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Deflating Gross Profitability

Ray Ball
University of Chicago Booth School of Business

Joseph Gerakos
University of Chicago Booth School of Business

Juhani T. Linnainmaa
University of Chicago Booth School of Business and NBER

Valeri Nikolaev
University of Chicago Booth School of Business

Fama-Miller Center for Research in Finance
The University of Chicago, Booth School of Business

Deflating profitability*

Ray Ball[†1], Joseph Gerakos[1], Juhani T. Linnainmaa[1,2] and Valeri Nikolaev[1]

[1]University of Chicago Booth School of Business, United States

[2]National Bureau of Economic Research, United States

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Abstract

Gross profit scaled by book value of total assets predicts the cross-section of average returns. Novy-Marx (2013) concludes that it outperforms other measures of profitability such as earnings, cash flows, and dividends. One potential explanation for the measure's predictive ability is that its numerator—gross profit—is a "cleaner" measure of economic profitability. An alternative explanation lies in the measure's deflator. We find that net income equals gross profit in predictive power when both measures are constructed using consistent deflators. We then construct an alternative measure of profitability, operating profitability, which better matches current expenses with current revenue. This measure exhibits a far stronger link with expected returns than either net income or gross profit.

JEL classification: G12

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†Corresponding author. Mailing address: University of Chicago Booth School of Business, 5807 South Woodlawn Avenue, Chicago, IL 60637, United States. E-mail address: Ray.Ball@ChicagoBooth.edu. Telephone number: +1 (773) 834-5941.

1 Introduction

Ball and Brown (1968) show that earnings—defined as "bottom line" net income excluding extraordinary items—predict the cross-section of average returns. Subsequent research indicates that earnings add little incremental information over size and book-to-market.[1] Novy-Marx (2013), however, finds that a different earnings variable—gross profitability, defined as gross profit (revenue minus cost of goods sold) deflated by the book value of total assets—predicts the cross-section of expected returns as well as book-to-market, has greater predictive power than net income, and is negatively correlated with the value premium. He interprets these results as showing that gross profit is a "cleaner" measure of economic profitability. These findings have attracted considerable attention, ranging from an endorsement by a market commentator (DeMuth 2013) to the investigation of gross profitability as a potential factor in asset pricing models (Fama and French 2014). Moreover, investment managers such as Dimensional Fund Advisors and AQR have modified their trading strategies to incorporate measures similar to gross profitability (Trammell 2014).

We re-evaluate whether gross profitability has greater predictive power than net income, and also investigate the predictive power of operating profitability (revenue less cost of goods sold and selling, general & administrative expenses, but not expenditures on research & development). Our analysis therefore proceeds in two stages.

We first show that gross profitability's greater predictive power than net income is driven by differences in deflators. When comparing the two measures, Novy-Marx (2013) deflates gross profit by the book value of total assets but deflates net income by the book value of equity. We find that the two earnings variables have similar ability to predict average returns, provided they are deflated

[1] See, for example, Fama and French (1996, 2008).

consistently. Any superiority is due to choosing different deflators. The predictive power of both earnings measures is highest when they are deflated by the book value of total assets, intermediate when they are deflated by the book value of equity, and lowest when they are deflated by the market value of equity.

In a regression of returns on an earnings variable, the benefit from deflating earnings by the book value of total assets likely arises from a mismatch between its deflator and that used for the dependent variable (stock returns, whose denominator is price). We show that this mismatch induces an interaction between the earnings measure and the ratio of the market value of equity to the book value of total assets, which in turn interacts the market-to-book ratio and book-valued leverage. It is these interactions that strengthen the link between future returns and the earnings measures. This point is similar to that raised by Christie (1987), who views earnings deflators other than price as giving rise to a correlated omitted variables problem.[2]

The similar predictive power of net income and gross profit is puzzling for two reasons. First, shareholders do not have a claim on gross profit: their cash flow rights are determined after accounting for all components of net income, not merely cost of goods sold. Second, prior research finds that some of the items between gross profit and net income, such as selling, general & administrative expenses and expenditures on research and development, predict returns.[3]

In the second stage, we address the puzzling similar predictive power of the two measures when they are deflated consistently, by building on Novy-Marx's (2013) intuition that gross profit is the

[2]Because the three deflators produce similar effects for all earnings measures, the important mismatch does not appear to be using a deflator that does not match the profit variable with respect to cash flow rights. One such mismatch is deflating net income (an equity flow that is calculated after deducting interest expense) by total assets (financed by both debt and equity). The other numerator-denominator mismatches are deflating gross or operating profit (calculated prior to deducting interest expense) by either the book or market of value equity.

[3]See, for example, Chan, Lakonishok, and Sougiannis (2001) and Eisfeldt and Papanikolaou (2013).

"cleanest" accounting measure of economic profitability because items lower down the income statement are "polluted." This interpretation is difficult to reconcile with the finding that gross profit and net income have similar predictive power over the cross-section of average returns—pollution would suggest that net income would have less predictive power. We find that the items farther down the income statement are not pure noise—it is just that in multivariate return regressions they have slopes with different magnitudes and signs.

Cost of goods sold, which is included in gross profit, and selling, general & administrative expenses, which are farther down the income statement are, however, economically similar. Both represent to a large extent expenses incurred to generate the current period's revenue. Moreover, the allocation of expenses between these two categories is not determined by Generally Accepted Accounting Principles and is largely at the discretion of firms (Weil, Schipper, and Francis 2014). Nonetheless, only cost of goods sold is deducted from gross profit. If these two items are economically similar and firms allocate expenses somewhat arbitrarily between them, we would expect that a profitability measure that subtracts both expenses from revenue would outperform gross profitability in asset pricing tests. Surprisingly, the data, at a first glance, disagree. Gross profitability has similar predictive power compared to an operating profitability measure that subtracts both cost of goods sold and selling, general & administrative expenses from revenue. This finding could point towards the uncomfortable conclusion that the correlation between future returns and gross profitability is spurious. That is, if gross profitability predicts returns because it more cleanly allocates current expenses against current revenue, then this measure should become stronger as we account for selling, general & administrative expenses, but it does not.

Why do these two economically similar expenses (cost of goods sold and selling, general &

administrative) appear to have different relations with future returns? A potential reason lies in the Compustat data. To "facilitate" comparability across firms, Standard & Poor's combines and adjusts several income statement items reported in firms' public filings. In particular, they define selling, general & administrative expenses (Compustat item XSGA) as the sum of firms' actual reported selling, general & administrative expenses and their research and development expenditures (Compustat item XRD).[4] Conservative accounting rules expense research and development expenditures as they are incurred, even though they are incurred largely to generate future rather than current revenues. This suggests that undoing Compustat's adjustment to selling, general & administrative expenses would improve the measure of operating profit.

When we undo the Compustat adjustment, we find that cost of goods sold and selling, general & administrative expenses have similar covariances with future returns. Moreover, a refined profitability measure—operating profitability—that deducts from revenue both cost of goods sold and selling, general & administrative expenses (excluding expenditures on research & development) is a significantly better predictor of future returns than gross profitability. In Fama and MacBeth (1973) regressions, the t-values for gross profitability are 5.20 for All-but-microcaps and 5.60 for Microcaps. These t-values significantly increase to 9.05 and 6.98 for our operating profitability measure. Similarly, the three-factor model alphas for strategies that purchase the stocks in the top decile and finance this purchase by selling the stocks in the bottom decile increase from 55 basis points per month (t-value = 4.1) for gross profitability to 75 basis points per month (t-value = 6.25) for operating profitability. That is, the profitability strategy's Sharpe ratio increases by over 50%.

[4]Therefore, Compustat items XSGA and XRD are not mutually exclusive. We are not aware of any finance or accounting study that acknowledges this double-counting, a fact buried deep in the Compustat manuals. See p. 254 of Volume 5 of the Compustat Manual.

The rest of the paper is organized as follows. Section 2 introduces the data. Section 3 quantifies the importance of deflators in horse races between gross profit and net income using Fama and MacBeth (1973) regressions. Section 4 illustrates the interactions induced by mismatched deflators. Section 5 presents horse races between gross profit and net income using portfolio sorts. Section 6 discusses Standard & Poor's adjustments to Compustat and shows that a refined profitability measure, obtained by undoing the Standard & Poor's adjustments to selling, general & administrative expenses, is a superior predictor of future returns. Section 7 discusses rational and irrational explanations for the predictive ability of profitability measures. Section 8 concludes.

2 Data

We obtain monthly stock returns from the Center for Research in Security Prices (CRSP) and accounting data from Compustat. Our sample starts with all firms traded on NYSE, Amex, and NASDAQ. We then match the firms on CRSP against Compustat, and lag annual accounting information by the standard six months. If a firm's fiscal year ends in December, we assume that this information is public by the end of the following June. We start our sample in July 1963 and end it in December 2012. The sample consists of firms that have non-missing market value of equity, book-to-market, gross profit, total book assets, current month returns, and returns for the prior one-year period. We also follow Novy-Marx (2013) and exclude financial firms from the sample. These are firms with one-digit standard industrial classification codes of six.

We calculate the book value of equity as shareholders' equity, plus balance sheet deferred taxes, plus balance sheet investment tax credits, and minus preferred stock. We set missing values of balance sheet deferred taxes and investment tax credits equal to zero. To calculate the value of preferred stock, we set it equal to the redemption value if available, or else the liquidation value or the carrying value, in that order. If shareholders' equity is missing, we set it equal to the value of common equity if available, or total assets minus total liabilities. We then use the Davis, Fama, and French (2000) book values of equity from Ken French's website to fill in missing values.

Gross profit (Compustat item GP) is revenue minus cost of goods sold. In the default specification we use the Novy-Marx (2013) definition of gross profitability by deflating gross profit by total book assets. In alternative specifications we deflate gross profit by the book and market values of equity. When we deflate either gross profit or net income by the market value of equity, we use the market value of equity as of the end of the prior month. This is the same deflator implicit in the stock return computation.[5] We use income before extraordinary items (Compustat item IB) to proxy for "bottom line" net income.

In Fama and MacBeth (1973) regressions we re-compute the explanatory variables every month. We follow Novy-Marx (2013) and trim all variables at the 1st and 99th percentiles. In some of our empirical specifications, we split firms into All-but-microcaps and Microcaps. Following Fama and French (2008), we define Microcaps as stocks with a market value of equity below the 20th percentile of the NYSE market capitalization distribution. For the tables that present Fama and MacBeth (1973) regressions, each panel or split between All-but-microcaps and Microcaps contains the same observations, so that coefficients are comparable across regressions. For example, the data underneath regression (1) in Table 3 Panel A are the same as those under regressions (2)

[5]Although the literature historically deflated book values of equity by lagged market values of equity—Fama and French (1992) introduced the convention of re-computing book-to-market ratios at the end of every June, and by using market values from the December of the prior year—research has shifted to using timely market values of equity. See, for example, Asness and Frazzini (2013) and Fama and French (2014).

through (7) of the same panel. In portfolio sorts we rebalance the portfolios annually at the end of June.

