

The Other Side of Value: The Gross Profitability Premium

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Abstract

Profitability, measured by gross profits-to-assets, has roughly the same power as book-to-market predicting the cross-section of average returns. Profitable firms generate significantly higher returns than unprofitable firms, despite having significantly higher valuation ratios. Controlling for profitability also dramatically increases the performance of value strategies, especially among the largest, most liquid stocks. These results are difficult to reconcile with popular explanations of the value premium, as profitable firms are less prone to distress, have longer cash flow durations, and have lower levels of operating leverage. Controlling for gross profitability explains most earnings related anomalies, and a wide range of seemingly unrelated profitable trading strategies.

Keywords: Profitability, value premium, factor models, asset pricing.

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1 Introduction

Profitability, as measured by gross profits-to-assets, has roughly the same power as book-to-market predicting the cross-section of average returns. It is also complimentary to book-to-market, contributing economically significant information above that contained in valuations. These conclusions differ dramatically from those of earlier studies (Fama and French (1993, 2006)), which find that profitability, as measured by earnings-to-assets, adds little or nothing to the prediction of returns provided by size and book-to-market. Gross profitability has far more power than earnings, however, predicting the cross section of returns.

Strategies based on gross profitability generate value-like average excess returns, even though they are growth strategies that provide an excellent hedge for value. At the same time the two strategies, despite being highly dissimilar in both characteristics and covariances, share much in common philosophically. While traditional value strategies finance the acquisition of inexpensive assets by selling expensive assets, profitability strategies exploit a different dimension of value, financing the acquisition of productive assets by selling unproductive assets. Because the two effects are closely related, it is useful to analyze profitability in the context of value.

Value strategies hold firms with inexpensive assets and short firms with expensive assets. When a firm's market value is low relative to its book value, then a stock purchaser acquires a relatively large quantity of book assets for each dollar spent on the firm. When a firm's market price is high relative to its book value the opposite is true. Value strategies were first advocated by Graham and Dodd in 1934, and their profitability has been documented countless times since.

Berk (1995) argues that the profitability of value strategies is mechanical. Firms for

which investors require high rates of return (i.e., risky firms) are priced lower, and consequently have higher book-to-markets, than firms for which investors require lower returns. Because valuation ratios help identify variation in expected returns, with higher book-to-markets indicating higher required rates, value firms generate higher average returns than growth firms.

A similar argument suggests that firms with productive assets should yield higher average returns than firms with unproductive assets. Productive firms that investors demand high average returns to hold should be priced similarly to less productive firms for which investors demand lower returns. Variation in productivity therefore helps identify variation in investors' required rates of return. Because productivity helps identify this variation, with higher profitability indicating higher required rates, profitable firms generate higher average returns than unprofitable firms. This fact motivates the return-on-asset factor employed in Chen, Novy-Marx and Zhang (2010).

Gross profits is the cleanest accounting measure of true economic 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. For example, a firm that has both lower production costs and higher sales than its competitors is unambiguously more profitable. Even so, it can easily have lower earnings than its competitors. If the firm is quickly increasing its sales through aggressive advertising, or commissions to its sales force, these actions can, even if optimal, reduce its bottom line income below that of its less profitable competitors. Similarly, if the firm spends on research and development to further increase its production advantage, or invests in organizational capital that will help it maintain its competitive advantage, these actions result in lower current earnings. Moreover, capital expenditures that directly increase the scale of the firm's operations further reduce its free cash flows relative to its competitors. These facts suggest constructing the

empirical proxy for productivity using gross profits.¹ Scaling by a book-based measure, instead of a market-based measure, avoids hopelessly conflating the productivity proxy with book-to-market. I scale gross profits by book assets, not book equity, because gross profits are an asset level measure of earnings. They are not reduced by interest payments, and are thus independent of leverage.

Determining the best measure of economic productivity is, however, ultimately an empirical question. Popular media is preoccupied with earnings, the variable on which Wall Street analysts' forecasts focus. Financial economists are generally more concerned with free cash flows, the present discounted value of which should determine a firm's value. I therefore also consider profitability measures constructed using earnings and free cash flows.

In a horse race between these three measures of productivity, gross profits-to-assets is the clear winner. Gross profits-to-assets has roughly the same power predicting the cross-section of expected returns as book-to-market. It completely subsumes the earnings based measure, and has significantly more power than the measure based on free cash flows. Gross profits-to-assets also is both strongly contemporaneously correlated with valuations, and predicts long run growth in gross profitability, earnings, free cash flows, and payouts (dividends plus stock repurchases), facts which may help explain why it is useful in forecasting returns.

Consistent with these results, portfolios sorted on gross-profits-to-assets exhibit large variation in average returns, especially in sorts that control for book-to-market. More profitable firms earn significantly higher average returns than unprofitable firms. They do so despite having, on average, lower book-to-markets and higher market capitalizations. Prof-

¹ Several studies have found a role for individual components of the difference between gross profits and earnings. For example, Sloan (1996) and Chan et. al. (2006) find that accruals predict returns, while Chan, Lakonishok and Sougiannis (2001) argue that R&D and advertising expenditures have power in the cross-section. Lakonishok, Shleifer, and Vishny (1994) also find that strategies formed on the basis of cash flow, defined as earnings plus depreciation, are more profitable than those formed on the basis of earnings alone.

itable firms are high return “good growth” stocks, while unprofitable firms are low return “value trap” stocks. Because strategies based on profitability are growth strategies, they provide an excellent hedge for value strategies, and thus dramatically improve a value investor’s investment opportunity set. In fact, the profitability strategy, despite generating significant returns on its own, actually provides insurance for value; adding profitability on top of a value strategy reduces the strategy’s overall volatility, despite doubling its exposure to risky assets. A value investor can thus capture the gross profitability premium without exposing herself to any additional risk. These results contrast strongly with those of Fama and French (2006), who find that profitability, at least as measured by earnings, adds little or nothing in economic terms to the prediction of returns provided by size and book-to-market.

These facts are difficult to reconcile with the interpretation of the value premium provided by Fama and French (1993), which explicitly relates value stocks’ high average returns to their low profitabilities. In particular, they note that “low-BE/ME firms have persistently high earnings and high-BE/ME firms have persistently low earnings,” suggesting that “the difference between the returns on high- and low-BE/ME stocks, captures variation through time in a risk factor that is related to relative earnings performance.” While a sort on book-to-market does yield a value strategy that is short profitability, a direct analysis of profitability shows that the value premium is emphatically not driven by unprofitable stocks.

My results present a similar problem for Lettau and Wachter’s (2007) duration-based explanation of the value premium. In their model, short-duration assets are riskier than long duration assets, and generate higher average returns. Value firms have short durations, and consequently generate higher average returns than longer duration growth firms. In the data, however, gross profitability is associated with long run growth in profits, earnings, free cash flows, and payouts. Profitable firms consequently have longer durations than less

profitable firms, and the Lettau-Wachter model therefore predicts, counter-factually, that profitable firms should underperform unprofitable firms.

The fact that profitable firms earn significantly higher average returns than unprofitable firms also poses difficulties for the “operating leverage hypothesis” of Carlson, Fisher, and Giammarino (2004), which drives the value premium in Zhang (2005) and Novy-Marx (2009, 2011). Under this hypothesis, operating leverage magnifies firms’ exposures to economic risks, because firms’ profits look like levered claims on their assets. In models employing this mechanism, however, operating leverage, risk, and expected returns are generally all decreasing with profitability. This is contrary to the profitability/expected return relation observed in the data.

The paper also shows that most earnings related anomalies, as well as a large number of seemingly unrelated anomalies, are really just different expressions of three basic underlying anomalies, mixed in various proportions and dressed up in different guises. A four-factor model, employing the market and industry-adjusted value, momentum and gross profitability “factors,” performs remarkably well pricing a wide range of anomalies, including (but not limited to) strategies based on return-on-equity, market power, default risk, net stock issuance and organizational capital.

Finally, the prediction that profitable firms should outperform unprofitable firms can be motivated just as easily on behavioral grounds, with an argument that is again closely related to “value.” The popular behavioral explanation for the high average returns observed on value stocks, consistent with Graham and Dodd’s original concept and advocated by Lakonishok, Shleifer, and Vishny (1994), is that low book-to-market stocks are on average overpriced, while the opposite is true for high book-to-market stocks. If stocks are not perfectly priced in the cross-section, then buying value stocks and selling growth stocks represents a crude but effective method for exploiting misvaluations. While there is certainly large variation in the true value of book-assets, and this drives the great majority of

the observed variation in book-to-market ratios, value strategies nevertheless produce value and growth portfolios biased toward under- and over-priced stocks, respectively.

A similar argument suggests that firms with productive assets should generate higher average returns than firms with unproductive assets. If stocks are not perfectly priced in the cross-section, then among firms with similar book-to-market ratios, productive firms are on average underpriced, while the opposite is true for unproductive firms. A trading strategy that buys firms with productive assets and sells firms with unproductive assets should generate positive abnormal returns because the long and short sides of the strategy will be biased toward under- and over-priced stocks, respectively.

Distinguishing between competing stories for the observed profitability premium is, however, beyond the scope of this paper. This paper is primarily concerned with documenting the fact that gross profits-to-assets has power predicting the cross section of average returns that both rivals, and is complimentary to, that of book-to-market.

The remainder of the paper is organized as follows. Section 2 provides a simple theoretical framework for the prediction that it is gross profits, and not earnings, that is strongly associated with average returns. Section 3 shows that gross profits-to-assets truly is a powerful predictor of the cross-section of expected returns. Section 4 investigates the relation between profitability and value more closely. It shows that controlling for book-to-market significantly improves the performance of profitability strategies, and that controlling for gross profits-to-assets significantly improves the performance of value strategies. Section 5 shows that these results hold even among the largest, most liquid stocks. Section 6 considers the performance of a four-factor model that employs the market and industry-adjusted value, momentum and gross profitability “factors,” and shows that this model performs better than canonical models pricing a wide array of anomalies. Section 7 concludes.

2 The relation between profitability and expected returns

Fama and French (2006) illustrate the intuition that book-to-market and profitability are both positively related to expected returns using the dividend discount model in conjunction with clean surplus accounting. In the dividend discount model a stock's price equals the present value of its expected dividends, while under clean surplus accounting the change in book equity equals retained earnings. Together these imply the market value of equity (cum dividend) is

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

where Y_t is time- t earnings, $dB_t \equiv B_t - B_{t-1}$ is the change in book equity, and r is the required rate of return on expected dividends. Holding all else equal, higher valuations imply lower expected returns, while higher expected earnings imply higher expected returns. That is, value firms should outperform growth firms, and profitable firms should outperform unprofitable firms.

Fama and French (2006) test the profitability/expected return relation with mixed results. Their cross-sectional regressions suggest that earnings is related to average returns in the manner predicted, but their portfolio tests suggest that profitability adds little or nothing to the prediction of returns provided by size and book-to-market. These empirical tests, however, employ current earnings as a simple proxy for future profitability. A deeper examination of equation (1) suggests that this proxy is poor.

To see why earnings is a poor proxy for future profitability, note that current earnings consist of the economic profits created by the firm, less investments treated as operating expenses (e.g., R&D, or advertising). Letting S denote economic profits (or “surplus”) and X denote investments treated as operating expenses, the previous equation can be written

recursively as

$$M_t = (S_t - X_t) - dB_t + \frac{\mathbf{E}_t[M_{t+1} | X = X_t, dB = dB_t]}{1 + r}. \quad (2)$$

This equation makes explicit the fact that the earnings process in equation (1), and consequently expected firm value tomorrow, are linked directly to decisions the firm makes today, some of which have a material impact on current earnings. That is, when considering changes to earnings in equation (1), it makes no sense to “hold all else equal.” Higher expensed investment directly reduces earnings without increasing book equity. These expenses should be associated, however, with higher future economic profits, and thus higher future dividends.

The previous equation can be rewritten as

$$M_t = S_t + \frac{\mathbf{E}_t[M_{t+1} | X = 0, dB = 0]}{1 + r} + N_t \quad (3)$$

where N_t is the inframarginal rents (or “net gain”) to expensed earnings and retained investment,

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

Equation (3) only depends on current expensed earnings and retained investment through N_t , the rents they generate. If the rents to “plow back” are small, then N_t is small. If a dollar of expensed investment or retained earnings increases the expected present value of future dividends by roughly a dollar, then it has a small effect on the cum dividend price of the stock, and is thus relatively uninformative. Economic profitability is, however, highly informative. It is strongly associated with prices today, both directly through its inclusion of the right hand side of equation (3), and indirectly because profitability is highly

persistent and thus a component of prices tomorrow. The data support this prediction. Gross profitability correlates much more strongly with contemporaneous valuation ratios than do earnings.

It is consequently economic profitability, not earnings, that is related to expected returns in the dividend discount model. Conditional on economic profitability, higher valuations imply lower expected stock returns, while conditional on valuations, greater economic profitability implies higher expected stock returns. That is, value firms should outperform growth firms, and profitable firms should outperform unprofitable firms, where “profitable” means firms that generate large economic profits, not those with high earnings.

3 Profitability and the cross-section of expected returns

Table 1 shows results of Fama-MacBeth regressions of firms’ returns on gross profits, earnings, and free cash flow, each scaled by assets. Regressions include controls for book-to-market ($\log(\text{bm})$), size ($\log(\text{me})$), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$).² Time-series averages of the cross-sectional Spearman rank correlations between these independent variables are provided in Appendix A.1, and show that gross profitability is negatively correlated with book-to-market, with a

² Gross profits and earnings before extraordinary items are Compustat data items GP and IB, respectively. For free cash flow I employ net income plus depreciation and amortization minus changes in working capital minus capital expenditures ($\text{NI} + \text{DP} - \text{WCAPCH} - \text{CAPX}$). Gross profits is also defined as total revenue (REVT) minus cost of goods sold (COGS), where COGS represents all expenses directly related to production, including the cost of materials and direct labor, amortization of software and capital with a useful life of less than two years, license fees, lease payments, maintenance and repairs, taxes other than income taxes, and expenses related to distribution and warehousing, and heat, lights, and power. Book-to-market is book equity scaled by market equity, where market equity is lagged six months to avoid taking unintentional positions in momentum. Book equity is shareholder equity, plus deferred taxes, minus preferred stock, when available. For the components of shareholder equity, I employ tiered definitions largely consistent with those used by Fama and French (1993) to construct HML. Stockholders equity is as given in Compustat (SEQ) if available, or else common equity plus the carrying value of preferred stock ($\text{CEQ} + \text{PSTX}$) if available, or else total assets minus total liabilities ($\text{AT} - \text{LT}$). Deferred taxes is deferred taxes and investment tax credits (TXDITC) if available, or else deferred taxes and/or investment tax credit (TXDB and/or ITCB). Preferred stock is redemption value (PSTKR) if available, or else liquidating value (PSTKRL) if available, or else carrying value (PSTK).

magnitude similar to the negative correlation observed between book-to-market and size. Independent variables are Winsorized at the one and 99% levels. I employ Compustat data starting in 1962, the year of the AMEX inclusion, and lag accounting data to the end of June of the following year. Asset pricing tests consequently cover July 1963 through December 2010. The sample excludes financial firms (i.e., those with a one-digit SIC code of six), though results including financial firms are qualitatively identical. The table also shows results employing gross profits, earnings, and free cash flow demeaned by industry, where the industries are the Fama-French (1997) 49 industry portfolios.

