The Other Side of Value: Good Growth and 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 cashflow 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 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 other studies (Fama and French (1993, 2006)), which find that profitability adds little or nothing to the prediction of returns provided by size and book-to-market. The difference is that "profitability" here is measured using gross profits, not earnings. Gross profitability represents "the other side of value." Strategies based on gross profitability generate value-like average excess returns, despite being growth strategies that provide an excellent hedge for value. 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 for which 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 though 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 cashflows 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 not reduced by interest payments and are thus independent of leverage.

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

In a horse race between these three measures of productivity, gross profits-to-assets is

[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 cashflow, defined as earnings plus depreciation, are more profitable than those formed on the basis of earnings alone.

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. Moreover, demeaning this variable dramatically increases its power. Gross profits-to-assets also predicts long run growth in earnings and free crashflow, 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. That is, profitable firms are high return "good growth" stocks, while unprofitable firms are low return "bad value" 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. These results contrast strongly with those of Fama and French (2006), who find that profitability, 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 also 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."

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, and free cashflows. 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, 2010a). 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, free cashflow growth, 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 presents evidence that gross profitability has power predicting long term growth in gross profits, earnings, and free cashflows. Section 4 shows that gross profits-to-assets is a powerful predictor of the cross-section of expected returns, even among the largest, most liquid stocks. Section 5 investigates the relation between profitability and value more closely. It shows both 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 6 shows that the results are robust to controlling for earlier, known results regarding accruals and R&D expenditures. Section 7 considers the performance of a four-factor model that employs the market and industry-adjusted value, momentum and gross profitability "factors." The model performs much better than canonical models pricing a wide array of anomalies. Section 8 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

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

where Y_t is time-t earnings, $dB_t = B_t - B_{t-1}$ 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

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

This equation makes explicit the fact that the earnings process in equation (1), and consequently the 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 implies

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

where N_t is the rents to expensed earnings and retained investment,

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

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. A dollar of expensed investment or retained earnings increases the expected present value of future dividends by roughly a dollar, has essentially no effect on the cum dividend price of the stock, and is thus 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 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. 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 profitability growth

Before considering the asset pricing implications of profitability, I first present evidence that current profitability, and in particular gross profitability, has power predicting long term growth in gross profits, earnings, and free cashflows, 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 1 reports results of Fama-MacBeth (1973) regressions of profitability growth on current profitability. The table considers both the three and ten year growths, and employs three different measures of profitability: gross profits, earnings before extraordinary items, and free cashflow.[2] Earnings variables are scaled by assets, though scaling by book equity, as in Fama-French (2006), yields similar results. Regressions included 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 (control coefficients 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 0.5 and 99.5 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 2009.

The first column of Table 1 shows that current gross profits have power predicting three year growth in gross profits, earnings, and free cashflow. Holding all else equal, an increase in current gross profits of one dollar is associated with a 20 cent average increase in gross profits three years in the future, a four cent average increase in earnings three years in the

[2] Gross profits and earnings before extraordinary items are Compustat data items GP and IB, respectively. For free cashflow I employ net income plus depreciation and amortization minus changes in working capital minus capital expenditures (NI + DP - WCAPCH - 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.

Table 1. 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), and free cashflow (FCF = NI + DP - WCAPCH - CAPX), on current profitability, valuations (ln(B/M)) and size (ln(ME)). Regressions include controls for prior year's stock price performance and the three year change in the dependent profitability variable (coefficients not reported). Profitability variables are scaled by total assets (AT). Independent variables are trimmed at the 0.5% and 99.5% 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 2009, inclusive.

slope coefficients and [test-statistics] from regressions of the form $y_t = \beta' \mathbf{x}_{tj} + \epsilon_{tj}$									
regressions predicting three-year growth ($\tau = 3$)					regressions predicting ten-year growth ($\tau = 10$)				
GP/A	IB/A	FCF/A	ln(B/M)	ln(ME)	GP/A	IB/A	FCF/A	ln(B/M)	ln(ME)
Panel A: regressions predicting gross profit growth, $y_t = \frac{GP_{t+\tau} - GP_t}{AT_t}$									
0.20			-0.09	-0.01	0.91			-0.40	-0.06
[5.83]			[-8.75]	[-4.30]	[3.54]			[-14.1]	[-3.31]
	-0.03		-0.11	-0.01		-0.32		-0.47	-0.07
	[-0.40]		[-10.5]	[-6.03]		[-0.48]		[-13.4]	[-5.35]
		-1.01	-0.11	-0.01			-4.23	-0.50	-0.06
		[-5.25]	[-10.1]	[-4.35]			[-2.04]	[-14.3]	[-5.88]
0.26	0.09	-0.56	-0.09	-0.01	1.19	-1.68	-0.69	-0.42	-0.05
[11.4]	[0.29]	[-1.55]	[-9.94]	[-3.18]	[5.87]	[-3.01]	[-2.79]	[-11.8]	[-3.29]
Panel B: regressions predicting earnings growth, $y_t = \frac{IB_{t+\tau} - IB_t}{AT_t}$									
0.04			-0.00	0.00	0.13			-0.05	0.01
[2.40]			[-0.10]	[1.32]	[3.72]			[-1.83]	[1.56]
	-0.06		-0.00	0.00		0.13		-0.06	0.01
	[-1.19]		[-0.07]	[1.85]		[1.44]		[-2.46]	[1.21]
		0.12	-0.00	0.00			-0.38	-0.06	0.01
		[1.38]	[-0.02]	[1.23]			[-0.79]	[-2.42]	[1.27]
0.06	-0.21	0.06	0.00	0.01	0.13	0.17	-0.21	-0.05	0.01
[3.12]	[-5.08]	[3.07]	[0.12]	[2.17]	[3.53]	[0.99]	[-1.46]	[-1.81]	[1.55]
Panel C: regressions predicting free cashflow growth, $y_t = \frac{FCF_{t+\tau} - FCF_t}{AT_t}$									
0.08			0.03	0.01	0.25			0.01	0.03
[4.55]			[4.60]	[3.63]	[6.07]			[0.59]	[4.42]
	0.11		0.03	0.01		0.61		-0.00	0.02
	[1.61]		[3.89]	[3.06]		[5.56]		[-0.16]	[4.29]
		-0.15	0.02	0.01			-0.09	-0.02	0.02
		[-1.58]	[3.72]	[3.81]			[-0.71]	[-1.31]	[4.21]
0.09	0.22	-0.34	0.04	0.01	0.24	0.85	-0.75	0.02	0.02
[4.00]	[2.70]	[-3.20]	[5.70]	[3.63]	[5.13]	[3.95]	[-2.84]	[1.57]	[4.72]

future, and an eight cent average increase in free cashflows three years in the future. In contrast, the second and third columns show that current level of earnings and current free cashflows are generally associated with lower future profitability. The fourth column shows that high valuation ratios are associated with higher gross profit growth, but lower free cashflow growth, after controlling for other variables. The last rows of each panel shows that including all three measures of current profitability as explanatory variables increases the power of gross profits to predict the three year growth in gross profits, earnings, and free cashflow. Holding all else equal, and controlling for current earnings and current free cashflows, an increase in current gross profits of one dollar is associated with a 26 cent average increase in gross profits three years in the future, an six cent average increase in earnings three years in the future, and a nine cent average increase in free cashflows three years in the future.

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 growth in gross profits, earnings, and free cashflow. Holding all else equal, an increase in current gross profits of one dollar is associated with a 91 cent increase in gross profits ten years in the future, a thirteen cent average increase in earnings ten years in the future, and a 25 cent average increase in free cashflows ten years in the future. These results are little changed controlling for current earnings and free cashflow.

Untabulated results employing total payouts (dividends plus stock purchases) yield similar results. High gross profits and high valuations (as well as high earnings) have significant power predicting payout growth at both three and ten year horizons.

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

4 Profitability and the cross-section of expected returns

Table 1 shows that current profitability, particularly as measured by gross profits, has power predicting long term growth in gross profits, earnings, and free cashflow. This section shows that current profitability also has power predicting the cross-section of expected returns.

4.1 Fama-MacBeth regressions

Table 2 shows results of regressions of firms' returns on gross profits, earnings, and free cashflow, each scaled by assets. Regressions include controls for book-to-market (log(bm)), size (log(me)), and past performance measured at horizons of one month ($r_{1,0}$) and twelve to two months ($r_{12,2}$).[3] 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 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 2009. The sample excludes financial firms (i.e., those with a one-digit SIC code of six), though results including financials are qualitatively identical. The table also shows results employing gross profits, earnings, and free cashflow 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

[3] 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 (CEQ + PSTX) if available, or else total assets minus total liabilities (AT - 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). Prefered stock is redemption value (PSTKR) if available, or else liquidating value (PSTKRL) if available, or else carrying value (PSTK).

