Resurrecting the Value Factor from its Redundancy *

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Abstract

The value factor is redundant in the Fama-French (2015) five-factor model and its explanatory power is primarily subsumed by the investment factor. We show that the value and investment factors' strong relation arises because book-to-market and investment are driven by common economic forces: cash flow shocks and discount rate shocks. We identify those stocks whose variation in book-to-market and investment is due to discount rate shocks, and thus due to differences in expected returns, and document that only they earn the value and investment premia. These stocks' value and investment premia are roughly 50% larger than the usual value and investment premia. We show that adjusted value and investment factors that use only stocks whose book-to-market and investment are driven by discount rate shocks cannot subsume each other. Thus, the value factor is not redundant if it is built only from stocks for which book-to-market is a good indicator of expected returns and which therefore actually reflect pricing information.
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1 Introduction

The value factor of Fama and French (1993, 1996) was arguably the main source of their three-factor model's explanatory power for the cross-section of stock returns. Therefore, the finding of Fama and French (2015) that the value factor becomes redundant when they extend their three-factor model with a profitability and an investment factor came as a surprise. They motivate these additional factors as well as the value factor by showing that book-to-market, profitability, and investment are, theoretically, related to expected returns. Empirically, the value factor has, however, no incremental explanatory power for expected returns, and its explanatory power is primarily subsumed by the investment factor. Nevertheless, given their theoretical motivation, Fama and French (2015) keep the value factor in their model[1].

The contrast between the theoretical motivation for the value factor and its empirical redundancy as well as Fama and French (2015)'s decision to keep it in their five-factor model have sparked controversy about the value factor. On the one hand, the value factor had been considered to be the most important factor for explaining the cross-section of stock returns for a long time. The value premium is an established empirical finding and Fama and French (2015) provide a profound theoretical motivation for the value factor. Additionally, the five-factor model, including the value factor, has been widely adopted in academia and practice, and other newly proposed factor models also comprise value factors (e.g. Barillas and Shanken (2018), Daniel et al. (2020), and Fama and French (2020)). On the other hand, the value factor seems to have no incremental explanatory power in the presence of an investment factor. Moreover, Hou et al. (2015) derive an economic model that is able to theoretically motivate the profitability and investment factors but not the value factor. Consequently, the theoretical motivation as well as the empirical usefulness of the value factor are both called into question.

Our goal is to resolve the controversy about the value factor. More specifically, we aim to answer the question of whether a value factor should still be part of a multifactor model that includes an investment factor. To this end, we evaluate the reasons for the value factor's close relation with the investment factor and assess whether a value factor can capture incremental pricing information beyond an investment factor. Shedding light on these issues is important for at least three reasons. First, the Fama-French (2015) five-factor model has established itself as the leading factor model in academic research, for the estimation of capital costs, and for performance evaluation. Hence, the inclusion or exclusion of the value factor has potentially huge implications for both academia and practice. This is particularly true since the value factor's redundancy might be specific to the sample or sample period for which it has been documented, and thus, might not hold in other samples or going forward. Evaluating the value factor's documented redundancy enables potential users of the model to make an educated decision on whether or not to include the value factor. Second, factor models are the workhorse approach in empirical asset pricing. The questions of how to combine factors

[1]Fama and French (2015) further rationalize this decision by arguing that the value factor's documented redundancy "may be specific to this sample" (p. 2).

in factor models and of how to construct them such that they capture the intended effects are critical. Beyond the assessment of whether a value factor should be part of a multifactor model that includes an investment factor, investigating the value factor's redundancy may also yield important guidelines on how to construct theoretically motivated factors in the most effective way. Third, investment strategies based on empirical factors such as the value and investment factors are widely employed in the investment management industry. Examining the value factor's redundancy may deliver valuable insights on how to implement value and investment factor strategies as well as on whether they have an added value with respect to each other.

In order to understand the reasons for the value factor's redundancy in the Fama-French (2015) five-factor model, we investigate the nature of the value factor's strong relation to the investment factor. For this purpose, we propose and evaluate an intuitive explanation for the association between their underlying characteristics - book-to-market and investment. Based on the dividend discount model and the net present value rule of investment, we argue that both are driven by cash flow and discount rate shocks: negative cash flow shocks as well as positive discount rate shocks lead investors to lower their valuation of a given firm, implying an increase in the firm's book-to-market ratio, while they also prompt the firm's managers to decrease investment[2]. This mechanism gives rise to a negative relation between book-to-market and investment. Importantly, this relation should only be driven by book-to-market changes that are due to market rather than book equity changes since only market equity changes reflect cash flow and discount rate shocks.

Our empirical evidence supports this explanation. Based on Fama-MacBeth (1973) regressions and portfolio sorts, we document a negative relation between book-to-market and investment that is only driven by stocks whose variation in book-to-market is due to market equity changes. These stocks give also rise to a substantial overlap between the value and investment factors' mimicking portfolios. This overlap is to a considerable extent responsible for the factors' strong comovement. Yet, their comovement is not only mechanical: stocks whose book-to-market is driven by market equity changes contribute to the value factor's comovement with the investment factor no matter whether they are in the investment factor's mimicking portfolio or not. We further demonstrate that mispricing or financial constraints are unlikely to cause these findings.

While it may be natural to assume that one of the two factors is redundant given that both are driven by the same effects, theory does not predict which of the two factors should be the redundant one. Based on spanning regressions, we find that the value factor is the redundant one for three reasons. First, it comprises the noisy book equity-driven part that reflects other effects than the value factor's market equity-driven part or the investment factor. Second, the value factor captures the effects less precisely, that is, with higher volatility, than the investment factor. This result is primarily due to periods of market-wide distortions, such as the dotcom bubble, which affect the value factor more than the investment factor because it relies on a

[2]The same reasoning applies analogously to positive cash flow shocks and negative discount rate shocks.

market variable. Third, the value factor is a slightly worse hedge for the three remaining factors of the five-factor model (i.e., market, size, and profitability) than the investment factor. The first two reasons indicate that the value factor is systematically more prone to redundancy than the investment factor. Nevertheless, supporting Fama and French (2015), we argue and present indicative evidence that the later two reasons may very well be specific to the considered sample or sample period - at least in their severity - suggesting that the value factor may be not redundant in other samples or going forward. This conjecture does, however, not imply that the investment factor becomes redundant in this case. Our results rather indicate that both factors may, in principle, be non-redundant simultaneously.

In theory, only differences in discount rates are associated with differences in expected returns. Thus, high book-to-market and low investment should be associated with higher future returns only if they are high respectively low due to discount rate shocks rather than cash flow shocks. Consequently, only those stocks whose variation in book-to-market and investment is due to discount rate shocks, and thus due to differences in expected returns, should contain the value and investment factors' pricing information for the cross-section of stock returns. In order to investigate these conjectures, we construct proxies for firms' cash flow and discount rate shocks. Following Hou and van Dijk (2019), our proxy for firms' cash flow shocks is the profitability shock as estimated from a cross-sectional profitability model. Building on the estimated profitability shocks, we obtain a proxy for firms' discount rate shocks as the residual return from a cross-sectional regression of their contemporaneous stock returns on the estimated profitability shocks.

Our proxies are successful in identifying the variation in book-to-market and investment that captures information about expected returns. Specifically, the results from Fama-MacBeth (1973) regressions show that the predictive power of book-to-market and investment for future returns primarily emanates from those book-to-market and investment changes that can be classified as discount rate shock-driven. Portfolio sorts corroborate this finding: only stocks whose book-to-market and investment are driven by discount rate shocks earn the value and investment premia. The value and investment premia of these stocks amount to around 6.0% and 3.6% per annum, respectively, and are thus roughly 50% larger than the usual premia. By contrast, the value and investment premia are weak to non-existent for stocks whose book-to-market and investment are driven by cash flow shocks. Moreover, the predictive power of discount rate shock-driven book-to-market, albeit weaker, remains significant even when we control for discount rate shock-driven investment, and vice versa. This indicates that both, book-to-market and investment, capture independent information about expected returns.

The differences between the discount rate shock- and cash flow shock-driven value and investment premia are arguably due to differences in expected returns. Nevertheless, the Fama-French (2015) five-factor model fails to explain why only discount rate shock-driven stocks earn value and investment premia while cash flow shock-driven stocks do not. Specifically, it produces sizable and statistically significant alphas for the differences between the discount rate shock-and cash flow shock-driven value and investment premia. Thus, the Fama-French (2015) model cannot distinguish whether book-to-market is high receptively investment is low due to high expected returns or due to low expected profitability, assigning similar expected returns to both types of stocks.

Following these finding, we construct adjusted versions of the value and investment factors that comprise only stocks whose book-to-market and investment are driven by discount rate shocks. These are the stocks for which book-to-market and investment are good indicators of expected returns and which therefore contain the factors' pricing information. We find that these discount rate shock-driven value and investment factors cannot subsume each other in spanning regressions. This result means that they are not redundant with respect to each other and that the value factor contains incremental pricing information beyond the investment factor. The cash flow shock-driven part is responsible that this incremental information is hidden in the Fama-French (2015) version of the value factor: it contains predictably hardly pricing information but strongly contributes to the value factor's comovement with the investment factor.

Based on formal asset pricing tests, we further show that a five-factor model that uses the factors' adjusted versions exhibits a better pricing performance than the standard five-factor model. In particular, it exhibits a higher squared Sharpe ratio and it can also explain why discount rate shock-driven stocks earn value and investment premia while cash flow shock-driven stocks do not. Hence, value and investment factors that use only stocks whose book-to-market and investment are good indicators of expected returns, and which are therefore more likely to capture pricing information, have the potential to improve the model's pricing performance.

Finally, we use our finding that the value and investment premia of discount rate shock-driven and cash flow shock-driven stocks are different as a laboratory to evaluate the three-factor ICAPM of Campbell et al. (2018) as a potential explanation for the value and investment effects. We find that our discount rate shock-driven value and investment factors have similar exposures to the three factors as cash flow shock-driven value and investment factors. Thus, the three-factor ICAPM cannot explain the return differences between the discount rate shock- and cash flow shock-driven factors. Contrary to earlier evidence, this finding implies that the three-factor ICAPM cannot rationalize the value and investment effects.

Our study contributes to four strands of literature. First, we contribute to the resolution of the controversy about the value factor that has been raised by the studies of Fama and French (2015) and Hou et al. (2015). While Fama and French (2015) motivate their factors based on a manipulation of the dividend discount model, Hou et al. (2015) motivate their factors based on an economic model inspired by q-theory and production-based asset pricing. Both approaches agree that discount rates, and therefore expected returns, should be higher for low investment and high profitability firms. However, the approach of Hou et al. (2015) does not yield an independent relation between book-to-market and discount rates. They argue that the value effect is a manifestation of the investment effect and that the value factor is a noisy version of the investment factor, suggesting that the value factor is not only empirically but also theoretically redundant. In support of Hou et al. (2015)'s conjectures, we show that the value and investment factors are strongly related because their underlying characteristics are driven by the same economic forces, and that the value factor is noisier because it comprises the book equity-driven part and because it is more strongly affected by market-wide distortions. Nevertheless, we reject the conclusion that these observations necessitate a value factor to be empirically redundant. On the one hand, our results support Fama and French (2015)'s claim that the redundancy of their value factor may be specific to the sample or sample period. On the other hand, we find that the value factor contains independent and incremental pricing information beyond the investment factor. This information is in parts hidden in the Fama-French (2015) version of the factor because its construction methodology does not take into account whether variation in book-to-market is due to differences in expected returns or due to differences in expected profitability. Consequently, our results support the inclusion of a value factor in a multifactor model even in the presence of an investment factor. Yet, the value factor's construction methodology should be modified such that its pricing information is reflected more accurately.

Second, this study contributes to the recent literature on improvements to the factors' construction methodologies. Fama and French (2018) show that the pricing performance of their five-factor model is quite sensitive to the factors' construction methodology. Fama and French (2020) construct cross-sectional factors from Fama-MacBeth (1973) regressions and document that they perform somewhat better than the traditional time-series factors. Daniel et al. (2020) propose hedged versions of the five Fama-French (2015) factors that aim to hedge unpriced sources of covariation in order to capture priced sources of covariation more accurately. They find that the factors' hedged versions improve upon the pricing performance of their standard versions. Moreover, their hedged value factor is no longer redundant. In line with these studies, our findings suggest that better versions of the existing factors are needed. In particular, factors' pricing performance can be substantially improved when their construction methodologies consider more carefully which stocks contain the pricing information that the factors aim to capture. Additionally, we also find that the value factor is not redundant when it is purged of its unpriced component. Thereby, we complement Daniel et al. (2020) by identifying the value factor's unpriced component to be its cash flow shock-driven part.

Third, our paper is related to the extensive literature on the source of book-to-market's predictive power for future returns and on the value premium. Fama and French (2006) aim to isolate book-to-market's information about expected returns by cancelling out its information about expected profitability. Their success in this endeavour is, however, limited. Daniel and Titman (2006) split the change in book-to-market into a tangible return, capturing firms' past performance, and an intangible return, capturing news about firms' future performance. They find that only the intangible return predicts future returns. Fama and French (2008) decompose the change in book-to-market into the per-share book equity change, the without-dividend return, and share issues. They document that all three components have predictive power for future returns. Most similar to our study, Gerakos and Linnainmaa (2018) differentiate between changes in total book equity and total market equity. Consistent with our results, they show that only stocks whose book-to-market is driven by market equity changes earn the value premium. We extend these studies by differentiating more explicitly between book-to-market changes that are informative about future returns and those that are informative about future profitability. Our results indicate that our discount rate shock proxy improves upon these studies in pinpointing the variation in book-to-market that reflects pricing information. That is, it is able to identify stocks whose book-to-market is a good indicator for expected returns and stocks whose book-to-market is a bad indicator for expected returns.

Finally, we contribute to the literature on the investment effect and its relation to the value effect. Titman et al. (2004) are among the first to document a negative relation between investment, as measured by capital expenditures to sales, and future returns. Cooper et al. (2008) show that this relation holds also when investment is measured by asset growth, which is the measure of investment that is used for the construction of the investment factor. Xing (2008) documents that book-to-market and investment capture similar information about future returns. Thereby, the investment effect seems to be able to subsume the value effect, but not vice versa. Our results add to this literature by narrowing down the variation in investment that is related to expected returns. Moreover, we confirm and rationalize the close relation between book-to-market and investment. Yet, contrary to prior evidence, we show that book-to-market and investment reflect incremental information about expected returns when their information about expected profitability is discarded.

Our results have also important implications for the investment management industry. While the value factor is one of the most frequently targeted factors in factor investing strategies, the investment factor is as of yet hardly targeted. Besides the fact that the value factor has been proposed much earlier, another reason may be that targeting the investment factor in addition to the value factor is not perceived to have an added value due to their close relation. Our findings challenge this perception. In particular, beyond indicating that value and investment strategies that use only stocks whose book-to-market and investment are good indicators of expected returns enhance returns, they also suggest that such value and investment strategies represent at least partially independent sources of returns.

