Cross-Sectional Anomalies

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What is a cross-sectional anomaly?

- An unexplained return spread
  - Significant risk-adjusted return (alpha)
  - Returns are outside the no-arbitrage bounds; transaction costs not high enough; idiosyncratic risk
- Explanation typically involves some aspect of investor behavior
  - Underreaction/overreaction
  - Rejection of market efficiency

What are some popular anomalies?

- Price-based anomalies
  - Size, momentum, reversal, seasonalities
- Accounting-based anomalies
  - Value, PEAD, accruals
- Other anomalies
  - Analysts, volume/liquidity, news
  - Increased use of proprietary datasets

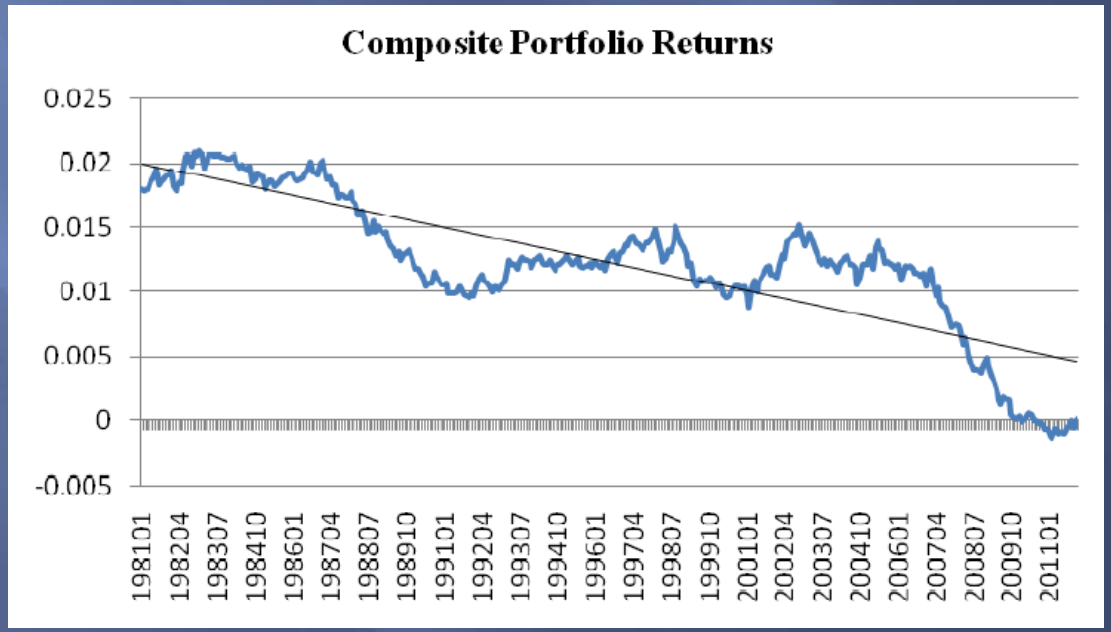
How has the literature responded?

- Compensation for unknown beta risk
  - Introduction of new risk factors
    - Subject to some critic (several factors explain value/size)
  - Conditional beta models (not with great success)
  - Liquidity risk (momentum, PEAD, analysts)

- Do the anomalies survive trading costs?
  - Often anomalies involve significant rebalancing and re-weighting
  - Many works document anomalies are costly

The test of time

- Has the anomaly survived post-publication?
  - Is so, then perhaps represents risk
  - If not, then market efficiency
- Anomalies disappeared over time due to increased liquidity and hedge-fund activity



Investor Horizon

- Some argue that cross-sectional anomalies can be represented by a beta model
- Consider long-horizon beta pricing: Should assessment of risk be related to the underlying investment horizon?
  - Delayed price reaction
  - Factor dynamics
  - Heterogeneous investor horizon