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 cashflow, respectively. Each of these variables has power individually, though less power than gross profitability. The fourth and fifth specifications show that gross margins completely subsumes earnings, and largely subsumes free cashflow. The sixth specification shows that free cashflow subsumes earnings. The seventh specification shows that free cashflow has incremental power above that in gross profitability after controlling for earnings, but that gross profitability is still the stronger predictive variable.

The appendix performs similar regressions employing several other earnings-related variables. It particular, it considers regression employing earnings before interest, taxes, depreciation and amortization (EBITDA) and selling, general and administrative expenses (XSGA), which together represent a decomposition of gross profits. EBITDA-to-assets and XSGA-to-assets each have significant power predicating the cross section of returns, both individually and jointly, but gross profits-to-assets subsumes either variables. The appendix also considers regressions employing a decomposition of gross profits-to-assets into asset turnover (sales-to-assets) and gross margins (gross profits-to-sales). 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. Detailed results of these tests are provided in Appendix A.2.

Panel B repeats the tests of panel A, employing gross profits-to-assets, earnings-to-assets and free cashflow-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 variables associated with value and momentum (log(BM) and $r_{12,2}$). Free cashflows also has some power, though less than gross profits. Earnings convey little information regard-

Table 2. 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 cashflow (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(bm)), size (log(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 2009.

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \boldsymbol{\beta}'\mathbf{x}_{tj} + \epsilon_{tj}$ (1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A: straight profitability variables						
gross profitability	0.67			0.67	0.61		0.62
	[5.06]			[5.27]	[4.88]		[4.94]
earnings		0.77		0.22		0.07	-0.28
		[1.77]		[0.49]		[0.15]	[-0.55]
free cashflow			0.65		0.31	0.91	0.73
			[2.52]		[1.20]	[2.97]	[2.44]
log(BM)	0.32	0.30	0.26	0.33	0.29	0.28	0.31
	[5.42]	[5.36]	[4.80]	[5.93]	[5.39]	[5.12]	[5.71]
log(ME)	-0.14	-0.15	-0.16	-0.13	-0.14	-0.15	-0.14
	[-3.22]	[-3.97]	[-3.95]	[-3.55]	[-3.63]	[-4.02]	[-3.62]
$r_{1,0}$	-6.10	-6.09	-6.08	-6.19	-6.18	-6.14	-6.23
	[-15.1]	[-15.3]	[-15.2]	[-15.6]	[-15.5]	[-15.5]	[-15.8]
$r_{12,2}$	0.61	0.62	0.63	0.57	0.59	0.61	0.56
	[3.28]	[3.34]	[3.42]	[3.09]	[3.18]	[3.30]	[3.07]
	Panel B: profitability variables demeaned by industry						
gross profitability	0.91			0.83	0.76		0.78
	[8.54]			[8.82]	[7.89]		[8.38]
earnings		0.87		0.28		0.09	-0.32
		[2.21]		[0.69]		[0.20]	[-0.70]
free cashflow			0.98		0.62	1.05	0.89
			[5.01]		[3.24]	[4.37]	[3.72]
log(BM)	0.32	0.29	0.27	0.32	0.30	0.27	0.30
	[5.50]	[5.01]	[4.74]	[5.38]	[5.11]	[4.75]	[5.13]
log(ME)	-0.13	-0.15	-0.15	-0.14	-0.14	-0.15	-0.14
	[-3.13]	[-3.76]	[-3.72]	[-3.48]	[-3.51]	[-3.81]	[-3.53]
$r_{1,0}$	-6.09	-6.08	-6.08	-6.12	-6.11	-6.10	-6.13
	[-15.0]	[-15.0]	[-15.0]	[-15.2]	[-15.1]	[-15.1]	[-15.2]
$r_{12,2}$	0.62	0.63	0.63	0.60	0.61	0.62	0.60
	[3.32]	[3.37]	[3.39]	[3.24]	[3.27]	[3.34]	[3.21]

ing future performance. The use of industry-adjustment to better predict the cross-section of returns is investigated in greater detail in section B.

Finally, it must be noted that while earnings performed poorly in Table 2, the annual accounting variables employed there are relatively stale (lagged at least six months from fiscal year end, and used for a full year), and the most recent quarterly earnings have significantly more power predicting returns than the old annual earnings employed here. Much of this additional power is not related to basic profitability, however, but can instead be attributed to post earnings announcement drift. Firms with the highest earnings over the last quarter are more likely to have quarterly earnings higher than their recent past earnings, and thus are more likely to be those with high standardized unexpected earnings (SUE, defined as the difference between the most recent quarter's earnings and earnings from the same quarter of the previous year, scaled by the standard deviation of earnings over the previous eight quarters). The time-series average cross-sectional Spearman rank correlation between quarterly ROA (quarterly earnings scaled by assets lagged one quarter) and SUE is 48.6%. High frequency return-on-assets strategies are thus formed by assigning firms to portfolios on the basis of a noisy measure of standardized unexpected earnings, and this fact partly explains their performance.

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.

4.2 Sorts on profitability

The Fama-MacBeth regressions of Table 2 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 portfolios sorted on profitability, non-parametrically testing the hypothesis that profitability predicts average returns.

Table 3 shows results of univariate sorts on gross profits-to-assets ((REVT – COGS) / AT) and, for comparison, valuation ratios. The Spearman rank correlation between gross profits-to-assets and market-to-book ratios is 18%, and highly significant, so strategies formed on the basis of these two criteria should be quite similar. Portfolios are constructed using a quintile sort, based on New York Stock Exchange (NYSE) break points, and are rebalanced at the end of each 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 2009.

The table shows that the gross profits-to-assets portfolios' average excess returns are generally increasing with profitability, with the most profitable firms earning 0.33 percent per month higher average returns than the least profitable firms, with a test-statistic of 2.63. This significant profitable-minus-unprofitable return spread is observed despite the fact that the profitable firms tend to be growth firms, while the unprofitable firms tend to be value firms. As a result, the abnormal returns of the profitable-minus-unprofitable return spread relative to the Fama-French three-factor model is 0.55 percent per month, with a test-statistic of 4.75.[4]

Consistent with the variation in HML loadings, the portfolios sorted on gross profitability exhibit large variation in book-to-market. Profitable firms tend to be growth firms, while unprofitable firms tend to be value firms. In fact, the portfolios sorted on gross prof-

[4] Including financial firms reduces the profitable-minus-unprofitable return spread to 0.25 percent per month, with a test-statistic of 1.86, but increases the Fama-French alpha of the spread to 0.63 percent per month, with a test-statistic of 5.71. Most financial firms end up in the first portfolio, because their large asset bases result low profits-to-assets ratios. This slightly increases the low profitability portfolio's average returns, but also significantly increases its HML loading.

Table 3. 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 2009.

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

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

Panel B: portfolios sorted on market-to-book

		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.79	0.07	1.01	0.26	0.53	0.21	5.49	349	755
	[3.81]	[1.05]	[60.3]	[11.2]	[20.8]				
2	0.64	-0.01	0.96	0.11	0.53	0.21	1.12	615	694
	[3.45]	[-0.19]	[74.0]	[5.87]	[27.1]				
3	0.53	0.02	0.96	0.04	0.22	0.26	0.79	797	675
	[2.81]	[0.34]	[61.3]	[1.94]	[9.53]				
4	0.44	-0.01	0.99	0.05	0.04	0.31	0.54	1,103	733
	[2.22]	[-0.23]	[77.2]	[2.82]	[2.33]				
High	0.37	0.14	0.98	-0.09	-0.40	0.43	0.25	1,841	1,022
	[1.75]	[2.97]	[87.7]	[-5.61]	[-23.7]				
H-L	-0.42	0.07	-0.04	-0.35	-0.92				
	[-3.00]	[0.76]	[-1.75]	[-12.4]	[-30.3]				

itability exhibit roughly half the variation in HML loadings and book-to-markets as the portfolios sorted on market-to-book, presented in Panel B. 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 extremely dissimilar in terms of average returns. That is, while the are growth firms under the standard definition, they are "good growth" firms, which tend to outperform despite their low book-to-markets.

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 3 are 0.33 and 0.42 percent per month, respectively, with standard deviations of 2.96 and 3.30 percent. An investor running the two strategies together would capture both strategies' returns, 0.75 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 2.90 percent. That is, while the 33 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 6.11, and its realized annual Sharpe ratio is 0.90, nearly three times the 0.32 observed on the market over the same period. The strategy is orthogonal to momentum.

Appendix A.3 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.

