APPENDIX

Acronym	Paper's author(s)	Date, Journal	Definition of the characteristic-based anomaly variable
absacc	Bandyopadhyay, Huang & Wirjanto	2010, WP	Absolute value of *acc*.
acc	Sloan	1996, TAR	Annual income before extraordinary items (*ib*) minus operating cash flows (*oancf*) divided by average total assets (*at*); if *oancf* is missing then set to change in *act* - change in *che* - change in *lct* + change in *dlc* + change in *txp-dp*.
aeavol	Lerman, Livnat & Mendenhall	2007, WP	Average daily trading volume (*vol*) for 3 days around earnings announcement minus average daily volume for 1-month ending 2 weeks before earnings announcement divided by 1-month average daily volume. Earnings announcement day from Compustat quarterly (*rdq*).
age	Jiang, Lee & Zhang	2005, RAS	Number of years since first Compustat coverage.
agr	Cooper, Gulen & Schill	2008, JF	Annual percent change in total assets (*at*).
baspread	Amihud & Mendelson	1989, JF	Monthly average of daily bid-ask spread divided by average of daily spread.
beta	Fama & MacBeth	1973, JPE	Estimated market beta from weekly returns and equal weighted market returns for 3 years ending month *t*-1 with at least 52 weeks of returns.
betasq	Fama & MacBeth	1973, JPE	Market beta squared.
bm	Rosenberg, Reid & Lanstein	1985, JPM	Book value of equity (*ceq*) divided by end of fiscal-year-end market capitalization.
bm_ia	Asness, Porter & Stevens	2000, WP	Industry adjusted book-to-market ratio.
cash	Palazzo	2012, JFE	Cash and cash equivalents divided by average total assets.
cashdebt	Ou & Penman	1989, JAE	Earnings before depreciation and extraordinary items (*ib*+*dp*) divided by avg. total liabilities (*lt*).
cashpr	Chandrashekar & Rao	2009, WP	Fiscal year end market capitalization plus long term debt (*dltt*) minus total assets (*at*) divided by cash and equivalents (*che*).
cfp	Desai, Rajgopal & Venkatachalam	2004, TAR	Operating cash flows divided by fiscal-year-end market capitalization.
cfp_ia	Asness, Porter & Stevens	2000, WP	Industry adjusted *cfp*.
chatoia	Soliman	2008, TAR	2-digit SIC - fiscal-year mean adjusted change in sales (*sale*) divided by average total assets (*at*).
chcsho	Pontiff & Woodgate	2008, JF	Annual percent change in shares outstanding (*csho*).
chempia	Asness, Porter & Stevens	1994, WP	Industry-adjusted change in number of employees.
chfeps	Hawkins, Chamberlin & Daniel	1984, FAJ	Mean analyst forecast in month prior to fiscal period end date from I/B/E/S summary file minus same mean forecast for prior fiscal period using annual earnings forecasts.
chinv	Thomas & Zhang	2002, RAS	Change in inventory (*inv*) scaled by average total assets (*at*).
chmom	Gettleman & Marks	2006, WP	Cumulative returns from months *t*-6 to *t*-1 minus months *t*-12 to *t*-7.
chnanalyst	Scherbina	2007, WP	Change in *nanalyst* from month *t*-3 to month *t*.
chpmia	Soliman	2008, TAR	2-digit SIC - fiscal-year mean adjusted change in income before extraordinary items (*ib*) divided by sales (*sale*).
chtx	Thomas & Zhang	2011, JAR	Percent change in total taxes (*txtq*) from quarter *t*-4 to *t*.

