CASH FLOW GROWTH AND STOCK RETURNS

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Abstract

I extend financial economic literature by presenting and testing a model that expresses a firm's expected stock return as a function of its expected free cash flow growth. Results suggest that cash flow growth is positively associated with stock returns. Furthermore, there is additional information reflected through cash flow growth relative to cash flow, profits, and dividends. Evidence additionally suggests that operating activities explain more than investment activities of the firm. I find that $1 invested in the long-short cash flow growth portfolio grows to $15.30 over the sample period, whereas $1 invested in the stock market grows to $9.85.

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I. Introduction

"The most that owners in aggregate can earn between now and Judgment Day is what their businesses in aggregate earn." —Warren Buffett, Chairman's Letter, February 2006

How does a firm's activities affect its stock price? Historically, the dividend growth model has been used to connect a firm's value-generating capabilities to its share price. This model has also been used to show that a firm's profits are a measure of a firm's value through the accounting association of dividends and profits. However, there are serious problems with using either dividends or profits as the variable proxying for a firm's value, and I propose that cash flow growth is a better measure of how a firm creates value. I extend financial economic literature by proposing and empirically testing a model in which expected returns are driven by the expected cash flow growth of a firm.

Prior research on asset pricing has focused on the consumption, or the demand, side of the economy, as noted by Hou, Xue, and Zhang (2015). The theoretical and empirical models, such as the capital asset pricing model and the Fama-French factor model, offer evidence of the consumption factors embedded in security prices. The consumption side of security pricing generally takes the risk preferences of investors, those "consuming" the security, and links these preferences to the riskiness of the security to estimate the risk premium needed to price the security. However, for something to be consumed, it must first be produced; therefore, it is important to also study the production factors embedded in security prices.

Research on the production side of security prices usually focuses on how firm characteristics affect value in stock returns using the level of dividends or profits. However, there are issues in using dividend and profits to capture value added to shareholders. Although correlated to adding value, dividends do not necessarily reflect value being generated by the firm. Harris, Ngo, and Susnjara (2020) find evidence that firms pay dividends even when the firms are not generating the cash flows to support the dividends. Dividends may be funded through raising external capital or selling assets. Alternatively, dividends may be cut to internally fund value-adding projects. Therefore, an increase (decrease) in dividends may not reflect value created (destroyed) in a given time period. For example, Olson and McFarlane (2019) report that despite a fall in profits and lower future oil demand, firms in the oil industry have been relying on asset sales to fund payouts to shareholders. These payouts do not reflect management's strong belief in the firm's future cash flow prospects but rather management's capacity to sell assets in place. In his 2006 letter to shareholders, Warren Buffett defines intrinsic value as "the discounted value of cash that can be taken out of a business in its remaining life." Value is not how much a firm pays out to its shareholders in a given time period; it is how much cash shareholders may claim as their own over time that matters. This further demonstrates the limitations of dividends as a proxy for shareholder value creation. Additionally, increasingly fewer firms pay dividends (Fama and French 2001; DeAngelo, DeAngelo, and Skinner 2004; Hoberg and Prabhala 2009); therefore, dividend-reliant valuation models are increasingly inapplicable.

Profits are another measure that financial literature has used as a proxy of shareholder value. However, profits are a pure accounting measure that do not entirely capture value added to shareholders and are prone to manipulation (Bernstein 1993; Sloan 1996; Markham 2006; Novy-Marx 2013). Fama and French (2008) note that the factors prevalent in stock pricing are all rough proxies for expected cash flows of a firm, which indicates that direct measures of cash flow may be more appropriate than using proxies. Evidence presented by Foerster, Tsagarelis, and Wang (2017) additionally suggests that cash flows offer empirically better explanatory power in stock returns relative to profits. In contrast to Foerster et al. (2017), who focus on cash flow levels, I focus on cash flow growth (CFG).[2] As discussed below, I study the association between CFG and returns because CFG offers information beyond that offered by the level of cash flows, which has been examined in the literature.

In addition to the problems associated with using dividends and profits to predict returns, there is also a problem in interpreting the relation between these variables and returns. Using the level of a variable ignores the scale in the differences between firms. This is why returns, rather than the price level, are typically used in economic settings so that variables may be better compared and analyzed. Furthermore, as shown in this paper, it is the growth in expected cash flows that generates the change in expected returns. However, research studying the relation between stock returns and profitability or dividends typically uses the profit or dividend level, often scaled by sales, assets, or stock price, to capture profitability.[3] Although scaling by sales or assets may make the profit or dividend measure more comparable, these scalars introduce another dimension of variability in the empirical proxy of profitability; therefore, these scaled variables capture information not necessarily related to a firm's cash production. Furthermore, firms may have comparable cash flows relative to their size; however, this does not mean that these firms will be generating similar levels of cash flow growth. Consider the growth potential of large versus small firms. Large and small firms may have similar cash flows controlling for

[2] In this case, CFG refers to all types of cash flow growth: realized, expected, and unexpected.

[3] Several other studies have examined the relation between a variable's growth and stock returns, such as sales growth (Lakonishok, Shleifer, and Vishny 1994) and capital expenditure growth (Anderson and Garcia-Feijóo 2006) and stock returns.

size; however, controlling for firm size does not change the fact that small and large firms have different investment opportunities, which translates into the potential CFG a firm may earn.

Although prior research has not studied the association of CFG and stock returns, several studies have investigated how profitability and cash flow levels are associated with stock returns. Fama and French (2006, 2016), Novy-Marx (2013), and Hou, Xue, and Zhang (2015) find that profitability is significantly related to stock returns. Bernstein (1993) notes that cash flows, rather than profits, are a more direct measure of value added to shareholders and are therefore more relevant to shareholder consideration. Lakonishok, Shleifer, and Vishny (1994) and Hou, Karolyi, and Kho (2011) present evidence suggesting that cash flow to price explains a significant amount of the return variation. However, they find that negative cash flows do not earn commensurately negative returns. Similarly, Fama and French (2008) find that unprofitable firms do not earn lower returns. Additionally, Foerster, Tsagarelis, and Wang (2017) find evidence suggesting there is more information in free cash flow (FCF) than in profits and operating cash flow (OCF). I extend their research by investigating the association of CFG and returns by developing a model that shows that expected cash flow growth (ECFG) is positively related to expected stock returns, and I find that the model is empirically supported. Additionally, contrary to Hou, Karolyi, and Kho (2011) and Fama and French (2008), I find that firms with negative cash flows earn lower returns when controlling for factors previous studies have found to explain stock returns. Furthermore, the results I present extend the findings of Foerster, Tsagarelis, and Wang (2017) by suggesting that the reason for FCF providing explanatory power above profits is that FCF reflects both the operating performance and investing activities of the firm.

The contribution of my paper is threefold. First, by focusing on the production side of the firm, I develop a model that shows ECFG is a significant factor in determining stock returns. The intuition of the model I develop—that expected stock returns are positively related to the firm's ECFG—is conceptually similar to the dividend growth model. Based on the arguments presented above, my model is an alternative that is principally sounder than a dividend-reliant model because it relies on FCF rather than dividends. This model supports previously established financial theory stating that a stock's price should reflect the value generated by the firm and extends this theory to show that growth in expected cash flow streams generated by the firm lead to changes in the stock price. My model additionally supports the findings of prior studies, which find a positive association between stock returns and profitability and cash flow measures. My paper extends these empirical studies by testing the growth in FCF rather than the level of FCF. As shown below, although the level of FCF is correlated to the growth of FCF, there are differences between the two variables, which suggests that they capture different information.

Second, cross-sectional and time-series regressions suggest that monthly and annual stock returns are significantly and positively related to a firm's CFG. These results are robust over time, between size classifications, across industries, and to the inclusion of other value measures, which prior studies have found to be significant in explaining stock returns. Furthermore, I find that when jointly controlling for ECFG and unexpected cash flow growth (UCFG), ECFG has an economically and statistically higher association to stock returns. Fama-French regressions further confirm the cross-sectional results, and I find that alpha increases across CFG quintile sorts. Additionally, I find evidence that suggests that the significance of CFG lies in CFG reflecting both operating cash flow growth (OCFG) and investing cash flow growth (ICFG). Prior literature (see Beneish, Lee, and Tarpley 2001; Richardson et al. 2005;

Novy-Marx 2013; Foerster, Tsagarelis, and Wang 2017) has separately suggested OCF and investing cash flow (ICF) have information pertaining to stock returns because these variables reflect the firm's operating performance and the exercise of real options, respectively. I find evidence that both OCFG and ICFG are significant factors in determining stock returns, and both of these measures are components of CFG, but OCFG is relatively more significant than ICFG.

Third, results suggest that investors will be able to earn significantly higher returns by investing in firms with high CFG and shorting firms with low CFG. Equal (value)-weighted Fama-French three-factor portfolios suggest the top quintile of realized cash flow growth (RCFG) firms earn 0.95% (0.38%) per month. However, equal (value)-weighted Fama-French three-factor portfolios suggest the bottom quintile of RCFG firms earn –0.06% (–0.43%) per month. This suggests portfolios that are long in the highest RCFG quintile and short in the lowest quintile may earn an alpha of 1.01% per month when estimated with equal-weighted returns and 0.81% per month when estimated with value-weighted returns. Over the sample period of 1988 through 2019, $1 invested in a value-weighted stock market portfolio would grow to $9.85, whereas $1 in the value-weighted long-short realized RCFG portfolio would grow to $15.30. Although the long-short RCFG portfolio earns higher returns and has lower volatility than the broader market, investing solely in the high RCFG portfolio results in growing $1 to $42.29 over the sample period. However, the long RCFG portfolio is more volatile than the long-short RCFG portfolio.

The paper proceeds as follows. Section II discusses related research. Section III develops the model and hypotheses. Section IV discusses data and presents preliminary evidence. Section V presents cross-sectional results. Section VI presents Fama-French and time-series portfolio results. Section VII concludes with a summary of the paper.

II. Prior Research

Although most of the research studying returns focuses on the investor side of the return process, as noted by Hou, Xue, and Zhang (2015), the supply-side contribution to the firm's return dates to the nascent era of finance being established as its own field of study. Williams (1938) suggests that the price of an asset reflects its intrinsic value. Graham (1949) famously notes that the stock market is a voting machine in the short run but a weighing machine in the long run, where the weight is the intrinsic value of the firm. Gordon and Shapiro (1956) and Gordon (1959) express the stock price through the dividend discount model. Campbell and Shiller (1988a, 1988b) find that dividends and the dividend-price ratio can partially explain stock returns. In addition, they find that the long-run averages of real earnings can forecast future dividends, which allows for an estimate of a stock's price.

However, there are several issues with using dividends to capture firm value. Black (1976) discusses how the nature of dividends is elusive. It is not clear why firms pay dividends and why investors should demand dividends when there are other channels through which firms may distribute value to shareholders and other ways for shareholders to capitalize on their investment. Fama and French (2001), DeAngelo, DeAngelo, and Skinner (2004), and Hoberg and Prabhala (2009) find that there is a significant reduction in the number of firms that pay dividends, although each study cites a different reason for the reduction. This suggests that between the unclear nature of dividends and the reduction in the number of firms paying dividends, models that rely on dividends as the source of value may not be capturing an accurate value of the firm and are also increasingly inapplicable to publicly listed firms. Additionally, Harris, Ngo, and Susnjara (2020) find evidence that firms pay dividends even when they do not have enough cash flow to pay for the dividends.

