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Mining the Short Side: Institutional Investors and Stock Market Anomalies

Descriptions of Stock Market Anomalies

In this paper, we consider the nine well-documented stock market anomalies as examined in Stambaugh et al. (2012), including total accruals, asset growth, gross profitability, investment-to-assets, momentum, net operating assets, net stock issuance, Ohlson's O-score, and return on assets. Appendix A provides definitions of these anomalies along with a list of major references. More detailed descriptions of the anomalies and related literature appear as follows:

1. Total accruals: changes in non-cash working capital minus depreciation scaled by average total assets from the previous two fiscal years. Sloan (1996) finds that firms with lower accruals earn higher abnormal returns, possibly because investors become overly optimistic about the persistence of accruals when forming earnings expectations.

2. Asset growth: the growth rate of a firm's total assets in the previous fiscal year. Cooper, Gulen, and Schill (2008) show that companies with lower asset growth rates earn higher subsequent returns, and attribute this anomaly to investors' initial overreaction to changes in future business prospects implied by asset expansions.

3. Gross profitability: a firm's gross profits divided by total assets. Novy-Marx (2013) documents that more profitable firms (as measured by gross profitability) generate significantly higher returns than less profitable peers, and argues that gross profitability is a clean accounting measure of a firm's true economic profitability.

4. Investment-to-assets: the change in gross property, plant, and equipment plus the change in inventories scaled by lagged total assets. Motivated by the q-theory of

investment and the real options theory, Lyandres, Sun, and Zhang (2007) show that low investment-to-assets firms outperform high investment-to-assets firms.

5. Momentum: the continuously compounded return from month t-13 to month t-2. As one of the most robust anomalies in asset pricing that is first documented by Jegadeesh and Titman (1993), the momentum effect refers to the phenomenon that higher past returns (e.g., over the previous 12 months) predict higher future stocks returns. Note that we skip month t-1 to control for potential short-term reversal (see, e.g., Jegadeesh (1990) and Lehmann (1990)).

6. Net operating assets: the difference between operating assets and operating liabilities divided by total assets in the previous fiscal year. Hirshleifer, Hou, Teoh, and Zhang (2004) show that net operating assets negatively predict future stock returns. They suggest that investors tend to pay more attention to companies' accounting profitability rather than cash profitability, and net operating assets capture such a bias.

7. Net stock issuance: the natural log of one plus the growth rate of split-adjusted shares outstanding in the previous fiscal year. Pontiff and Woodgate (2008) and Fama and French (2008) document a negative relation between net stock issues and average returns, which they attribute to the fact that firms opportunistically issue and repurchase shares in order to take advantage of mispricing. That is, firms issue (repurchase) shares when stocks are overpriced (underpriced).

8. Ohlson's O-score: the probability of bankruptcy in a static model using a set of accounting variables, such as net income divided by assets, working capital divided by

market assets, and current liability divided by current assets. Ohlson (1980) shows that firms with higher O-scores (a measure for financial distress) are associated with lower future stock returns.

9. Return on assets: the income before extraordinary items divided by one-quarter-lagged total assets. Fama and French (2006) and Chen, Novy-Marx, and Zhang (2011) find that firms with higher return on assets earn significantly higher abnormal returns. Wang and Yu (2013) show that such an effect exists primarily among firms with high arbitrage costs and high information uncertainty, supporting a mispricing explanation.

