The Other Side of Value: the Gross Profitability Premium

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Main results

- Gross profitability is a powerful predictor of the cross-section of average returns
  - **Much** stronger than earnings or free cashflows
- Has about as much power as B/M
  - And is complimentary to book-to-market
    - GP/A negatively correlated with B/M
    - Helps distinguish “good growth” from ordinary growth

Implications

- Obvious implications for portfolio construction
- Challenge to popular theories of value
  - Profitable firms:
    - Less distressed (FF 1993)
    - Longer durations (LW 2007)
    - Lower levels of operating leverage (CFG 2004)
- Provide a unifying feature of most earnings-related anomalies
  - And many seemingly unrelated anomalies

Why should profitability matter?

- Berk (1995): High IRR➔ low valuations
  - So low values associated with high returns
  - Conditional on valuations, profitable ➔ high IRR
    - ➔ Profitability premium
- LSV (1994): mispricing ➔ value premium
  - Sort on B/M partly sorts on the mis-valuations
  - Conditional on valuations, profitable underpriced
    - ➔ Profitability premium

Dividend discount model with clean surplus accounting

- Fama-French (2006)

$$M_t = \sum_{\tau=0}^{\infty} \frac{\mathbf{E}_t[Y_{t+\tau} - dB_{t+\tau}]}{(1+r)^{\tau}}$$

- Ceteris paribus:
  - ↑ M ➔ ↓ r
  - ↑ Y ➔ ↑ r
  - ↑ dB ➔ ↓ r

- Why hold all else equal?
  - Recursive formulation:

$$M_t = (S_t - X_t) - dB_t + \frac{\mathbf{E}_t\left[M_{t+1} \middle| X = X_t, dB = dB_t\right]}{1 + r}$$

  - S is economic profits ("surplus")
  - X is expensed investment (e.g., R&D, advertising)

- Can also write as

$$M_t = S_t + \frac{\mathbf{E}_t\left[M_{t+1}\middle|X=0, dB=0\right]}{1+r} + N_t$$

  – Here N is rents to investment ("net gain")

$$N_t \equiv \frac{\mathbf{E}_t\left[M_{t+1}\middle|X=X_t, dB=dB_t\right] - \mathbf{E}_t\left[M_{t+1}\middle|X=0, dB=0\right]}{1+r} - (X_t + dB_t)$$

Why gross profitability?

- Gross profits are “cleanest” measure of true economic profitability
- Earnings “punished” for growth-related activities
  - Costumer acquisition
    - Advertising, commissions
  - R&D
  - Development of organizational capital
- Free cashflows further “punished” for CAPX
  - Even optimal investment

Prima facie evidence

- Profitability predicts economic growth, even after controlling for valuations
  - Another dimension of "growth"
- Gross profits-to-assets predicts:
  - Gross profit growth
  - Earnings growth
  - Free cashflow growth
  - Dividends and repurchases
    - Note: earnings and cashflows go the other way

Profitability and Profitability Growth

	slope coefficients and [test-statistics] from regressions of the form $y_t = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$									
	regressions predicting three-year growth					regressions predicting ten-year growth				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel A: regressions predicting gross profit growth, $y_t = \frac{GP_{t+\tau} - GP_t}{AT_t}$									
GP/A	0.30 [9.98]				0.37 [12.5]	1.50 [6.62]				2.00 [9.43]
IB/A		0.18 [1.60]			0.29 [1.34]		0.33 [0.46]			-0.03 [-0.02]
FCF/A			-0.14 [-2.07]		-0.52 [-2.74]			-1.10 [-2.47]		-2.30 [-3.02]
DIV/A				-0.49 [-3.91]	-0.91 [-3.77]				-5.90 [-4.78]	-7.50 [-6.22]
ln(BM)	-0.04 [-10.2]	-0.05 [-9.95]	-0.04 [-9.87]	-0.04 [-9.54]	-0.03 [-7.76]	-0.33 [-8.76]	-0.35 [-10.5]	-0.34 [-11.0]	-0.33 [-11.4]	-0.27 [-7.11]
ln(ME)	-0.12 [-10.7]	-0.14 [-10.8]	-0.14 [-10.9]	-0.15 [-10.3]	-0.11 [-11]	-0.78 [-11.4]	-0.91 [-11.1]	-0.90 [-12.5]	-0.96 [-12.1]	-0.74 [-12.5]
$r_{12,1}$	0.23 [12.9]	0.23 [12.8]	0.24 [12.8]	0.23 [12.8]	0.23 [12.8]	0.94 [4.64]	0.98 [4.83]	1.00 [4.97]	0.98 [4.85]	0.95 [4.82]