There is much debate between finance and accounting literature on the appropriate way to measure value to shareholders. Accounting literature typically argues that accrual measures of earnings best reflect shareholder value (see Dechow 1994; Beneish, Lee, and Tarpley 2001; Richardson et al. 2005; Richardson, Tuna, and Wysocki 2010; Ohlson and Bilinski 2014). Whereas finance literature typically argues that cash flow measures of earnings best reflect shareholder value (see Bowen, Burgstahler, and Daley 1987; Bernstein 1993; Foerster, Tsagarelis, and Wang 2017). Cash flow measures actual cash receipts and expenses at the time the change in cash takes place. In other words, cash flow reflects tangible changes in firm value. This is important in order to avoid dealing with manipulated earnings estimates in financial statements and earnings recorded on an accrual basis as opposed to a realized basis. Although there is mixed empirical evidence over the informational content of cash flows versus accruals, I use cash flows in my paper due to the theoretical soundness of cash flows over accrual methods of measuring earnings as argued throughout financial economic literature.

Novy-Marx (2013) finds evidence that gross profitability, proxying for value, is a highly significant factor of monthly stock returns. He contends that "gross profits is the cleanest accounting measure of true economic profitability. The farther down the income statement one goes, the more polluted profitability measures become, and the less related they are to true economic profitability" (Novy-Marx 2013, p. 2). Fama and French (2006, 2016) and Hou, Xue, and Zhang (2015) also find that profitability is significantly related to stock returns. However, Bernstein (1993) notes that profits are an accounting item and are more prone to manipulation and finds that although earnings disseminate some information to shareholders, they do not fully reflect the financial standing of the company. The veracity of earnings depends on how much of the earnings are based on cash flows or accruals. Cash flows are a better indicator of financial standing and are not as easily manipulated as accruals.

Several papers have evaluated the role of a firm's cash flows in a firm's stock returns. Sloan (1996) finds that stock markets underreact to the cash flow component of earnings and that investors can earn returns using the underreaction to cash flow. Vuolteenaho (2002) finds that firm-level stock returns are primarily driven by a positive relation with cash flow news, proxied by return on equity (ROE). Celiker et al. (2016) similarly find that cash flow news is positively associated with price momentum. Cohen, Polk, and Vuolteenaho (2003) find that the dispersion of the "value spread" in book-to-market is largely driven by expected 15-year profitability. Hou, Karolyi, and Kho (2011) find that cash flow to price explains a significant amount of the return variation in an international setting. However, they capture cash flow using only non-negative values of cash flow levels in the time-series tests and include positive cash flows as a continuous variable while designating negative cash flows as an indicator variable in cross-sectional tests. Contrary to Hou et al.'s finding, Eisdorfer (2007) finds evidence that cash flow news is the most important driver of stock returns in financially distressed firms. Similar to the conclusions of Eisdorfer (2007), I find negative CFG is informative and yields a commensurate negative return as would be expected with poor CFG when controlling for other factors. Foerster, Tsagarelis, and Wang (2017) show that cash flow measures are more informative and are better predictors of stock returns than profit measures and that FCF is more informative than OCF, although they do not provide evidence as to why.

Although research agrees that value is pertinent to a firm's stock price, how exactly that value is measured is debatable. Research has shown that (1) dividends are a decreasingly used method to distribute earnings to shareholders and dividends are therefore a decreasingly useful valuation metric; (2) profit is an inferior value metric relative to cash flow; (3) although studies have found FCF has incremental explanatory power over profits in explaining stock returns, studies have not found a reason why this is the case; and (4) scaling matters when determining what valuation metric to use to estimate a firm's stock return. Prior studies have not examined how CFG, rather than the level of FCF, is associated with stock returns. I extend the literature by examining how CFG is related to stock returns. Additionally, I present empirical evidence that suggests that the reason there is more information in FCF than in profits is that FCF jointly captures the information contained in OCF and ICF, each of which have been found to reflect significant components of firm value.

III. The Model

Model Motivation

Research has previously focused on inferring the expected return of a security by tying the risk preferences of investors to the riskiness of the security. A problem with models developed using this method is that they usually ignore the production aspects of a firm. I correct for this by focusing on how a change in the firm's expected cash flows will affect the firm's stock price, rather than focusing on how investor's risk profiles affect the price.

The market value of a firm is based on the discounted expected future cash flows generated by the firm. If the price is based on expected cash flows, then it stands to reason that changes in price, or returns, should be based on changes in expected cash flow streams. To provide an example that helps to motivate the need for the model expressed below, I assume that the discount factor is fixed. A firm's stock price is observed at three different time periods: P_t, P_{t+1}, and P_{t+2}. Additionally, there is a positive change in the firm's expected cash flow stream growth observed at each of the respective time periods. Given this assumption, it necessarily follows from the growth in expected cash flow streams that $P_t < P_{t+1} < P_{t+2}$. This reflects that there is a positive stock return over these time periods stemming from the growth in the expected cash flow streams of the firm. This relation necessitates a model that reflects the relation between a firm's stock return and its growth in the cash flow generated by the firm.

By relying on the principle of market efficiency and rearranging the basic asset pricing identity—that the price of any asset is the expected discounted future payoff—I can express a simple relation between ECFG and expected return. I assume that the required return to shareholders and expected stock return are in equilibrium and are used interchangeably. Hence, if a firm is expected to generate more (less) value for its shareholders and the current price remains the same, the rate at which the future value is discounted will have to increase (decrease) in order to keep the stock price at time *t* equal to the future payoff in *t+1*. Holding the discount rate constant, the stock price will increase (decrease) as cash flows increase (decrease).

Propositions

The price of an asset at time *t* (P_t) is the expected discounted future cash flow, $P_t = E_t(m_{t+1}P_{t+1})$, where m_{t+1} is the discount factor and P_{t+1} is the price at time *t*+1. The price at each time period reflects the discounted future cash flow stream at that time—that is, $P_t = DCFS_t$ and $P_{t+1} = DCFS_{t+1}$. Adjusting the fundamental pricing equation by dividing by price at time *t* in the right-hand side (RHS) and left-hand side (LHS) and substituting the cash flow stream for the respective price will give the expected change of value generated by the firm.

$$1 = E_t(m_{t+1}R_{cf,t+1}) \quad (1)$$

where

$$R_{cf,t+1} = \frac{DCFS_{t+1}}{DCFS_t}.$$

Expectations built in the current period are based on the expected cash flow generated in the current time period. It is through these expectations that the future cash flow estimations are built on. The prices at *t* and *t+1* are determined by the expected future cash flow stream at the respective time period; therefore, the return observed between time *t* and *t+1* will be the result of the observed and expected growth in the cash flow generated by the firm in time *t*.

Next, I separate the expectation and rearrange the equation in order to express return in regard to value created, and because $m_{t+1} = \frac{1}{R_{r,t+1}}$, the equation becomes

$$1 = E_t\left(\frac{1}{R_{r,t+1}}\right) E_t\left(R_{cf,t+1}\right) + cov(m_{t+1}, R_{cf,t+1}). \tag{2}$$

This may be rearranged to be expressed in a stochastic framework and continuing value. Although each derivation results in a similar direct association between firm-generated cash flow growth and stock return, the additional value in expressing the continuing value model lies in its general simplicity.

Proposition 1: Stochastic Expression

Carrying the discount factor out of the expectation in the RHS of equation (2) evokes Jensen's inequality in the expression of the rearrangement. Therefore, by bringing m_{t+1} to the LHS, equation (2) may be expressed as

$$E_t(R_{r,t+1}) \geq \frac{E_t\left(R_{cf,t+1}\right)}{\left(1 - cov\left(m_{t+1}, R_{cf,t+1}\right)\right)}. \tag{3}$$

Equation (3) shows that the expected return of shareholders is at least as high as the growth in expected cash flows, scaled by one minus the variance of the discount factor and growth in value term. This suggests that investors may expect to earn a return on their equity holdings at least as high as the growth in the expected cash flow of the firm.

Another adjustment may be made to equation (3) to arrive at a strict equality between stock return and firm-generated value. $R_{r,t+1}$ is (1+$r_{r,t+1}$), where $r_{r,t+1}$ is the stochastic return and $R_{r,t+1}$ may be interpreted as an approximation of $e^{\ r_{r,t+1}}$. $E\left(\frac{1}{R_{r,t+1}}\right)$ is therefore approximately equivalent to $E(e^{-r_{r,t+1}})$, which may be expressed as $e^{E(-r_{r,t+1})+\frac{1}{2}\sigma^2(-r_{r,t+1})}$, through a second order Taylor approximation. The last term may be rearranged to be expressed as $E(e^{r_{r,t+1}})^{-1} * e^{\sigma^2(r_{r,t+1})}$, which implies $E\left(\frac{1}{R_{r,t+1}}\right)$ is equal to $\left(\frac{1}{E(R_{r,t+1})}\right)e^{\sigma^2(r_{r,t+1})}$, where $e^{\sigma^2(r_{r,t+1})} \geq 1$, consistent with Jensen's inequality. Under these conditions, equation (3) may be rearranged as

$$E_t\left(R_{r,t+1}\right) = \frac{E_t(R_{cf,t+1})e^{\sigma^2(r_{r,t+1})}}{(1-cov(m_{t+1},R_{cf,t+1}))}. \tag{4}$$

The model shows expected stock return ($E_t\left(R_{r,t+1}\right)$) equals the growth of the expected cash flow streams ($E_t\left(R_{cf,t+1}\right)$) multiplied by the exponential of the return variance ($e^{\sigma^2(r_{r,t+1})}$), divided by one minus the covariance of the discount factor and the growth of the expected cash flow streams ($cov\left(m_{t+1},R_{cf,t+1}\right)$). The variance term indicates that return is scaled in magnitude to the expected growth in cash flows, commensurate with the idiosyncratic volatility of returns. The idiosyncratic variance term is in line with the theoretical and empirical findings linking expected returns to idiosyncratic volatility shown by Levy (1978), Merton (1987), Jiang and Lee (2006), Fu (2009), and Feunou et al. (2014).

Proposition 2: Terminal Growth Expression

I now assume that the firm has reached terminal growth and therefore cash flows grow at a constant rate. Because of the constant growth, the CFG variance becomes zero and therefore the covariance of cash flow and return becomes zero, and it is shown that the required return of shareholders is based on the value created by the firm through growing FCF.

$$E_t(R_{r,t+1}) = E_t(R_{cf,t+1}) \tag{5}$$

Equation (5) explicitly shows that the expected return of shareholders equals the ECFG generated by the firm and that it is the primary driver of stock returns. This pricing identity is significant because much of the research in relation to asset pricing looks at pricing risk components or interpreting risks that drive demand behavior. However, equation (5) directly links the expected return with the intrinsic value supplied by a firm through its cash flow generation. Because the value of the firm is reflective of the discounted expected future cash flows the firm generates, $E_t(R_{cf,t+1})$ expresses shareholder return through expected value created by expected cash flow stream growth, which may be translated into capital appreciation and dividends. This relation shows that ceteris paribus, if a firm increases cash flows, then the value created increases, which will increase the return to shareholders.

