manipulation.

Short recommendations are more likely to be issued for firms with:

- Increases in Sales, SGAI, and Gross Margin
- High Accruals.
- Low B/M ratio (growth), high return momentum, and high liquidity.

Implications of Findings

Direct empirical evidence of a relation between the literature on the predictive ability of fundamental signals and the literature on the trading behavior of information arbitrageurs. (H1)

- Sensitive to information contained in accounting ratios, and in particular, target firms with poor earnings quality.
- Financial ratios may help short sellers to identify the subset of high momentum (growth) firms whose performance is not sustainable.
- Illustrates the importance of context-based fundamental analysis.

But, can these findings be generalized? The model is based on a small sample of short recommendation made by a single research firm.

- Does the model predict short interest in an out-of-sample period?
- Does the model predict returns in an out-of-sample period?

Out-of-Sample Analysis (Table IV and V)

Short interest (%) and Abnormal Returns (%)	Industry-adjusted Model Table II, Column (3)	
	Short Interest	Abnormal Returns
Decile 1 (Low)	0.465	0.0125 ***
2	0.634	0.0073 **
3	0.810	0.0050 **
4	0.850	0.0033
5	1.044	0.0014
6	1.055	0.0002
7	1.193	-0.0004
8	1.590	-0.0013
9	1.960	-0.0055 ***
Decile 10 (High)	3.239	-0.0076 **
t for High-Low	24.75	

Out-of-Sample period: 1990-1996.

Frequency: Annual

Firms are sorted into decile portfolios based on Predicted Probabilities each year.

Short interest exhibits a monotonic increase across decile portfolios out of sample (H2)

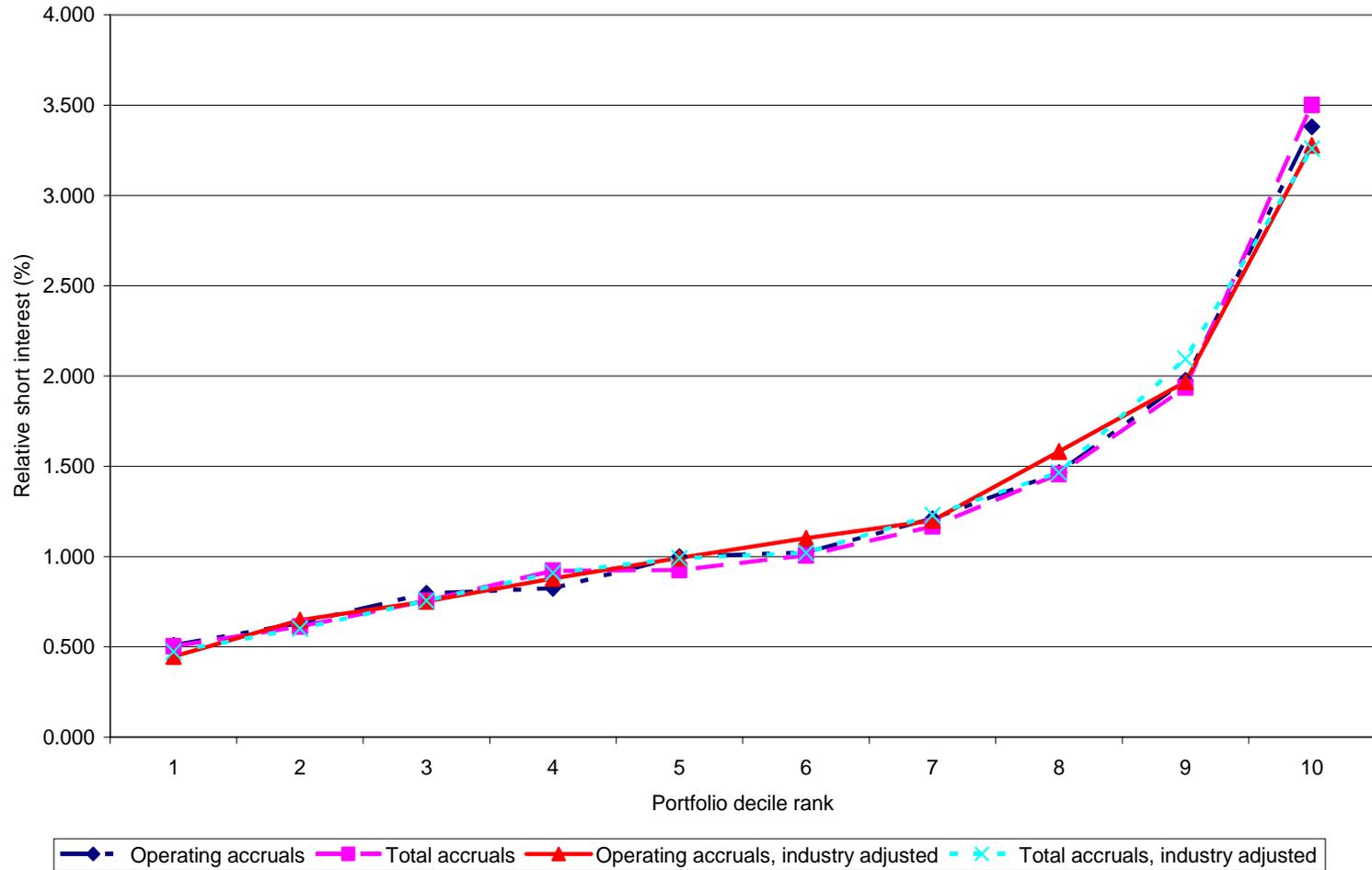
- Model captures the trading behavior of a broader group of short sellers.
- Short sellers in aggregate exploit the predictability in fundamental signals.