cinvest	Titman, Wei & Xie	2004, JFQA	Change over one quarter in net PP&E (*ppentq*) divided by sales (*saleq*) - average of this variable for prior 3 quarters; if *saleq* = 0, then scale by 0.01.
convind	Valta	2016, JFQA	An indicator equal to 1 if company has convertible debt obligations.
currat	Ou & Penman	1989, JAE	Current assets / current liabilities.
depr	Holthausen & Larcker	1992, JAE	Depreciation divided by PP&E.
disp	Diether, Malloy & Scherbina	2002, JF	Standard deviation of analyst forecasts in month prior to fiscal period end date divided by the absolute value of the mean forecast; if *meanest* = 0, then scalar set to 1. Forecast data from I/B/E/S summary files.
divi	Michaely, Thaler & Womack	1995, JF	An indicator variable equal to 1 if company pays dividends but did not in prior year.
divo	Michaely, Thaler & Womack	1995, JF	An indicator variable equal to 1 if company does not pay dividend but did in prior year.
dolvol	Chordia, Subrahmanyam & Anshuman	2001, JFE	Natural log of trading volume times price per share from month *t*-2.
dy	Litzenberger & Ramaswamy	1982, JF	Total dividends (*dvt*) divided by market capitalization at fiscal year-end.
ear	Kishore, Brandt, Santa-Clara & Venkatachalam	2008, WP	Sum of daily returns in three days around earnings announcement. Earnings announcement from Compustat quarterly file (*rdq*).
egr	Richardson, Sloan, Soliman & Tuna	2005, JAE	Annual percent change in book value of equity (*ceq*).
ep	Basu	1977, JF	Annual income before extraordinary items (*ib*) divided by end of fiscal year market cap.
fgr5yr	Bauman & Dowen	1988, FAJ	Most recently available analyst forecasted 5-year growth.
gma	Novy-Marx	2013, JFE	Revenues (*revt*) minus cost of goods sold (*cogs*) divided by lagged total assets (at).
grCAPX	Anderson & Garcia-Feijoo	2006, JF	Percent change in capital expenditures from year *t*-2 to year *t*.
grltnoa	Fairfield, Whisenant & Yohn	2003, TAR	Growth in long term net operating assets.
herf	Hou & Robinson	2006, JF	2-digit SIC - fiscal-year sales concentration (sum of squared percent of sales in industry for each company).
hire	Bazdresch, Belo & Lin	2014, JPE	Percent change in number of employees (*emp*).
idiovol	Ali, Hwang & Trombley	2003, JFE	Standard deviation of residuals of weekly returns on weekly equal weighted market returns for 3 years prior to month end.
ill	Amihud	2002, JFM	Average of daily (absolute return / dollar volume).
indmom	Moskowitz & Grinblatt	1999, JF	Equal weighted average industry 12-month returns.
invest	Chen & Zhang	2010, JF	Annual change in gross property, plant, and equipment (*ppegt*) + annual change in inventories (*invt*) all scaled by lagged total assets (*at*).
IPO	Loughran, Ritter & Ritter	1995, JF	An indicator variable equal to 1 if first year available on CRSP monthly stock file.
lev	Bhandari	1988, JF	Total liabilities (lt) divided by fiscal year end market capitalization.
lgr	Richardson, Sloan, Soliman & Tuna	2005, JAE	Annual percent change in total liabilities (*lt*).
maxret	Bali, Cakici & Whitelaw	2011, JFE	Maximum daily return from returns during calendar month *t*-1.
mom12m	Jegadeesh	1990, JF	11-month cumulative returns ending one month before month end.
mom1m	Jegadeesh & Titman	1993, JF	1-month cumulative return.
mom36m	Jegadeesh & Titman	1993, JF	Cumulative returns from months *t*-36 to *t*-13.

mom6m	Jegadeesh & Titman	1993, JF	5-month cumulative returns ending one month before month end.
ms	Mohanram	2005, RAS	Sum of 8 indicator variables for fundamental performance.
mve	Banz	1981, JFE	Natural log of market capitalization at end of month *t*-1.
mve_ia	Asness, Porter & Stevens	2000, WP	2-digit SIC industry-adjusted fiscal year-end market capitalization.
nanalyst	Elgers, Lo & Pfeiffer	2001, TAR	Number of analyst forecasts from most recently available I/B/E/S summary files in month prior to month of portfolio formation. *nanalyst* set to zero if not covered in I/B/E/S summary file.
nincr	Barth, Elliott & Finn	1999, JAR	Number of consecutive quarters (up to eight quarters) with an increase in earnings (*ibq*) over same quarter in the prior year.
operprof	Fama & French	2015, JFE	Revenue minus cost of goods sold - SG&A expense - interest expense divided by lagged common shareholders' equity.
orgcap	Eisfeldt & Papanikolaou	2013, JF	Capitalized SG&A expenses.
pchcapx_ia	Abarbanell & Bushee	1998, TAR	2-digit SIC - fiscal-year mean adjusted percent change in capital expenditures (*capx*).
pchcurrat	Ou & Penman	1989, JAE	Percent change in *currat.*
pchdepr	Holthausen & Larcker	1992, JAE	Percent change in *depr.*
pchgm_pchsale	Abarbanell & Bushee	1998, TAR	Percent change in gross margin (*sale-cogs*) minus percent change in sales (*sale*).
pchquick	Ou & Penman	1989, JAE	Percent change in *quick.*
pchsale_pchinvt	Abarbanell & Bushee	1998, TAR	Annual percent change in sales (*sale*) minus annual percent change in inventory (*invt*).
pchsale_pchrect	Abarbanell & Bushee	1998, TAR	Annual percent change in sales (*sale*) minus annual percent change in receivables (*rect*).
pchsale_pchxsga	Abarbanell & Bushee	1998, TAR	Annual percent change in sales (*sale*) minus annual percent change in SG&A (*xsga*).
pchsaleinv	Ou & Penman	1989, JAE	Percent change in *saleinv.*
pctacc	Hafzalla, Lundholm & Van Winkle	2011, TAR	Same as *acc* except that the numerator is divided by the absolute value of *ib*; if *ib* = 0 then *ib* set to 0.01 for denominator.
pricedelay	Hou & Moskowitz	2005, RFS	The proportion of variation in weekly returns for 36 months ending in month *t* explained by 4 lags of weekly market returns incremental to contemporaneous market return.
ps	Piotroski	2000, JAR	Sum of 9 indicator variables to form fundamental health score.
quick	Ou & Penman	1989, JAE	(current assets - inventory) / current liabilities.
rd	Eberhart, Maxwell & Siddique	2004, JF	An indicator variable equal to 1 if R&D expense as a percentage of total assets has an increase greater than 5%.
rd_mve	Guo, Lev & Shi	2006, JBFA	R&D expense divided by end-of-fiscal-year market capitalization.
rd_sale	Guo, Lev & Shi	2006, JBFA	R&D expense divided by sales (*xrd*/*sale*).
realestate	Tuzel	2010, RFS	Buildings and capitalized leases divided by gross PP&E.
retvol	Ang, Hodrick, Xing & Zhang	2006, JF	Standard deviation of daily returns from month *t*-1.
roaq	Balakrishnan, Bartov & Faurel	2010, JAE	Income before extraordinary items (*ibq*) divided by one quarter lagged total assets (*atq*).