Profitability and Earnings Growth

	slope coefficients and [test-statistics] from regressions of the form $y_t = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$									
	regressions predicting three-year growth					regressions predicting ten-year growth				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel B: regressions predicting earnings growth, $y_t = \frac{\text{IB}_{t+\tau} - \text{IB}_t}{\text{AT}_t}$									
GP/A	0.08 [4.66]				0.10 [4.31]	0.29 [3.31]				0.21 [2.52]
IB/A		-0.01 [-0.19]			-0.16 [-2.71]		0.58 [2.65]			1.10 [1.52]
FCF/A			0.02 [0.42]		0.05 [1.81]			0.25 [1.59]		-0.72 [-1.20]
DIV/A				0.17 [2.34]	0.11 [1.31]				0.47 [1.28]	-0.08 [-0.17]
ln(BM)	-0.00 [-0.29]	-0.00 [-0.25]	-0.00 [-0.34]	-0.00 [-0.71]	0.00 [0.43]	0.01 [0.36]	-0.00 [-0.21]	0.00 [0.05]	0.01 [0.21]	-0.00 [-0.06]
ln(ME)	0.01 [1.05]	0.01 [0.66]	0.01 [0.65]	0.01 [0.74]	0.01 [1.07]	0.01 [0.10]	-0.02 [-0.38]	-0.02 [-0.36]	-0.01 [-0.16]	0.00 [0.01]
$r_{12,1}$	-0.01 [-0.25]	-0.00 [-0.00]	-0.00 [-0.04]	-0.00 [-0.11]	-0.00 [-0.08]	-0.01 [-0.06]	-0.01 [-0.07]	-0.00 [-0.03]	0.01 [0.08]	-0.01 [-0.08]

So is profitability relevant for AP?

- Two stories why it might be
  - But they don't actually provide the answer
- Ultimately an empirical question
- Emphatic "yes" in the data
  - More profitable firms significantly outperform less profitable firms

Table 2. Fama-MacBeth regressions of returns on measures of profitability

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \boldsymbol{\beta}' \mathbf{x}_{tj} + \epsilon_{tj}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A: straight profitability variables						
gross profitability	0.67 [5.06]			0.67 [5.27]	0.61 [4.88]		0.62 [4.94]
earnings		0.77 [1.77]		0.22 [0.49]		0.07 [0.15]	-0.28 [-0.55]
free cashflow			0.65 [2.52]		0.31 [1.20]	0.91 [2.97]	0.73 [2.44]
log(BM)	0.32 [5.42]	0.30 [5.36]	0.26 [4.80]	0.33 [5.93]	0.29 [5.39]	0.28 [5.12]	0.31 [5.71]
log(ME)	-0.14 [-3.22]	-0.15 [-3.97]	-0.16 [-3.95]	-0.13 [-3.55]	-0.14 [-3.63]	-0.15 [-4.02]	-0.14 [-3.62]
$r_{1,0}$	-6.10 [-15.1]	-6.09 [-15.3]	-6.08 [-15.2]	-6.19 [-15.6]	-6.18 [-15.5]	-6.14 [-15.5]	-6.23 [-15.8]
$r_{12,2}$	0.61 [3.28]	0.62 [3.34]	0.63 [3.42]	0.57 [3.09]	0.59 [3.18]	0.61 [3.3]	0.56 [3.07]