Moreover, our findings also provide a theoretical underpinning for the infamous value trap that plagues value investing. The value trap refers to the observation that value stocks with weak profitability do, on average, not outperform. The common practice of avoiding such stocks in value investing strategies resonates well with our results: only value stocks whose book-to-market is high due to positive discount rate shocks earn the value premium. Stocks whose book-to-market is high due to negative cash flow shocks - implying, all else equal, lower profitability - do not earn the value premium.

The remainder of the paper is structured as follows: in Section 2, we discuss our explanation for the value factor's relation with the investment factor. Section 3 presents our data set and reviews the construction of the factors. In Section 4, we describe our book-to-market decomposition as well as our procedure to classify book-to-market and investment changes as cash flow shock- and discount rate shock-driven. Section 5 presents our results on the relation between book-to-market and investment. In Section 6, we investigate the value and investment factors' strong comovement. Section 7 examines why the value factor is the redundant one of the two factors. In Section 8, we present our results on the sources of book-to-market's and investment's predictive power for future returns. Section 9 introduces adjusted versions of the value and investment factors that capture the pricing information of book-to-market and investment more accurately. In Section 10, we evaluate the three-factor ICAPM of Campbell et al. (2018) as a potential explanation for the value and investment effects. Section 11 discusses and explores alternative explanations for the relation between book-to-market and investment. Finally, Section 12 concludes.

2 Theoretical Framework

In this section, we introduce our theses on why book-to-market and investment are related and why the value and investment factors comove. For this purpose, we first resort to the insight of Fama and French (2015) on the relation between a firm's book-to-market ratio, profitability, investment, and discount rate, which they derive by manipulating the dividend discount model:

$$\frac{M_0}{B_0} = \sum_{t=1}^{\infty} \frac{\frac{E_0(Y_t)}{B_0} - \frac{E_0(dB_t)}{B_0}}{(1+r)^t} \tag{1}$$

where M_0 (B_0) is the current market (book) value of the firm, Y_t is total earnings in year t, dB_t is the change in book equity in year t, and r is investors' required return for holding the firm's stock, which is in equilibrium equal to the stock's expected return. In words, this equation says that, all else equal, a firm's book-to-market ratio ($\frac{B_0}{M_0}$) and its expected profitability ($\frac{E_0(Y_t)}{B_0}$) are positively related to its expected return while the firm's expected investment ($\frac{E_0(dB_t)}{B_0}$) is negatively related to its expected return. Thus, book-to-market, profitability, and investment can be interpreted as indicators for expected returns. Fama and French (2015) motivate their value, profitability, and investment factors based on this insight. Thereby, the implicit hope is that the three variables capture sufficiently different information about expected returns, and thus, that the factors reflect priced covariation which is at least partly independent with respect to each other.

Equation (1) has to hold at any point in time. Thus, if one variable changes, one or multiple of the other variables also have to change. Two types of news may trigger changes: cash flow shocks and discount rate shocks. Cash flow shocks are news about a firm's future profitability whereas discount rate shocks reflect changes in investors' required return. In equation (1), the first-order effects of these two types of news are on the firm's expected profitability ($\frac{E_0(Y_t)}{B_0}$) and on its discount rate (r). These two variables are exogenous in the sense that they are only driven by these shocks but cannot be directly determined by investors or firm managers. In order for equation (1) to still hold after the occurrence of a cash flow or a discount rate shock, the firm's market value (M_0) and the firm's expected investment ($\frac{E_0(dB_t)}{B_0}$) need to adjust. These two variables are endogenous in the sense that investors can directly set the firm's market value and firm managers can directly set the firm's investment.

How do these two variables adjust upon cash flow and discount rate shocks, that is, how do investors and firm managers react to these shocks? First, consider a representative investor who values a firm's stock based on the dividend discount model:

$$P_0 = \sum_{t=1}^{\infty} \frac{E_0(D_t)}{(1+r)^t} \tag{2}$$

where P_0 is the fair value of the firm's stock (and thus, in equilibrium, the stock's price), D_t is the dividend in year t, and r is the required return of the investor.

Second, assume that the firm's manager evaluates projects based on the net present value rule of investment, that is, he realizes a project if its net present value is greater zero:

$$NPV_0 = -I_0 + \sum_{t=1}^{T} \frac{E_0(CF_t)}{(1+r)^t} \tag{3}$$

where NPV_0 is a project's current net present value, I_0 is the required investment to realize the project, CF_t is the cash flow from the project in year t, and r is the firm's cost of capital, which is in equilibrium equal to the investor's required return r from equation (2)[3].

Now, consider a discount rate shock. A positive (negative) discount rate shock means that the investor's required return for holding the firm's stock increases (decreases), and in turn, that the firm's cost of capital increases (decreases). Equation (2) shows that an increase (decrease) in the investor's required return leads him to value the firm's stock at a lower (higher) price, implying a decrease (increase) in the firm's market capitalization and an increase (decrease) in its book-to-market ratio. Simultaneously, equation (3) indicates that an increase (decrease) in the firm's cost of capital implies lower (higher) net present values for the firm's potential projects, prompting the firm's manager to decrease (increase) the firm's investment.

Next, suppose the firm experiences a cash flow shock. A negative (positive) cash flow shock implies lower (higher) expected cash flows from projects, and in turn, lower (higher) expected dividends. Equation (2) shows that lower (higher) expected dividends lead the investor to value the firm's stock at a lower (higher) price, implying again a decrease (increase) in the firm's market capitalization and an increase (decrease) in its book-to-market ratio. Simultaneously, equation (3) indicates that lower (higher) expected cash flows result in lower (higher) net present values for the firm's potential projects, prompting the firm's manager to invest less (more).

[3] For simplicity, we assume that the firm's assets are homogeneous, meaning that the discount rate for each project is the same and equal to the firm's average cost of capital.

In both cases - a positive (negative) discount rate shock and a negative (positive) cash flow shock - the firm's book-to-market ratio increases (decreases) and its investment decreases (increases). Thus, discount rate and cash flow shocks give rise to a negative relation between book-to-market and investment. Importantly, for both types of shocks, the negative relation of the firm's book-to-market ratio with its investment is associated with a change in its market equity (i.e., a change in the denominator of the book-to-market ratio; hf. market-channel) rather than with a change in its book equity (i.e., a change in the numerator of the book-to-market ratio; hf. book-channel).

The negative relation between book-to-market and investment should lead to a considerable overlap between the value and investment factors' mimicking portfolios. Specifically, stocks that are high book-to-market stocks (hf. value stocks) due to market equity changes are frequently also low investment stocks (hf. conservative stocks). Analogously, stocks that are low book-to-market stocks (hf. growth stocks) due to market equity changes are frequently also high investment stocks (hf. aggressive stocks). Since the value factor is long in value stocks and short in growth stocks while the investment factor is long in conservative stocks and short in aggressive stocks, the factors' long legs and the factors' short legs should strongly comove, causing in turn the total factors to comove. Figure 1 summarizes our theses on how discount rate shocks and cash flow shocks give rise to the value and investment factors' comovement.

[Insert Figure 1 near here.]

Our discussion so far suggests that discount rate shocks and cash flow shocks contribute both to the negative relation between book-to-market and investment, and thus, to the value and investment factors' comovement. However, only discount rate shocks reflect changes in investors' required returns, and thus, changes in stocks' expected returns. Therefore, only value and conservative stocks whose book-to-market is high respectively whose investment is low due to positive discount rate shocks should, all else equal, have higher expected returns. By contrast, value and conservative stocks whose book-to-market is high respectively whose investment is low due to negative cash flow shocks should, all else equal, not have higher expected returns but rather lower expected profitability. In both cases, the opposite holds for growth and aggressive stocks. This reasoning implies that book-to-market and investment are only good indicators for expected returns when they are driven by discount rate shocks. If they are driven by cash flow shocks, they are not good indicators for expected returns. Consequently, only those stocks whose variation in book-to-market and investment is due to discount rate shocks should contain the factors' pricing information for the cross-section of expected stock returns.

In our empirical analysis, we adopt a two-step approach to evaluate the predictions put forward in this section. In the first step, we examine them in the full cross-section of stocks by implementing Fama-MacBeth (1973) regressions. In the second step, we investigate the factors' mimicking portfolios to verify whether and how these effects drive the relation between the value factor and the investment factor.

3 Data

3.1 Data Sample

Our sample period spans the time from July 1963 to December 2019. We obtain stock data from CRSP and firm fundamentals data from Compustat. We supplement the Compustat fundamentals data with Davis et al. (2000)'s hand-collected book equity data from Kenneth French's website[4]. Our sample includes all stocks that are traded on the NYSE, AMEX, or NASDAQ and that have a CRSP share code of 10 or 11. We adjust monthly holding period returns for potential delisting returns. Following Shumway (1997) and Shumway and Warther (1999), we additionally set missing delisting returns for NYSE and AMEX stocks to -30% and for NASDAQ stocks to -55% in case the delisting was performance-related. Finally, we use the one-month T-bill rate retrieved from Kenneth French's website as a proxy for the risk-free rate. The construction of our key variables is described in detail in Appendix A.

3.2 Factor Portfolios

We construct the value factor and the investment factor as described in Fama and French (2015). In particular, for the construction of the value factor, we sort stocks at the end of each June into two groups according to their market equity at the end of June and into three groups according to their book-to-market from the last fiscal year ending in the prior year[5]. The breakpoints of the sorts are the median market equity and the 30th and 70th book-to-market percentiles of all NYSE stocks. Taking the intersections of the two market equity groups and the three book-to-market groups yields six portfolios. The return on the value factor (HML) is the average of the value-weighted returns on the two high book-to-market portfolios minus the average of the value-weighted returns on the two low book-to-market portfolios. The average monthly return on the value factor is 0.30% (t-statistic: 2.79).

The investment factor is constructed in the same way, only that the second sort is with respect to investment from the last fiscal year ending. The return on the investment factor (CMA) is the average of the value-weighted returns on the two low investment portfolios minus the average of the value-weighted returns on the two high investment portfolios. The average monthly return on the investment factor is 0.21% (t-statistic: 2.93) and its correlation with the value factor is 0.66.

Next, we form for each factor an aggregate long (short) portfolio as the equal-weighted combination of the small long (short) and the big long (short) portfolio. Thereby, each stock

[4] `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`

[5] We measure book-to-market slightly differently than Fama and French (2015): we take the market equity at the fiscal year ending rather than at the calendar year ending. We make this adjustment in order to align the market equity changes with our cash flow and discount rate shock proxies introduced in Section 4.

receives in the aggregate long (short) portfolio the same weight as it has in the calculation of the factor's returns. We refer to the long (short) portfolio of the value factor as the value (growth) portfolio and to the long (short) portfolio of the investment factor as the conservative (aggressive) portfolio. The long-short combinations of the aggregate factor portfolios are denoted as HML portfolio and CMA portfolio, respectively.

Furthermore, we construct subsets of the aggregate portfolios that consist only of those stocks that newly enter the respective portfolio. Specifically, we classify the portfolios' stocks at each rebalancing date (i.e., at the end of each June) as incoming stocks if they were not part of the respective portfolio in the previous year[6]. The stocks' weights in the incoming subsets are proportionally the same as in the complete portfolios and are scaled up to sum to one.

4 Methodology

4.1 Book-to-Market Decomposition

In order to examine our predictions from Section 2, we decompose firms' log-book-to-market ratios following Gerakos and Linnainmaa (2018):

$$BM_{i,t} = BM_{i,t-k} + \sum_{s=0}^{k-1} dBE_{i,t-s} - \sum_{s=0}^{k-1} dME_{i,t-s} \tag{4}$$

where $BM_{i,t}$ is firm i's log-book-to-market ratio in year t and $dBE_{i,t}$ ($dME_{i,t}$) is the log-change in the firm's book (market) equity from year $t-1$ to year t. t-variables are measured at the end of June of year t based on the firm's last fiscal year ending in year $t-1$. The equation states that a firm's log-book-to-market ratio is equal to its lagged log-book-to-market ratio plus the annual log-changes in its book equity minus the annual log-changes in its market equity.

[Insert Table 1 near here.]

Table 1 presents the contributions of lagged book-to-market, book equity changes, and market equity changes to the total cross-sectional variation in book-to-market for one- to five-year decompositions of book-to-market. In the full sample, book equity changes contribute virtually nothing to book-to-market's variation in the one-year decomposition while it contributes even negatively for the two- to five-year decompositions. The negative contributions imply that market equity changes overcompensate book equity changes, meaning that book-to-market decreases even if book equity increases because market equity increases more, and vice versa. By

[6]We classify only stocks that could have been but have not been in the previous year's portfolios as incoming stocks. This filter excludes stocks that were not yet in the sample, or that did not have valid book-to-market respectively investment data in the previous year.

contrast, market equity changes contribute 18.3% to book-to-market's variation in the one-year decomposition, further increasing to 52.6% in the five-year decomposition. The contributions of lagged book-to-market decrease in parallel from 81.5% to 53.1%. Overall, book-to-market changes are, in the full sample, primarily driven by market equity changes rather than book equity changes, implying that the market-channel heavily dominates the book-channel. These results are in line with those of Gerakos and Linnainmaa (2018).

Table 1 presents the same results also for the subsample of stocks that are newly entering the value and growth portfolios. Contrary to the full sample, lagged book-to-market accounts only for a minor fraction of book-to-market's cross-sectional variation. Across all decompositions, market equity changes account for the majority of the variation. This result implies that the market-channel is the primary channel for stocks to become value and growth stocks. Nevertheless, book equity changes contribute in this sample also considerably to book-to-market's variation (between 24.0% and 33.1%). Thus, book equity changes are a non-negligible driver for stocks to become value and growth stocks.

Next, we split the value and growth portfolios into market- and book-channel subsets based on the one-year decomposition of book-to-market. Specifically, we classify incoming value (growth) stocks as market-channel stocks if the negative of the cross-sectionally demeaned log-change in their market equity is greater (lower) than the cross-sectionally demeaned log-change in their book equity, and as book-channel stocks in the opposite case. Market-channel incoming stocks are thus stocks whose book-to-market change is, relative to other stocks' book-to-market change, more strongly driven by market rather than book equity changes. The opposite holds for book-channel stocks. Given that lagged book-to-market contributes close to nothing to the variation in book-to-market of incoming value and growth stocks, considering the one-year decomposition is sufficient to determine whether stocks become value and growth stock primarily due to book equity changes or due to market equity changes.

Stocks keep their classification for the whole time they remain uninterrupted in the value and growth portfolios. We weight the stocks in the portfolios' market- and book-channel subsets proportionally the same as in the complete portfolios. We find that 81.4% (18.6%) of incoming stocks are classified as market-channel (book-channel) incoming stocks (unreported). In line with the decomposition of the variation in incoming value and growth stocks' book-to-market, these numbers imply that the market-channel is the dominant channel. That is, stocks enter the value portfolio primarily due to a decrease in their market values and the growth portfolio primarily due to an increase in their market values.

