The gross profitability anomaly: UK evidence.[1]

William Forbes, Roelof Salamons, Tim van de Pol.

March 3, 2017

[1]The authors are respectively a visiting Tutor a Visiting Professor and a former MSc student in the Economics Department in Groningen.

Abstract

The paper presents UK evidence on the proposition that there exists a profitability anomaly, implying profitable companies earn a premium return, even after controlling for the well documented "value-anomaly". We evaluate the value of trading on a stock's gross profitability using data on UK stocks in the years 1989-2015 and find support for its efficacy, especially when it is used as part of a mixed strategy as a hedge to trading the value-premium.

Investors have long been thought to "buy-earnings" when they choose to invest in a company's equity (**?**). For this reason a cottage industry of earnings based valuation models already exists (**?**, **?**. Strangely despite the acceptance of earnings as a key valuation metric until recently earnings was not embedded in the now accepted standard for risk-controls the Fama-French 3-factor model **?**. A direct mapping between expected returns and corporate earnings is implied by a reformulation of discounted dividend valuation model when clean-surplus accounting is imposed

$$\frac{M_t}{B_t} = \frac{\sum_{\tau=1}^{\infty} \frac{E(Y_{t+\tau} - dB_{t+\tau})}{(1+r)^{\tau}}}{B_t} \tag{1}$$

where M is the market value of the company, B is book-value as recorded in its closing balance-sheet/position statement, dB is the change in the company's balance-sheet value, Y is the company's earnings and r is the company's expected stock return. Fixing book-value for the company allows us to map corporate earnings Y into an implied stock market return for the company, with higher earnings implying higher expected returns.

Consistent with this **?** report that lagged profitability has predict average returns (see Table 2, Fama and French, 2006) Of course equation (1) above maps expected earnings, not lagged earnings into expected returns. But since since Fama and French (2006, 501) confirm profitability is very persistent this need not be a huge problem. Indeed they report "differences in lagged profitability and analysts' forecasts show up roughly one for one in future profitability". But while lagged profits predict current ones current profits reflect many other factors as well. Fama and French (2006, p 514) state "Many other variables contribute to forecast regressions of profitability and asset growth.Thus there is information about profitability and growth beyond that in lagged profitability and asset growth." So while there is an clear theoretical role for corporate earnings to drive future returns its empirical expression has been found more illusive.

Recently the role of profitability in driving expected future returns has been clearly chronicled in the United States by **?** and **?**. Novy-Marx advances gross profitability, revenue minus the cost of goods sold, as a better predictor of expected return than either earnings or cash-flow. Novy-Marx (2013, p 3) states "gross profitability is the cleanest measure of true economics profitability. The farther down the income statement one goes, the more polluted profitability measures become, and the less related they are to true economic profitability." So with this improved empirical proxy for a company's "earnings power" Novy-Marx (2013) and Fama and French (2015) are able to confirm the theoretical prediction of equation (1) above that higher earnings are associated with higher future returns.

A large part of the attraction of a trading strategy based on earnings is the degree to which serves as an effective hedge to the well known value-premium anomaly (see **?**) corrected by the standard Fama-French 3-factor model. Portfolios selected on the basis of profitability do well when the value discount is high and the value premium is high when profitability based portfolios perform poorly. Consequently Novy-Marx (2013, p16) reports over his US test period 1963-2010 a mixed, 50/50 split, value/profitabilty based strategy never results in a five-year period of overall loss.

1 Data and summary statistics.

We look for evidence of a gross profitability anomaly in the UK examining all non-financial stocks on the main UK exchange, so excluding AIM and over-the-counter traded stocks. Our sample includes 1498 stocks taken from 32 SEDOL industrial groups. The distribution of our sample company-years is fairly even across size quintiles but the market value of these quintiles is not. The overwhelming majority of the market capitalisation of our sample is squeezed into the biggest size quintile, while we our low on the "microcap" stocks Fama and French (2015) find so problematic, because we exclude the AIM market from our sample. So in terms of market value the credibility of the "gross-profitability" in the UK rests almost entirely on its presence in very high market capitalisation companies.