Calendar time regression alphas (Fama-French)

- Decile 10 (high predicted probability): Negative alphas (Valuation shorts)

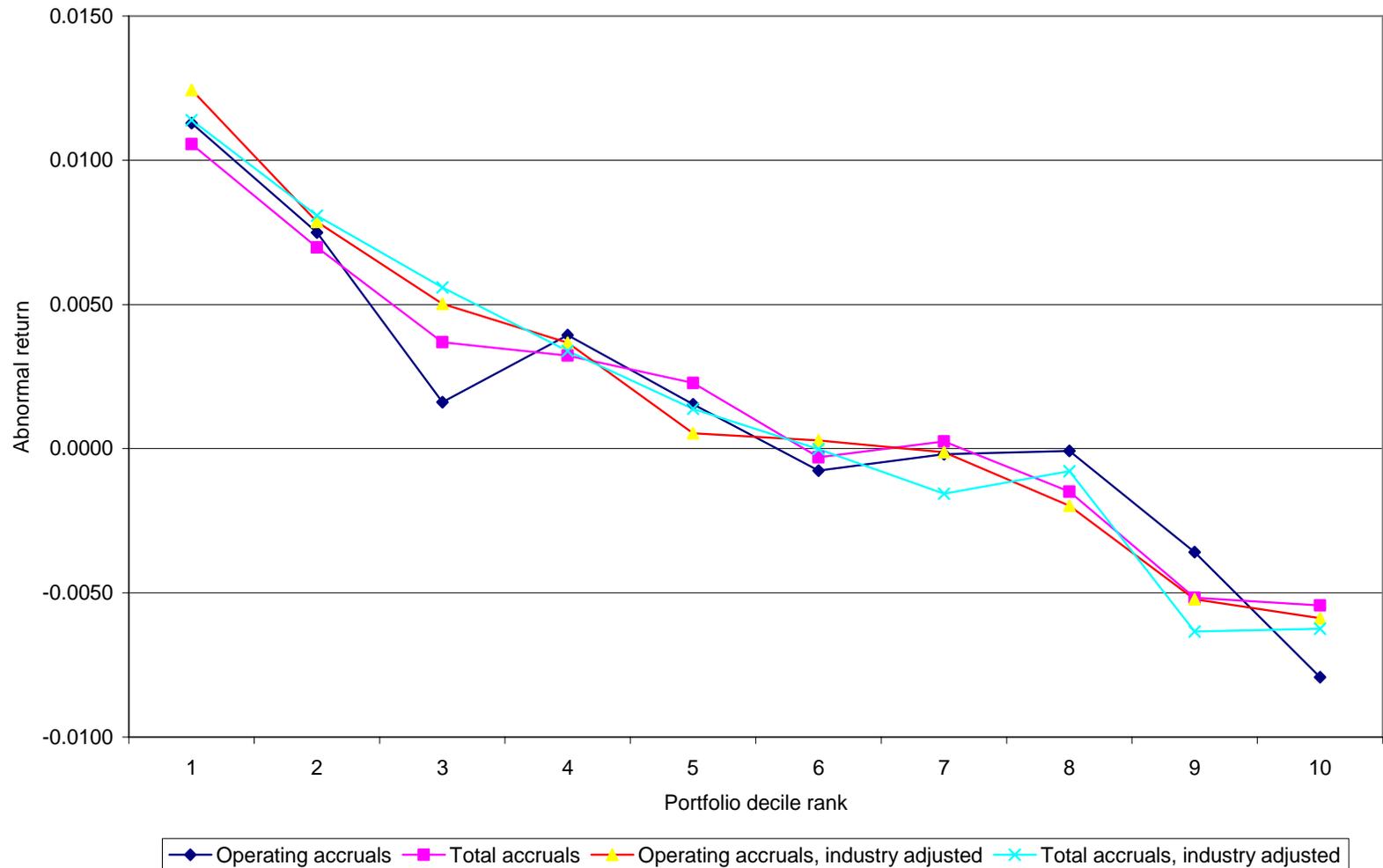
Short interest, by predicted probability bins