Table 1 reports summary descriptive statistics for the accounting and control variables. The deflated variables exhibit substantial outliers, pointing to a need either to trim these variables in cross-sectional regressions or to base inferences on portfolio sorts. Relative to gross profit, net income is more left-skewed, consistent with Basu (1997). Table 2 reports Pearson and Spearman rank correlations among the variables. When deflated by the book value of total assets, gross profit and income before extraordinary items exhibit relatively low correlation (0.40 and 0.40). When the variables are deflated by market value of equity, the Pearson correlation is 0.27 but the Spearman rank correlations is zero.

3 Fama and MacBeth regressions

Table 3 presents average Fama and MacBeth (1973) slopes and their t-values for comparing the explanatory power of gross profit and income before extraordinary items. We deflate the two earnings measures consistently in these comparisons, by the book value of total assets, the book value of equity, or the market value of equity. Following Novy-Marx (2013), we include the following control variables in all regressions: the natural logarithm of the book-to-market ratio, the natural logarithm of the market value of equity, and past returns for the prior month and for the prior 12-month period skipping a month. We estimate the regressions monthly using data from July 1963 through December 2012. We trim all independent variables to the 1st and 99th percentiles on a table-by-table basis so that within each panel all regressions have the same observations.

Column (1) in Panel A presents the baseline regression that includes just the control variables in the All-but-microcaps sample. In column (2) we include Novy-Marx's gross profitability measure (gross profit deflated by the book value of total assets). The coefficient on gross profitability is positive and significant (0.840 with a t-value of 5.40). Our estimate is close to the estimate presented in Panel A of Table 1 in Novy-Marx (0.750 with a t-value of 5.49), thus confirming his findings.

We next examine income before extraordinary items. To compare the explanatory power of the two measures, we focus on t-values. The average coefficient estimates in a Fama and MacBeth (1973) regression can be interpreted as monthly returns on long-short trading strategies that trade on that part of the variation in each regressor that is orthogonal to every other regressor.[6] The t-values associated with the Fama-MacBeth slopes are therefore proportional to the Sharpe ratios of these self-financing strategies. They equal the annualized Sharpe ratios times $\sqrt{T}$, where T represents the number of years in the sample. Column (3) presents results for regressions that include income before extraordinary times deflated by the book value of total assets. For income before extraordinary items, the t-value is actually larger than for gross profit (5.98 vs. 5.40). Moreover, the Sharpe ratios implied by the t-values are not significantly different. The bottom row shows that the t-value from a test of the equality of Sharpe ratios is 0.58.

In contrast with our results, in Panel A of Table 1 in Novy-Marx (2013) the average slope on income before extraordinary items is statistically insignificant (t-value = 0.84). However, in that specification, income before extraordinary items and gross profit have different deflators—income before extraordinary items is deflated by the book value of equity while gross profit is deflated by the book value of total assets. Therefore, in columns (4) and (5) we compare gross profit and

[6]The slope estimates from month-$t+1$ cross-sectional regression of a $N \times 1$ vector of returns, r_{t+1}, on a $N \times K$ data matrix X_t that consists of a constant and $K-1$ regressors equals $\hat{b}_{t+1} = (X_t' X_t)^{-1} X_t' r_{t+1}$. But this OLS estimator can be rephrased as being equal to $\hat{b}_{t+1} = w_t' r_{t+1}$, in which w_t is a $N \times K$ matrix that gives the portfolio weights on K different trading strategies that can be constructed using information available at time t. See Fama (1976, chapter 9).

income before extraordinary items when both measures are deflated by the book value of equity. Once again, t-values on both coefficients are similar in magnitude (gross profit, 4.39; income before extraordinary items, 4.13) and the Sharpe ratios do not significantly differ (t-value $= -0.21$).[7]

In columns (6) and (7) we further explore the role of the deflator by using the same deflator that is implicit in the dependent variable—the market value of equity. Once again, the t-values on the two profitability measures are similar in magnitude (gross profit, 3.50; income before extraordinary items, 3.17) and the Sharpe ratios implied by the t-values are not significantly different (t-value $= -0.23$).

Panel B presents the results for Microcaps. For these small firms, gross profit has higher explanatory power than income before extraordinary items for all three deflators. For example, when both variables are deflated by the book value of total assets, the t-value for gross profit is almost twice the magnitude as that for income (6.55 versus 3.41) and the Sharpe ratios significantly differ (t-value $= -2.96$). In the regressions that deflate gross profits and income by the book and market values of equity, t-values with the gross-profit variable are also larger but to a lesser extent (2.79 versus 2.39 and 1.92 versus 1.06) and the Sharpe ratios implied by the t-values are not significantly different.

Overall, for All-but-microcap stocks, which represent 97% of the total market capitalization of publicly traded U.S. companies, we find that gross profit and income before extraordinary items have similar explanatory power when they are constructed using the same deflator. For Micro-

[7]Novy-Marx (2013) finds that the average slope on income before extraordinary items deflated by the book value of equity is not significantly different from zero. Differences in trimming appear to drive the difference in statistical significance between our results and those presented in Novy-Marx (2013). We trim by all independent variables including income before extraordinary items deflated by the book value of equity. If we instead trim by all independent variables except for income before extraordinary items deflated by the book value of equity, the coefficient on income is no longer statistically significant.

caps, however, gross profit better explains the cross-section of expected returns, but income before extraordinary items generally retains significance.

Among both the All-but-microcap and Microcap stocks, the choice of deflator has a significant effect on the relation between future returns and the earnings measures. Across both earnings measures and both size groups, t-values are largest when the book value of total assets is the deflator, intermediate when the book value of equity is the deflator, and smallest when the market value of equity is the deflator.

We suggest that deflator choice matters because of a "mismatch" between the deflators used in the dependent and independent variables. Namely, the economics of the return regression change when one switches from one earnings deflator to another, holding constant the deflator implied in calculating stock returns (i.e., price, or market value of equity). A simple example illustrates the intuition. Suppose we estimate a cross-sectional regression of stock returns on profitability

$$r_{i,t} = \alpha + \beta \frac{\pi_{i,t-1}}{\mathrm{TA}_{i,t-1}} + \varepsilon_{i,t} \tag{1}$$

in which $\pi_{i,t-1}$ represents profit of firm i in month $t-1$ and $\mathrm{TA}_{i,t-1}$ represents firm i's total book assets in month $t-1$, lagged appropriately so that they are known to investors. We can rewrite returns as the change in the market value of equity plus dividends,

$$\frac{\triangle \mathrm{ME}_{i,t} + \mathrm{D}_{i,t}}{\mathrm{ME}_{i,t-1}} = \alpha + \beta \frac{\pi_{i,t-1}}{\mathrm{TA}_{i,t-1}} + \varepsilon_{i,t}. \tag{2}$$

The mismatch in deflators for the dependent and independent variables in regression (2) induces an interaction term that consists of the ratio of profit to the market value of equity times the ratio of the market value of equity to the book value of total assets. The second ratio can be further decomposed as the product of the inverse of the book-to-market ratio with book leverage, that is,

$$\begin{aligned}\frac{\triangle \mathrm{ME}_{i,t} + \mathrm{D}_{i,t}}{\mathrm{ME}_{i,t-1}} &= \alpha + \beta \left(\frac{\pi_{i,t-1}}{\mathrm{ME}_{i,t-1}}\right)\left(\frac{\mathrm{ME}_{i,t-1}}{\mathrm{TA}_{i,t-1}}\right) + \varepsilon_{i,t} \\ &= \alpha + \beta \left(\frac{\pi_{i,t-1}}{\mathrm{ME}_{i,t-1}}\right)\left(\frac{\mathrm{ME}_{i,t-1}}{\mathrm{BE}_{i,t-1}}\right)\left(\frac{\mathrm{BE}_{i,t-1}}{\mathrm{TA}_{i,t-1}}\right) + \varepsilon_{i,t}. \end{aligned} \tag{3}$$

Interacting profit with these variables, which prior research finds to explain the cross-section of average returns,[8] likely increases the explanatory power of the deflated profit measure and likely explains the negative correlation of gross profitability with the value premium. When we deflate net income by the book value of total assets, these interactions also elevate net income's explanatory power. Similarly, deflating either gross profit or net income by the book value of equity implicitly interacts the earnings measure with the inverse of book-to-market but not with book leverage, thereby increasing explanatory power but to a lesser degree.

Prior research (e.g., the series of papers by Fama and French and Novy-Marx (2013)) recommends that when constructing a profitability measure the numerator and denominator should match with respect to cash flow rights. Namely, if the profit measure in the numerator represents a flow to equity holders (i.e., net income), then the denominator should represent an equity-holder claim (i.e., either the book or market of value equity). And, if the profit measure in the numerator represents flows to both equity- and debt-holders (i.e., gross or operating profit, calculated without deducting interest expense), then the denominator should be total assets. If the hypothesis is that explanatory power is increased by not matching the numerator and denominator based on cash flow rights, we would observe greater explanatory power whenever they are not matched. Alter-

[8] See, for example, Bhandari (1988) and Fama and French (1992).

natively, if the hypothesis is that explanatory power is decreased by mismatching the numerator and denominator, we would observe lower explanatory power for all mismatches. In the data, neither hypothesis is the case—the explanatory power is always highest when deflating by the book value of total assets, intermediate when deflating by the book value of equity, and lowest when deflating by the market value of equity. This ordering occurs regardless of whether the numerator and denominator match with respect to cash flow rights. The dominant mismatch appears to be between the deflators of the dependent and independent variables and not between the numerator and denominator of the earnings measure.

We do not suggest that the gross profitability premium emerges solely because a regression of returns on gross profit-to-assets picks up interactions between profitability, book leverage, and the inverse of book-to-market. The interaction $(\mathrm{ME}_{i,t-1}/\mathrm{BE}_{i,t-1})\,(\mathrm{BE}_{i,t-1}/\mathrm{TA}_{i,t-1})$ could be written in many different ways with different economic interpretations. What we point out is that switching the deflator from the market value of equity to total assets always induces interactions, which can involve variables such as ME/BE and BE/TA that correlate with average returns. The results in Table 3 demonstrate that such interactions contribute significantly to the gross profitability premium. Moreover, we find similar effects for portfolio sorts in Section 5.