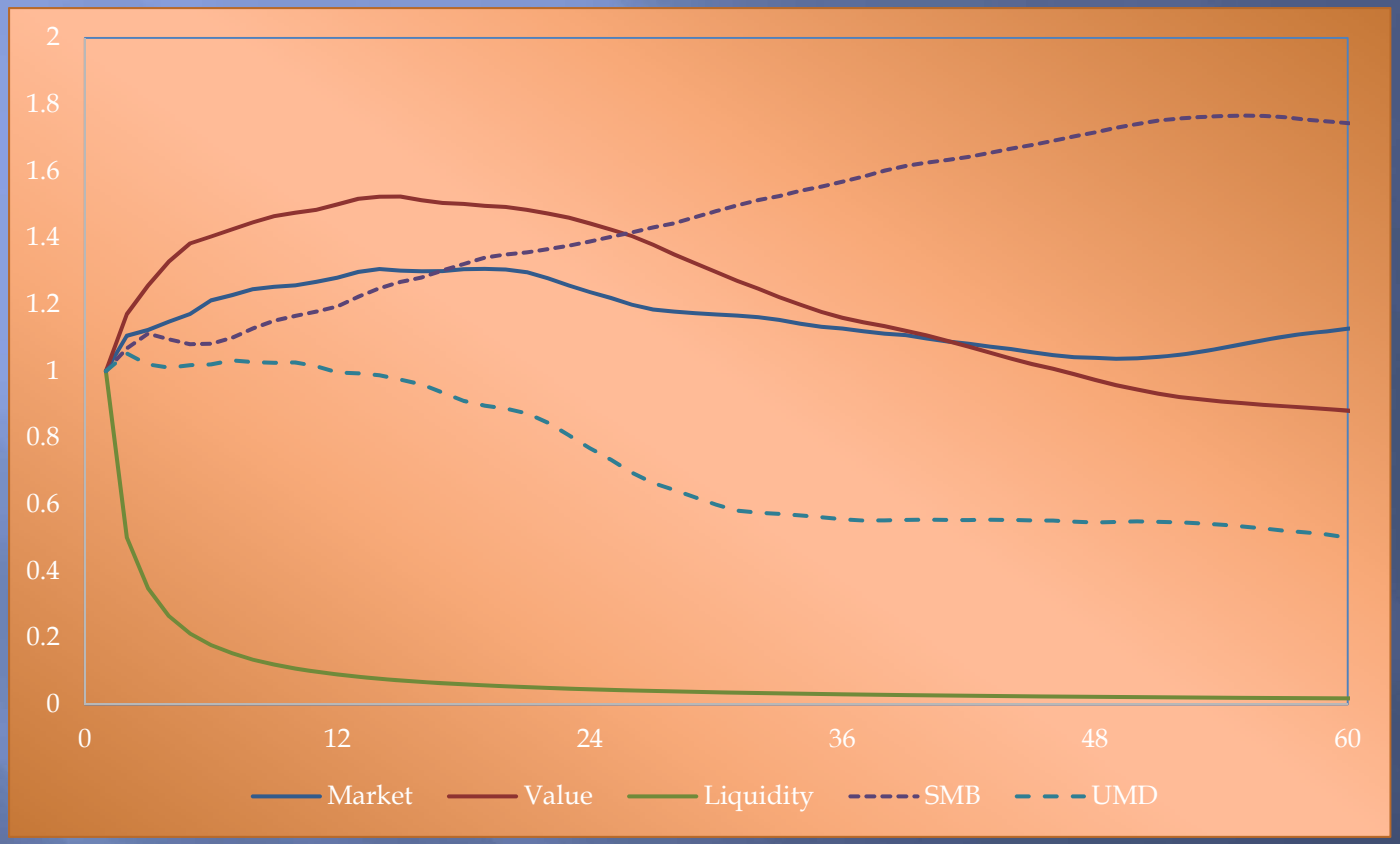
    (Pension funds, endowments, hedge funds, FoF)
- Are there "long-horizon" factors and "short-horizon" factors?

