Are Cash Flows Better Stock Return Predictors Than Profits?

by

Stephen Foerster, CFA
John Tsagarelis, CFA
Grant Wang, CFA

Forthcoming in Financial Analysts Journal, 2017 (Version: January 5, 2017)

Stephen Foerster, CFA, is professor of finance at Ivey Business School, Western University, London, Ontario. John Tsagarelis, CFA, is senior research analyst at Highstreet Asset Management, and Adjunct Lecturer, Department of Economics, Western University, London, Ontario. Grant Wang, CFA, is senior vice president and co–chief investment officer at Highstreet Asset Management, London, Ontario.

Abstract

Although various income statement–based measures predict the cross section of stock returns, direct method cash flow measures have even stronger predictive power. We transform indirect method cash flow statements into disaggregated and more direct estimates of cash flows from operations and other sources and form portfolios on the basis of these measures. Stocks in the highest-cash-flow decile outperform those in the lowest by over 10% annually (risk adjusted). Our results are robust to investment horizons and across risk factors and sector controls. We also show that, in addition to operating cash flow information, cash taxes and capital expenditures provide incremental predictive power.

Editor's note: John Tsagarelis and Grant Wang are employed by Highstreet Asset Management, an investment management firm that uses empirically based research and the combination of quantitative and fundamental analysis to capture alpha drivers—growth, value, and quality. Proprietary models are based on numerous factors, only a small portion of which are related to the cash flow measure variables and findings in this paper.

Editor's note: This article was reviewed and accepted by Executive Editor Stephen J. Brown.

Acknowledgments
We thank Feng Chen, Rossana Di Lieto, Melanie Foerster, Keith Godfrey, Matthias Hanauer, Darren Henderson, Mark Huson, Andrew Karolyi, Aditya Kaul, Stephannie Larocque, CFA, Juhani Linnainma, Rick Robertson, Lu Zhang, two anonymous referees, and seminar participants at the University of Alberta Frontiers in Finance Conference, the Northern Finance Association Conference, and Western University for helpful comments and suggestions. We thank Executive Editor Stephen Brown and Co-Editor Luis Garcia-Feijoo as well as Andrew L. Berkin and Heiko Jacobs for their comments—all of which helped strengthen our paper. The research assistance of Yufeng Wang is greatly appreciated.

Keywords: stock return predictability; cash flows; profitability; direct cash flow method

Electronic copy available at: https://ssrn.com/abstract=2472571

Investors rely on financial information, such as profitability and cash-related measures, to assess a company's intrinsic equity value and predict the cross section of average returns. Fama and French (2006) found that more profitable companies have higher expected returns. Novy-Marx (2013) showed that profitability, measured by the ratio of gross profits to assets, predicts the cross section of average returns just as well as the book-to-market ratio does. Fama and French (2015) incorporated a profitability measure as a new factor, extending their well-known three-factor model. Hou, Xue, and Zhang (2015, 2016) created a *q*-factor model that incorporates a profitability factor, which performs well in explaining anomalies. Ball, Gerakos, Linnainmaa, and Nikolaev (BGLN 2015) showed that an operating profitability measure that better matches current expenses and revenues is an even better predictor of returns and also showed that results depend on whether the denominator is total assets or the market value of equity. Thus, the search continues for financial information that better predicts stock returns.

Although the income statement has long been at the center of financial statement analysis, well-documented shortcomings [1] call into question the efficacy of relying on its components to value stocks and predict stock returns. Notorious bankruptcies, including Enron and WorldCom, graphically illustrate that profitable GAAP income statements can coexist with negative operating or free cash flows for the same company for long periods (see Appendix A for a typical representation). More specifically, we believe that existing GAAP requirements permit too many alternative types of financial statement presentations; such information is too aggregated and can be inconsistently presented, making it difficult for users to understand the relationship between how accounting information is presented and the underlying economic results of the company. Novy-Marx's (2013) intuition in this area certainly rings true: The farther down the income statement one goes, the more "polluted" profitability measures become and the less related to "true" or economic profitability. Yet it is not obvious that *any* accrual accounting profit measure, regardless of where

[1]See Sloan (1996) and Markham (2006). See also, more generally, American Institute of Certified Public Accountants (1973); a committee chaired by Robert Trueblood urged the accounting profession to be more responsive to investors and creditors in providing information about the companies they audit and to show less deference to corporate management.

Electronic copy available at: https://ssrn.com/abstract=2472571

on the income statement it appears, should be superior to cash-based measures of performance and value.

In theory, if financial information is sourced from the same underlying economic data, there should be no difference between using information from the income statement and using information from the cash flow statement when making investment decisions. If, however, this assumption does not hold (as was the case with Enron and WorldCom), the income statement may depict one state of affairs and the cash flow statement another. We believe that the lack of uniformity among reported statements and their disjointed presentations make it extremely difficult for investors to test the quality of a corporation's historical earnings and compare the results within and across industries. Our study shows that by using a standardized "direct cash flow" template, investors can better understand a company's historical, contemporaneous, and forecasted return potential.

Both International Financial Reporting Standards (IFRS) and US GAAP encourage companies to use the *direct method* of financial statement presentation for reporting operating cash receipts and payments. The vast majority of companies, however, elect to present operating cash flows using the *indirect method.* Unfortunately, under the indirect method, no operating cash receipts or payments are presented in the statement of cash flows.[2] Instead, net income is merely reconciled to "operating cash flow" by adjusting for accounting entries that do not generate or use cash, including depreciation; changes in accounts receivable/payable or taxes; and discontinued operations, restructuring, or special charges. Thus, the details presented in the *indirect* cash

[2]The accounting standard for presenting the statement of cash flows is documented in FASB (1987, p. 6) as FAS No. 95, which states that "the information provided in a statement of cash flows . . . should help investors . . . to assess the enterprise's ability to generate positive future net cash flows." In an exposure draft (FASB 2008), the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) examined the use of the direct cash flow method for measuring a company's operating performance as opposed to the commonly used indirect method that starts with net income and makes adjustments. According to FASB (2008, p. 45), the indirect approach includes a major deficiency: "It derives the net cash flow from operating activities without separately presenting any of the operating cash receipts and payments." It merely reconciles information and is not a valid substitute for reporting operating cash inflows and outflows. For another overview of the proposed changes, see Reilly (2007).

flow statement consist of noncash operating items included in net income (or loss) rather than operating cash receipts and payments. Moreover, it is impossible to model the magnitude, frequency, timing, and volatility of prospective cash flows because inflows and outflows are not grouped according to common economic characteristics.[3] Consider the simple example of a sale made wholly on credit. An increase in accounts receivable resulting from a customer's delayed payment leaves both revenues and net income unchanged *as if* full payment had been received. Only by examining a separate operating cash flow statement can users learn that cash inflows were reduced and accruals were increased by the same amount. Furthermore, changes in accounts receivable are not grouped with their intuitive economic companion "revenues" but, rather, with "working capital changes." The shortcoming is evident: The indirect cash flow statement derives net cash flow from operating activities without separately presenting any of the operating cash receipts and payments. Although the Financial Accounting Standards Board (FASB) sees accruals as improving the ability of earnings to measure company performance by smoothing out "temporary" fluctuations in cash flows, we see the lack of cash inflows from the tardy customer and the resulting inconsistent presentation across several financial statements as fertile ground for security mispricing.

Investors often adjust for some of these issues by using approximations, including "free cash flow to equity" (FCFE).[4] FCFE fits well with our direct cash flow template computation (D), adjusted for capital expenditures, as shown in

[3]For example, net income can include results from primary business operations, different products or jurisdictions, proceeds from the sale of assets, discontinued operations, or investment income, among others. Each earnings source can respond differently to the same economic factors. Likewise, expenses associated with raw materials, direct labor, transportation, and energy costs are not segregated in the indirect cash flow statement, preventing investors from understanding how economic circumstances might affect forecasted results and thus the relationship between cash inflows and outflows. More generally, the difference between net income and cash earnings has spawned considerable academic interest in the area of "quality of earnings" and has contributed to investors' renewed interest in cash flow statements and cash flow–related measures. See O'Glove (1987); Kellogg and Kellogg (1991); Siegel (1991).

[4]FCFE = Cash flow from operations + Depreciation – Capital expenditures, or Earnings before interest and taxes, × (1 – Tax rate) + Depreciation – Interest expense × (1 – Tax rate) +/– Working capital changes – Capital expenditures. Some believe that free cash flow to equity should include debt, both preferred and equity. Our primary purpose in measuring free cash flows, as distinct from owner sources of financing, was to measure competitive advantage and assess the probability of recurrence. The same cannot be said of external financing.

Table 1. In our study, we were most interested in understanding how investors price companies' ongoing competitive advantage as measured by their ability to generate free cash flow vis-à-vis net income. In other words, we believe that companies that generate cash flow from irregular "nonoperating or extraordinary activities" or from capital raising (e.g., debt, preferred shares, or equity) are not as prized as companies that generate cash flow from recurring skill-based activities.[5] As shown in **Table 2**, there is a material difference between our direct cash flow measures (e.g., CFODM, our measure of direct method cash flow from operations) and the FCFE metric (CFONM in Table 2). When deflated by total assets, the correlation between these two variables is only 45% and drops to –17% when deflated by the market value of equity. Although standard FCFE and indirect cash flow measures can be cured by making similar computation adjustments, we favor the wide-scale adoption of direct cash flow statements as a superior method and as potentially opening the door to further discovery of unique fundamental factors.

Because the direct method cash flow (DMCF) aggregates cash flows with similar economic characteristics and disaggregates those with dissimilar characteristics,[6] investors can, for example, isolate the growth rate associated with net cash inflows stemming from operating activities as distinct from gross cash inflows stemming from asset sales, tax reimbursements, or foreign exchange gains. This calculation is practically impossible using existing indirect cash flow statements. Investors can also model the percentage change in cash flows associated with operating, financing, tax, and nonrecurring activities. For our study we highlight how investors can potentially achieve superior incremental risk-adjusted returns by replacing commonly used profitability ratios—including return—on—equity and price–earnings multiples—with their

[5]In an unreported analysis, we found that our direct cash flow measures are superior to FCFE measures, particularly those FCFE measures that include any new debt, which can add a nonoperational and sporadic component. Anecdotally, Apple had zero net borrowing from Q1 2005 to Q1 2013 and then incurred $17 billion in net borrowing in Q2 2013.

[6]In practice, companies often group items that are different in nature and that respond differently to the same economic events. For example, fixed-cost lease payments versus variable labor expenses are aggregated and presented as part of selling, general, and administrative expenses (SG&A). If lease payments are not functionally related to revenues but labor costs are, investors are better informed by presenting the information separately.

cash flow equivalents. This line of reasoning is consistent with research suggesting that earnings targets influence accounting decisions, thereby creating strong incentives to bias accruals either upward or downward.[7] We believe that the incremental alpha (discussed later in the article) would not have been possible without reference to the structural logic and internal efficiency of the "direct cash flow" statement.