4 Gross profit versus leverage

The t-value of 5.40 for gross profitability in Panel A of Table 3 implies that gross profitability predicts returns because ultimately either gross profit deflated by the market value of equity, leverage (ME/TA), or the interaction between the two measures predicts returns. Table 4 reports on regressions that distinguish between these channels. To illustrate, consider a regression of returns on gross profit deflated by the book value of total assets, $\pi_{i,t-1}/\mathrm{TA}_{i,t-1}$. The argument we explore in Table 4 is based on the observation that this variable can be rewritten as $(\pi_{i,t-1}/\mathrm{ME}_{i,t-1}) * (\mathrm{ME}_{i,t-1}/\mathrm{TA}_{i,t-1})$. We can therefore evaluate the extent to which gross profitability's explanatory power comes from gross profit, leverage, or the interaction between gross profit and leverage by regressing returns on (*i*) $\pi_{i,t-1}/\mathrm{ME}_{i,t-1}$, (*ii*) $\mathrm{ME}_{i,t-1}/\mathrm{TA}_{i,t-1}$, and the interaction between these variables, (*iii*) $(\pi_{i,t-1}/\mathrm{ME}_{i,t-1}) * (\mathrm{ME}_{i,t-1}/\mathrm{TA}_{i,t-1}) = \pi_{i,t-1}/\mathrm{TA}_{i,t-1}$.

The sample in Table 4 is slightly different than that in Table 3 because we trim the observations based on all independent variables, so for comparison purposes the first three columns present results for this sample that correspond to Table 3. Panel A presents results for All-but-microcaps. Columns (4) and (5) analyze the two components of gross profit deflated by the book value of equity: gross profit deflated by the book value of equity, and the ratio of the book value of equity to the book value of total assets (i.e., book leverage). When employed separately in the column (4) specification, gross profit to the book value of equity is significant while the leverage ratio is not. Column (5) reports a horserace between gross profit deflated by the book value of total assets versus gross profit deflated by the book value of equity, controlling for the book leverage term that causes them to differ. Gross profit deflated by the book value of total assets is the interaction between the other two regressors, a measure of profitability (π/BE) and book leverage (BE/TA). In this specification, the t-value for gross profit to the book value of equity remains statistically significant but attenuates by almost half. In contrast, the t-value associated with gross profit to total assets is close that in column (1), implying that the mismatched and hence interacted variable has more explanatory power than its components.

Columns (6) and (7) report the equivalent analyses for gross profit to market equity. Here the leverage term is the ratio of market equity to total assets, and gross profit to total assets represents the interaction between this leverage term and gross profit to market equity. Once again, the interacted variable has greater explanatory power than its individual components. Finally, in column (8) we run a horserace among the three deflators. When the three versions of gross profit with the different deflators are included in the same regression along with the control variables, only the version of gross profit deflated by total assets is statistically significant.

In Panel B, we carry out the same analysis for Microcaps. Columns (1), (2), and (3) show the same ordering of deflators: the book value of total assets, the book value of equity, and the market value of equity. When we compare the interaction effects, the results for Microcaps differ from those for All-but-microcaps. Specifically, the leverage terms matter as much as or more than the interactions. For example, in column (5), the leverage term (book equity to total assets) is highly significant as is gross profit to book equity, while gross profit to total assets is not. Similarly, in column (7) the leverage term (market equity to total assets) is significant. In column (8) we run a horserace among the three deflators and, as for All-but-microcaps, deflating by total assets has the highest explanatory power.

The results in Table 4 are consistent with gross profitability deriving a large part of its explanatory power from the interactions arising from the mismatch in the deflators between the dependent and independent variables. However, among Microcaps the leverage terms on their own have as much or more explanatory power as their interactions with profitability.

5 Portfolio sorts

Given the skewed distributions and extreme observations for both earnings measures presented in Table 1, portfolio tests provide a robust method to evaluate predictive ability without imposing the strict parametric assumptions embedded in the Fama and MacBeth (1973) regressions. Table 5 therefore compares gross profit and income before extraordinary items using quintile (as in Novy-Marx (2013)) and decile portfolio sorts. For each sorting variable, the table reports portfolio average value-weighted excess returns and three-factor model alphas and loadings on the market, size (SMB), and value (HML) factors. We rebalance the portfolios annually at the end of June and the sample runs from July 1963 through December 2012.

In the left half of Panel A, we sort stocks into portfolios based on gross profitability (revenue less cost of goods sold deflated by the book value of total assets). Portfolio excess returns and three-factor model alphas increase in gross profitability, though not monotonically. The high-minus-low quintile portfolio earns an average excess return of 30 basis points per month, which is economically and statistically significant (t-value = 2.44). The three-factor model alpha is 53 basis points per month (t-value = 4.74). The loadings on MKT and SMB are insignificant, but that is not the case with HML (t-value = -12.67). These results closely replicate those presented in Novy-Marx (2013, Table 2, Panel A).

The right half of Panel A presents results for portfolio sorts based on income before extraordinary items, also deflated by the book value of total assets. In contrast with gross profit, income deflated by the book value of total assets does not spread excess returns. Nevertheless, when controlling MKT, SMB, and HML, the alphas for the high-minus-low decile and quintile portfolios are significant and similar in magnitude to those for gross profitability.

It is important to emphasize that an investor who considers trading profitability cares about the multi-factor model alphas but not about the excess returns. A non-zero alpha implies that the factors of the asset pricing model (here, MKT, SMB, and HML) and Treasury bills cannot be combined to generate a mean-variance efficient portfolio. The significant three-factor model alphas in our tests reveal the extent that an investor can improve the mean-variance efficiency of his portfolio—that is, increase the portfolio Sharpe ratio—by tilting the portfolio towards the profitability strategy.[9]

In Panel B we further examine the choice of deflator by using the market value of equity. The results change dramatically. In the left half, the high-minus-low quintile portfolio for gross profit earns an average excess return of 50 basis points per month (t-value = 3.11), a 60% increase over its equivalent in Panel A when the deflator is the book value of total assets. Thus, deflating by the market value of equity produces a greater separation of excess returns than deflating by the book value of total assets.

Despite the greater separation of excess returns, the large three-factor model alpha obtained when deflating gross profit by the book value of total assets decreases when we deflate gross profit by the market value of equity: from 53 basis per month (t-value = 4.74) to −7 basis points (t-value = −0.73) for the high-minus-low quintile portfolio and from 55 basis points per month (t-value = 4.10) to −14 basis points (t-value = −1.01) for the high-minus-low decile portfolio. In addition, the loadings on MKT, SMB and HML for the high-minus-low quintile and decile portfolios increase substantially, (for quintiles, t-values = 3.88, 17.61 and 27.18; for deciles, t-values = 2.60, 16.65, and 26.05). Importantly, the HML loadings change signs. These results are consistent with our hypothesis that using the book value of total assets as a deflator implicitly interacts earnings with

[9] See, for example, Pástor and Stambaugh (2003, section IV) and the references therein.

other factors that are priced, so that this profitability measure subsumes a large portion of the predictive power of MKT, SMB and HML for returns.

The right half of Panel B presents portfolio results for income before extraordinary items deflated by the market value equity. As is the case for gross profit, the spread in average returns increase for income before extraordinary items when it is deflated by the market value of equity. Moreover, the three-factor model alphas are no longer statistically significant for the high-minus-low quintile and decile portfolios and the three-factor model loadings increase.

Similar to the results for the Fama and MacBeth (1973) regressions, the portfolio sorts show that gross profit and income before extraordinary items have similar predictive ability when compared using the same deflator. And as with the Fama and MacBeth (1973) regressions, the three-factor model alphas for both earnings measures are largest when they are deflated by the book value of total assets.

Our results on the importance of the choice of deflator are not specific to comparisons made between gross profit and net income. Consider, for example, the power of cash flow in explaining the cross-section of average returns. Fama and French (1996) show that the three-factor model explains, among many other anomalies, average returns earned by a cash flow-to-price strategy. This zero-alpha result, however, is specific to a strategy that deflates cash flow by the market value of equity. When we construct cash flow-to-price and cash flow-to-total assets variables, the 10-1 strategies' monthly three-factor model alphas are zero basis points (t-value = 0.01) and 50 basis points (t-value = 3.82).[10] That is, the three-factor model is unable to explain the returns earned by a cash-flow strategy when cash flows are deflated by total assets. This result mirrors the stark

[10] We follow Fama and French's (1996) definition and measure cash flows by adding deferred taxes and equity's shares of depreciation to income before extraordinary items plus deferred taxes.

change in the three-factor model alphas when we switch the deflator of gross profit and income before extraordinary items from the market value of equity to the book value of total assets. We find the same effect in Fama-MacBeth regressions. In regressions that mirror those reported in Table 3, cash flow has the highest explanatory power when deflated by the book value of total assets (the t-values are 6.87 and 3.58 in the All-but-microcaps and Microcaps samples) and the lowest explanatory power when deflated by the market value of equity (the t-values are 4.81 and 1.29).

6 Components between gross profit and income before extraordinary items

The Fama and MacBeth (1973) regressions and portfolio tests presented in Tables 3 through 5 raise the following question. Why do gross profit and income before extraordinary items have similar predictive ability, yet income before extraordinary items is calculated after subtracting off more expenses borne by shareholders than just costs of goods sold? Novy-Marx (2013) posits that the items located on the income statement between gross profit and income before extraordinary items are less related to "true economic profitability," which we interpret as meaning they contain more noise. But if these items simply added noise, gross profit would have higher explanatory power than net income, which is not the case. Further, even if the items are noisy, they nevertheless can contain information about expected returns. Indeed, prior research finds that some of these income statement items predict the cross-section of expected returns. For example, Chan, Lakonishok, and Sougiannis (2001) find that expenditures on research & development predict future returns and

Eisfeldt and Papanikolaou (2013) find that capitalized selling, general & administrative expenses also predict future returns.[11] We therefore examine these income statement items individually.

Before presenting results, it is worth discussing the structure of the income statement and the nature of the items that lie between gross profit and income before extraordinary items. We base this discussion on the classifications used in the Compustat database, which may diverge from the presentation and classification of items on income statements included in public filings. To start, gross profit (GP) is the difference between revenue and cost of goods sold (REVT − COGS). Between gross profit and income before extraordinary items (IB), there are seven Compustat items: selling, general & administrative expenses (XSGA); depreciation & amortization (DP); interest (XINT); taxes (TXT); non-operating income (NOPI); special items (SPI); and minority interest income (MII). Income before extraordinary items is therefore defined by the following accounting identity:

$$
\begin{aligned}
\text{Income before extraordinary items (IB)} \equiv \; & \text{Revenue (REVT)} \\
- \; & \text{Cost of goods sold (COGS)} \\
- \; & \text{Sales, general \& administrative expenses (XSGA)} \\
- \; & \text{Depreciation \& amortization (DP)} \\
- \; & \text{Interest (XINT)} \\
- \; & \text{Taxes (TXT)} \\
+ \; & \text{Non-operating income (NOPI)} \\
+ \; & \text{Special items (SPI)} \\
- \; & \text{Minority interest income (MII).}
\end{aligned} \tag{4}
$$

The items between gross profit and income differ economically and likely have different relations with expected returns. For example, the relation between expected returns and depreciation & amortization, which is a function of previously purchased assets, likely differs from the relation between expected returns and current operating expenses, such as sales, general & administrative

[11] Similarly, Lipe (1986) finds that income statement items differ in their relation with realized returns.

expenses. The economically different nature of these income statement line items provides an additional motivation for examining these items individually.