2 Literature

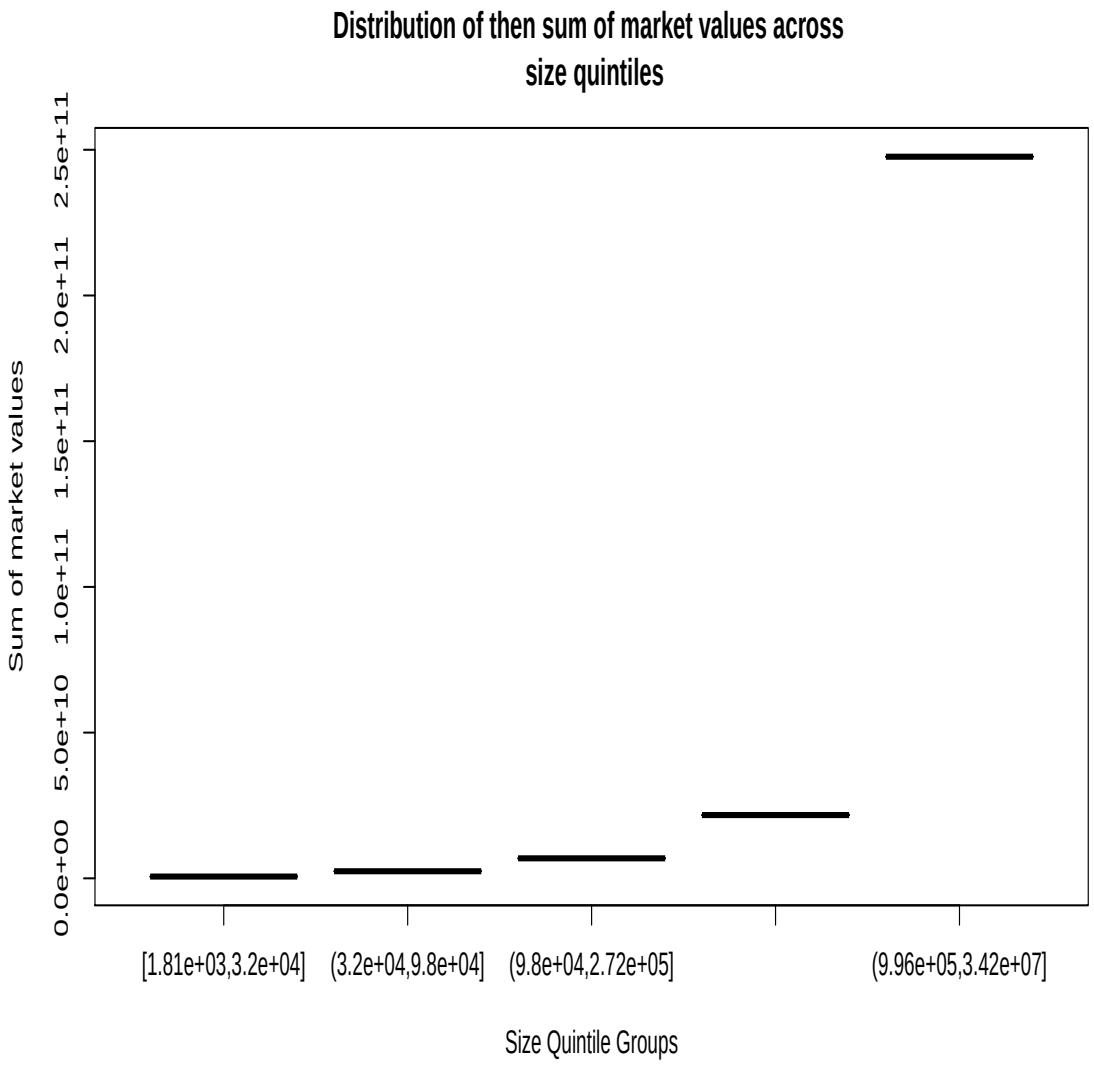
As in equation (1) and other ratios of cash-flow to price, a higher market value comes from lower expected returns or higher expected earnings. Variables of this nature predict discounted cash flows which implies that they both forecast discount rate growth and cash flow growth. Hence, controlling for the latter would enhance the forecasting power of cash flow to price metric such as the book-to-market ratio. **?** argues that, instead of net profitability as used by **?**, gross profitability provides a stronger signal for future profitability. The focal idea here is that if a company is investing today, today's profits may tank but it raises expected future profits. Likewise, **?** and **?** come up with similar measures of companies strength as which are proxies for expected net cash flow or, to see it another way, earnings minus investment. With this in mind, proxies such as profitability, asset growth and accruals variables hang together.