Our main finding is that *direct cash flow* measures are generally better stock return predictors than *indirect cash flow* measures, which in turn tend to be better than various income statement profitability measures that focus on gross profits, operating profits, or net income. In our study, we first outlined a systematic process for combining existing income and indirect method cash flow statements to generate a direct cash flow approximation; that is, we created a new statement that disaggregates operating, financing, tax, and nonoperating cash flows to isolate recurring value-creation activities. We then created a series of cash-based financial ratios and compared them with BGLN's (2015) operating profitability measure, Novy-Marx's (2013) gross profitability measure, and the traditional return on assets (ROA) measure—all of which have total assets in the denominator. (We repeated our analysis with return on capital measures as well as the traditional return on equity measure and found that the results [unreported] are qualitatively the same.) Consistent with BGLN (2015), we repeated our analysis using market value of equity as the denominator. In this article, we show that our new measures generate greater risk-adjusted returns than those based on standard income statement information. Our results are robust across investment horizons and risk factors, including controlling for sector differences.

Our study is most closely related to and extends Novy-Marx (2013) and BGLN (2015), as well as Hou, Karolyi, and Kho (2011). Although Novy-Marx (2013) argued that gross profitability is the "cleanest" accounting measure of true economic profitability and BGLN (2015) derived an improved operating profitability measure, we argue that even "cleaner" measures can be derived by

[7]See Graham, Harvey, and Rajgopal (2005); for abnormal accruals, see Healy and Wahlen (1999).

focusing on the cash flow statement and cash that is available to equityholders.[8] Like BGLN (2015), we examined disaggregated information but with a focus on cash flows rather than on accounting measures. Like Hou et al. (2011), we found that cash-based measures capture significant time-series variation in stock returns; but our focus was on the US market rather than the global market, and we examined much more extensive types of cash measures in addition to the measure of cash flow to price (cash earnings before noncash charges, such as depreciation and amortization). We empirically tested the relationship between DMCF-based cash flow estimates and future stock returns in the US equity market in order to test our conjecture that disaggregated direct cash flows permit investors to separate recurring from nonrecurring value-adding activities, leading to superior return predictions.

We constructed new profitability measures on the basis of various estimates of cash flows from operations less capital expenditures, adjusted for financing and taxes. Consistent with BGLN (2015), we used both total assets and market value of equity in the denominator of these ratios. We compared these ratios with Novy-Marx's (2013) gross profitability measure, BGLN's (2015) operating profitability measure, and return on assets as well as the earnings-to-price ratio (E/P) and related measures based on the market value of equity. We found a significant positive relationship between the derived cash-based ratios and future stock returns as measured by high–low portfolio returns, information ratios, and risk-adjusted alphas. Stocks in the highest-cash-flow decile outperformed those in the lowest-cash-flow decile by over 10% annually, after controlling for well-known risk factors. In contrast, other profitability and earnings-based ratios generally had relatively weak relationships with future returns in our sample of S&P 1500 stocks over 1994–2013. We also show that, in addition to operating cash flow information, information on cash, taxes, and capital expenditures provides incremental predictive power.

[8]Our study also complements previous studies that investigated cash flows and investments (e.g., Hackel and Livnat 1992; Lakonishok, Shleifer, and Vishny 1994; Hackel, Livnat, and Rai 1994), accruals and investments (e.g., Sloan 1996; Xie 2001; DeFond and Park 2001; Thomas and Zhang 2002; Richardson, Sloan, Soliman, and Tuna 2005; Livnat and Santicchia 2006), and cash flows, accruals, and investments (e.g., Houge and Loughran 2000; Livnat and López-Espinosa 2008).

The Direct Cash Flow Template

As an alternative to the traditional income and cash flow statements, we offer a direct cash flow template and an alternative set of cash-based capital efficiency and valuation ratios. Unlike the indirect approach that begins with net income and reconciles to operating cash flows by reversing noncash activities, the direct cash flow template adheres to the culinary principle of *mise en place*. That is, it organizes and sorts financial information into clusters of homogeneous business activities, thereby permitting the user to understand *how* value is being created and *what* can be extrapolated. In this way, operating activities associated with a competitive advantage are value enhancing and are likely to repeat. Although obtaining an optimal capital structure can enhance value (given the benefit of debt and interest deductibility for tax purposes but balanced with the associated risk), financing activities per se, as reflected in interest expenses, are not value enhancing. Potential benefits of certain tax structures have received considerable media attention recently (i.e., large, profitable companies paying little in taxes) and may be value enhancing because the lower the amount of cash taxes paid, the better; but their sustainability might be questionable. Other nonoperating activities may also have some value-enhancing attributes but are probably unsustainable. This overview is consistent with earlier studies that demonstrated that cash-based components of earnings are more persistent and thus of "higher quality" than accrual-based components (Sloan 1996).

We recognize that this template does not generate actual direct cash flows as envisioned by FASB (2008) because corporations are not required to publish *segregated* operating and nonoperating cash flows. We believe, however, that it provides a better method than nontransformed accounting data for estimating intrinsic values. Although all the individual components of the cash flows are publicly available, we conjectured in our study that their availability alone does not ensure their timely integration and use by investors to estimate intrinsic values. Patterns must be isolated, revealed, and applied before stock prices can reflect this information. Our analysis also highlights what types of information are most informative.

The direct cash flow template (Table 1) works as follows. First, we directly estimate net cash flows from operating activities. We begin with the main cash inflow of sales, adjusted for changes in accounts receivable, deferred revenues, and other cash inflows from operations. We subtract cost of goods sold as well as selling, general, and administrative expenses and then adjust for changes in accounts payable from operations and changes in inventories. The result is our estimate of net cash flows from operations (A), similar to Ball, Gerakos, Linnainmaa, and Nikolaev (2016).[9]

Next, we estimate net cash flows from operations after financing activities (B) by subtracting interest expenses and adjusting for other financing income and expenses. Subsequently, we estimate net cash flows from operations after financing and tax activities (C) by subtracting cash flows related to tax activities—including taxes on the income statement, adjusted for changes in account-payable taxes and deferred taxes. Finally, we estimate net cash flows from operations after financing, tax, and extraordinary activities (D) by accounting for other nonoperating activities, including discontinued operations, foreign exchange, and pension-related items. For completeness and to reconcile this cash flow estimate with the traditional free cash flows to equityholders, we account for cash flows from investing activities by simply subtracting the cash outflows associated with capital expenditures. We conjecture that measures related to either net cash flows from operations after financing activities or net cash flows from operations after financing and tax activities should be best at predicting the cross section of future stock returns, depending on the sustainability of value-enhancing tax structures.

Data and Methodology

We obtained the fundamental and pricing data from the Standard & Poor's Xpressfeed North American database (Xpressfeed). Our sample's investment universe is the S&P 1500, consisting of the largest 500 stocks by market

[9]Subsequent to earlier drafts of this article, a first draft of Ball et al. (2016) appeared on SSRN (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2587199). Similar to what we show in this article, they showed that a cash-based operating profitability measure is a strong predictor of the cross section of returns. Their measure is similar to our measure of net cash flows from operations. They did not adjust their cash flow measures for capital expenditures, and they focused on accruals.

capitalization, the mid-cap 400, and the small-cap 600. We chose the S&P 1500 to ensure that the stocks would be truly investable and that the tested investment strategies would be relevant to practitioners. The historical S&P 1500 constituents are also from Xpressfeed. For each month, we obtained a list of the stocks in the S&P 1500 *at that time* to avoid any survivorship bias. As is common in studies that rely on accounting metrics—and given major structural differences between financial and nonfinancial companies (e.g., leverage)—for most of our reported analysis we excluded financial companies (banks, insurance companies, and REITs), about 15% of the overall sample.[10] We included companies with negative earnings (about 13% of the sample) and companies with negative operating cash flows (about 6% of the sample). We used data for October 1994–December 2013; cash flow statements have been mandatory in the United States only since 1987, and the actual index constituents of the S&P 1500 have only been available in readily-usable database form since October 1994.

The major fundamental variables that we used in our study are presented below (Xpressfeed mnemonics):

Operating activities net cash flow: OANCF
Net sales: SALE
Accounts receivable – Decrease/increase: RECCH
Cost of goods sold: COGS
Selling, general, and administrative expense: XSGA
Depreciation and amortization – Income statement: DP
Depreciation and amortization – Cash flow statement: DPC
Funds from operations – Other: FOPO
Accounts payable and accrued liabilities – Increase/decrease: APALCH
Inventory – Decrease/increase: INVCH
Assets and liabilities – Other – Net change: AOLOCH
Sale of property, plant, and equipment and investments – Gain/loss: SPPIV
Interest and related expense – Total: XINT
Income taxes – Total: TXT
Income taxes – Accrued – Increase/decrease: TXACH
Deferred taxes – Cash flow: TXDC

[10]In addition, financial companies face unique accounting regulations, including how investments are classified, which can materially affect operating cash flows.

Special items: SPI
Discontinued operations: DO
Extraordinary items: XI
Capital expenditure: CAPX
Income before extraordinary items – Available for common: IBCOM

Following industry practice, we created trailing 12-month (TTM) values for the fundamental variables. We updated these TTM values with each quarter's new information and combined them with monthly return data to conduct the tests. Despite the quarterly updates and to avoid any look-ahead bias, we used only accounting data that had been lagged by four months.[11] We used two variables to normalize various measures: (1) Total assets includes current assets; investments; intangibles; and property, plant, and equipment, as reported on each company's balance sheet, and (2) market value of equity is measured as common shares outstanding multiplied by the month-end prices.

On the basis of our template definitions in Table 1, we created various measures of direct and indirect free cash flow. CFAFAT represents net cash flows from operations after financing and tax activities (C) – Capex; CFAF represents net cash flows from operations after financing activities (B) – Capex; and CFO represents net cash flows from operations (A) – Capex. We compared these direct method cash flow (DMCF) measures with the indirect method cash flow measure CFIM, defined as operating activities net cash flow (OANCF) – Capex. Note that this indirect measure, OANCF, results in the same number as net cash flows from operations after financing, tax, and extraordinary activities (D) in Table 1.

We then used these definitions of free cash flow to construct various metrics for cash returns on assets and free cash flow yield. The variable CFAFAT/TA is the cash return on assets measured as the direct free cash flow metric CFAFAT divided by total assets. The variables CFAF/TA, CFO/TA, and CFIM/TA are alternative measures of return on assets, with the numerators CFAF, CFO, and CFIM, respectively. We compared these measures with a number of accounting-based measures. The numerator of the operating profit

[11]The four-month lag is conservative. In our untabulated analysis of S&P 1500 companies between 1993 and 2013, 99% of them filed 10-Q statements within three months after the quarter-end.

measure, OP/TA, is operating profits (as estimated by BGLN [2015] by subtracting from sales the cost of goods sold and selling, general, and administrative expenses excluding R&D) and the denominator is total assets. The numerator of Novy-Marx's (2013) gross profit to total assets, GP/TA, is gross profit measured as sales less cost of goods sold. The traditional return-on-assets ratio is measured as IBCOM (income before extraordinary items available for common shareholders) divided by total assets. The price yield measures are similar to the measures just described except that the market value of equity (MVE) replaces total assets as the denominator. Note that the traditional earnings yield E/P (the inverse of the price-to-earnings ratio) is measured as IBCOM, or net income, divided by the market value of equity and is noted simply as NI/MVE. On the basis of our discussion in the previous section, we would expect those measures with CFAFAT and CFAF in the numerator to be superior.