Data and Measures

- NYSE/AMEX/NASDAQ, 1963–2010
- Factors
  - MKT, SMB, HML, UMD, LIQ
- Factors of horizon q
  - Constructed from monthly factors
  - Excess return factors
    - $f_{q,t}^{MKT} = \prod_{i=0}^{q-1}(1 + r_{m,t-i}) - \prod_{i=0}^{q-1}(1 + r_{f,t-i})$
    - $f_{q,t}^{SMB} = \prod_{i=0}^{q-1}(1 + r_{s,t-i}) - \prod_{i=0}^{q-1}(1 + r_{B,t-i})$
  - How do we treat the liquidity factor?

$$LIQ_{t,q} = Liquidity_t - E_{t-q}[Liquidity_t]$$

Variance Ratio Tests



$$VR(q) = \frac{Var(r_{q,t})}{q \cdot Var(r_t)}$$

- $VR(q)=1$ independent
- $VR(q)>1$ persistent
- $VR(q)<1$ transitory

- Some factors exhibit long-run risks

Price Delay and Systematic Risk

- Example: One-factor model, one-period delay
  - Relation between one-period horizon risk and q-period horizon risk

$$\beta_q = \beta_1 + \frac{q-1}{q}\frac{1}{VR(q)Var(f_1)}Cov(\varepsilon_{1,t}, f_{1,t-1})$$

- Additional effects
  - Longer delays
  - Discrete compounding

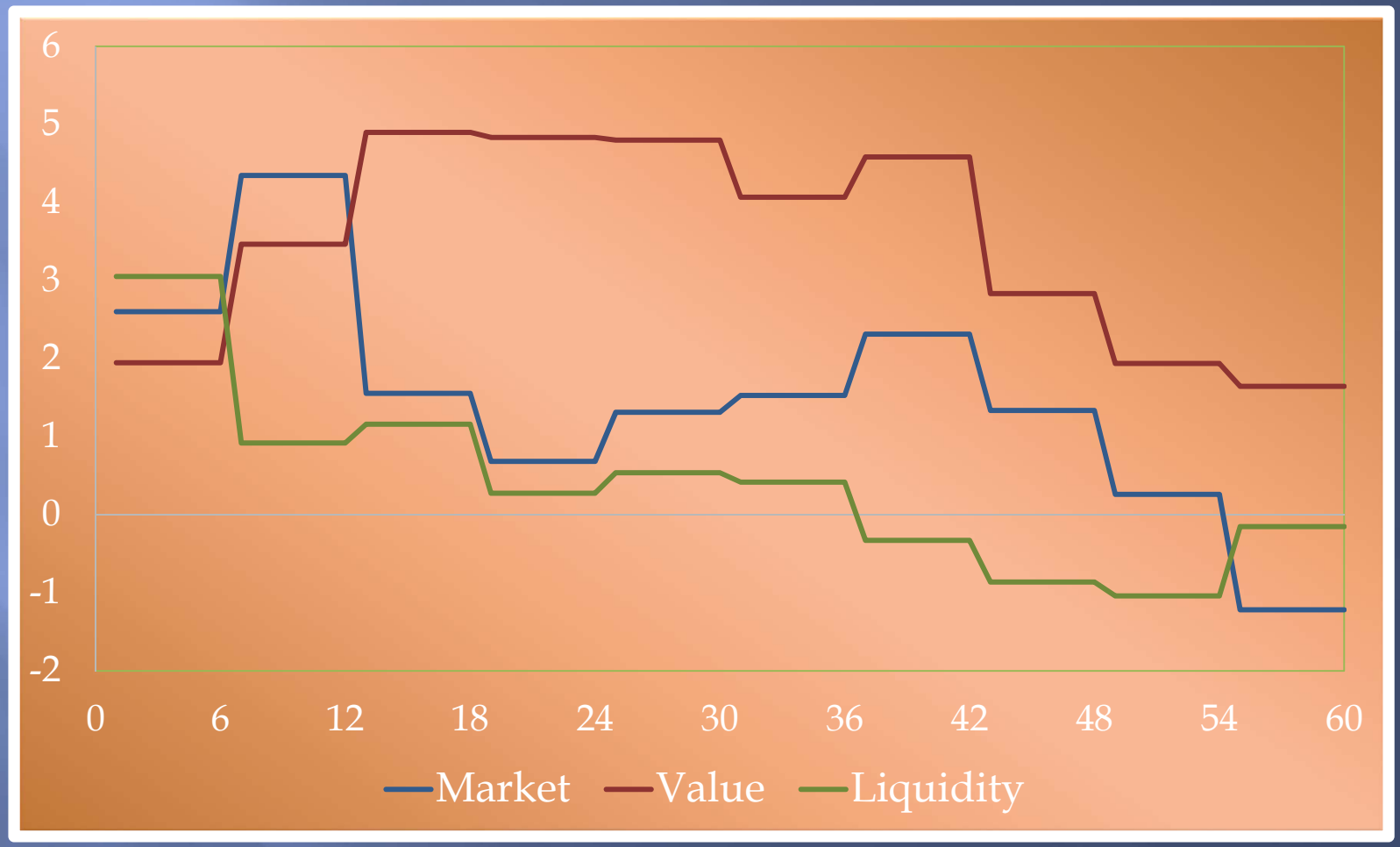
- What horizon is relevant for investors?