roavol	Francis, LaFond, Olsson & Schipper	2004, TAR	Standard deviaiton for 16 quarters of income before extraordinary items (*ibq*) divided by average total assets (*atq*).
roeq	Hou, Xue & Zhang	2014, RFS	Earnings before extraordinary items divided by lagged common shareholders' equity.
roic	Brown & Rowe	2007, WP	Annual earnings before interest and taxes (*ebit*) minus non-operating income (*nopi*) divided by non-cash enterprise value (*ceq+lt-che*).
rsup	Kama	2009, JBFA	Sales from quarter t minus sales from quarter *t*-4 (*saleq*) divided by fiscal-quarter-end market capitalization (*cshoq* * *prccq*).
salecash	Ou & Penman	1989, JAE	Annual sales divided by cash and cash equivalents.
saleinv	Ou & Penman	1989, JAE	Annual sales divided by total inventory.
salerec	Ou & Penman	1989, JAE	Annual sales divided by accounts receivable.
secured	Valta	2016, JFQA	Total liability scaled secured debt.
securedind	Valta	2016, JFQA	An indicator equal to 1 if company has secured debt obligations.
sfe	Elgers, Lo & Pfeiffer	2001, TAR	Analysts mean annual earnings forecast for nearest upcoming fiscal year from most recent month available prior to month of portfolio formation from I/B/E/S summary files scaled by price per share at fiscal quarter end.
sgr	Lakonishok, Shleifer & Vishny	1994, JF	Annual percent change in sales (*sale*).
sin	Hong & Kacperczyk	2009, JFE	An indicator variable equal to 1 if a company's primary industry classification is in smoke or tobacco, beer or alcohol, or gaming.
SP	Barbee, Mukherji, & Raines	1996, FAJ	Annual revenue (*sale*) divided by fiscal-year-end market capitalization.
std_dolvol	Chordia, Subrahmanyam & Anshuman	2001, JFE	Monthly standard deviation of daily dollar trading volume.
std_turn	Chordia, Subrahmanyam, &Anshuman	2001, JFE	Monthly standard deviation of daily share turnover.
stdacc	Bandyopadhyay, Huang & Wirjanto	2010, WP	Standard deviation for 16 quarters of accruals (*acc* measured with quarterly Compustat) scaled by sales; if *saleq* = 0, then scale by 0.01.
stdcf	Huang	2009, JEF	Standard deviation for 16 quarters of cash flows divided by sales (*saleq*); if *saleq* = 0, then scale by 0.01. Cash flows defined as *ibq* minus quarterly accruals.
sue	Rendelman, Jones & Latane	1982, JFE	Unexpected quarterly earnings divided by fiscal-quarter-end market cap. Unexpected earnings is I/B/E/S actual earnings minus median forecasted earnings if available, else it is the seasonally differenced quarterly earnings before extraordinary items from Compustat quarterly file.
tang	Almeida & Campello	2007, RFS	Cash holdings + 0.715 × receivables + 0.547 × inventory + 0.535 × PPE/ total assets.
tb	Lev & Nissim	2004, TAR	Tax income, calculated from current tax expense divided by maximum federal tax rate, divided by income before extraordinary items.
turn	Datar, Naik & Radcliffe	1998, JFM	Average monthly trading volume for most recent 3 months scaled by number of shares outstanding in current month.
zerotrade	Liu	2006, JFE	Turnover weighted number of zero trading days for most recent 1 month.