The first specification of Panel A shows that gross profitability has roughly the same power as book-to-market predicting the cross-section of returns. Profitable firms generate higher average returns than unprofitable firms. The second and third specifications replace gross profitability with earnings and free cash flow, respectively. Each of these variables has power individually, though less power than gross profitability. The fourth and fifth specifications show that gross profitability completely subsumes earnings, and largely subsumes free cash flow. The sixth specification shows that free cash flow subsumes earnings. The seventh specification shows that free cash flow has incremental power above that in gross profitability after controlling for earnings, but that gross profitability is still the stronger predictive variable.

Appendix A.2 performs similar regressions employing alternative earnings variables. In particular, it considers earnings before interest, taxes, depreciation and amortization (EBITDA) and selling, general and administrative expenses (XSGA), which together represent a decomposition of gross profits. These regressions show that EBITDA-to-assets and XSGA-to-assets each have significant power predicating the cross section of returns, both individually and jointly, but that gross profits-to-assets subsumes their predictive powers. It also considers the “DuPont Model” decomposition of gross profits-to-assets into asset turnover (sales-to-assets, an accounting measure of efficiency) and gross margins (gross

Table 1. Fama-MacBeth regressions of returns on measures of profitability

Panel A reports results from Fama-MacBeth regressions of firms' returns on gross profits (revenues minus cost of goods sold, Compustat REVT - COGS), income before extraordinary items (IB), and free cash flow (net income plus amortization and depreciation minus changes in working capital minus capital expenditures, NI + DP - WCAPCH - CAPX), each scaled by assets (AT). Panel B repeats the tests of panel A, employing profitability measures demeaned by industry (Fama-French 49). Regressions include controls for book-to-market ($\log(\text{bm})$), size ($\log(\text{me})$), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$). Independent variables are Winsorized at the one and 99% levels. The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: straight profitability variables							
gross profitability	0.66 [4.99]			0.66 [5.22]	0.59 [4.76]		0.60 [4.83]
earnings		0.74 [1.72]		0.21 [0.47]		0.01 [0.03]	-0.31 [-0.63]
free cash flow			0.64 [2.50]		0.31 [1.19]	0.94 [3.13]	0.75 [2.57]
$\log(\text{BM})$	0.31 [5.36]	0.29 [5.29]	0.25 [4.72]	0.32 [5.87]	0.28 [5.31]	0.27 [5.05]	0.30 [5.64]
$\log(\text{ME})$	-0.14 [-3.39]	-0.16 [-4.15]	-0.16 [-4.13]	-0.14 [-3.73]	-0.15 [-3.80]	-0.16 [-4.19]	-0.14 [-3.80]
$r_{1,0}$	-6.07 [-15.2]	-6.07 [-15.3]	-6.06 [-15.3]	-6.17 [-15.6]	-6.15 [-15.6]	-6.11 [-15.5]	-6.20 [-15.8]
$r_{12,2}$	0.60 [3.27]	0.61 [3.34]	0.62 [3.42]	0.56 [3.09]	0.58 [3.18]	0.60 [3.30]	0.55 [3.07]
Panel B: profitability variables demeaned by industry							
gross profitability	0.90 [8.30]			0.88 [10.0]	0.67 [6.35]		0.70 [6.91]
earnings		0.83 [1.86]		0.16 [0.34]		0.10 [0.19]	-0.33 [-0.64]
free cash flow			0.99 [4.61]		0.65 [3.10]	1.05 [3.96]	0.89 [3.39]
$\log(\text{BM})$	0.31 [5.19]	0.26 [4.08]	0.24 [3.80]	0.32 [5.52]	0.26 [4.13]	0.24 [3.81]	0.27 [4.13]
$\log(\text{ME})$	-0.14 [-3.11]	-0.15 [-3.32]	-0.15 [-3.29]	-0.13 [-3.39]	-0.14 [-3.13]	-0.15 [-3.37]	-0.14 [-3.15]
$r_{1,0}$	-6.01 [-14.3]	-6.34 [-14.2]	-6.34 [-14.1]	-6.1 [-14.7]	-6.37 [-14.2]	-6.36 [-14.3]	-6.39 [-14.3]
$r_{12,2}$	0.60 [3.12]	0.58 [2.74]	0.58 [2.76]	0.57 [2.98]	0.56 [2.67]	0.57 [2.70]	0.55 [2.61]

profits-to-sales, a measure of market power). These variables also have power predicating the cross section of returns, both individually and jointly, but again lose their power when used in conjunction with gross profitability. The analysis does suggest however that high asset turnover primarily drives the high average returns of profitable firms, while high gross margins are the distinguishing characteristic of “good growth” stocks.

The power gross profitability has predicting returns observed in Table 1 is also not driven by accruals or R&D expenditures. While these both represent components of the wedge between earnings and gross profits, and Sloan (1996) and Chan, Lakonishok and Sougiannis (2001) show, respectively, that these each have power in the cross section, the results of Sloan and Chan et. al. cannot explain those presented here. Appendix A.3 shows that gross profits-to-assets retains power predicting returns after controlling for accruals and R&D expenditures. This is not to say that the results of Sloan and Chan et. al. do not exist independently, but simply that gross profitability’s power to predict returns persists after controlling for these earlier, well documented results.

Panel B repeats the tests of panel A, employing gross profits-to-assets, earnings-to-assets and free cash flow-to-assets demeaned by industry. These tests tell the same basic story, though the results here are even stronger. Gross profits-to-assets is a powerful predictor of the cross-section of returns. The test-statistic on the slope coefficient on gross profits-to-assets demeaned by industry is more than one and a half times as large as that on the variable associated with value ($\log(\text{BM})$), and more than two and a half times as large on the variable associated with momentum ($r_{12,2}$). Free cash flows also has some power, though less than gross profits. Earnings convey little information regarding future performance. The use of industry-adjustment to better predict the cross-section of returns is investigated in greater detail in section 6.

Because gross profitability appears to be the measure of basic profitability with the most power predicting the cross-section of expected returns, it is the measure I focus on for the

remainder of the paper.

3.1 Sorts on profitability

The Fama-MacBeth regressions of Table 1 suggest that profitability predicts expected returns. These regressions, because they weight each observation equally, put tremendous weight on the nano- and micro-cap stocks, which make up roughly two-thirds of the market by name but less than 6% of the market by capitalization. The Fama-MacBeth regressions are also sensitive to outliers, and impose a potentially misspecified parametric relation between the variables, making the economic significance of the results difficult to judge. This section attempts to address these issues by considering the performance of value-weighted portfolios sorted on profitability, non-parametrically testing the hypothesis that profitability predicts average returns.

Table 2 shows results of univariate sorts on gross profits-to-assets $((REVT - COGS) / AT)$ and, for comparison, valuation ratios (book-to-market). The Spearman rank correlation between gross profits-to-assets and book-to-market ratios is -18%, and highly significant, so strategies formed on the basis of gross profitability should be growth strategies, while value strategies should hold unprofitable firms. Portfolios are constructed using a quintile sort, based on New York Stock Exchange (NYSE) break points, and are rebalanced each year at the end of June. The table shows the portfolios' value-weighted average excess returns, results of the regressions of the portfolios' returns on the three Fama-French factors, and the time-series average of the portfolios' gross profits-to-assets (GPA), book-to-markets (BM), and market capitalizations (ME), as well as the average number of firms in each portfolio (n). The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

The table shows that the gross profits-to-assets portfolios' average excess returns are

Table 2. Excess returns to portfolios sorted on profitability

This table shows monthly value-weighted average excess returns to portfolios sorted on gross profits-to-assets ((REVT - COGS) / AT), employing NYSE breakpoints, and results of time-series regressions of these portfolios' returns on the Fama-French factors. It also shows time-series average portfolio characteristics (portfolio gross profits-to-assets (GPA), book-to-market (BM), average firm size (ME, in 10^6), and number of firms (n)). Panel B provides similar results for portfolios sorted on book-to-market. The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

Panel A: portfolios sorted on gross profits-to-assets									
	r^e	FF3 alphas and factor loadings				portfolio characteristics			
		α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.31 [1.65]	-0.18 [-2.54]	0.94 [57.7]	0.04 [1.57]	0.15 [5.87]	0.10	1.10	748	771
2	0.41 [2.08]	-0.11 [-1.65]	1.03 [67.5]	-0.07 [-3.13]	0.20 [8.51]	0.20	0.98	1,100	598
3	0.52 [2.60]	0.02 [0.27]	1.02 [69.9]	-0.00 [-0.21]	0.12 [5.42]	0.30	1.00	1,114	670
4	0.41 [1.94]	0.05 [0.83]	1.01 [70.6]	0.04 [1.90]	-0.24 [-11.2]	0.42	0.53	1,114	779
High	0.62 [3.12]	0.34 [5.01]	0.92 [58.3]	-0.04 [-2.03]	-0.29 [-12.3]	0.68	0.33	1,096	938
H-L	0.31 [2.49]	0.52 [4.49]	-0.03 [-0.99]	-0.08 [-2.15]	-0.44 [-10.8]				
Panel B: portfolios sorted on book-to-market									
	r^e	FF3 alphas and factor loadings				portfolio characteristics			
		α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.39 [1.88]	0.13 [2.90]	0.98 [90.1]	-0.09 [-5.62]	-0.39 [-23.9]	0.43	0.25	1,914	965
2	0.45 [2.33]	-0.02 [-0.29]	0.99 [78.1]	0.05 [2.61]	0.04 [2.23]	0.31	0.54	1,145	696
3	0.56 [2.99]	0.03 [0.53]	0.96 [63.5]	0.04 [2.09]	0.22 [9.71]	0.26	0.79	849	640
4	0.67 [3.58]	-0.00 [-0.03]	0.96 [74.8]	0.10 [5.66]	0.53 [27.1]	0.21	1.12	641	655
High	0.80 [3.88]	0.07 [1.04]	1.01 [60.7]	0.25 [10.7]	0.51 [20.5]	0.21	5.47	367	703
H-L	0.41 [2.95]	-0.06 [-0.71]	0.03 [1.44]	0.34 [12.0]	0.91 [30.0]				

generally increasing with profitability, with the most profitable firms earning 0.31 percent per month higher average returns than the least profitable firms, with a test-statistic of 2.49. This significant profitable-minus-unprofitable return spread is observed despite the fact that the strategy is a growth strategy, with a large, significant negative loading on HML. As a result, the abnormal returns of the profitable-minus-unprofitable return spread relative to the Fama-French three-factor model is 0.52 percent per month, with a test-statistic of 4.49.³

Consistent with the observed variation in HML loadings, the portfolios sorted on gross profitability exhibit large variation in the value characteristic. Profitable firms tend to be growth firms, in the sense of having low book-to-markets, while unprofitable firms tend to be value firms, with high book-to-market. In fact, the portfolios sorted on gross profitability exhibit roughly half the variation in book-to-markets as portfolios sorted directly on book-to-market (Table 2, Panel B). Profitable firms also tend to be growth firms, in the literal sense that they grow faster. Gross profitability is a powerful predictor of future growth in gross profitability, earnings, free cash flow and payouts (dividends plus repurchases) at both three and ten year horizons (see Appendix A.4).

While the high gross profits-to-assets stocks resemble typical growth firms in both characteristics and covariances (low book-to-markets and negative HML loadings), they are distinctly dissimilar in terms of expected returns. That is, while they appear to be typical growth firms under standard definitions, they are really “good growth” firms, exceptional in their tendency to outperform the market despite their low book-to-markets. Similarly, while the unprofitable stocks are value stocks, they are “value trap” stocks, which underperform the market despite their low valuations and high HML loadings.

³ Including financial firms reduces the profitable-minus-unprofitable return spread to 0.25 percent per month, with a test-statistic of 1.82, but increases the Fama-French alpha of the spread to 0.61 percent per month, with a test-statistic of 5.62. Most financial firms end up in the first portfolio, because their large asset bases result in low profits-to-assets ratios. This slightly increases the low profitability portfolio’s average returns, but also significantly increases its HML loading.

Because the profitability strategy is a growth strategy it provides a great hedge for value strategies. The monthly average returns to the profitability and value strategies presented in Table 2 are 0.31 and 0.41 percent per month, respectively, with standard deviations of 2.94 and 3.27 percent. An investor running the two strategies together would capture both strategies' returns, 0.71 percent per month, but would face no additional risk. The monthly standard deviation of the joint strategy, despite having long/short positions twice as large as those of the individual strategies, is only 2.89 percent. That is, while the 31 basis point per month gross profitability spread is somewhat modest, it is a payment an investor receives (instead of pays) for insuring a value strategy. As a result, the test-statistic on the average monthly returns to the mixed profitability/value strategy is 5.87, and its realized annual Sharpe ratio is 0.85, two and a half times the 0.34 observed on the market over the same period. The strategy is orthogonal to momentum.

Appendix A.5 presents similar results using international data. The evidence from developed markets outside the US supports the hypothesis that gross profits-to-assets has roughly the same power as book-to-market predicting the cross-section of expected returns.

3.2 Performance over time

Figure 1 shows the performance over time of the profitability strategy presented in Table 2. The figure shows the strategy's realized annual Sharpe ratio over the preceding five years at the end of each month between June 1968 and December 2010 (dashed line). It also shows the performance of a similarly constructed value strategy (dotted line), and a 50/50 mix of the two (solid line).

The figure shows that while both the profitability and value strategies generally performed well over the sample, both had significant periods in which they lost money. Profitability performed poorly from the mid-1970s to the early-1980s and over the middle of

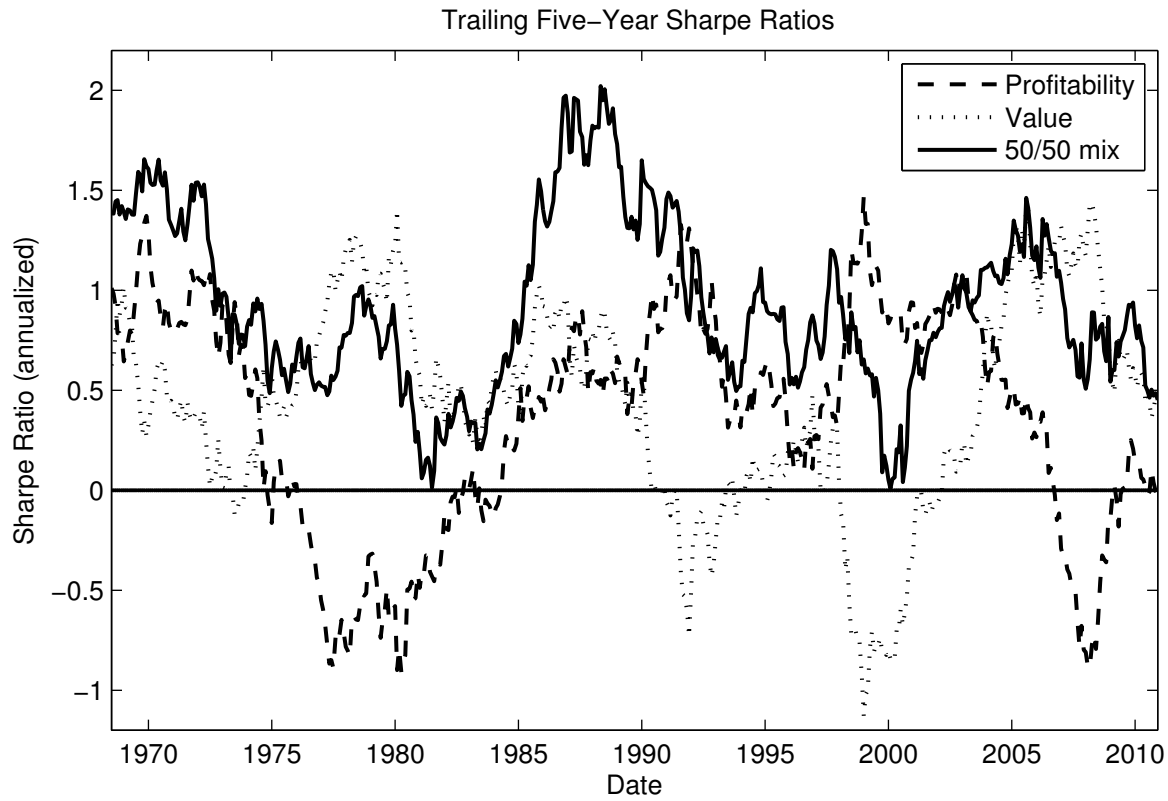


Figure 1. Performance over time of profitability and value strategies

The figure shows the trailing five-year Sharpe ratios of profitability and value strategies (dashed and dotted lines, respectively), and a 50/50 mix of the two (solid line). The strategies are long-short extreme value-weighted quintiles from sorts on gross profits-to-assets and book-to-market, respectively, and correspond to the strategies considered in Table 2. The sample excludes financial firms, and covers June 1963 to December 2010.

the 2000s, while value performed poorly over the 1990s. Profitability generally performed well in the periods when value performed poorly, however, while value generally performed well in the periods when profitability performed poorly. As a result, the mixed profitability-value strategy never had a losing five year period over the sample (July 1963 to December 2010).