If I assume that cash flows are growing at a continuous rate—that is, the continuing value of the firm is reached—and the firm is not paying dividends, then equation (5) can be expressed through the terminal value of a constantly growing cash flow stream:

$$E_t(R_{r,t+1}) = E_t\left(\frac{G * CF_{t+2} / (r_r - g)}{G * CF_{t+1} / (r_r - g)}\right) \tag{6}$$

where

$$G = 1 + g$$

$$r_r = required\ return$$

$$g = cash\ flow\ growth.$$

Equation (6) is simplified to

$$E_t(R_{r,t+1}) = E_t\left(\frac{CF_{t+2}}{CF_{t+1}}\right). \tag{7}$$

Because cash flow is growing at a steady rate, cash flow at each period is just the previous period's cash flow multiplied by the cash flow growth rate. Therefore, equation (7) can be expressed as

$$E_t(R_{r,t+1}) = E_t\left(\frac{G * CF_{t+1}}{CF_{t+1}}\right), \tag{8}$$

which simplifies to

$$E_t(R_{r,t+1}) = E_t(G). \tag{9}$$

Finally, taking the unconditional expectation of the conditional expected return and cash flow growth:

$$E(R_{r,t+1}) = E(G) \tag{10}$$

where

$$E(G) = expected\ cash\ flow\ growth.$$

With the continuous growth rate assumption, equation (10) shows that the expected stock return is equal to the value generated to shareholders, or the growth of cash flows.

This is important because it shows that expected stock return is primarily driven by the value generated by the firm, measured as cash flow growth. The model expressed in equations (4) and (10) may be thought of analogously to the Gordon growth model; however, rather than relying on dividends paid by the firm, this model relies on the cash flows generated by the firm. This is a significant improvement on the dividend-centered pricing literature because not all firms pay dividends, and there is evidence suggesting that firms are increasingly unlikely to initiate dividends (Fama and French 2001; Grullon and Michaely 2002; DeAngelo, DeAngelo, and Skinner 2004; Denis and Osobov 2008), which will lead to a decline in the applicability of dividend-reliant pricing models.

The stochastic model in equation (4) and the terminal value model in equation (10) both suggest the hypothesis that stock returns are significantly and positively related to ECFG. One potential issue with using CFG to proxy for value generation is that CFG may not reflect all the value being generated, such as by investing in intangible assets. However, to create value, intangible assets have to eventually generate cash flows and this cash flow will be captured by CFG when the value is realized.

Hypotheses

Prior literature has examined the association of stock returns with dividends, profitability, and FCF. However, studies have not taken the next step of examining the association of stock returns with free cash flow growth. Although the model above predicts expected returns are predicated on ECFG, investors and empirical asset pricing tests often use realized variables as the basis to estimate their expectations. Therefore, I use both RCFG and ECFG as a proxy for ECFG.

$$H_1\text{: } Stock\ returns\ are\ positively\ related\ to\ realized\ and\ expected\ cash\ flow\ growth.$$

However, any realized variable is the sum of its expected and unexpected components. In this case, RCFG is the sum of ECFG and UCFG. The model presented in equation (10) suggests that ECFG should explain expected stock returns. Because RCFG reflects ECFG and UCFG, there may still be explanatory power in UCFG. Therefore, an extension of the first hypothesis is to additionally analyze ECFG and UCFG:

$$E(R_{r,t+1}) = E(G) + U(G) \tag{11}$$

where

$U(G) = unexpected\ cash\ flow\ growth.$

Because the model above suggests ECFG should be the cash flow component, which is associated with returns, I hypothesize that ECFG is more economically and statistically significant in stock returns than UCFG:

$$H_2: Expected\ cash\ flow\ growth\ is\ more\ economically\ and\ statistically\ significant\ than\ unexpected\ cash\ flow\ growth.$$

Additionally, the research of Berk, Green, and Naik (1999), Anderson and Garcia-Feijóo (2006), Cooper, Gulen, and Schill (2008), and Watanabe et al. (2013) suggest that asset growth reflects a firm's exercise of real options it holds. Furthermore, Foerster, Tsagarelis, and Wang (2017) find there is more information contained in FCF than in profitability and OCF. However, Foerster et al. do not provide evidence showing why FCF has more explanatory power than profitability or OCF. I hypothesize that FCF explains more than profitability or OCF because FCF has the additional information contained in capital expenditures (CAPX), as measured by ICF below. ICF reflects a firm's decision to exercise its real options and is included in FCF but not in profitability or OCF. Additionally, separating CFG into its operating and investment components shows where the explanatory power of FCF in stock returns lie (i.e., $FCF = OCF - ICF$). OCFG is positively related to returns, whereas asset growth, captured through ICFG, is negatively related to returns. Therefore, CFG jointly captures the information of OCFG and ICFG (i.e., $E(G) = E(OCFG) - E(ICFG)$), and equation (10) may be separated into CFG's components of OCFG and ICFG:

$$E(R_{r,t+1}) = (OCFG) - E(ICFG). \quad (12)$$

Because FCF captures both the operating and investing activities of the firm, CFG jointly reflects the operating and investment activities of the firm. Which component of CFG, OCFG or ICFG, explains relatively more of the stock returns is a matter of empirical investigation. Therefore,

H_{3a1}: *Stock returns are positively related to operating cash flow growth.*

H_{3b1}: *Stock returns are negatively related to investing cash flow growth.*

H_{3a2}: *Operating cash flow growth explains stock returns more than investing cash flow growth.*

H_{3b2}: *Investing cash flow growth explains stock returns more than operating cash flow growth.*

IV. Data and Descriptive Analysis

Data

All financial statement and stock data are gathered from June 1988 to December 2019. Monthly stock return information is collected from CRSP for NYSE-, AMEX-, and NASDAQ-listed stocks. Annual financial statement information is collected from Compustat. The monthly risk-free rate and Fama-French factors are gathered from Kenneth French's website.[4] In line with previous research, all financial firms are dropped from the sample in order to avoid the

[4] I thank Kenneth French for making these data available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

idiosyncratic effect of highly regulated firms. All independent variables are trimmed at the 1st and 99th percentile.[5]

The dependent variable is the holding period return (R) of common stocks, including dividends, measured both monthly and annually. Following the literature, I assume that R is an approximate proxy of the expected return and use realized accounting variables lagged back to last June. The independent variable of focus is CFG: realized, expected, and unexpected. RCFG is the growth of FCF, $(FCF_t - FCF_{t-1})/(FCF_{t-1})$. Following Foerster, Tsagarelis, and Wang (2017), FCF is calculated as operating activities net cash flow (OANCF from Compustat) net of CAPX. Because growth rates yield uninterpretable inferences when a value crosses zero, CFG is measured when FCF is either consecutively positive for at least two years or consecutively negative[6] for at least two years and then stacked together. I additionally test for RCFG using strictly positive or strictly negative cash flows.[7] Although empirical tests of stock return factors generally use lagged measures of the independent variable, the model above suggests a

[5] Results are sensitive to outliers in CFG measures. As seen in the summary statistics, even with the 1% trim at the top and bottom of the distribution, there are still relatively high levels of CFG in the tails. However, as shown in tests below, controlling for changes in the firm's asset base partially explains the effects of CFG outliers. Additionally, in tests not shown, I use lower cut points in the data to trim out the high CFG data, and results remain similar.

[6] Because negative values are inversely grown without adjustment, growth rates for negative cash flows are multiplied by –1. For example, if a firm's cash flow goes from –$10 million to –$20 million, its unadjusted growth rate would be (–20 – (–10))/–10 = 100%.

[7] I do not tabulate the results for RCFG tests using the strictly positive or negative FCF samples. Results for the positive FCF sample are economically and statistically stronger. Although results for the negative FCF sample are statistically weaker, the results for the negative FCF sample are statistically significant after controlling for changes in the firm's asset base.

contemporaneous association. Therefore, I test both lagged to last June and contemporaneous values of RCFG.[8]

Following Kahl, Lunn, and Nilsson (2014), I empirically measure ex ante expectations of FCF using the geometric growth rate of positive FCF from the previous two years:

$$E(FCF_{i,t}) = FCF_{i,t-1}\sqrt{\left(\frac{FCF_{i,t-1}}{FCF_{i,t-3}}\right)} \tag{11}$$

where $FCF_{i,t}$ is firm *i*'s FCF in time *t*. ECFG is then measured as

$$E(CFG_{i,t}) = \frac{\left(E(FCF_{i,t}) - FCF_{i,t-1}\right)}{FCF_{i,t-1}}. \tag{12}$$

As suggested by the second hypothesis, it follows from RCFG and ECFG that there is the remaining unexpected portion of CFG. Therefore, I additionally measure the UCFG as:[9]

$$U\left(CFG_{i,t}\right) = RCFG_t - E\left(CFG_{i,t}\right) = \frac{\left(FCF_{i,t} - FCF_{i,t-1}\right)}{FCF_{i,t-1}} - \frac{\left(E\left(FCF_{i,t}\right) - FCF_{i,t-1}\right)}{FCF_{i,t-1}} \tag{13}$$

$$= \frac{\left(FCF_{i,t} - E(FCF_{i,t})\right)}{FCF_{i,t-1}}$$

I use several sets of control variables throughout the empirical tests. Consistent with prior literature, I follow Novy-Marx (2013), Fama and French (2016), and Foerster, Tsagarelis, and Wang (2017) in measuring control variables which are year-end Beta estimates from CRSP (Beta), the natural log of firm size measured by total market value (SIZE), measured in the prior June; the natural log of book-to-market equity ratio (BM), with the book value taken from the

[8] I only tabulate the lagged to last June RCFG; contemporaneous RCFG results are available upon request.

[9] Because FCF and E(FCF) values cross zero at different times and these variables cannot cross over zero within the same two consecutive years, the number of observations decreases from RCFG, ECFG, and UCFG.

prior June and market value taken from the prior December; the previous month's return (LR); and the previous 11 months' return (MOM) taken from *t*-2 to *t*-12.[10] These studies find evidence that operating profits and investment are significantly related to stock returns. I additionally control for the level of FCF, operating profitability, and firm investment in order to test whether CFG has explanatory power above these variable levels previous studies have examined. Although Fama and French (2016) present evidence of a firm's operating performance and investment activities being separately related to a firm's return, I argue above that the combination of OCF and ICF in FCF is the reason why cash flows are better estimates of a firm's value and will therefore be more closely related to the firm's stock return.

Descriptive Analysis

Table 1, Panel A reports the averages of all measures of CFG. After trimming CFG at the top and bottom 1%, around 20% of CFG are greater than |100%| growth, as shown in the 1st and 5th quintile sorts. Results discussed below are similar when I use higher cutoffs, such as trimming at the 5% level or dropping observations greater than |100%|, though results are generally more statistically and economically significant when the larger cutoffs are used. Because the high CFG rates may stem from structural changes in the firm (such as restructuring through mergers and

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[10] Berk, Green, and Naik (1999), Anderson and Garcia-Feijóo (2006), Cooper, Gulen, and Schill (2008), Watanabe et al. (2013), and Chowdhury, Sonaer, and Celiker (2018) find evidence of asset growth and market share growth having explanatory power in stock returns. Because these growth variables may be associated with CFG, I additionally control for market share growth and asset growth in untabulated results. Results for the association between CFG and returns are robust to the inclusion of these related growth variables.

acquisitions), I control for this in RCFG measures in robustness tests below. Finally, the negative median UCFG suggests that firms generally have lower RCFG than expected.

