

Understanding Anomalies: Is Much of What We Call Alpha Actually Beta?

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Introduction

Alpha vs. beta

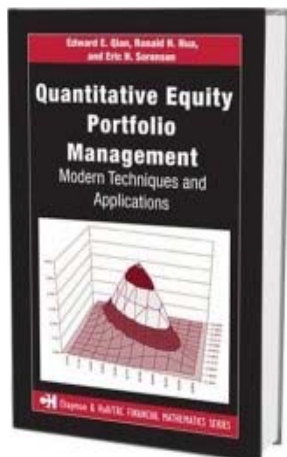
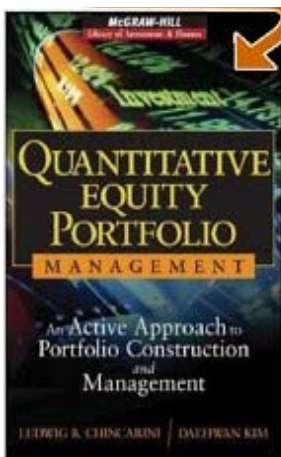
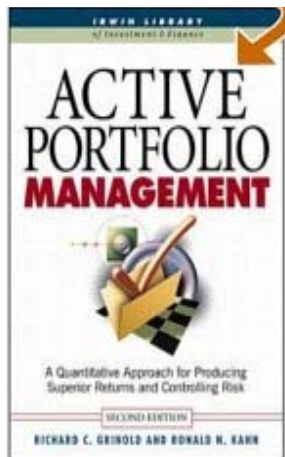
Value, momentum, distress, earnings, accruals, new issues. . .

Realized returns = Expected returns + Abnormal returns

- Existing expected-return models: CAPM, Fama-French, Carhart
- The average abnormal return: *Alpha*

Introduction

Alpha: The goal of Quantitative Strategies and Active Portfolio Management



Introduction

Can we develop better expected-return models?

Alphas might reflect beta if our models are incomplete à la Fama (1998)

Summarize a body of work on investment-based asset pricing:

- Neoclassical factors
- The new issues puzzle: Testing the investment-based explanation
- The accrual anomaly: Exploring the optimal investment hypothesis

I thank Long Chen, Evgeny Lyandres, Le Sun, Ginger Wu, and Frank Zhang for their outstanding collaboration

Introduction

The bottom line

The Neoclassical Three-Factor Model:

$$E[R_j] - R_f = b_j E[MKT] + i_j E[INV] + p_j E[PROD]$$

is a good start to describing the cross section of average stock returns

Introduction

Theoretical motivation

The neoclassical q -theory of investment implies that:

$$\text{Expected return} = \frac{\text{Expected profitability} + 1}{\text{Marginal cost of investment}}$$

Note: See the handout for detailed derivations

We adopt the Fama-French (1993) portfolio approach:

$$R_{jt} - R_f = \alpha_j^{NEO} + b_j MKT_t + i_j INV_t + p_j PROD_t + \epsilon_{jt}$$

Outline

- 1 Results
- 2 Explanations
- 3 Fundamentals

Results

Properties of neoclassical factors, 1/1972–12/2006, 420 months

INV: Low-minus-high investment, a 2×3 sort on size and $I/A =$ (annual changes in PPE and inventories)/lagged assets, annual rebalancing

PROD: High-minus-low productivity, a 2×3 sort on size and $ROA =$ quarterly earnings/one-quarter-lagged assets, monthly rebalancing

	Mean	α^{CAPM}	α^{FF}	α^{CARH}
<i>INV</i>	0.43 (4.75)	0.51 (6.12)	0.33 (4.23)	0.22 (2.87)
<i>PROD</i>	0.96 (5.10)	1.05 (5.61)	1.01 (5.60)	0.74 (4.16)