Portfolio sorts

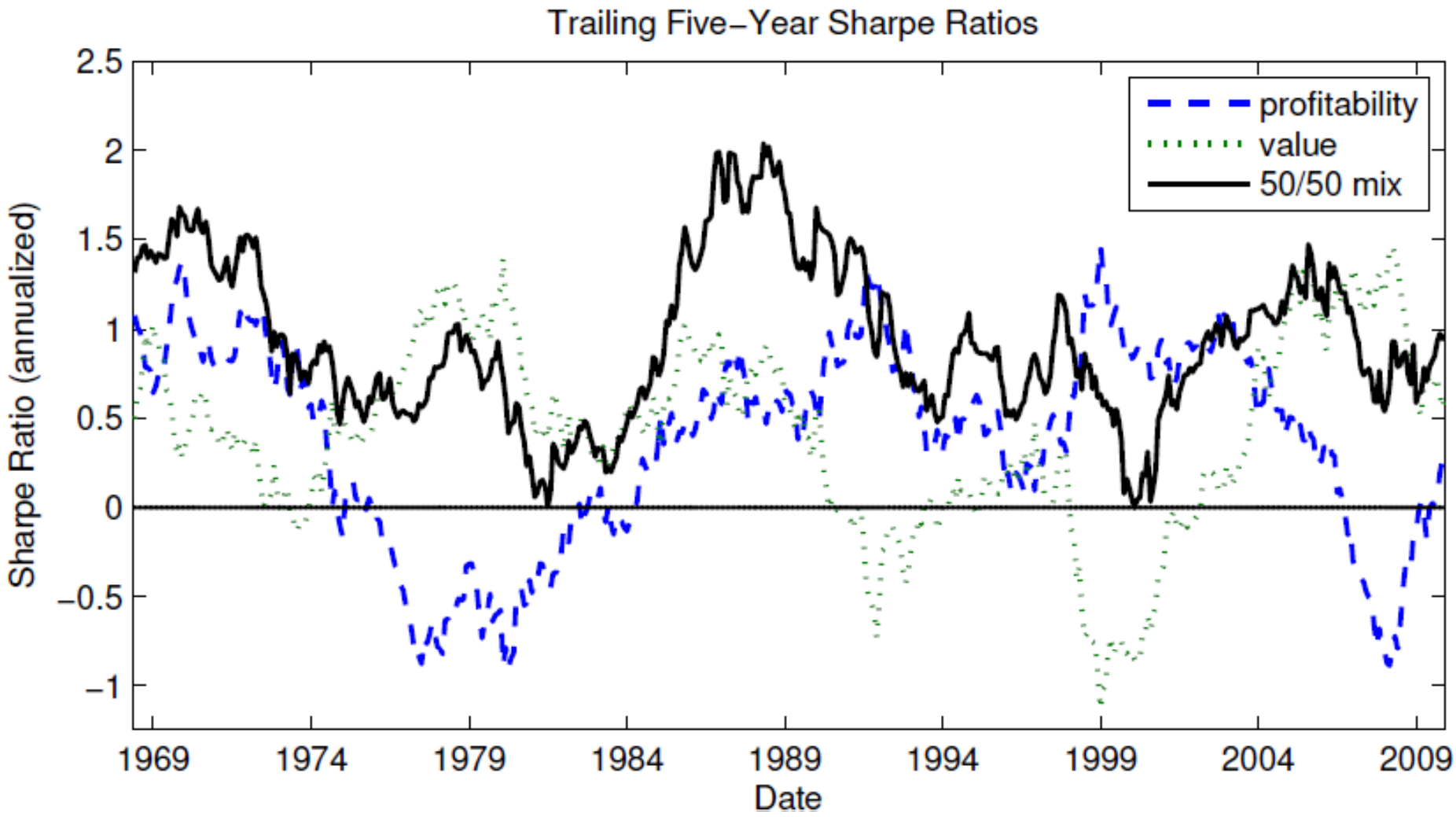
- If GP/A really predicts returns, should see it in simple trading strategies (and you do!)
- Also show clear positive correlation between profitability and current valuation ratios
  - This fact leads to FF (1993) discussion that HML may reflect earnings-related risk
  - And why GP/A isn't obvious in the data
- But sort on GP/A, growth outperforms value