TABLE 1

Listing of firm characteristics used in the study. The source for and exact definition of each characteristic is in the Appendix.

Acronym	Firm characteristic	Acronym	Firm characteristic
absacc	Absolute accruals	*divo*	Dividend omission
acc	Working capital accruals	*dolvol*	Dollar trading volume
aeavol	Abnormal earnings announcement volume	*dy*	Dividend to price
age	# years since first Compustat coverage	*ear*	Earnings announcement return
agr	Asset growth	*egr*	Growth in common shareholder equity
baspread	Bid-ask spread	*ep*	Earnings to price
beta	Beta	*fgr5yr*	Forecasted growth in 5-year EPS
betasq	Beta squared	*gma*	Gross profitability
bm	Book-to-market	*grCAPX*	Growth in capital expenditures
bm_ia	Industry-adjusted book to market	*grltnoa*	Growth in long term net operating assets
cash	Cash holdings	*herf*	Industry sales concentration
cashdebt	Cash flow to debt	*hire*	Employee growth rate
cashpr	Cash productivity	*idiovol*	Idiosyncratic return volatility
cfp	Cash flow to price ratio	*ill*	Illiquidity
cfp_ia	Industry-adjusted cash flow to price ratio	*indmom*	Industry momentum
chatoia	Industry-adjusted change in asset turnover	*invest*	Capital expenditures and inventory
chcsho	Change in shares outstanding	*IPO*	New equity issue
chempia	Industry-adjusted change in employees	*lev*	Leverage
chfeps	Change in forecasted EPS	*lgr*	Growth in long-term debt
chinv	Change in inventory	*maxret*	Maximum daily return
chmom	Change in 6-month momentum	*mom12m*	12-month momentum
chnanalyst	Change in number of analysts	*mom1m*	1-month momentum
chpmia	Industry-adjusted change in profit margin	*mom36m*	36-month momentum
chtx	Change in tax expense	*mom6m*	6-month momentum
cinvest	Corporate investment	*ms*	Financial statement score
convind	Convertible debt indicator	*mve*	Size
currat	Current ratio	*mve_ia*	Industry-adjusted size
depr	Depreciation / PP&E	*nanalyst*	Number of analysts covering stock
disp	Dispersion in forecasted EPS	*nincr*	Number of earnings increases
divi	Dividend initiation	*operprof*	Operating profitability

TABLE 1 (continued)

Acronym	Firm characteristic	Acronym	Firm characteristic
orgcap	Organizational capital	*roeq*	Return on equity
pchcapx_ia	Industry adjusted % change in capital expenditures	*roic*	Return on invested capital
pchcurrat	% change in current ratio	*rsup*	Revenue surprise
pchdepr	% change in depreciation	*salecash*	Sales to cash
pchgm_pchsale	% change in gross margin - % change in sales	*saleinv*	Sales to inventory
pchquick	% change in quick ratio	*salerec*	Sales to receivables
pchsale_pchinvt	% change in sales - % change in inventory	*secured*	Secured debt
pchsale_pchrect	% change in sales - % change in A/R	*securedind*	Secured debt indicator
pchsale_pchxsga	% change in sales - % change in SG&A	*sfe*	Scaled earnings forecast
pchsaleinv	% change sales-to-inventory	*sgr*	Sales growth
pctacc	Percent accruals	*sin*	Sin stocks
pricedelay	Price delay	*SP*	Sales to price
ps	Financial statements score	*std_dolvol*	Volatility of liquidity (dollar trading volume)
quick	Quick ratio	*std_turn*	Volatility of liquidity (share turnover)
rd	R&D increase	*stdacc*	Accrual volatility
rd_mve	R&D to market capitalization	*stdcf*	Cash flow volatility
rd_sale	R&D to sales	*sue*	Unexpected quarterly earnings
realestate	Real estate holdings	*tang*	Debt capacity/firm tangibility
retvol	Return volatility	*tb*	Tax income to book income
roaq	Return on assets	*turn*	Share turnover
roavol	Earnings volatility	*zerotrade*	Zero trading days