[Table 1 about here]

Table 1, Panel B reports the averages of the respective CFG, cash flow–to–assets (CFA), market value (MKTV[11]), and BM across respective CFG quintile sorts. CFA is highest in the top RCFG quintile and lowest in the bottom RCFG quintile; however, CFA is flat across the second to fourth RCFG quintile. CFA is concavely associated to both ECFG and UCFG. The association between CFA and CFG suggests that FCF levels may yield different inferences from CFG. I find that BM is convexly associated with all three CFG measures and MKTV is concavely associated with all three CFG measures. These results suggest that the typical scalars previous studies have used may not directly reflect a firm's CFG because of the nonlinear association of these variables with CFG. In other words, CFG may capture information that is not necessarily reflected in CFA or a similarly constructed scaled variable.

Table 1, Panel C reports the average ECFG across independent bivariate quintile sorts of ECFG and UCFG. This table shows that the ECFG is relatively constant across UCFG quintile sorts. Table 1, Panel D reports the average UCFG across independent bivariate quintile sorts of ECFG and UCFG. This table shows that the UCFG is not significantly different across the 2–4 ECFG quintiles; however, there is a decrease in UCFG across ECFG quintiles in the lowest UCFG quintile and a convex association of UCFG across ECFG quintiles in the highest UCFG quintile. This suggests that the higher the CFG expectations are, the lower the propensity for

[11] I also look at total book assets and stock price, two other common scalars, across CFG quintiles, and results are similar to the convexity of CFG's association to MKTV.

unexpected cash flow shocks. In untabulated results, as well as inferred by the construction of the variables, ECFG and UCFG are negatively related. So, although not always the case, firms that have higher ECFG may have lower UCFG. However, as shown in Panel D, there are relatively few firms that are in the intersection of the highest ECFG and UCFG quintiles.

Table 1, Panel E reports the average number of firm-year observations per ECFG and UCFG quintile intersections. Because of the general negative relation between ECFG and UCFG, there are relatively fewer firms in the top and bottom quintile intersections than there are around the middle quintile intersections. This sorting biases against finding significant results in their intersection in the tests below.

Table 2 reports the monthly return sorted into CFG portfolios, sorted from low (1) to high (5) quintiles. The returns observed in Panel A increase from the lowest to highest CFG portfolio in RCFG and UCFG. However, returns are flat across ECFG quintiles. This suggests that RCFG, particularly the UCFG component of RCFG, is significantly positively associated with monthly stock returns. This is contrary to the second hypothesis, which posits that ECFG should be relatively more associated with returns. However, because ECFG and UCFG are components of RCFG, there may be omitted variable bias when only controlling for either ECFG or UCFG. Therefore, I additionally control for both ECFG and UCFG. Panel B presents the independent bivariate quintile sorts of ECFG and UCFG. When controlling for both ECFG and UCFG, the increase in monthly stock returns across quintiles is more economically and statistically significant with the return difference across ECFG quintiles becoming statistically significant. The intersection of the fifth quintile for ECFG and UCFG sorts results in an average monthly return of 2.88% for equal-weighted returns and 2.04% for value-weighted returns. The average monthly return in the S&P 500 over the sample period is 0.71% and the average monthly return of the CRSP sample in the sample period is 1.3%. This suggests that investing in a portfolio of firms that are expected to generate high CFG will outperform the market by around 1 percentage point per month.

[Table 2 about here]

V. Cross-Sectional Results

Fama-MacBeth Regressions

Table 3 reports the results of Fama-MacBeth regressions of stock returns on CFG and controls for operating cash flow to assets (OCFA), investment cash flow to assets (ICFA), cash flow to assets (CFA), Beta, BM, SIZE, LR, and MOM.[12] Panel A presents results using monthly stock returns, Panel B controls for CFA, and Panel C presents results using annual stock returns. Results suggest that CFG is significantly related to both monthly and annual stock return. The association of CFG and returns is similar with or without the controls included. Results support the first hypothesis: RCFG is significantly and positively associated with stock returns. ECFG is statistically insignificant when UCFG is not controlled for;[13] however, ECFG is significant when UCFG is controlled for. Additionally, the coefficient estimate of UCFG roughly doubles when controlling for ECFG. However, the ECFG coefficient is around 100% larger than the UCFG coefficient when both ECFG and UCFG are controlled for, which supports the second

[12] LR and MOM are not controlled for in the annual return regressions because of the time mismatch with LR and MOM.

[13] Even though it is standard practice to lag accounting-based variables to the previous June, contemporaneous ECFG is more consistent with the model in equation (10). ECFG is more statistically significant when I use the contemporaneous estimation of ECFG.

hypothesis. This suggests that ECFG explains more of a firm's stock returns than UCFG. However, the change from insignificance to significance when jointly estimating returns using ECFG and UCFG suggests that there is omitted variable bias in estimating either ECFG or UCFG without controlling for the other respective RCFG component. I use various empirical models to alleviate concerns for this omitted variable bias, and the CFG results are consistent across all models.[14]

[Table 3 about here]

When ECFG and UCFG are not jointly controlled for, results suggest a rejection of the second hypothesis. However, when jointly controlling ECFG and UCFG, results support the second hypothesis. Why do the estimated coefficients for ECFG and UCFG increase so much when jointly controlled for? First and foremost, ECFG and UCFG are negatively related to each other, but each is positively related to stock returns. Therefore, excluding one introduces omitted variable bias in the coefficient estimate. Second, as the cash flows are realized, the stock price impounds that information and these cash flows are then used to estimate the next period's cash flows.

Panel B controls for CFA to test whether there is marginal information in CFG relative to the level of FCF. Results suggest that there is explanatory power of CFG in stock returns above that in the FCF level, which previous studies have examined. All CFG proxies remain

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[14] To alleviate omitted variable bias concerns, I test the association between stock returns and CFG while controlling for Beta, Size, BM, lagged monthly returns, and momentum to reflect factors studies have found to be consistently associated with stock returns. I additionally control for cash flow levels, operating cash flow, investing cash flow, net income, gross profitability, revenue, asset growth, market share growth, and dividends to control for variables that have been found to be associated with stock returns and that may be related to CFG.

statistically and economically significant when controlling for CFA. This further suggests that CFG contains pertinent information to a firm's value above that reflected in the level of cash flows, profitability, or dividends, which previous studies have examined.

Fama and French (2008) find that many variables shown to explain stock returns are primarily significant in micro-cap stocks. Therefore, I replicate Table 3 across size quintiles and by using subsamples of NYSE-, AMEX-, and NASDAQ-listed firms separately.[15] The significant and positive relation between CFG and stock returns is present in each of the size quintiles, suggesting that the result is not driven by firm size. Results using only firms listed on each exchange are similar to the aggregate sample, further suggesting that results are not being driven by the small firm effect.

Table 4 presents the results of Fama-MacBeth regressions of firms' monthly stock returns regressed on RCFG, separated into OCFG and ICFG, reflecting operating performance and asset growth, respectively. Following Anderson and Garcia-Feijóo (2006), Cooper, Gulen, and Schill (2008), and Watanabe et al. (2013), ICFG is measured from year *t*-1 and *t*-2. The results support the third hypothesis; when CFG is separated into its operating and investing elements, they have a significantly positive and negative estimated coefficient, respectively. However, OCFG has a much higher economic and statistical significance relative to ICFG, which supports H_{3a2}. This suggests that the significance of CFG stems from its joint capture of operating performance through OCFG and investing activities through ICFG but that operating performance is more important than investment performance.

[Table 4 about here]

[15] Results for robustness tests are not tabulated and are available upon request.

Why does operating performance explain more in stock returns than investment performance? I think that this has an intuitive economic explanation. Since the value of an asset is tied to the expected cash flows of that asset, it follows that over the long run, it is the operating performance of a firm that maintains that firm's operations. Although it is necessary for firms to make investments to generate future value, it does not matter what investments a firm makes if those investments are not generating cash flows. Therefore, we should expect to see that the operating performance of the firm is more closely related to the firm's stock returns than its investment activities.

Changes in the Asset Base

A significant concern of the RCFG measure used is whether the large RCFG rates reflect significant changes in the firm's asset base. Although results are stronger using more conservative growth cutoff criteria, these high growth rates may be the result of changes within the firm, such as significant growth periods early on in the firm or acquiring another firm, and therefore may not represent outliers in the sample. In time periods such as these, the prior year's FCF may be much smaller than the preceding or proceeding year's cash flow, which is grown by the firm's expanding or contracting asset base. To control for these large growth changes, I rerun regressions using only firms with asset growth less than 25%; results are presented in Panel A of Table 5. Results are similar to those presented in Table 3; RCFG is significantly and positively related to monthly stock returns.[16]

[Table 5 about here]

[16] I additionally test the CFG and return relation for firms with asset growth under 5%, 10%, and 50% in untabulated regressions, and results remain similar.

Another way to control for RCFG reflecting changes in the firm's asset base, and therefore the changes in the magnitude of the cash flows it is capable of generating, is to scale FCF by the firm's size. This will provide a relative measure of CFG. Additionally, RCFG is positively related to SIZE, and this relation may affect both RCFG and SIZE's relation to stock returns. To additionally control for changes in the firm's size, which may affect its cash flow levels and the interrelation between RCFG and size, I scale FCF by the firm's total assets that year[17] and estimate RCFG using the asset scaled measure of FCF. Results for this test are presented in Panel B of Table 5. Results remain similar to those presented in Table 3: CFG is positively related to stock returns.

Test across Time Periods and Industries

It is possible that the association between CFG and stock returns declines across time. Therefore, I examine the association between CFG and returns across my sample period by dividing the sample into roughly three equal time periods. The time periods examined are 1988–1999, 2000–2009, and 2010–2019. Additionally, it is possible that results are industry specific. Therefore, I also split my sample into industry groups based on the first-digit SIC code.[18]

Table 6 reports time subsample estimations of the Fama-MacBeth regressions of monthly stock returns on CFG in Panel A and industry subsamples in Panel B.[19] The results offer the same conclusions obtained above: RCFG is a highly significant factor of monthly stock returns

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[17] I do not use market value of equity to proxy for size because both SIZE and BM already use that measure and using assets rather than equity avoids introducing multicollinearity.

[18] I reinclude financial firms to the sample for the cross-industry tests.

[19] I do not tabulate results for ECFG and UCFG in the subsample tests because results are similar. Results are available upon request.

in each time period. Consistent with the results of Wahal (2019), who finds evidence suggesting profitability is significant in stock returns prior to 1963, the persistence of the relation between stock returns and CFG suggests that the relation between a firm's CFG and its stock return is not found as a result of a temporary anomaly.

[Table 6 about here]

Results in the industry subsample are similar to those presented above; there is a significant and positive relation between RCFG and monthly stock returns. Although RCFG and control variables are statistically insignificant or negative in the agriculture, acquisition corporations, and mining industries, these industries make up around 6% of the observations of the sample and each industry has a small number of observations to test statistical significance. Additionally, acquisition firms are not oriented toward generating cash flows but rather for the sole purpose of acquiring other firms. However, CFG is statistically insignificant in the transportation and utilities industry, which has a relatively high number of sampled observations. As discussed in the descriptive section above, results are sensitive to extreme CFG values. In untabulated results, I find that there is an overrepresentation of highly negative RCFG observations in both the transportation and utilities and mining industries. When I trim these extreme values, the estimated RCFG coefficient is statistically significant in these industries. This suggests that the relation between the firm's cash flow generation and the firm's stock return is not constrained to a given industry.