Panel A: portfolios sorted on gross profits-to-assets

		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.28	-0.20	0.95	0.04	0.15	0.10	1.11	715	864
	[1.45]	[-2.79]	[56.7]	[1.68]	[6.08]				
2	0.38	-0.12	1.02	-0.07	0.19	0.20	0.97	1,058	644
	[1.91]	[-1.78]	[65.5]	[-3.17]	[8.25]				
3	0.49	0.01	1.02	-0.01	0.12	0.30	1.01	1,061	718
	[2.45]	[0.17]	[68.0]	[-0.24]	[5.33]				
4	0.39	0.06	1.01	0.04	-0.24	0.43	0.53	1,072	835
	[1.82]	[0.89]	[68.7]	[1.99]	[-11.0]				
High	0.61	0.35	0.92	-0.05	-0.30	0.69	0.33	1,057	1,020
	[3.04]	[5.18]	[56.7]	[-2.07]	[-12.2]				
H-L	0.33	0.55	-0.03	-0.08	-0.45				
	[2.63]	[4.75]	[-1.24]	[-2.24]	[-10.9]				

Insurance

- For your value strategy
  - Levering to run profitability over value reduces return volatility!
- The best kind insurance
  - It pays you
    - Negative average “premiums”
- Momentum orthogonal to joint value-profitability strategy
  - Has diversifying, but not hedging, role


Trailing Five−Year Sharpe Ratios
Sharpe Ratio (annualized)
2.5
2
1.5
1
0.5
0
−0.5
−1
1969
1974
1979
1984
1989
1994
1999
2004
2009
Date
profitability
value
50/50 mix