3.3 High frequency strategies

Firms' revenues, costs of goods sold, and assets are available on a quarterly basis beginning in 1972 (Compustat data items REVTQ, COGSQ and ATQ, respectively), allowing for the construction of gross profitability strategies using more current public information than that employed when constructing the strategies presented in Table 2. This section shows that a gross profitability strategy formed on the basis of the most recently available public information is even more profitable.

Table 3 shows results of time series regression employing a "conventional" gross profitability strategy, "profitable-minus-unprofitable" (PMU), built following the Fama-French convention of rebalancing at the end of June using accounting data from the previous calendar year, and a "high frequency" strategy, PMU^{hf} , rebalanced each month using the most recently released data (formed on the basis of $(REVTQ - COGSQ)/ATQ$, from Compustat quarterly data, employed starting at the end of the month following a firm's report date of quarterly earnings, item RDQ).

The table shows that while the low frequency strategy generated significant excess returns over the sample (January 1972 to December 2010, determined by the availability of the quarterly data), the high frequency strategy was almost twice as profitable. The high frequency strategy generated excess returns of almost eight percent per year. It also had a larger Fama-French three-factor alpha, and a significant information ratio relative to the low frequency strategy.

Table 3. Spanning tests employing the high frequency gross profitability strategy

Results of time-series regressions employing low and high frequency gross “profitable-minus-unprofitable” strategies. The low frequency strategy, PMU, is rebalanced at the end of each June using the annual Compustat data for the fiscal year ending in the previous calendar year. The high frequency strategy, PMU^{hf} , is rebalanced each month using the most recent quarterly Compustat data, which is assumed to be available at the end of the month following a firm’s report date of quarterly earnings. Both strategies are long/short extreme deciles from a sort on gross profitability, using NYSE breaks. Portfolio returns are value-weighted. The sample covers January 1972 to December 2010, and is determined by the availability of the quarterly data.

Independent variables	PMU ^{hf} as dependent variable			PMU 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			0.64 [16.3]			
PMU ^{hf}						0.57 [16.3]
adj.-R ² (%)		4.7	36.2		6.7	36.2

Despite these facts, the remainder of this paper focuses on gross profitability measured using annual data. I am particularly interested in the persistent power gross profitability has predicting returns, and its relation to the similarly persistent value effect. While the high frequency gross profitability strategy is most profitable in the months immediately following portfolio formation, Figure 2 shows that its profitability persists for more than three years. Focusing on the strategy formed using annual profitability data ensures that results are truly driven by the level of profitability, and not surprises about profitability like those that drive post earnings announcement drift. The low frequency profitability strategy also incurs lower transaction costs, turning over only once every four years, less frequently

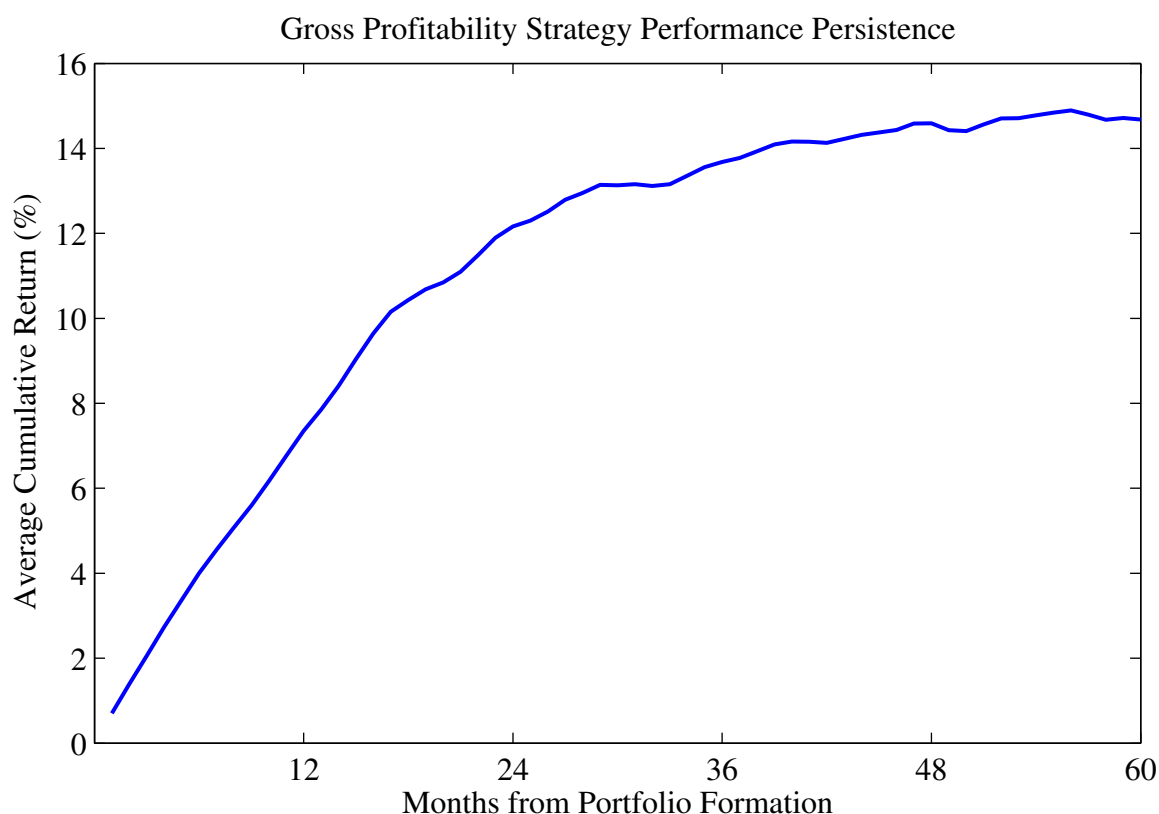


Figure 2. Persistence of profitability strategy performance

This figure shows the average cumulative returns to the high frequency gross profitability strategy considered in Table 3 from one to 60 months after portfolio formation. The sample excludes financial firms, and covers January 1972 to December 2010.

than the corresponding value strategy, and only a quarter as often as the high frequency profitability strategy. Using the annual data has the additional advantage of extending the sample ten years.

4 Profitability and value

The negative correlation between profitability and book-to-market observed in Table 2 suggests that the performance of value strategies can be improved by controlling for profitabil-

ity, and that the performance of profitability strategies can be improved by controlling for book-to-market. A univariate sort on book-to-market yields a value portfolio “polluted” with unprofitable stocks, and a growth portfolio “polluted” with profitable stocks. A value strategy that avoids holding stocks that are “more unprofitable than cheap,” and avoids selling stocks that are “more profitable than expensive,” should outperform conventional value strategies. Similarly, a profitability strategy that avoids holding stocks that are profitable but “fully priced,” and avoids selling stocks that are unprofitable but despite this still “cheap,” should outperform conventional profitability strategies.

4.1 Double sorts on profitability and book-to-market

This section tests these predictions by analyzing the performance of portfolios double sorted on gross profits-to-assets and book-to-market. Portfolios are formed by independently quintile sorting on the two variables, using NYSE breaks. The sample excludes financial firms, and covers July 1963 to December 2010. Table 4 shows the double sorted portfolios’ average returns, the average returns of both sorts’ high-minus-low portfolios, and results of time-series regressions of these high-minus-low portfolios’ returns on the Fama-French factors. It also shows the average number of firms in each portfolio, and the average size of firms in each portfolio. Because the portfolios exhibit little variation in gross profits-to-assets within profitability quintiles, and little variation in gross book-to-market within book-to-market quintiles, these characteristics are not reported.

The table confirms the prediction that controlling for profitability improves the performance of value strategies and controlling for book-to-market improves the performance of profitability strategies. The average value spread across gross profits-to-assets quintiles is 0.68 percent per month, and in every book-to-market quintile exceeds the 0.41 percent per month spread on the unconditional value strategy presented in Table 2. The average

Table 4. Double sorts on gross profits-to-assets and book-to-market

This table shows the value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on gross profits-to-assets and book-to-market, and results of time-series regressions of both sorts' high-minus-low portfolios' returns on the Fama-French factors. The table also shows the average number of firms, and the average size of firms, in each portfolio (the portfolios exhibit little gross-profits to asset variation within book-to-market quintiles, and little book-to-market variation within profitability quintiles). The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

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}
book-to-market quintiles	L	-0.08	0.19	0.27	0.26	0.56	0.64 [3.52]	0.83 [4.76]	-0.24 [-6.03]	-0.27 [-4.81]	-0.01 [-0.18]
	2	0.19	0.30	0.40	0.70	0.90	0.70 [4.13]	0.69 [4.00]	-0.12 [-3.05]	0.26 [4.61]	0.01 [0.09]
	3	0.38	0.39	0.74	0.69	0.87	0.49 [2.80]	0.27 [1.64]	0.09 [2.30]	0.53 [9.89]	0.10 [1.77]
	4	0.50	0.60	0.94	1.04	0.93	0.43 [2.47]	0.28 [2.06]	0.07 [-0.94]	0.65 [9.40]	-0.14 [-1.27]
	H	0.65	0.83	0.96	1.09	1.08	0.44 [2.38]	0.34 [1.79]	-0.04 [1.83]	0.51 [12.6]	-0.08 [-2.52]
book-to-market strategies	r^e	0.73 [3.52]	0.64 [3.42]	0.69 [3.76]	0.83 [4.74]	0.52 [2.81]					
	α	0.45 [2.76]	0.27 [1.65]	0.39 [2.26]	0.38 [2.80]	-0.03 [-0.20]					
	β_{mkt}	-0.18 [-4.77]	-0.06 [-1.44]	-0.03 [-0.86]	-0.06 [-1.95]	0.02 [0.72]					
	β_{smb}	-0.04 [-0.75]	0.27 [5.00]	0.32 [5.57]	0.74 [16.6]	0.75 [16.2]					
	β_{hml}	0.91 [15.7]	0.81 [14.1]	0.58 [9.52]	0.69 [14.2]	0.85 [17.0]					
Panel B: portfolio average number of firms (left) and average firm size (right, \$10^6\$)											
		gross profits-to-asset quintiles					gross profits-to-asset quintiles				
		L	2	3	4	H	L	2	3	4	H
BM quintiles		number of firms					average firm size				
	L	195	101	128	194	343	653	1,461	1,891	2,694	2,493
	2	104	95	130	170	192	1,002	1,729	1,590	1,238	669
	3	113	104	128	145	142	1,003	1,402	1,266	534	277
	4	144	129	128	128	118	955	1,118	630	268	187
	H	174	151	135	120	108	568	424	443	213	102

profitability spread across book-to-market quintiles is 0.54 percent per month, and in every book-to-market quintile exceeds the 0.31 percent per month spread on the unconditional profitability strategy presented in Table 2.

Appendix A.6 presents results of similar tests performed within the large and small cap universes, defined here as stocks with market capitalization above and below the NYSE median, respectively. These results are largely consistent with the all-stock results presented in Table 4.

4.2 Conditional value and profitability “factors”

Table 4 suggests that Fama and French’s HML factor would be more profitable if it were constructed controlling for profitability. This section confirms this hypothesis explicitly. It also shows that a “profitability factor,” constructed using a similar methodology, has a larger information ratio relative to the three Fama-French factors than does UMD.

These conditional value and profitability factors are constructed using the same basic procedure employed in the construction of HML. Instead of using a tertile sort on book-to-market, however, they use either 1) tertile sorts on book-to-market within gross profitability deciles, or 2) tertile sorts on gross profitability within book-to-market deciles. That is, a firm is deemed a “value” (“growth”) stock if it has a book-to-market higher (lower) than 70 percent of the NYSE firms in the same gross profitability decile, and is considered “profitable” (“unprofitable”) if it has a gross profits-to-assets higher (lower) than 70 percent of the NYSE firms in the same book-to-market decile. Table 5 shows results of time-series regressions employing these HML-like factors, HML|GP (“HML conditioned on gross profitability”) and PMU|BM (“profitable-minus-unprofitable conditioned on book-to-market”), over the sample July 1963 to December 2010.

The first specification shows that controlling for profitability does indeed improve the

Table 5. HML constructed conditioning on gross profitability

This table shows the performance of HML-like factors based on 1) book-to-market within gross profitability deciles (HML|GP), and 2) gross profitability within book-to-market deciles (PMU|BM). That is, a firm is deemed a “value” (“growth”) stock if it has a book-to-market higher (lower) than 70% of the NYSE firms in the same gross profitability decile, and is considered “profitable” (“unprofitable”) if it has a gross profits-to-assets higher (lower) than 70% of the NYSE firms in the same book-to-market decile. The strategies exclude financial firms (those with one-digit SIC codes of six). The table shows the factors’ average monthly excess returns, and time series regression of the strategies’ returns on HML and the three Fama-French factors. The sample covers July 1963 to December 2010.

independent variables	dependent variable									
	HML GP			PMU BM			HML		PMU	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
intercept	0.54 [5.01]	0.23 [4.55]	0.23 [4.52]	0.48 [5.35]	0.48 [5.23]	0.51 [5.54]	0.40 [3.25]	-0.07 [-1.31]	0.32 [3.30]	0.02 [0.57]
MKT			-0.03 [-2.37]			-0.07 [-3.24]				
SMB			0.05 [2.86]			0.03 [1.12]				
HML		0.77 [45.4]	0.77 [43.0]		0.02 [0.51]	-0.01 [-0.26]				
HML GP								1.04 [47.6]		-0.33 [-22.7]
PMU BM								-0.18 [-6.73]		0.98 [57.2]
adj.-R ² (%)		78.4	78.7		0.0	1.4		79.9		85.8

performance of HML. HML|GP generates excess average returns of 0.54 percent per month over the sample, with a test-statistic of 5.01. This compares favorably with the 0.40 percent per month, with a test-statistic of 3.25, observed on HML. The second and third specifications show that HML|GP has an extremely large information ratio relative to canonical HML and the three Fama-French factors (abnormal return test-statistics exceeding four). It is essentially orthogonal to momentum, so also has a large information ratio relative to the three Fama-French factors plus UMD.