Fig. 2a Prediction period short interest using prior 6-month momentum in estimation



Abnormal returns, by predicted probability bins

Fig. 3a Prediction period abnormal returns using prior 6-month momentum in estimation



Robustness tests (Table VI)

Results are robust to:

- Operating accruals vs total accruals.
- Unadjusted vs industry median adjusted measures.
- Momentum measured over prior 1 year or 6 months.
- Turnover or trading volume.
- Four factor model, including the momentum factor.
- Controlling for learning effects (Table VI)
- Excluding low priced firms (Table VI)
- Selecting every 10th firm from the universe as control firm. (Table VI)

Application: To distinguish between Valuation and Arbitrage Motivated Short Selling (Table VII)

Panel A: Abnormal return

Predicted probability	Low (deciles 1 - 3)	Medium (deciles 4 - 7)	High (deciles 8 - 10)
Low short interest (decile 1)	1.19 *** (0.03) [1320]	0.14 (0.04) [900]	-1.08 ** (0.04) [435]
High short interest (decile 10)	0.08 (7.43) [264]	-0.72 *** (7.26) [623]	-0.71 *** (8.74) [1237]

Independent sorts: Low, medium and high predicted probability bins.

- **Valuation shorts:** High short interest and High predicted probability.
 - Consistent with theory, they exhibit **negative future returns** (-0.71%).
- **Arbitrage shorts:** High short interest but low predicted probability.
 - No evidence of negative future returns.
 - Note that average short interest is not different across the two groups.
- **Short constrained:** High predicted probability but low short interest.

Application: Additional evidence (Table VII)

Panel B: Firm characteristics

Predicted probability	Low (deciles 1-3)		High (deciles 8-10)	
	Low (decile 1)	High (decile 10)	Low (decile 1)	High (decile 10)
Short interest				
MVE (\$ mill)	48.6	726.9 ^{###}	229.0	926.8 ^{###}
BM	1.55	1.22 ^{###}	0.32	0.27 ^{###}
Average turnover (%)	0.13	0.42 ^{###}	0.25	0.76 ^{###}
% with cvt. sec.	12.3	56.4 ^{###}	19.5	24.0 [#]
% in S&P 500 Index	0.53	19.7 ^{###}	0.23	5.01 ^{###}

Are firm characteristics consistent with classification?

Arbitrage shorts: 56% of firms have convertible bonds outstanding and 20% of firms are members of the S&P500 index.

- Model includes neither convertible bonds nor S&P membership!

Short constrained: Low B/M ratio but smaller and less liquid.

Valuation shorts: Larger, more liquid firms with low BM ratio.

Concluding Remarks

The study provides new insights into the information arbitrage process, based on a database of short sale recommendations.

- Information arbitrageurs attempt to exploit the return predictability in valuation and fundamental signals.
- Validates the importance of accounting-based information for valuation-motivated short sellers.
 - Advantage: Short recommendations represent a more precise signal of shorting demand by valuation shorts, as compared to reported short interest, which aggregates both valuation and arbitrage shorts.
- Short interest model can help distinguish valuation shorts from arbitrage shorts.
 - Helps refine the information content of short interest for future returns.

Earnings Quality and Information Asymmetry: Evidence from Trading Costs

- Bhattacharya, Desai and Venkataraman (2007, WP)