4.2 Determination of Cash Flow and Discount Rate Shocks

We further aim to determine whether market equity changes are due to cash flow shocks or due to discount rate shocks. For this purpose, we construct proxies for stocks' cash flow and discount rate shocks. In order to obtain a proxy for firms' cash flow shocks, we follow Hou and van Dijk (2019) and estimate firms' profitability shocks. In a first step, we implement their cross-sectional profitability model that yields estimates for firms' expected profitability. Specifically, we run the following cross-sectional regression at the end of each June from 1963 to 2019[7]:

$$\frac{E_{i,t}}{A_{i,t-1}} = b_{0,t} + b_{1,t}\frac{A_{i,t-1} + ME_{i,t-1} - BE_{i,t-1}}{A_{i,t-1}} + b_{2,t}DD_{i,t-1} + b_{3,t}\frac{D_{i,t-1}}{BE_{i,t-1}} + b_{4,t}\frac{E_{i,t-1}}{A_{i,t-2}} + \epsilon_{i,t} \quad (5)$$

where $E_{i,t}$ is firm i's operating income after depreciation, $A_{i,t}$ are total assets, $ME_{i,t}$ is market equity (from Compustat), $BE_{i,t}$ is book equity (calculated as described in Appendix A), $D_{i,t}$ are dividend payments, and $DD_{i,t}$ is a dummy variable that equals one if the firm does not pay dividends. t-variables are measured at the end of June of year t based on the firm's last fiscal year ending in year $t-1$.

The average coefficients from the annual regressions are presented in Panel A of Table 2. Their signs are identical and their magnitudes are similar to those reported by Hou and van Dijk (2019). In line with intuition, the coefficients indicate that expected profitability is higher for firms with higher firm valuations, for firms that pay more dividends, and for firms with higher current profitability.

Like Hou and van Dijk (2019), we use the annual regression coefficients from the profitability model in (5) to calculate firms' profitability shocks. In particular, we forecast firm i's profitability for year t by multiplying the estimated coefficients from the regression in year $t-1$ with the firm's values for the predictor variables in year $t-1$. The firm's profitability shock in year t is then its realized profitability in year t minus its forecasted profitability, that is:

$$PS_{i,t} = \frac{E_{i,t}}{A_{i,t-1}} - E_{t-1}\left(\frac{E_{i,t}}{A_{i,t-1}}\right) = \frac{E_{i,t}}{A_{i,t-1}} - X_{i,t-1}b'_{t-1} \quad (6)$$

where $X_{i,t-1}$ is a vector that contains firm i's values for the predictors as of year $t-1$ and b_{t-1} is the vector of estimated coefficients from regression (5) in year $t-1$. We employ $PS_{i,t}$ as a proxy for firm i's cash flow shock across the fiscal year that ended in year $t-1$.

In order to construct a proxy for firms' discount rate shocks, we regress firms' annual returns on their estimated profitability shocks. Specifically, we estimate at the end of each June from 1964 to 2019 the following cross-sectional regression[8]:

$$\overline{R}_{i,t} = c_{1,t}\overline{PS}_{i,t} + RR_{i,t} \quad (7)$$

where $\overline{R}_{i,t}$ is the cross-sectionally demeaned return of firm i across the fiscal year that ended in year $t-1$, $\overline{PS}_{i,t}$ is the firm's cross-sectionally demeaned profitability shock across the fiscal

[7]Following Hou and van Dijk (2019), we exclude firms with total assets of less than \$10 million and book equity of less than \$5 million for the estimation of the model.

[8]This approach is similar to Hou and van Dijk (2019)'s second return adjustment method. The only difference is that we use stocks' compounded returns across their fiscal years rather than their monthly returns during their fiscal years. We use annual rather than monthly returns to align them with annual market equity and investment changes.

year that ended in year $t-1$, and $RR_{i,t}$ is the firm's return across the fiscal year that ended in year $t-1$ that is unexplained by its profitability shock[9].

Panel B of Table 2 presents the regression results, showing that the average coefficient on the profitability shock is positive and highly significant. Thus, a positive profitability shock is associated with a positive contemporaneous return. This is consistent with the notion that the estimated profitability shock captures cash flow shocks.

Campbell (1991) argues that realized stock returns are driven by three components: expected returns, cash flow shocks, and discount rate shocks. Assuming that the estimated profitability shocks are a reasonable proxy for firms' cash flow shocks, which is corroborated by the results of Hou and van Dijk (2019) as well as by the significantly positive coefficient in Panel B of Table 2, the regression in (7) cancels the part of the realized return that is related to firms' cash flow shocks. Moreover, by demeaning the return cross-sectionally before estimating the regression model in (7), we further cancel the part of the realized return that is due to the expected market risk premium as well as due to market cash flow and discount rate shocks. Consequently, the residual return should only capture firm-specific discount rate shocks as well as pre-existing cross-sectional differences in expected returns. Pre-existing differences in expected returns are on average zero, are by nature uncorrelated with subsequent discount rate shocks, and are likely to be small relative to the price effects of discount rate shocks. Therefore, we argue that $RR_{i,t}$ is a reasonable proxy for the negative of firm i's discount rate shock across the fiscal year that ended in year $t-1$.

Our attempt to separate the effects of cash flow and discount rate shocks extends the approaches of Gerakos and Linnainmaa (2018), Daniel and Titman (2006), and Fama and French (2008). In these studies, the authors argue that market equity changes, intangible returns, and without-dividend returns, respectively, predict future returns because they capture news about discount rates. However, they neglect that market equity changes, intangible returns, and without-dividend returns also reflect news about cash flows. These two types of news contain, in theory, different information about expected returns. In particular, only discount rate news should be associated with cross-sectional differences in expected returns but cash flow news should not.

4.3 Classification of Changes and Stocks

We use the estimated profitability shocks and residual returns to classify market equity and investment changes as cash flow shock- or discount rate shock-driven. Comparing the estimated profitability shocks and residual returns directly would be inappropriate for this purpose since they have different scales and different cross-sectional dispersions. Therefore, we rank stocks at the end of each June according to the estimated profitability shocks and residual returns across

[9]Note that this regression as well as the estimation of the profitability shocks requires only data that is publicly available by the end of June of year t. Thus, there is no look-ahead bias.

the previous fiscal from low to high and assign them normalized ranks between 0 and 1 with respect to both proxies. By comparing a stock's profitability shock rank with its residual return rank, we can assess which of the two types of shocks has affected the respective stock, relative to other stocks, more strongly during the previous fiscal year.

We classify stocks' cross-sectionally demeaned market equity decreases (increases) as cash flow shock-driven if their profitability shock ranks are lower (higher) than their residual return ranks, and as discount rate shock-driven in the opposite case. That is, market equity decreases (increases) are classified as cash flow shock-driven if the stock's negative (positive) cash flow shock is likely to have been more pronounced than its positive (negative) discount rate shock. Analogously, we classify stocks' cross-sectionally demeaned investment decreases (increases) as cash flow shock-driven if their profitability shock ranks are lower (higher) than their residual return ranks, and as discount rate shock-driven in the opposite case. On average, 36.2% (54.0%) of the market equity (investment) changes are classified as cash flow shock-driven, while the remaining 63.8% (46.0%) are classified as discount rate shock-driven (unreported).

Furthermore, we split the value and growth portfolios' market-channel subsets from Section 4.1 in a similar fashion into cash flow shock- and discount rate shock-driven subsets. In particular, we rank all market-channel incoming value stocks at the end of each June according to the estimated profitability shocks and residual returns from low to high and assign them normalized ranks between 0 and 1 with respect to both proxies, and we do the same for incoming growth stocks. Incoming value (growth) stocks are then classified as cash flow shock-driven if their profitability shock ranks are lower (higher) than their residual return ranks, and as discount rate shock-driven in the opposite case. On average, 59.1% of incoming value and growth stocks that can be classified are classified as cash flow shock-driven while the remaining 40.9% are classified as discount rate shock-driven (unreported).

Incoming conservative and aggressive stocks are classified analogously. That is, we rank all incoming conservative stocks at the end of each June according to the estimated profitability shocks and residual returns from low to high and assign them normalized ranks between 0 and 1 with respect to both proxies, and we do the same for incoming aggressive stocks. Incoming conservative (aggressive) stocks are classified as cash flow shock-driven if their profitability shock ranks are lower (higher) than their residual return ranks, and as discount rate shock-driven in the opposite case. On average, 52.0% of incoming conservative and aggressive stocks that can be classified are classified as cash flow shock-driven while the remaining 48.0% are classified as discount rate shock-driven (unreported).

In all cases, stocks keep their classification for the whole time they remain uninterrupted in the portfolios. Moreover, we weight the stocks in the portfolios' cash flow shock- and discount rate shock-driven subsets proportionally the same as in the complete portfolios.

5 The Relation between Book-to-Market and Investment

In this section, we investigate the relation between book-to-market and investment. Our theoretical discussion in Section 2 suggests that they should be negatively related and that market rather than book equity changes should drive book-to-market's negative relation to investment.

5.1 Correlation between Investment and Book-to-Market

Panel A of Figure 2 presents the cross-sectional rank correlations of book-to-market and investment changes with up to five-year ago and up to ten-year ahead investment changes. Book-to-market changes are negatively correlated with contemporaneous investment changes (-0.094) and even more so with one-year-ahead investment changes (-0.142). These observations confirm a negative relation between book-to-market changes and investment changes. The result that book-to-market changes are more strongly related to one-year ahead than contemporaneous investment changes is intuitive: being a market-based variable, book-to-market is likely to reflect cash flow and discount rate shocks more timely than investment, which is an accounting-based variable[10]. Panel B shows that the negative correlation between their changes carries over to a negative correlation between book-to-market and investment in general. Specifically, the correlation of book-to-market with investment is negative across all five lags and ten leads but peaks again for contemporaneous and one-year ahead investment (around -0.27).

[Insert Figure 2 near here.]

5.2 The Relation of Investment with Market and Book Equity Changes

Having confirmed the negative relation between book-to-market and investment, we examine the prediction that the relation is due to book-to-market changes that are driven by market equity changes. For this purpose, we implement annual cross-sectional Fama-MacBeth (1973) regressions that regress investment on book-to-market and changes in book and market equity. In order to mitigate the impact of microcaps, we use weighted least squares with the stocks' market capitalizations as weights.

[Insert Table 3 near here.]

[10]Investment is likely to reflect firms' actual investment decisions and thus the effects of cash flow and discount rate shocks with a lag for two reasons. First, depending on the timing of the shocks during the fiscal year, firms' decisions to adjust their investment may be only reflected in the financial statements of the following fiscal year. Second, firms' investment plans may be sticky, meaning that they cannot immediately adjust their investment upon a shock. Investors, on the other hand, can immediately react to cash flow and discount rate shocks, wherefore stock prices are likely to reflect the shocks quite timely. Thus, the corresponding changes in firms' book-to-market should already be observable based on the financial statements of the respective fiscal year.

The time-series averages of the annual coefficient estimates are presented in Table 3. Regression (1) regresses investment on contemporaneous book-to-market. Book-to-market exhibits a highly significantly negative coefficient. That is, high book-to-market is associated with low investment, and vice versa, again reflecting the negative relation between book-to-market and investment. In regressions (2) to (6), we add current and past annual changes in book and market equity, one at a time, and lag book-to-market accordingly such that the book equity changes, the market equity changes, and lagged book-to-market sum up to current book-to-market. Across all these regressions, the coefficients on lagged book-to-market remain significantly negative but decay monotonously the farther book-to-market is lagged.

Consistent with our predictions, we can observe that only market equity changes drive the negative relation between investment and book-to-market: all current and lagged market equity changes across regressions (2) to (6) exhibit significantly positive coefficients with t-statistics between 4.38 and 7.66. The coefficients' magnitudes decline with the number of lags, indicating that more recent cash flow and discount rate shocks affect investment more strongly than shocks from several years ago. The coefficients of the book equity changes are also significantly positive across regressions (2) to (6). Book equity changes would, therefore, give actually rise to a positive rather than a negative relation between book-to-market and investment. This finding is not surprising: given that book equity plus debt equals total assets in the balance sheet, investment, as measured by asset growth, can be expected to be positively related to contemporaneous book equity changes. This balance sheet effect compensates the contemporaneous association between market equity changes and investment, and is thus also to a certain extent responsible for the rather weak relation between contemporaneous book-to-market and investment changes as observed in Panel A of Figure 2.

Besides cash flow and discount rate shocks, as reflected in returns, changes in firms' total market equity may also be due to corporate actions such as stock issues, stock repurchases, and dividend payments. In order to verify that the positive relation between market equity changes and investment is not due to these corporate actions but in fact due to the return component of market equity changes, and thus due to cash flow and discount rate shocks, we repeat regressions (2) to (6) in regressions (7) to (11) while controlling for net issues[11]. Current net issues exhibit significantly positive coefficients across regressions (7) to (11) while past net issues exhibit significantly negative coefficients. More importantly, the coefficients on the market equity changes remain significantly positive, verifying that the positive relation between market equity changes and investment is not due to firms' issuance and distribution policy. The magnitudes of the coefficients on lagged market equity changes increase somewhat as compared to regressions (2) to (6), those on current market equity changes decrease and are now smaller than those for one-year lagged changes. This is consistent with our conjecture that discount rate and cash flow shocks are reflected more timely in book-to-market than in investment.

In the Internet Appendix, we also regress investment directly on our estimated profitability

[11] We define net issues such that it reflects all market equity changes that are not due to returns. See Appendix A for the detailed construction of net issues.

shocks and residual returns. The results reveal that they have similar explanatory power for investment, indicating that both types of shocks drive the negative relation between book-to-market and investment to similar degrees.

5.3 Average Investment of Value and Growth Stocks

In order to confirm that the relation between book-to-market and investment holds also for the value factors' mimicking portfolio, Panel A of Figure 3 displays incoming value and growth stocks' average investment across the five years prior to their entry and the ten years after their entry. The average investment of incoming value and growth stocks is similar in the years before their entry as well as in the year of their entry. In the years after they become growth and value stocks, however, growth stocks have, on average, a much higher investment than value stocks. Thus, incoming value and growth stocks also reflect the negative relation between book-to-market and investment.

[Insert Figure 3 near here.]

The figure reaffirms that this negative relation is only associated with variation in book-to-market that is due to market equity changes. Specifically, market-channel incoming growth stocks exhibit a higher contemporaneous investment than market-channel incoming value stocks, growing even larger for one-year ahead investment, and slowly reverting afterwards. The peak for one-year ahead rather than contemporaneous investment is again consistent with our conjecture that cash flow and discount rate shocks are reflected earlier in book-to-market than in investment. Contrary to market-channel stocks, book-channel growth stocks exhibit a much lower investment in the year of their entry than book-channel value stocks. In subsequent years, their investment is quite similar. These observations are in line with the balance sheet effect. This balance sheet effect largely compensates the effect of discount rate and cash flow shocks such that incoming value and growth stocks in general do not exhibit a pronounced difference in contemporaneous investment.