4.3 Performance over time

Figure 1 shows the performance over time of the profitability strategy presented in Table 3. 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 2009 (dashed blue line). It also shows the performance of a similarly constructed value strategy (dotted green line), and a 50/50 mix of the two (solid black line).

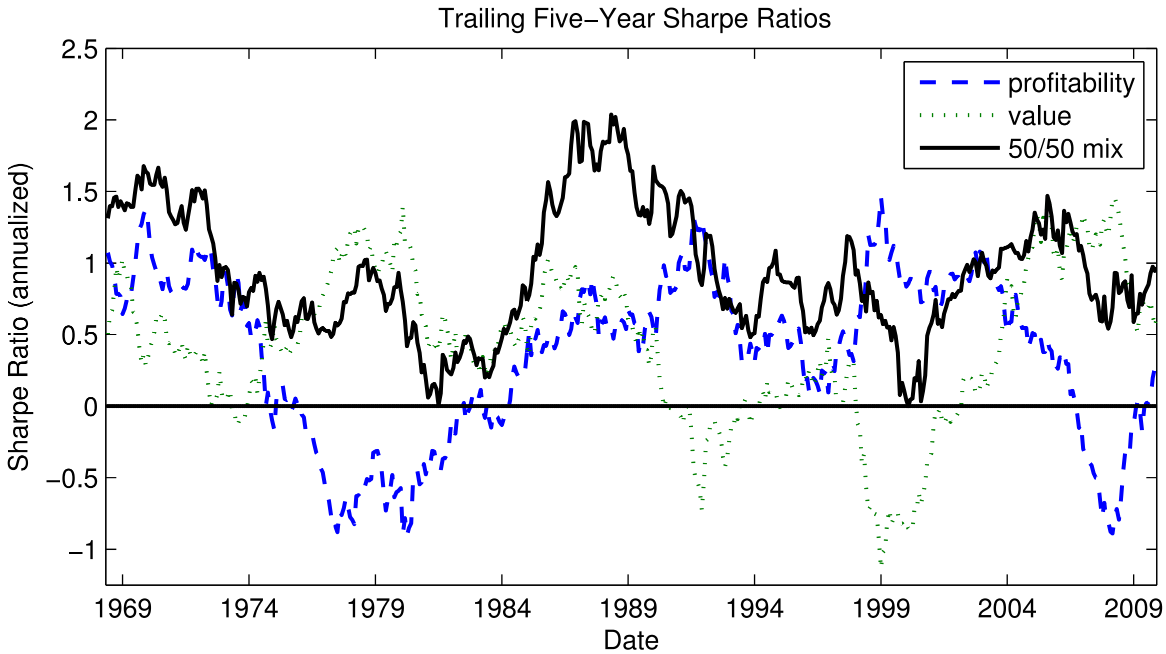

Figure 1. Performance over time of strategies based on GP/A and B/M
The figure shows the trailing five-year Sharpe ratios of profitability and value strategies (dashed blue and dotted green, respectively), and a 50/50 mix of the two (solid black). The profitability and value strategies are long-short extreme value-weighted quintiles from sorts on gross profits-to-assets and book-to-market, respectively, and correspond to the strategies considered in Table 3. The sample excludes financial firms, and covers June 1963 to December 2009.

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 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 almost never had a loosing five year period.

4.4 Gross profitability spread by size

The portfolio results presented in Table 3 suggest that the power that gross profits-to-assets has predicting the cross section of average returns is economically as well as statistically

Table 4. 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 2009.

	(small)	(2)	(3)	(4)	(large)
number of firms	2,429	752	485	385	334
percent of firms	55.4	17.1	11.1	8.8	7.6
average capitalization ($\$10^6$)	37.6	196	484	1,214	9,119
total capitalization ($\$10^9$)	91	147	234	467	3,045
total capitalization (%)	2.3	3.7	5.9	11.7	76.4
portfolio book-to-market	2.63	1.35	1.05	0.88	0.61
portfolio gross profits-to-assets	0.27	0.28	0.26	0.25	0.27

significant. By analyzing portfolios double sorted on size and profitability, 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, using NYSE breaks. The sample excludes financial firms, and covers July 1963 to December 2009.

Table 4 reports time-series average characteristics of the size portfolios. More than half of firms are in the small portfolio, but these stocks comprise less than three percent of the market by capitalization, while the large 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 5 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-assets within profitability quintiles, and little variation in size within size quintiles, these characteristics are not reported.

Table 5. 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 2009.

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

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

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	L	2	3	4	H
		number of firms					book-to-market				
size quintiles	S	420	282	339	416	517	4.21	4.65	2.63	1.82	1.07
	2	123	106	123	143	161	1.49	1.92	1.87	1.14	0.69
	3	84	76	80	88	104	1.26	1.46	1.2	0.93	0.54
	4	76	68	65	67	77	1.15	1.05	0.99	0.72	0.43
	B	63	64	59	61	72	0.97	0.81	0.93	0.42	0.27

The table shows that the profitability spread is large and significant across size quintiles. The spreads are decreasing across size quintiles, but 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 29 basis points per month (test-statistic of 2.05) is considerably larger that the value spread of 16 basis points per month (test-statistic of 1.06). The two strategies have a negative correlation of -0.59, and consequently perform very well together. While the two strategies' realized annual Sharpe ratios over the period are only 0.30 and 0.16, respectively, a 50/50 mix of the two strategies had a Sharpe ratio of 0.49. While not nearly as large as the 0.90 Sharpe ratio observed in the previous section on the 50/50 mix of the value-weighted profitability and value strategies that trade stocks of all sizes, this Sharpe ratio still greatly exceeds the 0.32 Sharpe ratio observed on the market over the same period. It does so despite trading exclusively in the largest two-thirds of the fortune 500 universe.

4.4.1 Fortune 500 profitability and value strategies

While the Sharpe ratio on the large cap mixed value and growth strategy is 0.49, one and a half times 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 percent), and consequently has a high Sharpe ratio despite generating relatively modest average returns (0.23 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.

Table 6. 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 $\$10^6$), and number of firms (n)). The sample covers July 1963 to December 2009.

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

		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.34	-0.17	1.02	-0.03	0.23	0.13	1.02	5,529	150
	[1.70]	[-2.18]	[54.1]	[-1.25]	[8.07]				
2	0.54	-0.00	1.13	0.11	0.08	0.31	0.85	7,536	200
	[2.37]	[-0.01]	[72.7]	[5.12]	[3.48]				
High	0.63	0.25	1.03	0.08	-0.17	0.64	0.41	8,940	150
	[2.90]	[3.80]	[66.6]	[3.78]	[-7.53]				
H-L	0.28	0.42	0.00	0.11	-0.40				
	[2.38]	[3.90]	[0.05]	[3.20]	[-10.5]				

Panel B: portfolios sorted on book-to-market

	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.35	0.07	1.10	0.04	-0.49	0.51	0.25	10,086	150
	[1.40]	[1.05]	[68.0]	[1.91]	[-19.9]				
2	0.49	-0.01	1.07	0.07	0.09	0.34	0.58	7,004	200
	[2.33]	[-0.22]	[78.7]	[3.66]	[4.33]				
High	0.68	0.02	1.02	0.06	0.53	0.22	1.54	5,092	150
	[3.49]	[0.28]	[71.9]	[3.06]	[24.9]				
H-L	0.34	-0.06	-0.08	0.02	1.02				
	[2.22]	[-0.72]	[-4.49]	[0.68]	[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	0.15	-0.22	1.13	0.01	-0.27	0.22	0.45	7,499	150
	[0.59]	[-2.43]	[52.5]	[0.26]	[-8.27]				
2	0.57	0.10	1.01	0.03	0.10	0.38	0.68	8,518	200
	[2.89]	[1.90]	[85.3]	[1.53]	[5.31]				
High	0.78	0.16	1.08	0.15	0.30	0.45	1.20	5,669	150
	[3.68]	[2.69]	[75.1]	[7.72]	[13.8]				
H-L	0.64	0.39	-0.05	0.15	0.56				
	[5.21]	[3.77]	[-1.92]	[4.38]	[15.6]				

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 average of the profitability and value ranks, and shorts one dollar of each of the 150 stocks with the lowest average ranks.[5] The performance of this strategy is provided in Table 6. 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 0.64 percent per month, and has a realized annual Sharpe ratio of 0.76, almost two and a half times that observed on the market. All together these large firms yielded average excess returns of 0.41 percent per month over the period, so the strategy makes 58 percent of its profits on the long side and 42 percent on the short side (0.37 vs. 0.27 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.