To evaluate these effects, we include each income statement item separately in Fama and MacBeth (1973) regressions. We do, however, make two modifications. First, the distributions of NOPI, SPI, and MII include a large number of observations with values of zero. We therefore combine these items into a regressor "Other expenses." Second, in an apparent attempt to facilitate comparability across firms, Standard and Poor's defines its selling, general & administrative expenses variable (XSGA) as the sum of firms' actual reported selling, general & administrative expenses and expenditures on research & development.[12] Whereas sales, general & administrative expenses are expenses the company incurs primarily for generating the current period's revenue, research & development expenditures are largely about generating future revenue. In some specifications we therefore subtract XRD from XSGA to disentangle selling, general & administrative expenses from research & development expenses.[13] We label this new variable "reported selling, general & administrative expense" to distinguish it from the Compustat version, and compare its predictive ability to that of Compustat's adjusted measure (XSGA).

Standard & Poor's makes other adjustments. For example, when creating the Compustat data item cost of goods sold (COGS), Standard and Poor's often subtracts total depreciation from the cost of goods sold reported in public filings, even if some of that total was not included in the reported number. For example, the depreciation attributable to head office buildings would have

[12]See p. 254 of Volume 5 of the Compustat Manual. It follows that Compustat items XSGA and XRD are not mutually exclusive.

[13]There are two accounting requirements for research & development expenditures: they are expensed (deducted from earnings) when incurred, and if the amount exceeds one percent of firm revenue it must be disclosed (either as a separate line item on the Income Statement, or in the Notes to the Accounts). If not reported as a separate line item on the Income Statement, research & development expenditures are typically included in selling, general & administrative expenses and rarely in cost of goods sold.

been included in the amount reported for selling, general & administrative expenses, not COGS. Compustat adds a footnote to this variable to alert users to the fact that they have carried out such an adjustment. The frequency of this adjustment is not stationary through time. Standard and Poor's starts making these adjustments in 1971 and the frequency increases through the 1990s.[14] In unreported analysis, we add back depreciation to cost of goods sold to examine whether this Compustat adjustment affects our inferences, and find that it does not.

In Table 6 we present average Fama and MacBeth (1973) slopes along with their associated t-values for these income statement items. Consistent with Novy-Marx (2013), we deflate all accounting variables by the book value of total assets. Panel A presents results for All-but-microcap stocks and Panel B presents results for Microcaps.

Starting with All-but-microcaps, column (1) presents the baseline result that includes just the control variables along with gross profit deflated by the book value of total assets.[15] In column (2), we also include the items between gross profit and income before extraordinary items, but separate expenditures on research & development from selling, general & administrative expenses. As expected, these items enter with different magnitudes, signs, and levels of statistical significance. For example, reported selling, general & administrative expenses, taxes, and other expenses are all negative (and therefore consistent with them being income-decreasing), while depreciation & amortization, research & development, and interest are all positive. Only reported selling, general & administrative expenses and other expenses are statistically significant.

A Hotelling's T^2 test is the appropriate test in the context of Fama-MacBeth regression for

[14] See Lambert, Bostwick, and Donelan (2014) for a discussion of this point.

[15] This estimate differs slightly from the estimate in Table 3 because in each table we trim observations based on all independent variables—except those that only appear in columns (2) and (3) of Table 6—and so the sample in Table 6 differs slightly from that in Table 3.

testing the hypothesis that the estimated slopes on gross profit, depreciation & amortization, selling, general & administrative expenses, research & development, interest, taxes, and other expenses are all equal. The test statistic of $T^2 = 70.83$ is $F(6, 588)$-distributed under the null, so this test rejects the hypothesis of equal slopes with a p-value < 0.001. This result implies that constraining the coefficients on the components of income before extraordinary items to be the same, as in Table 3, leads to lower explanatory power. This lower explanatory power can be seen if we compare the average Adjusted R^2s between the two tables: 5.93% for column (3) of Table 3 versus 7.69% for column (2) of Table 6.

The absolute magnitudes of the average coefficient and t-value for reported selling, general & administrative expenses are similar to those for gross profit (-2.69 with a t-value of -3.04 versus 3.02 with a t-value of 3.54). This is not case for the other items. This similarity is relevant given that firms' classification of expense items as selling, general & administrative versus cost of goods sold is not determined by Generally Accepted Accounting Principles and is to a large extent discretionary (Weil, Schipper, and Francis 2014). Economically, however, both expenses are relevant to the generation of current profit. Given their similarity and somewhat arbitrary delineation, as well as the similar magnitude and significance of their coefficients, we create an operating profit measure by subtracting both cost of goods sold and reported selling, general & administrative expenses (which excludes research & development expenditures) from revenue. We label this variable "operating profit (reported SG&A)" and evaluate its predictive power in column (5).

Column (3) demonstrates the pitfall of using Compustat's adjusted measure of selling, general & administrative expenses (XSGA) that includes expenditures on research & development. In this regression we include all of the components between gross profit and income before extraordinary items but exclude expenditures on research & development and replace reported selling, general & administrative expenses with the adjusted Compustat measure (XSGA). In this specification, the average coefficients and t-values on gross profit and selling, general & administrative expenses all attenuate by approximately one-third.

In columns (4) and (5) we compare two measures of operating profit. In column (4) we subtract Compustat's adjusted measure of selling, general & administrative expenses (XSGA) from gross profit ("operating profit (Compustat SG&A)") and in column (5) we present results for our operating profit (reported SG&A) measure. As indicated by their t-values, both operating profit measures have significantly greater predictive ability than gross profit alone. However, the t-value for the operating profit measure based on reported selling, general & administrative expenses is almost double than that for gross profit (9.05 versus 5.20) and almost 50% larger than the t-value for the operating profit measure based on Compustat's adjusted XSGA (9.05 versus 6.14). These results are consistent with the noise arising from arbitrary assignment of costs between cost of goods sold and selling, general & administrative expenses canceling out when they are aggregated in our operating profit measure. Removing expenditures on research & development from Compustat's XSGA further enhances the predictive power of our operating profit (reported SG&A) measure.[16]

We find similar effects for Microcaps in Panel B. Reported selling, general & administrative expenses outperform the adjusted Compustat measure (XSGA) and our operating profit measure based on reported selling, general & administrative expenses outperforms both gross profit and the operating profit measure based on Compustat's XSGA. When we examine the other items

[16]The operating profit measures include minority interests in both the numerator and denominator. These minority interests do not represent claims of common equity holders. In untabulated Fama and MacBeth (1973) regressions, we find that the average t-value for operating profit (reported SG&A) increases slightly, but not significantly, when we remove minority interests from both the numerator and denominator.

below gross profit, a Hotelling T^2 again rejects the equality of the average regression slopes for the components of income before extraordinary items with a p-value < 0.001. There are, however, interesting contrasts with the results for All-but-microcaps. For Microcaps, the average coefficients for depreciation & amortization and research & development become positive and significant and the coefficient on interest becomes negative and significant. Hence, the relation between these items and expected returns varies with market capitalization.

In Table 7, we examine how our operating profitability measure based on reported selling, general & administrative expenses performs in portfolio tests. When we deflate this measure by the book value of total assets, it spreads excess returns similarly to gross profitability. For excess returns, the average return on the high-minus-low decile portfolio is 31 basis points per month (t-value = 2.03) compared to 35 basis points per month (t-value = 2.57) for gross profitability. But when we compare three-factor model alphas, operating profitability significantly outperforms gross profit. For the high-minus-low decile portfolio the alpha is 75 basis points per month (t-value = 6.25) compared to 55 basis points (t-value = 4.1) for gross profitability. Operating profitability (reported SG&A) also outperforms gross profitability when we create industry-hedged portfolios as per Novy-Marx (2013). In untabulated results, the three-factor model alpha for the high-minus-low decile based on operating profitability is 53 basis points per month with a t-value of 5.89, compared to 27 basis points with a t-value of 4.38 for gross profitability.

Table 8 sorts stocks independently into quintiles based on operating profitability and market capitalization. We base the market capitalization quintiles on NYSE breakpoints. Panel A presents average excess returns for this two-way sort. Across the size quintiles the average returns on the high-minus-low operating profitability portfolios are significantly positive except for the largest size quintile. Moreover, average returns and their t-values for the high-minus-low operating profitability portfolios decrease monotonically in size, starting at 55 basis points per month (t-value $= 5.21$) for the smallest size quintile and ending at 20 basis points per month (t-value $= 1.48$) for the largest size quintile. The difference between the returns on the large and small high-minus-low operating profitability portfolios is statistically significant (-35 basis points with a t-value of -2.29).

Panels B and C presents three-factor model alphas and their t-values for the two-way sort. Alphas are positive and statistically significant for the high-minus-low operating profitability portfolios across all of the size quintiles. As with excess returns, the alphas on the high-minus-low operating profitability portfolios decrease in size, starting at 69 basis points per month (t-value $=$ 6.76) for the smallest size quintile and ending at 49 basis points (t-value $= 4.04$) for the largest size decile. However, the difference between these two portfolios is not statistically significant. Overall, operating profitability is associated with positive returns across the size distribution with excess returns decreasing in size.

7 Rational and irrational asset-pricing explanations

What explains the ability of profitability measures to predict future returns? Fama and French (1992) distinguish "rational asset-pricing stories" from "irrational asset-pricing stories." Under irrational pricing explanations, profitability is mispriced due to a combination of trading frictions such as limits to arbitrage and behavioral factors such as overconfidence, anchoring, confirmation bias, herding, and hindsight bias (Barberis and Thaler 2003). If investors systematically under-react to profitability information, and if the under-reaction subsequently is corrected as arbitrage or other mechanisms become more effective, then profitability will predict future returns.

Rational pricing explanations build on Fama's (1970) "joint hypothesis problem" or "bad model problem." The basic idea is that profitability and expected returns share common economic determinants such as risk, and hence profitability is informative about priced variables.[17] If priced variables unknown to the researcher are omitted from the model of expected returns employed in the research design (e.g., the CAPM) or the variables are measured with error, profitability can proxy for model error and thus be informative about expected returns (Ball 1978).