For each month, we ranked the S&P 1500 companies by a particular measure of return on asset or yield and divided the universe into deciles from lowest (P1) to highest (P10). We calculated one-month-ahead portfolio returns on a value-weighted basis (we also considered other horizons). In standard fashion, we estimated a long–short portfolio return as the spread return difference between the highest (P10) and lowest (P1) portfolio returns. We then tested for the significance of the return differences.

Information in Cash Flow Components

We began our analysis by investigating the impact of segregating various cash flow components in order to see how those components might provide incremental information about predicting stock returns. For example, in addition to information regarding a company's operations, is there incremental information in cash flows about financing, taxes, investments, or other nonoperating activities? We were also able to compare operating cash flow information with accounting measures of gross profit and operating profit.

As shown in Table 2, we first examined the correlations of the time series (winsorized at 1% and 99%) of equal-weighted averages across companies of various cash flow measures and components: our measure of direct method cash flow from operations, CFODM; our measure of indirect method cash flow from

operations, CFOIM; Novy-Marx's (2013) free cash flow measure of net income plus depreciation/amortization minus working capital change minus capital expenditures, CFONM; financing activities, FinAct (see Table 1 for definitions of this and other "activities" measures); tax activities, TaxAct; other activities, OthAct; and capital expenditures, Capex. We deflated each of the variables by either total assets (TA) or market value of equity (MVE).

Not surprisingly, there are high correlations between the CFODM/TA, CFOIM/TA, and CFONM/TA measures: 0.81 for the first two measures, dropping to 0.45 for the first and third. Consistent with BGLN (2015), the correlations across variables with the same numerator but with MVE or TA in the denominator are quite low in many instances: for CFODM, 0.28; for CFOIM, 0.32; and for CFONM, 0.47. These results show the impact of the book value of total assets, which changes slowly over time compared with the market value of equity, which changes frequently and potentially by larger magnitudes.

Across the three cash flow measures deflated by TA, we see a consistent pattern of correlations for FinAct (negative), TaxAct (positive), and Capex (positive). The absolute values of the correlations for FinAct are generally low, below 0.23, whereas those for Capex are generally slightly higher and those for TaxAct higher still (above 0.48). The absolute values of the correlations between OthAct and the CFODM and CFOIM variables are low, but the absolute value of the correlation between OthAct and CFONM is surprisingly high (0.55). *Not* surprisingly, the correlations tend to be lower with MVE in the denominator. These preliminary results prompted us to conduct a more rigorous investigation of the components of cash flows.

Following BGLN (2015, Table 7), we performed Fama and MacBeth (1973) cross-section regressions.[12] For each month of our sample, we regressed the one-month-ahead returns for each stock on our measure of net cash flows from operations, net CF ops ("A" in the Table 1 template). In additional regressions, we included a number of other independent variables: financing activities as measured by interest expenses ± other financing income/expenses; tax activities

[12]For a discussion of the advantages and disadvantages of the Fama–MacBeth approach compared with sorting returns, see Fama and French (2006, 2008).

as measured by taxes on the income statement ± changes in account-payable taxes ± changes in deferred taxes; other nonoperating activities measured as discontinued operations/special charges ± foreign exchange gains/losses ± pension gains/losses/contributions; and capital expenditures (capex). We deflated all these variables by the book value of total assets. Similar to BGLN (2015), we included a number of control variables: log(BVE/MVE) is the natural logarithm of the ratio of book value of equity to market value of equity; log(ME) is a size variable measured as the natural logarithm of the market value of equity; $r_{1,1}$ is the stock's one-month-prior return; and $r_{12,2}$ is the stock's prior-year return (skipping a month). We winsorized all independent variables on the basis of the 1st and 99th percentiles. We also performed separate regressions, replacing the net CF ops variable with (1) Novy-Marx's (2013) gross profit measure, (2) the BGLN (2015) operating profit measure, (3) our measure of cash flows from operations based on the indirect cash flow method (CFOIM), or (4) Novy-Marx's (2013) free cash flow measure of net income plus depreciation/amortization minus working capital change minus capital expenditures (CFONM).

Table 3 reports our results, including averages of the Fama–MacBeth (1973) slope coefficients and their *t*-values. Column 1 presents the regression of returns on gross profit alone and the control variables; column 2 does the same with operating profit and the control variables, whereas column 3 does the same with net CF ops and the control variables. We can see in column 1 that the gross profit measure is only marginally significant, with a *t*-statistic of 1.81. In column 2, the operating profit measure is significant, with a *t*-statistic of 3.38; in column 3, the net CF ops coefficient estimate is also significant and of a similar order of magnitude, with a *t*-statistic of 3.22.

The regression results reported in columns 4 and 5 allow us to compare the results in columns 1 and 2 with the effect of adding the net CF ops measure. In column 4, we see that the cash flow measure subsumes the gross profit measure, which is no longer significant. Column 5 shows that neither the operating profit measure nor the cash flow measure is significant (perhaps owing

to multicollinearity), although the cash flow measure does have a slightly higher *t*-statistic.[13]

The regression results presented in columns 6, 7, and 8 repeat the analysis in columns 1, 2, and 3 but with additional segregated cash flow components related to financing activities, tax activities, nonoperating activities, and capex (investing activities). In all cases, the adjusted R^2 increases. In column 6, the gross profit measure drops in significance, with a *t*-statistic of 1.64, and none of the cash flow component measures are significant. Given our earlier results suggesting that (for our sample) the gross profit measure is dominated by other measures, this result is not surprising. In column 7, the operating profit measure remains significant, with a *t*-statistic of 3.85. However, both the tax activities coefficient estimate and the capex coefficient estimate are marginally significant and negative. The column 8 net CF ops measure results are similar. In addition to the net CF ops variable—which remains significant, with a *t*-statistic of 3.60—the tax activities coefficient estimate is negative and marginally significant, with a *t*-statistic of –1.91; the capex coefficient estimate is also negative and significant, with a *t*-statistic of –2.03.

Our finding no significance in the financing activities coefficient estimate is consistent with our initial conjecture and also with BGLN (2015), who found no significance in their interest coefficient estimate for their "all-but-microcaps" sample. Unlike BGLN (2015), however, we found our tax activities coefficient estimate to be negative and significant.[14] We would expect a negative correlation with the intrinsic value of equityholders as cash taxes increase.[15]

The negative coefficient estimate for the capex variable, which is consistent with prior literature, is known as the *investment effect* or the *asset growth effect*,

[13]In their Fama–MacBeth analysis over a longer period (1963–2014), BGLN (2016) found that their cash-based operating profitability measure is significant whereas their accounting-based operating profitability measure is not.
[14]Thomas and Zhang (2014) offered a variety of explanations for why some studies have found significant positive relationships and others have found significant negative relationships.
[15]In untabulated results, we observed that corporate cash taxes paid were consistently lower than the income statement tax account. Through tax planning and timing, differences between capital expenditures and depreciation, deferred tax liabilities are typically generated but are paid at a later date.

whereby companies that increase their investments (e.g., as measured by capital expenditures as a percentage of total assets) subsequently experience lower risk-adjusted returns.[16] Two possible explanations are related to the *q*-theory of investment and overinvestment. In the first explanation, companies invest more when stock returns are lower than expected. In the second explanation, companies that increase investments may overinvest. Markets may interpret some capital investments as inefficient; for example, capital expenditures in large, risky projects may lead to unfavorable outcomes.

Column 9 presents the regression of returns on CFOIM and the segregated cash flow components related to financing activities, tax activities, nonoperating activities, and capex (investing activities), as well as the control variables. As expected, the CFOIM coefficient estimate is significant, with a *t*-statistic of 3.71. Consistent with our column 7 and 8 results, the capex coefficient estimate is significantly negative. The tax activities coefficient estimate is still negative but not significant, whereas the nonoperating activities coefficient estimate is negative and marginally significant. Finally, column 10 presents a similar regression as in column 9 but with the CFOIM measure replaced by free cash flows (CFONM) measured as net income plus depreciation minus change in working capital minus capital expenditures (Novy-Marx 2013). Only the nonoperating activities variables are significant.

Overall, our results suggest that there is additional information in segregating cash flow components for predicting the cross section of returns. In particular, in addition to the information contained in cash flows from operations, there is incremental information in disaggregating tax activities and capital expenditures. Companies that generate strong cash flows from operations while paying relatively low cash taxes and having relatively less capital expenditure tend to perform best.

[16]See Baker, Stein, and Wurgler (2003); Titman, Wei, and Xie (2004, 2013); Anderson and Garcia-Feijóo (2006).

Cash Flow, Profitability Return and Yield Measures, and One-Month-Ahead Returns

Next, we analyzed our results with the aggregated cash flow measures. **Table 4** reports our results from comparing the one-month-ahead returns for the various value-weighted portfolios (P1 through P10), as well as the P10–P1 high–low portfolio return spread, sorted on the basis of the previous month's return on assets or yield measure over October 1994–December 2013. Table 4 also shows the standard deviations of the P10–P1 returns, the *t*-statistics of the significance of the P10–P1 returns, the minimum and maximum monthly P10–P1 observations, and the information ratio (IR) measured as the annualized P10–P1 return divided by the annualized standard deviation of the return difference.[17] As expected, there is a general (but not perfect) monotonic relationship across all measures, with higher measures tending to exhibit higher one-month-ahead returns than lower measures. The top half of the table presents measures with total assets in the denominator.

The returns generally increase somewhat monotonically from the low to the high portfolios for the various measures. We see from Table 4 that the Novy-Marx (2013) GP/TA variable has the largest P10 return among the ROA variables but not the biggest P10–P1 spread because many of the cash flow measures have more cross-sectional variation. For the portfolios sorted on the basis of our three DMCF efficiency measures (CFAFAT/TA, CFAF/TA, and CFO/TA), the high–low (P10–P1) return differences are significantly positive (*t*-statistics range from 2.14 to 2.73), with monthly return differences ranging from 0.64% to 0.82% (or 8.0% to 10.3% annually). Information ratios range from 0.489 to 0.623. For the indirect method cash flow return measure (CFIM/TA), the high–low monthly return difference drops to 0.49% (6.0% annually) but is not significant, and the information ratio drops to 0.356. The return difference for the portfolios sorted on the basis of operating profits to total assets (OP/TA) is very similar to that of the CFIM/TA variable (0.49%; 6.0% annually) and is not significant, with the same information ratio (0.356). The high–low portfolio return based on the measure of gross profit to total assets (GP/TA) is also similar (0.49%; 6.1%

[17]We also repeated our analysis with returns measured using equal weights and separately with financial companies in the sample. The results are substantively similar.

annually) but, given the lower standard deviation, is significant, with a *t*-statistic of 2.10; the information ratio is higher, at 0.480. Finally, for the measure of return on assets (NI/TA), the monthly high–low return difference is only 0.06% (0.7% annually) and is not significantly different from zero, with the information ratio dropping to 0.040.[18] Consistent with our conjecture, among these cash flow return measures, the best-performing high–low portfolio is based on sorting by the CFAF measure (net cash flows from operations after financing activities ["B" in Table 1] less capex). This measure also has the highest information ratio. These initial results suggest that cash flow measures are superior to profitability measures in long–short positions because (1) the cash-related information may be more informative and (2) the cash flow measures capture a wider dispersion across the portfolios.