“High” Frequency Strategy

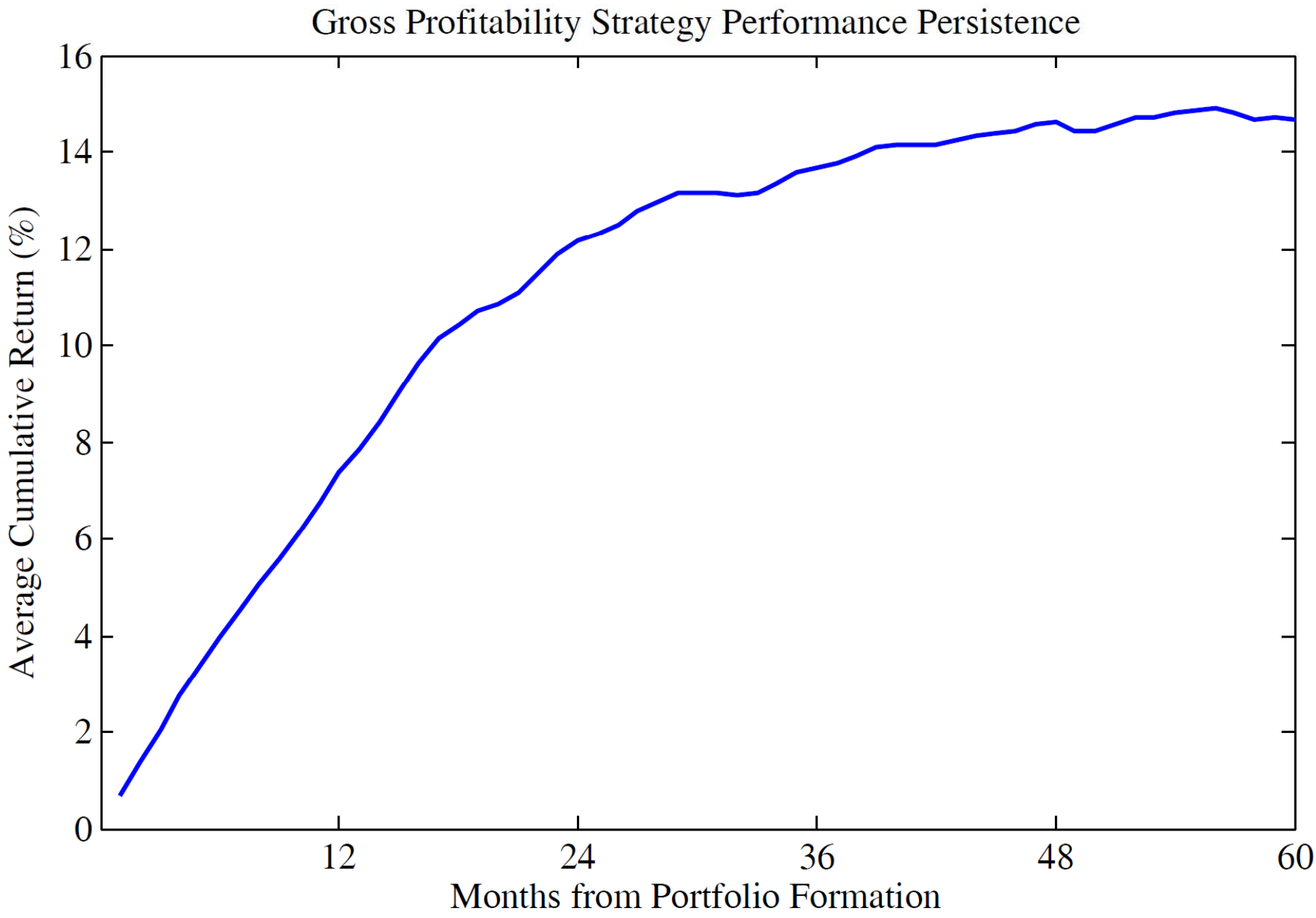
Bigger spreads using better information

- Rebalance monthly
  - End of month
- Using most recent accounting data
  - Released quarterly
    - From 1972

“High Frequency” Strategy

Independent variables	$PMU^{monthly}$ as dependent variable			PMU^{annual} as dependent variable		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.63 [3.73]	0.78 [4.61]	0.42 [3.10]	0.33 [2.06]	0.51 [3.24]	-0.03 [-0.23]
MKT		-0.14 [-3.72]			-0.05 [-1.40]	
SMB		-0.14 [-2.63]			-0.20 [-3.93]	
HML		-0.12 [-2.12]			-0.27 [-5.07]	
PMU^{annual}			0.64 [16.3]			
$PMU^{monthly}$						0.57 [16.3]
Adj. R^2		4.7	36.2		6.7	36.2

- 26% correlated with PEAD
  - Also some momentum
    - But significant information ratio relative to these
    - And to low frequency profitability strategy
- Highly persistent profits
  - So “cleaner” to analyze low frequency strategy
    - No PEAD, No momentum
    - Relation to value more clear


Gross Profitability Strategy Performance Persistence
Average Cumulative Return (%)
0
2
4
6
8
10
12
14
16
12
24
36
48
60
Months from Portfolio Formation