Table IA1. Properties of Stock Market Anomalies

This table reports properties of the nine stock market anomalies as defined in Appendix A, including total accruals, asset growth, gross profitability, investment-to-assets, momentum, net operating assets, net stock issuance, Ohlson's O-score, and return on assets. The sample period is from 1984 to 2019. On each anomaly updating date, we sort all U.S. domestic stocks (i.e., all NYSE, Amex, and NASDAQ common stocks with CRSP share codes of 10 and 11 from the CRSP/Compustat merged dataset, with the exception of financial and utility stocks and stocks with prices under $5) into decile portfolios based on each of the nine anomaly variables, with decile 10 (i.e., long-leg) being the stocks expected to outperform and decile 1 (i.e., short-leg) being those expected to underperform. "L-S" corresponds to the long-short portfolio that takes long and short positions in the long- and short-leg portfolios, respectively. Panel A reports the annualized Fama and French (1993) three-factor alphas (expressed in percentages) of the long-leg, short-leg, and long-short value-weighted anomaly portfolios for each anomaly. The figures in the last column ("Average") are based on the portfolio formed by taking equal positions across the nine anomalies. The Newey and West (1987) t-statistics are shown in square brackets. Panel B presents the correlation matrix of the long-short benchmark-adjusted returns among the nine anomalies. Following Stambaugh, Yu, and Yuan (2012), we define the benchmark-adjusted returns as the sum of the intercept and the residuals from regressions of a long-short portfolio's monthly excess returns on the Fama and French (1993) three factors. P-values are shown in parentheses.

	Total Accruals	Asset Growth	Gross Profitability	Investment-to-assets	Momentum	Net Operating Assets	Net Stock Issuance	Ohlson's O-Score	Return on Assets	Average
Panel A: Abnormal Returns										
Long-leg	3.70	1.83	5.01	2.07	3.69	4.40	2.79	3.56	6.99	3.78
	[2.02]	[1.25]	[3.54]	[2.14]	[1.49]	[2.62]	[2.42]	[3.62]	[5.79]	[5.26]
Short-leg	-3.01	-2.98	-2.95	-2.64	-4.99	-5.19	-2.68	-5.31	-10.27	-4.45
	[-2.04]	[-1.81]	[-1.20]	[-1.38]	[-2.20]	[-2.75]	[-1.99]	[-2.99]	[-3.90]	[-4.65]
L-S	6.71	4.81	7.96	4.71	8.68	9.59	5.47	8.87	17.25	8.23
	[2.72]	[2.22]	[2.65]	[2.26]	[2.17]	[3.30]	[3.01]	[4.23]	[5.85]	[6.32]
Panel B: Correlations										
Asset Growth	0.28									
	(0.000)									
Gross Profitability	-0.09	0.20								
	(0.059)	(0.000)								
Investment-to-assets	0.12	0.30	0.06							
	(0.012)	(0.000)	(0.221)							
Momentum	0.12	0.10	0.08	0.08						
	(0.015)	(0.030)	(0.088)	(0.083)						
Net Operating Assets	0.39	0.32	0.05	0.35	0.24					
	(0.000)	(0.000)	(0.348)	(0.000)	(0.000)					
Net Stock Issuance	0.07	0.20	0.19	0.30	0.02	0.27				
	(0.177)	(0.000)	(0.000)	(0.000)	(0.688)	(0.000)				
Ohlson's O-Score	0.06	0.07	0.19	0.01	0.02	0.11	0.17			
	(0.188)	(0.135)	(0.000)	(0.763)	(0.712)	(0.024)	(0.000)			
Return on Assets	-0.15	0.11	0.42	0.01	0.21	0.05	0.13	0.40		
	(0.002)	(0.026)	(0.000)	(0.822)	(0.000)	(0.281)	(0.008)	(0.000)		