The bottom part of Table 4 presents measures with market value of equity in the denominator. We can see that all the return differences for the portfolios sorted on the basis of our three direct method cash flow yield measures (CFAFAT/MVE, CFAF/MVE, and CFO/MVE) and the indirect method cash flow return measure (CFIM/MVE) are significantly positive (*t*-statistics range from 1.91 to 3.03), with monthly return differences ranging from 0.55% to 0.77% (6.9% to 9.6% annually). Information ratios range from 0.436 to 0.692. The return difference for the portfolios sorted on operating profit yield (OP/MVE) is 0.70% (8.7% annually) and marginally significant, but the information ratio is lower (0.380). For the gross profit yield (GP/MVE), the high–low return difference is 0.58% (7.2% annually) but is not significant, and the information ratio drops to 0.313. Finally, for the earnings yield measure (NI/MVE), the monthly high–low return difference is 0.43% (5.2% annually) and is not significant, with an information ratio of only 0.271. Consistent with our conjecture, among these cash flow return measures, the best-performing long–short portfolio is again based on sorting by CFAF/MVE (net cash flows from operations after financing ["B" in Table 1] less capex) and generates the highest information ratio. The sortings on the AFAT and AF DMCF measures result in higher information ratios

[18]Although the P10–P1 return difference is small for NI/TA, it is worth noting that the P1 return is quite high (as is the P1 return for the NI/MVE variable). This result may be driven by negative-earnings companies with strong one-month-ahead returns.

than does the sorting on the indirect cash flow measure (CFIM/MVE). Our results (with market value of equity in the denominator of our measures) suggest a robustness of the superiority of cash flow measures compared with profitability measures. Our results are also robust across subperiods.[19]

Our overall interpretation of the results in Table 4 is as follows. Direct cash flow measures tend to be superior to indirect cash flow measures because of the additional information provided by segregating operating, financing, and tax activities. Cash flow measures tend to be superior stock return predictors than profitability measures (operating profit, gross profit, and net income) because cash-related measures are economically "cleaner" than profitability measures and are more closely related to how companies are valued. Thus, inconsistencies in how accrual financial statements are presented can confuse investors who are trying to understand *what* to extrapolate and *how* sustainable the value-creating activities are.[20]

Portfolio-Sorted Regressions.

We adjusted for risk in a more systematic manner by using the returns of portfolios P1 through P10 as well as the P10–P1 return spread (i.e., the portfolios sorted on either the return-on-assets variable or the yield variable) to run

[19]In unreported results, we divided our sample into four subperiods. Subperiod 1 (October 1994–February 2000; 65 months) coincides with the "technology bubble" period, with a cumulative stock market return, as measured by the S&P 500 Composite Index total return, of 109.5% (1.1% a month, compounded); subperiod 2 (March 2000–July 2007; 89 months) coincides with the post–technology bubble/pre–financial crisis period, with a cumulative stock market return of 20.3% (0.2% a month); subperiod 3 (August 2007–May 2009; 22 months) coincides with the financial crisis period, with a cumulative stock market return of –34.0% (–1.9% a month); and subperiod 4 (June 2009–December 2013; 55 months) coincides with the post–financial crisis period, with a cumulative stock market return of 121.6% (1.5% a month). Cash flow–based measures tend to dominate the profitability measures in all but the third subperiod.

[20]In comparing our results with those of Novy-Marx (2013), we note some sampling differences. Given our data limitations, we focused on a shorter and more recent period (1994–2013) compared with his 1963–2010 study; it is possible that the profitability measure has weakened more recently. Moreover, our sample of stocks is different. He used the universe of Compustat stocks (excluding financials), whereas we focused on the largest 1,500 stocks, which is a more liquid and tradable sample. Although Novy-Marx considered an estimate of free cash flows in part of his analysis, he defined free cash flow as net income plus depreciation minus working capital change minus capital expenditures. Interestingly, in Appendix Table A2 in Novy-Marx's paper, his EBITDA-to-assets variable—most similar to some of our DMCF measures except that it does not account for capital expenditures—performs well, even better than his free cash flow measure.

regressions against well-known risk factors. We used monthly data over the entire sample period, October 1994–December 2013. Our regression model is

$$P_{i,t+1} = \alpha_i + \beta_{1i}\text{MKTRF}_t + \beta_{2i}\text{SMB}_t + \beta_{3i}\text{HML}_t + \varepsilon_{i,t+1} \quad t = 1,\ldots,N. \tag{1}$$

The dependent variables are the individual decile portfolios, P1 (low) through P10 (high), as well as the P10–P1 return difference for the various portfolios sorted on the return-on-assets and yield measures (i) in Table 4 for each monthly time series. For example, we regressed returns for November 1994 ($t + 1$) on the basis of information as of the end of October 1994 (t). The independent variables are the Fama–French (1993) three-factor model, in which MKTRF is the market risk premium (market return in excess of the risk-free rate), SMB is the small minus big (size) factor, and HML is the high minus low (book-to-market) factor (we discuss the Fama–French five-factor model later in the article).[21] After controlling for all these risk factors, the intercept, α, is interpreted as the alpha or abnormal return. If alpha is positive and significant, the implication is that the other factors cannot be combined to form a mean–variance-efficient portfolio, suggesting how an investor could tilt a portfolio toward a profitability strategy, such as investing in portfolios that have recently generated high cash flows relative to their total assets or market value of equity. We used White's (1980) heteroskedasticity-consistent standard errors. For comparison, we present the average monthly returns in excess of the monthly Treasury bill (from Ken French's website).

Table 5 summarizes our regression results. Panel A reports the regression results for the P1 (low) portfolio sorted on the various return and yield measures. Panel B presents the regression results for the P10 (high) portfolio sorted on the

[21]Data are available from Ken French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). We also examined a model with two additional factors: UMD is the up minus down (price momentum) factor (also available from Ken French's website), and LIQ is Pástor and Stambaugh's (2003) traded liquidity factor, derived from dividing US common stocks into 10 portfolios on the basis of each stock's sensitivity to the nontraded liquidity innovation factor—the return on the portfolio of high-liquidity betas less the return on the portfolio of low-liquidity betas. For these two factors, the results are qualitatively the same.

various return and yield measures. Panel C shows the regression results for the P10–P1 return difference sorted on the same measures.

Across the panels, we see that the portfolio alphas (and the average returns) increase as we move from P1 to P10 for the various return-on-assets and yield measures. In Panel A (P1 results), most of the alphas are negative but not significant, whereas in Panel B (P10 results), all the alphas are positive and most are significant, with the exception of CFO/MVE, OP/MVE, and GP/MVE. Consistent with our results in Table 4, in Panel C all three of the DMCF return and yield measure P10–P1 return differences are significantly positive (with the exception of CFO/MVE), as are the indirect measure return differences. The OP return differences are significantly positive vis-à-vis total assets but not market value of equity. In most cases, the cash flow–based measures have higher alphas than does the corresponding OP measure. The GP measure is significant with TA as the denominator but is not significant with MVE as the denominator, in both cases with a lower alpha than the corresponding OP measure. For the net income measure, the results are marginally significant. Most of the DMCF variables result in larger alphas than the indirect method variables. Among the DMCF variables with TA in the denominator, the alpha for CFAF is 1.11%, which translates into an annual return difference of 14.2%; for CFO, the alpha is 1.07%, which translates into an annual return difference of 13.6%, even stronger than the Table 4 results. With MVE as the denominator, CFIM has an alpha of 0.67%, for an annual difference of 8.3%. Thus, even controlling for well-known risk factors, we found significant value in using information available from our "direct cash flow" statements. In general, direct cash flow measures tend to be superior to indirect cash flow measures, which in turn tend to be better than profitability measures; among profitability measures, operating profit measures tend to be superior to gross profit measures, which in turn are superior to net income measures.

We contrasted our P10–P1 results with those of Novy-Marx (2013, Table 2). Despite some differences in methodologies,[22] we found that our alpha

[22]In addition to some sampling differences in Novy-Marx's (2013) Table 2, he reported quintile differences rather than decile differences.

estimate for the measure of gross profit to total assets, 0.59%, is close to his estimate of 0.52%. Thus, we conclude not that his measure performs poorly given our different sample and design but, rather, that cash-based measures perform even better.

Recently, Harvey, Liu, and Zhu (2016) presented a critique of empirical studies purporting to uncover new factors. They highlighted data-mining concerns, suggesting that the threshold of reported *t*-statistics should be raised far above the traditional 2.0 level to around 3.0. They noted, however, that factors developed from first principles rather than as a purely empirical exercise arguably have a lower threshold. Note that in our Panel C results, all the cash flow measures with total assets as the denominator comfortably exceed the 3.0 level, as does the operating profit measure but not the gross profit and net income measures. For measures with MVE in the denominator, the *t*-statistics of the cash flow measures are generally above 2.0 but below 3.0, whereas the *t*-statistics of all the profitability measures are below 2.0. We argue that our cash flow measures are derived from first principles based on the direct cash flow measure.

As noted by Fama and French (1992) and BGLN (2015), the relationship between the various measures of return on assets and yield and future stock returns can be explained by either rational or irrational asset pricing stories. Mispricing can be explained by the behaviors and biases of irrational investors or short-term trading frictions; alternatively, there may be risk factors not captured by the three factors in our regression model. Persistence of returns, discussed in the next section, may be consistent with a rational explanation if we assume that trading frictions should not persist over longer periods. In the next section, we also consider a five-factor model that captures more risk factors.

Robustness Checks

In presenting our robustness checks, we re-examined P10-P1 return alphas using the Fama–French five-factor (instead of three-factor) model regressions, consider extended-horizon returns, and repeated our analysis but with sector neutral P10-P1 returns.

Fama–French Five-Factor Model Regressions.

Fama and French (2015) recently introduced a five-factor model, which builds on their original three-factor model:

$$P_{i,t+1} = \alpha_i + \beta_{1i}\text{MKTRF}_t + \beta_{2i}\text{SMB}_t + \beta_{3i}\text{HML}_t + \beta_{4i}\text{RMW}_t + \beta_{5i}\text{CMA}_t + \varepsilon_{i,t+1}, \quad t = 1,\ldots,N. \tag{2}$$

The two additional factors are RMW, which is the average return on the robust operating profitability portfolios minus the average return on the weak operating profitability portfolios, and CMA, which is the average return on the conservative (low) investment portfolios minus the average return on the aggressive (high) investment portfolios. They argue that this model is better than their three-factor model at capturing size, value, profitability, and investment patterns. They also argue that if exposure to the five factors captures all the variation in expected returns, the intercept or alpha should be zero.

The addition of the RMW factor is quite relevant to our study because we argue that there is information in cash-based measures that is not captured in accounting-based profitability measures. If our results are robust and if we find positive and significant alphas for our P10–P1 long–short portfolios, we can confidently conclude that cash-based variables matter more than profitability measures. In fact, that *is* what we found, in results reported in **Table 6**. In measures relative to total assets, all the cash-related measures of alpha remain positive and significant, as in the case of the Fama–French three-factor model (Table 6 repeats the results from Table 5 for comparison). The operating profit measure is also significant but is smaller than all the cash-related measures of alpha (although very close to the indirect method measure). Neither the gross profit measure of alpha nor the net income measure of alpha is significant. In measures relative to market value of equity, the alphas for the cash measures (except CFO) are higher than the alphas for the profitability measures and are marginally significant, whereas none of the alphas for the profitability measures

are significant. Thus, on the basis of our cash-sorted measures, exposure to the five factors does not capture all the variation in expected returns.[23]

Extended-Horizon Returns.