Panel B of Figure 3 displays the results for the total portfolios rather than only incoming stocks. The observations are in line with those for incoming stocks: value stocks exhibit lower investment than growth stocks, and this pattern is mainly due to market- rather than book-channel stocks.

Furthermore, Panels C and D show that the results are quite similar for the discount rate shock- and cash flow shock-driven subsets of the value and growth portfolios. The only distinct difference is that the spread between cash flow shock-driven incoming value and growth stocks peaks for contemporaneous investment whereas the spread between discount rate shock-driven incoming value and growth stocks peaks for one-year ahead investment. This suggests that the intertemporal pattern between book-to-market and investment is primarily due to discount rate shock-driven stocks.

5.4 Overlaps of Value and Growth Stocks with CMA Portfolios

Figure 4 depicts the implications of the negative relation between book-to-market and investment for the overlap between the value and investment factors' mimicking portfolios. Specifically, the figure displays the overlaps of the value and growth portfolios with up to five-year ago and up to ten-year ahead CMA portfolios. The overlap of the value (growth) portfolio with a given CMA portfolio is calculated as the weighted percentage of value (growth) stocks that are in the respective conservative portfolio minus the weighted percentage of value (growth) stocks that are in the respective aggressive portfolio. If the factors' mimicking portfolios were independent of each other, we would expect to observe that the value and growth portfolios' overlaps with the CMA portfolios are similar.

[Insert Figure 4 near here.]

Panel A of Figure 4 shows that this is not the case. In line with their investment patterns, incoming value stocks exhibit in general a positive overlap with contemporaneous and future CMA portfolios whereas incoming growth stocks exhibit negative overlaps. Thus, incoming value stocks are more likely to become conservative stocks than aggressive stocks in the same or in the subsequent year while the opposite holds for incoming growth stocks. This result is entirely due to market-channel stocks: the difference between the overlaps of market-channel incoming value and growth stocks is 46.2% for the contemporaneous CMA portfolio, increases to 57.3% for the one-year ahead CMA portfolio, and slowly reverts afterwards. By contrast, the difference between book-channel incoming value and growth stocks' overlaps is strongly negative for the contemporaneous CMA portfolio and is negligible for future CMA portfolios. That is, book-channel incoming value stocks are more likely to be aggressive stocks than conservative stocks, and vice versa for book-channel incoming growth stocks.

Panel B of Figure 4 displays consistent results for the total portfolios. The value portfolio has higher overlaps with all past and future CMA portfolios than the growth portfolio, and this observation is again primarily due to market-channel stocks. The difference between the overlaps of value and growth stocks with the contemporaneous CMA portfolio is 43.6%, meaning that the overlap between the contemporaneous HML and CMA portfolios is 21.8% (=43.6%/2).

Panels C and D show that these results are to similar degrees driven by the discount rate shock- and cash flow shock-driven subsets of the value and growth portfolios. Like for their investment patterns, discount rate shock-driven stocks are again relatively more responsible for the intertemporal relation than cash flow shock-driven stocks. In the Internet Appendix, we further document that, as can be expected, discount rate shock-driven value and growth stocks are more strongly associated with the discount rate shock-driven part of the CMA portfolio than cash flow shock-driven value and growth stocks, and vice versa.

In sum, the findings of this section confirm our predictions on the relation between book-to-market and investment. First, we document that their relation is clearly negative. In line with our theoretical prediction that the relation is driven by cash flow and discount rate shocks, this negative relation is only due to market equity changes. Furthermore, market-channel value and growth stocks give also rise to a positive overlap between the value and investment factors' mimicking portfolios. Moreover, we find that the relation is, in general, most pronounced between current book-to-market and one-year ahead investment. We conjecture that this is because book-to-market is likely to lead investment in reflecting cash flow and discount rate shocks, and because the balance sheet effect gives rise to a positive contemporaneous relation between book equity-driven book-to-market changes and investment.

6 Comovement of the Value Factor with the Investment Factor

The finding from Figure 4 that the value factor and the investment factor select to a considerable extent the same stocks in their long legs as well as in their short legs leads, by nature, to a positive correlation between the two factors. Given that the overlap between the value and investment factors' mimicking portfolios is due to market-channel value and growth stocks, we expect that they are also responsible for the factors' strong comovement. Yet, the documented overlaps of below 25% between the factor portfolios, while sizable, seem rather small when compared to the value factor's correlation of 0.66 with the investment factor. This indicates that the strong association between the value factor and the investment factor is not only due to their overlap. In this section, we investigate the reasons for the value and investment factors' strong comovement in more detail.

6.1 Prediction of Investment Factor Correlation

We begin the investigation of the factors' comovement with annual cross-sectional Fama-MacBeth (1973) regressions that predict stocks' correlations with the investment factor (hf. investment factor correlation)[12]. We estimate stocks' investment factor correlations at the end of each June based on daily data across the subsequent 12 months. Stocks' future investment factor correlations are then regressed on book-to-market and changes in book and market equity. As previously, we estimate the regressions with weighted least squares, whereby stocks' weights correspond to their market capitalizations.

The time-series averages of the annual coefficient estimates are presented in Table 4. Regression (1) reveals that the future investment factor correlation is positively associated with book-to-market. That is, high book-to-market stocks comove positively with the investment factor and low book-to-market stocks comove negatively with the investment factor. This is in line with the positive correlation of the value factor with the investment factor. Regressions

[12] In unreported results, we conduct the same analysis using stocks' investment factor betas rather than their investment factor correlations. The findings are qualitatively the same.

(2) to (6) add current and past annual changes in book and market equity, one at a time, and lag book-to-market accordingly such that the book equity changes, the market equity changes, and lagged book-to-market sum up to current book-to-market. Across all regressions, the coefficients on lagged book-to-market remain significantly positive and decay only slightly the farther book-to-market is lagged. Thus, book-to-market's predictive power for comovement with the investment factor is quite persistent.

[Insert Table 4 near here.]

The results from regressions (2) to (6) support our conjecture that the value factor's positive comovement with the investment factor is driven by stocks whose variation in book-to-market is due to market equity changes. Market equity changes exhibit across all regressions significantly negative coefficients with t-statistics between -6.82 and -10.68. By tendency, the coefficients decline with increasing lag, suggesting that more recent cash flow and discount rate shocks drive stocks' correlation with the investment factor more strongly than those from several years ago. Nevertheless, since even four-year lagged market equity changes have strong predictive power for future investment factor correlations, the effects of cash flow and discount rate shocks on the comovement with the investment factor seem to be quite long-lasting.

Current book equity changes are significantly negatively related to future investment factor correlations. Yet, contrary to the results from Table 3 with investment as dependent variable, the coefficients on current book equity changes hardly compensate those on current market equity changes. Thus, the balance sheet effect, while important for the association with investment, plays only a minor role in shaping stocks' correlation with the investment factor and is dominated by the more fundamental economic drivers that discount rate and cash flow shocks are. Contrary to current book equity changes, past book equity changes are positively related to future investment factor correlations, in parts even significantly. However, their coefficients are much lower than those on past market equity changes, implying that the positive relation between book-to-market and investment factor correlation is still mainly due to market equity changes.

Since market-channel value stocks are more frequently conservative than aggressive stocks, and vice versa for market-channel growth stocks, the negative association between market equity changes and investment factor correlation may in parts be mechanical. In order to control for this mechanical association, regressions (7) to (11) add investment as an explanatory variable to regressions (2) to (6). The results for the market equity changes are qualitatively the same as in regressions (2) to (6), only the magnitudes of the coefficients decrease slightly. This finding suggests that the negative association between market equity changes and investment factor correlation is not only mechanical. Negative cash flow shocks and positive discount rate shocks give rise to a positive comovement with the investment factor even if they are not, or not yet, reflected in investment.

In the Internet Appendix, we regress stocks' investment factor correlations directly on their estimated profitability shocks and residual returns. Both exhibit similar predictive power for investment factor correlation, indicating that cash flow and discount rate shocks drive the correlation with the investment factor to similar degrees.

6.2 Comovement of Value and Growth Stocks with Investment Factor

Next, we evaluate whether the market-channel value and growth stocks are, in fact, responsible for the value factor's comovement with the investment factor. For this purpose, we consider the book- and market-channel subsets of the HML portfolio as well as the cash flow shock- and discount rate shock-driven subsets. For comparison, we also consider the book- and market-channel subsets together[13]. In order to examine to which extent the factor portfolios' overlap drive the results, we further split the subsets according to whether the value (growth) stocks are contemporaneously also conservative (aggressive) stocks (we refer to the stocks that are contemporaneously in the corresponding legs of the CMA portfolio as "overlapping" part and to the stocks that are contemporaneously not in the corresponding legs of the CMA portfolio as "non-overlapping" part).

[Insert Table 5 near here.]

Table 5 presents the subsets' overlaps with the contemporaneous CMA portfolio, their correlations with the investment factor, and the results from regressing their monthly returns on the market, size, profitability, and investment factors[14]. The results confirm that the HML portfolio's market-channel subset is the predominant driver of the value factor's comovement with the investment factor. In particular, the market-channel subset exhibits a considerably higher correlation with the investment factor (0.648 vs. 0.189) as well as a considerably higher investment beta (1.06 vs. 0.44) than the book-channel subset.

Moreover, the market-channel subset's comovement with the investment factor is not only due to a mechanical association stemming from its overlap with the CMA portfolio. Although the correlation of the non-overlapping part with the investment factor is naturally lower than for the overlapping part (0.399 vs. 0.772), it is still considerable, especially given its substantial negative overlap with the CMA portfolio of -27.4%. Thus, market-channel value (growth) stocks behave like conservative (aggressive) stocks even if they are not, or not yet, identified as conservative (aggressive) stocks. This finding is intuitive: stocks whose discount rate and cash flow shocks are only reflected in book-to-market but not, or not yet, in investment nevertheless behave like stocks whose discount rate and cash flow shocks are already reflected in investment. Given that the non-overlapping part is larger than the overlapping part, accounting on average

[13]Note that the two subsets taken together are not equivalent to the complete HML portfolio since stocks that are new in the sample or that lack data on relevant variables cannot be classified. The two subsets together capture, on average, 62.5% of the complete HML portfolio and exhibit in general similar properties as the complete HML portfolio.

[14]See Appendix B for the construction of the market, size, and profitability factors.

for 61.8% of the total HML portfolio, its comovement with the investment factor is a major reason for the value factor's comovement with the investment factor.

Table 5 further reveals that the cash flow shock- and discount rate shock-driven subsets exhibit in general similar investment factor correlations and investment betas. This observation suggests that the investment factor reflects the covariation of cash flow shock-driven stocks and the covariation of discount rate shock-driven stocks to similar degrees.

Overall, the results in this section are in line with our expectations. In particular, high (low) book-to-market is associated with positive (negative) comovement with the investment factor only if it is driven by market equity changes. Consequently, market-channel value and growth stocks are also responsible for the value factor's strong comovement with the investment factor. Furthermore, we show that the factors' comovement is not only mechanical. These findings corroborate the notion that the factors comove because both reflect the covariation of stocks that experienced discount rate and/or cash flow shocks.

7 Why is the Value Factor the Redundant Factor?

Our empirical evidence so far supports our thesis that book-to-market and investment are both driven by cash flow and discount rate shocks, and that the value and investment factors both reflect the covariation of stocks that experienced such shocks. It may, therefore, be natural to assume that they capture similar information about expected returns, and thus, that one of the two factors is redundant. However, our theoretical framework does not predict which of the two factors should be the redundant one. This section addresses the question of why, ex-post, the value factor is the redundant one.

[Insert Table 6 near here.]

To this end, we conduct spanning regressions with different versions of the value and the investment factors. Table 6 presents the results. In specifications (1) to (3), we regress the investment factor, the standard value factor, a market-channel value factor, and a book-channel value factor on the market, size, and profitability factors. The market-channel (book-channel) value factor is formed in the same way as the standard value factor but excludes all stocks that are not identified as market-channel (book-channel) stocks from the portfolios used for the construction of the standard value factor. We can observe that the market-channel value factor contains the standard value factor's entire information about expected returns. Its average return of 0.35% per month is slightly higher than the average return of the standard value factor of 0.30% per month whereas the book-channel value factor's average return is close to zero. The investment factor, the standard value factor, and the market-channel value factor exhibit all significantly positive alphas, meaning that they are individually not redundant with respect to the market, size, and profitability factors. Moreover, the market-channel value factor's exposures to the other factors are quite similar to those of the investment factor, even more so than the standard value factor's exposures. It exhibits the same market beta and only slightly higher size and profitability betas than the investment factor. This is in line with the notion that only the market-channel part of the value factor reflects the same effects as the investment factor.

In specifications (4) and (5), we add the investment factor as an explanatory factor to explain the standard and market-channel value factors, and vice versa. In specification (4), we can observe the usual result: the value factor is subsumed by the market, size, profitability, and investment factors, exhibiting an insignificant monthly alpha of 0.00%. The investment factor, on the other hand, is not subsumed by the market, size, profitability, and value factors, exhibiting a significant monthly alpha of 0.20%.

The value factor's book-channel part seems to be a "noise" component that reflects other effects than the value factor's market-channel part or the investment factor, and importantly, that does not capture information about expected returns. Thus, the book-channel part may be the reason why the investment factor trumps the value factor. The results from specification (5) reveal that the book-channel part is, in fact, to a considerable extent responsible for the value factor's redundancy. Specifically, the monthly alpha of the value factor increases from 0.00% to 0.09%, and the alpha of the investment factor decreases from 0.20% to 0.17% when employing the market-channel rather than the standard value factor. Nevertheless, the market-channel value factor is still redundant given that its alpha is insignificant.

Comparing the results for the investment factor with those for the market-channel value factor reveals three major differences that may explain why the latter is still the redundant one. First, the investment factor's beta on the market-channel value factor is much lower than vice versa (0.37 vs. 1.05). Second, the market-channel value factor exhibits a higher volatility than the investment factor (2.87% vs. 1.82%). Third, the market-channel value factor's betas on the market, size, and profitability factors are somewhat higher than those of the investment factor.

The first difference and the second difference are related: a higher standard deviation of the dependent variable implies, all else equal, a lower regression coefficient. In specification (6), we rescale the market-channel value factor to have the same volatility as the investment factor. The results show that the factors' betas with respect to each other are much more similar in this case (0.59 vs. 0.67). Moreover, the market-channel value factor would exhibit a significantly positive alpha of 0.19% and would thus not be redundant anymore. Its elevated volatility as compared to the investment factor is thus another major reason for its redundancy besides the book-channel part. Importantly, the investment factor remains also non-redundant. This result implies that, although both reflect largely the same effects, it is not a necessity that one of the two factors has to be redundant. That is, in principle, both factors may be non-redundant.