VI. Fama-French Regressions and Portfolios

Fama-French Regressions

Table 7 presents the alphas from Fama-French three- and five-factor time-series regression results of CFG quintile sorted portfolios. Portfolios are formed in June of each year. Panel A presents the univariate sorts, and Panel B presents the bivariate ECFG and UCFG sorts. Results for the three- and five-factor models are similar, except where noted below, so I refer to the three-factor model throughout the discussion of alpha estimates.

The portfolio alpha increases across CFG sorts, after controlling for the market return, size, value, profitability, and investment factors. The highest equal-weighted RCFG portfolio earns a significant monthly excess return of 0.95%, whereas the lowest earns a significant –0.06% per month. The highest value-weighted RCFG portfolio earns a significant monthly excess return of 0.38%, whereas the lowest earns a significant –0.43% per month. The negative alpha in the lower RCFG quintiles suggests that firms that have low RCFG earn negative market returns for their underperformance. This result is contrary to Hou, Karolyi, and Kho (2011) and Fama and French (2008) who find that negative earnings are not commensurately related to negative returns. Given these estimated alphas and assuming no transaction frictions, an investor can earn an average costless monthly excess return of 1.01% per month under the equal-weighted estimates and 0.81% per month under the value-weighted estimates by investing in the high RCFG portfolio and shorting the low RCFG portfolio. This translates into an average of 12.81% and 10.16% compounded annual excess return per year for the equal- and value-weighted portfolios, respectively.

Similar to the univariate and cross-sectional results, the univariate time-series portfolios of ECFG and UCFG reflect the omitted variable bias from not controlling for the counterpart to RCFG. The highest equal-weighted ECFG portfolio earns a significant monthly excess return of 0.38%, whereas the lowest earns a significant 0.37% per month. The highest value-weighted

ECFG portfolio earns a significant monthly excess return of 0.15%, whereas the lowest earns an insignificant 0.01% per month. The highest equal-weighted UCFG portfolio earns a significant monthly excess return of 0.90%, whereas the lowest earns an insignificant 0.15% per month. The highest value-weighted UCFG portfolio earns a significant monthly excess return of 0.31%, whereas the lowest earns an insignificant –0.24% per month. One stark difference between the time-series alphas and the univariate results presented above is the nonmonotonic alpha increase across value-weighted ECFG and UCFG portfolios. This might suggest a nonlinear association of returns with ECFG and UCFG; however, results in Panel B suggest a more linear association between portfolio alphas with ECFG and UCFG sorts.

[Table 7 about here]

Results in Panel B suggest alpha increases across the ECFG and UCFG quintiles for both equal- and value-weighted returns. However, the intersection of the ECFG and UCFG portfolios results in a higher alpha increase across portfolios going from low to high. The highest equal-weighted return is observed in the intersection of the top quintiles of ECFG and UCFG with an alpha of 1.71%. Similarly, the highest value-weighted return is observed in the intersection of the ECFG and UCFG top quintiles with an alpha of 1.01%. Although the increase in excess portfolio returns across CFG portfolios is consistent across the proxies of CFG, alpha remains negative in the untabulated strictly negative FCF value-weighted cash flow portfolios. This further suggests that firms that have negative cash flows and negative cash flow growth are discounted for their poor performance.

Alphas across Time Periods

Table 8 presents the estimated portfolio alphas of the time-series regressions sorted across RCFG quintiles between three sets of time periods. The first time period is 1990 through 1999, the second is 2000 through 2009, and the last is 2010 through 2019. Similar to the cross-sectional results, the positive alpha across portfolio sorts is higher in the 2000s and postcrisis time period. Although there is some variation in the sign and significance of the inner portfolios, the results in each time period show increases in alpha across the cash flow sorts. This further suggests that the relation found is not driven by any one of the sampled time periods from which the data are collected, and future out-of-sample tests are likely to arrive at similar conclusions.

[Table 8 about here]

Cash Flow Growth Cumulative Return

One of the benefits of investment research is providing investors with profitable investment strategies. The typical strategy stemming from findings presented here is to take a long position in firms that have relatively high CFG and a short position in firms that have a relatively low CFG with the long-short composition affording a costless investment strategy. Stocks are sorted into quintiles based on their CFG, and portfolios are rebalanced each June. The average monthly value-weighted return for that portfolio is then estimated.[20] Figure I presents the value-weighted cumulative return on a $1 investment starting in May 1988 through December 2019 of the zero-cost strategy, shown in RCFG. Additionally, the cumulative value-weighted excess return of the Fama-French market factor (MKT), the return to the high RCFG (RCFG_High) portfolio, and the return to the low RCFG (RCFG_Low) portfolio are depicted in the figure.

[20] The equal-weighted RCFG portfolio earns higher average returns than the value-weighted portfolio and results in a terminal portfolio value of $40.29.

[Figure I about here]

This analysis implies that the return of the zero-cost investment strategy outperforms the market and is less volatile than the market. Ignoring trading frictions, $1 invested in May 1988 in the RCFG portfolio grows into $15.30 in December 2019, compared to $9.85 for the MKT portfolio. There are no significant drawdowns over the sample period for the RCFG strategy, including during the 2008 financial crisis. In addition, these results suggest that investors focusing their investments in firms that generate relatively high CFG and short firms with relatively low CFG may earn high and stable returns on their investments without being exposed to significant drawdown risk. In fact, the RCFG portfolio did not experience the same negative shock that the overall stock market experienced in the financial crisis. However, if an investor placed $1 solely into the top quintile of RCFG in May 1988, that investment would be worth $42.29 in December 2019. Even though investing in the highest CFG firms earns higher returns, it does not offer the same low volatility as the long-short investment. Finally, $1 invested into the bottom quintile of RCFG in May 1988 grows to $2.20 in 2019. This is significantly less than the stock market returned over this time period. Overall, the results suggest that firms generating high cash flow growth consistently outperform firms that generate low cash flow growth.

VII. Conclusion

This paper develops a model that shows that expected changes in cash flows are the primary driver of stock return. Empirical evidence supports the fundamental implication of the model, that stock returns are positively associated with cash flow growth. CFG is found to be highly economically and statistically significant. From a practical standpoint, the results suggest that investors may be able to earn substantial returns by focusing their investment in companies that can create value for shareholders by growing cash flows.

Daniel and Titman (1997) and Cochrane (2011) describe the findings of Fama and French (1993) as not being based on the covariation of the factors but rather on the "characteristics" of the factors. It may not be the risk component of these factors that are propelling returns but rather the characteristics of the associated factors. These characteristics may be something that are reflective of properties associated with companies' proficiency in generating value for shareholders, which is then reflected in the stock price. There may always be some factors outside the standard framework (e.g., behavioral aspects, temporary correlations, or observable variables capturing unobservable effects) that have an impact on a market-driven asset. However, much research in stock values has not assigned the significance that is due to the value supplied by a firm to the value of its securities, proxied by CFG in this paper. Ultimately, it is the cash flow a firm generates that sustains its stock price, and over the long run, it is the growth in the firm's cash flows that causes the firm's stock price to grow.

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Figures and Tables

Figure I. Cash Flow Portfolio Cumulative Return

This figure presents the value-weighted cumulative return of investing in a portfolio of the top fifth of realized cash flow–generating firms (RCFG_High), the bottom fifth of firms (RCFG_Low), and a neutral cost strategy of long in the top fifth and short the bottom fifth (RCFG), and the cumulative return of investing in the excess market return (MKT). Portfolios are rebalanced June of each year. Data are from 1988 through 2019.

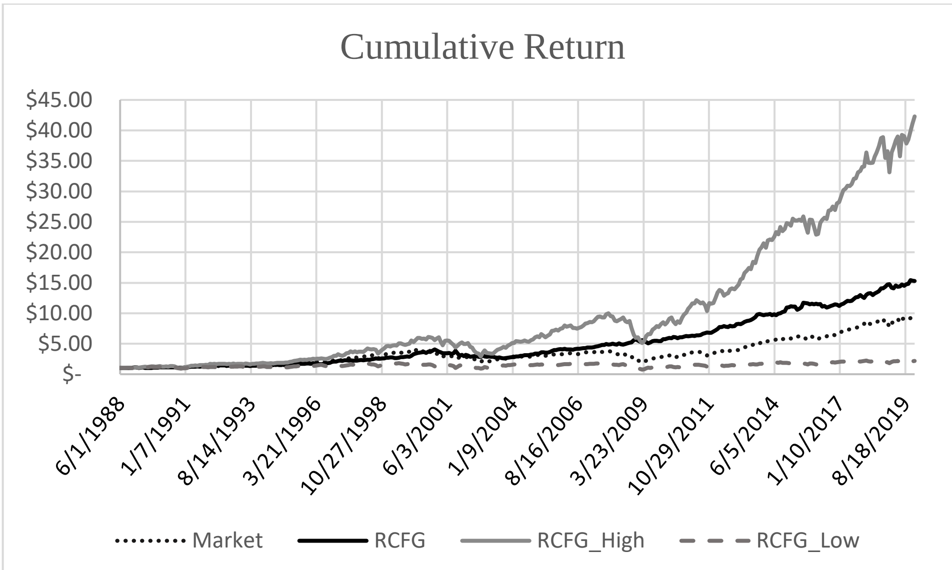

TABLE 1. Summary Statistics

Panel A. Summary Statistics

Variable	Obs.	Mean	SD	1	2	3	4	5
RCFG	573,030	0.2644	2.0600	–1.5116	–0.2902	0.0593	0.4498	2.6178
ECFG	325,031	0.2491	0.7025	–0.4046	–0.0870	0.1032	0.3426	1.2934
UCFG	283,047	0.2726	2.1549	–1.4543	–0.4828	–0.0952	0.3651	3.0385

Panel B. Averages across CFG Portfolios

RCFG Quintile	Average		
	CFA	BM	MKTV
1	–0.0524	0.5541	2,400
2	0.0190	0.4898	5,100
3	0.0366	0.4387	8,830
4	0.0323	0.4749	6,110
5	0.0761	0.5414	3,940
ECFG Quintile	**Average**		
	CFA	BM	MKTV
1	0.0414	0.5999	4,370
2	0.0657	0.4867	8,890
3	0.0776	0.4285	11,800
4	0.0772	0.4310	8,610
5	0.0641	0.4894	5,500
UCFG Quintile	**Average**		
	CFA	BM	MKTV
1	0.0577	0.5045	4,880
2	0.0741	0.4509	8,350
3	0.0909	0.4047	13,600
4	0.0959	0.4385	10,900
5	0.0893	0.5316	5,520

Panel C: Average ECFG in independent bivariate ECFG and UCFG quintile sorts

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.229462	–0.311593	-0.343509	-0.33956	-0.435569
2	-0.049609	-0.081681	-0.080343	-0.093069	-0.110261
3	0.1199342	0.1143424	0.1113515	0.0925648	0.0948428
4	0.3949071	0.3607372	0.3237694	0.3396069	0.3544313
5	1.4928766	0.8391741	0.9097541	0.9050195	1.0178312

Panel C. Average ECFG in Independent Bivariate ECFG and UCFG Quintile Sorts

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.2295	–0.3116	–0.3435	–0.3396	–0.4356
2	–0.0496	–0.0817	–0.0803	–0.0931	–0.1103
3	0.1199	0.1143	0.1114	0.0926	0.0948
4	0.3949	0.3607	0.3238	0.3396	0.3544
5	1.4929	0.8392	0.9098	0.9050	1.0178