Table IA2. Abnormal Returns of Stock Market Anomalies by Credit Rating

This table reports the abnormal returns of the nine stock market anomalies as defined in Appendix A, including total accruals, asset growth, gross profitability, investment-to-assets, momentum, net operating assets, net stock issuance, Ohlson's O-score, and return on assets, among the stocks sorted by credit rating. The sample period is from 1984 to 2019. We first sort the stocks that are shorted by AMFs and rated by Standard and Poor's (S&P) at the end of each quarter into three credit rating tercile groups, with Terciles 1, 2, and 3 being the best-, medium-, and worst-rated, respectively. Within each tercile, we further sort stocks into decile portfolios based on each of the nine anomaly variables on the anomaly updating date, with decile 10 (i.e., long-leg) being the stocks expected to outperform and decile 1 (i.e., short-leg) being those expected to underperform. "L-S" corresponds to the long-short portfolio that takes long and short positions in the long- and short-leg portfolios, respectively. We then report the annualized Fama and French (1993) three-factor alphas (expressed in percentages) of the long-leg, short-leg, and long-short value-weighted anomaly portfolios for each anomaly. The figures in the last column ("Average") are based on the portfolio formed by taking equal positions across the nine anomalies. The Newey and West (1987) t-statistics are shown in square brackets.

	Total Accruals	Asset Growth	Gross Profitability	Investment-to-assets	Momentum	Net Operating Assets	Net Stock Issuance	Ohlson's O-Score	Return on Assets	Average
Tercile 3 (Worst rating)										
Long-leg	-5.02	-1.05	-3.23	-6.04	-1.19	0.65	6.18	-8.70	7.16	-1.77
	[-1.93]	[-0.44]	[-0.49]	[-1.97]	[-0.32]	[0.16]	[2.78]	[-1.47]	[1.59]	[-0.78]
Short-leg	-5.06	-5.40	-4.54	-2.03	-3.65	-6.83	-6.77	-5.74	-17.27	-6.93
	[-1.39]	[-1.66]	[-1.59]	[-0.73]	[-0.89]	[-2.55]	[-2.06]	[-3.26]	[-6.37]	[-2.93]
L-S	0.03	4.35	1.31	-4.01	2.47	7.48	12.96	-2.96	24.44	5.06
	[0.01]	[0.97]	[0.22]	[-0.90]	[0.39]	[1.45]	[2.98]	[-0.49]	[4.94]	[3.09]
Tercile 2 (Medium rating)										
Long-leg	0.43	-0.04	-2.22	-0.14	-3.74	4.22	1.02	-5.01	-1.47	-0.80
	[0.18]	[-0.02]	[-1.05]	[-0.08]	[-1.11]	[1.27]	[0.91]	[-2.05]	[-0.55]	[-0.57]
Short-leg	0.27	-2.78	-5.13	-2.89	-1.92	-1.73	0.13	-4.39	-10.80	-3.92
	[0.11]	[-0.99]	[-2.25]	[-0.86]	[-0.57]	[-0.68]	[0.04]	[-1.43]	[-2.49]	[-1.90]
L-S	0.16	2.74	2.91	2.75	-1.83	5.96	0.89	-0.62	9.33	2.89
	[0.06]	[0.77]	[1.11]	[0.64]	[-0.31]	[1.46]	[0.24]	[-0.18]	[2.47]	[1.79]
Tercile 1 (Best rating)										
Long-leg	2.54	1.08	2.61	-1.08	1.17	0.83	1.27	1.69	2.42	1.48
	[0.95]	[0.44]	[1.44]	[-0.55]	[0.37]	[0.29]	[1.11]	[1.60]	[2.48]	[1.77]
Short-leg	2.50	3.34	-1.09	-0.75	0.74	-1.51	2.82	2.28	-2.64	0.38
	[1.27]	[1.32]	[-0.64]	[-0.45]	[0.26]	[-0.76]	[1.03]	[1.06]	[-0.75]	[0.35]
L-S	0.04	-2.26	3.69	-0.33	0.44	2.34	-1.55	-0.59	5.06	0.97
	[0.01]	[-0.64]	[1.41]	[-0.12]	[0.10]	[0.80]	[-0.54]	[-0.27]	[1.32]	[0.94]

Table IA3. Short-side Anomaly Trading Activity and Performance of Alternative Mutual Funds Based on An Alternative Trading Measure