That said, **?** argue that an altered profitability measure, operating profitability exhibits a more dominant link with expected returns than either gross profits of net income. As **?** deflates gross profits by the book value total assets and net income by the book value of equity, **?** state that both the profit variables have similar power in forecasting average returns if deflated consistently. Similarly, deflating gross profits by total assets rather than by book equity creates an additional variable, the ratio of market value of assets to book value of total assets, that is priced according to **?** (GP/AT = GP/ME x ME/AT). Further, **?** find that cash-based operating profitability, so excluding accruals, outperforms profitability metric including accruals and argue that their cash based metric subsumes the accrual anomaly, as evidenced by **?**, in forecasting the cross section of average returns. These results coupled with the Olhson model (**?**, **?** and work of **?** provide a proper hypothesis for existence of a profitability premium in the equity markets of the UK.

3 Replicating NovyMarx tests.

We begin in Table 1 with some basic **?**. We present these regressions in their simplest bivariate form for our three central measures of profitability, gross profit, earnings and cash–flow as well as in a form which includes control variables for size, book to market and prior returns. Beginning with the simple bivariate regressions gross–profitability does indeed explain portfolio returns but its explanatory power is much lower than either earnings or cash-flow. In his original US NovyMarx study the explanatory power of gross profitability was about three times that of earnings and cash-flow. But in the UK the ability of gross profit to explain the performance of stock return

portfolios seems modest and is swamped by the ability of earnings, and to a lesser extent cash-flow, to do so. Adding in the controls for size and market value greatly reduces the coefficient on both earnings and cash-flow but does not alter the ranking of profitability variables the explanatory power with regard to stock returns. Following the original NovyMarx we repeat the Fam-MacBeth regresion tests on industry–mean adjusted returns. In the industry–mean adjusted regressions the performance of the three profitability variables in explaining returns narrows but remains the same in relative terms. The coefficient on gross-profitability rises substantially when an industry–mean adjustment is made but gross-profitability remains insignificant while both earnings and cash-flow continue to be significant significant.


Distribution of then sum of market values across size quintiles
Sum of market values
0.0e+00
5.0e+10
1.0e+11
1.5e+11
2.0e+11
2.5e+11
[1.81e+03,3.2e+04]
(3.2e+04,9.8e+04]
(9.8e+04,2.72e+05]
(9.96e+05,3.42e+07]
Size Quintile Groups