The intuition behind this explanation is illustrated as follows. Assume that firm i invests shareholders' assets, $\mathrm{BE}_{i,t-1}$, to earn profit, $\pi_{i,t-1}$, at an average rate of return on equity, $\pi_{i,t-1}/\mathrm{BE}_{i,t-1}$. The rate of return on equity can be decomposed into the firm's opportunity cost of equity capital and a quasi-rent component, $\rho_{i,t-1}$.[18] If we ignore potential differences between the firm's opportunity cost of equity capital and investors' expected return $\mathrm{E}_{t-1}(r_i)$ at the investment date that arise due to factors such as taxes on dividend distributions and transactions costs, then $\pi_{i,t-1}/\mathrm{BE}_{i,t-1} = \mathrm{E}_{t-1}(r_i) + \rho_{i,t-1}$.[19] Assume further that the evolution of expected returns over time can be described as: $\mathrm{E}_t(r_i) = \mathrm{E}_{t-1}(r_i) + \eta_{i,t}$. Then $\pi_{i,t-1}/\mathrm{BE}_{i,t-1} = \mathrm{E}_t(r_i) + \rho_{i,t-1} + \eta_{i,t}$.

Past profitability thus is correlated with expected returns and informative about error in the researcher's measure of expected returns. The potential informativeness of profitability is, however, reduced by at least four factors: variation in expected returns over time; the quasi-rent component of profits; differences between firms' opportunity costs of equity capital and investors' expected

[17] Ball, Sadka, and Sadka (2009) report that the principal components of earnings and returns are highly correlated and that the sensitivities of securities' returns to the earnings factors explain a significant portion of the cross-sectional variation in returns. This finding suggests that earnings performance is an underlying source of priced risk.

[18] Quasi-rents represent temporary rents that can arise from barriers to entry that can limit competition in the short-run, such as innovations in products, production or marketing, and patents. In comparison with monopoly rents that arise from barriers such as licensing laws, quasi-rents are a less persistent component of accounting profit. See, for example, Alchian (1987).

[19] For example, taxes on dividend distributions can cause the opportunity cost of an investment when financed by retained earnings to differ from that of an investment financed by raising equity capital from investors, whose expected return is $\mathrm{E}_{t-1}(r_i)$. See Auerbach (2002) for a review of relevant literature.

returns; and accounting measurement issues in reporting profits and assets.[20] While these factors introduce error in profitability as a predictor of expected returns, the potential for informativeness remains.

To assist in differentiating between the rational and irrational explanations, we investigate how far into the future the predictive ability of operating profitability persists. The idea is that the effects of limits to arbitrage and other trading frictions are unlikely to persist for long periods. Hence, mispricing is more likely to be corrected over longer horizons. However, expected returns are likely to be more stationary, and hence the informativeness of past profitability measures for future returns is likely to persist longer.

Figure 1 plots average Fama and MacBeth (1973) regression slopes and the 95% confidence intervals associated with these slopes from cross-sectional regressions of monthly returns on the control variables and lagged values of operating profitability. The lags range up to ten years, increasing in increments of six months. In Panel A we lag all regressors while in Panel B we lag just operating profitability (i.e., we update the values of the control variables). The regressors are: prior one-month return, prior one-year return skipping a month, log-book-to-market, log-size, and operating profitability. Operating profitability is defined as gross profit minus selling, general & administrative expenses (excluding research & development expenditures) deflated by the book value of total assets. The regressions are estimated monthly using data from July 1973 through December 2012 using data on stocks with a market value of equity above the 20th percentile of the NYSE market capitalization distribution (All-but-microcaps). The sample period begins in 1973

[20]Due to conservative accounting rules, market values likely capture quasi-rents more quickly than book values of equity. Hence, including the book-to-market ratio likely controls in part for quasi-rents.

so returns can be held constant for up to ten year lags of the regressors, making the regressions comparable across lags.

Panel A provides evidence on the horizon over which operating profitability has predictive ability. The value on the x-axis indicates the number of years by which the regressors are lagged. The estimates at $x = 10$, for example, explain cross-sectional variation in returns using the values of regressors recorded ten years earlier. Panel A indicates that the ability of operating profitability to predict future returns decays over time but is reliably positive for at least four years and persists perhaps as long as ten years. The pattern of persistence is consistent with past operating profitability and expected returns sharing common economic determinants such as risk, but with the predictive power of operating profitability decaying because the common determinants evolve over time, for example as firms' investments, financing and operations change. Such changes would cause lagged profitability to gradually lose its predictive ability over time.

Panel B reports on the ability of operating profitability to predict returns at increasing lags when the control variables (but not profitability) are updated over time. We expect updating the values of book-to-market to better control for at least two of the sources of error in profitability as a predictor of expected returns, and to thereby increase the average slope on profitability in the Fama and MacBeth (1973) regressions, especially at longer lags. First, we expect quasi-rents to be correlated over time with the book-to-market ratio, since information about quasi-rents likely affects price but goes mostly unrecorded on cost-based balance sheets. Second, we expect changes in book-to-market to be correlated with any effect of taxes on the profitability levels that firms require from investments financed by retained earnings (Auerbach 2002), because changes in retained earnings are incorporated in book value of equity. Consistent with the expectation that updating the controls removes error in using profitability to predict expected returns, the average slope on profitability decays more slowly over time in Panel B than in Panel A. It is reliably positive for most of the ten-year prediction period.

The results in both Panels (especially in Panel B) are difficult to reconcile with market mispricing being the explanation for operating profitability's predictive power. If market mispricing is the correct explanation, then the mispricing must persist uncorrected for a large number of years to be consistent with these results. We caution, however, that these results are far from conclusive. Neither explanation offers precise predictions of the shape that Figure 1 should take. We offer this analysis because it provides some (but not perfect) insight into what lies behind the ability of profitability measures to predict returns.

8 Conclusion

We examine the source of gross profitability's ability to predict differences in average returns and re-evaluate whether gross profitability has greater predictive power than net income. We find that net income "loses" to gross profitability only because net income is usually deflated by either the market or book value of equity, whereas gross profitability deflates gross profit (revenue minus cost of goods sold) by total assets. A regression of returns on gross profitability induces an implicit interaction term that consists of gross profit and the ratio of the market value of equity to the book value of total assets. This implicit interaction drives a significant part of the gross profitability premium. We then take Novy-Marx's (2013) intuition about focusing on those income statement items that relate to current revenue further and construct a measure of operating profit with a far stronger link with expected returns.

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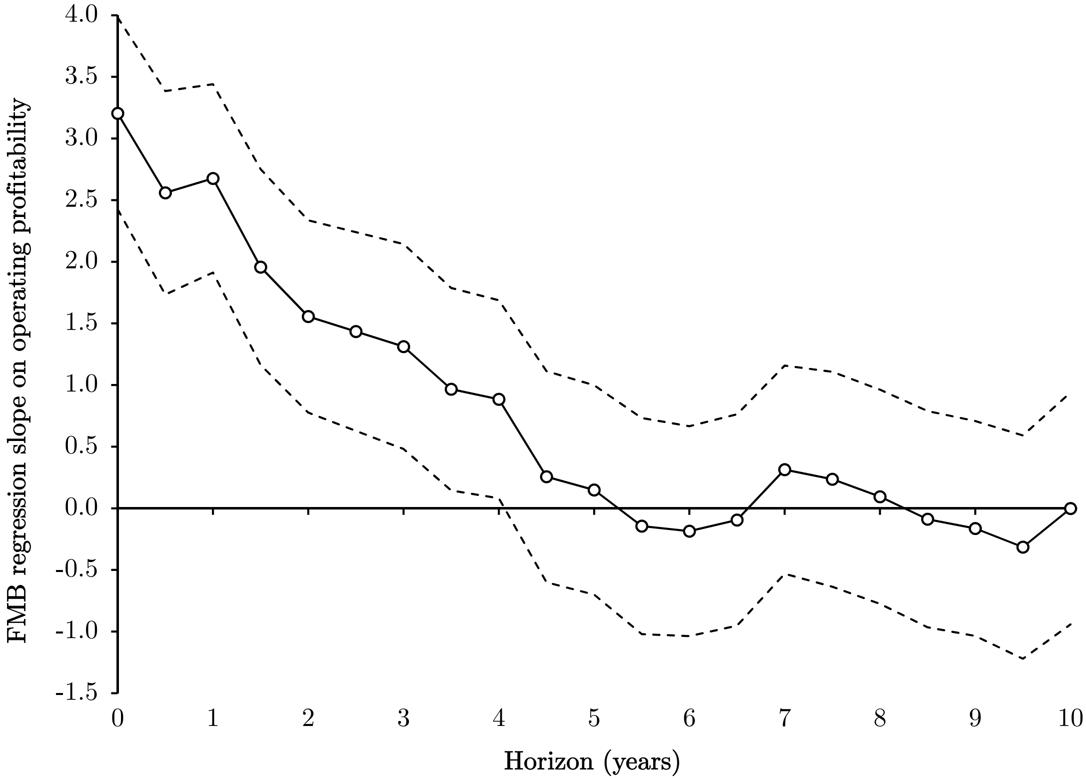
Panel A: Lag all explanatory variables