The fourth specification shows that the profitability factor constructed controlling for book-to-market is equally profitable. PMU|BM generates excess average returns of 0.48

percent per month, with a test-statistic of 5.35. The fifth and sixth specifications show that PMU|BM has a large information ratio relative to HML or the three Fama-French factors. In fact, its information ratio relative to the three Fama-French factors exceeds that of UMD (abnormal return test-statistics of 5.54 and 5.11, respectively). It is essentially orthogonal to momentum, so has a similarly large information ratio relative to the three Fama-French factors plus UMD.

The seventh and eighth specifications show that while canonical HML has a high realized Sharpe ratio over the sample, it is inside the span of HML|GP and PMU|BM. HML loads heavily on HML|GP (slope of 1.04), and garners a moderate, though highly significant, negative loading on PMU|BM (slope of -0.18). These loadings explain all of the performance of HML, which has insignificant abnormal returns relative to these two factors. Including the market and SMB as explanatory variables has essentially no impact on this result (untabulated).

The last two specifications consider an “unconditional” profitability factor, constructed without controlling for book-to-market. They show that this unconditional factor generates significant average returns, but is much less profitable than the factor constructed controlling for book-to-market. The unconditional factor is also inside the span of HML|GP and PMU|BM. It is long “real” profitability, with a 0.98 loading on PMU|BM, but short “real” value, with a -0.33 loading on HML|GP, and these loadings completely explain its average returns.

5 Profitability and size

The value-weighted portfolio results presented in Table 2 suggest that the power that gross profits-to-assets has predicting the cross section of average returns is economically as well as statistically significant. By analyzing portfolios double sorted on size and profitabil-

Table 6. Size portfolio time-series average characteristics

This table reports the time-series averages of the characteristics of quintile portfolios sorted on market equity. Portfolio break points are based on NYSE stocks only. The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

	(small)	(2)	(3)	(4)	(large)
number of firms	2,427	749	484	384	335
percent of firms	54.2	16.9	11.3	9.26	8.25
average capitalization (\$10 ⁶)	39.6	206	509	1,272	9,494
total capitalization (\$10 ⁹)	101	173	273	544	3,652
total capitalization (%)	2.43	3.73	6.13	12.6	75.1
portfolio book-to-market	2.64	1.36	1.06	0.88	0.61
portfolio gross profits-to-assets	0.27	0.28	0.26	0.25	0.27

ity, this section shows that its power is economically significant even among the largest, most liquid stocks. Portfolios are formed by independently quintile sorting on the two variables (market capitalization and gross profits-to-assets), using NYSE breaks. The sample excludes financial firms, and covers July 1963 to December 2010.

Table 6 reports time-series average characteristics of the size portfolios. More than half of firms are in the nano-cap portfolio, but these stocks comprise less than three percent of the market by capitalization, while the large cap portfolio typically contains fewer than 350 stocks, but makes up roughly three-quarters of the market by capitalization. The portfolios exhibit little variation in profitability, but a great deal of variation in book-to-market, with the smaller stocks tending toward value and the larger stocks toward growth.

Table 7 reports the average returns to the portfolios sorted on size and gross profits-to-assets. It also shows the average returns of both sorts' high-minus-low portfolios, and results of time-series regressions of these high-minus-low portfolios' returns on the Fama-French factors. It also shows the average number of firms in each portfolio, and the average portfolio book-to-markets. Because the portfolios exhibit little variation in gross profits-to-

Table 7. Double sorts on gross profits-to-assets and market equity

This table shows the value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on gross profits-to-assets and market equity, and results of time-series regressions of both sorts' high-minus-low portfolios' returns on the Fama-French factors. The table also shows the average number of firms in each portfolio, and each portfolios' average book-to-market (the portfolios exhibit little gross-profits to asset variation within size quintiles, and little size variation within profitability quintiles). The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

Panel A: portfolio average excess returns and time-series regression results											
gross profits-to-asset quintiles						profitability strategies					
						r^e	α	β_{mkt}	β_{smb}	β_{hml}	
size quintiles	S	0.40	0.64	0.78	0.89	1.07	0.67 [4.59]	0.63 [4.27]	0.05 [1.48]	-0.13 [-2.68]	0.13 [2.47]
	2	0.37	0.71	0.71	0.73	0.90	0.53 [3.97]	0.54 [3.96]	0.01 [0.35]	0.06 [1.34]	-0.08 [-1.58]
	3	0.40	0.73	0.74	0.68	0.81	0.41 [2.88]	0.38 [2.71]	0.10 [3.02]	0.18 [4.01]	-0.15 [-3.05]
	4	0.45	0.62	0.59	0.65	0.84	0.38 [2.82]	0.45 [3.62]	0.03 [1.00]	0.21 [5.14]	-0.35 [-7.95]
	B	0.30	0.37	0.49	0.36	0.55	0.26 [1.88]	0.50 [3.90]	-0.05 [-1.56]	-0.05 [-1.09]	-0.51 [-11.3]
small-minus-big strategies	r^e	0.10 [0.39]	0.28 [1.40]	0.29 [1.45]	0.53 [2.64]	0.51 [2.37]					
	α	-0.21 [-1.30]	-0.16 [-1.63]	-0.13 [-1.26]	-0.03 [-0.31]	-0.08 [-0.72]					
	β_{mkt}	-0.03 [-0.69]	-0.00 [-0.01]	-0.01 [-0.45]	0.01 [0.53]	0.07 [2.88]					
	β_{smb}	1.54 [28.9]	1.34 [41.1]	1.34 [38.9]	1.32 [39.7]	1.45 [41.9]					
	β_{hml}	-0.22 [-3.90]	0.20 [5.56]	0.17 [4.56]	0.48 [13.5]	0.42 [11.1]					
Panel B: portfolio average number of firms (left) and portfolio book-to-markets (right)											
gross profits-to-asset quintiles						gross profits-to-asset quintiles					
						L	2	3	4	H	
size quintiles	number of firms					book-to-market					
	S	421	282	339	416	518	4.17	4.65	2.61	1.85	1.07
	2	124	106	123	143	162	1.49	1.94	1.87	1.14	0.69
	3	84	76	80	89	104	1.26	1.44	1.24	0.94	0.54
	4	77	68	66	68	78	1.15	1.07	0.98	0.73	0.43
	B	63	64	60	62	72	0.97	0.82	0.92	0.42	0.27

assets within profitability quintiles, and little variation in size within size quintiles, these characteristics are not reported.

The table shows that the profitability spread is large and significant across size quintiles. While the spreads are decreasing across size quintiles, the Fama-French three-factor alpha is almost as large for the large-cap profitability strategy as it is for small-cap strategies, because the magnitudes of the negative HML loadings on the profitability strategies are increasing across size quintiles,. That is, the predictive power of profitability is economically significant even among the largest stocks, and its incremental power above and beyond book-to-market is largely undiminished with size.

Among the largest stocks, the profitability spread of 26 basis points per month (test-statistic of 1.88) is considerably larger than the value spread of 14 basis points per month (test-statistic of 0.95, untabulated). The large cap profitability and value strategies have a negative correlation of -0.58, and consequently perform well together. While the two strategies' realized annual Sharpe ratios over the period are only 0.27 and 0.14, respectively, a 50/50 mix of the two strategies had a Sharpe ratio of 0.44. While not nearly as large as the 0.85 Sharpe ratio on the 50/50 mix of the value-weighted profitability and value strategies that trade stocks of all size observed in Section 3, this Sharpe ratio still greatly exceeds the 0.34 Sharpe ratio observed on the market over the same period. It does so despite trading exclusively in the Fortune 500 universe.

5.1 “Fortune 500” profitability and value strategies

While the Sharpe ratio on the large cap mixed value and growth strategy is 0.44, a third higher than that on the market, this performance is driven by the fact that the profitability strategy is an excellent hedge for value. As a result, the large cap mixed value and growth strategy has extremely low volatility (standard deviations of monthly returns of 1.59 per-

cent), and consequently has a high Sharpe ratio despite generating relatively modest average returns (0.20 percent per month). This section shows that a simple trading strategy based on gross profits-to-assets and book-to-market generates average excess returns of almost eight percent per year. It does so despite trading only infrequently, in only the largest, most liquid stocks.

The strategy I consider is constructed within the 500 largest non-financial stocks for which gross profits-to-assets and book-to-market are both available. Each year I rank these stocks based on their gross profits-to-assets and book-to-market ratios. At the end of each June the strategy buys one dollar of each of the 150 stocks with the highest combined profitability and value ranks, and shorts one dollar of each of the 150 stocks with the lowest combined ranks.⁴ The performance of this strategy is provided in Table 8. The table also shows, for comparison, the performance of similarly constructed strategies based on profitability and value individually.

This simple strategy generates average excess returns of 0.62 percent per month, and has a realized annual Sharpe ratio of 0.74, more than twice that observed on the market over the same period. These large cap firms yielded average excess returns of 0.43 percent per month over the period, so the strategy makes 60 percent of its profits on the long side and 40 percent on the short side (0.37 vs. 0.24 percent per month). The strategy requires little rebalancing, because both gross profits-to-assets and book-to-market are highly persistent.

Only one-third of each side of the strategy turns over each year.

⁴ Well known firms among those with the highest combined gross profits-to-assets and book-to-market ranks at the end of the sample (July through December of 2010) are AstraZeneca, GlaxoSmithKline, JC Penney, Sears, and Nokia, while the lowest ranking firms include Ivanhoe Mines, Ultra Petroleum, Vertex Pharmaceuticals, Marriott International, Delta Airlines, Lockheed Martin, and Unilever. The largest firms held on the long side of the strategy are WalMart, Johnson & Johnson, AT&T, Intel, Verizon, Kraft, Home Depot, CVS, Eli Lilly, and Target, while the largest firms from the short side are Apple, IBM, Philip Morris, McDonald's, Schlumberger, Disney, United Technologies, Qualcomm, Amazon, and Boeing.

Table 8. Performance of large stock profitability and value strategies

This table shows the performance of portfolios formed using only the 500 largest non-financial firms for which gross profits-to-assets (GPA) and book-to-market (BM) are both available. Portfolios are tertile sorted on GPA (Panel A), BM (Panel B), and the sum of the firms' GPA and BM ranks within the sample (Panel C). It also shows time-series average portfolio characteristics (portfolio GPA, portfolio BM, average firm size (ME, in 10^9), and number of firms (n)). The sample covers July 1963 to December 2010.

Panel A: portfolios sorted on gross profits-to-assets									
	r^e	FF3 alphas and factor loadings				portfolio characteristics			
		α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.38 [1.88]	-0.15 [-1.96]	1.02 [55.1]	-0.04 [-1.38]	0.22 [7.89]	0.12	1.02	5.93	150
2	0.57 [2.51]	0.00 [0.06]	1.13 [74.4]	0.11 [5.08]	0.08 [3.36]	0.31	0.86	7.82	200
High	0.65 [3.03]	0.25 [3.84]	1.02 [68.5]	0.08 [3.69]	-0.18 [-7.81]	0.64	0.41	9.20	150
H-L	0.27 [2.33]	0.40 [3.75]	0.00 [0.17]	0.11 [3.23]	-0.40 [-10.5]				
Panel B: portfolios sorted on book-to-market									
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.38 [1.56]	0.07 [1.08]	1.10 [69.5]	0.04 [1.86]	-0.48 [-20.2]	0.51	0.25	1.03	150
2	0.52 [2.49]	-0.00 [-0.02]	1.07 [79.7]	0.07 [3.56]	0.08 [3.91]	0.34	0.58	7.27	200
High	0.70 [3.60]	0.02 [0.40]	1.02 [73.3]	0.06 [2.85]	0.52 [24.9]	0.21	1.55	5.33	150
H-L	0.32 [2.16]	-0.05 [-0.64]	-0.08 [-4.41]	0.01 [0.56]	1.01 [37.0]				
Panel C: portfolios sorted on average gross profits-to-assets and book-to-market ranks									
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.19 [0.79]	-0.20 [-2.25]	1.12 [53.2]	0.01 [0.25]	-0.27 [-8.51]	0.22	0.45	7.72	150
2	0.59 [3.00]	0.10 [1.95]	1.01 [87.3]	0.02 [1.32]	0.09 [5.05]	0.38	0.68	8.83	200
high	0.81 [3.81]	0.17 [2.80]	1.08 [77]	0.15 [7.62]	0.29 [13.8]	0.45	1.21	5.87	150
H-L	0.62 [5.11]	0.37 [3.67]	-0.04 [-1.73]	0.14 [4.30]	0.56 [15.8]				

6 Profitability Commonalities Across Anomalies

This section considers how a set of alternative “factors,” constructed on the basis of industry-adjusted book-to-market, past performance and gross profitability, perform “pricing” a wide array of anomalies. While I remain agnostic here with respect to whether these factors are associated with priced risks, they do appear to be useful in identifying underlying commonalities in seemingly disparate anomalies. The Fama-French model’s success explaining long run reversals can be interpreted in a similar fashion. Even if one does not believe that the Fama-French factors truly represent priced risk factors, they certainly “explain” long run reversals in the sense that buying long term losers and selling long term winners yields a portfolio long small and value firms, and short large and growth firms. An investor can largely replicate the performance of strategies based on long run past performance using the right “recipe” of Fama-French factors, and long run reversals do not, consequently, represent a truly distinct anomaly.

In much the same sense, regressions employing these industry-adjusted factors suggest that most earnings related anomalies (e.g., strategies based on price-to-earnings, or asset turnover), and a large number of seemingly unrelated anomalies (e.g., strategies based on default risk, or net stock issuance), are really different expressions of just three underlying basic anomalies (industry-adjusted value, momentum and gross profitability), mixed in various proportions and dressed up in different guises.

The anomalies considered here include:

1. *Anomalies related to the construction of the factors themselves:* strategies sorted on size, book-to-market, past performance, and gross profitability;
2. *Earnings related anomalies:* strategies sorted on return-on-assets, earnings-to-price, asset turnover, gross margins, and standardized unexpected earnings; and

3. *The anomalies considered by Chen, Novy-Marx and Zhang (2010)*: strategies sorted on the failure probability measure of Campbell, Hilscher, and Szilagyi (2008), the default risk “O-score” of Ohlson (1980), net stock issuance, asset growth, total accruals, and (not considered in CNZ) the organizational capital based strategy of Eisdeldt and Papanikolaou (2009).