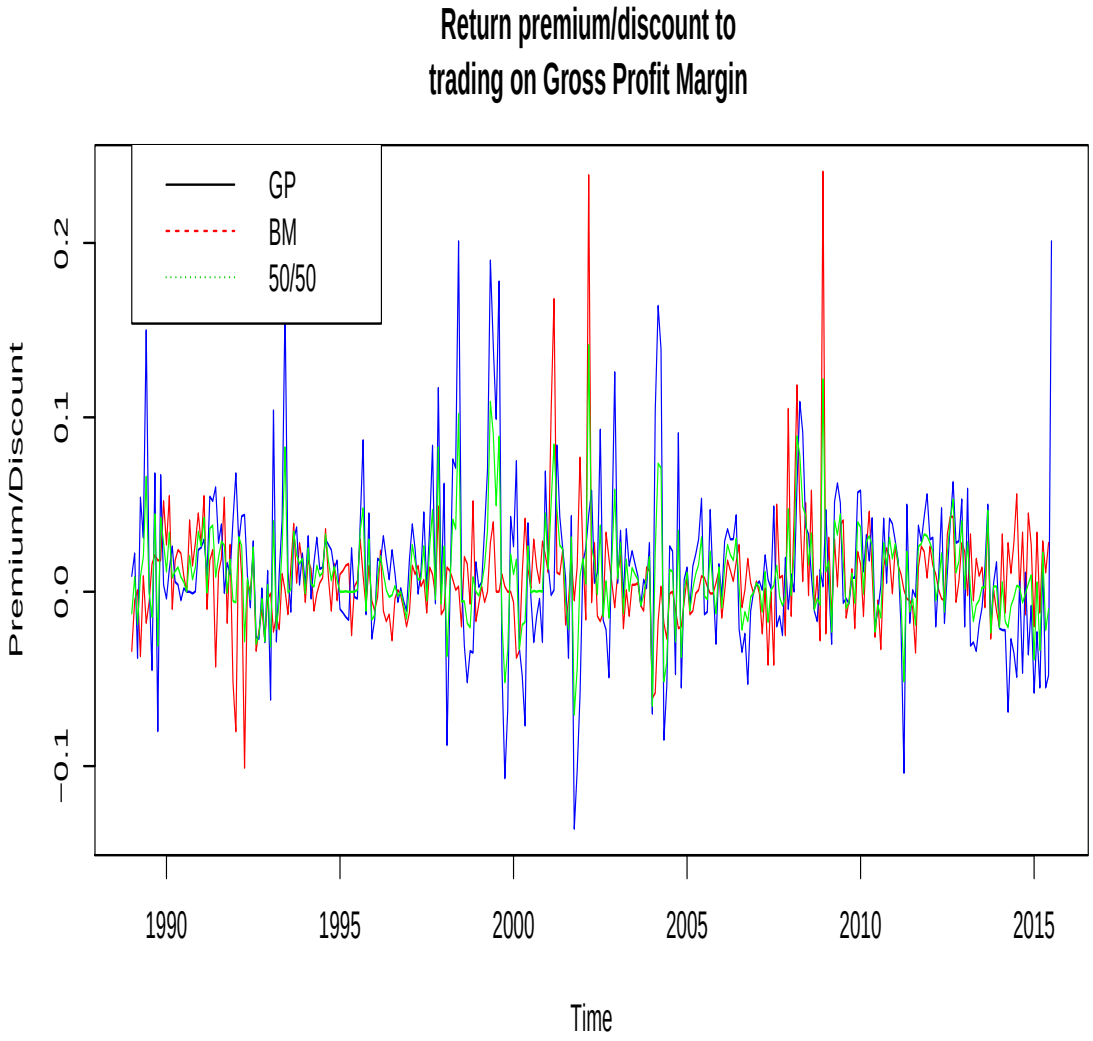

Return premium/discount to
trading on Gross Profit Margin
GP
BM
50/50
Premium/Discount
−0.1
0.0
0.1
0.2
1990
1995
2000
2005
2010
2015
Time

Table 1: **Fama-McBeth regression of shareholder returns on (unscaled) profitability metrics.**

Unscaled variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Adj R-square	N
Univariate	Gross Profit	Earnings	FCF	log(BM)	log(MV)	r1,0	r12,2		
Gross Profitability	0.002							0	15229
	(3.89)								
Earnings	0.15							0.037	15229
	(24.37)								
Free Cash Flow	0.013							0.032	15229
	(22.50)								
log(Book to Market)	-0.003							0.009	14747
	(-11.92)								
log(Market Equity)	0.002							0.017	15229
	(16.34)								
r1,0	0.96							0	15229
	(325.16)								
r12,2	0,12							0	15229
	(14.3)								
Regressions + controls									
Gross Profitability	0.0007			0.0006	-0.001	0.98	-0.069	0.8	13406
	(1.59)			(2.77)	(-5.30)	(313.97)	(-21.49)		
Earnings		0.002		0.0005	-0.0009	0.979	-0.072	0.8	13406
		(5.00)		(2.66)	(-6.06)	(303.92)	(22.00)		
Cash-Flow			0.001	0.0005	-0.001	0.98	-0.071	0.8	13406
			(4.59)	(2.47)	(-5.99)	(305.09)	(-21.877)		

Table 2: **Fama-McBeth regression of shareholder returns on (scaled) profitability metrics**