Panel B: Lag only operating profitability

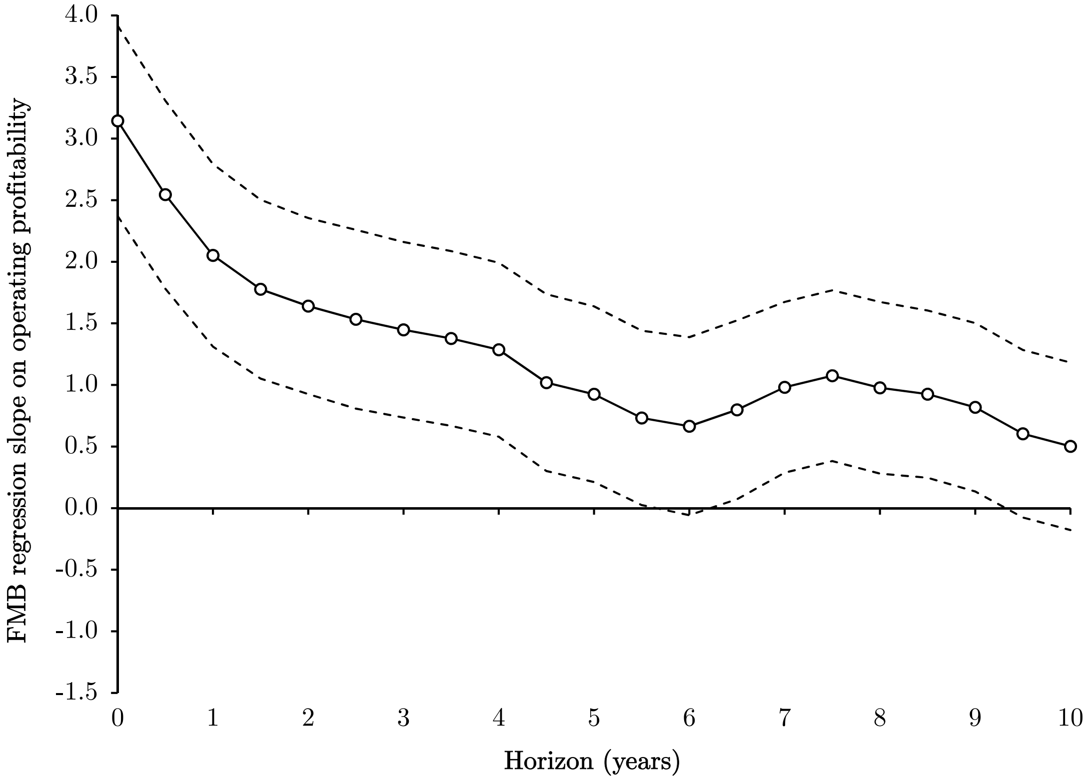


Figure 1: **Fama-MacBeth regressions of stock returns on lagged operating profitability.** This figure plots average Fama and MacBeth (1973) regression slopes and the 95% confidence intervals associated with these slopes from cross-sectional regressions to predict monthly returns. The regressions are estimated monthly using data from July 1973 through December 2012 for stocks with a market value of equity above the 20th percentile of the NYSE market capitalization distribution (All-but-microcaps). The regressors are: prior one-month return, prior one-year return skipping a month, log-book-to-market, log-size, and operating profitability. Operating profitability is defined as gross profit minus selling, general & administrative expenses (excluding research & development expenditures) deflated by the book value of total assets. Panel A lags all regressors by the value indicated on the x-axis. The estimates at $x = 10$, for example, explain cross-sectional variation in returns using the values of regressors recorded 10 years earlier. Panel B lags only operating profitability and uses current values of the other regressors.

Table 1: Descriptive statistics, 1963–2012

This table presents descriptive statistics for the variables used in our analysis. We deflate accounting variables by both the book value of total assets and the market value of equity. The accounting variables are taken from Compustat and are defined as follows with the relevant Compustat items in parentheses: gross profit (GP); income before extraordinary items (IB); selling, general & administrative expenses excluding research & development (XSGA − XRD); depreciation & amortization (DP); research & development (XRD); interest (XINT); taxes (TXT); other expenses (NOPI + SPI − MII). The other variables used in our analysis are defined as follows: log(BE/ME) is the natural logarithm of the book-to-market ratio; log(ME) is the natural logarithm of the market value of equity; $r_{1,1}$ is the prior one month return; $r_{12,2}$ is the prior year's return skipping a month. Our sample period starts in July 1963 and ends in December 2012.

			Percentiles				
Variable	Mean	SD	1st	25th	50th	75th	99th
Accounting variables scaled by total book assets							
Gross profit	0.372	0.296	−0.298	0.190	0.341	0.514	1.230
Income before extraordinary items	0.002	0.188	−0.725	−0.009	0.041	0.076	0.228
Sales, general & administrative	0.242	0.262	−0.234	0.081	0.196	0.347	1.090
Depreciation & amortization	0.043	0.038	0.002	0.024	0.036	0.053	0.168
Research & development	0.034	0.086	0.000	0.000	0.001	0.036	0.360
Interest	0.019	0.021	0.000	0.006	0.016	0.028	0.077
Taxes	0.032	0.043	−0.064	0.007	0.026	0.052	0.160
Other expenses	−0.001	0.077	−0.134	−0.016	−0.006	0.003	0.222
Accounting variables scaled by market value of equity							
Gross profit	0.724	1.749	−0.188	0.218	0.417	0.787	5.426
Income before extraordinary items	−0.032	0.840	−1.739	−0.006	0.055	0.092	0.341
Sales, general & administrative	0.507	1.405	−0.122	0.075	0.221	0.520	4.703
Depreciation & amortization	0.099	0.321	0.001	0.021	0.048	0.096	0.845
Research & development	0.035	0.147	0.000	0.000	0.001	0.028	0.428
Interest	0.068	0.314	0.000	0.005	0.020	0.059	0.738
Taxes	0.038	0.171	−0.229	0.012	0.036	0.065	0.252
Other expenses	0.010	0.516	−0.343	−0.021	−0.006	0.004	0.649
Other variables							
ln(BE/ME)	−0.541	0.935	−3.235	−1.054	−0.453	0.053	1.478
ln(ME)	4.512	1.966	0.621	3.079	4.381	5.834	9.367
$r_{1,1}$	0.013	0.152	−0.305	−0.063	0.001	0.071	0.490
$r_{12,2}$	0.145	0.589	−0.669	−0.177	0.053	0.325	2.201

Table 2: Correlations, 1963–2012

This table presents Pearson (Panel A) and Spearman rank (Panel B) correlations between the variables used in our analysis. We deflate accounting variables by both the book value of total assets and the market value of equity. The accounting variables are taken from Compustat and are defined as follows with the relevant Compustat items in parentheses: gross profit (GP); income before extraordinary items (IB); selling, general & administrative expenses excluding research & development (XSGA − XRD); depreciation & amortization (DP); research & development (XRD); interest (XINT); taxes (TXT); other expenses (NOPI + SPI − MII). Our sample period starts in July 1963 and ends in December 2012.

Panel A: Pearson correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Scaled by book value of total assets:																
(1)	Gross profit	1.00														
(2)	Income before extraordinary items	0.40	1.00													
(3)	Sales, general & administrative	0.81	−0.02	1.00												
(4)	Depreciation & amortization	0.07	−0.22	0.04	1.00											
(5)	Research & development	−0.24	−0.59	−0.21	0.03	1.00										
(6)	Interest	−0.11	−0.17	−0.03	0.08	−0.08	1.00									
(7)	Taxes	0.36	0.33	0.08	−0.08	−0.08	−0.22	1.00								
(8)	Other expenses	0.02	−0.47	0.01	0.16	0.14	0.04	−0.13	1.00							
Scaled by market value of equity:																
(9)	Gross profit	0.10	0.01	0.11	0.02	−0.04	0.06	−0.04	0.02	1.00						
(10)	Income before extraordinary items	0.05	0.19	−0.02	−0.09	−0.04	−0.05	0.08	−0.17	0.27	1.00					
(11)	Sales, general & administrative	0.14	−0.03	0.20	0.02	−0.05	0.08	−0.08	0.03	0.88	−0.04	1.00				
(12)	Depreciation & amortization	−0.02	−0.06	−0.01	0.25	−0.04	0.11	−0.09	0.06	0.71	−0.07	0.61	1.00			
(13)	Research & development	−0.03	−0.10	−0.02	0.02	0.14	0.00	−0.03	0.04	0.77	0.26	0.51	0.57	1.00		
(14)	Interest	−0.03	−0.01	−0.02	0.01	−0.04	0.17	−0.08	0.01	0.38	−0.46	0.39	0.51	0.24	1.00	
(15)	Taxes	0.02	0.02	0.00	−0.01	0.00	−0.01	0.07	−0.02	0.82	0.47	0.50	0.51	0.85	0.23	1.00
(16)	Other expenses	0.00	−0.13	0.01	0.06	0.00	0.01	−0.06	0.27	0.00	−0.74	0.12	0.09	−0.05	0.29	−0.21

Panel B: Spearman rank correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Scaled by book value of total assets:																
(1)	Gross profits	1.00														
(2)	Income before extraordinary items	0.40	1.00													
(3)	Sales, general & administrative	0.81	0.01	1.00												
(4)	Depreciation & amortization	0.11	−0.11	0.02	1.00											
(5)	Research & development	0.06	−0.34	0.09	0.03	1.00										
(6)	Interest	−0.14	−0.18	−0.11	0.14	−0.23	1.00									
(7)	Taxes	0.44	0.69	0.12	−0.05	−0.10	−0.27	1.00								
(8)	Other expenses	0.10	−0.29	0.09	0.16	0.12	0.15	−0.14	1.00							
Scaled by market value of equity:																
(9)	Gross profits	0.41	−0.03	0.42	0.10	−0.12	0.28	−0.08	0.21	1.00						
(10)	Income before extraordinary items	0.21	0.73	−0.06	−0.14	−0.33	−0.08	0.44	−0.29	0.00	1.00					
(11)	Sales, general & administrative	0.40	−0.19	0.59	0.05	−0.06	0.19	−0.16	0.18	0.89	−0.21	1.00				
(12)	Depreciation & amortization	−0.10	−0.31	−0.06	0.48	−0.08	0.39	−0.30	0.23	0.62	−0.31	0.53	1.00			
(13)	Research & development	0.04	−0.35	0.08	0.07	0.82	−0.12	−0.13	0.16	0.14	−0.42	0.17	0.18	1.00		
(14)	Interest	−0.16	−0.25	−0.09	0.08	−0.15	0.66	−0.31	0.15	0.59	−0.25	0.51	0.73	0.10	1.00	
(15)	Taxes	0.23	0.44	0.03	−0.07	−0.19	−0.03	0.67	−0.10	0.26	0.56	0.08	0.01	−0.12	0.02	1.00
(16)	Other expenses	0.09	−0.29	0.08	0.13	0.22	0.03	−0.06	0.78	0.12	−0.46	0.14	0.18	0.27	0.08	−0.17

Table 3: Fama-MacBeth regressions

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross-sectional regressions to predict monthly returns. The regressions are estimated monthly using data from July 1963 through December 2012. Panel A presents results for All-but-microcaps and Panel B presents results for Microcaps. Microcaps are stocks with a market value of equity below the 20th percentile of the NYSE market capitalization distribution. In each panel, gross profit and income before extraordinary items are deflated by the book value of total assets, the book value of equity, and the market value of equity. We trim all independent variables to the 1st and 99th percentiles.