6.1 Explanatory factors

The factors employed to price these anomalies are formed on the basis of book-to-market, past performance and gross profitability. They are constructed using the basic methodology employed in the construction of HML. Because Table 1 suggests that industry-adjusted gross profitability has more power than straight gross profitability predicting the cross-section of expected returns, and the literature has shown similar results for value and momentum, the factor construction employs industry adjusted sorts, and the factors’ returns are hedged for industry exposure.⁵ Specifically, the primary characteristic on which they are tertile sorted (log book-to-market, performance over the first eleven months of the preceding year, or gross profitability-to-assets) is demeaned by industry (the Fama-French 49). The strategies’ are then hedged of any remaining industry exposure, by offsetting each position with an equal and opposite position in the corresponding stock’s value-weighted industry portfolio. The construction of these factors is discussed in greater detail in Appendix A.7.

The characteristics of these factors, industry-adjusted high-minus-low (HML*), up-minus-down (UMD*) and profitable-minus-unprofitable (PMU*), are shown in Table 9. All three factors generate highly significant average excess returns over the sample, July

⁵ Cohen and Polk (1998), Asness, Porter and Stevens (2000) and Novy-Marx (2009, 2011) all consider strategies formed on the basis of industry-adjusted book-to-market. Asness, Porter and Stevens (2000) also consider strategies formed on industry-adjusted past performance. These papers find that strategies formed on the basis of industry-adjusted book-to-market and past performance significantly outperform their conventional counterparts.

Table 9. Alternative factor average excess returns and Fama-French factor loadings

This table shows the returns to the factors based on book-to-market, performance over the first eleven months of the preceding year, and gross profitability scaled by book assets, where each of these characteristics are demeaned by industry (the Fama-French 49), and the resultant factors are hedged for industry exposure (HML*, UMD* and PMU*). The table also shows results of regressions of each factor's abnormal returns on the three Fama-French factors and UMD. The sample covers July 1973 to December 2010.

	$E[r^e]$	Time-series regression results				
		α	MKT	SMB	HML	UMD
HML*	0.47 [6.42]	0.25 [5.41]	0.02 [2.07]	0.10 [6.71]	0.42 [26.6]	0.01 [1.09]
UMD*	0.58 [4.17]	0.28 [6.51]	-0.06 [-6.74]	-0.07 [-5.27]	-0.09 [-6.58]	0.58 [63.7]
PMU*	0.27 [4.88]	0.35 [6.90]	-0.08 [-7.39]	-0.11 [-6.78]	-0.08 [-4.63]	0.05 [4.56]

1973 to December 2010, dates determined by the availability of the quarterly earnings data employed in the construction of some of the anomaly strategies investigated in the next table. In fact, all three of the industry-adjusted factors have Sharpe ratios exceeding those on any of the Fama-French factors. The table also shows that while the four Fama-French factors explain roughly half of the returns generated by HML* and UMD*, they do not significantly reduce the information ratios of any of the three factors.

6.2 Explaining anomalies

Table 10 shows the average returns to the fifteen anomaly strategies, as well as the strategies' abnormal returns relative to both the canonical Fama-French three-factor model plus UMD (hereafter referred to, for convenience, as the "Fama-French four-factor model"), and the alternative four-factor model employing the market and industry-adjusted value, momentum and profitability factors (HML*, UMD* and PMU*, respectively). Abnormal returns relative to the model employing the four Fama-French factors plus the industry-

adjusted profitability factor, and relative to the three-factor model employing just the market and industry-adjusted value and momentum factors, are provided in Appendix A.8.

The first four strategies considered in the table investigate anomalies related directly to the construction of the Fama-French factors and the profitability factor. The strategies are constructed by sorting on size (end of year market capitalization), book-to-market, performance over the first eleven months of the preceding year, and industry-adjusted gross profitability-to-assets. All four strategies are long/short extreme deciles of a sort on the corresponding sorting variable, using NYSE breaks. Returns are value weighted, and portfolios are rebalanced at the end of July, except for the momentum strategy, which is rebalanced monthly. The profitability strategy is hedged for industry exposure. The sample covers July 1973 through December 2010.

The second column of Table 10 shows the strategies' average monthly excess returns. All the strategies, with the exception of the size strategy, exhibit highly significant average excess returns over the sample. The third column shows the strategies' abnormal returns relative to the Fama-French four-factor model. The top two lines show that the Fama-French four-factor model prices the strategies based on size and book-to-market. It struggles, however, with the extreme sort on past performance, despite the fact that this is the same variable used in the construction of UMD. This reflects, at least partly, the fact that selection into the extreme deciles of past performance are little influenced by industry performance. Canonical UMD, which is constructed using the less aggressive tertile sort, is formed more on the basis of past industry performance. It consequently exhibits more industry driven variation in returns, and looks less like the decile sorted momentum strategy. The Fama-French model hurts the pricing of the profitability based strategy, because it is a growth strategy that garners a significant negative HML loading despite generating significant positive average returns. The fourth column shows that the alternative four-factor model prices all four strategies. Unsurprisingly, it prices the momentum and profitability

Table 10. Anomaly strategy average excess returns and abnormal performance

This table reports the average excess returns ($E[r^e]$) to strategies formed by sorting on 1) the variables used in factor construction (market capitalization, book-to-market, performance over the first eleven months of the preceding year, and gross profits-to-assets demeaned by industry and hedged for industry exposure); 2) earnings related variables (return-on-assets, earnings-to-price, asset turnover, gross margins, standardized unexpected earnings); and 3) failure probability, default risk (Ohlson's O-score), net stock issuance, asset growth, total accruals, and organizational capital. Strategies are long-short extreme deciles from a sort on the corresponding variable, employing NYSE breaks, and returns are value-weighted. Momentum, return-on-assets, return-on-equity, SUE, failure and default probability strategies are rebalanced monthly, while the other strategies are rebalanced annually, at the end of June. Strategies based on variables scaled by assets exclude financial firms. The table also reports abnormal returns relative to the Fama-French four-factor model (α_{FF4}), and results of time series regressions of the strategies' returns on the alternative four-factor model employing the market and industry-adjusted value, momentum and profitability factors (HML*, UMD* and PMU*, respectively). The sample covers July 1973 through December 2010, and is determined by the availability of monthly earnings data.

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

strategies with large significant loadings on the corresponding industry-adjusted factors. It prices the value strategy with a large significant loading on the industry-adjusted value factor, and a significant negative loading on the industry-adjusted profitability factor. The conventional value strategy is, as in Table 5, long “real value” (HML*) but short profitability.

The next five lines of Table 10 investigate earnings-related anomalies. These strategies are constructed by sorting on return-on-assets, earnings-to-price, asset turnover, gross margins, and standardized unexpected earnings. They are again long/short extreme deciles of a sort on the corresponding sorting variable, using NYSE breaks. The return-on-assets, asset turnover, and gross margin strategies exclude financial firms (i.e., those with one-digit SIC codes of six). Returns are value weighted. The asset turnover and gross margin strategies are rebalanced at the end of June; the others are rebalanced monthly.

The second column shows the strategies’ average monthly excess returns. All of the strategies, with the exception of that based on gross margins, exhibit highly significant average excess returns over the sample. The third column shows that the canonical Fama-French four-factor model performs extremely poorly pricing earnings related anomalies. This is admittedly tautological, as the Fama-French model’s failure to price a strategy is used here as the defining characteristic of an anomaly.

The fourth column shows that the alternative four-factor model explains the returns to all of the strategies, with the exception of post earnings announcement drift, where the model can explain about half the excess returns. All of the strategies have large, significant loadings on PMU*, especially the return-on-assets, earnings-to-price and asset turnover strategies. The fact that the model prices the return-on-assets strategy is especially remarkable, given that the strategy only produces significant returns when rebalanced monthly using the most recently available earnings information, while the profitability factor is only rebalanced annually employing relatively stale gross profitability information. The model

also does well pricing the strategy based on gross margins, despite the fact that the high margin firms tend to be growth firms, a fact that drives the strategy's large Fama-French alpha, because the high margin firms also tend to be profitable. The resulting large positive PMU* loading effectively offsets the pricing effect of the large negative HML* loading.

The last six strategies considered in Table 10 are those considered, along with value, momentum, and post earnings announcement drift, by Chen, Novy-Marx and Zhang (2010). These strategies are based on the failure probability measure of Campbell, Hilscher, and Szilagyi (2008), the default risk "O-score" of Ohlson (1980), net stock issuance, asset growth, total accruals, and (not considered in CNZ) Eisfeldt and Papanikolaou's (2009) organizational capital based strategy.⁶ All six anomalies are constructed as long/short extreme decile strategies, and portfolio returns are value-weighted. The strategies based on failure probability and Ohlson's O-score are rebalanced monthly, while the other four strategies are rebalanced annually, at the end of June.

The second and third columns of Table 10 show the six strategies' average monthly excess returns, and their abnormal returns relative to the Fama-French four-factor model. All of the strategies exhibit highly significant average excess returns and four-factor alphas over the sample. The fourth column shows that the four-factor model employing the market and industry-adjusted HML, UMD and PMU explains the performance of all the strategies except for that based on total accruals. The model explains the poor performance of the failure probability and default probability firms primarily through large, significant loadings on the industry-adjusted profitability factor. Firms with low industry-adjusted gross profits-to-assets tend to be firms that both the Campbell, Hilscher, and Szilagyi (2008) and

⁶ Eisfeldt and Papanikolaou (2009) construct this strategy on the basis of their accounting based measure, which accumulates selling, general and administrative expenses (XSGA), the accounting variable most likely to include spending on the development of organizational capital. The stock of organizational capital is assumed to depreciate at a rate of 15% per year, and the initial stock is assumed to be ten times the level of selling, general and administrative expenses that first appear in the data, though results employing this measure are not sensitive to these choices. The trading strategy is formed by sorting on the organizational capital measure within industries.

Ohlson (1980) measures predict are more likely to default, and this fact drives the performance of both strategies. The fact that the model performs well pricing these two strategies is again especially remarkable given that these anomalies only exist at the monthly frequency, in the sense that strategies based on the same sorting variables do not produce significant excess returns when rebalanced annually. The model explains the net stock issuance anomaly primarily through loadings on HML^* and PMU^* . The low returns to net issuers are explained by the fact that issuers tend to be industry-adjusted growth stocks with low industry-adjusted profitability. The model explains the out-performance of high organizational capital firms primarily through a positive loading PMU^* , suggesting that firms with large stocks of organizational capital, at least as quantified by the Eisfeldt and Papanikolaou (2009) measure, are more profitable than those with small stocks of organizational capital. Direct investigation of portfolios underlying organizational capital strategy confirms this prediction. Decile portfolios sorted on organizational capital show strong monotonic variation in gross profitability.

The alternative four-factor model also performs well in the sense that it dramatically reduces the strategies' root-mean-squared pricing error. The root-mean-squared average excess return across the fifteen anomalies is 0.67 percent per month. The root-mean-squared pricing error relative to the alternative four-factor model is only 0.22 percent per month, less than half the 0.54 percent per month root-mean-squared pricing errors observed relative to the canonical Fama-Fench four-factor model. Appendix A.8 shows that roughly two-thirds of the alternative four-factor model's improved performance relative to the canonical Fama-French four-factor model is due to the inclusion of the industry-adjusted profitability factor, while one-third is due to the industry-adjustments to the value and momentum factors.

7 Conclusion

Gross profitability represents the other side of value. The same basic philosophy underpins strategies based on both valuation ratios and profitability. Both are designed to acquire productive capacity cheaply. Value strategies do this by financing the purchase of inexpensive assets through the sale of expensive assets, while profitability strategies achieve the same end by financing the purchase of productive assets through the sale of unproductive assets. Both strategies generate significant abnormal returns.

But while profitability is another dimension of value, and gross profits-to-assets and has roughly the same power as book-to-market predicting the cross-section of average returns, profitable firms are extremely dissimilar from value firms. Profitable firms generate significantly higher average returns than unprofitable firms despite having, on average, lower book-to-markets and higher market capitalizations. That is, while trading on gross profits-to-assets exploits a value philosophy, the resulting strategy is a growth strategy as measured by either characteristics (valuation ratios) or covariances (HML loadings). Because the value and profitability strategies' returns are negatively correlated the two strategies work extremely well together. In fact, a value investor can capture the full profitability premium without taking on any additional risk. Adding a profitability strategy on top of an existing value strategy actually reduces overall portfolio volatility, despite doubling the investors exposure to risky assets. Value investors should consequently pay close attention to gross profitability when selecting their portfolio holdings, because controlling for profitability dramatically increases the performance of value strategies.

A Appendix

A.1 Correlations between variables employed in the FMB regressions

Table 11 reports the time-series averages of the cross-sectional Spearman rank correlations between the independent variables employed in the Fama-MacBeth regressions of Table 1. The table shows that the earnings-related variables are, not surprisingly, all positively correlated with each other. Gross profitability and earnings are also negatively correlated with book-to-market, with magnitudes similar to the negative correlation observed between book-to-market and size. Earnings and free cash flows are positively associated with size (more profitable firms have higher market values), but surprisingly the correlation between gross profitability and size is negative, though weak. These facts suggest that strategies formed on the basis of gross profits-to-assets will be growth strategies, and relatively neutral with respect to size.

Table 11. Spearman rank correlations between independent variables

This table reports the time-series averages of the cross-section Spearman rank correlations between the independent variables employed in the Fama-MacBeth regressions of Table 1: gross profitability ((REVT - COGS)/AT), earnings (IB/AT), free cash flow ((NI + DP - WCAPCH - CAPX)/AT), book-to-market, market equity, and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$). The sample excludes financial firms (those with one-digit SIC codes of six), and covers 1963 to 2010.

	IB/A	FCF/A	BM	ME	$r_{12,2}$	$r_{1,0}$
gross profitability (GP/A)	0.45 [58.7]	0.31 [17.9]	-0.18 [-17.2]	-0.03 [-2.51]	0.09 [7.00]	0.02 [1.87]
earnings (IB/A)		0.60 [16.7]	-0.25 [-8.89]	0.36 [30.4]	0.23 [14.4]	0.07 [6.27]
free cash flows (FCF/A)			-0.03 [-1.33]	0.20 [10.7]	0.17 [10.6]	0.07 [7.12]
book-to-market (BM)				-0.26 [-13.1]	-0.09 [-4.98]	0.02 [1.37]
market equity (ME)					0.26 [11.3]	0.13 [9.20]
prior year's performance ($r_{12,2}$)						0.08 [5.15]

A.2 Tests employing other earnings variables

Earnings before interest, taxes, depreciation and amortization is gross profits minus operating expenses, which largely consist of selling, general and administrative expenses. Table 12 shows results of Fama-MacBeth regressions employing gross-profits-to-assets, and a decomposition of gross profits-to-assets into EBITDA-to-assets and XSGA-to-assets. EBITDA-to-assets and XSGA-to-assets have time-series average cross-sectional Spearman rank correlations with gross profits-to-assets of 0.51 and 0.77, respectively, and are essentially uncorrelated with each other. The table shows that both variables have power explaining the cross-section of average returns, either individually or jointly, but neither has power in regressions that include gross profits-to-assets. Because of the collinearity resulting from the fact that EBITDA-to-assets and XSGA-to-assets together make up gross profits-to-assets, all three variables cannot be used in the same regression.