Results

The 25 size and momentum portfolios, 1/1972–12/2006

	L	2	3	4	W	W-L	L	2	3	4	W	W-L
	Average excess returns						α^{CAPM}					
S	-0.04	0.60	0.80	0.95	1.21	1.25	-0.59	0.15	0.40	0.53	0.73	1.33
2	-0.11	0.47	0.71	0.81	1.06	1.17	-0.69	0.01	0.29	0.38	0.55	1.23
3	0.03	0.39	0.58	0.71	0.98	0.95	-0.51	-0.05	0.18	0.30	0.48	1.00
4	0.05	0.36	0.47	0.63	0.90	0.85	-0.49	-0.07	0.07	0.24	0.43	0.92
B	-0.22	0.21	0.29	0.41	0.68	0.90	-0.69	-0.17	-0.07	0.05	0.25	0.94
	α^{FF}						α^{NEO}					
S	-0.93	-0.30	-0.05	0.15	0.51	1.44	0.38	0.45	0.49	0.60	0.92	0.54
2	-0.87	-0.34	-0.08	0.06	0.47	1.34	0.22	0.25	0.30	0.35	0.75	0.53
3	-0.62	-0.35	-0.17	0.03	0.47	1.09	0.35	0.18	0.12	0.20	0.63	0.28
4	-0.47	-0.31	-0.22	0.02	0.46	0.92	0.40	0.10	0.00	0.07	0.48	0.08
B	-0.60	-0.13	-0.05	0.07	0.46	1.06	-0.10	-0.01	-0.10	-0.11	0.31	0.41

Results

The 25 size and book-to-market portfolios, 1/1972–12/2006

	<i>L</i>	2	3	4	<i>H</i>	<i>H-L</i>	<i>L</i>	2	3	4	<i>H</i>	<i>H-L</i>
	Average excess returns						α^{CAPM}					
<i>S</i>	0.10	0.81	0.88	1.07	1.19	<i>1.09</i>	<i>-0.63</i>	0.21	<i>0.37</i>	<i>0.60</i>	<i>0.70</i>	<i>1.32</i>
2	0.34	0.66	0.90	1.00	1.04	<i>0.69</i>	-0.38	0.09	<i>0.40</i>	<i>0.53</i>	<i>0.53</i>	<i>0.91</i>
3	0.41	0.72	0.74	0.84	1.07	<i>0.66</i>	-0.27	0.17	<i>0.27</i>	<i>0.40</i>	<i>0.59</i>	<i>0.86</i>
4	0.51	0.58	0.79	0.84	0.92	0.42	-0.13	0.04	<i>0.30</i>	<i>0.39</i>	<i>0.45</i>	<i>0.58</i>
<i>B</i>	0.40	0.61	0.59	0.65	0.65	0.25	-0.11	0.13	0.16	<i>0.26</i>	0.25	0.36
	α^{FF}						α^{NEO}					
<i>S</i>	<i>-0.52</i>	0.08	0.09	<i>0.23</i>	<i>0.16</i>	<i>0.68</i>	0.08	<i>0.64</i>	<i>0.46</i>	<i>0.59</i>	<i>0.64</i>	<i>0.57</i>
2	<i>-0.21</i>	-0.12	0.05	0.09	-0.07	0.15	0.14	0.19	<i>0.32</i>	<i>0.40</i>	<i>0.38</i>	0.24
3	-0.03	-0.05	-0.12	-0.09	-0.02	0.01	0.19	0.14	0.07	0.15	0.31	0.13
4	0.11	-0.17	-0.07	-0.05	-0.11	-0.22	0.19	-0.12	0.05	0.15	0.08	-0.11
<i>B</i>	<i>0.17</i>	0.04	-0.02	-0.13	<i>-0.26</i>	<i>-0.43</i>	-0.11	-0.13	-0.04	-0.03	0.03	0.14

Results

The Campbell-Hilscher-Szilagyi (2007) F -probability portfolios, 1/1972–12/2006

	L	2	3	4	5	6	7	8	9	H	$H-L$	GRS
Mean	1.03	0.82	0.72	0.63	0.72	0.45	0.58	0.28	0.16	-0.35	-1.38	
α^{CAPM}	0.39	0.21	0.10	-0.01	0.01	-0.33	-0.30	-0.61	-0.86	-1.48	-1.87	3.01
β	0.95	0.90	0.93	0.95	1.06	1.17	1.30	1.32	1.51	1.69	0.73	
α^{FF}	0.39	0.36	0.19	0.10	-0.01	-0.49	-0.27	-0.71	-1.06	-1.75	-2.14	4.75
b^{FF}	0.91	0.87	0.93	0.94	1.06	1.21	1.24	1.24	1.38	1.48	0.57	
s	0.17	-0.14	-0.18	-0.16	0.01	0.12	0.20	0.48	0.85	1.27	1.10	
h	-0.04	-0.19	-0.10	-0.13	0.03	0.20	-0.09	0.02	0.09	0.09	0.13	
α^{NEO}	0.19	-0.01	-0.11	-0.01	0.13	-0.07	0.33	0.34	0.24	-0.13	-0.32	1.78
b^{NEO}	0.99	0.95	0.97	0.95	1.03	1.10	1.16	1.11	1.27	1.42	0.43	
i	0.00	0.07	0.03	-0.08	-0.01	-0.19	-0.27	-0.34	-0.34	0.02	0.03	
p	0.18	0.17	0.17	0.04	-0.10	-0.14	-0.43	-0.69	-0.82	-1.22	-1.40	