This table reports the short-side anomaly trading activity and performance of alternative mutual funds (AMFs) based on an alternative trading measure, namely Δ%SHR – the change in the fraction of shares held short collectively by AMFs over a trading window of three quarters prior to the anomaly updating date. The sample period is from 2002 to 2019. On each anomaly updating date, we sort the stocks held short by AMFs into three groups based on each of the nine anomaly variables as defined in Appendix A: *Underpriced* (*Overpriced*) refers to the top (bottom) 30% stocks ranked based on each anomaly variable, and *Neutral* corresponds to the middle 40%. In Panel A, we then report AMFs' short-side trading activity (as measured by Δ%SHR) averaged across the nine anomalies in each of the three groups. "U-N" ("O-N") denotes the difference in Δ%SHR between the Underpriced (Overpriced) and Neutral groups, and "U-O" denotes the difference in Δ%SHR between the Underpriced and Overpriced groups. In Panel B, we also independently sort the stocks held short by AMFs into five quintiles based on Δ%SHR, and term the top (bottom) quintile as the *Short* (*Cover*) group. We then form four value-weighted conditional anomaly portfolios from the intersections of the Underpriced and Overpriced groups with the Short and Cover groups, and report the annualized Fama and French (1993) three-factor alphas (expressed in percentages) of conditional portfolios averaged across the nine anomalies. "S-C" denotes the difference in alphas between the Short and Cover groups within the underpriced or overpriced stocks. The Newey and West (1987) t-statistics are shown in square brackets.

Panel A: Anomaly Trading Activity

	Δ%SHR	
Underpriced	0.004	
Neutral	0.007	
Overpriced	0.027	
U-N	-0.003	[-1.99]
O-N	0.020	[3.70]
U-O	-0.023	[-3.75]

Panel B: Anomaly Trading Performance

	Short	Cover	S-C
Underpriced	-0.16	1.72	-1.88
	[-0.13]	[1.80]	[-1.38]
Overpriced	-1.85	-0.56	-1.29
	[-1.75]	[-0.36]	[-1.34]

Table IA4. Short-side Anomaly Trading Activity and Performance of Alternative Mutual Funds Based on Alternative Trading Windows

This table reports the short-side anomaly trading activity and performance of alternative mutual funds (AMFs) based on alternative trading windows. The sample period is from 2002 to 2019. The alternative trading windows include one, two, four, five, and six quarters prior to the anomaly updating date, labeled as [q-1, q], [q-2, q], [q-4,q], [q-5, q], and [q-6, q], respectively. On each anomaly updating date, we sort the stocks held short by AMFs into three groups based on each of the nine anomaly variables as defined in Appendix A: *Underpriced* (*Overpriced*) refers to the top (bottom) 30% stocks ranked based on each anomaly variable, and *Neutral* corresponds to the middle 40%. In Panel A, we then report AMFs' short-side trading activity averaged across the nine anomalies in each of the three groups. Short-side trading activity is measured by Δ%FUND – the annualized percent change in the fraction of AMFs with an outstanding short position in a given stock over a particular alternative trading window. "U-N" ("O-N") denotes the difference in Δ%FUND between the Underpriced (Overpriced) and Neutral groups, and "U-O" denotes the difference in Δ%FUND between the Underpriced and Overpriced groups. In Panel B, we also independently sort the stocks held short by AMFs into five quintiles based on Δ%FUND, and term the top (bottom) quintile as the *Short* (*Cover*) group. We then form four value-weighted conditional anomaly portfolios from the intersections of the Underpriced and Overpriced groups with the Short and Cover groups, and report the annualized Fama and French (1993) three-factor alphas (expressed in percentages) of conditional portfolios averaged across the nine anomalies. "S-C" denotes the difference in alphas between the Short and Cover groups within the underpriced or overpriced stocks. The Newey and West (1987) t-statistics are shown in square brackets.