Table 12. Fama-MacBeth regressions employing EBITDA and XSGA

This table reports results from Fama-MacBeth regressions of firms' returns on gross profits (revenues minus cost of goods sold, Compustat REVT – COGS), earnings before interest, taxes, depreciation, and amortization (EBITDA), and selling, general, and administrative expenses (XSGA), each scaled by assets (AT). Regressions include controls for book-to-market ($\log(\text{bm})$), size ($\log(\text{me})$), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$). Independent variables are Winsorized at the one and 99% levels. The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$					
	(1)	(2)	(3)	(4)	(5)	(6)
gross profitability	0.66 [4.99]			0.58 [4.43]	1.20 [4.02]	
EBITDA-to-assets		0.96 [3.19]		0.46 [1.45]		1.23 [3.86]
XSGA-to-assets			0.66 [4.35]		-0.39 [-1.28]	0.76 [5.24]
$\log(\text{BM})$	0.31 [5.36]	0.29 [5.34]	0.35 [6.51]	0.32 [6.03]	0.34 [6.18]	0.34 [6.14]
$\log(\text{ME})$	-0.14 [-3.39]	-0.16 [-4.40]	-0.11 [-2.76]	-0.15 [-3.95]	-0.14 [-3.76]	-0.14 [-3.82]
$r_{12,2}$	0.60 [3.27]	0.60 [3.3]	0.61 [3.34]	0.56 [3.07]	0.57 [3.16]	0.57 [3.16]
$r_{1,0}$	-6.07 [-15.2]	-6.10 [-15.4]	-6.15 [-15.3]	-6.20 [-15.7]	-6.28 [-15.8]	-6.29 [-15.8]

A.2.1 Tests employing gross margins and asset turnover

Gross profitability is driven by two dimensions, asset turnover and gross margins,

$$\frac{\text{gross profits}}{\text{assets}} = \underbrace{\frac{\text{sales}}{\text{assets}}}_{\text{asset turnover}} \times \underbrace{\frac{\text{gross profits}}{\text{sales}}}_{\text{gross margins}},$$

a decomposition known in the accounting literature as the “Du Pont model.” Asset turnover, which quantifies the ability of assets to “generate” sales, is often regarded as a measure of efficiency. Gross margins, which quantifies how much of each dollar of sales goes to the firm, is a measure of profitability. It relates directly, in standard oligopoly models, to firms’ market power. Asset turnover and gross margins are generally negatively related. A firm can increase sales, and thus asset turnover, by lowering prices, but lower prices reduce gross margins. Conversely, a firm can increase gross margins by increasing prices, but this generally reduces sales, and thus asset turnover.⁷

Given this simple decomposition of gross profitability into asset turnover and gross margins, it seems natural to ask which of these two dimensions of profitability, if either, drives profitability’s power to predict the cross-section of returns. The results of this appendix suggest that both dimensions have power, but that this power is subsumed by basic profitability. That is, it appears that the decomposition of profitability into asset turnover and gross margins does not add any incremental information beyond that contained in gross profitability alone. The results do suggest, however, that high asset turnover is more directly associated with higher returns, while high margins are more strongly associated with “good growth.” That is, high sales-to-assets firms tend to outperform on an absolute basis, while firms that sell their goods at high mark-ups tend to be growth firms that outperform their peers.

Table 13 shows results of Fama-MacBeth regressions of firms’ returns on gross profitability, asset turnover, and gross margins. These regressions include controls for book-to-market ($\log(\text{bm})$), size ($\log(\text{me})$), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two

⁷ The time-series average of the Spearman rank correlation of firms’ asset turnovers and gross margins in the cross-section is -0.27, in the sample spanning 1963 to 2010 that excludes financial firms. Both asset turnover and gross margins are strongly positively correlated with gross profitability in the cross-section (time-series average Spearman rank correlations of 0.67 and 0.43, respectively).

Table 13. Fama-MacBeth regressions with asset turnover and gross margins

This table reports results from Fama-MacBeth regressions of firms' returns on profitability (gross profits-to-assets, measured as revenues minus cost of goods sold (REVT - COGS) scaled by assets (AT)), asset turnover (REVT / AT), and gross margins (GP / REVT). Regressions include controls for book-to-market ($\log(\text{bm})$), size ($\log(\text{me})$), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$). Independent variables are Winsorized at the one and 99% levels. The sample covers July 1963 to December 2010, and excludes financial firms (those with one-digit SIC codes of six).

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
profits-to-assets	0.66 [4.99]			0.77 [6.41]	0.71 [5.31]		0.76 [5.11]
asset turnover		0.10 [2.29]		-0.05 [-1.21]		0.13 [2.95]	-0.02 [-0.57]
gross margins			0.34 [3.63]		0.23 [2.22]	0.36 [3.66]	0.16 [1.03]
$\log(\text{BM})$	0.31 [5.36]	0.28 [4.94]	0.31 [5.50]	0.31 [5.49]	0.33 [5.83]	0.30 [5.34]	0.33 [5.75]
$\log(\text{ME})$	-0.14 [-3.39]	-0.14 [-3.39]	-0.15 [-3.58]	-0.15 [-3.44]	-0.14 [-3.37]	-0.14 [-3.37]	-0.14 [-3.35]
$r_{12,2}$	0.6 [3.27]	0.61 [3.34]	0.65 [3.52]	0.59 [3.23]	0.59 [3.23]	0.6 [3.31]	0.58 [3.2]
$r_{1,0}$	-6.07 [-15.2]	-6.06 [-15.2]	-5.98 [-14.8]	-6.11 [-15.4]	-6.09 [-15.2]	-6.08 [-15.2]	-6.13 [-15.4]

months ($r_{12,2}$). Independent variables are Winsorized at the one and 99 percent levels. The sample covers July 1963 to December 2010, and excludes financial firms (those with one-digit SIC codes of six).

Specification one, which employs gross profitability, is identical to the first specification in Table 1. It shows the baseline result, that gross profitability has roughly the same power as book-to-market predicting the cross-section of returns. The second and third specifications replace gross profitability with asset turnover and gross margins, respectively. Each of these variables has power individually, especially gross margins, but less power than gross profitability. The fourth specification shows that gross margins completely subsumes asset turnover, but that including asset turnover increases the coefficient estimated on gross profitability, and improves the precision with which it is estimated. The fifth specification shows that gross margins has some incremental power after controlling for gross profitability. The sixth and seventh specifications show that asset turnover and gross margins

both have power when used together, but neither has power when used in conjunction with gross profitability.

Table 14 shows results of univariate sorts on asset turnover and gross margins. These tests employ the same methodology as that employed in Table 2, replacing gross profitability with asset turnover and gross margins. The table shows the portfolios' value-weighted average excess returns, results of time-series regression of the portfolios' returns on the three Fama-French factors, and the time-series averages of the portfolios' gross profits-to-assets (GPA), book-to-markets (BM), and market capitalizations (ME), as well as the average number of firms in each portfolio (n).

Panel A provides results for the five portfolios sorted on asset turnover. The portfolios' average excess returns are increasing with asset turnover, but show little variation in loadings on the three Fama-French factors. As a result, the high-minus-low turnover strategy produces significant average excess returns that cannot be explained by the Fama-French model. The portfolios show a great deal of variation in gross profitability, with more profitable firms in the high asset turnover portfolios. They show some variation in book-to-market, with the high turnover firms commanding higher average valuation ratios, but this variation in book-to-market across portfolios is not reflected in the portfolios' HML loadings.

Panel B provides results for the five portfolios sorted on gross margins. Here the portfolios' average excess returns exhibit little variation across portfolios, but large variation in their loadings on SMB and especially HML, with the high margin firms covarying more with large growth firms. As a result, while the high-minus-low turnover strategy does not produce significant average excess returns, it produces highly significant abnormal returns relative to the Fama-French model, 0.37 percent per month with a test-statistic of 4.35. The portfolios show less variation in gross profitability than do the portfolios sorted on asset turnover, though the high margin firms are more profitable, on average, than the low margin firms. The portfolios sorted on gross margins exhibit far more variation in book-to-market, however, than the asset turnover portfolios, with high margin firms commanding high valuations ratios. These firms are emphatically growth firms, both possessing the defining characteristic (low book-to-markets) and garnering large negative loadings on the canonical value factor. These growth firms selected on the basis of gross margins are "good growth" firms, however, which dramatically outperform their peers in size and book-to-market.

Table 14. Excess returns to portfolios sorted on asset turnover and gross margins

This table shows monthly value-weighted average excess returns to portfolios sorted on asset turnover (REVT / AT, Panel A) and gross margins ((REVT - COGS) / REVT, Panel B). It also shows results of time-series regressions of these portfolios' returns on the Fama-French factors, and time-series average portfolio characteristics (portfolio gross profits-to-assets (GPA), book-to-market (BM), average firm size (ME, in \$10⁶), and number of firms (n)). The sorts employ NYSE breakpoints. The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

		FF3 alphas and factor loadings				portfolio characteristics			
		α	MKT	SMB	HML	GPA	BM	ME	n
panel A: portfolios sorted on asset turnover									
Low	0.29 [1.52]	-0.11 [-1.40]	0.91 [50.1]	-0.05 [-2.10]	0.00 [0.16]	0.16	0.93	1,004	821
2	0.45 [2.25]	0.09 [1.51]	1.00 [73.1]	-0.07 [-3.55]	-0.15 [-7.33]	0.25	0.71	1,461	671
3	0.51 [2.54]	0.10 [1.94]	1.01 [87.7]	0.00 [0.01]	-0.08 [-4.9]	0.34	0.79	1,336	664
4	0.56 [2.77]	0.09 [1.64]	1.01 [75.8]	0.04 [2.36]	0.01 [0.32]	0.37	0.61	889	742
High	0.62 [3.01]	0.15 [1.81]	0.96 [49.2]	0.17 [6.36]	-0.00 [-0.08]	0.48	0.57	623	856
H-L	0.34 [2.51]	0.26 [1.94]	0.04 [1.41]	0.23 [5.17]	-0.01 [-0.14]				
panel B: portfolios sorted on gross margins									
Low	0.44 [2.06]	-0.17 [-2.89]	1.03 [74.9]	0.28 [14.9]	0.18 [8.48]	0.16	1.08	525	812
2	0.50 [2.54]	-0.04 [-0.56]	0.99 [63.9]	0.04 [1.84]	0.20 [8.50]	0.26	0.87	1,119	623
3	0.48 [2.43]	-0.03 [-0.49]	1.04 [85.5]	-0.02 [-1.37]	0.13 [7.09]	0.27	1.04	990	628
4	0.47 [2.49]	0.05 [0.95]	0.97 [80.3]	-0.02 [-1.45]	-0.00 [-0.21]	0.29	0.68	1,017	712
High	0.45 [2.29]	0.20 [4.39]	0.94 [88.6]	-0.10 [-6.75]	-0.35 [-21.8]	0.36	0.45	1,528	945
H-L	0.01 [0.13]	0.37 [4.35]	-0.09 [-4.48]	-0.39 [-13.9]	-0.52 [-17.6]				

A.3 Controlling for accruals and R&D

Accruals and R&D expenditures both represent components of the wedge between earnings and gross profits. Sloan (1996) shows that accruals have power predicting the cross section of returns, hypothesizing that "... if investors naively fixate on earnings, then they will tend to overprice (un-

derprice) stocks in which the accrual component is relatively high (low)... [so] a trading strategy taking a long position in the stock of firms reporting relatively low levels of accruals and a short position in the stock of firms reporting relatively high levels of accruals generates positive abnormal stock returns.” Chan, Lakonishok and Sougiannis (2001) provide a similar result for R&D expenditures, showing that “companies with high R&D to equity market value (which tend to have poor past returns) earn large excess returns.”

Table 15 confirms these results independently, but shows that these results are basically unrelated to the power gross profitability has predicting returns. The table performs a series of Fama-MacBeth regressions, similar to those presented in Table 1, employing gross profits-to-assets, accruals, and R&D expenditures-to-market, and controls for valuation ratios, size and past performance. Accruals are defined, as in Sloan (1996), as the change in non-cash current assets, minus the change

Table 15. Fama-MacBeth regressions with accruals and R&D expenditures

This table reports results from Fama-MacBeth regressions of firms’ returns on gross profits (REVT - COGS) scaled by assets (AT), accruals ($\Delta\text{ACT} - \text{CHECH} - \Delta\text{LCT} + \Delta\text{DCT} + \Delta\text{TXP} - \text{DP}$) scaled by average assets ($\text{AT}/2 + \text{lag}(\text{AT})/2$), and research and development expenditures (XRD) scaled by market value. Regressions include controls for book-to-market ($\log(\text{bm})$), size ($\log(\text{me})$), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$). Independent variables are Winsorized at the one and 99% levels. The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1973 to December 2010, a period determined by the availability of high quality data on R&D expenditures.

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
profits-to-assets	0.73 [4.67]			0.73 [4.74]	0.68 [3.96]		0.67 [3.89]
accruals		-1.32 [-5.59]		-1.38 [-6.04]		-1.37 [-5.01]	-1.40 [-5.22]
R&D-to-market			1.20 [3.42]		1.08 [3.16]	0.94 [2.65]	0.97 [2.77]
$\log(\text{BM})$	0.31 [4.79]	0.25 [4.02]	0.27 [3.50]	0.27 [4.25]	0.28 [3.73]	0.23 [3.02]	0.23 [3.00]
$\log(\text{ME})$	-0.15 [-3.30]	-0.15 [-3.25]	-0.16 [-3.31]	-0.14 [-3.11]	-0.16 [-3.34]	-0.16 [-3.26]	-0.15 [-3.21]
$r_{1,0}$	-5.98 [-13.1]	-6.00 [-13.0]	-6.43 [-13.6]	-6.11 [-13.4]	-6.60 [-14.5]	-6.61 [-14.2]	-6.73 [-14.6]
$r_{12,2}$	0.43 [2.10]	0.44 [2.13]	0.44 [2.09]	0.38 [1.89]	0.36 [1.80]	0.35 [1.71]	0.30 [1.48]

in current liabilities (excluding changes in debt in current liabilities and income taxes payable), minus depreciation.⁸ The table shows that while accruals and R&D expenditures both have power predicting returns, these variables do not explain the power gross profitability has predicting returns.

A.4 Profitability and profitability growth

Current profitability, and in particular gross profitability, has power predicting long term growth in gross profits, earnings, free cash flows and payouts (dividends plus repurchases), all of which are important determinants of future stock prices. Gross profits-to-assets in particular is strongly associated with contemporaneous valuation ratios, so variables that forecast gross profit growth may be expected to predict future valuations, and thus returns.

Table 16 reports results of Fama-MacBeth (1973) regressions of profitability growth on current profitability. The table considers both the three and ten year growth rates, and employs four different measures of profitability: gross profits, earnings before extraordinary items, free cash flow, and total payouts to equity holders (dividends plus share repurchases). Earnings variables are scaled by assets, though scaling by book equity, as in Fama-French (2006), yields similar results. Regressions include controls for valuations and size ($\ln(B/M)$ and $\ln(ME)$). They also include controls for prior year's stock performance and the three year change in the dependent profitability variable (coefficient not reported). The sample excludes financial firms (those with one-digit SIC codes of six). To avoid undue influence from outlying observations, I trim independent variables at the 1 and 99 percent levels. To avoid undue influence from small firms, I exclude firms with market capitalizations under \$25 million. Test-statistics are calculated using Newey-West standard errors, with two or nine lags. The data are annual, and cover 1962 to 2010.