5 Profitability and value

The negative correlation between profitability and book-to-market observed in Table 3 suggests that the performance of value strategies can be improved by controlling for profitability, 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

[5] Well known firms among those with the highest combined gross profits-to-assets and book-to-market ranks at the end of the sample are Astrazeneca, SAP, Sun Microsystems, Sears and JC Penny, while the lowest ranking firms include Vertex Pharmaceuticals, Plum Creek Timber, Marriott International, Lockheed Martin and Delta Airlines. Among the largest firms held on the long side of the strategy are Intel, ConocoPhillips, CVS, Home Depot and Time Warner, while the short side includes IBM, Apple, GE, Oracle and McDonalds.

value strategies. Similarly, a profitability strategy that avoids holding stocks that are profitable but "fully priced," and avoids selling stocks that are unprofitable but "cheap," should outperform conventional profitability strategies.

5.1 Double sorts on profitability and book-to-market

This section tests these predictions by analyzing the performance of portfolios independently 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 2009. Table 7 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 0.71 percent per month, and in every book-to-market quintile exceeds the 0.42 percent per month spread on the unconditional value strategy presented in Table 3. The average profitability spread across book-to-market quintiles is 0.56 percent per month, and in every book-to-market quintile exceeds the 0.33 percent per month spread on the unconditional profitability strategy presented in Table 3.

Appendix A.4 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. The large cap results are largely consistent with the all-stock results presented in Table 7. Among large stocks, controlling for profitability greatly improves the performance of value strategies, and controlling for book-to-market greatly improves

Table 7. 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 2009.

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

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
		number of firms					average firm size				
BM quintiles	L	194	102	128	194	342	620	1,367	1,802	2,581	2,315
	2	104	95	129	169	191	950	1,652	1,550	1,140	617
	3	112	104	127	144	142	921	1,352	1,165	500	261
	4	144	129	127	127	118	881	1,056	583	247	170
	H	174	151	135	120	108	509	385	419	182	92

the performance of profitability strategies. The average large cap value spread across gross profits-to-assets quintiles is 0.64 percent per month, and in every book-to-market quintile exceeds the 0.29 percent per month spread generated by the unconditional large cap value strategy. The average large cap profitability spread across book-to-market quintiles is 0.54 percent per month, and in every book-to-market quintile exceeds the 0.36 percent per month spread generated by the unconditional large cap profitability strategy. The small cap results differ somewhat from the all-stock results presented in Table 7. While both the profitability and value spreads are larger within the small cap universe, controlling for profitability has little impact on the average performance of small cap value strategies, and controlling for book-to-market has little impact on the average performance of small cap profitability strategies. The results do suggest, however, that the value effect is stronger among unprofitable stocks, while the profitability effect is stronger among growth stocks.

5.2 Conditional value and profitability "factors"

Table 7 suggests that HML 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 methodology 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 8 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

Table 8. 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 2009.

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

on book-to-market"), over the sample July 1963 to December 2009.

The first specification shows that controlling for profitability does indeed improve the performance of HML. HML | GP generates excess average returns of 0.54 percent per month over the sample, with a test-statistic of 5.00. This compares favorably with the 0.42 percent per month, with a test-statistic of 3.34, observed on HML. The second and third specifications show that HML | GP has an extremely large information ratio relative to 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 0.49 percent per month, with a test-statistic of 5.40. The fifth and sixth specifications show that PMU|BM has an enormous information ratio relative to HML and 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 5.41 and 5.66, 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 -0.16). These loadings explain all of the performance of HML, which has completely insignificant abnormal returns relative to these two factors. Including the market and SMB as explanatory variables has essentially no impact on this result.

The last two specifications consider a profitability factor constructed without controlling for book-to-market. They show that this factor generates significant average returns, but is much less profitable than the factor constructed controlling for book-to-market. This factor is also long "real" profitability, with a 0.97 loading on PMU|BM, but short "real" value, with a -0.32 loading on HML|GP.

6 Relation to results in the literature

Previous studies have found a role for individual components of the difference between gross profits and earnings. In particular, Sloan (1996) finds that accruals predict returns, while Chan, Lakonishok and Sougiannis (2001) show that R&D expenditures have power in the cross-section. While both accruals and R&D expenditures represent parts of the wedge between earnings and gross profits, the results of Sloan and Chan et. al. cannot explain those presented here. 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.

The next two sections show this, by presenting results from double sorts on gross profitability and accruals, and gross profitability and R&D expenditures. In both cases the profitability results are as strong within accruals and R&D expenditures quintiles as they are unconditionally. The appendix also provides evidence, from Fama-MacBeth regressions, that gross profits-to-assets retains power predicting returns after controlling for accruals and R&D expenditures (Table 20).

6.1 Controlling for accruals

Sloan (1996) hypothesizes that "... if investors naively fixate on earnings, then they will tend to overprice (underprice) 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." This accruals effect is, however, strongly concentrated in small stocks, suggesting that the profitability spread, which is present among the largest stocks, cannot be driven by accruals. Even so, this section considers this possibility explicitly, by investigating the performance of portfolios double sorted on gross profitability and accruals.

Accruals are defined, as in Sloan (1996), as the change in non-cash current assets, minus the change in current liabilities (excluding changes in debt in current liabilities and income taxes payable), minus depreciation.[6] 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 9 shows value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on gross profits-to-assets and accruals-to-average assets, and results of

[6] Specifically, this is defined as the change in Compustat annual data item ACT (current assets), minus item CHECH (change in cash/cash equivalents), minus the change in item LCT (current liabilities), plus the change in item DLC (debt included in liabilities), plus the change in item TXP (income taxes payable), minus item 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.

Table 9. Double sorts on accruals-to-average assets and gross profits-to-assets
This table shows value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on gross profits-to-assets and accruals-to-average assets, and results of time-series regressions of both sorts' spread portfolios' returns on the Fama-French factors. The sample, which covers July 1963 to June 2010, excludes financial firms (those with one-digit SIC codes of six) and firms for which accruals data is unavailable.

		Portfolio average returns and time-series regression results										
			Accrual-to-average asset quintiles					Accrual strategies				
		All	H	4	3	2	L	r^e	α	β_{mkt}	β_{smb}	β_{hml}
	All		0.35	0.42	0.47	0.48	0.49	0.14	0.05	-0.06	-0.08	0.33
								[1.39]	[0.54]	[-2.76]	[-2.76]	[10.3]
gross profits-to-asset quintiles	L	0.30	0.23	0.44	0.36	0.26	0.24	0.01	-0.04	0.03	-0.02	0.11
								[0.05]	[-0.24]	[0.64]	[-0.40]	[1.79]
	2	0.36	0.13	0.31	0.44	0.46	0.39	0.26	0.26	-0.06	-0.36	0.28
								[1.45]	[1.54]	[-1.41]	[-6.70]	[4.81]
	3	0.49	0.27	0.24	0.45	0.64	0.52	0.25	0.18	-0.05	-0.32	0.41
								[1.53]	[1.23]	[-1.45]	[-6.53]	[7.87]
	4	0.38	0.38	0.22	0.53	0.66	0.48	0.10	0.06	0.00	-0.14	0.20
								[0.66]	[0.37]	[0.00]	[-2.73]	[3.57]
	H	0.58	0.52	0.64	0.64	0.47	0.80	0.28	0.21	-0.11	0.10	0.20
								[1.90]	[1.47]	[-3.30]	[2.15]	[3.95]
profitability strategies	r^e	0.28	0.29	0.20	0.27	0.21	0.56					
		[2.25]	[1.66]	[1.31]	[1.69]	[1.29]	[2.91]					
	α	0.51	0.57	0.47	0.44	0.37	0.82					
		[4.44]	[3.38]	[3.22]	[2.87]	[2.22]	[4.36]					
	β_{mkt}	-0.02	-0.04	-0.05	0.02	-0.04	-0.18					
		[-0.93]	[-1.12]	[-1.44]	[0.50]	[-1.06]	[-4.16]					
	β_{smb}	-0.07	-0.40	-0.18	0.03	-0.05	-0.27					
		[-1.94]	[-7.27]	[-3.67]	[0.65]	[-0.90]	[-4.39]					
	β_{hml}	-0.48	-0.37	-0.49	-0.45	-0.30	-0.29					
		[-11.8]	[-6.32]	[-9.49]	[-8.24]	[-5.14]	[-4.27]					

time-series regressions of both sorts' spread portfolios' returns on the Fama-French factors. The sample, which covers July 1963 to June 2010, excludes financial firms (those with one-digit SIC codes of six) and firms for which accruals data is unavailable.

The table shows that gross profits-to-assets' power to predict returns is undiminished after controlling for accruals. Within accrual quintiles the average profitability spread, and the spreads' average three-factor alpha, are as large as the unconditional profitability spread and three-factor alpha in the sample.