	[q-6, q]			[q-5, q]			[q-4, q]			[q-2, q]			[q-1, q]		
Panel A: Anomaly Trading Activity															
Underpriced	3.53			5.59			3.51			7.68			17.74		
Neutral	4.50			6.80			5.11			9.87			21.66		
Overpriced	9.48			11.40			9.65			16.38			30.77		
U-N	-0.96	[-2.84]		-1.21	[-3.37]		-1.60	[-3.63]		-2.18	[-2.28]		-3.91	[-3.15]	
O-N	4.98	[13.07]		4.60	[8.01]		4.54	[9.46]		6.51	[5.33]		9.11	[3.84]	
U-O	-5.94	[-11.63]		-5.81	[-9.60]		-6.14	[-9.15]		-8.70	[-4.33]		-13.02	[-3.68]	
Panel B: Anomaly Trading Performance															
	Short	Cover	S-C	Short	Cover	S-C	Short	Cover	S-C	Short	Cover	S-C	Short	Cover	S-C
Underpriced	0.01	0.30	-0.29	-1.64	0.44	-2.08	-0.72	0.01	-0.73	1.87	0.40	1.47	0.01	0.78	-0.77
	[0.00]	[0.30]	[-0.16]	[-0.94]	[0.47]	[-1.08]	[-0.38]	[0.01]	[-0.38]	[1.49]	[0.52]	[0.90]	[0.01]	[0.91]	[-0.47]
Overpriced	-2.27	-2.11	-0.17	-4.19	-0.05	-4.15	-3.56	-0.07	-3.50	-3.41	-1.22	-2.19	-2.50	-0.20	-2.30
	[-1.32]	[-1.98]	[-0.10]	[-2.76]	[-0.04]	[-2.43]	[-2.35]	[-0.06]	[-2.05]	[-1.90]	[-1.22]	[-1.18]	[-1.58]	[-0.21]	[-1.23]

Table IA5. Short-side Anomaly Trading Activity and Performance of Alternative Mutual Funds by Fund Category

This table reports the short-side anomaly trading activity and performance of alternative mutual funds (AMFs) for each of the five fund categories, including *Long-short Equity*, *Market Neutral*, *Multialternative*, *130–-30*, and *Bear Market*. The sample period is from 2002 to 2019. On each anomaly updating date, we sort the stocks held short by the funds in each category into three groups based on each of the nine anomaly variables as defined in Appendix A: *Underpriced* (*Overpriced*) refers to the top (bottom) 30% stocks ranked based on each anomaly variable, and *Neutral* corresponds to the middle 40%. In Panel A, we then report the funds' short-side trading activity averaged across the nine anomalies in each of the three groups. Short-side trading activity is measured by Δ%FUND – the annualized percent change in the fraction of AMFs with an outstanding short position in a given stock over a trading window of three quarters prior to the anomaly updating date. "U-N" ("O-N") denotes the difference in Δ%FUND between the Underpriced (Overpriced) and Neutral groups, and "U-O" denotes the difference in Δ%FUND between the Underpriced and Overpriced groups. In Panel B, we also independently sort the stocks held short by the funds in each category into five quintiles based on Δ%FUND, and term the top (bottom) quintile as the *Short* (*Cover*) group. We then form four value-weighted conditional anomaly portfolios from the intersections of the Underpriced and Overpriced groups with the Short and Cover groups, and report the annualized Fama and French (1993) three-factor alphas (expressed in percentages) of conditional portfolios averaged across the nine anomalies. "S-C" denotes the difference in alphas between the Short and Cover groups within the underpriced or overpriced stocks. The Newey and West (1987) t-statistics are shown in square brackets.