⁸ Specifically, this is defined as the change in Compustat annual data item ACT (current assets), minus CHECH (change in cash/cash equivalents), minus the change in LCT (current liabilities), plus the change in DLC (debt included in liabilities), plus the change in TXP (income taxes payable), minus DP (depreciation and amortization). Variables are assumed to be publicly available by the end of June in the calendar year following the fiscal year with which they are associated. Following Sloan, accruals are scaled by "average assets," defined as the mean of current and prior year's total assets (Compustat data item AT).

Table 16. Profitability and profitability growth

This table reports results of Fama-MacBeth regressions of three and ten year growth in profitability, measured by gross profits (GP), earnings before extraordinary items (IB), free cash flow (FCF = NI + DP - WCAPCH - CAPX), and dividends plus share repurchases (DIV = DVC + PRSTKCC) on current profitability, size (ln(ME)), valuations (ln(B/M)) and prior year's stock price performance ($r_{12,1}$). Profitability variables are scaled by total assets (AT). Independent variables are Winsorized at the one and 99% levels. Test-statistics are calculated using Newey-West standard errors, with two or nine lags. The sample exclude financial firms (those with one-digit SIC codes of six) and firms with market capitalizations smaller than \$25 million, and uses accounting data for fiscal years ending between 1962 to 2010, inclusive.

slope coefficients and [test-statistics] from regressions of the form $y_t = \beta'x_{tj} + \epsilon_{tj}$										
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]
Panel B: regressions predicting earnings growth, $y_t = \frac{IB_{t+\tau} - IB_t}{AT_t}$										
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]

Table 16 continued

	regressions predicting three-year growth					regressions predicting ten-year growth				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel C: regressions predicting free cash flow growth, $y_t = \frac{FCF_{t+\tau} - FCF_t}{AT_t}$										
GP/A	0.13 [4.94]				0.13 [4.17]	0.36 [4.36]				0.29 [4.06]
IB/A		0.27 [1.91]			0.41 [2.59]		0.82 [4.58]			1.90 [1.53]
FCF/A			-0.15 [-1.60]		-0.47 [-5.17]			-0.27 [-1.12]		-2.00 [-1.83]
DIV/A				0.43 [3.64]	0.52 [2.57]				1.80 [2.30]	2.10 [2.10]
ln(BM)	0.02 [3.70]	0.01 [3.90]	0.02 [5.60]	0.01 [3.38]	0.01 [4.29]	0.07 [2.79]	0.06 [2.55]	0.07 [2.59]	0.06 [2.68]	0.05 [3.44]
ln(ME)	0.05 [4.07]	0.04 [3.38]	0.04 [4.1]	0.04 [3.88]	0.06 [4.72]	0.14 [1.78]	0.10 [1.47]	0.10 [1.34]	0.12 [1.48]	0.15 [1.88]
$r_{12,1}$	-0.09 [-4.90]	-0.09 [-4.71]	-0.08 [-4.22]	-0.09 [-4.73]	-0.09 [-4.55]	-0.19 [-1.08]	-0.19 [-1.10]	-0.18 [-1.01]	-0.17 [-1.02]	-0.18 [-1.04]
Panel D: regressions predicting payout growth, $y_t = \frac{DIV_{t+\tau} - DIV_t}{AT_t}$										
GP/A	0.02 [5.54]				0.02 [5.54]	0.09 [7.04]				0.11 [3.94]
IB/A		0.06 [4.43]			0.07 [4.19]		0.18 [2.23]			0.17 [2.80]
FCF/A			0.02 [3.87]		0.02 [3.95]			0.04 [0.99]		-0.05 [-0.92]
DIV/A				-0.45 [-4.65]	-0.57 [-6.69]				-0.35 [-1.23]	-0.65 [-3.00]
ln(BM)	0.00 [2.30]	0.00 [1.48]	0.00 [1.90]	0.00 [3.84]	0.00 [4.12]	-0.00 [-1.59]	-0.01 [-2.13]	-0.00 [-1.63]	-0.00 [-0.70]	0.00 [0.02]
ln(ME)	-0.00 [-6.13]	-0.00 [-6.24]	-0.01 [-7.11]	-0.01 [-8.22]	-0.01 [-7.10]	-0.05 [-12.5]	-0.06 [-9.91]	-0.06 [-14.6]	-0.06 [-13.2]	-0.05 [-11.8]
$r_{12,1}$	0.01 [8.59]	0.01 [8.86]	0.01 [9.05]	0.01 [9.03]	0.01 [7.73]	0.06 [4.05]	0.06 [3.83]	0.06 [4.01]	0.06 [4.30]	0.05 [3.88]

The first column of Table 16 shows that current gross profits have power predicting three year growth in gross profits, earnings, and free cash flow. Holding all else equal, an increase in current gross profits of one dollar is associated with a 20 cent average three year increase in gross profits, an eight cent average increase in earnings, a thirteen cent average increase in free cash flows, and a two cent average increase in dividends and repurchases. In contrast, the second, third and fourth columns show that current level of earnings, free cash flows and dividends are generally associated with lower future profitability. The fifth column shows that current gross profitability retains its power to predict future profit growth after controlling for other measures of current profitability.

The right half of the table repeats the tests of the left half, using ten year growths in profitability, as opposed to three year growths, as the dependent variables. The results are basically consistent with the test employing three year profitability growth. Current gross profits have power predicting ten year growths in gross profits, earnings, free cash flow and payouts to equity holders. Holding all else equal, an increase in current gross profits of one dollar is associated with a ten year increase in gross profits of \$1.50, a 29 cent average increase in earnings, a 36 cent average increase in free cash flows, and a nine cent increase in dividends. These results are again little changed controlling for other measures of current profitability.

Including financial firms leaves the results of Table 16 qualitatively unchanged. Deflating future profits (i.e., letting the dependent variable be $y_t = (Y_{t+N}/(1+r)^N - Y_t)/AT_t$) somewhat weakens the power that current profitability has predicting gross profit growth, but generally increases the power it has predicting earnings growth and free cash flow growth.

A.5 International evidence

Table 17 shows results of univariate sorts on gross profits-to-assets and book-to-market, like those presented in Table 2, performed on international stocks, including those from Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Hong Kong, Italy, Japan, the Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, and Switzerland. The data come from Compustat Global. The sample excludes financial firms and covers July 1990 to October 2009. The table shows that the profitability spread in international markets is significant, and even larger than the international value spread.

Table 17. Returns to portfolios sorted on GP/A and B/M, international evidence

This table shows monthly value-weighted average excess returns to portfolios of stocks from developed markets outside the US (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Hong Kong, Italy, Japan, the Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, and Switzerland) sorted on gross profits-to-assets ((REVT - COGS) / AT) and book-to-market, and results of time-series regressions of these portfolios' returns on the Fama-French factors. It also shows time-series average portfolio characteristics (portfolio gross profits-to-assets (GPA), book-to-market (BM), average firm size (ME, in \$10⁶), and number of firms (n)). The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1990 to October 2009.

Panel A: portfolios sorted on gross profits-to-assets									
	r^e	FF3 alphas and factor loadings				portfolio characteristics			
		α	MKT	SMB	HML	GPA	BM	ME	n
Low	-0.11 [-0.26]	-0.49 [-1.31]	0.83 [9.47]	0.03 [0.23]	-0.00 [-0.01]	0.09	0.93	914	1,517
2	0.20 [0.54]	-0.20 [-0.67]	0.78 [11.2]	0.09 [1.01]	0.10 [1.01]	0.20	0.74	1,574	1,517
3	0.27 [0.72]	-0.10 [-0.35]	0.82 [12.7]	0.07 [0.85]	-0.05 [-0.61]	0.33	0.79	1,752	1,516
4	0.47 [1.49]	0.08 [0.37]	0.81 [16.4]	0.02 [0.39]	0.05 [0.79]	0.57	1.03	1,858	1,517
High	0.58 [1.75]	0.14 [0.55]	0.75 [13.0]	0.23 [3.1]	0.18 [2.29]	1.05	1.42	1,007	1,517
H-L	0.70 [2.08]	0.63 [1.86]	-0.08 [-1.06]	0.20 [2.01]	0.18 [1.69]				
Panel B: portfolios sorted on book-to-market									
	r^e	FF3 alphas and factor loadings				portfolio characteristics			
		α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.12 [0.34]	-0.21 [-0.78]	0.81 [12.8]	0.01 [0.11]	-0.09 [-1.01]	0.31	0.18	2,213	1,517
2	0.32 [0.91]	-0.10 [-0.35]	0.77 [12.0]	0.10 [1.15]	0.14 [1.60]	0.29	0.46	2,049	1,517
3	0.35 [1.04]	-0.06 [-0.24]	0.78 [13.1]	0.01 [0.18]	0.15 [1.82]	0.28	0.71	1,476	1,516
4	0.44 [1.29]	0.03 [0.12]	0.78 [12.8]	0.02 [0.25]	0.14 [1.62]	0.32	1.09	914	1,517
High	0.64 [1.89]	0.20 [0.81]	0.81 [13.9]	0.11 [1.41]	0.15 [1.91]	0.40	7.66	537	1,517
H-L	0.52 [2.14]	0.42 [1.70]	0.00 [0.06]	0.10 [1.33]	0.24 [3.09]				

A.6 Double sorts on profitability and book-to-market split by size

Table 4 shows that profitability strategies constructed within book-to-market quintiles are more profitable than the unconditional profitability strategy, while value strategies constructed within profitability quintiles are more profitable than the unconditional value strategy. The book-to-market sort yields a great deal of variation in firm size, however, especially among the more profitable stocks, making the results more difficult to interpret. The next two tables address this by double sorting on profitability and book-to-market within the large and small cap universes, respectively, where these are defined as firms with market capitalizations above and below the NYSE median. The gross profits-to-assets and book-to-market breaks are determined using all large or small non-financial stocks (NYSE, AMEX and NASDAQ).

Table 18 shows the large cap results, which are largely consistent with the all-stock results presented in Table 4. Again, controlling for profitability improves the performance of value strategies and controlling for book-to-market improves the performance of profitability strategies. The average large cap value spread across gross profits-to-assets quintiles is 0.59 percent per month, and in every book-to-market quintile exceeds the 0.30 percent per month spread generated by the unconditional large cap value strategy. The average large cap profitability spread across book-to-market quintiles is 0.45 percent per month, and in every book-to-market quintile exceeds the 0.29 percent per month spread generated by the unconditional large cap profitability strategy. These results should be treated cautiously, however, as among large cap stocks there are very few unprofitable growth or profitable value firms, and the low-low and high-high corners are consequently very thin.

Table 19 shows the small cap results, which differ somewhat from the all-stock results presented in Table 4. Here controlling for profitability has little impact on the performance of value strategies, and controlling for book-to-market has little impact on the performance of profitability strategies. The average small cap value spread across gross profits-to-assets quintiles is 0.81 percent per month, only slightly higher than the 0.72 percent per month spread generated by the unconditional small cap value strategy. The average small cap profitability spread across book-to-market quintiles is 0.54 percent per month, slightly less than the 0.57 percent per month spread generated by the unconditional small cap profitability strategy. The value effect is stronger, however, among unprofitable stocks, while the profitability effect is stronger among growth stocks.

Table 18. Double sorts on gross profits-to-assets and book-to-market, large stocks

This table shows the value-weighted average excess returns to large cap portfolios double sorted on gross profits-to-assets and book-to-market, and results of time-series regressions of both sorts' high-minus-low portfolios' returns on the Fama-French factors. Large cap is defined as bigger than the NYSE median. The table also shows the average number of firms, and the average size of firms, in each portfolio (the portfolios exhibit little gross-profits to asset variation within book-to-market quintiles, and little book-to-market variation within profitability quintiles). The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

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}
book-to-market quintiles	L	0.12	0.23	0.29	0.28	0.55	0.43 [2.21]	0.59 [3.11]	-0.27 [-6.14]	-0.14 [-2.33]	0.00 [0.00]
	2	0.23	0.31	0.41	0.69	0.87	0.64 [3.53]	0.65 [3.52]	-0.14 [-3.16]	0.2 [3.39]	-0.00 [-0.05]
	3	0.38	0.39	0.74	0.62	0.76	0.38 [1.94]	0.19 [0.99]	0.07 [1.59]	0.42 [6.79]	0.10 [1.56]
	4	0.47	0.58	0.91	1.07	0.81	0.34 [1.51]	0.25 [1.15]	0.08 [1.54]	0.39 [5.47]	-0.14 [-1.81]
	H	0.61	0.78	0.89	1.07	1.04	0.48 [1.70]	0.48 [1.69]	-0.03 [-0.41]	0.20 [2.11]	-0.13 [-1.24]
book-to-market strategies	r^e	0.49 [2.19]	0.55 [2.72]	0.60 [2.99]	0.79 [3.47]	0.51 [1.83]					
	α	0.23 [1.21]	0.19 [1.05]	0.34 [1.73]	0.40 [1.91]	0.10 [0.38]					
	β_{mkt}	-0.22 [-4.98]	-0.04 [-1.02]	-0.02 [-0.45]	-0.06 [-1.17]	0.03 [0.44]					
	β_{smb}	0.01 [0.17]	0.22 [3.78]	0.24 [3.76]	0.63 [9.14]	0.35 [4.04]					
	β_{hml}	0.89 [13.5]	0.79 [12.4]	0.52 [7.52]	0.61 [8.13]	0.76 [8.02]					
Panel B: portfolio average number of firms (left) and average firm size (right, \$10 ⁶)											
		gross profits-to-asset quintiles					gross profits-to-asset quintiles				
		L	2	3	4	H	L	2	3	4	H
BM quintiles		number of firms					average firm size				
	L	32	34	47	78	140	3,145	3,313	3,958	5,542	5,611
	2	33	40	52	60	49	3,377	3,529	3,450	3,114	2,117
	3	42	43	43	32	22	2,570	3,094	3,320	2,101	1,264
	4	56	44	26	14	8	2,340	3,045	2,666	1,737	1,578
	H	38	26	14	8	4	2,338	2,108	2,697	1,256	1,057

Table 19. Double sorts on gross profits-to-assets and book-to-market, small stocks

This table shows the value-weighted average excess returns to large cap portfolios double sorted on gross profits-to-assets and book-to-market, and results of time-series regressions of both sorts' high-minus-low portfolios' returns on the Fama-French factors. Small cap is defined as smaller than the NYSE median. The table also shows the average number of firms, and the average size of firms, in each portfolio (the portfolios exhibit little gross-profits to asset variation within book-to-market quintiles, and little book-to-market variation within profitability quintiles). The sample excludes financial firms (those with one-digit SIC codes of six), and covers July 1963 to December 2010.