Equal-weighting portfolio returns greatly strengthens the results in both directions (results untabulated). The equal weighted long/short strategies all have highly significant average returns and three-factor alphas in both directions. Equal-weighting portfolio returns does not, however, weaken the conclusion that gross profits-to-assets has power predicting returns. The average equal-weighted profitability spread (three-factor alpha) across accruals quintiles is as large as the unconditional equal-weighted profitability spread (three-factor alpha).

6.2 Controlling for R&D expenditures

Chan, Lakonishok and Sougiannis (2001) show that "companies with high R&D to equity market value (which tend to have poor past returns) earn large excess returns." As with accruals, however, this effect is concentrated in small stocks, again suggesting that the profitability spread cannot be driven by R&D expenditures. Even so, this section considers this possibility explicitly, by investigating the performance of portfolios double sorted on gross profitability and R&D expenditures.

Table 10 shows value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on gross profits-to-assets and R&D-to-market, and results of time-series regressions of both sorts' high-minus-low portfolios' returns on the Fama-French factors. The sample, which covers July 1973 to June 2010, excludes financial firms (those with one-digit SIC codes of six) and firms that fail to report R&D expenditures or report expenditures of zero.

The table shows that gross profits-to-assets' power to predict returns is undiminished after controlling for R&D expenditures. The average profitability spread across R&D quintiles, and the spreads' average three-factor alpha, are as large as the unconditional profitability spread and three-factor alpha in the sample.

Equal-weighting portfolio returns again greatly strengthens the results in both directions (results untabulated). The equal weighted long/short strategies all have highly significant average returns and three-factor alphas in both directions. Equal-weighting portfolio returns does not, however, weaken the conclusion that gross profits-to-assets has power

Table 10. Double sorts on R&D-to-market and gross profits-to-assets
This table shows value-weighted average excess returns to portfolios double sorted, using NYSE breakpoints, on gross profits-to-assets and R&D-to-market, and results of time-series regressions of both sorts' high-minus-low portfolios' returns on the Fama-French factors. The sample, which covers July 1973 to June 2010, excludes financial firms (those with one-digit SIC codes of six) and firms that fail to report R&D expenditures or report expenditures of zero.

		Portfolio average returns and time-series regression results										
			R&D-to-market quintiles					R&D strategies				
		All	L	2	3	4	H	r^e	α	β_{mkt}	β_{smb}	β_{hml}
	All		0.36	0.49	0.51	0.66	0.82	0.46	0.02	0.18	0.66	0.40
								[2.14]	[0.10]	[4.23]	[11.0]	[6.36]
gross profits-to-asset quintiles	L	0.32	0.02	0.19	0.32	0.57	0.94	0.92	0.47	-0.06	1.17	0.33
								[2.24]	[1.22]	[-0.66]	[9.56]	[2.53]
	2	0.43	0.23	0.58	0.58	0.50	0.74	0.51	0.12	0.20	0.45	0.40
								[1.76]	[0.41]	[3.21]	[5.00]	[4.24]
	3	0.57	0.47	0.64	0.59	0.73	0.74	0.27	-0.19	0.37	0.58	0.30
								[0.99]	[-0.76]	[6.62]	[7.31]	[3.55]
	4	0.39	0.42	0.33	0.47	0.62	0.91	0.49	0.10	0.17	0.47	0.41
								[1.90]	[0.41]	[3.11]	[5.87]	[4.93]
	H	0.51	0.53	0.61	0.47	0.89	0.92	0.39	0.01	0.12	0.77	0.26
								[1.48]	[0.03]	[2.28]	[9.90]	[3.12]
profitability strategies	r^e	0.19	0.51	0.42	0.16	0.32	-0.02					
		[0.96]	[2.02]	[1.33]	[0.54]	[1.15]	[-0.06]					
	α	0.61	0.82	0.94	0.46	0.54	0.36					
		[3.46]	[3.29]	[3.25]	[1.73]	[2.02]	[0.96]					
	β_{mkt}	-0.25	-0.22	-0.40	-0.06	0.02	-0.04					
		[-6.28]	[-3.91]	[-6.17]	[-1.01]	[0.39]	[-0.44]					
	β_{smb}	-0.39	-0.18	-0.73	-0.85	-0.56	-0.58					
		[-6.83]	[-2.23]	[-7.92]	[-9.95]	[-6.53]	[-4.89]					
	β_{hml}	-0.47	-0.38	-0.29	-0.08	-0.18	-0.46					
		[-7.89]	[-4.58]	[-2.99]	[-0.87]	[-1.94]	[-3.63]					

predicting returns. The average equal-weighted profitability spread and three-factor alpha across R&D quintiles are as large as their unconditional counterparts.

7 Explaining 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 (or even improve on) the performance of value strategies 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 free cashflow growth), and a large number of seemingly unrelated anomalies (e.g., strategies based on default risk, or net stock issuance), are really just 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 return-on-assets, earnings-to-price, changes in free cashflow, 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 (2010)) the organizational capital based strategy of Eisfeldt and Papanikolaou (2009).

7.1 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 2 suggests that industry-adjusted gross profitability has more power than 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.[7] 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 (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 B.

The characteristics of these factors, industry-adjusted high-minus-low (HML*), up-minus-down (UMD*) and profitable-minus-unprofitable (PMU*), are shown in Table 11. All three factors generate highly significant average excess returns over the sample, January 1972 to June 2009[8] It 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 the returns to HML* and UMD*, they do not significantly reduce the information rations of any of the three factors.

[7] Cohen and Polk (1998), Asness, Porter and Stevens (2000) and Novy-Marx (2009, 2010a) 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.

[8] This sample is determined by the availability of the quarterly earnings data employed in the construction of some of the anomaly strategies investigated in the next table.

Table 11. 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 industry), and the resultant factors are hedged for industry exposure (HML*, UMD* and PMU*). The table also shows each factor's abnormal returns relative to the Fama-French four-factor model, with factor loadings. The sample covers January 1972 to June 2009.

		four-factor loadings				
	$\mathbf{E}[r^e]$	α	MKT	SMB	HML	UMD
HML*	0.48	0.26	0.02	0.10	0.42	0.01
	[6.67]	[5.76]	[1.56]	[6.97]	[26.8]	[0.76]
UMD*	0.62	0.28	-0.07	-0.07	-0.1	0.58
	[4.49]	[6.52]	[-6.77]	[-5.39]	[-6.68]	[63.9]
PMU*	0.26	0.31	-0.08	-0.11	-0.07	0.05
	[4.51]	[5.97]	[-6.92]	[-6.55]	[-3.97]	[4.17]

7.2 Explaining anomalies

Table 12 shows the average returns to the sixteen anomaly strategies, as well as the strategies' abnormal returns relative to the canonical Fama-French three-factor model plus UMD (hereafter referred to, for convenience, as the "Fama-French four-factor model"), the three factor model employing the market and industry-adjusted HML and UMD, and the four factor model employing the market and industry-adjusted HML, UMD and UMD.

The first four lines of the Table investigate anomaly strategies related directly to the construction of the Fama-French factors and the profitability factor. The strategies are constructed by sorting on size, 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. The profitability strategy is hedged for industry exposure. The sample covers January 1972 through June 2009.

The second column of Table 12 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

Table 12. Anomaly strategy average excess returns and abnormal performance

This table reports the average excess returns ($\mathbf{E}[r^e]$) 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, the one year change in free cashflow-to-assets, 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}), the model employing the market and industry-adjusted value and momentum factors (α_{Alt3}), and the the model employing the market and industry-adjusted value, momentum and profitability factors (α_{Alt4}). The sample covers January 1972 to June 2009.