Value-profitability relation

- Gross profits-to-assets and book-to-market negatively correlated
- Univariate sort on GP/A sorts *against* B/M
  - Similarly, sorting on B/M sorts against GP/A
- Suggests that:
  - Profitability strategies should perform better when constructed to control for valuations
  - Value strategies should perform better when constructed to control for profitability

		gross profits-to-asset quintiles					profitability strategies				
		L	2	3	4	H	r^e	α	β_{mkt}	β_{smb}	β_{hml}
book-to-market quintiles	L	-0.13	0.13	0.23	0.23	0.55	0.68	0.86	-0.25	-0.27	-0.00
							[3.71]	[4.88]	[-6.03]	[-4.67]	[-0.07]
	2	0.17	0.27	0.38	0.70	0.88	0.71	0.70	-0.13	0.26	-0.00
							[4.09]	[4.02]	[-3.19]	[4.54]	[-0.02]
	3	0.36	0.35	0.72	0.66	0.85	0.49	0.27	0.09	0.52	0.10
							[2.74]	[1.66]	[2.21]	[9.72]	[1.76]
	4	0.45	0.59	0.90	1.02	0.94	0.49	0.37	0.06	0.65	-0.16
							[2.69]	[2.33]	[1.61]	[12.65]	[-2.78]
	H	0.62	0.82	0.95	1.12	1.03	0.42	0.35	-0.05	0.50	-0.09
							[2.36]	[2.09]	[-1.25]	[9.19]	[-1.53]
book-to-market strategies	r^e	0.75	0.69	0.72	0.89	0.49					
		[3.58]	[3.65]	[3.84]	[4.94]	[2.56]					
	α	0.43	0.31	0.41	0.43	-0.08					
		[2.60]	[1.91]	[2.36]	[3.07]	[-0.54]					
	β_{mkt}	-0.17	-0.06	-0.05	-0.05	0.03					
		[-4.36]	[-1.51]	[-1.13]	[-1.67]	[0.90]					
	β_{smb}	-0.02	0.27	0.33	0.76	0.75					
		[-0.39]	[5.00]	[5.78]	[16.8]	[16.2]					
	β_{hml}	0.95	0.81	0.58	0.70	0.87					
		[16.2]	[13.8]	[9.42]	[14.2]	[17.2]					

HML “decomposition”

- Book-to-market sort used in HML sorts against profits-to-assets
  - So HML is long “real” value, but short profitability
    - I.e., short “good growth”
- Investigate by constructing:
  - HML that controls for GP/A
  - HML-like GP/A “factor” that controls for B/M

independent variables	dependent variable									
	HML | GP			PMU | BM			HML		PMU	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
intercept	0.54 [5.00]	0.22 [4.37]	0.22 [4.29]	0.49 [5.40]	0.49 [5.41]	0.52 [5.66]	0.42 [3.34]	-0.06 [-1.12]	0.33 [3.37]	0.03 [0.83]
MKT			-0.03 [-2.22]			-0.07 [-3.15]				
SMB			0.05 [3.32]			0.04 [1.48]				
HML		0.77 [45.4]	0.77 [42.9]		-0.01 [-0.42]	-0.03 [-1.07]				
HML | GP								1.04 [47.3]		-0.32 [-21.3]
PMU | BM								-0.16 [-6.26]		0.97 [53.1]
adj.-R^2 (%)		78.7	79.1		0.0	1.3		80.0		84.6

Effect is strong in large caps

- Double sort on size and profitability
- Profitability spread is smaller in large caps
  - Though still significant
- FF3 alpha almost undiminished in large caps
  - Sorting on GP/A still sorts against B/M
    - Especially among bigger stocks