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}
book-to-market quintiles	L	-0.20	-0.10	0.28	0.37	0.74	0.94 [4.82]	0.98 [5.01]	-0.02 [-0.52]	-0.24 [-3.68]	0.08 [1.11]
	2	0.41	0.67	0.67	0.75	1.02	0.61 [2.79]	0.50 [2.29]	0.07 [1.37]	-0.17 [-2.35]	0.30 [3.90]
	3	0.60	0.69	0.72	0.97	1.09	0.49 [2.99]	0.37 [2.19]	0.12 [3.01]	0.08 [1.42]	0.14 [2.32]
	4	0.75	0.86	0.99	1.07	1.12	0.37 [2.42]	0.21 [1.38]	0.08 [2.29]	0.32 [6.45]	0.11 [2.00]
	H	0.77	1.00	1.13	1.16	1.08	0.31 [2.01]	0.36 [2.32]	-0.14 [-3.80]	0.21 [4.12]	-0.11 [-1.98]
book-to-market strategies	r^e	0.98 [3.95]	1.10 [4.99]	0.84 [4.10]	0.79 [4.57]	0.35 [1.91]					
	α	0.68 [3.73]	0.82 [4.51]	0.65 [4.14]	0.60 [4.44]	0.05 [0.42]					
	β_{mkt}	-0.02 [-0.47]	-0.08 [-1.77]	-0.18 [-4.75]	-0.13 [-4.09]	-0.13 [-4.37]					
	β_{smb}	-0.54 [-9.00]	-0.22 [-3.73]	-0.28 [-5.48]	-0.19 [-4.26]	-0.09 [-2.21]					
	β_{hml}	1.13 [17.5]	0.92 [14.3]	0.87 [15.6]	0.74 [15.5]	0.94 [20.5]					
Panel B: portfolio average number of firms (left) and average firm size (right, \$10 ⁶)											
		gross profits-to-asset quintiles					gross profits-to-asset quintiles				
		L	2	3	4	H	L	2	3	4	H
BM quintiles		number of firms					average firm size				
	L	163	67	81	117	203	85	95	108	119	113
	2	71	55	78	110	143	89	120	118	116	101
	3	71	62	84	112	120	99	122	115	102	85
	4	88	85	102	114	110	98	103	89	75	63
	H	136	126	121	112	105	68	73	66	57	48

A.7 Factors constructed controlling for industries

Table 1 suggests that industry-adjusted gross profitability has more power than gross profitability predicting the cross-section of expected returns. This fact suggests that strategies formed on the basis of industry-adjusted characteristics should outperform similar strategies constructed on the basis of unadjusted characteristics. If this is true, then the industry-adjusted strategies might “explain” the performance of conventional strategies, in the sense that the conventional strategies might not generate abnormal returns relative to the industry-adjusted strategies, while the conventional strategies have no hope of explaining the performance of the industry-adjusted strategies.

Cohen and Polk (1998), Asness, Porter and Stevens (2000) and Novy-Marx (2009, 2011) all consider strategies formed on the basis of industry-adjusted book-to-market. Asness, Porter and Stevens (2000) also consider strategies formed on industry-adjusted past performance. These papers find that strategies formed on the basis of industry-adjusted book-to-market and past performance do outperform their conventional counterparts. These industry-adjusted strategies do not, however, generate higher average returns. Their improved performance is driven by a reduction in the strategies’ volatilities. While this is undeniably an important determinant of performance, it raises questions regarding whether the industry-adjusted characteristics are really more strongly associated with expected returns. Strategies formed on the basis of industry-adjusted characteristics are much more balanced across industries. It is possible that the improved performance of industry-adjusted value and momentum strategies comes simply from reducing the strategies’ exposure to industry related-volatility unrelated to average returns.

While I consider strategies formed on the basis of industry-adjusted characteristics, I also consider an alternative adjustment for industry exposure. This alternative adjustment simply involves hedging away the industry exposure from strategies formed on the basis of conventional characteristics. That is, these strategies are formed by assigning stocks to the portfolios on the basis of unadjusted characteristics, and holding offsetting positions of equal magnitudes in each stocks’ industry (i.e., the Fama-French 49 value-weighted industry portfolios). This helps identify the true importance of industry adjusting characteristics, by quantifying the extent to which performance can be improved by simply reducing industry driven volatility unrelated to expected returns. The strategies hedged of industry exposure and the hedge portfolios also represent a clean decomposition

of the conventional strategies' returns into intra-industry and industry components, which makes it simple to quantify how much of the conventional strategies' variation is due to industry exposure.

Table 20 presents the performance of 1) strategies formed on the basis of unadjusted characteristics; 2) strategies formed on the basis of unadjusted characteristics but hedged for industry exposure; 3) the previous strategies' industry-hedges; 4) strategies formed on the basis of characteristics demeaned by industry; 5) strategies formed on the basis of the mean industry characteristics; and 6) strategies formed on the basis of characteristics demeaned by industry and hedged for industry exposure. All strategies are formed using the procedure employed in the construction of HML or UMD. Panel A employs book-to-market as the primary sorting characteristic. Panel B employs performance over the first eleven months of the preceding year. Panel C employs gross profits-to-assets and, because the strategies are constructed employing industry adjustments, includes financial firms.

The first column of Table 20 shows the average excess returns to HML-like factors constructed on the basis of unadjusted book-to-market, past performance and gross profitability. That is, it shows the performance of the canonical Fama-French factors HML and UMD, and a profitable-minus-unprofitable factor, PMU. Over the sample, which covers July 1963 to December 2010, HML generates average excess returns of 0.40 percent per month, with a test-statistic equal to 3.25, and has a realized annual Sharpe ratio of 0.47. UMD generates average excess returns of 0.72 percent per month, with a test-statistic of 3.94, and has a realized annual Sharpe ratio of 0.57. PMU generates average excess returns of 0.23 percent per month, with a test-statistic equal to 2.41, and has a realized annual Sharpe ratio of 0.35.

The second column shows the performance of the strategies hedged of industry exposure. Hedging the strategies decreases the average returns generated by all three strategies, but increases all three strategies' Sharpe ratios. While hedged HML, UMD and PMU generate excess average returns over the sample of only 0.36, 0.62 and 0.15 percent per month, respectively, the strategies' realized annual Sharpe ratios are 0.88, 0.79 and 0.52, far in excess of their conventional counterparts. In all three cases the strategies either "price" or "over-price" their conventional counterparts. HML and UMD have significant negative abnormal returns relative to the hedged strategies, while PMU has statistically insignificant returns relative to the hedged strategy.

The third column shows the performance of the hedges. The results here contrast strongly with

Table 20. Factors constructed with industry controls

This table reports the average excess returns to industry-adjusted “factors,” constructed employing the HML construction methodology, and the results of regressions of the canonical factors on these alternative factors’ returns. Panels A, B and C show results for strategies formed on the basis of book-to-market, performance over the first eleven months of the preceding year, and gross profits-to-assets, respectively. The first column presents the canonical strategies (i.e., no industry adjustments). The second column shows strategies hedged for industry exposure, where each stock position is off-set with an opposite position in the firm’s industry (Fama-French 49, value-weighted). The third column shows the industry hedge. The fourth and fifth columns show strategies constructed using a tertile sort on the primary sorting characteristic demeaned by industry, and sorted on the industry characteristic, respectively. The sixth column shows strategies constructed by sorting on the characteristic demeaned by industry and hedged for industry exposure. The sample covers July 1963 to December 2010.

	methodology used in strategy construction					
	canonical	hedged for industry	the industry hedge	industry-adjusted sort	industry sort	adjusted sort and hedged returns
panel A: alternative HMLs, and results from regressions of HML on these alternatives						
$\mathbf{E}[r^e]$	0.40 [3.25]	0.36 [6.09]	0.04 [0.65]	0.38 [5.03]	0.07 [0.51]	0.42 [6.67]
intercept		-0.20 [-2.52]	0.33 [6.11]	-0.03 [-0.36]	0.35 [5.14]	-0.24 [-2.95]
slope		1.64 [31.1]	1.68 [49.3]	1.14 [23.3]	0.75 [36.5]	1.53 [29.4]
adj.- R^2 (%)		62.9	81.0	48.8	70.0	60.3
panel B: alternative UMDs, and results from regressions of UMD on these alternatives						
$\mathbf{E}[r^e]$	0.72 [3.94]	0.62 [5.42]	0.17 [2.37]	0.62 [5.17]	0.54 [3.50]	0.61 [5.28]
intercept		-0.21 [-3.17]	0.34 [3.76]	-0.13 [-1.56]	0.21 [1.89]	-0.19 [-3.19]
slope		1.49 [63.8]	2.23 [41.8]	1.36 [48.5]	0.93 [31.2]	1.49 [69.8]
adj.- R^2 (%)		87.7	75.4	80.5	63.0	89.5
panel C: alternative PMUs, and results from regressions of PMU on these alternatives						
$\mathbf{E}[r^e]$	0.23 [2.41]	0.15 [3.56]	0.08 [0.84]	0.27 [4.42]	0.12 [1.05]	0.26 [5.43]
intercept		0.14 [1.50]	0.16 [3.77]	0.11 [1.14]	0.15 [2.58]	0.03 [0.35]
slope		0.60 [6.60]	0.92 [48.9]	0.47 [7.33]	0.65 [30.9]	0.76 [9.86]
adj.- R^2 (%)		7.0	80.8	8.5	62.6	14.5

those presented in the second column. Only the momentum strategy generates significant excess average returns, and these are relatively modest. That is, while there is some momentum at the industry level, industry average book-to-market and industry average profitability appear totally unrelated to expected returns. Even so, the industry related components contribute most of the volatility of HML and PMU. While contributing only 10% (0.04/0.40) of HML's average excess returns, industry exposure drives 80% of the factor's variation. Similarly, industry exposure contributes only 34% (0.08/0.23) of PMU's average excess returns, but again drives more than 80% of its variation.

The fourth and fifth columns show the performance of the strategies constructed on the basis of characteristics demeaned by industry and industry average characteristics, respectively. Column four shows that sorting on industry-adjusted characteristics improves the performance of all three strategies. For the value and momentum strategies this improvement is slightly less pronounced, however, than that achieved by simply hedging for industry exposure. This suggests that much of the benefit realized by forming strategies on the basis of industry-adjusted book-to-market and past performance comes simply from reducing the strategies' industry exposures. With gross profitability the situation is very different. Industry-adjusting gross profitability reduces the volatility of the associated factor while simultaneously *increasing* its average returns, suggesting that industry-adjusted profitability is truly more strongly associated with average excess returns. The strategy formed on the basis of industry adjusted gross profitability generates excess average returns a third higher than the unadjusted strategy, 0.27 percent per year with a test-statistic of 4.42, and has a higher Sharpe ratio of 0.64.

The sixth column shows that hedging the remaining industry exposure of the strategies formed on the basis of the industry-adjusted characteristics further improves the strategies' performances. This is especially true for PMU and, to a lesser extent, HML. The average annual Sharpe ratios of the strategies formed on the basis of industry-adjusted book-to-market, past performance and gross profitability, and hedged for industry exposure, are 0.97, 0.77 and 0.79, respectively, much higher than the 0.47, 0.57 and 0.35 achieved by their conventional counterparts. The performance of these strategies suggests that it is worthwhile investigating whether they have any power to "explain" anomalies.

A.8 Anomaly performance relative to alternative models

Table 10 shows the excess returns to fifteen test strategies, and these strategies abnormal returns relative to the canonical four-factor Fama-French model, and the alternative four-factor model employing the market and industry-adjusted value, momentum and profitability factors. That table showed that the root-mean-squared pricing error across the fifteen anomalies was much lower for the alternative four-factor model than for the canonical four-factor model, 0.22 percent per month compared to 0.54 percent per month. This section investigates how much of this improved performance comes from the inclusion of a profitability factor, and how much comes from industry-adjusting the value and momentum factors.

The second column of Table 21 again shows the fifteen strategies' excess returns. The third column shows the strategies' abnormal returns relative to the Fama-French four-factor model, while the last column shows the abnormal returns relative to the alternative four-factor model. The fourth and fifth columns show the performance of two "intermediate" models— the five factor model formed by augmenting the canonical four-factor model with the industry-adjusted profitability factor, and the three-factor model composed of the market and industry-adjusted value and momentum factors. The root-mean-squared pricing errors of the fifteen anomaly strategies relative to these two models are 0.36 and 0.44, percent, respectively. This suggests that almost two-thirds of the improved performance of the alternative four-factor model is due to the inclusion of the profitability factor, and only roughly one third is due to the industry-adjustments to the value and momentum factors.

Table 21. Anomaly strategy abnormal returns relative to alternative models

This table reports the average excess returns ($E[r^e]$) to strategies formed by sorting on market capitalization, book-to-market, performance over the first eleven months of the preceding year, gross profits-to-assets demeaned by industry and hedged for industry exposure, return-on-assets, earnings-to-price, asset turnover, gross margins, standardized unexpected earnings, failure probability, default risk (Ohlson's O-score), net stock issuance, asset growth, total accruals, and organizational capital. Strategies are long-short extreme deciles from a sort on the corresponding variable, employing NYSE breaks, and returns are value-weighted. Momentum, return-on-assets, return-on-equity, SUE, failure and default probability strategies are rebalanced monthly, while the other strategies are rebalanced annually, at the end of June. Strategies based on variables scaled by assets exclude financial firms. The table also reports abnormal returns relative to the Fama-French four-factor model, the Fama-French four-factor model plus the industry-adjusted profitability factor, the three-factor model employing the market and industry-adjusted value and momentum factors, and the four-factor model employing the market and industry-adjusted value, momentum and profitability factors. The sample covers July 1973 to December 2010.

sorting variable used in strategy construction	$E[r^e]$	abnormal returns relative to the model employing the factors:			
		MKT, SMB, HML, UMD	MKT, SMB, HML, UMD, PMU*	MKT, HML*, UMD*	MKT, HML*, UMD*, PMU*
1 / market equity	0.35 [1.53]	-0.19 [-1.60]	-0.02 [-0.14]	-0.13 [-0.52]	0.38 [1.54]
book-to-market	0.58 [3.13]	0.05 [0.39]	0.27 [1.92]	-0.20 [-1.32]	-0.03 [-0.20]
prior performance	1.43 [4.28]	0.52 [3.99]	0.53 [3.89]	-0.11 [-0.76]	-0.14 [-0.92]
ind. adj. profitability	0.21 [2.34]	0.32 [4.01]	-0.02 [-0.23]	0.34 [3.95]	-0.04 [-0.61]
return-on-assets	0.67 [2.81]	0.84 [4.63]	0.20 [1.20]	0.73 [3.19]	-0.15 [-0.75]
return-on-equity	1.02 [4.47]	0.82 [4.23]	0.41 [2.13]	0.64 [2.91]	0.07 [0.32]
asset turnover	0.54 [2.92]	0.47 [2.45]	-0.32 [-1.96]	0.63 [3.12]	-0.15 [-0.81]
gross margins	0.02 [0.15]	0.42 [3.33]	0.16 [1.28]	0.39 [2.52]	0.01 [0.05]
SUE	0.69 [4.00]	0.54 [3.66]	0.45 [2.94]	0.48 [3.03]	0.36 [2.20]
1 / failure probability	0.76 [2.09]	0.94 [4.44]	0.40 [1.94]	0.57 [2.09]	-0.26 [-0.99]
1/ Ohlson's O-score	0.11 [0.58]	0.59 [4.55]	0.47 [3.47]	0.41 [2.26]	0.09 [0.48]
1 / net stock issuance	0.73 [5.15]	0.62 [4.70]	0.38 [2.86]	0.52 [3.66]	0.21 [1.49]
1 / total accruals	0.37 [2.35]	0.37 [2.32]	0.60 [3.69]	0.24 [1.41]	0.39 [2.16]
1 / asset growth	0.70 [4.17]	0.30 [2.12]	0.36 [2.41]	0.16 [1.02]	0.23 [1.37]
organizational capital	0.46 [3.73]	0.30 [2.55]	0.14 [1.15]	0.36 [2.75]	0.27 [1.94]
r.m.s. pricing error	0.67	0.54	0.36	0.44	0.22

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