sorting variable used in strategy construction	$\mathbf{E}[r^e]$	α_{FF4}	α_{Alt3}	four-factor loadings				
				α_{Alt4}	MKT	HML*	UMD*	PMU*
market equity	-0.10	0.05	-0.10	-0.45	0.04	-0.41	0.45	0.98
	[-0.44]	[0.37]	[-0.44]	[-1.90]	[0.79]	[-2.84]	[6.06]	[5.06]
book-to-market	0.55	0.00	-0.27	-0.14	-0.03	1.70	-0.03	-0.38
	[2.93]	[-0.02]	[-1.83]	[-0.90]	[-1.03]	[17.8]	[-0.57]	[-2.98]
prior performance	1.56	0.55	-0.08	-0.10	0.06	0.46	2.26	0.06
	[4.70]	[4.21]	[-0.53]	[-0.64]	[1.89]	[4.82]	[45.9]	[0.47]
ind. adj. profitability	0.23	0.32	0.35	-0.00	-0.06	-0.05	0.06	0.98
	[2.60]	[3.96]	[3.98]	[-0.06]	[-3.94]	[-1.21]	[2.57]	[16.9]
return-on-assets	0.71	0.76	0.73	-0.02	-0.08	-0.10	0.43	2.08
	[3.07]	[4.23]	[3.31]	[-0.08]	[-1.91]	[-0.83]	[6.99]	[13.0]
return-on-equity	1.10	0.73	0.44	-0.05	-0.08	1.11	0.48	1.38
	[4.70]	[3.49]	[1.93]	[-0.22]	[-1.77]	[8.07]	[6.77]	[7.49]
free cashflow growth	0.44	0.43	0.40	0.21	0.06	0.01	0.10	0.54
	[3.42]	[3.26]	[2.85]	[1.46]	[1.86]	[0.12]	[2.18]	[4.53]
asset turnover	0.50	0.44	0.61	-0.09	0.27	0.09	-0.12	1.99
	[2.71]	[2.31]	[3.02]	[-0.52]	[7.08]	[0.85]	[-2.16]	[13.6]
gross margins	0.10	0.49	0.50	0.19	-0.04	-0.56	-0.04	0.87
	[0.70]	[3.94]	[3.33]	[1.29]	[-1.28]	[-6.12]	[-0.83]	[7.07]
SUE	0.78	0.60	0.57	0.48	0.06	-0.36	0.64	0.26
	[4.42]	[4.02]	[3.55]	[2.85]	[1.57]	[-3.50]	[12.1]	[1.93]
failure probability	-1.29	-1.16	-0.79	0.33	0.25	-0.63	-0.96	-2.91
	[-3.48]	[-4.56]	[-2.44]	[1.14]	[4.06]	[-3.47]	[-10.3]	[-12.3]
Ohlson's O-score	-0.72	-0.74	-0.58	0.20	0.12	0.17	-0.69	-2.21
	[-2.60]	[-4.28]	[-2.28]	[0.88]	[2.39]	[1.13]	[-9.34]	[-11.6]
net stock issuance	-0.52	-0.45	-0.33	-0.13	0.10	-0.50	-0.07	-0.57
	[-4.33]	[-4.09]	[-2.70]	[-1.04]	[3.70]	[-6.53]	[-1.88]	[-5.64]
total accruals	-0.54	-0.53	-0.41	-0.38	0.14	-0.26	-0.11	-0.10
	[-2.88]	[-2.82]	[-2.04]	[-1.79]	[3.15]	[-1.95]	[-1.64]	[-0.57]
asset growth	-0.83	-0.42	-0.24	-0.27	0.11	-1.19	-0.11	0.09
	[-4.58]	[-2.74]	[-1.40]	[-1.51]	[2.79]	[-10.6]	[-1.95]	[0.58]
organizational capital	0.44	0.28	0.33	0.21	-0.00	0.05	0.19	0.33
	[3.52]	[2.41]	[2.45]	[1.52]	[-0.07]	[0.61]	[4.39]	[2.91]
r.m.s. pricing error	0.76	0.57	0.46	0.25				

struggles, however, with the extreme sort on past performance, despite the fact that this is the same variable used in the construction of UMD. The model Fama-French model fails to help in the pricing of the profitability based strategy. The fourth column shows that the three-factor model employing the market and industry-adjusted HML and UMD generally performs similarly to the canonical Fama-French four-factor model, though it performs much better pricing the momentum. It prices the momentum strategy better than the canonical four-factor model primarily because the momentum strategy loads much more heavily on UMD* than it does on UMD (loadings of 2.30 and 1.40, respectively). 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 fifth column shows that industry-adjusted PMU somewhat worsens the pricing of the size strategy, but greatly improves the pricing the strategy based on gross profitability. As in Table 8, the conventional value strategy is long "real value" (HML*), and but significantly short profitability.

The next six lines of Table 12 investigate earnings-related anomalies. These strategies are constructed by sorting on return-on-assets, earnings-to-price, the one year change in free cashflow (scaled by assets), 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, gross margin strategies exclude financial firms (i.e., those with one-digit SIC codes of six). Returns are value weighted. Portfolios are rebalanced annually, at the end of June, except for the strategy based on return-on-assets, return-on-equity and standardized unexpected earnings, which are rebalanced monthly. The sample covers January 1972 through June 2009, and is determined by the availability of monthly earnings data. The strategy based on SUE requires earnings from the same quarter one year prior to portfolio construction, and consequently this return series starts later, in October 1972.[9]

[9] I construct SUE here directly from the most recent quarterly earnings, as the difference between the

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 these strategies is what makes them anomalies. The fourth column shows that the three-factor model employing the market and industry-adjusted HML and UMD performs similarly to the canonical Fama-French four-factor model pricing the earnings related anomalies, though it does perform somewhat better pricing the earnings-to-price strategies.

The fifth column shows that the model that includes the industry-adjusted profitability factor explains the returns to all of the strategies, with the exception of post earnings announcement drift. All of the strategies have large, significant loadings on PMU*, especially the return-on-assets, earnings-to-price and asset turnover strategies. The model prices the free cashflow growth strategy primarily through the virtue of a large positive loading on the profitability factor. It does well pricing the strategy based on gross margins, despite the fact that the high margin firms tend to be growth firms, which 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 panel of Table 12 consider the five strategies considered, along with value, momentum, and post earnings announcement drift, by Chen, Novy-Marx and Zhang (2010). These five 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, and total accruals. The table also analyzes the performance of Eisfeldt and Papanikolaou's (2009) organizational capital based strategy.[10] All six anomalies are con-

most recent quarter's earnings and earnings from the same quarter of the previous year, scaled by the standard deviation of earnings over the previous eight quarters. This strategy performs better, and is more difficult to explain, than that formed on the basis of earnings per share, like that employed in Chan, Jegadeesh, and Lakonishok (1996).

[10] This strategy is based on their accounting based measure of organizational capital, which accumulates selling, general and administrative expenses (XSGA), the accounting variable most likely to include spending

structed 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 performance of the first five strategies comes from the Chen-Zhang Data Library. The sample covers January 1972 through June 2009, and is determined by the availability of quarterly earnings data. Due to more stringent data requirements, the failure probability series is not available until mid-1975.

The second and third columns of Table 12 shows 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 three-factor model employing the market and industry-adjusted HML and UMD performs only slightly better than the canonical Fama-French four-factor model. The fifth column shows that the four-factor model employing the market and industry-adjusted HML, UMD and PMU explains the performance of all six strategies. The model explains the poor performance of the high failure probability and high default probability firms primarily through large, negative loadings on the industry-adjusted profitability factor. That is, firms with extremely low industry-adjusted gross profits-to-assets tend to be firms that both the Campbell, Hilscher, and Szilagyi (2008) and Ohlson (1980) measures predict are more likely to default. The fact that the model performs well pricing these two strategies is 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 negative loadings on HML* and PMU*. That is, net 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

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. Results employing this measure are not sensitive to these choices. The trading strategy is formed by sorting on the organizational capital measure within industries.

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 sixteen anomalies is 0.76 percent per month. The root-mean-squared pricing error relative to the alternative four-factor model is only 0.25 percent per month, less than half the 0.57 percent per month root-mean-squared pricing errors observed relative to the canonical Fama-Fench four-factor models, and much smaller than the 0.46 percent per month relative to the three-factor model employing the market and industry-adjusted HML and UMD.[11]

8 Conclusion

Profitability, as 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 average returns than unprofitable firms, despite having, on average, lower book-to-markets and higher market capitalizations. Controlling for profitability also dramatically increases the performance of value strategies. These results are robust to controlling for accruals or R&D expenditures. They are difficult to reconcile with popular explanations of the value premium, as profitable firms are less prone to distress, have longer cashflow durations, and have lower levels of operating leverage, than unprofitable firms. Controlling for gross profitability explains most earnings related anomalies, as well as a wide range of seemingly unrelated profitable trading strategies.

[11] The root-mean-squared pricing error of the sixteen strategies relative to the Chen, Novy-Marx and Zhang (2010) three-factor model is 0.45 percent per month.

A Additional results

A.1 Correlations between variables employed in the FMB regressions

Table 13 reports the time-series averages of the cross-sectional Spearman rank correlations between the independent variables employed in the Fama-MacBeth regressions of Table 2. 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 cashflows 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 13. 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 2: gross profitability ((REVT - COGS)/AT), earnings (IB/AT), free cashflow ((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 2009.