	Long-short Equity			Market Neutral			Multialternative			130–30			Bear Market		
Panel A: Anomaly Trading Activity															
Underpriced	2.12			0.93			0.55			0.63			0.32		
Neutral	2.25			1.29			0.94			1.82			-0.10		
Overpriced	4.81			3.39			1.23			2.36			0.98		
U-N	-0.13	[-0.43]		-0.36	[-1.15]		-0.39	[-3.11]		-1.18	[-1.28]		0.43	[1.39]	
O-N	2.56	[3.35]		2.10	[8.61]		0.29	[2.22]		0.54	[1.88]		0.99	[1.47]	
U-O	-2.69	[-4.19]		-2.46	[-6.86]		-0.67	[-3.18]		-1.73	[-1.66]		-0.66	[-1.41]	
Panel B: Anomaly Trading Performance															
	Short	Cover	S-C	Short	Cover	S-C	Short	Cover	S-C	Short	Cover	S-C	Short	Cover	S-C
Underpriced	1.41	2.86	-1.45	3.64	0.06	3.58	-1.06	6.21	-7.28	-3.93	0.43	-4.36	2.23	3.37	-1.13
	[0.54]	[1.34]	[-0.37]	[1.68]	[0.05]	[1.30]	[-0.38]	[2.29]	[-2.35]	[-1.50]	[0.14]	[-1.41]	[0.92]	[2.40]	[-0.49]
Overpriced	-4.29	1.86	-6.14	-5.76	-2.78	-2.98	-3.69	3.80	-7.49	-0.06	1.17	-1.23	-2.91	0.09	-3.00
	[-1.87]	[0.71]	[-1.81]	[-2.95]	[-1.93]	[-1.38]	[-1.94]	[1.46]	[-2.85]	[-0.01]	[0.23]	[-0.26]	[-1.61]	[0.03]	[-0.89]

Table IA6. Short-side Anomaly Trading Activity and Performance of Alternative Mutual Funds with At Least Five or Ten Short Equity Positions

This table reports the short-side anomaly trading activity and performance of alternative mutual funds (AMFs) with at least five or ten short positions in U.S. domestic equities. The sample period is from 2002 to 2019. On each anomaly updating date, we sort the stocks held short by the sample funds into three groups based on each of the nine anomaly variables as defined in Appendix A: *Underpriced* (*Overpriced*) refers to the top (bottom) 30% stocks ranked based on each anomaly variable, and *Neutral* corresponds to the middle 40%. In Panel A, we then report the funds' short-side trading activity averaged across the nine anomalies in each of the three groups. Short-side trading activity is measured by Δ%FUND – the annualized percent change in the fraction of AMFs with an outstanding short position in a given stock over a trading window of three quarters prior to the anomaly updating date. "U-N" ("O-N") denotes the difference in Δ%FUND between the Underpriced (Overpriced) and Neutral groups, and "U-O" denotes the difference in Δ%FUND between the Underpriced and Overpriced groups. In Panel B, we also independently sort the stocks held short by the sample funds into five quintiles based on Δ%FUND, and term the top (bottom) quintile as the *Short* (*Cover*) group. We then form four value-weighted conditional anomaly portfolios from the intersections of the Underpriced and Overpriced groups with the Short and Cover groups, and report the annualized Fama and French (1993) three-factor alphas (expressed in percentages) of conditional portfolios averaged across the nine anomalies. "S-C" denotes the difference in alphas between the Short and Cover groups within the underpriced or overpriced stocks. The Newey and West (1987) t-statistics are shown in square brackets.

	>= 5 Shorts			>= 10 Shorts		
Panel A: Anomaly Trading Activity						
Underpriced	5.03			5.08		
Neutral	7.07			7.13		
Overpriced	12.73			12.85		
U-N	-2.04	[-2.75]		-2.06	[-2.76]	
O-N	5.66	[6.71]		5.71	[6.79]	
U-O	-7.70	[-5.37]		-7.77	[-5.42]	
Panel B: Anomaly Trading Performance						
	Short	Cover	S-C	Short	Cover	S-C
Underpriced	-1.49	0.96	-2.44	-1.31	1.20	-2.51
	[-0.88]	[0.82]	[-1.15]	[-0.77]	[0.81]	[-1.06]
Overpriced	-4.98	-0.58	-4.39	-4.97	0.10	-5.07
	[-3.22]	[-0.58]	[-2.81]	[-3.12]	[0.07]	[-2.92]