Note: Results with Ohlson's O -score are largely similar

Results

The net stock issues portfolios, 1/1972–12/2006

	<i>L</i>	2	3	4	5	6	7	8	9	<i>H</i>	<i>H-L</i>	<i>GRS</i>
Mean	1.00	0.77	0.39	0.85	0.82	0.88	0.72	0.68	0.27	0.16	<i>-0.84</i>	
α^{CAPM}	0.42	0.17	-0.30	0.25	0.17	0.18	-0.04	-0.13	-0.55	-0.64	<i>-1.06</i>	<i>3.97</i>
β	0.88	0.90	1.05	0.92	0.99	1.06	1.16	1.23	1.24	1.21	0.33	
α^{FF}	0.22	0.08	-0.28	0.15	0.13	0.16	0.00	-0.01	-0.41	-0.59	<i>-0.82</i>	<i>3.10</i>
b^{FF}	0.99	0.96	1.03	0.99	1.01	1.04	1.12	1.14	1.13	1.14	0.15	
<i>s</i>	0.01	-0.01	0.03	-0.06	0.00	0.18	0.08	0.12	0.16	0.26	0.25	
<i>h</i>	0.32	0.15	-0.03	0.17	0.08	0.04	-0.06	-0.19	-0.23	-0.07	-0.39	
α^{NEO}	0.09	0.00	0.01	0.12	0.24	0.35	0.24	0.43	0.16	-0.19	-0.28	<i>2.60</i>
b^{NEO}	0.96	0.95	0.97	0.94	0.96	1.01	1.07	1.06	1.05	1.08	0.12	
<i>i</i>	0.11	0.07	-0.22	-0.10	-0.17	-0.12	-0.40	-0.51	-0.50	-0.43	-0.55	
<i>p</i>	0.21	0.10	-0.15	0.14	0.02	-0.08	-0.06	-0.23	-0.36	-0.18	-0.39	

Results

The earnings-to-price portfolios, 1/1972–12/2006

	<i>L</i>	2	3	4	5	6	7	8	9	<i>H</i>	<i>H-L</i>	<i>GRS</i>
Mean	0.31	0.40	0.59	0.57	0.55	0.64	0.83	0.80	0.83	1.00	<i>0.69</i>	
α^{CAPM}	-0.31	-0.11	0.11	0.11	0.08	0.21	0.40	0.37	0.39	0.51	<i>0.82</i>	<i>2.48</i>
β	1.23	1.02	0.95	0.91	0.92	0.86	0.84	0.85	0.87	0.97	-0.25	
α^{FF}	0.06	0.01	0.09	0.07	-0.07	-0.04	0.12	0.04	-0.04	-0.07	-0.13	0.86
b^{FF}	1.06	0.99	0.99	0.96	1.02	0.99	1.00	1.00	1.06	1.19	0.13	
<i>s</i>	-0.02	-0.14	-0.16	-0.14	-0.13	-0.04	-0.10	0.03	0.06	0.23	0.25	
<i>h</i>	-0.57	-0.16	0.05	0.08	0.25	0.38	0.45	0.51	0.65	0.84	1.41	
α^{NEO}	-0.02	-0.27	-0.15	-0.10	-0.13	-0.08	0.02	0.10	0.21	0.28	0.31	1.76
b^{NEO}	1.14	1.04	0.99	0.95	0.95	0.92	0.93	0.91	0.92	1.03	-0.12	
<i>i</i>	-0.46	-0.06	-0.01	0.05	0.06	0.20	0.33	0.28	0.24	0.23	0.69	
<i>p</i>	-0.05	0.18	0.25	0.17	0.17	0.18	0.21	0.12	0.06	0.10	0.15	

Note: Results with other valuation ratios are largely similar

Results

The new issues puzzle: Factor regressions

Alphas of the new issues portfolio excess returns (1970:01–2005:12)