Panel D. Average UCFG in Independent Bivariate ECFG and UCFG Quintile Sorts

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.6827	–0.4625	–0.0729	0.4630	3.9079
2	–0.8268	–0.4929	–0.0765	0.4059	2.0331
3	–0.9131	–0.4899	–0.0967	0.3572	2.0355
4	–1.0119	–0.5132	–0.1188	0.3650	2.3423
5	–1.7376	–0.5525	–0.1172	0.3851	2.5045

Panel E. Average Number of Firms per Year in Independent Bivariate ECFG and UCFG Quintile Sorts

ECFG Quintile	UCFG Quintile 1	2	3	4	5	Total
1	39.27	154.26	166.87	391.28	1,195.07	856.37
2	90.55	324.70	504.12	795.94	487.44	569.97
3	178.94	510.20	781.01	586.35	203.64	570.34
4	435.70	806.67	565.29	288.03	146.76	566.25

5	1,429.30	357.78	132.98	92.39	86.65	1,059.44
Total	1,072.25	547.44	572.09	569.88	822.51	716.36

Note: This table presents summary statistics of realized cash flow growth (RCFG), expected cash flow growth (ECFG), and unrealized cash flow growth (UCFG), where RCFG = ECFG + UCFG. Panel A presents the summary statistics and average cash flow growth (CFG) across its respective quintile sort. Panel B presents the average cash flow to assets (CFA), book-to-market equity (BM), and market value of the firm (MKTV) across respective CFG quintiles. Panel C presents average values of ECFG across independent quintile sorts of ECFG and UCFG. Panel D presents average values of UCFG across independent quintile sorts of ECFG and UCFG. Panel E presents the average number of firm-month observations within independent quintile sorts of ECFG and UCFG. The sample covers the period 1988–2019 and excludes financial firms.

TABLE 2. CFG Portfolio Sorts

Panel A. Average Monthly Stock Returns in Univariate CFG Quintile Sorts

	Equal-Weighted			Value-Weighted		
Portfolio	RCFG	ECFG	UCFG	RCFG	ECFG	UCFG
1	0.0099	0.0138	0.0114	0.0035	0.0071	0.0051
2	0.0119	0.0134	0.0121	0.0066	0.0074	0.0062
3	0.0139	0.0137	0.0134	0.0074	0.0085	0.0096
4	0.0175	0.0136	0.0163	0.0096	0.0089	0.0098
5	0.0198	0.0136	0.0188	0.0111	0.0088	0.0099
High-Low	0.0099	–0.0002	0.0074	0.0076	0.0017	0.0048
t-stat	(3.42)	(–0.09)	(2.85)	(3.05)	(0.66)	(1.64)

Panel B. Average Monthly Stock Returns in Independent Bivariate ECFG and UCFG Quintile Sorts

Equal-Weighted

ECFG Quintile	UCFG Quintile 1	2	3	4	5	High-Low
1	0.0080	0.0066	0.0110	0.0112	0.0170	0.0090
						(3.44)
2	0.0003	0.0096	0.0111	0.0156	0.0188	0.0185
						(6.88)
3	0.0072	0.0114	0.0130	0.0170	0.0223	0.0152
						(5.29)
4	0.0090	0.0118	0.0147	0.0212	0.0238	0.0148
						(3.69)
5	0.0126	0.0182	0.0246	0.0215	0.0262	0.0136
						(2.88)
High-Low	0.0046	0.0116	0.0136	0.0103	0.0092	0.0182
t-stat	(1.79)	(3.87)	(3.51)	(2.42)	(1.95)	(3.86)

Value-Weighted

ECFG Quintile	UCFG Quintile 1	2	3	4	5	High-Low
1	0.0065	0.0079	0.0051	0.0082	0.0093	0.0029
						(0.96)
2	–0.0012	0.0050	0.0073	0.0086	0.0106	0.0118
						(4.16)
3	0.0006	0.0074	0.0087	0.0110	0.0130	0.0124
						(3.78)
4	0.0025	0.0075	0.0114	0.0136	0.0129	0.0104
						(2.72)
5	0.0076	0.0066	0.0196	0.0155	0.0170	0.0094
						(1.86)
High-Low	0.0011	–0.0013	0.0145	0.0074	0.0077	0.0105
t-stat	(0.38)	0.38	(3.43)	(1.54)	(1.52)	(2.08)

Note: This table presents average monthly stock returns across realized cash flow growth (RCFG), expected cash flow growth (ECFG), and unrealized cash flow growth (UCFG) quintiles, where RCFG = ECFG + UCFG. The lowest CFG quintile is represented by 1and the largest by 5. Panel A presents univariate quintile sorts. Panel B presents independent variate quintile sorts of ECFG and UCFG. The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are in parentheses.

TABLE 3. Fama-MacBeth Regressions of Stock Return on CFG

Panel A. Fama-MacBeth Regressions of Monthly Stock Return on CFG

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	R	R	R	R	R	R	R	R	R	R	R	R
RCFG	0.0013***	0.0009***							0.0009***			
	(10.82)	(8.14)							(9.27)			
ECFG			0.0001	0.0000			0.0030***	0.0019***		–0.0002		0.0020***
			(0.32)	(–0.02)			(5.10)	(3.59)		(–0.58)		(3.68)
UCFG					0.0009***	0.0005***	0.0015***	0.0009***			0.0006***	0.0011***
					(6.88)	(3.95)	(8.83)	(5.95)			(4.86)	(6.79)
Beta		0.0050**		0.0039		0.0042*		0.0039	0.0028	0.0021	0.0027	0.0024
		(1.99)		(1.50)		(1.66)		(1.52)	(1.25)	(0.92)	(1.15)	(1.01)
Size		–0.0024***		–0.0013***		–0.0013***		–0.0013***	–0.0020***	–0.0011**	–0.0011***	–0.0011**
		(–4.94)		(–2.91)		(–2.93)		(–2.83)	(–4.59)	(–2.56)	(–2.66)	(–2.56)
BM		0.0022***		0.0050***		0.0047***		0.0047***	0.0022***	0.0052***	0.0050***	0.0050***
		(3.12)		(6.86)		(6.58)		(6.56)	(3.74)	(8.10)	(7.88)	(7.85)
OCFA		0.0256***		0.0766***		0.0761***		0.0727***	0.0286***	0.0795***	0.0765***	0.0731***
		(6.17)		(16.90)		(14.60)		(13.78)	(7.93)	(17.48)	(15.95)	(14.99)
ICFA		–0.0221***		–0.0509***		–0.0594***		–0.0563***	–0.0240***	–0.0538***	–0.0585***	–0.0556***
		(–3.18)		(–6.75)		(–6.38)		(–6.01)	(–3.77)	(–7.43)	(–6.52)	(–6.14)
LR									–0.0428***	–0.0519***	–0.0534***	–0.0537***
									(–9.46)	(–10.46)	(–10.51)	(–10.57)
MOM									0.0023	0.0006	–0.0002	–0.0004
									(1.47)	(0.33)	(–0.12)	(–0.23)
Intercept	0.0143***	0.0588***	0.0136***	0.0347***	0.0142***	0.0342***	0.0133***	0.0333***	0.0504***	0.0296***	0.0301***	0.0293***
	(5.42)	(5.81)	(5.57)	(3.66)	(5.94)	(3.70)	(5.65)	(3.61)	(5.51)	(3.35)	(3.49)	(3.39)
N	569,179	533,107	323,658	303,225	282,072	264,098	281,032	263,082	514,195	298,007	260,197	259,203
R-sq	0.002	0.056	0.002	0.06	0.003	0.062	0.006	0.065	0.067	0.077	0.08	0.083

Panel A: Fama-MacBeth regressions of monthly stock return on CFG

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(1
	R	R	R	R	R	R	R	R	R	R	R	

RCFG	0.0013***	0.0009***							0.0009***			
	(10.82)	(8.14)							(9.27)			
ECFG			0.0001	0.0000			0.0030***	0.0019***		-0.0002		0.002
			(0.32)	(-0.02)			(5.10)	(3.59)		(-0.58)		(3.
UCFG					0.0009***	0.0005***	0.0015***	0.0009***			0.0006***	0.001
					(6.88)	(3.95)	(8.83)	(5.95)			(4.86)	(6.
Beta		0.0050**		0.0039		0.0042*		0.0039	0.0028	0.0021	0.0027	0.0
		(1.99)		(1.50)		(1.66)		(1.52)	(1.25)	(0.92)	(1.15)	(1.
Size		-0.0024***		-0.0013***		-0.0013***		-0.0013***	-0.0020***	-0.0011**	-0.0011***	-0.00
		(-4.94)		(-2.91)		(-2.93)		(-2.83)	(-4.59)	(-2.56)	(-2.66)	(-2
BM		0.0022***		0.0050***		0.0047***		0.0047***	0.0022***	0.0052***	0.0050***	0.005
		(3.12)		(6.86)		(6.58)		(6.56)	(3.74)	(8.10)	(7.88)	(7.
OCFA		0.0256***		0.0766***		0.0761***		0.0727***	0.0286***	0.0795***	0.0765***	0.073
		(6.17)		(16.90)		(14.60)		(13.78)	(7.93)	(17.48)	(15.95)	(14
ICFA		-0.0221***		-0.0509***		-0.0594***		-0.0563***	-0.0240***	-0.0538***	-0.0585***	-0.05
		(-3.18)		(-6.75)		(-6.38)		(-6.01)	(-3.77)	(-7.43)	(-6.52)	(-6
LR									-0.0428***	-0.0519***	-0.0534***	-0.05
									(-9.46)	(-10.46)	(-10.51)	(-10
MOM									0.0023	0.0006	-0.0002	-0.0
									(1.47)	(0.33)	(-0.12)	(-0

Intercept	0.0143***	0.0588***	0.0136***	0.0347***	0.0142***	0.0342***	0.0133***	0.0333***	0.0504***	0.0296***	0.0301***	0.029
	(5.42)	(5.81)	(5.57)	(3.66)	(5.94)	(3.70)	(5.65)	(3.61)	(5.51)	(3.35)	(3.49)	(3.
N	569179	533107	323658	303225	282072	264098	281032	263082	514195	298007	260197	259
R-sq	0.002	0.056	0.002	0.06	0.003	0.062	0.006	0.065	0.067	0.077	0.08	0.0

Panel B. Fama-MacBeth Regressions of Monthly Stock Return on CFG

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	R	R	R	R	R	R	R	R
RCFG	0.0011***	0.0009***						
	(9.01)	(8.80)						
ECFG			–0.0001	–0.0001			0.0021***	0.0016***
			(–0.13)	(–0.32)			(3.46)	(2.85)
UCFG					0.0007***	0.0004***	0.0011***	0.0009***
					(5.13)	(3.66)	(6.59)	(5.29)
CFA	0.0037	0.0200***	0.0493***	0.0760***	0.0563***	0.0817***	0.0510***	0.0775***
	(0.56)	(4.43)	(8.95)	(16.84)	(7.61)	(13.41)	(6.63)	(11.81)
Beta		0.0023		0.0019		0.0023		0.002
		(1.04)		(0.80)		(0.97)		(0.86)
Size		–0.0017***		–0.0010**		–0.0009**		–0.0009**
		(–3.91)		(–2.46)		(–2.23)		(–2.15)
BM		0.0024***		0.0047***		0.0047***		0.0046***
		(4.26)		(7.54)		(7.51)		(7.41)
LR		–0.0413***		–0.0516***		–0.0529***		–0.0528***
		(–9.11)		(–10.31)		(–10.47)		(–10.48)
MOM		0.0031*		0.0005		–0.0004		–0.0005
		(1.92)		(0.24)		(–0.21)		(–0.29)
Intercept	0.0142***	0.0455***	0.0105***	0.0303***	0.0096***	0.0271***	0.0094***	0.0266***
	(5.31)	(5.07)	(4.02)	(3.49)	(3.81)	(3.18)	(3.75)	(3.13)
N	556,123	506,037	319,343	295,417	277,984	257,180	276,975	256,216
R-sq	0.012	0.063	0.008	0.074	0.008	0.076	0.012	0.08