We re-examined our one-month-ahead value-weighted return results by considering a variety of extended-horizon holding periods, including 3 months, 6 months, and 12 months. The results are generally consistent with the one-month-ahead return results. The three-month return differences are significantly positive for all the cash flow return measures as well as the operating profit (OP/TA) and gross profit (GP/TA) measures, whereas the traditional measure of return on assets (NI/TA) is not significant. Return differences are highest for the DMCF measures, followed by the GP/TA measure and then the indirect method cash flow measures. The three-month return difference for the CFAF/TA measure is 2.1% (8.7% annualized). For the yield measures, all the return differences are significantly positive, with a similar order of magnitude for the CFAF/MVE, CFIM/MVE, OP/MVE, and GP/TA measures, whereas the earnings yield, NI/MVE, is only marginally significant. The three-month return difference for the CFAF/MVE measure is 2.1% (8.6% annualized). Among the return-on-assets measures, the information ratio is highest for the GP/TA measure given the much lower standard deviation of returns. Among the yield measures, the information ratio is much higher for the cash flow measures than for the profitability measures.

For the six-month horizon, the return differences for the return-on-assets measures are again significantly positive in all cases except the NI/TA measure. The highest return difference is for the CFAF/TA variable, with a six-month return of 3.4% (6.9% annualized). Among the yield measures, the CFIM/MVE and GP/MVE six-month returns are almost identical, at around 3.8% (7.7% annualized). For the return-on-assets measures, the information ratio is highest for the GP/TA measure, followed by the various cash flow measures; among the yield measures, the cash flow measures dominate on the basis of the information ratio.

[23]As a further robustness check, we replaced the Fama–French five-factor model with the Hou et al. (2016) *q*-model variables and found that the results are qualitatively the same.

The results for the 12-month returns are similar to the results for the 6-month returns. Among both the return-on-assets measures and the yield measures, the DMCF measures exhibit superior information ratios compared with the indirect measures. Most of the return differences of the DMCF and indirect method return-on-assets measures are generally superior to those of the profitability measures, which in turn are superior to the return differences of the NI/TA and NI/MVE measures. Even for the 12-month horizon, the high–low CFAF/MVE portfolio offers returns of almost 7.5%. Overall, our extended-horizon results are consistent with our earlier results and also suggest, though still positive and significant, only a small tapering of return differences for longer horizons.

Although longer holding periods result in slightly lower returns across all measures, the trade-off is that longer holding periods also reduce turnover and thus transaction costs. We attempted to quantify the order of magnitude of these costs by examining the turnover related to the various measures and horizons. For one-month holding periods, the average two-way turnover across the four cash flow measures is 19% with total assets in the denominator and 25% with market value of equity in the denominator. Across the three profitability measures, the average monthly turnover is 10% with total assets in the denominator and 24% with market value of equity in the denominator. For annual holding periods, the average two-way turnover across the four cash flow measures is 113% with either total assets or market value of equity in the denominator. Across the three profitability measures, the average annual turnover is 78% with total assets in the denominator and 100% with market value of equity in the denominator. Following Leclerc, L'Her, Mouakhar, and Savaria (2013), we assumed two-way rebalancing costs of 0.882 bps per 1% of turnover (recall that our sample highlights the largest and generally most liquid stocks). Across the cash flow measures, net monthly returns would be reduced by approximately 0.17% with total assets in the denominator and by 0.22% with market value of equity in the denominator. Across the three profitability measures, net monthly returns would be reduced by 0.09% with total assets in the denominator and by 0.21% with market value of equity in the denominator. For the cash flow measures, net annual returns would be reduced by

approximately 0.99% with total assets in the denominator and by 1.00% with market value of equity in the denominator. Across the three profitability measures, net annual returns would be reduced by 0.69% with total assets in the denominator and by 0.88% with market value of equity in the denominator. Even after rebalancing costs, our results are robust, with cash flow–based measures providing higher returns than profitability measures. We also found that monthly versus annual rebalancing leads to superior net returns.

Sector Analysis.

To check whether our results are sector specific, we performed a number of tests. First, we segregated our sample among the 10 Global Industry Classification Standard (GICS) sectors: energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, information technology, telecommunication services, and utilities (recall that financials are not included in our previous results but are included here because results are segmented by industry). We estimated information ratios for each measure within each sector. On the basis of untabulated results, we found no consistent pattern across all sectors but can summarize our results as follows. For the measures with total assets as the denominator, cash flow measures tend to do better than the various profitability and earnings measures, particularly in the energy and industrials sectors but also in materials, consumer discretionary, health care, telecom, and financials. Information ratios are strong across all measures for telecom companies, with the operating profitability measure doing the best. Information ratios are low across all measures in consumer staples (except NI/TA) and utilities. For the measures with market value of equity as the denominator, cash flow measures tend to do better than the various profitability and earnings measures, particularly in the industrials, consumer discretionary, and information technology sectors but also in consumer staples and telecom. Profitability measures tend to do better in the energy, materials, and health care sectors. Information ratios are low across all measures in utilities, and only NI/MVE does well in the financials sector.

Table 7 reports another set of robustness checks regarding the sectors in which stocks in the long–short portfolio are invested. It is possible that the

composition of the lowest-return portfolio based on sorting, P1, might be very different from the composition of the highest-return portfolio based on sorting, P10, in terms of the sectors in which the stocks are invested. To control for this possibility, we created sector-neutral portfolios. We repeated our sorting procedure within each of 20 of the 24 GICS industry groups (recall that financials—banks, insurance companies, diversified financials, and REITs—are omitted from our sample). P1 (P10) is populated by the lowest-performing (highest-performing) stocks by decile within each sector.

Panel A of Table 7 presents the one-month-ahead value-weighted return results, which are generally consistent with those in Table 2, with some notable exceptions. For the return-on-assets results, we see that cash flow measures tend to have higher return differences and information ratios than profitability measures, except that the NI/TA measure does very well. Interestingly, neither the OP/TA return difference nor the GP/TA return difference is significant, suggesting that results highlighting these variables in other studies may be benefiting from a long position in stocks in one industry and a short position in another industry. Among the yield measures, the only marginally significant results are for the GP/MVE measure, whereas all the other return differences are significant.

For our final sector robustness check, Panel B of Table 7 reports sector-neutral portfolio results for the regression analysis. These results are similar to those in Table 5, with exceptions similar to those uncovered in Panel A. The OP/TA and GP/TA alphas are lower than those of the corresponding cash-based measures. For the yield measures, the OP/MVE and GP/MVE alphas are not significant. Thus, it appears that our results are not being driven by sector-specific performance. Moreover, for our sample, sorting on operating profit and gross profit in a sector-neutral setting is not as strong as cash flow sorting.

Conclusion

Inspired by Novy-Marx (2013), much recent attention has been focused on the importance of income statement–related measures, such as gross profit to total assets, as predictors of the cross section of returns. In this article, we showed that commonly used income statement–related metrics, including return

on assets and earnings yield, have some predictive power, but in general, cash-based measures are superior to measures of operating profitability and gross profitability to total assets. We examined strategies that suggest superior risk-adjusted returns from using transformed financial statements with our DMCF to estimate free cash flows. We created a direct cash flow template by segregating operating cash flows from activities related to financing, tax, nonoperating, and investing. We argue that this segregation helps investors understand how value is created and thus better estimate the true intrinsic value of a company's equity. We found that both DMCF return-on-assets measures and DMCF yield measures are generally better at predicting stock returns than indirect cash flow method measures, which in turn are generally superior to income statement measures based on profitability. After controlling for well-known risk factors, we found similar results. We also tested various holding periods and performed robustness checks that controlled for sector performance, finding similar results. Our Fama–MacBeth regressions suggest the incremental importance of information on taxes, capital expenditures, and operating cash flows. Future research may provide further explanations for why those variables are important in forecasting stock returns.

Our conclusion—that there is incrementally better information in segregating cash flows to account for both investing activities and taxes, in addition to operating cash flow information—lends support to the initiatives of the International Accounting Standards Board (IASB) and the US Financial Accounting Standards Board (FASB) to require reconstructed financial statements. From an investment perspective, investors may be able to obtain better information about investment prospects—and thus future stock returns—by relying on cash flows that disaggregate operating cash flows from financing, tax, investing, nonoperating, and nonrecurring activities rather than relying on income statement profitability measures. Although "quality investing" strategies based on various fundamental criteria have recently gained notoriety, our study suggests that analysts and investors would be better off following the cash.

Appendix A. Comparing Income Statements with Both Indirect and Direct Cash Flow Statements

Corporations can present their net cash flow from operating activities by using either the direct or the indirect method. Under each method, net cash flow from operating activities will be the same. However, the direct method presents the specific amounts of cash received and paid for each significant business activity and the resulting net cash flow from operating activities. We argue that by using the structure of the income statement and the informational content of the cash flow statement, investors are better able to isolate recurring cash flows that add to net present value, segregate financing activities that do not add to net present value, and flag one-off gains/losses.

The indirect method derives net cash from operating activities without separately presenting any of the operating cash receipts and payments. The indirect approach merely reconciles information between the income statement and actual cash flows. In this way, the indirect statement is not as intuitive as the direct statement. In addition, it is difficult to forecast corporate results that are presented "net" of operating, financing, and tax effects.

To highlight some of the key concepts and illustrate how operating cash flows are reported using both the direct and the indirect methods, we begin with XYZ Corporation's income statement and balance sheet amounts, shown in **Table A1.**

Table A1. XYZ Corporation Income Statement and Balance Sheet Amounts

Income Statement Amounts		Balance Sheet Amounts	
Sales	$1,000	Change in accounts receivable (A/R)	+$200
– Cost of goods sold	700	Change in inventory	+100
– Operating expenses	100	Change in accounts payable (A/P) operations	–50
– Depreciation	10	Change in accounts payable (A/P) taxes	+90
– Interest expense	10		
+ Interest income	3		
– Corporate taxes	35		
Net income	$148		

Under the direct method, net operating cash flows are calculated by using specific cash inflows and outflows related to the income statement and balance sheet working capital accounts, as shown in **Table A2**.

Table A2. Calculation of XYZ Corporation's Net Operating Cash Flow (Direct Method)

Cash inflows		
Sales	$1,000	
Change in A/R[a]	–200	
Gross cash inflows	$800	
Cash outflows		
Cost of goods sold	–$700	
Operating expenses	–100	
Change in inventory	–100	
Change in A/P operations[b]	–50	
Gross cash outflows	–950	
Direct business cash flows		–$150
Financing		
Interest expense	–$10	
Interest income	+3	
Financing outflows		–$7
Corporate taxes		
Income statement taxes	–$35	
Change in A/P taxes	+90	
Net tax cash flows		+$55
Net cash from operating activities		–$102

[a]Where A/R increases, cash has yet to be received.
[b]Where A/P decreases, cash was paid.