Pricing of Horizon Betas

Horizon	Market Beta		SMB Beta		HML Beta		UMD Beta		Liq Beta		Liq Beta	
(q)	Return	Spread	Return	Spread	Return	Spread	Return	Spread	Return	Spread	FF4 Alpha	Spread
1	1.50	[0.58]	-1.20	[-0.35]	1.82	[0.65]	-2.74	[-1.17]	3.35	[1.73]	4.67	[2.33]
[5,6,7]	4.56	[2.34]	-1.41	[-0.48]	2.54	[1.05]	0.46	[0.23]	4.17	[2.33]	4.81	[2.63]
[11,12,13]	3.51	[1.94]	-1.13	[-0.41]	3.81	[1.69]	-0.58	[-0.29]	-0.23	[-0.14]	0.02	[0.01]
[23,24,25]	0.73	[0.39]	1.73	[0.74]	4.95	[2.29]	0.41	[0.22]	-0.68	[-0.44]	-0.83	[-0.52]
[35,36,37]	2.22	[1.14]	0.50	[0.24]	4.53	[2.17]	-0.94	[-0.48]	0.89	[0.54]	0.94	[0.55]
[47,48,49]	1.83	[0.94]	1.39	[0.65]	2.02	[1.13]	-3.04	[-1.57]	0.27	[0.17]	0.40	[0.25]
[59,60,61]	0.19	[0.09]	1.88	[0.89]	1.56	[0.81]	-2.63	[-1.44]	0.53	[0.34]	0.47	[0.30]

- Liquidity is a short-run factor
- Market is a medium-run factor
- HML is a long-run factor
- SMB and UMD are not priced risk factors

Term Structure of Risk Premia



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Conditioning Systematic Risk on Characteristics

	(1)	(2)	(3)	(4)
MKT(1)	-0.10			
	[-1.29]			
MKT(6)	0.03			
	[0.39]			
MKT(12)	0.30			0.13
	[0.85]			[0.39]
HML(1)		0.08		
		[0.94]		
HML(12)		-0.01		
		[-0.08]		
HML(24)		0.16		0.21
		[2.62]		[3.29]
LIQ(1)			0.20	0.21
			[1.77]	[1.87]
LIQ(3)			0.59	
			[1.47]	
LIQ(6)			-0.04	
			[-0.57]	
Log(Cap)	0.13	-0.06	-0.11	0.07
	[0.47]	[-1.11]	[-1.34]	[0.30]
BM	0.04	0.01	-0.29	-0.04
	[0.82]	[0.13]	[-1.39]	[-0.59]
Ret(12,2)	0.57	0.39	0.71	0.32
	[2.46]	[4.09]	[1.77]	[1.54]

- Condition each factor exposure on size, b/m, momentum, and historical own beta
- Estimate per firm using entire sample
- Cross-sectional regressions (standardized)

Investor Horizon – Cont'd

- Some characteristics might be priced due to their information about betas
- A return spread could be a risk-factor for one investor and an alpha for another
  - The case of liquidity risk
  - Is value a characteristic of a factor?

Summary and Conclusion

- Exciting research in the cross-section of returns
  - Probably a bit of both risk and mispricing; also investor flow sentiment
  - Alpha or premium for systematic risk?