Panel C. Fama-MacBeth Regressions of Annual Stock Return on CFG

	(1) AR	(2) AR	(3) AR	(4) AR	(5) AR	(6) AR	(7) AR	(8) AR
RCFG	0.0171***	0.0141***						
	(10.02)	(7.16)						
ECFG			–0.0029	–0.0039			0.0357***	0.0222**
			(–0.47)	(–0.77)			(3.63)	(2.68)
UCFG					0.0111***	0.0053***	0.0180***	0.0106***
					(5.17)	(2.84)	(6.52)	(4.28)
Beta		0.042		0.0363		0.0438		0.0386
		(1.16)		(1.07)		(1.22)		(1.09)
Size		–0.0302***		–0.0177**		–0.0167**		–0.0163**
		(–4.18)		(–2.74)		(–2.75)		(–2.65)
BM		0.0123		0.0510***		0.0511***		0.0493***
		(1.01)		(4.07)		(4.10)		(3.86)
OCFA		0.1404		0.8294***		0.8166***		0.7527***
		(1.33)		(11.17)		(9.10)		(8.66)
ICFA		–0.1844*		–0.6617***		–0.7419***		–0.6893***
		(–1.87)		(–7.48)		(–4.48)		(–4.07)
Intercept	0.1717***	0.7430***	0.1631***	0.4607***	0.1709***	0.4400***	0.1604***	0.4346***
	(–6.05)	(–4.91)	(–6.29)	(–3.62)	(–6.65)	(–3.64)	(–6.33)	(–3.57)
N	44,003	41,466	25,275	23,769	22,060	20,722	21,979	20,643
R-sq	0.007	0.062	0.002	0.079	0.006	0.079	0.011	0.082

Panel C: Fama-MacBeth regressions of monthly stock return on CFG and CFA

	(1) R	(2) R	(3) R	(4) R	(5) R	(6) R	(7) R	(8) R	(9) R	(10) R
RCFG			0.0011***	0.0009***						

			(8.62)	(8.62)						
ECFG					0.0000	0.0000			0.0022***	0.0018***
					(-0.03)	(0.01)			(3.62)	(3.13)
UCFG							0.0006***	0.0004***	0.0011***	0.0009***
							(4.83)	(3.60)	(6.53)	(5.36)
CFA	0.0203***	0.0348***	0.0046	0.0205***	0.0518***	0.0812***	0.0568***	0.0869***	0.0509***	0.0812***
	(3.52)	(8.41)	(0.68)	(4.16)	(9.48)	(17.28)	(7.68)	(12.77)	(6.69)	(11.53)
Size		-0.0018***		-0.0017***		-0.0010***		-0.0008**		-0.0008**
		(-4.89)		(-4.61)		(-2.81)		(-2.33)		(-2.34)
BM		0.0039***		0.0026***		0.0049***		0.0048***		0.0047***
		(6.16)		(4.12)		(7.61)		(7.60)		(7.44)
LR		-0.0373***		-0.0396***		-0.0483***		-0.0494***		-0.0495***
		(-7.97)		(-7.72)		(-8.95)		(-8.78)		(-8.76)
MOM		0.0034**		0.0029		-0.0005		-0.0012		-0.0014
		(2.04)		(1.63)		(-0.26)		(-0.56)		(-0.67)
Intercept	0.0137***	0.0484***	0.0139***	0.0469***	0.0099***	0.0305***	0.0093***	0.0262***	0.0091***	0.0262***
	(4.80)	(6.14)	(5.09)	(5.90)	(3.74)	(3.91)	(3.62)	(3.38)	(3.57)	(3.40)
N	837097	736811	544696	503403	310901	290288	269793	251543	268844	250639
R-sq	0.008	0.035	0.012	0.041	0.008	0.046	0.008	0.048	0.012	0.052

Note: This table presents Fama-MacBeth regressions of monthly returns (R) and compounded annual return (AR) on realized cash flow growth (RCFG), expected cash flow growth (ECFG), and unrealized cash flow growth (UCFG), where RCFG = ECFG + UCFG. Panel A presents monthly returns, Panel B controls for free cash flow to assets (CFA), and Panel C presents annual returns. Controls include Beta, ln(market equity) (SIZE), ln(book equity/market equity) (BM), operating cash flow scaled by assets (OCFA), investing cash flow scaled by assets (ICFA), one-month lag of monthly stock return (LR), and prior 11-month momentum taken from *t*-1 to *t*-12 (MOM). The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

TABLE 4. **Fama-MacBeth Regressions of Return on OCFG and ICFG**

	(1) R	(2) R	(3) R	(4) R	(5) R	(6) R
OCFG	0.0065***	0.0068***			0.0069***	0.0072***
	(11.79)	(15.66)			(12.48)	(16.00)
ICFG			–0.0026***	–0.0017***	–0.0023***	–0.0017***
			(–5.75)	(–4.73)	(–4.31)	(–3.90)
Beta		0.0014		0.0022		0.0014
		(0.64)		(1.12)		(0.65)
Size		–0.0012***		–0.0013***		–0.0012***
		(–2.95)		(–3.31)		(–2.85)
BM		0.0032***		0.0041***		0.0031***
		(6.05)		(7.73)		(5.81)
LR		–0.0431***		–0.0468***		–0.0433***
		(–10.07)		(–12.24)		(–10.07)
MOM		0.0039**		0.0051***		0.0035**
		(2.53)		(3.79)		(2.19)
Intercept	0.0136***	0.0367***	0.0152***	0.0395***	0.0137***	0.0360***
	(5.44)	(4.32)	(6.33)	(4.86)	(5.61)	(4.27)
N	639,035	587,752	816,426	745,242	579,498	534,385
R-sq	0.003	0.059	0.002	0.057	0.006	0.062

Note: This table presents Fama-MacBeth regressions of monthly return on operating cash flow growth (OCFG) and investing cash flow growth (ICFG) lagged one additional year. Controls include Beta, ln(market equity) (SIZE), ln(book equity/market equity) (BM), one-month lag of monthly stock return (LR), and prior 11-month momentum taken from *t*-1 to *t*-12 (MOM). The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

TABLE 5. Fama-MacBeth Regressions of Stock Return on RCFG Controlling for Asset Growth Effects on FCF and SIZE in FCF

Panel A. Fama-MacBeth Regressions of Monthly Stock Return on RCFG for Firms with Less Than 25% Asset Growth

	(1) R	(2) R
RCFG	0.0012***	0.0013***
	(9.74)	(11.54)
Beta		–0.0006
		(–0.28)
Size		–0.0005
		(–1.19)
BM		0.0035***
		(6.14)
LR		–0.0513***
		(–11.39)
MOM		–0.0008
		(–0.50)
Intercept	0.0117***	0.0237**
	(4.74)	(2.58)
N	449,739	412,734
R-sq	0.002	0.059

Panel B. Fama-MacBeth Regressions of Monthly Stock Return on CFGA, Where FCF Is Scaled by Total Assets

	(1) R	(2) R
CFGA	0.0014***	0.0014***
	(10.13)	(11.96)
Beta		0.0017
		(0.76)
Size		–0.0014***
		(–2.88)
BM		0.0026***
		(4.18)
LR		–0.0406***
		(–8.77)
MOM		0.0039**
		(2.45)
Intercept	0.0143***	0.0398***
	(5.43)	(4.08)
N	566,144	514,155
R-sq	0.002	0.057

Note: This table presents Fama-MacBeth regressions of monthly returns (R) regressed on realized cash flow growth (RCFG) when asset growth is less than |25%| in Panel A and regressed on realized growth of free cash flow scaled by total assets (CFGA) in Panel B. Controls include Beta, ln(market equity) (SIZE), ln(book equity/market equity) (BM), one-month lag of monthly stock return (LR), and prior 11-month momentum taken from *t*-1 to *t*-12 (MOM). The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

TABLE 6. Time and Industry Subsample Fama-MacBeth Regressions of Returns on RCFG

Panel A: Fama-MacBeth regressions of monthly stock return on CFG across sampled time periods

	90s		00s		Post-Crisis	
	(1)	(2)	(1)	(2)	(1)	(2)
	R	R	R	R	R	R
RCFG	0.0011***	0.0011***	0.0013***	0.0014***	0.0014***	0.0014***
	(5.74)	(6.98)	(5.90)	(7.80)	(7.11)	(7.44)
Size		-0.0014*		-0.0019**		-0.0009*
		(-1.80)		(-2.31)		(-1.89)
BM		0.0027**		0.0057***		0.0002
		(2.06)		(4.57)		(0.28)
LR		-0.0439***		-0.0429***		-0.0254***
		(-5.58)		(-4.18)		(-2.92)
MOM		0.0107***		-0.0025		-0.0006
		(4.46)		(-0.61)		(-0.24)
Intercept	0.0161***	0.0432**	0.0140**	0.0517***	0.0125***	0.0292***
	(3.79)	(2.57)	(2.44)	(2.88)	(3.03)	(2.79)
N	152757	144956	194135	174960	213497	195636
R-sq	0.002	0.033	0.002	0.041	0.002	0.027

Panel A. Fama-MacBeth Regressions of Monthly Stock Return on CFG across Sampled Time Periods

	’90s		’00s		Postcrisis	
	(1)	(2)	(1)	(2)	(1)	(2)
	R	R	R	R	R	R
RCFG	0.0011***	0.0011***	0.0013***	0.0014***	0.0014***	0.0014***
	(5.74)	(6.98)	(5.90)	(7.80)	(7.11)	(7.44)
Size		–0.0014*		–0.0019**		–0.0009*
		(–1.80)		(–2.31)		(–1.89)
BM		0.0027**		0.0057***		0.0002
		(2.06)		(4.57)		(0.28)
LR		–0.0439***		–0.0429***		–0.0254***
		(–5.58)		(–4.18)		(–2.92)
MOM		0.0107***		–0.0025		–0.0006
		(4.46)		(–0.61)		(–0.24)
Intercept	0.0161***	0.0432**	0.0140**	0.0517***	0.0125***	0.0292***
	(3.79)	(2.57)	(2.44)	(2.88)	(3.03)	(2.79)
N	152,757	144,956	194,135	174,960	213,497	195,636
R-sq	0.002	0.033	0.002	0.041	0.002	0.027

Panel B. Fama-MacBeth Regressions of Monthly Stock Return on CFG across Sample Time Industries