	IB/A	FCF/A	BM	ME	$r_{1,0}$	$r_{12,2}$
gross profitability (GP/A)	0.45	0.31	-0.18	-0.03	0.02	0.09
	[58.8]	[17.6]	[-16.7]	[-2.44]	[1.81]	[6.93]
earnings (IB/A)		0.59	-0.26	0.36	0.07	0.23
		[16.4]	[-8.85]	[30.0]	[6.06]	[14.9]
free cashflows (FCF/A)			-0.03	0.19	0.07	0.18
			[-1.23]	[10.6]	[6.92]	[10.6]
book-to-market (BM)				-0.26	0.02	-0.09
				[-12.8]	[1.39]	[-4.88]
market equity (ME)					0.13	0.26
					[9.01]	[11.2]
prior month's performance ($r_{1,0}$)						0.08
						[5.22]

A.2 Tests employing other earnings variables

A.2.1 Regressions employing EBITDA and XSGA

Earnings before interest, taxes, depreciation and amortization is gross profits minus operating expenses, which largely consist of selling, general and administrative expenses. Table 14 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. Earnings before interest, taxes, depreciation and amortization is gross profits minus operating expenses, which largely consist of selling, general and administrative expenses. EBITDA-to-assets and XSGA-to-assets, have time-series average cross-sectional Spearman rank correlation 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 gross profits-to-assets

Table 14. 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(bm)), size (log(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 2009.

independent variables	slope coefficients ($\times 10^2$) and [test-statistics] from regressions of the form $r_{tj} = \boldsymbol{\beta}'\mathbf{x}_{tj} + \epsilon_{tj}$ (1)	(2)	(3)	(4)	(5)	(6)
gross profitability	0.67 [5.06]			0.58 [4.40]	1.27 [4.17]	
EBITDA-to-assets		0.99 [3.26]		0.49 [1.53]		1.30 [4.01]
XSGA-to-assets			0.68 [4.42]		-0.43 [-1.39]	0.79 [5.34]
log(BM)	0.32 [5.42]	0.30 [5.40]	0.36 [6.57]	0.33 [6.07]	0.35 [6.20]	0.35 [6.16]
log(ME)	-0.14 [-3.22]	-0.16 [-4.24]	-0.11 [-2.58]	-0.14 [-3.79]	-0.14 [-3.60]	-0.14 [-3.66]
$r_{1,0}$	-6.10 [-15.1]	-6.12 [-15.4]	-6.18 [-15.2]	-6.23 [-15.7]	-6.31 [-15.7]	-6.32 [-15.8]
$r_{12,2}$	0.61 [3.28]	0.61 [3.30]	0.62 [3.36]	0.57 [3.07]	0.58 [3.17]	0.58 [3.17]

is essentially EBITDA-to-assets and XSGA-to-assets, all three variables cannot be used together.

A.2.2 Tests employing gross margins and asset turnover

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

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

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 reduces gross margins. Conversely, a firm can increase gross margins by increasing prices, but this generally reduces sales, and thus asset turnover.[12]

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 section 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 15 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(bm)), size (log(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 percent levels. The sample

[12] 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 2009 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 15. 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(bm)), size (log(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 2009, 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 $r_{tj} = \boldsymbol{\beta}'\mathbf{x}_{tj} + \epsilon_{tj}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
profits-to-assets	0.67			0.79	0.77		0.86
	[5.06]			[6.57]	[5.65]		[5.59]
asset turnover		0.10		-0.05		0.13	-0.04
		[2.28]		[-1.28]		[2.96]	[-0.91]
gross margins			0.33		0.19	0.36	0.11
			[3.41]		[1.68]	[3.46]	[0.66]
log(BM)	0.32	0.29	0.32	0.32	0.35	0.31	0.34
	[5.42]	[5.00]	[5.59]	[5.56]	[5.98]	[5.43]	[5.95]
log(ME)	-0.14	-0.14	-0.14	-0.14	-0.13	-0.14	-0.13
	[-3.22]	[-3.23]	[-3.42]	[-3.27]	[-3.17]	[-3.21]	[-3.15]
$r_{1,0}$	-6.10	-6.09	-5.98	-6.14	-6.10	-6.08	-6.15
	[-15.1]	[-15.2]	[-14.7]	[-15.3]	[-15.1]	[-15.1]	[-15.3]
$r_{12,2}$	0.61	0.62	0.67	0.60	0.60	0.62	0.60
	[3.28]	[3.34]	[3.57]	[3.23]	[3.25]	[3.36]	[3.23]

covers July 1963 to December 2009, 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 2. 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 16 shows results of univariate sorts on asset turnover and gross margins. These tests

Table 16. 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 $\$10^6$), 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 2009.

		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
panel A: portfolios sorted on asset turnover									
Low	0.25	-0.12	0.92	-0.05	0.00	0.13	0.93	954	908
	[1.34]	[-1.57]	[49.6]	[-2.10]	[0.15]				
2	0.43	0.09	1.00	-0.06	-0.15	0.26	0.71	1,408	718
	[2.13]	[1.51]	[71.2]	[-3.25]	[-7.09]				
3	0.49	0.10	1.01	0.00	-0.09	0.34	0.79	1,287	709
	[2.43]	[2.05]	[85.4]	[-0.02]	[-4.91]				
4	0.53	0.08	1.01	0.04	0.01	0.37	0.61	838	801
	[2.59]	[1.39]	[73.7]	[2.32]	[0.64]				
High	0.62	0.17	0.96	0.17	-0.01	0.48	0.57	602	945
	[2.96]	[2.03]	[47.5]	[6.13]	[-0.19]				
H-L	0.36	0.30	0.04	0.22	-0.01				
	[2.66]	[2.18]	[1.17]	[5.05]	[-0.20]				
panel B: portfolios sorted on gross margins									
Low	0.41	-0.17	1.03	0.28	0.17	0.16	1.07	498	906
	[1.93]	[-2.76]	[72.3]	[14.5]	[8.18]				
2	0.48	-0.04	1.00	0.04	0.21	0.26	0.87	1,072	672
	[2.43]	[-0.59]	[62.7]	[1.97]	[8.64]				
3	0.45	-0.04	1.04	-0.03	0.13	0.27	1.04	952	674
	[2.23]	[-0.80]	[84.3]	[-1.58]	[7.18]				
4	0.44	0.04	0.97	-0.03	-0.01	0.29	0.68	976	763
	[2.29]	[0.74]	[79.0]	[-1.76]	[-0.28]				
High	0.44	0.21	0.94	-0.10	-0.35	0.36	0.44	1,461	1,027
	[2.19]	[4.59]	[86.4]	[-6.40]	[-21.64]				
H-L	0.02	0.38	-0.09	-0.38	-0.53				
	[0.22]	[4.38]	[-4.42]	[-13.5]	[-17.3]				

employ the same methodology as that employed in Table 3, 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 rations, 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, 0.42 percent per month with a test-statistic of 4.77. 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.

A.3 International evidence

Table 17 shows results of univariate sorts on gross profits-to-assets and book-to-market, like those presented in Table 3, performed on international stocks, including those from Australia, Austria, Belgium, Canada, Germany, Denmark, Spain, Finland, France, Great Britain, Hong Kong, Italy, Japan, the Netherlands, Norway, New Zealand, Singapore, 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 larger than the value spread, and the two strategies have similar Sharpe ratio over the sample. The two strategies' returns are 24 percent correlated.

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 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 $\$10^6$), 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

		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	-0.11	-0.49	0.83	0.03	-0.00	0.09	0.93	914	1,517
	[-0.26]	[-1.31]	[9.47]	[0.23]	[-0.01]				
2	0.20	-0.20	0.78	0.09	0.10	0.2	0.74	1,574	1,517
	[0.54]	[-0.67]	[11.2]	[1.01]	[1.01]				
3	0.27	-0.10	0.82	0.07	-0.05	0.33	0.79	1,752	1,516
	[0.72]	[-0.35]	[12.7]	[0.85]	[-0.61]				
4	0.47	0.08	0.81	0.02	0.05	0.57	1.03	1,858	1,517
	[1.49]	[0.37]	[16.4]	[0.39]	[0.79]				
High	0.58	0.14	0.75	0.23	0.18	1.05	1.42	1,007	1,517
	[1.75]	[0.55]	[13.0]	[3.1]	[2.29]				
	0.70	0.63	-0.08	0.20	0.18				
	[2.08]	[1.86]	[-1.06]	[2.01]	[1.69]				

Panel B: portfolios sorted on book-to-market

		FF3 alphas and factor loadings				portfolio characteristics			
	r^e	α	MKT	SMB	HML	GPA	BM	ME	n
Low	0.12	-0.21	0.81	0.01	-0.09	0.31	0.18	2,213	1,517
	[0.34]	[-0.78]	[12.8]	[0.11]	[-1.01]				
2	0.32	-0.10	0.77	0.10	0.14	0.29	0.46	2,049	1,517
	[0.91]	[-0.35]	[12.0]	[1.15]	[1.60]				
3	0.35	-0.06	0.78	0.01	0.15	0.28	0.71	1,476	1,516
	[1.04]	[-0.24]	[13.1]	[0.18]	[1.82]				
4	0.44	0.03	0.78	0.02	0.14	0.32	1.09	914	1,517
	[1.29]	[0.12]	[12.8]	[0.25]	[1.62]				
High	0.64	0.20	0.81	0.11	0.15	0.40	7.66	537	1,517
	[1.89]	[0.81]	[13.9]	[1.41]	[1.91]				
H-L	0.52	0.42	0.00	0.10	0.24				
	[2.14]	[1.70]	[0.06]	[1.33]	[3.09]				

A.4 Double sorts on profitability and book-to-market split by size

Table 7 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 7. 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 0.64 percent per month, and in every book-to-market quintile exceeds the 0.29 percent per month spread generated by the unconditional large cap value strategy. The average large cap profitability spread across book-to-market quintiles is 0.54 percent per month, and in every book-to-market quintile exceeds the 0.36 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 7. 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 0.87 percent per month, only slightly higher than the 0.83 percent per month spread generated by the unconditional small cap value strategy. The average small cap profitability spread across book-to-market quintiles is 0.60 percent per month, slightly less than the 0.63 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 2009.