Panel A: All-but-microcaps

		Accounting variables deflated by:					
Explanatory		Total assets		Book equity		Market equity	
variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gross profit		0.840		0.271		0.329	
		(5.40)		(4.39)		(3.50)	
Income before			3.455		1.330		1.838
extraordinary items			(5.98)		(4.13)		(3.17)
log(BE/ME)	0.300	0.387	0.387	0.354	0.348	0.218	0.251
	(3.92)	(4.90)	(4.78)	(4.37)	(4.20)	(2.80)	(3.47)
log(ME)	−0.067	−0.058	−0.080	−0.063	−0.080	−0.059	−0.073
	(−1.69)	(−1.47)	(−2.10)	(−1.60)	(−2.08)	(−1.50)	(−1.88)
$r_{1,1}$	−3.326	−3.414	−3.334	−3.472	−3.367	−3.462	−3.408
	(−7.38)	(−7.72)	(−7.53)	(−7.87)	(−7.58)	(−7.80)	(−7.66)
$r_{12,2}$	1.022	1.041	1.066	1.019	1.041	1.029	1.037
	(5.44)	(5.60)	(5.69)	(5.54)	(5.59)	(5.58)	(5.58)
Adjusted R^2	5.44%	5.99%	5.93%	5.89%	5.86%	5.83%	5.90%
Difference in			0.081		−0.037		−0.046
Sharpe Ratios			(0.58)		(−0.21)		(−0.23)

Panel B: Microcaps

Explanatory variable	(1)	Accounting variables deflated by: Total assets (2)	(3)	Book equity (4)	(5)	Market equity (6)	(7)
Gross profit		0.876		0.143		0.106	
		(6.55)		(2.79)		(1.92)	
Income before extraordinary items			2.035		0.752		0.458
			(3.41)		(2.39)		(1.06)
log(BE/ME)	0.560	0.570	0.555	0.575	0.540	0.521	0.549
	(8.38)	(8.36)	(8.36)	(8.20)	(7.81)	(7.88)	(8.60)
log(ME)	−0.181	−0.167	−0.212	−0.169	−0.208	−0.175	−0.188
	(−2.79)	(−2.54)	(−3.45)	(−2.57)	(−3.36)	(−2.68)	(−3.06)
$r_{1,1}$	−5.845	−5.947	−5.990	−5.925	−5.967	−5.909	−5.944
	(−13.14)	(−13.46)	(−13.74)	(−13.39)	(−13.60)	(−13.33)	(−13.60)
$r_{12,2}$	1.159	1.098	1.121	1.122	1.122	1.138	1.144
	(6.16)	(5.86)	(6.13)	(6.04)	(6.11)	(6.11)	(6.17)
Adjusted R^2	2.89%	3.07%	3.27%	3.04%	3.22%	3.00%	3.23%
Difference in Sharpe Ratios			−0.447		−0.056		−0.123
			(−2.96)		(−0.31)		(−0.68)

Table 4: Gross profit and leverage in Fama-MacBeth regressions

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross-sectional regressions to predict monthly returns. The regressions are estimated monthly using data from July 1963 through December 2012. Panel A presents results for All-but-microcaps and Panel B presents results for Microcaps. Microcaps are stocks with a market value of equity below the 20th percentile of the NYSE market capitalization distribution. We trim all independent variables to the 1st and 99th percentiles.

Panel A: All-but-microcaps

Explanatory	Regression							
variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gross profit	0.724				0.595		0.679	0.725
to total assets	(5.28)				(4.03)		(4.73)	(5.12)
Gross profit		0.081		0.102	0.054			0.028
to book equity		(3.45)		(4.05)	(2.10)			(1.31)
Gross profit			0.264			0.261	0.034	−0.052
to market equity			(3.31)			(3.28)	(0.40)	(−0.60)
Book equity				0.298	0.045			
to total assets				(1.72)	(0.25)			
Market equity						−0.012	−0.012	
to total assets						(−0.71)	(−0.68)	
log(BE/ME)	0.340	0.308	0.211	0.320	0.351	0.184	0.305	0.372
	(4.98)	(4.33)	(3.16)	(4.63)	(5.00)	(2.71)	(4.30)	(4.81)
log(ME)	−0.051	−0.052	−0.047	−0.055	−0.055	−0.052	−0.055	−0.051
	(−1.33)	(−1.36)	(−1.26)	(−1.47)	(−1.49)	(−1.41)	(−1.49)	(−1.37)
$r_{1,1}$	−2.692	−2.650	−2.723	−2.722	−2.801	−2.754	−2.787	−2.767
	(−6.33)	(−6.16)	(−6.36)	(−6.42)	(−6.69)	(−6.47)	(−6.62)	(−6.56)
$r_{12,2}$	0.861	0.856	0.853	0.857	0.861	0.856	0.870	0.873
	(5.66)	(5.67)	(5.65)	(5.76)	(5.82)	(5.62)	(5.74)	(5.84)
Adjusted R^2	5.85%	5.52%	5.67%	5.89%	6.32%	5.93%	6.36%	6.23%

Panel B: Microcaps

Explanatory variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Regression							
Gross profit to total assets	0.340				0.136		0.408	0.354
	(2.86)				(0.97)		(3.08)	(2.57)
Gross profit to book equity		0.029		0.042	0.105			0.055
		(1.64)		(2.29)	(2.89)			(1.89)
Gross profit to market equity			−0.010			−0.009	−0.034	−0.063
			(−0.34)			(−0.30)	(−0.95)	(−1.60)
Book equity to total assets				0.671	0.784			
				(4.10)	(4.59)			
Market equity to total assets						0.073	0.080	
						(2.49)	(2.73)	
log(BE/ME)	0.455	0.483	0.467	0.465	0.453	0.506	0.528	0.516
	(7.67)	(7.81)	(7.88)	(7.41)	(7.30)	(7.96)	(7.90)	(7.65)
log(ME)	−0.416	−0.414	−0.417	−0.422	−0.421	−0.417	−0.418	−0.414
	(−5.93)	(−5.90)	(−5.98)	(−6.01)	(−6.02)	(−5.98)	(−6.03)	(−5.97)
$r_{1,1}$	−5.926	−5.851	−5.879	−5.909	−5.971	−5.893	−5.952	−5.917
	(−15.30)	(−15.01)	(−15.11)	(−15.24)	(−15.47)	(−15.15)	(−15.40)	(−15.28)
$r_{12,2}$	0.739	0.781	0.771	0.762	0.724	0.763	0.727	0.743
	(4.86)	(5.08)	(5.02)	(5.07)	(4.88)	(4.95)	(4.77)	(4.89)
Adjusted R^2	2.97%	2.86%	3.00%	2.98%	3.15%	3.06%	3.23%	3.23%

Table 5: Portfolio results

This table reports value-weighted excess returns and three-factor model alphas and MKT, SMB, and HML loadings for portfolios sorted by gross profit and income before extraordinary items. Panel A sorts stocks into portfolios based on gross profit and income before extraordinary items ("net income") deflated by the book value of total assets. Panel B sorts stocks into portfolios based on the same variables deflated by the market value of equity. We sort stocks into deciles based on NYSE breakpoints at the end of each June and hold the portfolio for the next year. The sample starts in July 1963 and ends in December 2012.

Panel A: Gross profit and income before extraordinary items deflated by book value of total assets

	Sort by gross profit / total assets					Sort by net income / total assets				
	Average	Three-factor model				Average	Three-factor model			
Portfolio	return	α	b_{mkt}	b_{smb}	b_{hml}	return	α	b_{mkt}	b_{smb}	b_{hml}
1 (low)	0.324	−0.164	0.944	0.049	0.117	0.414	−0.278	1.218	0.657	−0.078
	(1.68)	(−1.85)	(45.15)	(1.65)	(3.67)	(1.43)	(−2.42)	(44.97)	(17.20)	(−1.90)
2	0.356	−0.204	0.952	−0.039	0.353	0.497	−0.211	1.144	0.296	0.293
	(1.94)	(−2.65)	(52.50)	(−1.51)	(12.80)	(2.15)	(−2.63)	(60.42)	(11.09)	(10.18)
3	0.395	−0.129	1.033	−0.100	0.205	0.427	−0.155	1.039	0.016	0.271
	(2.01)	(−1.68)	(56.72)	(−3.90)	(7.42)	(2.13)	(−1.99)	(56.52)	(0.61)	(9.72)
4	0.417	−0.109	1.024	−0.035	0.177	0.473	−0.041	0.933	−0.054	0.266
	(2.10)	(−1.37)	(54.65)	(−1.33)	(6.21)	(2.66)	(−0.58)	(55.70)	(−2.29)	(10.47)
5	0.571	0.070	1.016	0.000	0.098	0.489	0.003	0.949	0.063	0.096
	(2.85)	(0.89)	(54.39)	(0.01)	(3.44)	(2.57)	(0.04)	(52.14)	(2.44)	(3.47)
6	0.516	0.015	1.004	0.117	0.035	0.527	0.020	0.980	−0.036	0.180
	(2.55)	(0.21)	(58.12)	(4.82)	(1.35)	(2.82)	(0.30)	(60.67)	(−1.57)	(7.35)
7	0.443	0.032	1.034	0.048	−0.194	0.489	−0.001	0.984	−0.038	0.132
	(2.06)	(0.41)	(55.93)	(1.86)	(−6.91)	(2.62)	(−0.02)	(67.85)	(−1.86)	(5.98)
8	0.439	0.090	0.981	−0.002	−0.261	0.526	0.105	0.988	−0.106	−0.009
	(2.11)	(1.14)	(52.56)	(−0.07)	(−9.23)	(2.76)	(1.61)	(64.32)	(−4.88)	(−0.40)
9	0.572	0.265	0.927	−0.024	−0.289	0.443	0.059	0.969	−0.049	−0.122
	(2.91)	(3.72)	(55.25)	(−1.04)	(−11.36)	(2.31)	(0.96)	(66.41)	(−2.40)	(−5.52)
10 (high)	0.677	0.382	0.903	−0.053	−0.276	0.526	0.280	0.923	−0.122	−0.380
	(3.46)	(4.55)	(45.56)	(−1.88)	(−9.16)	(2.71)	(4.52)	(63.14)	(−5.92)	(−17.13)
High-Low	0.353	0.546	−0.041	−0.101	−0.392	0.112	0.558	−0.295	−0.779	−0.302
(deciles)	(2.57)	(4.10)	(−1.30)	(−2.29)	(−8.22)	(0.63)	(4.21)	(−9.44)	(−17.69)	(−6.37)
High-Low	0.300	0.529	−0.051	−0.052	−0.507	0.072	0.455	−0.232	−0.547	−0.367
(quintiles)	(2.44)	(4.74)	(−1.95)	(−1.39)	(−12.67)	(0.53)	(4.37)	(−9.45)	(−15.80)	(−9.84)

Panel B: Gross profit and income before extraordinary items deflated by market value of equity