The results from specification (6) raise the question of why the value factor captures the effects with less precision (i.e., with higher volatility) than the investment factor. In general, the factors' volatilities are determined by the volatilities of their long legs, the volatilities of their short legs, and the correlations between their long and short legs[15]. In unreported results, we find that the volatilities of the investment, the standard value, and the market-channel value factors' long legs (5.44%, 5.42%, and 5.45% per month) and of their short legs (4.85%, 4.99%, and 5.10% per month) are quite similar. Yet, the investment factor's long and short legs are much higher correlated (0.944) than the standard and the market-channel value factors' long and short legs (0.864 and 0.854). The lower correlation between value and growth stocks as compared to conservative and aggressive stocks is thus the main reason for the value factors' elevated volatilities.

[Insert Figure 5 near here.]

In order to shed further light on the underlying reasons for this result, Figure 5 displays three-year moving volatilities of the investment, the standard value, and the market-channel value factors as well as their long and short legs, and three-year moving correlations between the factors' long and short legs. Panels C and D show that the short legs' volatilities as well as the long legs' volatilities are very similar across the whole sample period. Panel B reveals, however, that the correlations between the factors' long and short legs behave quite differently. The correlation between the investment factor's legs is quite stable across time and never drops below 0.85. By contrast, the correlations between the value factors' legs fluctuate strongly across time. We can observe pronounced drops in the correlations during times of market-wide turbulences and exaggerations, such as the oil crises in the early 70's and 80's, the biotech bubble in the early 90's, the dotcom bubble around the turn of the century, and the global financial crisis in 2007/08. Panel A shows that the low correlations between the value factors' legs during such periods are associated with surges in their total volatilities and, importantly, with strong divergences from the investment factor's volatility. Thus, the value factors are noisier than the investment factor during such periods of market inefficiencies. The reason for value's deficiencies during such periods is arguably that book-to-market is much more distorted than investment by market inefficiencies as it relies on a market variable. The value factor is, in fact, likely to select the stocks with the most distorted market prices. This conjecture suggests that the value factors suffer from a systematic disadvantage compared to the investment factor.

Nevertheless, these findings also imply that it is possible that the value factor recovers from its redundancy going forward. In order for the value factor to recover, the correlation between value and growth stocks would need to be higher than during our sample period. In specification (7) of Table 6, we show that, all else equal, a correlation of 0.89 between market-channel value and growth stocks would have been sufficient for the market-channel value factor to be non-redundant. Specification (8) reveals that a correlation of 0.95 would have even rendered the investment factor redundant. Although 0.95 is probably implausibly high, 0.89 is not unrealistic. It would represent only a slight increase from the actual correlation of 0.854 and the correlation fluctuated between 0.85 and 0.95 for most of our sample period. Based on data from Kenneth

[15] A factor's variance may be expressed as follows: $\sigma^2_{Factor} = \sigma^2_{Long} + \sigma^2_{Short} - 2 \cdot \rho_{Long,Short} \cdot \sigma_{Long} \cdot \sigma_{Short}$.

French's website, we further find that the correlation between the value and growth portfolio was as high as 0.930 during the period from July 1926 to June 1964. This finding suggests that the correlation between value and growth stocks was, in fact, exceptionally low during our sample period due to the quite frequently occurring market turbulences.

Besides its book-channel part and its elevated volatility, a third reason for the value factor's redundancy is its less favourable exposure to the market, size, and profitability factors as compared to the investment factor. Specifically, the market-channel value factor's mean return is in parts explained by its slightly positive betas on these factors, deflating its alpha. By contrast, the investment factor's slightly negative betas on these factors increase the portion of its mean return that is not explained, inflating its alpha. The market-channel value and investment factors capture each others' mean returns actually similarly well. To illustrate this, column α^{VAL} (α^{INV}) depicts the part of the investment (value) factor's mean return that is left unexplained when we account only for its exposure to the value (investment) factor. Specification (5) shows that the market-channel value factor fails to capture an insignificant 0.08% of the investment factor's mean return and that the investment factor fails to capture an insignificant 0.14% of the market-channel value factor's mean return.

In order to further outline the impact of the factors' exposures to the other factors, specification (9) uses investment and market-channel value factors that are first orthogonalized with respect to the market, size, and profitability factors, and then rescaled to have the same mean and volatility as originally. When we regress the orthogonalized factors on each other, we find a marginally significant alpha of 0.15% for the market-channel value factor and an insignificant alpha of 0.07% for the investment factor. Thus, if they had, all else equal, the same exposures to the other factors, the market-channel value factor would be non-redundant while the investment factor would be redundant.

Finally, our results in Section 5 suggest that book-to-market reflects the effects more timely than investment. Specifications (10) and (11) examine whether the value factor benefits from its more timely nature. For this purpose, the market-channel value factor in specification (10) excludes all incoming stocks from its factor portfolios. The market-channel value factor in specification (11) excludes only incoming stocks from its factor portfolios that are not simultaneously incoming stocks in the investment factor's portfolios, and which are thus more likely to be subject to the timing issue. If the value factor would benefit from its more timely nature, the value factors in specifications (10) and (11) should be more redundant. However, their alphas remain insignificant and are almost identical to the usual market-channel value factor's alpha in specification (5), indicating that the value factor does not benefit from its more timely nature.

In sum, the findings in this section indicate that the value factor is the redundant one of the two factors for three reasons. First, it comprises the noisy and unpriced book-channel part that captures other effects than its market-channel part and than the investment factor. Second, it captures the effects less precisely because it is more prone to times of market inefficiencies than the investment factor. Third, it is a slightly worse hedge for the other factors than the investment factor. Since the later two reasons may be specific to the considered sample period, the value factor may very well become non-redundant going forward. This conjecture supports Fama and French (2015)'s decision to keep the value factor in their five-factor model.

8 Identification of Book-to-Market's and Investment's Predictive Information

Our findings so far support the thesis that cash flow and discount rate shocks give rise to the relation between book-to-market and investment, and that the value and investment factors reflect the covariation of stocks that experienced such shocks. However, as outlined in Section 2, only discount rate shocks give rise to differences in expected returns, implying that only discount rate shock-driven stocks should contain the factors' pricing information. This section examines this prediction.

8.1 Return Prediction

We start by running monthly cross-sectional Fama-MacBeth (1973) regressions that predict stocks' one-month ahead returns based on book-to-market, market equity changes, book equity changes, investment, and investment changes[16]. We include size, operating profitability, momentum, and short-term reversal as additional controls. As previously, we estimate the regressions with weighted least squares, whereby stocks' weights correspond to their market capitalizations. The time-series averages of the monthly coefficient estimates are presented in Table 7. Regressions (1) and (7) show that book-to-market predicts future returns significantly positive and that investment predicts future returns significantly negative when only one of the two is included. In line with the notion that they capture similar effects, regression (13) reveals that book-to-market and investment subsume each others' predictive power to some extent when they are included simultaneously. Specifically, book-to-market exhibits now an insignificantly positive coefficient and the coefficient on investment, although still significant, decreases notably.

[Insert Table 7 near here.]

Regressions (2) to (6) extend regression (1) by adding current and past annual changes in book and market equity, one at a time, and lagging book-to-market accordingly such that the book equity changes, the market equity changes, and lagged book-to-market sum up to current book-to-market. In order to differentiate between the predictive power of discount rate shock-

[16]The Internet Appendix presents the results when we predict stocks' returns across the next 12 months. They are qualitatively identical.

versus cash flow shock-driven market equity changes, these regressions include the market equity changes not on their own but rather interaction terms between them and dummy variables that indicate discount rate shock-driven changes and cash flow shock-driven changes[17]. The results show that the positive predictive power of book-to-market for future returns is mainly concentrated in discount rate shock-driven market equity changes. More specifically, discount rate shock-driven market equity changes exhibit uniformly negative coefficients, albeit only those on current and two-year lagged changes are statistically significant. By contrast, none of the cash flow shock-driven market equity changes displays a significantly negative coefficient. The coefficients are mostly close to zero and exhibit t-statistics between -0.90 and 0.51. The coefficients on book equity changes are also insignificant. Thus, our discount rate shock proxy performs reasonably well in identifying the variation in book-to-market that is informative about future returns.

Regressions (8) to (12) investigate analogously the predictive power of investment changes. That is, they add current and past annual changes in investment to regression (7), one at a time, and lag investment accordingly such that the investment changes and lagged investment sum up to current investment. Like the market equity changes in regressions (2) to (6), the investment changes are not included on their own but rather interaction terms between them and dummy variables that indicate discount rate shock-driven changes and cash flow shock-driven changes[18]. Surprisingly, the results show that the negative predictive power of investment for future returns is not only concentrated in discount rate shock-driven investment changes. Specifically, not only all discount rate shock-driven but also all cash flow shock-driven investment changes exhibit significantly negative coefficients. The significant predictive power of cash flow shock-driven investment changes indicates that the estimated profitability shocks do not only identify investment's information about future profitability but to some extent also its information about future returns. The coefficients on the cash flow shock-driven investment changes are in absolute terms, however, considerably smaller than those on the discount rate shock-driven changes[19]. That is, the predictive power of discount rate shock-driven investment changes is much stronger. Therefore, our discount rate shock proxy performs also reasonable in identifying the variation in investment that is informative about future returns.

Finally, regressions (14) to (18) include market equity changes and investment changes. The results reveal that the discount rate shock-driven market equity and investment changes largely retain their significant predictive power even when they are included simultaneously. In particular, the coefficients on current, two-year lagged, and four-year lagged market equity changes are still mostly significant, exhibiting t-statistics between -1.50 and -2.31. Moreover, the coefficients on one-, two-, and three-year lagged investment changes, albeit somewhat attenuated, also remain mostly significant, exhibiting t-statistics between -1.44 and -2.95. Thus, the variation in

[17]See Section 4.3 for the classification of market equity changes.

[18]See Section 4.3 for the classification of investment changes.

[19]In unreported results, we find that the difference between the coefficients on the cash flow shock-driven investment changes and those on the discount rate shock-driven investment changes is in nine out of the 15 cases statistically significant.

book-to-market that is informative about future returns seems to capture incremental information relative to the variation in investment that is informative about future returns, and vice versa. This conjecture contrasts with the finding that book-to-market and investment subsume each others' predictive power to a considerable extent, suggesting that the later finding arises because both reflect also information about future profitability. This common noise component seems to overshadow their complementary information about future returns.

As in regressions (2) to (6), book equity changes and cash flow shock-driven market equity changes are not significantly related to future returns in regressions (14) to (18). Additionally, most of the cash flow shock-driven investment changes lose their significant predictive power observed in regressions (8) to (12), displaying again considerably smaller coefficients than the discount rate shock-driven changes. These findings reaffirm that our discount rate shock proxy identifies book-to-market's as well as investment's predictive information for future returns.

8.2 Average Portfolio Returns

Next, we examine whether the factor portfolios' discount rate shock-driven subsets contain the factors' pricing information. To this end, we conduct bivariate portfolios sorts. First, we sort stocks at the end of each June into quintiles with respect to their market equity. The breakpoints for the sorts are based only on NYSE stocks. Second, we take the intersections of the size quintiles with the value, growth, conservative, and aggressive portfolios, the value and growth portfolios' book- and market-channel subsets, and the value, growth, conservative, and aggressive portfolios' cash flow shock- and discount rate shock-driven subsets. The stocks in the resulting portfolios are value-weighted. Panel A of Table 8 displays the average returns and five-factor alphas of the value and conservative portfolios over the corresponding growth and aggressive portfolios. These are essentially market-channel, book-channel, discount rate shock-driven, and cash flow shock-driven HML returns (i.e., value premia) and discount rate shock-driven and cash flow shock-driven CMA returns (i.e., investment premia) within each size quintile. The table further presents results for strategies that go (1) long the market-channel HML returns and short the book-channel HML returns, (2) long the discount rate shock-driven HML returns and short the cash flow shock-driven HML returns, and (3) long the discount rate shock-driven CMA returns and short the cash flow shock-driven CMA returns. These strategies are close to book-to-market- respectively investment-neutral since value and growth stocks respectively conservative and aggressive stocks exhibit similar book-to-market respectively investment, no matter whether they are market equity-, book equity-, discount rate shock-, or cash flow shock-driven. The standard value and investment effects would thus suggest that the strategies' returns should, on average, be zero.

[Insert Table 8 near here.]

Panel A of Table 8 documents a strong value premium: the average excess return of value stocks over growth stocks across the size quintiles is 0.32% per month, which is highly significant. The value premium is, however, only observable for the market-channel subset of the HML portfolio. In particular, the average market-channel value premium across the size quintiles is 0.32% per month whereas the average book-channel value premium is only -0.01% per month. The difference between the average market- and book-channel value premia is a highly significant 0.33% per month[20]. While the five-factor model is quite successful in pricing the market-channel value premium, producing an insignificant monthly alpha of 0.06%, it leaves a significantly negative monthly alpha of -0.16% for the book-channel value premium. Consequently, the five-factor model also fails to explain the difference between the average market- and book-channel value premia, leaving a significant monthly alpha of 0.22%. This result implies that the five-factor model cannot sufficiently differentiate between book-channel and market-channel value and growth stocks, assigning them expected returns that are too similar.

When further decomposing the market-channel subset of the HML portfolio into its discount rate shock-driven and cash flow shock-driven subsets, we find that the former contains almost the entire pricing information of the value factor. Specifically, discount rate shock-driven value stocks earn a strong and highly significant value premium of on average 0.49% per month over discount rate shock-driven growth stocks. The five-factor model is unable to entirely capture this value premium, producing a significant monthly alpha of 0.16%. Contrary to the discount rate shock-driven value premium, the cash flow shock-driven value premium of 0.13% per month is small and insignificant. The difference of 0.36% per month between the discount rate shock- and cash flow shock-driven value premia is highly significant. It cannot be explained by the five-factor model, leaving a substantial monthly alpha of 0.24%[21]. Thus, the five-factor model can also hardly differentiate between discount rate shock-driven and cash flow shock-driven value and growth stocks. It assigns them similar expected returns although they have, predictably, very different expected returns.

Panel A further documents a significant investment premium of on average 0.19% per month. Like for the value factor, the discount rate shock-driven subset of the CMA portfolio contains the entire pricing information of the investment factor. In particular, discount rate shock-driven conservative stocks earn a significant investment premium of 0.30% per month over discount rate shock-driven aggressive stocks. The five-factor model leaves a non-negligible but insignificant monthly alpha of 0.07%. The cash flow shock-driven investment premium, on the other hand, exhibits an insignificant average return of only 0.04% per month and a marginally insignificant monthly alpha of -0.07%. The difference of 0.26% per month between the discount rate shock-

[20]The results on the difference between the market- and book-channel value premia do not add up perfectly with those on the individual market- and book-channel value premia because a few of the book-channel size quintiles are empty in the first two years of the sample period (in total, five portfolio-year observations are missing).