Equal-weighted		Value-weighted		Equal-weighted		Value-weighted	
CAPM	FF	CAPM	FF	CAPM	FF	CAPM	FF
SEOs				IPOs			
-0.41	-0.39	-0.44	-0.35	-0.71	-0.43	-0.82	-0.45
(-2.43)	(-3.52)	(-3.76)	(-3.04)	(-2.60)	(-2.18)	(-3.03)	(-1.91)
Convertible debt issues				Straight debt issues			
-0.63	-0.54	-0.44	-0.26	0.13	-0.26	-0.01	-0.09
(-4.20)	(-4.72)	(-3.38)	(-2.00)	(0.73)	(-2.35)	(-0.06)	(-0.90)

Results

The new issues puzzle: Factor regressions augmented with *INV* (1970:01–2005:12)

	Equal-weighted		Value-weighted		Equal-weighted		Value-weighted	
	CAPM	FF	CAPM	FF	CAPM	FF	CAPM	FF
	SEOs				IPOs			
α	-0.07 (-0.40)	-0.08 (-0.72)	-0.14 (-1.09)	-0.05 (-0.44)	-0.29 (-0.84)	-0.05 (-0.21)	-0.13 (-0.36)	0.21 (0.69)
β_{INV}	-0.44 (-2.74)	-0.40 (-4.78)	-0.38 (-4.73)	-0.38 (-4.99)	-0.49 (-1.80)	-0.44 (-2.55)	-0.73 (-3.04)	-0.69 (-4.13)
$\frac{ \Delta\alpha }{ \alpha }$ %	82	78	68	85	59	88	84	
	Convertible debt issues				Straight debt issues			
α	-0.34 (-2.04)	-0.37 (-3.26)	-0.20 (-1.37)	-0.07 (-0.53)	0.46 (2.56)	0.03 (0.27)	0.16 (1.12)	0.06 (0.51)
β_{INV}	-0.41 (-3.16)	-0.25 (-2.09)	-0.33 (-3.40)	-0.27 (-2.51)	-0.38 (-3.31)	-0.32 (-5.39)	-0.18 (-1.44)	-0.16 (-2.59)
$\frac{ \Delta\alpha }{ \alpha }$ %	46	31	55	72				

Results

The Accrual Anomaly: Factor regressions of the total accruals portfolios

Equal-weighted returns						Value-weighted returns					
α_{ew}^{L-H}	MKT	SMB	HML	INV_{ew}	$\frac{ \Delta\alpha }{\alpha}\%$	α_{vw}^{L-H}	MKT	SMB	HML	INV_{vw}	$\frac{ \Delta\alpha }{\alpha}\%$
0.74	-0.08					0.78	-0.25				
(5.4)	(-2.6)					(3.4)	(-5.1)				
0.49	-0.02			0.29	34	0.24	-0.10			0.75	69
(3.3)	(-0.7)			(3.8)		(1.0)	(-1.9)			(6.5)	
0.80	-0.06	-0.19	-0.06			0.80	-0.14	-0.49	0.04		
(5.8)	(-1.8)	(-4.4)	(-1.3)			(3.6)	(-2.7)	(-7.1)	(0.5)		
0.57	-0.02	-0.18	-0.10	0.29	29	0.38	-0.04	-0.45	-0.02	0.64	53
(3.8)	(-0.5)	(-4.2)	(-1.9)	(3.8)		(1.7)	(-0.8)	(-6.7)	(-0.3)	(5.7)	