The information presented here depicts gross cash inflows and outflows in a straightforward manner, along with an undistorted view of accrual revenues and costs versus cash inflows and outflows. For example, although XYZ booked $1,000 in sales, only $800 was received in cash over the period and the balance was sold on credit. Cost of goods sold, operating expenses, and working capital needs totaled $850. On an operating cash flow basis, the company suffered a –$150 loss for the period. Recall that net income is reported as +$148. As a result of interest expense and a favorable tax effect, net operating cash flow was only –$102.

Under the indirect method, net operating cash flows are calculated by using the differences between net income and working capital changes, as shown in **Table A3**.

Table A3. Calculation of XYZ Corporation's Net Operating Cash Flow (Indirect Method)

Net income	$148
Add/subtract noncash adjustments:	
Depreciation	+10
Change in A/R	–200
Change in inventory	–100
Change in A/P operations	–50
Change in A/P taxes	+90
Net cash from operating activities	–$102

Under both methods, net cash from operating activities is –$102. The direct method, however, shows specific amounts of cash receipts and payments segregated by major business activity. The indirect method merely reconciles net income to the operating cash flows. Users of the indirect statement may not fully appreciate that business activities (prefinancing, pretax) generated –$150, whereas a tax benefit of $90 minimized the overall cash outflows. Moreover, although the direct statement links working capital gains/losses to their respective source accounts (accounts receivable to sales, accounts payable to cost of goods sold), the indirect statement relates these working capital changes to net income, leaving the user with the cumbersome task of sorting and rearranging. Thus, investors have three different measures to extrapolate: net income ($148), direct business cash flows (–$150), and net operating cash flows (–$102).

References

American Institute of Certified Public Accountants. 1973. "Objectives of Financial Statements." Report of the Study Group on the Objectives of Financial Statements.

Anderson, Christopher, and Luis Garcia-Feijóo. 2006. "Empirical Evidence on Capital Investment, Growth Options, and Security Returns." *Journal of Finance*, vol. 61, no. 1 (February): 171–194. doi:10.1111/j.1540-6261.2006.00833.x

Baker, Malcolm, Jeremy Stein, and Jeffrey Wurgler. 2003. "When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms." *Quarterly Journal of Economics*, vol. 118, no. 3 (August): 969–1005. doi:10.1162/00335530360698478

Ball, Ray, Joseph Gerakos, Juhani Linnainmaa, and Valeri Nikolaev. 2015. "Deflating Profitability." *Journal of Financial Economics*, vol. 117, no. 2 (August): 225–248. doi:10.1016/j.jfineco.2015.02.004

Ball, Ray, Joseph Gerakos, Juhani Linnainmaa, and Valeri Nikolaev. 2016. "Accruals, Cash Flows, and Operating Profitability in the Cross Section of Stock Returns." *Journal of Financial Economics*, vol. 121, no. 1 (July): 28–45.

DeFond, Mark, and Chul Park. 2001. "The Reversal of Abnormal Accruals and the Market Valuation of Earnings Surprises." *Accounting Review*, vol. 76, no. 3 (July): 375–404. doi:10.2308/accr.2001.76.3.375

Fama, Eugene F., and Kenneth R. French. 1992. "The Cross-Section of Expected Returns." *Journal of Finance*, vol. 47, no. 2 (June): 427–465. doi:10.1111/j.1540-6261.1992.tb04398.x

Fama, Eugene F., and Kenneth R. French. 1993. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics*, vol. 33, no. 1 (February): 3–56. doi:10.1016/0304-405X(93)90023-5

Fama, Eugene F., and Kenneth R. French. 2006. "Profitability, Investment and Average Returns." *Journal of Financial Economics*, vol. 82, no. 3 (December): 491–518. doi:10.1016/j.jfineco.2005.09.009

Fama, Eugene F., and Kenneth R. French. 2008. "Dissecting Anomalies." *Journal of Finance*, vol. 63, no. 4 (August): 1653–1678. doi:10.1111/j.1540-6261.2008.01371.x

Fama, Eugene F., and Kenneth R. French. 2015. "A Five-Factor Asset Pricing Model." *Journal of Financial Economics*, vol. 116, no. 1 (April): 1–22. doi:10.1016/j.jfineco.2014.10.010

Fama, Eugene F., and James D. MacBeth. 1973. "Risk, Return, and Equilibrium: Empirical Tests." *Journal of Political Economy*, vol. 81, no. 3 (May–June): 607–636. doi:10.1086/260061

FASB. 1987. "Statement of Financial Accounting Standards No. 95: Statement of Cash Flows." Financial Accounting Standards Board (November).

FASB. 2008. "Preliminary Views on Financial Statement Presentation." Financial Accounting Series Discussion Paper No. 1630-100, Financial Accounting Standards Board (16 October): http://fasb.org/draft/DP_Financial_Statement_Presentation.pdf.

Graham, John R., Campbell R. Harvey, and Shiva Rajgopal. 2005. "The Economic Implications of Corporate Financial Reporting." *Journal of Accounting and Economics*, vol. 40, no. 1–3 (December): 3–73. doi:10.1016/j.jacceco.2005.01.002

Hackel, Kenneth S., and Joshua Livnat. 1992. *Cash Flow and Security Analysis.* Homewood, IL: Business One-Irwin.

Hackel, Kenneth S., Joshua Livnat, and Atul Rai. 1994. "The Free Cash Flow/Small-Cap Anomaly." *Financial Analysts Journal*, vol. 50, no. 5 (September/October): 33–42. doi:10.2469/faj.v50.n5.33

Harvey, Campbell R., Yan Liu, and Heqing Zhu. 2016. "… and the Cross-Section of Expected Returns." *Review of Financial Studies*, vol. 29, no. 1 (January): 5–68.

Healy, Paul M., and James M. Wahlen. 1999. "A Review of the Earnings Management Literature and Its Implications for Standard Setting." *Accounting Horizons*, vol. 13, no. 4 (December): 365–383.

Hou, Kewei, G. Andrew Karolyi, and Bong-Chan Kho. 2011. "What Factors Drive Global Stock Returns?" *Review of Financial Studies*, vol. 24, no. 8 (August): 2527–2574. doi:10.1093/rfs/hhr013

Hou, Kewei, Chen Xue, and Lu Zhang. 2015. "Digesting Anomalies: An Investment Approach." *Review of Financial Studies*, vol. 28, no. 3 (March): 650–705. doi:10.1093/rfs/hhu068

Hou, Kewei, Chen Xue, and Lu Zhang. 2016. "A Comparison of New Factor Models." Charles A. Dice Center Working Paper No. 2015-05 (June): http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2520929.

Houge, Todd, and Tim Loughran. 2000. "Cash Flow Is King? Cognitive Errors by Investors." *Journal of Psychology and Financial Markets*, vol. 1, no. 3–4: 161–175. doi:10.1207/S15327760JPFM0134_2

Kellogg, Irving, and Loren Kellogg. 1991. *Fraud, Window Dressing, and Negligence in Financial Statements*. New York: McGraw-Hill.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny. 1994. "Contrarian Investment, Extrapolation, and Risk." *Journal of Finance*, vol. 49, no. 5 (December): 1541–1578. doi:10.1111/j.1540-6261.1994.tb04772.x

Leclerc, Frank, Jean-François L'Her, Tammam Mouakhar, and Patrick Savaria. 2013. "Industry-Based Alternative Equity Indices." *Financial Analysts Journal*, vol. 69, no. 2 (March/April): 42–56.

Livnat, Joshua, and Germán López-Espinosa. 2008. "Quarterly Accruals or Cash Flows in Portfolio Construction?" *Financial Analysts Journal*, vol. 64, no. 3 (May/June): 67–79. doi:10.2469/faj.v64.n3.7

Livnat, Joshua, and Massimo Santicchia. 2006. "Cash Flows, Accruals, and Future Returns." *Financial Analysts Journal*, vol. 62, no. 4 (July/August): 48–61. doi:10.2469/faj.v62.n4.4186

Markham, Jerry. 2006. *A Financial History of Modern U.S. Corporate Scandals: From Enron to Reform*. Armonk, NY: M.E. Sharpe Inc.

Novy-Marx, Robert. 2013. "The Other Side of Value: The Gross Profitability Premium." *Journal of Financial Economics*, vol. 108, no. 1 (April): 1–28. doi:10.1016/j.jfineco.2013.01.003

O'Glove, Thornton L. 1987. *Quality of Earnings: The Investor's Guide to How Much Money a Company Is Really Making*. New York: The Free Press.

Pástor, Luboš, and Robert F. Stambaugh. 2003. "Liquidity Risk and Expected Stock Returns." *Journal of Political Economy*, vol. 111, no. 3 (June): 642–685. doi:10.1086/374184

Reilly, David. 2007. "Profit as We Know It Could Be Lost with New Accounting Statements." *Wall Street Journal* (12 May): http://online.wsj.com/article/SB117893520139500814.html.

Richardson, Scott A., Richard G. Sloan, Mark T. Soliman, and İrem Tuna. 2005. "Accrual Reliability, Earnings Persistence and Stock Prices." *Journal of Accounting and Economics*, vol. 39, no. 3 (September): 437–485. doi:10.1016/j.jacceco.2005.04.005

Siegel, Joel. 1991. *How to Analyze Businesses, Financial Statements, and the Quality of Earnings*, 2nd ed. Englewood Cliffs, NJ: Prentice-Hall.

Sloan, Richard G. 1996. "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings?" *Accounting Review*, vol. 71, no. 3 (July): 289–315.

Thomas, Jacob, and Frank Zhang. 2014. "Valuation of Tax Expense." *Review of Accounting Studies*, vol. 19, no. 4 (December): 1436–1467. doi:10.1007/s11142-013-9274-3

Thomas, Jacob K., and Huai Zhang. 2002. "Inventory Changes and Future Returns." *Review of Accounting Studies*, vol. 7, no. 2 (June): 163–187.