	Sort by gross profit / market value					Sort by net income / market value				
	Average	Three-factor model				Average	Three-factor model			
Portfolio	return	α	b_{mkt}	b_{smb}	b_{hml}	return	α	b_{mkt}	b_{smb}	b_{hml}
1 (low)	0.362	0.094	1.060	−0.020	−0.556	0.433	−0.085	1.172	0.426	−0.326
	(1.55)	(1.42)	(67.75)	(−0.91)	(−23.40)	(1.52)	(−0.66)	(38.38)	(9.89)	(−7.04)
2	0.297	−0.067	0.970	−0.175	−0.093	0.357	0.020	1.108	0.053	−0.478
	(1.58)	(−1.07)	(65.26)	(−8.37)	(−4.11)	(1.46)	(0.23)	(55.52)	(1.87)	(−15.77)
3	0.420	0.011	0.936	−0.123	0.032	0.468	0.066	1.042	−0.024	−0.179
	(2.38)	(0.21)	(70.89)	(−6.62)	(1.60)	(2.23)	(0.97)	(64.33)	(−1.03)	(−7.29)
4	0.480	0.027	0.904	−0.099	0.171	0.404	0.002	0.956	−0.117	−0.014
	(2.81)	(0.42)	(60.66)	(−4.72)	(7.57)	(2.16)	(0.02)	(56.96)	(−4.95)	(−0.55)
5	0.640	0.152	0.909	−0.005	0.195	0.441	−0.007	0.938	−0.123	0.133
	(3.67)	(2.33)	(59.00)	(−0.21)	(8.32)	(2.43)	(−0.09)	(51.45)	(−4.77)	(4.82)
6	0.693	0.118	0.951	0.042	0.341	0.484	−0.003	0.919	−0.055	0.212
	(3.76)	(1.61)	(54.77)	(1.73)	(12.94)	(2.73)	(−0.04)	(53.22)	(−2.25)	(8.09)
7	0.854	0.169	1.034	0.233	0.405	0.502	−0.008	0.886	0.002	0.277
	(4.14)	(2.23)	(57.67)	(9.22)	(14.87)	(2.88)	(−0.11)	(48.13)	(0.06)	(9.92)
8	0.786	0.075	1.052	0.295	0.412	0.668	0.100	0.932	−0.011	0.382
	(3.63)	(0.86)	(51.01)	(10.13)	(13.16)	(3.68)	(1.26)	(49.63)	(−0.42)	(13.40)
9	0.760	−0.056	1.100	0.417	0.551	0.740	0.076	0.950	0.131	0.517
	(3.29)	(−0.63)	(51.71)	(13.89)	(17.05)	(3.82)	(0.84)	(44.82)	(4.39)	(16.07)
10 (high)	0.941	−0.045	1.145	0.742	0.728	0.796	0.026	1.031	0.268	0.608
	(3.52)	(−0.39)	(42.14)	(19.38)	(17.65)	(3.65)	(0.25)	(42.04)	(7.76)	(16.33)
High-Low	0.579	−0.139	0.084	0.762	1.284	0.362	0.111	−0.141	−0.158	0.934
(deciles)	(2.76)	(−1.01)	(2.60)	(16.65)	(26.05)	(1.68)	(0.63)	(−3.37)	(−2.67)	(14.68)
High-Low	0.496	−0.074	0.093	0.597	0.991	0.376	0.052	−0.144	0.036	1.000
(quintiles)	(3.11)	(−0.73)	(3.88)	(17.61)	(27.18)	(2.07)	(0.40)	(−4.63)	(0.82)	(21.16)

Table 6: Fama-MacBeth regressions for the components of income before extraordinary items

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross-sectional regressions to predict monthly returns. The regressions are estimated monthly using data from July 1963 through December 2012 separately for All-but-microcaps (Panel A) and Microcaps (Panel B). Microcaps are stocks with a market value of equity below the 20th percentile of the NYSE market capitalization distribution. All accounting variables are deflated by the book value of total assets. We trim all independent variables to the 1st and 99th percentiles.

Panel A: All-but-microcaps

Regressor	(1)	(2)	(3)	(4)	(5)
Gross profit	0.798	3.019	2.215		
	(5.20)	(3.54)	(2.53)		
Operating profit (Compustat SG&A)				2.418	
				(6.14)	
Operating profit (reported SG&A)					3.205
					(9.05)
Depreciation & amortization		1.849	2.613		
		(1.37)	(1.93)		
Compustat SG&A			−1.753		
			(−1.93)		
Reported SG&A		−2.692			
		(−3.04)			
Research & development		1.262			
		(0.83)			
Interest		1.778	−0.819		
		(0.86)	(−0.36)		
Taxes		−0.799	−0.131		
		(−0.49)	(−0.08)		
Other expenses		−1.606	−1.311		
		(−1.82)	(−1.48)		
log(BE/ME)	0.386	0.454	0.400	0.392	0.457
	(5.18)	(6.49)	(5.36)	(5.18)	(6.07)
log(ME)	−0.060	−0.072	−0.076	−0.084	−0.084
	(−1.51)	(−1.95)	(−2.07)	(−2.21)	(−2.13)
$r_{1,1}$	−3.377	−3.777	−3.675	−3.314	−3.244
	(−7.62)	(−9.03)	(−8.59)	(−7.50)	(−7.29)
$r_{12,2}$	1.013	1.003	0.977	1.025	1.065
	(5.37)	(5.55)	(5.31)	(5.40)	(5.59)
Adjusted R^2	5.92%	7.69%	7.11%	5.89%	5.79%

Panel B: Microcaps

Regressor	(1)	(2)	(3)	(4)	(5)
Gross profit	0.755	2.262	1.493		
	(5.60)	(3.32)	(2.14)		
Operating profit (Compustat SG&A)				1.354	
				(3.37)	
Operating profit (reported SG&A)					2.489
					(6.98)
Depreciation & amortization		3.143	3.402		
		(2.91)	(3.15)		
Compustat SG&A			−0.919		
			(−1.28)		
Reported SG&A		−1.897			
		(−2.71)			
Research & development		2.964			
		(2.07)			
Interest		−4.144	−5.896		
		(−2.19)	(−3.06)		
Taxes		1.270	1.570		
		(0.95)	(1.18)		
Other expenses		−2.189	−2.151		
		(−2.41)	(−2.37)		
log(BE/ME)	0.529	0.625	0.567	0.518	0.521
	(8.22)	(9.95)	(8.95)	(8.34)	(8.07)
log(ME)	−0.183	−0.231	−0.207	−0.228	−0.264
	(−2.77)	(−3.72)	(−3.33)	(−3.68)	(−4.25)
$r_{1,1}$	−5.961	−6.227	−6.217	−6.046	−5.980
	(−13.48)	(−14.57)	(−14.41)	(−13.92)	(−13.55)
$r_{12,2}$	1.075	1.093	1.055	1.102	1.088
	(5.63)	(6.10)	(5.80)	(5.94)	(5.75)
Adjusted R^2	3.03%	3.95%	3.76%	3.24%	3.13%

Table 7: Portfolio results for operating profitability

This table reports value-weighted excess returns and three-factor model alphas and MKT, SMB, and HML loadings for portfolios sorted by operating profitability (reported SG&A), defined as gross profit minus selling, general & administrative expenses (excluding research & development expenditures) deflated by the book value of total assets. We sort stocks into deciles based on NYSE breakpoints at the end of each June and hold the portfolio for the next year. The sample starts in July 1963 and ends in December 2012.

	Average	Three-factor model			
Portfolio	return	α	b_{mkt}	b_{smb}	b_{hml}
1 (low)	0.221	−0.461	1.177	0.480	0.061
	(0.85)	(−4.70)	(50.86)	(14.70)	(1.75)
2	0.372	−0.215	1.050	0.035	0.259
	(1.82)	(−2.67)	(55.30)	(1.32)	(8.99)
3	0.417	−0.177	0.983	0.062	0.343
	(2.19)	(−2.39)	(56.21)	(2.51)	(12.92)
4	0.418	−0.147	0.982	0.063	0.266
	(2.20)	(−2.09)	(59.15)	(2.68)	(10.55)
5	0.543	0.046	0.959	−0.046	0.186
	(2.97)	(0.67)	(59.20)	(−2.03)	(7.58)
6	0.465	−0.016	0.962	−0.038	0.134
	(2.49)	(−0.22)	(55.68)	(−1.57)	(5.10)
7	0.460	−0.039	0.996	−0.059	0.155
	(2.43)	(−0.58)	(62.30)	(−2.60)	(6.41)
8	0.620	0.161	1.034	−0.025	−0.019
	(3.09)	(2.61)	(71.11)	(−1.22)	(−0.87)
9	0.483	0.075	0.975	−0.078	−0.046
	(2.56)	(1.22)	(67.07)	(−3.80)	(−2.09)
10 (high)	0.528	0.289	0.932	−0.081	−0.437
	(2.64)	(4.85)	(66.17)	(−4.10)	(−20.43)
High-Low	0.307	0.750	−0.245	−0.561	−0.498
(deciles)	(2.03)	(6.25)	(−8.66)	(−14.06)	(−11.60)
High-Low	0.217	0.548	−0.160	−0.284	−0.489
(quintiles)	(1.93)	(5.82)	(−7.22)	(−9.06)	(−14.51)

Table 8: Two-way portfolio sorts for operating profitability and market capitalization

This table reports value-weighted excess returns, three-factor model alphas, and the t-values associated with the three-factor model alphas for portfolios sorted by operating profitability, defined as gross profit minus selling, general & administrative expenses (excluding research & development expenditures) deflated by the book value of total assets and market capitalization. We sort stocks into quintiles based on NYSE breakpoints at the end of each June and hold the portfolio for the next year. The operating profitability and market capitalization sorts are independent of each other. The sample starts in July 1963 and ends in December 2012.

Panel A: Excess returns

	Market capitalization, ME						
Operating						Q5 − Q1	
profitability	Q1	Q2	Q3	Q4	Q5	Mean	t-value
Q1	0.47	0.38	0.44	0.39	0.28	−0.19	−0.82
Q2	0.81	0.77	0.61	0.51	0.33	−0.48	−2.73
Q3	0.93	0.81	0.72	0.64	0.44	−0.49	−2.59
Q4	0.89	0.77	0.76	0.72	0.49	−0.40	−2.25
Q5	1.02	0.91	0.81	0.76	0.48	−0.54	−2.67
Q5 − Q1							
Mean	0.55	0.53	0.37	0.36	0.20	−0.35	−2.29
t-value	5.21	4.59	3.05	3.00	1.48	−2.29	

Panel B: Three-factor model alphas

Operating	Market capitalization, ME					
profitability	Q1	Q2	Q3	Q4	Q5	Q5 − Q1
Q1	−0.40	−0.44	−0.28	−0.22	−0.26	0.14
Q2	−0.05	−0.04	−0.08	−0.12	−0.18	−0.13
Q3	0.08	0.06	0.01	−0.01	0.04	−0.04
Q4	0.09	0.02	0.08	0.10	0.07	−0.02
Q5	0.29	0.24	0.23	0.29	0.23	−0.06
Q5 − Q1	0.69	0.68	0.50	0.51	0.49	0.08

Panel C: Three-factor model $t(\alpha)$s

Operating	Market capitalization, ME					
profitability	Q1	Q2	Q3	Q4	Q5	Q5 − Q1
Q1	−4.08	−5.18	−2.96	−2.29	−2.67	1.04
Q2	−0.71	−0.51	−1.00	−1.47	−2.44	−1.43
Q3	1.26	1.01	0.12	−0.10	0.64	−0.41
Q4	1.36	0.30	1.08	1.29	1.13	−0.25
Q5	3.83	3.23	3.02	3.95	4.50	−0.71
Q5 − Q1	6.76	5.96	4.14	4.55	4.04	−1.34