Panel A: portfolio average returns and time-series regression results

		gross profits-to-asset quintiles					profitability strategies				
		L	2	3	4	H	r^e	α	β_{mkt}	β_{smb}	β_{hml}
size quintiles	S	0.36	0.60	0.76	0.85	1.03	0.67 [4.53]	0.62 [4.11]	0.06 [1.78]	-0.13 [-2.59]	0.15 [2.73]
	2	0.33	0.69	0.66	0.70	0.87	0.54 [3.94]	0.54 [3.91]	0.02 [0.58]	0.05 [1.19]	-0.07 [-1.40]
	3	0.35	0.69	0.70	0.64	0.77	0.42 [2.92]	0.40 [2.85]	0.09 [2.82]	0.18 [4.02]	-0.16 [-3.14]
	4	0.42	0.57	0.57	0.62	0.80	0.38 [2.75]	0.46 [3.60]	0.02 [0.81]	0.21 [5.01]	-0.35 [-7.66]
	B	0.26	0.34	0.46	0.34	0.55	0.29 [2.05]	0.54 [4.22]	-0.06 [-1.84]	-0.05 [-1.22]	-0.53 [-11.6]
small-minus-big strategies	r^e	0.10 [0.37]	0.26 [1.29]	0.29 [1.43]	0.51 [2.52]	0.49 [2.20]					
	α	-0.16 [-0.97]	-0.16 [-1.62]	-0.11 [-1.06]	-0.04 [-0.36]	-0.09 [-0.79]					
	β_{mkt}	-0.05 [-1.17]	0.01 [0.53]	-0.01 [-0.36]	0.02 [0.75]	0.07 [2.87]					
	β_{smb}	1.53 [28.5]	1.34 [40.6]	1.34 [38.6]	1.33 [39.5]	1.45 [41.2]					
	β_{hml}	-0.26 [-4.38]	0.20 [5.51]	0.17 [4.55]	0.49 [13.4]	0.42 [10.8]					

Simple large cap profitability/value strategy

- Each June select 500 largest non-financial firms
- Rank on GP/A and B/M
  - Buy top 150 by rank-sum
  - Sell bottom 150 by rank-sum
- Large spreads (almost 8% per year)
  - Huge capacity
  - Low trading costs
    - Liquid stocks
    - Turns over only once every three years

Panel C: portfolios sorted on average gross profits-to-assets and book-to-market ranks									
		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.19	-0.20	1.12	0.01	-0.27	0.22	0.45	7.72	150
	[0.79]	[-2.25]	[53.2]	[0.25]	[-8.51]				
2	0.59	0.10	1.01	0.02	0.09	0.38	0.68	8.83	200
	[3.00]	[1.95]	[87.3]	[1.32]	[5.05]				
high	0.81	0.17	1.08	0.15	0.29	0.45	1.21	5.87	150
	[3.81]	[2.80]	[77]	[7.62]	[13.8]				
H-L	0.62	0.37	-0.04	0.14	0.56				
	[5.11]	[3.67]	[-1.73]	[4.30]	[15.8]				

- 7.5% per year in the biggest, most liquid stocks
  - Twice the spread of the similarly constructed value and profitability strategies

Portfolios (End 2010)

- **Long side**
  - **Top:** Astrazeneca, GlaxoSmithKline, JC Penney, Sears and Nokia
  - **Big:** WalMart, Johnson & Johnson, AT&T, Intel, Verizon, Kraft, Home Depot, CVS, Eli Lilly and Target
- **Short side**
  - **Bottom:** Ivanhoe Mines, Ultra Petroleum, Vertex Pharmaceuticals, Marriott International, Delta Airlines, Lockheed Martin and Unilever
  - **Big:** Apple, IBM, Philip Morris, McDonald's, Schlumberger, Disney, United Technologies, Qualcomm, Amazon and Boeing