Titman, Sheridan, K.C. John Wei, and Feixue Xie. 2004. "Capital Investments and Stock Returns." *Journal of Financial and Quantitative Analysis*, vol. 39, no. 4 (December): 677–700. doi:10.1017/S0022109000003173

Titman, Sheridan, K.C. John Wei, and Feixue Xie. 2013. "Market Development and the Asset Growth Effect: International Evidence." *Journal of Financial and Quantitative Analysis*, vol. 48, no. 5 (October): 1405–1432. doi:10.1017/S0022109013000495

White, Halbert. 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica*, vol. 48, no. 4 (May): 817–838. doi:10.2307/1912934

Xie, Hong. 2001. "The Mispricing of Abnormal Accruals." *Accounting Review*, vol. 76, no. 3 (July): 357–373. doi:10.2308/accr.2001.76.3.357

Table 1. Direct Cash Flow Template

Operating Activities
Cash Inflows:
Sales
+/– Change in accounts receivable
+/– Change in deferred revenues
+/– Change in other cash inflows from operations
= Cash inflows to the company
Cash Outflows:
Less: Cost of goods sold
Less: Selling, general, and administrative expenses
+/– Change in accounts payable from operations
+/– Change in inventories
= Net Cash Flows from Operations (A)

Financing Activities
Less: Interest expense
+/– Other financing income/expenses
= Net Cash Flows from Operations after Financing Activities (B)

Tax Activities
Less: Taxes on income statement
+/– Change in account-payable taxes
+/– Change in deferred taxes
= Net Cash Flows from Operations after Financing and Tax Activities (C)

Other Nonoperating Activities (Extraordinary Activities)
+/– Discontinued operations/special charges
+/– Foreign exchange gains/losses
+/– Pension gains/losses/contributions
= Net Cash Flows from Operations after Financing, Tax, and Extraordinary Activities (D)

Investing Activities
Less: Capital expenditures (capex)
= Free Cash Flows to Equityholders (FCF)

Table 2. Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	CFODM/TA	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—
(2)	CFOIM/TA	0.81	1.00	—	—	—	—	—	—	—	—	—	—	—	—
(3)	CFONM/TA	0.45	0.66	1.00	—	—	—	—	—	—	—	—	—	—	—
(4)	FinAct/TA	−0.13	−0.22	−0.21	1.00	—	—	—	—	—	—	—	—	—	—
(5)	TaxAct/TA	0.49	0.50	0.62	−0.27	1.00	—	—	—	—	—	—	—	—	—
(6)	OthAct/TA	−0.23	0.12	0.55	−0.02	0.24	1.00	—	—	—	—	—	—	—	—
(7)	Capex/TA	0.22	0.29	0.28	0.04	0.14	0.07	1.00	—	—	—	—	—	—	—
(8)	CFODM/MVE	0.28	0.08	−0.21	0.27	−0.17	−0.31	0.04	1.00	—	—	—	—	—	—
(9)	CFOIM/MVE	0.22	0.32	0.02	0.21	−0.11	−0.01	0.14	0.74	1.00	—	—	—	—	—
(10)	CFONM/MVE	−0.07	0.12	0.47	0.12	0.10	0.53	0.14	−0.17	0.20	1.00	—	—	—	—
(11)	FinAct/MVE	−0.17	−0.25	−0.28	0.60	−0.29	−0.06	−0.03	0.59	0.43	0.03	1.00	—	—	—
(12)	TaxAct/MVE	0.05	0.09	0.25	0.01	0.52	0.28	0.05	−0.02	0.12	0.43	−0.03	1.00	—	—
(13)	OthAct/MVE	−0.12	0.12	0.45	−0.08	0.23	0.70	0.07	−0.61	−0.20	0.67	−0.30	0.31	1.00	—
(14)	Capex/MVE	−0.08	−0.07	−0.11	0.32	−0.22	−0.01	0.52	0.50	0.52	0.20	0.57	0.04	−0.21	1.00

Table 3. Fama–MacBeth Regressions for Profitability and Cash Flow Components
(*t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gross profit	0.0046			0.0018		0.0045				
	(1.81)			(0.70)		(1.64)				
Operating profit		0.0159			0.0090		0.0205			
		(3.38)			(1.11)		(3.85)			
Net CF ops			0.0153	0.0140	0.0094			0.0194		
			(3.22)	(2.92)	(1.18)			(3.60)		
CFOIM									0.0257	
									(3.71)	
CFONM										0.0077
										(0.93)
FinAct						–0.0360	–0.0450	–0.0577	–0.0403	–0.0512
						(–0.66)	(–0.84)	(–1.08)	(–0.72)	(–0.92)
TaxAct						–0.0051	–0.026	–0.0286	–0.0223	–0.0052
						(–0.41)	(–1.70)	(–1.91)	(–1.49)	(–0.36)
Nonop. activities						–0.0146	–0.0107	0.0025	–0.0157	–0.0233
						(–1.63)	(–1.17)	(0.25)	(–1.69)	(–2.17)
Capex						–0.0118	–0.0171	–0.0200	–0.0215	–0.0065
						(–1.23)	(–1.70)	(–2.03)	(–2.18)	(–0.55)
log(BE/ME)	0.0020	0.0026	0.0020	0.0022	0.0025	0.0016	0.0021	0.0013	0.0013	0.0013
	(1.67)	(2.49)	(1.71)	(1.89)	(2.44)	(1.41)	(1.93)	(1.19)	(1.10)	(1.13)
log(ME)	–0.0006	–0.0007	–0.0008	–0.0008	–0.0007	–0.0005	–0.0006	–0.0008	–0.0009	–0.0007
	(–1.03)	(–1.17)	(–1.36)	(–1.30)	(–1.27)	(–0.94)	(–1.11)	(–1.44)	(–1.52)	(–1.21)
$r_{1,1}$	–0.0240	–0.0240	–0.0239	–0.0243	–0.0247	–0.0250	–0.0250	–0.0248	–0.0250	–0.0245
	(–3.11)	(–3.13)	(–3.09)	(–3.16)	(–3.31)	(–3.26)	(–3.36)	(–3.28)	(–3.30)	(–3.24)
$r_{12,2}$	–0.0007	–0.0001	–0.0009	–0.0008	–0.0004	–0.0010	–0.0006	–0.0014	–0.0014	–0.0010
	(–0.20)	(–0.03)	(–0.24)	(–0.23)	(–0.11)	(–0.28)	(–0.17)	(–0.38)	(–0.41)	(–0.28)
Adjusted R^2	5.78%	5.52%	5.64%	6.10%	6.05%	7.44%	7.22%	7.29%	7.31%	7.31%

Table 4. Return and Yield Measures and One-Month-Ahead Returns, October 1994–December 2013

Measure	P1 (low)	P2	P3	P4	P5	P6	P7	P8	P9	P10 (high)	P10–P1	Std. Dev.	*t*-Stat.	Min.	Max.	IR
CFAFAT/TA	0.517%	0.547%	0.688%	0.745%	0.931%	0.759%	1.079%	1.135%	1.058%	1.159%	0.642%	4.555	2.14	–11.740%	14.952%	0.489
CFAF/TA	0.413	0.679	0.417	1.040	0.824	0.859	1.063	1.207	0.890	1.232	0.819	4.554	2.73	–12.906	15.300	0.623
CFO/TA	0.435	0.633	0.694	0.872	0.787	0.859	1.031	1.168	0.947	1.221	0.786	4.572	2.61	–12.089	16.011	0.595
CFIM/TA	0.672	0.494	0.672	0.939	0.801	0.865	0.932	1.159	1.034	1.161	0.489	4.757	1.56	–15.334	13.541	0.356
OP/TA	0.630	0.816	0.681	1.058	0.770	0.786	0.885	0.878	0.995	1.118	0.488	4.743	1.56	–18.139	14.284	0.356
GP/TA	0.785	0.781	0.796	0.690	0.958	0.847	1.009	0.733	1.057	1.276	0.491	3.547	2.10	–8.589	11.545	0.480
NI/TA	1.055	0.710	0.918	0.638	0.976	0.940	0.942	0.858	0.781	1.110	0.056	4.847	0.17	–23.592	15.464	0.040
CFAFAT/MVE	0.760	0.556	0.497	0.560	0.691	1.223	1.061	1.122	1.311	1.476	0.716	3.935	2.77	–11.336	20.771	0.630
CFAF/MVE	0.728	0.354	0.532	0.437	0.909	1.129	1.170	1.090	1.437	1.494	0.766	3.837	3.03	–11.875	13.083	0.692
CFO/MVE	0.740	0.376	0.341	0.704	1.150	1.056	1.019	1.257	1.348	1.294	0.554	4.401	1.91	–13.778	20.451	0.436
CFIM/MVE	0.762	0.606	0.410	0.640	0.597	0.976	1.146	1.407	1.213	1.490	0.729	4.086	2.71	–12.829	12.088	0.618
OP/MVE	0.611	0.833	0.807	0.891	0.816	0.931	1.127	1.118	1.474	1.310	0.699	6.381	1.67	–22.587	38.757	0.380
GP/MVE	0.792	0.646	0.829	0.974	1.068	1.023	1.151	1.296	1.268	1.373	0.581	6.427	1.37	–20.541	43.622	0.313
NI/MVE	0.916	0.663	0.804	0.870	0.846	0.870	0.909	1.015	1.248	1.341	0.425	5.437	1.19	–26.958	24.932	0.271

Table 5. Regression Results for Return and Yield Measures, October 1994–December 2013
(*t*-statistics in parentheses)

Dependent Variable	Average Excess Return (%)	α (%)	MKTRF (%)	SMB (%)	HML (%)	Adjusted R^2
A. P1						
CFAFAT/TA	0.285	–0.23	1.250	0.053	–0.212	0.766
	(0.63)	(–1.06)	(22.26)	(0.62)	(–2.16)	
CFAF/TA	0.181	–0.31	1.221	0.068	–0.243	0.758
	(0.41)	(–1.40)	(22.56)	(0.77)	(–2.36)	
CFO/TA	0.203	–0.29	1.240	0.049	–0.270	0.764
	(0.45)	(–1.28)	(22.23)	(0.56)	(–2.67)	
CFIM/TA	0.440	–0.16	1.315	0.175	–0.165	0.772
	(0.93)	(–0.69)	(22.59)	(2.18)	(–2.01)	
OP/TA	0.398	–0.25	1.328	–0.030	0.193	0.806
	(0.91)	(–1.32)	(26.62)	(–0.47)	(2.96)	
GP/TA	0.553	0.19	0.957	–0.177	0.145	0.805
	(1.79)	(1.34)	(26.90)	(–4.58)	(2.65)	
NI/TA	0.823	0.22	1.363	0.234	–0.334	0.811
	(1.65)	(0.99)	(20.33)	(2.86)	(–3.88)	
CFAFAT/MVE	0.528	–0.01	1.132	0.024	0.213	0.761
	(1.38)	(–0.04)	(23.31)	(0.27)	(2.61)	
CFAF/MVE	0.496	–0.03	1.137	0.040	0.169	0.760
	(1.28)	(–0.17)	(21.98)	(0.46)	(2.15)	
CFO/MVE	0.508	0.00	1.166	0.023	0.026	0.748
	(1.25)	(–0.02)	(21.86)	(0.26)	(0.30)	
CFIM/MVE	0.530	–0.12	1.270	0.061	0.254	0.742
	(1.21)	(–0.49)	(19.68)	(0.62)	(2.87)	
OP/MVE	0.379	0.05	1.169	–0.032	–0.650	0.842
	(0.85)	(0.26)	(24.41)	(–0.54)	(–9.28)	
GP/MVE	0.560	0.28	1.101	–0.127	–0.609	0.858
	(1.37)	(1.77)	(25.93)	(–2.04)	(–10.07)	
NI/MVE	0.684	0.00	1.405	0.236	–0.134	0.780
	(1.35)	(0.02)	(20.27)	(2.42)	(–1.28)	
B. P10						
CFAFAT/TA	0.927	0.68	0.986	–0.215	–0.360	0.827
	(2.68)	(4.51)	(26.74)	(–3.54)	(–6.22)	
CFAF/TA	1.000	0.80	0.945	–0.246	–0.388	0.827
	(2.98)	(5.42)	(27.00)	(–4.29)	(–7.19)	
CFO/TA	0.989	0.78	0.948	–0.243	–0.360	0.820