[21]The results on the difference between the discount rate shock- and cash flow shock-driven value premia do not add up perfectly with those on the individual discount rate shock- and cash flow shock-driven value premia because a few of the discount rate shock-driven as well as of the cash flow shock-driven size quintiles are empty in the early years of the sample period (in total, five portfolio-year respectively nine portfolio-year observations are missing).

and cash flow shock-driven investment premia is significant, and the five-factor model leaves a significant monthly alpha of 0.14%. That is, the five-factor model can also not sufficiently differentiate between discount rate shock-driven and cash flow shock-driven conservative and aggressive stocks. It assigns them expected returns that are too similar given that they are, predictably, quite different.

The table reveals also an interesting pattern across the size quintiles. For the standard value and investment premia, we can observe the familiar pattern of declining average returns when moving from small to big stocks. Yet, for the discount rate shock-driven value and investment premia, the pattern is much weaker and far from monotonous. This observation is consistent with the notion that differences in discount rates generate the value and investment premia as differences in discount rates should give rise to differences in expected returns irrespective of firm size.

Panel B displays the results for the value premia when we control for investment rather than size. In general, the value premia are somewhat attenuated compared to those in Panel A. This observation indicates again that the standard investment effect subsumes the standard value effect to some extent. Nevertheless, the documented patterns remain intact: the average market-channel and discount rate shock-driven value premia (0.28% and 0.35% per month, respectively) are considerably and significantly higher than the average book-channel and cash flow shock-driven value premia (0.06% and 0.15% per month, respectively). Although the monthly alphas of 0.12% and 0.18% for the differences between the market- and book-channel value premia respectively the discount rate shock- and cash flow shock-driven value premia are insignificant, the five-factor model does little to explain these differences given that the alphas are still sizable and only slightly lower than the average returns.

Analogously to Panel B, Panel C displays the results for the investment premia when we control for book-to-market rather than size. Like the value premia in Panel B, the investment premia are also notably attenuated, meaning that the standard value effect also subsumes the standard investment effect to some extent. Nevertheless, the general pattern is again preserved: the average discount rate shock-driven investment premium of 0.19% per month is considerably higher than the average cash flow shock-driven investment premium of only 0.03% per month. Although the difference of 0.16% per month is not significant anymore, it is still sizable and cannot be explained by the five-factor model.

In Panel D, we examine whether the discount rate shock-driven value and investment premia can subsume each other. For this purpose, we exclude all discount rate shock-driven conservative (aggressive) stocks from the discount rate shock-driven subset of the value (growth) portfolio, and vice versa. These portfolios are then intersected with the size quintiles. The results indicate that the discount rate shock-driven subsets of the HML and CMA portfolio contain largely independent pricing information. Specifically, the average discount rate shock-driven value (investment) premium across the size quintiles amounts to a highly significant 0.44% (0.23%) per month when the discount rate shock-driven stocks of the CMA (HML) portfolio are excluded.

This represents a decline of only 0.05%-points (0.07%-points) per month as compared to Panel A. Thus, the discount rate shock-driven value and investment effects cannot subsume each other, and hence, represent complementary sources of excess returns. This result is consistent with our conjecture based on the results from Table 7 that the variation in book-to-market that is informative about future returns captures incremental information relative to the variation in investment that is informative about future returns, and vice versa.

We conduct two further robustness checks in the Internet Appendix. First, we examine whether the findings hold in both the first half (July 1964 to December 1992) and the second half (January 1993 to December 2019) of our sample period. The value and investment premia are weaker in the second half than in the first half. Nevertheless, the main findings remain in general intact in both subperiods. That is, the market-channel value premium, the discount rate shock-driven value premium, and the discount rate shock-driven investment premium outperform the book-channel value premium, the cash flow shock-driven value premium, and the cash flow shock-driven investment premium, respectively. The five-factor model has in general again problems to explain these patterns. In the second robustness check, we equal-weight rather than value-weight the stocks in the portfolios. The results are qualitatively nearly identical to those for the value-weighted portfolios and quantitatively in general even more pronounced.

In sum, the findings in this section are in line with our prediction that only stocks whose book-to-market and investment is driven by discount rate shocks should contain the factors' pricing information. The Fama-MacBeth (1973) regressions in Table 7 show that only discount rate shock-driven book-to-market and investment changes exhibit robust predictive power for future returns. Consistently, the portfolio sorts presented in Table 8 show that only discount rate shock-driven HML and CMA stocks earn the value and investment premia. In both analyses, the discount rate shock-driven variation in book-to-market and the discount rate shock-driven variation in investment capture largely complementary information about future returns. Furthermore, the five-factor model largely fails to price book-to-market- and investment-neutral strategies that go long discount rate shock-driven value and investment premia and short cash flow shock-driven value and investment premia. This finding indicates that the standard value and investment factors cannot differentiate between stocks whose variation in book-to-market and investment is due to differences in expected returns and stocks whose variation in book-to-market and investment is due to differences in expected profitability.

9 Discount Rate Shock-Driven Value and Investment Factors

Our results in the previous section reveal that the discount rate shock-driven subsets of the HML and CMA portfolios almost exclusively earn the value and investment premia. That is, these subsets contain almost the entire pricing information of the factors for the cross-section of stock returns. In this section, we built on this finding and construct value and investment factors that use only discount rate shock-driven stocks. These factors should reflect more priced covariation and less unpriced covariation than the standard factors because they use only stocks for which book-to-market and investment are good indicators of expected returns. Given that the discount rate shock-driven value and investment effects cannot subsume each other, the discount rate shock-driven value and investment factors may, contrary to the standard factors, also reflect sufficiently independent priced covariation. Consequently, we examine whether a discount rate shock-driven value factor is still redundant or whether it captures incremental pricing information with respect to a discount rate shock-driven investment factor. Moreover, we also evaluate whether the discount rate shock-driven factors have the potential to improve the pricing performance of the five-factor model.

We construct the discount rate shock-driven value (investment) factor in the same way as the standard value (investment) factor but exclude all stocks that are not identified as discount rate shock-driven value (conservative) and growth (aggressive) stocks from the portfolios used for the construction of the standard value (investment) factor. For comparison, we analogously construct cash flow shock-driven value and investment factors that use only cash flow shock-driven stocks. Table 9 presents correlations between the factors. First, we can observe that the discount rate shock- and cash flow shock-driven factors' correlations with the standard factors are quite similar, implying that the standard factors reflect both effects to similar degrees. Second, the correlations between the discount rate shock- and cash flow shock-driven value factors as well as between the discount rate shock- and cash flow shock-driven investment factors are rather moderate (0.63 and 0.40, respectively). This result corroborates that they reflect different effects. Third, the correlation between the discount rate shock-driven factors is lower than the correlation between the standard factors (0.59 vs. 0.66), suggesting that they reflect more independent covariation.

[Insert Table 9 near here.]

9.1 Spanning Regressions

In order to investigate whether the discount rate shock-driven factors contain incremental pricing information with respect to each other, we conduct again spanning regressions. Table 10 presents the results. In line with the results from the portfolio sorts in Table 8, the discount rate shock-driven value and investment factors exhibit highly significant mean returns of 0.54% and 0.34% per month, respectively. By contrast, the cash flow shock-driven factors exhibit insignificant mean returns of 0.17% and 0.07% per month, respectively.

[Insert Table 10 near here.]

Importantly, the discount rate shock-driven factors capture incremental pricing information with respect to each other. Specifically, the discount rate shock-driven value and investment factors always exhibit significant alphas, no matter whether we employ the standard, cash flow shock-driven, or discount rate shock-driven version of the respective other factor as explanatory factor. In particular, when we use both discount rate shock-driven factors (specification (12)), the monthly alpha of the value factor is 0.25% and the monthly alpha of the investment factor is 0.20%. Thus, the value factor would - even in the considered sample period - not be redundant if it would only comprise those stocks that contain its cross-sectional pricing information. This result also implies that the discount rate shock-driven factors reflect to a considerable degree complementary information about expected returns. The cash flow shock-driven value and investment factors, on the other hand, exhibit in general small and insignificant alphas, implying that they hardly capture incremental pricing information.

Besides the results of the spanning regressions, Table 10 also displays the maximum squared Sharpe ratios that can be obtained when the value and investment factors of the respective specification are combined with the market, size, and profitability factors. The results show that an adjusted five-factor model that comprises the discount rate shock-driven value and investment factors outperforms the standard Fama-French (2015) five-factor model. In particular, the standard five-factor model has a maximum squared Sharpe ratio of 0.088 whereas the adjusted five-factor model has a maximum squared Sharpe ratio of 0.098. Based on the argument of Barillas and Shanken (2017) that the factor model with the highest maximum squared Sharpe ratio has the best pricing performance, this result implies that the adjusted five-factor model exhibits a considerably better pricing performance.

9.2 Pricing of Long-Short Portfolios

Next, we examine how the adjusted five-factor model performs compared to the standard five-factor model in pricing the different parts of the value and investment premia. We start by regressing the average value and investment premia across the size quintiles from Panel A of Table 8 on the two factor models. The results are displayed in Panel A of Table 11. As already observed in Table 8, the standard five-factor model does in general a reasonable job in explaining the value and investment premia, producing only few significant alphas. Yet, the model fails to explain the differences between the market- and book-channel value premia, between the discount rate shock- and cash flow shock-driven value premia, and between the discount rate shock- and cash flow shock-driven investment premia, leaving significant monthly alphas of 0.22%, 0.24%, and 0.14%. That is, the standard five-factor model cannot explain why market-channel HML stocks and discount rate shock-driven HML and CMA stocks generate value and investment premia while book-channel HML stocks and cash flow shock-driven HML and CMA stocks do not. It assigns expected returns to the different types of value, growth, conservative, and aggressive stocks that are too similar although they are, predictably, quite different.

[Insert Table 11 near here.]

The adjusted five-factor model performs better in this regard. Specifically, it produces only for the difference between the market- and book-channel value premia a significant alpha, but leaves rather small and insignificant alphas for the differences between the discount rate shock- and cash flow shock-driven value and investment premia. Thus, it can explain why discount rate shock-driven stocks earn value and investment premia while cash flow shock-driven stocks do not, assigning them different expected returns.

9.3 Time-Series Asset Pricing Tests

In Panel B of Table 11, we conduct formal asset pricing tests that use various test asset sets. In particular, we use the portfolios from Section 8.2 that are constructed as the intersections of the size quintiles with the value, growth, conservative, and aggressive portfolios as well as their cash flow shock- and discount rate shock-driven subsets. Additionally, we construct long-short portfolios by going long the discount rate shock-driven size quintiles of the value, growth, conservative, and aggressive portfolios and short the corresponding cash flow shock-driven size quintiles.

We compare the pricing performance of the standard and the adjusted five-factor model for these test assets based on several metrics. First, the GRS statistic of Gibbons et al. (1989) as well as its p-value, testing whether the alphas of the test assets are jointly zero. Second, the average absolute alpha across the test assets as well as the fraction of significant alphas. Third, following Fama and French (2015), the ratio of the average absolute alpha to the average absolute deviation of the test assets' mean returns from their mean, reflecting the unexplained proportion of the mean returns' dispersion. Fourth, the cross-sectional R^2 employed by Cooper and Maio (2019)[22], reflecting the proportion of the mean returns' variance that is explained by the factor model. Finally, the test assets' average time-series R^2.

To set a benchmark, we calculate these performance metrics first based on the size quintiles of the standard value, growth, conservative, and aggressive portfolios as test assets. Since the Fama-French (2015) five-factor model aims to capture, among others, especially the value and investment premia, one would expect that the standard five-factor model does quite well in explaining the returns of these test assets. Yet, the model is rejected by the GRS test and leaves a considerable average absolute alpha of 0.091%.

Next, we turn to the pricing of the test assets that are based on the factor portfolios' cash flow and discount rate shock-driven subsets. We observe that the standard five-factor model produces a higher percentage of significant alphas (30% vs. 15%), exhibits a substantially lower cross-sectional R^2 (2.1% vs. 78.8%), and is rejected at a lower significance level (0.1% vs. 5.5%)

[22]The cross-sectional R^2 is calculated as one minus the ratio of the variance of the test assets' alphas to the variance of the test assets' mean returns.

based on the cash flow shock-driven test assets than based on the discount rate shock-driven test assets. This result suggests that the standard five-factor model has more problems in explaining why the cash flow shock-driven subsets do not earn value and investment premia rather than in explaining why the discount rate shock-driven subsets do.

The standard five-factor model exhibits a particularly bad pricing performance for the long-short portfolios that go long the discount rate shock-driven test assets and short the corresponding cash flow shock-driven test assets. The average absolute alpha amounts to a substantial 0.154%, the percentage of significant alphas is 25%, and the cross-sectional R^2 is only 8.3%. The model's performance is also not quite good when it is asked to explain the size quintiles of the standard value, growth, conservative, and aggressive portfolios jointly with the long-short portfolios. While the cross-sectional R^2 of 81.1% is reasonable, the average absolute alpha of 0.127% per month is sizable and 35% of the alphas are statistically significant. These findings indicate that the standard five-factor model has rather problems to explain why the value and investment premia for the discount rate shock- and cash flow shock-driven subsets are so different than to explain the existence of the value and investment premia in the first place.

The adjusted model performs quite similarly as the standard model in pricing the size quintiles of the value, growth, conservative, and aggressive portfolios. Thus, the use of the value and investment factors' discount rate shock-driven versions does not harm the explanation of the value and investment effects. Importantly, the adjusted model outperforms the standard model in pricing the discount rate shock-driven test assets. For instance, it is not rejected by the GRS test and it produces a lower average alpha (0.090% vs. 0.102%). This result is expected since the discount rate shock-driven factors are especially designed to explain the discount rate shock-driven value and investment premia. Although its performance worsens, the adjusted model outperforms the standard model also in pricing the cash flow shock-driven test assets, producing a lower average alpha (0.102% vs. 0.114%) and a much higher cross-sectional R^2 (21.4% vs. 2.1%). Overall, the adjusted five-factor model has, nevertheless, also more problems in explaining why the cash flow shock-driven subsets do not earn value and investment premia rather than in explaining why the discount rate shock-driven subsets do.

Finally, the adjusted five-factor model considerably improves upon the standard model in pricing the long-short portfolios. Specifically, it produces a much lower average alpha (0.126% vs. 0.154%) and a much higher cross-sectional R^2 (22.6% vs. 8.3%). Consequently, the adjusted model performs also somewhat better than the standard model in explaining the size quintiles of the value, growth, conservative, and aggressive portfolios jointly with the long-short portfolios. On balance, the adjusted model does not seem to have considerably more problems in explaining why the value and investment premia for the discount rate shock- and cash flow shock-driven subsets are so different than in explaining the existence of the value and investment premia in general.