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	-0.13	0.00	0.20	0.20	0.53	0.65	0.84	-0.38	-0.20	0.05
							[2.50]	[3.33]	[-6.43]	[-2.45]	[0.61]
	2	0.10	0.22	0.38	0.44	0.69	0.59	0.57	-0.14	0.01	0.18
							[2.80]	[2.69]	[-2.87]	[0.14]	[2.43]
	3	0.15	0.28	0.41	0.72	0.59	0.44	0.37	-0.04	0.09	0.13
							[2.25]	[1.89]	[-0.86]	[1.44]	[1.91]
	4	0.29	0.41	0.79	0.55	0.80	0.50	0.31	0.15	0.26	0.16
							[2.66]	[1.65]	[3.41]	[4.20]	[2.35]
	H	0.49	0.66	0.85	1.03	0.99	0.50	0.49	0.05	0.26	-0.19
							[2.06]	[2.02]	[0.95]	[3.33]	[-2.25]
book-to-market strategies	r^e	0.62	0.66	0.65	0.83	0.46					
		[2.15]	[2.87]	[2.87]	[4.06]	[1.83]					
	α	0.33	0.26	0.28	0.35	-0.03					
		[1.39]	[1.46]	[1.40]	[1.98]	[-0.12]					
	β_{mkt}	-0.39	-0.20	-0.06	0.02	0.04					
		[-7.11]	[-4.68]	[-1.29]	[0.39]	[0.79]					
	β_{smb}	0.01	0.08	0.05	0.64	0.47					
		[0.15]	[1.34]	[0.79]	[11.2]	[6.22]					
	β_{hml}	1.10	1.12	0.92	0.76	0.85					
		[13.2]	[17.8]	[13.1]	[12.2]	[10.2]					

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
		number of firms					average firm size				
BM quintiles	L	16	18	26	47	89	2,753	2,858	3,568	6,842	6,435
	2	20	30	41	54	51	4,609	3,427	4,118	4,621	2,901
	3	28	38	50	49	30	2,535	3,506	3,464	2,729	1,656
	4	50	52	46	30	16	2,399	3,116	2,898	1,584	1,344
	H	80	57	32	15	8	2,302	2,667	2,329	1,373	1,180

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 2009.

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	-0.43	-0.08	0.15	0.37	0.68	1.12	1.12	-0.00	-0.23	0.13
							[5.69]	[5.68]	[-0.10]	[-3.52]	[1.85]
	2	0.42	0.37	0.50	0.76	1.02	0.60	0.49	0.02	-0.23	0.39
							[2.79]	[2.30]	[0.44]	[-3.32]	[5.16]
	3	0.36	0.65	0.74	0.92	1.19	0.82	0.68	0.12	0.09	0.17
							[4.80]	[3.90]	[3.00]	[1.61]	[2.83]
	4	0.77	0.93	1.12	1.02	0.85	0.08	0.00	0.01	0.19	0.06
							[0.50]	[0.03]	[0.29]	[3.44]	[1.06]
	H	0.75	0.94	0.99	1.22	1.12	0.36	0.41	-0.15	0.17	-0.05
							[2.04]	[2.27]	[-3.64]	[2.92]	[-0.82]
book-to-market strategies	r^e	1.19	1.02	0.84	0.85	0.43					
		[4.62]	[4.66]	[4.30]	[4.27]	[2.10]					
	α	0.82	0.75	0.59	0.63	0.10					
		[4.27]	[4.30]	[4.03]	[3.94]	[0.66]					
	β_{mkt}	0.02	-0.14	-0.16	-0.17	-0.13					
		[0.34]	[-3.40]	[-4.56]	[-4.54]	[-3.66]					
	β_{smb}	-0.52	-0.22	-0.20	-0.17	-0.12					
		[-8.28]	[-3.93]	[-4.19]	[-3.16]	[-2.32]					
	β_{hml}	1.18	0.93	0.89	0.79	1.00					
		[17.4]	[15.2]	[17.0]	[13.9]	[18.1]					

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
		number of firms					average firm size				
BM quintiles	L	140	75	76	97	139	79	92	104	112	102
	2	86	84	105	125	131	78	110	111	105	91
	3	79	101	120	125	105	83	111	101	90	77
	4	85	126	123	108	84	80	93	79	64	57
	H	118	143	110	82	67	58	64	55	46	38

A.5 Regressions employing accruals and R&D expenditures

Table 20. 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 (ΔACT - CHECH - ΔLCT + ΔDCT + ΔTXP - DP) scaled by average assets (AT/2 + lag(AT)/2), and research and development expenditures (XRD) scaled by market value. Regressions include controls for book-to-market (log(bm)), size (log(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 2009, 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 $r_{tj} = \boldsymbol{\beta}'\mathbf{x}_{tj} + \epsilon_{tj}$						
	(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-to-assets		-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(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(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]

B Factors constructed controlling for industries

Table 2 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, 2010a) 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 21 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 21 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

Table 21. 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 2009.

	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						
$\mathbf{E}[r^e]$	0.42	0.37	0.05	0.39	0.06	0.43
	[3.34]	[6.24]	[0.72]	[5.11]	[0.43]	[6.78]
α		-0.20	0.34	-0.03	0.37	-0.24
		[-2.60]	[6.22]	[-0.33]	[5.32]	[-2.98]
β		1.66	1.67	1.14	0.78	1.54
		[31.0]	[49.2]	[23.1]	[34.9]	[29.3]
adj.-R^2 (%)		63.3	81.3	48.9	68.6	60.6
panel B: alternative UMDs, and results from regressions of UMD on these alternatives						
$\mathbf{E}[r^e]$	0.72	0.63	0.17	0.63	0.62	0.62
	[3.90]	[5.36]	[2.34]	[5.13]	[4.00]	[5.21]
α		-0.21	0.35	-0.13	0.10	-0.19
		[-3.14]	[3.73]	[-1.56]	[1.00]	[-3.12]
β		1.49	2.23	1.36	1.01	1.48
		[63.2]	[41.2]	[48.0]	[35.9]	[69.3]
adj.-R^2 (%)		87.8	75.3	80.5	69.8	89.6
panel C: alternative PMUs, and results from regressions of PMU on these alternatives						
$\mathbf{E}[r^e]$	0.23	0.15	0.08	0.26	0.16	0.25
	[2.36]	[3.60]	[0.82]	[4.13]	[1.24]	[4.98]
α		0.15	0.16	0.12	0.14	0.06
		[1.51]	[3.82]	[1.22]	[2.20]	[0.61]
β		0.57	0.92	0.45	0.59	0.70
		[5.94]	[50.4]	[7.01]	[28.3]	[9.01]
adj.-R^2 (%)		5.8	82.0	8.0	59.0	12.6

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 2009, HML generates average excess returns of 0.42 percent per month, with a test-statistic equal to 3.34, and has a realized annual Sharpe ratio of 0.49. UMU generates average excess returns of 0.72 percent per month, with a test-statistic of 3.90, 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 2.36, 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 0.37, 0.63 and 0.15 percent per month, respectively, the strategies' realized annual Sharpe ratios are 0.91, 0.79 and 0.53, 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 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% (0.05/0.43) of HML's average excess returns, industry exposure drives 49% (81.3%/1.67) of the factor's variation. Similarly, industry exposure contributes only 34% (0.08/0.23) of PMU's average excess returns, but drives 89% (82.0%/0.92) 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 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 does reduce the volatility of the associated factor, but it also increases 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, 0.26 percent per year with a test-statistic of 4.13, and has a higher Sharpe ratio of 0.61.

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 0.99, 0.76 and 0.73, respectively, much higher than the 0.49, 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.

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