Dependent Variable	Average Excess Return (%)	α (%)	MKTRF (%)	SMB (%)	HML (%)	Adjusted R^2
	(2.95)	(5.18)	(26.25)	(–4.17)	(–6.51)	
CFIM/TA	0.929	0.73	0.952	–0.239	–0.453	0.855
	(2.73)	(5.42)	(29.44)	(–4.54)	(–9.41)	
OP/TA	0.886	0.69	0.975	–0.239	–0.531	0.825
	(2.44)	(4.40)	(26.19)	(–4.22)	(–9.02)	
GP/TA	1.044	0.79	0.887	–0.077	–0.190	0.758
	(3.30)	(4.87)	(23.88)	(–1.41)	(–3.01)	
NI/TA	0.878	0.71	0.924	–0.258	–0.456	0.852
	(2.65)	(5.32)	(32.07)	(–5.74)	(–10.04)	
CFAFAT/MVE	1.244	0.54	1.147	0.177	0.640	0.744
	(3.07)	(2.58)	(16.77)	(2.05)	(6.05)	
CFAF/MVE	1.262	0.57	1.163	0.136	0.625	0.753
	(3.12)	(2.65)	(19.00)	(1.75)	(6.58)	
CFO/MVE	1.062	0.30	1.220	0.148	0.755	0.795
	(2.54)	(1.49)	(19.48)	(2.09)	(8.59)	
CFIM/MVE	1.258	0.55	1.158	0.116	0.745	0.798
	(3.18)	(3.13)	(24.53)	(1.74)	(9.37)	
OP/MVE	1.078	0.27	1.323	0.142	0.629	0.690
	(2.26)	(1.11)	(14.92)	(1.06)	(3.99)	
GP/MVE	1.141	0.32	1.273	0.335	0.676	0.690
	(2.40)	(1.26)	(13.23)	(2.58)	(4.39)	
NI/MVE	1.109	0.52	1.110	0.034	0.458	0.741
	(2.91)	(2.67)	(20.47)	(0.46)	(5.72)	
C. P10–P1						
CFAFAT/TA	0.642	0.91	–0.265	–0.268	–0.148	0.121
	(2.14)	(3.16)	(–3.62)	(–2.55)	(–1.14)	
CFAF/TA	0.819	1.11	–0.276	–0.313	–0.146	0.145
	(2.73)	(3.90)	(–3.98)	(–2.89)	(–1.11)	
CFO/TA	0.786	1.07	–0.292	–0.292	–0.090	0.147
	(2.61)	(3.69)	(–4.08)	(–2.74)	(–0.70)	
CFIM/TA	0.489	0.90	–0.363	–0.414	–0.289	0.234
	(1.56)	(3.12)	(–5.11)	(–4.41)	(–2.76)	
OP/TA	0.488	0.94	–0.354	–0.208	–0.724	0.305
	(1.56)	(3.64)	(–5.71)	(–2.31)	(–7.92)	
GP/TA	0.491	0.59	–0.072	0.101	–0.335	0.109
	(2.10)	(2.56)	(–1.29)	(1.49)	(–3.74)	
NI/TA	0.056	0.49	–0.438	–0.492	–0.122	0.325
	(0.17)	(1.78)	(–5.67)	(–5.72)	(–1.19)	

Dependent Variable	Average Excess Return (%)	α (%)	MKTRF (%)	SMB (%)	HML (%)	Adjusted R^2
CFAFAT/MVE	0.716	0.56	0.018	0.152	0.426	0.124
	(2.77)	(2.27)	(0.26)	(1.69)	(4.45)	
CFAF/MVE	0.766	0.61	0.028	0.096	0.456	0.144
	(3.03)	(2.51)	(0.43)	(1.19)	(5.00)	
CFO/MVE	0.554	0.31	0.055	0.124	0.730	0.279
	(1.91)	(1.21)	(0.76)	(1.37)	(7.69)	
CFIM/MVE	0.729	0.67	–0.111	0.054	0.491	0.188
	(2.71)	(2.68)	(–1.58)	(0.61)	(6.16)	
OP/MVE	0.581	0.25	0.158	0.172	1.279	0.405
	(1.37)	(0.79)	(1.53)	(1.19)	(7.25)	
GP/MVE	0.699	0.04	0.173	0.462	1.285	0.419
	(1.67)	(0.13)	(1.61)	(3.15)	(7.34)	
NI/MVE	0.425	0.52	–0.294	–0.203	0.592	0.278
	(1.19)	(1.74)	(–3.45)	(–2.00)	(4.92)	

Table 6. Fama–French Five-Factor Model Regression Results for Return and Yield Measures, October 1994–December 2013
(*t*-statistics in parentheses)

Dependent Variable	FF3α (%)	α (%)	MKTRF (%)	SMB (%)	HML (%)	RMW (%)	CMA (%)	Adjusted R^2
CFAFAT/TA	0.91	0.70	–0.179	–0.187	–0.352	0.313	0.251	0.141
	(3.16)	(2.28)	(–2.22)	(–1.64)	(–2.08)	(1.72)	(1.14)	
CFAF/TA	1.11	0.78	–0.145	–0.178	–0.450	0.503	0.348	0.194
	(3.90)	(2.63)	(–1.78)	(–1.56)	(–2.82)	(2.88)	(1.68)	
CFO/TA	1.07	0.74	–0.163	–0.161	–0.394	0.490	0.355	0.194
	(3.69)	(2.48)	(–1.97)	(–1.43)	(–2.44)	(2.87)	(1.74)	
CFIM/TA	0.90	0.62	–0.257	–0.292	–0.527	0.433	0.241	0.265
	(3.12)	(2.08)	(–3.15)	(–2.83)	(–3.41)	(2.79)	(1.20)	
OP/TA	0.94	0.62	–0.231	0.038	–0.925	0.716	–0.071	0.398
	(3.64)	(2.48)	(–3.41)	(0.38)	(–7.40)	(4.72)	(–0.41)	
GP/TA	0.59	0.31	0.038	0.255	–0.561	0.506	0.154	0.185
	(2.56)	(1.29)	(0.62)	(3.28)	(–4.70)	(3.96)	(0.89)	
NI/TA	0.49	0.07	–0.279	–0.136	–0.352	1.006	–0.227	0.514
	(1.78)	(0.31)	(–3.85)	(–1.36)	(–2.57)	(7.03)	(–1.13)	
CFAFAT/MVE	0.56	0.41	0.080	0.161	0.243	0.123	0.351	0.143
	(2.27)	(1.56)	(1.12)	(1.46)	(1.62)	(0.88)	(1.79)	
CFAF/MVE	0.61	0.45	0.094	0.109	0.262	0.141	0.360	0.165
	(2.51)	(1.73)	(1.46)	(1.10)	(1.93)	(1.03)	(1.78)	
CFO/MVE	0.31	0.16	0.116	0.141	0.553	0.139	0.321	0.292
	(1.21)	(0.57)	(1.52)	(1.26)	(4.02)	(0.93)	(1.54)	
CFIM/MVE	0.67	0.42	–0.015	0.142	0.260	0.344	0.292	0.219
	(2.68)	(1.63)	(–0.20)	(1.47)	(2.00)	(2.62)	(1.57)	
OP/MVE	0.25	0.10	0.214	0.269	1.180	0.295	0.010	0.413
	(0.79)	(0.31)	(1.97)	(1.69)	(5.63)	(1.44)	(0.03)	
GP/MVE	0.04	–0.16	0.251	0.549	1.108	0.311	0.185	0.428
	(0.13)	(–0.46)	(2.29)	(3.45)	(5.24)	(1.83)	(0.69)	
NI/MVE	0.52	0.19	–0.171	0.114	0.441	0.864	–0.311	0.399
	(1.74)	(0.65)	(–2.00)	(0.89)	(2.93)	(4.36)	(–1.24)	

Table 7. Sector-Neutral Results for Return and Yield Measures, October 1994–December 2013

Measure	P10–P1 (%)	Std. Dev.	*t*-Stat.	Min. (%)	Max. (%)	IR
A. One-month-ahead return						
CFAFAT/TA	0.606	3.985	2.31	–16.943	14.375	0.527
CFAF/TA	0.661	4.233	2.37	–17.556	14.866	0.541
CFO/TA	0.693	4.104	2.57	–17.547	13.238	0.585
CFIM/TA	0.525	4.210	1.90	–18.022	10.631	0.432
OP/TA	0.340	4.272	1.21	–15.177	18.118	0.276
GP/TA	0.203	3.436	0.90	–12.193	11.459	0.204
NI/TA	0.644	4.033	2.43	–10.512	12.615	0.553
CFAFAT/MVE	0.523	3.411	2.33	–10.482	13.318	0.532
CFAF/MVE	0.619	3.490	2.70	–11.953	13.887	0.615
CFO/MVE	0.774	3.618	3.25	–10.206	11.792	0.741
CFIM/MVE	0.504	3.461	2.21	–9.476	13.487	0.504
OP/MVE	0.868	5.448	2.42	–15.708	30.744	0.552
GP/MVE	0.592	5.025	1.79	–15.73	17.600	0.408
NI/MVE	0.567	3.768	2.29	–9.457	15.645	0.521

Table 7. Sector-Neutral Results for Return and Yield Measures, October 1994–December 2013 (continued)

Dependent Variable	Average Return (%)	α (%)	MKTRF (%)	SMB (%)	HML (%)	Adjusted R^2
B. Regression analysis						
CFAFAT/TA	0.606	0.90	–0.185	–0.248	–0.465	0.185
	(2.31)	(3.69)	(–2.90)	(–1.94)	(–4.18)	
CFAF/TA	0.661	0.95	–0.184	–0.246	–0.471	0.166
	(2.37)	(3.69)	(–2.64)	(–1.86)	(–3.83)	
CFO/TA	0.693	0.99	–0.186	–0.252	–0.456	0.172
	(2.57)	(3.91)	(–2.72)	(–2.05)	(–4.03)	
CFIM/TA	0.525	0.89	–0.153	–0.462	–0.618	0.312
	(1.90)	(3.69)	(–2.49)	(–5.74)	(–6.09)	
OP/TA	0.340	0.64	–0.324	0.112	–0.535	0.234
	(1.21)	(2.57)	(–5.47)	(1.05)	(–5.18)	
GP/TA	0.203	0.41	–0.228	0.067	–0.338	0.156
	(0.90)	(1.98)	(–4.62)	(0.98)	(–4.24)	
NI/TA	0.644	0.97	–0.256	–0.427	–0.238	0.236
	(2.43)	(3.98)	(–4.12)	(–5.59)	(–2.27)	
CFAFAT/MVE	0.523	0.66	–0.150	–0.231	0.097	0.137
	(2.33)	(3.02)	(–2.33)	(–2.80)	(1.13)	
CFAF/MVE	0.619	0.72	–0.161	–0.202	0.209	0.172
	(2.70)	(3.31)	(–2.68)	(–2.82)	(2.82)	
CFO/MVE	0.774	0.78	–0.065	–0.118	0.283	0.110
	(3.25)	(3.26)	(–0.92)	(–1.54)	(3.30)	
CFIM/MVE	0.504	0.71	–0.197	–0.380	0.068	0.262
	(2.21)	(3.42)	(–3.19)	(–5.42)	(0.88)	
OP/MVE	0.868	0.39	0.261	0.339	0.913	0.315
	(2.42)	(1.34)	(3.22)	(2.83)	(6.26)	
GP/MVE	0.592	0.14	0.163	0.440	0.982	0.421
	(1.79)	(0.53)	(2.45)	(5.27)	(9.17)	
NI/MVE	0.567	0.66	–0.102	–0.285	0.182	0.142
	(2.29)	(2.76)	(–1.57)	(–3.68)	(2.10)	