Note: Results for the discretionary accruals portfolios are largely similar

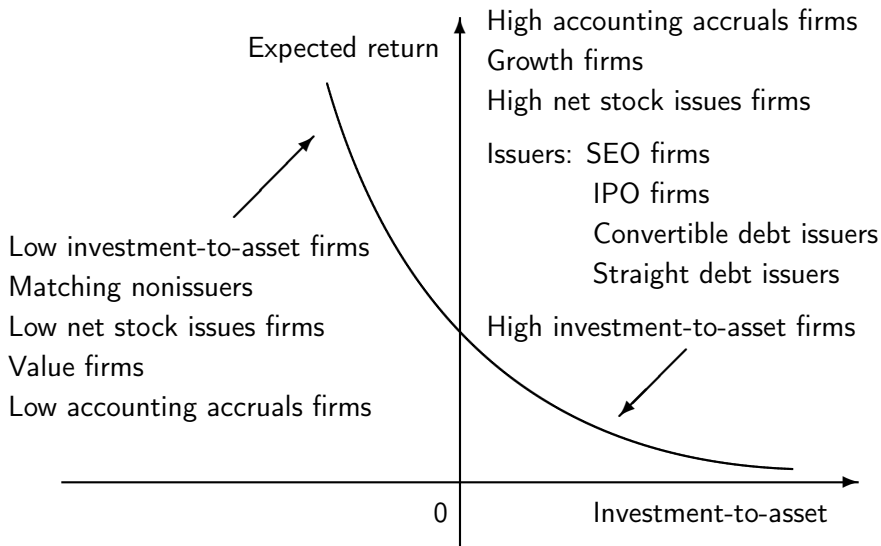
Results

The Accrual Anomaly: Factor regressions of the net operating assets portfolios

Equal-weighted returns						Value-weighted returns					
α_{ew}^{L-H}	MKT	SMB	HML	INV_{ew}	$\frac{ \Delta\alpha }{\alpha}$ %	α_{vw}^{L-H}	MKT	SMB	HML	INV_{vw}	$\frac{ \Delta\alpha }{\alpha}$ %
1.34	-0.07					0.84	-0.18				
(7.2)	(-1.8)					(3.8)	(-3.8)				
0.13	0.19			1.40	91	0.10	0.02			0.99	88
(0.8)	(5.3)			(16.4)		(0.5)	(0.3)			(9.0)	
1.54	-0.20	0.14	-0.35			1.09	-0.24	-0.27	-0.36		
(8.4)	(-4.7)	(2.6)	(-5.3)			(5.0)	(-4.5)	(-4.0)	(-4.6)		
0.26	0.03	0.19	-0.51	1.58	83	0.36	-0.07	-0.20	-0.48	1.08	67
(1.9)	(1.1)	(4.8)	(-11.4)	(21.8)		(1.7)	(-1.5)	(-3.2)	(-6.7)	(10.0)	

Explanations

The investment hypothesis



Explanations

The productivity hypothesis

$$\text{Expected return} = \frac{\text{Expected profitability} + 1}{\text{Marginal cost of investment}}$$

- High profitability with low investment means high discount rate
- Implications for momentum and the distress anomaly

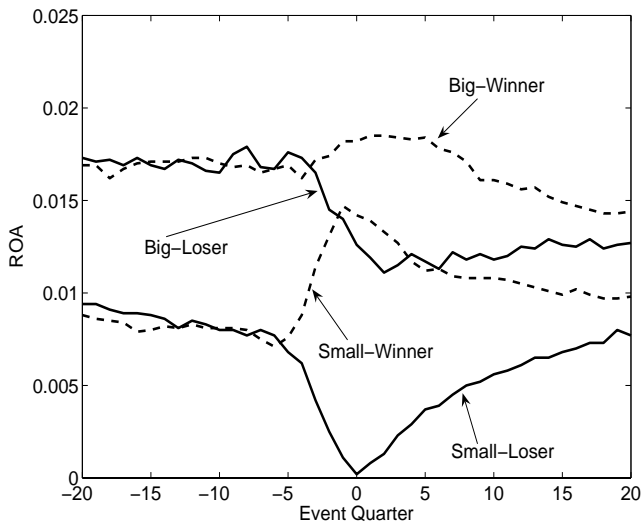
Fundamentals

Factor loadings of the size-momentum portfolios

	<i>L</i>	2	3	4	<i>W</i>	<i>W-L</i>	<i>L</i>	2	3	4	<i>W</i>	<i>W-L</i>
	<i>s</i>						<i>h</i>					
<i>S</i>	1.27	1.03	0.96	0.99	1.15	-0.12	0.22	0.43	0.44	0.35	0.10	-0.13
2	0.90	0.79	0.72	0.77	0.98	0.08	0.08	0.34	0.38	0.30	-0.07	-0.16
3	0.63	0.49	0.45	0.50	0.76	0.14	0.04	0.32	0.40	0.28	-0.11	-0.15
4	0.25	0.19	0.19	0.25	0.51	0.26	-0.07	0.30	0.36	0.25	-0.13	-0.05
<i>B</i>	-0.08	-0.18	-0.21	-0.17	0.02	0.10	-0.11	-0.03	0.02	0.01	-0.29	-0.18
	<i>i</i>						<i>p</i>					
<i>S</i>	-0.31	0.13	0.25	0.31	0.29	<i>0.60</i>	-0.80	-0.37	-0.24	-0.24	-0.35	<i>0.45</i>
2	-0.56	-0.05	0.11	0.17	0.07	<i>0.62</i>	-0.59	-0.22	-0.07	-0.07	-0.24	<i>0.35</i>
3	-0.58	-0.16	0.05	0.12	0.00	<i>0.58</i>	-0.53	-0.14	0.03	0.04	-0.14	<i>0.39</i>
4	-0.80	-0.19	0.03	0.11	0.03	<i>0.83</i>	-0.44	-0.07	0.06	0.10	-0.06	<i>0.38</i>
<i>B</i>	-0.67	-0.22	-0.11	0.07	-0.10	<i>0.57</i>	-0.21	-0.04	0.09	0.13	0.00	0.22