Industry	Manufacturing	Services	Financials	Transportation and Utilities	Trade	Mining and Construction	Agriculture	Acquisition
RCFG	0.0014***	0.0019***	0.0017**	0.0004	0.0013***	–0.0002	–0.074	–0.0087**
	(9.74)	(7.11)	(2.13)	(1.43)	(4.16)	(–0.31)	(–1.25)	(–2.13)
Size	–0.0015***	–0.0014**	–0.0004	–0.0006	0.0006	–0.0009	–0.0128	–0.0099**
	(–3.27)	(–2.49)	(–0.95)	(–1.59)	(1.26)	(–1.27)	(–1.38)	(–2.25)
BM	0.0030***	0.0027***	0.0005	0.0026***	0.0047***	0.0044***	0.0506	–0.0163
	(3.93)	(2.69)	(0.65)	(2.72)	(4.15)	(3.31)	(1.37)	(–0.88)
LR	–0.0440***	–0.0367***	–0.0615***	–0.0478***	–0.0388***	–0.0298**	0.6277	0.1225
	(–7.83)	(–5.32)	(–7.06)	(–5.25)	(–5.10)	(–2.06)	(1.28)	(0.95)
MOM	0.0015	0.0042**	0.0113***	0.0042	0.0033	0.0055	0.0553	0.0153
	(0.75)	(2.01)	(3.72)	(1.25)	(1.26)	(1.07)	(0.66)	(0.47)
Intercept	0.0436***	0.0416***	0.0191**	0.0228***	0.0015	0.0299*	0.2918	0.2068**
	(4.57)	(3.75)	(2.13)	(2.71)	(0.15)	(1.94)	(1.55)	(2.35)
N	276,081	105,088	55,728	55,180	53,385	31,149	2,306	912
R-sq	0.041	0.06	0.101	0.097	0.081	0.158	0.894	0.999

Note: This table presents subsample Fama-MacBeth regressions of monthly return on realized cash flow growth (RCFG), ln(market equity) (SIZE), ln(book equity/market equity) (BM), one-month lag of monthly stock return (LR), and prior 11-month momentum taken from t-1 to t-12 (MOM). Panel A presents time period subsamples, and Panel B presents industry subsamples. ’90s cover 1990–1999, ’00s cover 2000–2009, and Postcrisis covers 2010–2019. The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

TABLE 7. Excess Returns of Portfolios Sorted on CFG

Panel A. Alphas across Univariate CFG Portfolio Sorts

	Fama-French Three-Factor Model				Fama-French Five-Factor Model			
RCFG Portfolio	EW		VW		EW		VW	
	α	*t*-stat	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	–0.0006	(–0.69)	–0.0043***	(–3.30)	–0.0001	(–0.13)	–0.0042***	(–3.06)
2	0.0020***	(2.92)	–0.0003	(–0.30)	0.0012*	(1.75)	–0.0009	(–0.82)
3	0.0041***	(5.87)	0.0012	(1.54)	0.0040***	(5.43)	0.0001	(0.08)
4	0.0074***	(9.06)	0.0034***	(3.21)	0.0075***	(8.91)	0.0036***	(3.27)
High	0.0095***	(13.30)	0.0038***	(3.86)	0.0090***	(12.15)	0.0034***	(3.31)
ECFG Portfolio	EW		VW		EW		VW	
	α	*t*-stat	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	0.0037***	(4.13)	0.0001	(0.04)	0.0027***	(2.94)	–0.0019	(–1.37)
2	0.0039***	(5.43)	0.0015	(1.44)	0.0025***	(3.61)	–0.0001	(–0.06)
3	0.0045***	(6.26)	0.0027***	(2.76)	0.0030***	(4.42)	0.0015	(1.52)
4	0.0042***	(5.93)	0.0024*	(1.93)	0.0032***	(4.53)	0.0026**	(2.07)
High	0.0038***	(4.84)	0.0015	(1.05)	0.0032***	(3.89)	0.0017	(1.16)
UCFG Portfolio	EW		VW		EW		VW	
	α	*t*-stat	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	0.0015*	(1.73)	–0.0024	(–1.48)	0.0002	(0.18)	–0.0037**	(–2.31)
2	0.0026***	(3.44)	–0.0006	(–0.45)	0.0013*	(1.79)	–0.0003	(–0.25)
3	0.0045***	(6.53)	0.0039***	(4.02)	0.0030***	(4.61)	0.0027***	(2.78)
4	0.0070***	(9.37)	0.0043***	(4.05)	0.0057***	(7.75)	0.0027**	(2.54)
High	0.0090***	(11.04)	0.0031**	(2.29)	0.0077***	(9.63)	0.002	(1.45)

Panel B. Alphas across Independent Bivariate ECFG and UCFG Portfolio Sorts

Fama-French Three-Factor Model — EW

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.0013	–0.0045*	0.0015	0.0013	0.0071***
	(–0.17)	(–1.91)	(0.72)	(1.02)	(6.91)
2	–0.0089***	–0.0007	0.0019*	0.0065***	0.0092***
	(–2.86)	(–0.41)	(1.94)	(6.38)	(7.31)
3	–0.0036	0.0018	0.0045***	0.0089***	0.0131***
	(–1.61)	(1.43)	(4.98)	(8.07)	(7.38)
4	–0.0008	0.0027***	0.0062***	0.0115***	0.0143***
	(–0.56)	(2.88)	(5.58)	(6.86)	(5.24)
5	0.0029***	0.0086***	0.0148***	0.0117***	0.0171***
	(3.05)	(5.88)	(5.64)	(3.67)	(4.26)

Fama-French Five-Factor Model — EW

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.0018	–0.0048*	0.0006	0.0000	0.0057***
	(–0.23)	(–1.93)	(0.26)	(–0.03)	(5.55)
2	–0.0105***	–0.002	0.0004	0.0051***	0.0081***
	(–3.23)	(–1.07)	(0.39)	(4.97)	(6.30)
3	–0.0048**	0.0003	0.0025***	0.0073***	0.0115***
	(–2.07)	(0.24)	(3.00)	(6.68)	(6.37)
4	–0.0024*	0.0012	0.0047***	0.0109***	0.0134***
	(–1.79)	(1.33)	(4.27)	(6.25)	(4.80)
5	0.0017*	0.0081***	0.0154***	0.0102***	0.0182***
	(1.79)	(5.32)	(5.68)	(3.08)	(4.43)

Fama-French Three-Factor Model — VW

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.0048	–0.0004	–0.0028	0.0015	0.0019
	(–0.56)	(–0.13)	(–1.01)	(0.71)	(1.03)
2	–0.0084**	–0.0025	0.0007	0.0033**	0.0040**
	(–2.30)	(–1.17)	(0.44)	(2.20)	(2.05)
3	–0.0080***	0.0005	0.0031**	0.0064***	0.0062**
	(–2.61)	(0.21)	(2.22)	(3.92)	(2.50)
4	–0.0054**	0.0009	0.0059***	0.0064**	0.0073**
	(–2.28)	–0.57	(3.15)	(2.53)	(2.27)
5	0.0001	–0.0002	0.0126***	0.0082**	0.0101**
	(0.08)	(–0.11)	(3.65)	(2.03)	(2.28)

Fama-French Five-Factor Model — VW

ECFG Quintile	UCFG Quintile 1	2	3	4	5
1	–0.0048	–0.0024	–0.0047*	–0.0019	0.0001
	(–0.55)	(–0.81)	(–1.65)	(–0.93)	(0.05)
2	–0.0105***	–0.0036	–0.0011	0.0017	0.002
	(–2.75)	(–1.62)	(–0.63)	(1.13)	(1.02)
3	–0.0107***	0.0015	0.0008	0.0045***	0.0058**
	(–3.39)	(0.63)	(0.57)	(2.69)	(2.28)
4	–0.0070***	0.0008	0.0058***	0.0068**	0.0055*
	(–2.84)	(0.49)	(2.99)	(2.54)	(1.72)
5	–0.0013	–0.0001	0.0117***	0.0062	0.0133***
	(–0.74)	(–0.04)	(3.27)	(1.49)	(2.92)

Note: This table presents alphas from time-series regressions of equal (EW)- and value (VW)-weighted monthly portfolio returns sorted on realized cash flow growth (RCFG), expected cash flow growth (ECFG), or unrealized cash flow growth (UCFG) quintile portfolios each June, where RCFG = ECFG + UCFG. Panel A presents the univariate portfolio sorts, and Panel B presents the bivariate ECFG and UCFG sorts. Portfolio returns are regressed on the market return above the risk-free rate (MKT), small stock returns above large stock returns (SMB), and high BM returns above low BM returns (HML). The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

TABLE 8. Time-Series Alphas of Portfolios Sorted on RCFG across Time Periods

Equal-Weighted Returns

Fama-French Three-Factor Model

CFG Portfolio	'90s		'00s		Postcrisis	
	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	–0.0004	(–0.32)	0.0032	(1.64)	–0.0030***	(–2.65)
2	0.0014	(1.39)	0.0058***	(3.75)	–0.001	(–1.03)
3	0.0034***	(3.21)	0.0095***	(5.97)	0.0021**	(2.58)
4	0.0063***	(5.39)	0.0147***	(8.42)	0.0042***	(4.55)
High	0.0085***	(7.89)	0.0157***	(9.97)	0.0059***	(6.35)

Fama-French Five-Factor Model

CFG Portfolio	'90s		'00s		Postcrisis	
	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	–0.0004	(–0.30)	0.0037*	(1.78)	–0.0027**	(–2.46)
2	0.001	(0.99)	0.0044***	(2.82)	–0.0009	(–0.94)
3	0.0029***	(2.70)	0.0094***	(5.61)	0.0023***	(2.67)
4	0.0059***	(4.98)	0.0150***	(8.46)	0.0044***	(4.67)
High	0.0077***	(7.29)	0.0148***	(9.06)	0.0059***	(6.27)

Value-Weighted Returns

Fama-French Three-Factor Model

CFG Portfolio	'90s		'00s		Postcrisis	
	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	–0.0050***	(–3.08)	0.0009	(0.28)	–0.0054***	(–3.45)
2	–0.0008	(–0.46)	0.0035	(1.31)	–0.0021*	(–1.90)
3	0	(0.02)	0.0030*	(1.84)	0.0011	(1.25)
4	0.0069***	(3.91)	0.0077***	(2.99)	–0.0002	(–0.22)
High	0.0025	(1.51)	0.0079***	(3.39)	0.0027**	(2.36)

Fama-French Five-Factor Model

CFG Portfolio	'90s		'00s		Postcrisis	
	α	*t*-stat	α	*t*-stat	α	*t*-stat
Low	–0.0057***	(–3.44)	0.0013	(0.38)	–0.0058***	(–3.65)
2	–0.0017	(–0.98)	0.0023	(0.83)	–0.0023**	(–2.08)
3	–0.0013	(–0.96)	0.002	(1.23)	0.0006	(0.72)
4	0.0068***	(3.73)	0.0072***	(2.74)	–0.0005	(–0.46)
High	0.0021	(1.26)	0.0073***	(3.03)	0.0025**	(2.19)

Note: This table presents alphas from time-series regressions of equal- and value-weighted monthly return sorted by realized cash flow growth (RCFG). Returns are regressed on the monthly stock market return above the risk-free rate (MKT), small stock returns above large stock returns (SMB), and high BM returns above low BM returns (HML). '90s cover 1990–1999, '00s cover 2000–2009, and Postcrisis covers 2010–2019. The sample covers the period 1988–2019 and excludes financial firms. *T*-statistics are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.