In sum, the findings in this section suggest that value and investment factors that are built only from stocks for which book-to-market and investment are good indicators of expected returns improve upon the standard factors. These adjusted factors capture incremental pricing information with respect to each other, meaning that the value factor would - even in our sample period - no longer be redundant. The factors' incremental pricing information is only discernible when purging them of their cash flow shock-driven parts. These parts do hardly contain any cross-sectional pricing information but strongly contribute to the factors' comovement. Hence, the value factor's redundancy is due to its simplistic construction methodology that does not consider which stocks' variation in book-to-market is informative about expected returns, and thus, which stocks contain cross-sectional pricing information. Moreover, we also show that an adjusted five-factor model that uses discount rate shock-driven value and investment factors exhibits a better pricing performance than the standard five-factor model.

10 Exposure to Cash Flow News, Discount Rate News, and Variance News

The literature has put forward many explanations that aim to rationalize the value premium[23]. Our finding that only discount rate shock-driven stocks generate the value premium while cash flow shock-driven stocks do not provides a fresh laboratory to test these explanations. In particular, in order to rationalize the value premium, any explanation would need to be able to explain also why only discount rate shock-driven value stocks earn the value premium.

An evaluation of all explanations is beyond the scope of this paper. However, given that it has shown much promise and has so far not been rejected, we reevaluate whether the three-beta model of Campbell et al. (2018) may be able to rationalize the value premium. In this model, exposure to market cash flow news is positively priced while exposures to market discount rate news and market volatility news are negatively priced. Campbell et al. (2018) show that value stocks have a higher exposure to cash flow news and a lower exposure to volatility news than growth socks. This observations suggests that the value premium may be a compensation for adverse exposures to market cash flow and volatility news.

Gerakos and Linnainmaa (2018) reexamine this conclusion. They decompose book-to-market into a size component and an orthogonal component, and construct two value factors from these components. In line with our findings, their size value factor (similar to our market-channel value factor) earns the entire value premium while their orthogonal value factor (similar to our book-channel value factor) earns no return premium. They find that both value factors have similar exposures to market cash flow and discount rate news. Exposure to market cash flow news is, therefore, unable to rationalize the value premium. Gerakos and Linnainmaa (2018) find, however, also that the size value factor has a significantly lower exposure to volatility news than the orthogonal value factor. Consequently, exposure to market volatility news remains a valid candidate as an explanation for the value premium.

[23]See Golubov and Konstantinidi (2019) for a comprehensive overview.

If exposure to market volatility news would in fact explain the value premium, our discount rate shock-driven value factor should have a lower volatility news beta than our cash flow shock-driven value factor. In order to investigate this conjecture, we obtain data on the quarterly estimated news terms for the period until December 2011 from Christopher Polk's website[24]. The factors' betas on the news terms are presented in Table 12. In line with the findings of Gerakos and Linnainmaa (2018), the cash flow and discount rate news betas of the market-channel and book-channel value factors are not significantly different whereas the market-channel value factor's volatility news beta is significantly lower.

However, the results for the discount rate shock- and cash flow shock-driven value factors refute exposure to volatility news as an explanation for the value premium. Specifically, the two factors have similar exposures to all types of news, and the differences between their exposures are insignificant. This holds in particular also for their exposure to volatility news. Since exposure to volatility news cannot explain the return difference between the discount rate shock-driven and cash flow shock-driven value factors, it can also not rationalize the value effect in general.

[Insert Table 12 near here.]

We further examine whether exposure to any of the news may explain the investment premium. For the standard investment factor, the results reveal an insignificant beta on market cash flow news and significantly negative betas on market discount rate and volatility news. Thus, exposure to market discount rate and volatility news would have the potential to provide an explanation for the investment premium. However, like for the value premium, this conjecture is rejected by the results for the cash flow shock-driven and discount rate shock-driven investment factors. Specifically, none of the differences between the factors' news betas is significant. Thus, exposure to market discount rate or volatility news cannot explain the factors' return differential, and therefore, also not the investment effect in general.

Overall, contrary to the conclusions of Campbell et al. (2018) and Gerakos and Linnainmaa (2018), the results in this section suggest that neither the value nor the investment effect can be rationalized as compensation for exposure to market cash flow, discount rate, or volatility news. Explanations that aim to rationalize these two effects should also be able to explain the return differential between our cash flow shock-driven and discount rate shock-driven value and investment factors.

11 Alternative Explanations

In Section 2, we argue that the negative relation between book-to-market and investment arises because both are driven by cash flow and discount rate shocks, and that this relation should,

[24] `https://personal.lse.ac.uk/polk/research/work.htm`

therefore, be only due to market equity-driven changes in book-to-market. Our results so far are consistent with this thesis. However, mispricing and financial constraints are alternative explanations that may give rise to the relation between investment and the market equity-driven part of book-to-market. In this section, we investigate whether and to what extent they drive our results.

11.1 Mispricing

Changes in firms' market equity may be due to mispricing rather than cash flow or discount rate shocks. The literature has put forward several mechanisms how overpricing (underpricing) may prompt firms to increase (decrease) their investment[25]. In order to examine whether such mispricing-related explanations play a role for our results, we split our sample based on several mispricing proxies and repeat for each of the subsamples the Fama-MacBeth (1973) regressions in Tables 3 and 4 that aim to explain investment and investment factor correlation. If mispricing rather than cash flow and discount rate shocks drive the documented relations of investment and investment factor correlations with market equity changes, the relations should be much stronger for stocks that are more likely to be mispriced.

We split our sample based on three mispricing proxies. First, following the arguments of Baker and Wurgler (2002), firms that are overvalued (undervalued) should be more likely to issue (repurchase) equity. Second, following Baker et al. (2003), stocks with very high (low) returns across the subsequent three years are more likely to be undervalued (overvalued). Third, following Edmans et al. (2012), stocks that are subject to high hypothetical sales by mutual funds are likely to be undervalued due to non-fundamental price pressure. At the end of each June, we therefore classify firms whose net share issues across the next fiscal year are below the 25th or above the 75th percentile (between the 25th and the 75th percentile), firms whose cumulative three-year ahead returns are below the 25th or above the 75th percentile (between the 25th and the 75th percentile)[26], and firms with above-median (below-median) mutual fund hypothetical sales across the previous fiscal year[27] as mispriced (fairly priced). The breakpoints for the splits are based only on NYSE stocks.

For each of these six subsamples, we run regression (6) from Table 3 as well as regression (6) from Table 4. These regressions regress contemporaneous investment respectively future investment factor correlation on up to four-year lagged book and market equity changes as well as five-year lagged book-to-market. The results are presented in columns (2) to (7) of Table 13 and in columns (2) to (7) of Table 14.

The results in Table 13 reveal that the coefficients on the market equity changes are mostly somewhat higher for the mispriced than the fairly priced subsamples based on net stock issues

[25] See for example Polk and Sapienza (2009) and Dessaint et al. (2019).

[26] We measure a firm's three-year ahead return across the 36-month period beginning at the end of the month of its last fiscal year ending.

[27] Appendix C describes in detail how stocks' mutual fund hypothetical sales are calculated.

and three-year ahead returns. Yet, the differences are rather small compared to the coefficients' absolute magnitudes. Moreover, the coefficients on the market equity changes are even somewhat lower for the mispriced than the fairly priced subsample based on mutual fund hypothetical sales. Consequently, mispricing drives, if anything, the positive relation between market equity changes and investment only to a very limited extent.

Table 14 shows that the coefficients on market equity changes are, in absolute terms, only somewhat higher for the mispriced than the fairly priced subsamples based on net stock issues and mutual fund hypothetical sales, and even somewhat lower for the mispriced than the fairly priced subsample based on three-year ahead returns. Thus, mispricing does also not seem to play a major role for the negative association between market equity changes and comovement with the investment factor.

[Insert Table 13 near here.]

[Insert Table 14 near here.]

11.2 Financial Constraints

A second alternative explanation for the relation between market equity changes and investment is that changes in firms' market equity may affect their ability to raise external capital. Specifically, negative returns may lead external investors to be more pessimistic about firms' prospects, reducing their willingness to provide further capital to the firms. This makes it more difficult for the firms to obtain external financing wherefore they need to reduce their investment in new projects, even if these projects had positive net present values[28]. Analogous to the previous subsection, we conduct again subsample analyses to verify whether such financing-related explanations play a role for our results. If financial constraints rather than cash flow and discount rate shocks drive the relations of investment and investment factor correlation with market equity changes, the relations should be much stronger for financially constrained firms since they are more affected by investors' unwillingness to provide financing.

We split our sample based on three proxies for financial constraints. First, as argued by Fazzari et al. (1988), firms that are financially constrained should pay out less capital in the form of dividends and stock repurchases. Second, following Whited (1992), firms that have no S&P long-term debt rating or whose debt is in default should be more financially constrained. Third, we use the Kaplan-Zingales index as proposed by Lamont et al. (2001) as a composite score of firms' financial constraints. At the end of each June, we therefore classify firms whose total payout-to-book equity ratios are below-median (above-median), firms with outstanding debt but no S&P long-term debt rating or whose debt is in default (firms with no outstanding debt

[28]The same reasoning holds analogously for positive returns and increased investment.

or a S&P long-term debt rating and whose debt is not in default)[29], and firms whose Kaplan-Zingales index value is above-median (below-median) as financially constrained (unconstrained). As previously, the breakpoints for the splits are based only on NYSE stocks.

For each subsample, we again implement regression (6) from Table 3 and regression (6) from Table 4. The results for investment as the dependent variable are presented in columns (8) to (13) of Table 13, the results for future investment factor correlation as the dependent variable are presented in columns (8) to (13) of Table 14.

Table 13 documents that the coefficients on current market equity changes are somewhat higher in the unconstrained than in the constrained subsamples based on payout-to-book and the Kaplan-Zingales index, but are lower in the unconstrained than in the constrained subsample based on debt rating. Lagged market equity changes' coefficients are higher in the constrained than in the unconstrained subsamples for all proxies. This observation suggests that financial constraints may to some extent be responsible for the positive relation between lagged market equity changes and investment. Yet, the coefficients on lagged market equity changes in the unconstrained subsamples are, if indeed, not substantially lower than in the constrained subsamples. On balance, the effect of cash flow and discount rate shocks is, therefore, still the main driver of the relation between market equity changes and investment.

Finally, the results in Table 14 show that the coefficients on market equity changes are, in absolute terms, in general notably higher for the unconstrained than for the constrained subsamples. This finding means that the negative association between market equity changes and comovement is stronger for unconstrained firms. Financial constraints are therefore unlikely to drive this association.

In sum, the results in this section confirm that the relation between book-to-market and investment as well as between the value and investment factors are in fact most likely due to cash flow and discount rate shocks. Mispricing-related effects seem to contribute slightly to market equity changes' relation to both, investment and comovement with the investment factor, but they seem to play a rather subordinated role. Financial constraints have a notable influence on the relation between market equity changes and investment, but our evidence suggests that they do not drive the association between market equity changes and comovement with the investment factor.

12 Conclusion

The finding of Fama and French (2015) that the value factor does not posses incremental explanatory power for the cross-section of stock returns in their five-factor model has sparked controversy about the value factor. In this work, we aim to resolve this controversy.

The value factor's explanatory power is primarily subsumed by the investment factor. In

[29] We obtain data on firms' S&P ratings from Compustat.

order to understand the reasons for the value factor's statistical redundancy, we put forward an explanation for its close relation with the investment factor. Based on the dividend discount model and the net present value rule, we argue that book-to-market and investment are both driven by cash flow and discount rate shocks, giving rise to their negative relation and the factors' positive comovement. Importantly, since only market equity changes reflect cash flow and discount rate shocks, this relation should only be observable for variation in book-to-market that is due to market rather than book equity changes.

In line with these predictions, we document a negative relation between firms' book-to-market and investment that is exclusively due to market equity-driven book-to-market changes. This negative relation gives rise to a positive overlap between the value and investment factors' mimicking portfolios. The positive overlap is, in turn, to a considerable extent responsible for the factors' comovement. Nevertheless, the comovement is not only mechanical: stocks that are in the value factor's mimicking portfolio without being in the corresponding legs of the investment factor's mimicking portfolio also contribute to the comovement. These results support the conjecture that the factors comove because both reflect the covariation of stocks that experienced cash flow or discount rate shocks.

In light of this conclusion, it is not surprising that one of the two factors is redundant. However, it is not clear why the value factor is the redundant one rather than the investment factor. We uncover three reasons why the value factor is the redundant one. First, it comprises the noisy and unpriced book equity-driven part. Second, it is much more distorted in times of market-wide turbulances. Third, it is a worse hedge for the market, size, and profitability factors. The first two reasons imply that the value factor is systematically more prone to be the redundant one of the two factors. Yet, we argue and provide evidence that the later two reasons may be specific to the sample period. Hence, the value factor may possibly recover from its redundancy in the future. This conjecture does, however, not mean that the investment factor needs to turn redundant. Our results rather indicate that both factors may be non-redundant simultaneously.

We further show that the value and investment premia are only earned by stocks whose variation in book-to-market and investment is likely to be driven by discount rate shocks. These are stocks for which book-to-market and investment are good indicators of expected returns. By contrast, the value and investment premia are weak to non-existent for stocks whose book-to-market and investment are likely to be driven by cash flow shocks or book equity changes. The Fama-French (2015) five-factor model cannot explain why discount rate shock-driven stocks earn value and investment premia while book equity- and cash flow shock-driven stocks do not. That is, the five-factor model cannot distinguish whether stocks' variation in book-to-market and investment is due to differences in expected returns or due to differences in expected profitability. It therefore assigns similar expected returns to both types of stocks although they have predictably quite different expected returns.

Resurrecting the value factor for good, we show that an adjusted version of the value factor that comprises only discount rate shock-driven stocks, that is, stocks for which book-to-market is a good indicator of expected returns, is not redundant. This result holds even when the investment factor is also adjusted to comprise only stocks for which investment is a good indicator of expected returns. This finding implies that the value factor contains incremental pricing information. This incremental information is watered-down in its standard version by the cash flow shock-driven part, which contains hardly any pricing information but strongly contributes to the factor's comovement with the investment factor. Thus, a value factor has still a place in a multifactor model - even in the presence of an investment factor - but its construction methodology should be adjusted such that its pricing information is reflected more clearly.

Our findings provide also a fresh opportunity for the evaluation of explanations for the value and investment effects. Specifically, every explanation for these effects should be able to capture our finding that the value and investment premia are only earned by stocks whose variation in book-to-market and investment is likely to be due to discount rate shocks. We show that the three-factor ICAPM of Campbell et al. (2018) fails to do so, meaning that it is unable to explain the value and investment effects. Future research may want to use our discount rate shock-driven and cash flow shock-driven value and investment strategies as additional test assets for the evaluation of explanations for these effects.

Moreover, our results yield also important insights for the implementation of factor investing strategies. First, value and factor investing strategies can be considerably enhanced if they take into account whether firms' book-to-market and investment are high because of high expected returns or because of low expected profitability. Second, such enhanced value and investment strategies represent to a large degree independent sources of excess returns, meaning that it is beneficial for investors to engage in both strategies simultaneously.