Performance Metric				log(BM)	log(MV)	r_{t-1}	$r_{0,t-1}$	$r_{2,t-12}$	R-sq
N									
Gross Profitability-Industry-adjusted	0.009			0.005	0	0.97	-0.08	0.78	13406
	(1.87)			(2.96)	(-0.81)	(285.00)	(-23.60)		
Earnings Industry-adjusted		0.002		0.0005	-0.001	0.979	-0.072	0.8	13406
		(5.00)		(2.66)	(-6.05)	(303.92)	(-6.60)		
Cash Industry-adjusted			0.0015	0.0004	-0.001	0.97	-0.071	0.8	13406
			(4.59)	(2.47)	(6.00)	(305.09)	(-21.87)		

Table 3: **Portfolio characteristics across Gross Profit and Book to Market Value Quintile double-sorts.**

Portfolio characteristics	GP/A	B/M	ME	N
Lowest Gross Profit	0.09	0.002	192678.4	40535
2	0.23	0.004	1598591.6	40521
3	0.36	0.006	1191068.4	40526
4	0.53	0.001	1276957.2	40523
Highest Gross Profit	1.19	0.001	896360.6	40526
Portfolio characteristics	GP/A	B/M	ME	N
Lowest Book to Market	0.678	-0.0005	302743.5	40527
2	0.559	0.003	840888.9	40527
3	0.475	0.005	239079.2	40527
4	0.401	0.008	1618853.4	40526
Highest Book to Market	0.314	0.012	1734140.4	40524

Table 4: Size portfolio time–series average characteristics.

Table 3 replication					
	Smaller	2	3	4	Larger
Number of companies	859	966	904	764	460
% of companies	21.73%	24.44%	22.87%	19.33%	11.64%
Average Market Capitalisation	14836.9	60844.78	169100.4	536070.05	6110445.96
Total Market Capitalisation	610167622	2429714487	6859557710	21704404189	2.4761E+11
% of total market capitalisation	0.22%	0.87%	2.46%	7.77%	88.68%
Average Book to Market	0.0015	0.00086	0.00064	0.000567	0.00047
Average Gross Profit/Assets	0.509	0.522	0.503	0.458	0.434

Table 5: Add caption

			Fama-French factors in GPA Quintiles				
Gross Profitability	Intercept	rmrf loading	smb loading	hml loading	Raw return	rmrf factor	smb f
Low	-0.005033	0.88774	0.688798	0.117371	-0.00161065	0.00326664	0.00098
2	-0.001471	0.90014	0.649609	0.17361	0.002764933	0.00369732	0.00102
3	-0.001264	0.855896	0.75623	0.134162	0.003246412	0.00411385	0.00094
4	0.0009554	0.8465335	0.7257928	0.0684736	0.005157822	0.00409715	0.00078
High	0.0004283	0.8408011	0.797928	0.1126248	0.004508201	0.00392804	0.00056

Table 6: Add caption

Table 4: Part A Portfolio returns to GPA/Size Quintiles

Gross Profitability	Low	2	3	4	High
Smallest	-0.019	-0.013	-0.012	-0.009	-0.012
2	-0.007	-0.006	-0.004	0.001	0.001
3	-0.003	-0.0002	0.00017	0.002	0.002
4	NA	0.002	0.004	0.005	0.005
Largest	0.0021	0.006	0.006	0.006	0.006

Table 7: Add caption

	Sample size by GPA/Size Quintile-Table 4: Panel B				
Gross Profitability	Low	2	3	4	High
Small	273	285	333	320	303
2	309	333	377	365	321
3	302	349	354	339	302
4	NA	325	306	306	201
Large	198	226	200	149	131

Table 8: Add caption

	Table 5-Panel B Global 3-factors by Book to Market				
Book to Market	Low	2	3	4	5
return on equity	0.01	0.01	0.005	0.0001	-0.013
	(17.39)	(20.79)	(10.63)	(0.32)	(-19.81)
α	0.001	0.002	-0.002	-0.007	-0.02
	(1.72)	(4.17)	(-4.98)	(-13.23)	(-29.15)
MKT	0.94	0.87	0.86	0.83	0.79
	(63.82)	(70.79)	(72.09)	(67.66)	(55.10)
SMB	0.76	0.68	0.68	0.71	0.79
	(42.57)	(44.13)	(45.21)	(45.27)	(43.93)
HML	-0.25	0.027	0.13	0.32	0.41
	(-16.07)	(-1.86)	(8.93)	(21.88)	(24.63)