“Explaining” anomalies

- Power of gross profits-to-assets suggests it might “explain” anomalies
  - A proximate, not ultimate explanation
    - Anomalies might be taking positions in profitability
    - Like LRR strategies are a backdoor to size and value
      - Doesn’t explain why profitable firms outperform in the first place
  - Simple Fama-French Time-Series regressions to identify theses positions
    - Profitability factor
    - Industry adjustments to HML and UMD

sorting variable used in strategy construction	$\mathbf{E}[r^e]$	α_{FF4}	alternative model abnormal returns and factor loadings				
			α	MKT	HML*	UMD*	PMU*
1 / market equity	0.35	-0.19	0.38	-0.01	0.43	0.25	-1.35
	[1.53]	[-1.60]	[1.54]	[-0.24]	[2.83]	[3.20]	[-6.42]
book-to-market	0.58	0.05	-0.03	-0.05	1.65	-0.02	-0.43
	[3.13]	[0.39]	[-0.20]	[-1.64]	[17.5]	[-0.41]	[-3.33]
prior performance	1.43	0.52	-0.14	0.07	0.47	2.25	0.08
	[4.28]	[3.99]	[-0.92]	[2.06]	[4.93]	[45.6]	[0.61]
ind. adj. profitability	0.21	0.32	-0.04	-0.06	-0.04	0.04	1.01
	[2.34]	[4.01]	[-0.61]	[-3.95]	[-0.86]	[1.63]	[16.8]
return-on-assets	0.67	0.84	-0.15	-0.10	0.06	0.35	2.33
	[2.81]	[4.63]	[-0.75]	[-2.39]	[0.49]	[5.53]	[13.6]
return-on-equity	1.02	0.82	0.07	-0.13	0.77	0.42	1.52
	[4.47]	[4.23]	[0.32]	[-2.82]	[5.76]	[6.09]	[8.23]
asset turnover	0.54	0.47	-0.15	0.26	0.15	-0.13	2.05
	[2.92]	[2.45]	[-0.81]	[6.95]	[1.40]	[-2.24]	[13.5]
gross margins	0.02	0.42	0.01	-0.01	-0.46	-0.07	1.00
	[0.15]	[3.33]	[0.05]	[-0.39]	[-4.97]	[-1.38]	[7.78]
SUE	0.69	0.54	0.36	0.06	-0.31	0.62	0.30
	[4.00]	[3.66]	[2.20]	[1.88]	[-3.08]	[11.9]	[2.13]

sorting variable used in strategy construction	$\mathbf{E}[r^e]$	α_{FF4}	alternative model abnormal returns and factor loadings				
			α	MKT	HML*	UMD*	PMU*
1 / failure probability	0.76 [2.09]	0.94 [4.44]	-0.26 [-0.99]	-0.34 [-6.41]	-0.34 [-2.11]	1.30 [15.8]	2.19 [9.93]
1/ Ohlson's O-score	0.11 [0.58]	0.59 [4.55]	0.09 [0.48]	-0.14 [-3.62]	-0.51 [-4.50]	0.16 [2.75]	0.85 [5.40]
1 / net stock issuance	0.73 [5.15]	0.62 [4.70]	0.21 [1.49]	-0.09 [-3.06]	0.64 [7.31]	0.07 [1.49]	0.81 [6.71]
1 / total accruals	0.37 [2.35]	0.37 [2.32]	0.39 [2.16]	-0.13 [-3.46]	0.28 [2.53]	0.05 [0.84]	-0.38 [-2.54]
1 / asset growth	0.70 [4.17]	0.30 [2.12]	0.23 [1.37]	-0.11 [-3.10]	1.06 [10.4]	0.13 [2.48]	-0.18 [-1.26]
organizational capital	0.46 [3.73]	0.30 [2.55]	0.27 [1.94]	-0.01 [-0.46]	0.06 [0.71]	0.18 [4.06]	0.25 [2.11]
r.m.s. pricing error	0.67	0.54	0.22				

- Roughly 2/3 of improved pricing comes from the profitability factor
  - Other 1/3 from industry adjusting HML and UMD

Conclusions

- Gross profitability is a powerful predictor of the cross-section of average returns
  - Obscured by its negative correlation with B/M
    - Sort on B/M, looks like profitable stocks underperform
- Presents an additional challenge to rational value stories
- "Explains" the abnormal performance of many seemingly unrelated strategies
  - Many anomalies take positions in profitability