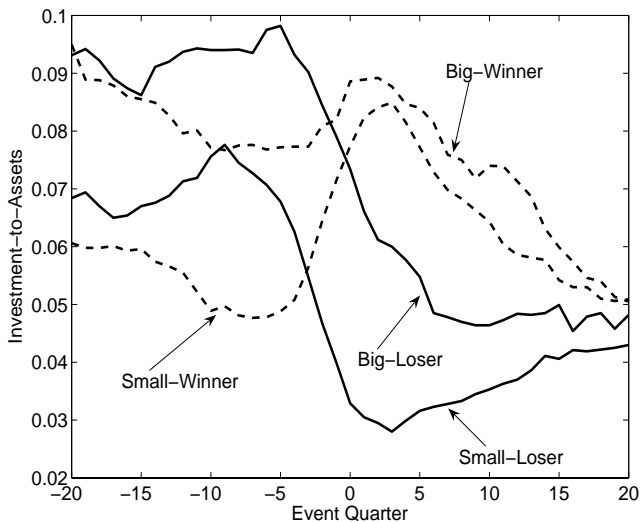
Fundamentals

What explains the average returns across the momentum portfolios? Productivity patterns



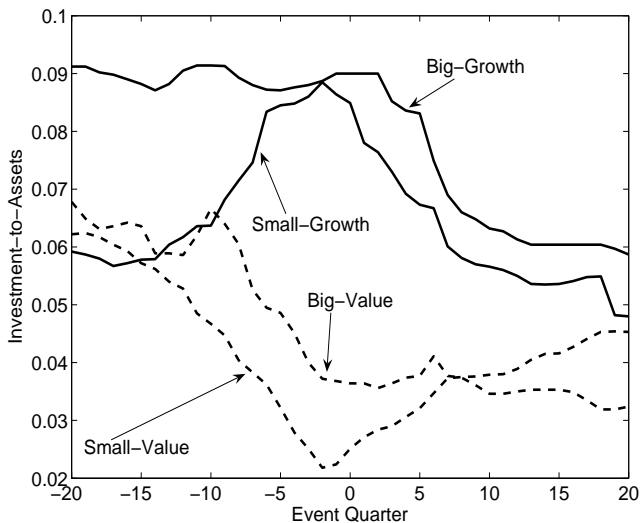
Fundamentals

What explains the average returns across the momentum portfolios? Investment patterns



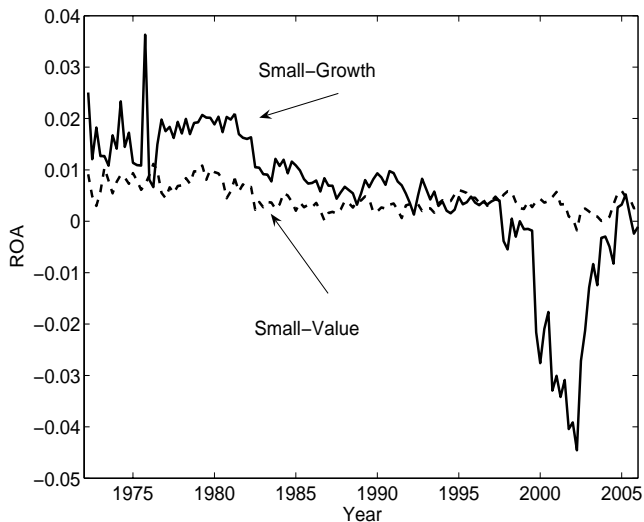
Fundamentals

What explains the average returns across the value portfolios? Investment patterns



Fundamentals

PROD helps explain the small-stock value premium



Fundamentals

New issues portfolios and accruals portfolios

The investment-to-assets spread dominates the profitability spread

Summary

and implications

The Neoclassical Three-Factor Model:

$$E[R_j] - R_f = b_j E[MKT] + i_j E[INV] + p_j E[PROD]$$

goes a long way in describing the cross section of average stock returns

- Much of what we call alpha might actually be beta
- *Take risk management seriously*