Finally, an important limitation of our findings is that they cannot definitely rule out that irrationalities play a role. Specifically, our proxy for discount rate shocks may not only capture stock price changes that are due to changes in risk but also due to mispricing. Yet, since changes in risk as well as mispricing are both associated with changes in expected returns, our discount rate shock proxy is still a valid instrument for identifying variation in book-to-market and investment that is due to differences in expected returns. Moreover, although our theoretical framework is certainly more in line with rationality, it can also accommodate irrationalities. In particular, the representative investor's required return in the dividend discount model in equation (2) may be determined by the stock's risk as well as by the investor's behavioural biases. However, the assumption that the investor's required return from equation (2) is equal to the firm's cost of capital in equation (3) is probably violated. Nevertheless, the evidence of, among others, Polk and Sapienza (2009) and Dessaint et al. (2019) suggests that firms' investment decisions are affected by mispricing, meaning that discount rate shocks that are due to mispricing rather than changes in risk may drive investment as well. In short, we cannot distinguish whether discount rate shocks are rational or irrational, but we argue that it is neither critical for our theoretical motivation nor for the interpretation of our empirical findings.

A Variable Definitions

Market Equity (ME):

A stock's market equity for the end of month t is calculated as the stock's price at the end of month t times the stock's shares outstanding at the end of month t. In order to reduce the skewness in ME, we transform it by the natural logarithm. If ME is non-positive, the ME data is considered to be missing.

Book-to-Market Equity Ratio (BM):

A stock's book-to-market equity ratio for the end of June of year y is calculated as the firm's book equity from the last fiscal year ending in year $y-1$, divided by the firm's ME at the end of the month of this fiscal year ending[30]. Following Davis et al. (2000), book equity is the book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit (if available), minus the book value of preferred stock (depending on availability, the redemption, liquidation, or par value of preferred stock is used, in that order); if the book value of stockholders' equity is not directly available, it is measured as the book value of common equity plus the par value of preferred stock or as the difference between the book value of total assets and the book value of total liabilities (in that order). In order to reduce the skewness in BM, we transform it by the natural logarithm. If either ME or book equity is non-positive, the BM data is considered to be missing.

Investment (INV):

A stock's investment for the end of June of year y is calculated as the firm's total assets from the last fiscal year ending in year $y-1$ divided by the firm's total assets from the last fiscal year ending in year $y-2$, minus 1. In order to reduce the skewness in INV, we transform it by the natural logarithm. If total assets are non-positive, the INV data is considered to be missing.

Net Issues (NI):

A firm's net issues for the end of June of year y is calculated as the natural logarithm of the firm's market equity at the last fiscal year ending in year $y-1$ minus the natural logarithm of the firm's market equity at the last fiscal year ending in year $y-2$ minus the natural logarithm of the firm's cumulative with-dividend gross return across the period from the last fiscal year ending in year $y-2$ to the last fiscal year ending in year $y-1$. If either market equity at the last fiscal year ending in year $y-2$, market equity at the last fiscal year ending in year $y-1$, or all monthly returns between the two fiscal year endings are missing, the NI data is considered to be missing.

[30]This construction of BM slightly differs from Fama and French (2015) who divide the book equity by the firm's ME from the end of December of year $y-1$.

Operating Profitability (OP):

A stock's operating profitability for the end of June of year y is calculated as the firm's annual revenues minus cost of goods sold, interest expense, and selling, general, and administrative expenses, divided by the firm's book equity, all from the last fiscal year ending in year $y-1$. The OP data is considered to be missing if annual revenues data is missing, if data for each of cost of goods sold, interest expense, and selling, general, and administrative expenses is missing, or if book equity is non-positive.

Momentum (MOM):

A stock's momentum for the end of month t is the stock's return from the end of month $t-12$ to the end of month $t-1$. If a stock does not have good price data for the end of month $t-12$ or good return data for month $t-1$, its MOM data is considered to be missing.

Short-Term Reversal (STR):

A stock's short-term reversal for the end of month t is the stock's return from the end of month $t-1$ to the end of month t. If a stock does not have good price data for the end of month $t-1$ or good return data for month t, its STR data is considered to be missing.

Net Share Issues (NSI):

Following Hou et al. (2020), a firm's net share issues for the end of June of year y is calculated as the natural logarithm of the firm's split-adjusted shares outstanding from the last fiscal year ending in year $y-1$ minus the natural logarithm of the firm's split-adjusted shares outstanding from the last fiscal year ending in year $y-2$. Split-adjusted shares outstanding is shares outstanding times the adjustment factor, both from Compustat.

Total Payout-to-Book Equity Ratio (TPB):

Following Hou et al. (2020), a firm's total payout-to-book equity ratio for the end of June of year y is calculated as total payout from the last fiscal year ending in year $y-1$ divided by the firm's book equity from the last fiscal year ending in year $y-2$. Total payout is dividends on common stocks plus total expenditure on the purchase of common and preferred stocks (zero if missing) plus reductions in the redemption value of preferred stocks (i.e. increases are set to zero). The TPB data is considered to be missing if data on dividends, preferred stocks' redemption value, or book equity is missing.

Kaplan-Zingales Index (KZ Index):

Following Lamont et al. (2001), we calculate firm i's Kaplan-Zingales index for the end of June of year y as follows:

$$KZ_{i,y} = -1.002\frac{CF_{i,y}}{K_{i,y-1}} + 0.283Q_{i,y} + 3.139\frac{Debt_{i,y}}{Debt_{i,y} + SEQ_{i,y}} - 39.368\frac{D_{i,y}}{K_{i,y-1}} - 1.315\frac{Cash_{i,y}}{K_{i,y-1}}$$

$CF_{i,y}$ is cash flow measured as income before extraordinary items plus depreciation and amortization from the last fiscal year ending in year $y-1$. $K_{i,y-1}$ is net property, plant, and equipment from the last fiscal year ending in year $y-2$. $Q_{i,y}$ is Tobin's Q measured as total assets plus market equity (from CRSP) minus book value of common equity and deferred taxes, divided by total assets, all from the last fiscal year ending in year $y-1$ (except for market equity, which is from the end of December of year $y-1$). $Debt_{i,y}$ is the sum of short-term debt and long-term debt from the last fiscal year ending in year $y-1$. $SEQ_{i,y}$ is stockholders' equity from the last fiscal year ending in year $y-1$. $D_{i,y}$ is total dividends from the last fiscal year ending in year $y-1$. $Cash_{i,y}$ is cash and short-term investments from the last fiscal year ending in year $y-1$.

Investment Factor Correlation (ρ^{CMA}):
We estimate a stock's correlation with the investment factor for the end of month t as the correlation of the stock's daily excess returns from the beginning of month $t-11$ to the end of month t with the investment factor. We require at least 100 daily return observations for the stock across the 12-month estimation period.

B Market, Size, and Profitability Factors

We construct the market, size, and profitability factors as described in Fama and French (2015). First, the market portfolio in a given month contains all stocks that are listed on the NYSE, AMEX, or NASDAQ and have a CRSP share code of 10 or 11 as well as good market equity (ME) data at the beginning of the month. The market portfolio is newly formed at the beginning of each month and the stocks in the market portfolio are value-weighted based on their market capitalizations. The return on the market factor (MP) is the return on the market portfolio in excess of the one-month T-bill rate.

The profitability factor is constructed in the same way as the value factor (see Section 3.2), only that the second sort is with respect to operating profitability (OP) from the last fiscal year ending. The return on the profitability factor (RMW) is the average of the value-weighted returns on the two high OP portfolios minus the average of the value-weighted returns on the two low OP portfolios.

Finally, the return on the size factor (SMB) is the average of the returns on the nine low ME portfolios resulting from the bivariate sorts with respect to ME and any of BM, OP, and INV, minus the average of the returns on the nine high ME portfolios.

C Calculation of Mutual Fund Hypothetical Sales

We determine each stock's mutual fund hypothetical sales across a given fiscal year following the approaches of Edmans et al. (2012) and Dessaint et al. (2019). For this purpose, we obtain monthly mutual fund data from CRSP as well as quarterly mutual fund holdings data from Thomson Reuters, which is available from 1980 onwards. We use all US mutual funds that are not specialized in a certain industry.

CRSP reports mutual funds' monthly returns and total net asset values by share class. We calculate fund f's average return across all share classes in month m by averaging its share classes' returns in month m as follows:

$$Return_{f,m} = \frac{\sum_{s=1}^{S_f}(TNA_{f,m,s} \times Return_{f,m,s})}{\sum_{s=1}^{S_f} TNA_{f,m,s}}$$

where $Return_{f,m,s}$ is the return of share class s of fund f in month m, $TNA_{f,m,s}$ is the total net asset value of share class s of fund f at the end of month m, and S_f is the number of share classes of fund f. We compound funds' average monthly returns on a quarterly basis. Moreover, we calculate funds' total net asset values at the end of each quarter by aggregating the total net asset values of their share classes.

Next, we estimate the net inflow of fund f across quarter q as a percentage of its beginning-of-quarter total net asset value as follows:

$$Flow_{f,q} = \frac{TNA_{f,q} - TNA_{f,q-1} \times (1 + Return_{f,q})}{TNA_{f,q-1}}$$

where $TNA_{f,q}$ is fund f's total net asset value at the end of quarter q and $Return_{f,q}$ is fund f's compounded return across quarter q.

Using the mutual fund holdings data from Thomson Reuters, we estimate stock i's hypothetical sales in quarter q caused by mutual fund outflows as follows:

$$MFHS_{i,q} = \frac{\sum_f Flow_{f,q} \times Shares_{i,f,q-1} \times Price_{i,q-1}}{Volume_{i,q}}$$

where $Shares_{i,f,q}$ is the number of shares in stock i held by fund f at the end of quarter q, $Price_{i,q}$ is stock i's price at the end of quarter q, and $Volume_{i,q}$ is stock i's dollar trading volume in quarter q. We use only funds with extreme outflows, defined as funds with $Flow_{f,q} \leq -0.05$.

Finally, we calculate stocks' average mutual fund hypothetical sales across their fiscal years. For this purpose, we first assign $MFHS_{i,q}$ to each month m in quarter q. Then, we calculate stock i's average hypothetical sales across fiscal year y as follows:

$$MFHS_{i,y} = \frac{\sum_{m \in y} MFHS_{i,m}}{N_{i,y}}$$

where $N_{i,y}$ is the number of months in stock i's fiscal year y (i.e. usually 12).

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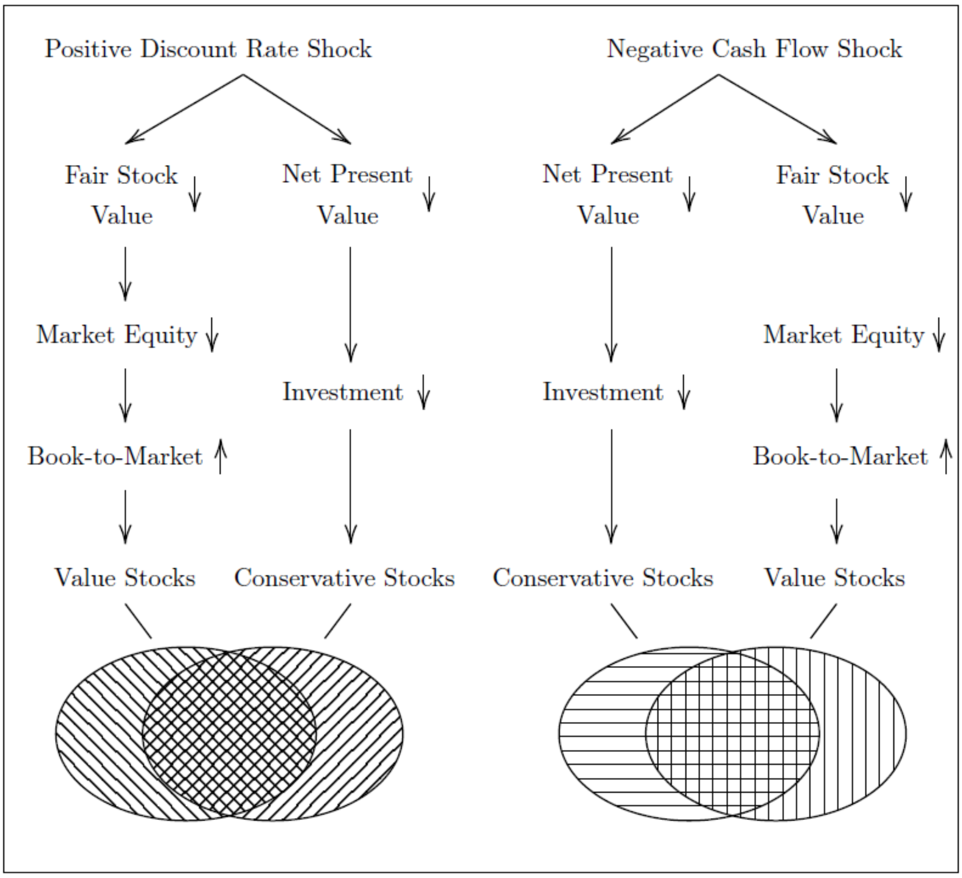
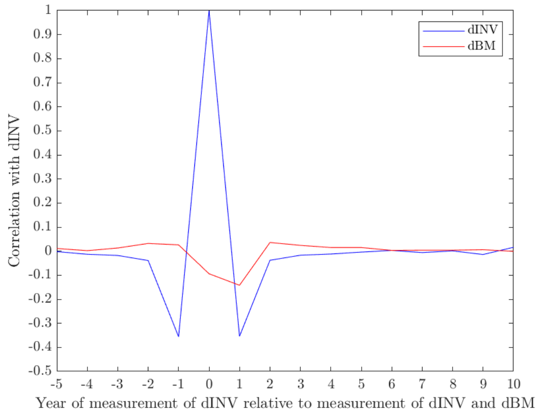
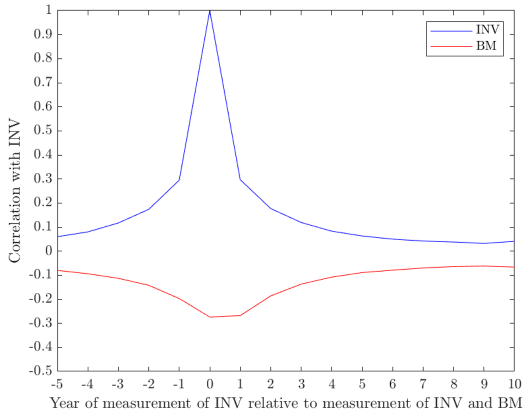


Figure 1
Cash Flow and Discount Rate Shocks as Drivers of the Value and Investment Factors' Relation

This figure illustrates our thesis on how negative cash flow shocks and positive discount rate shocks drive the association between the value portfolio and the conservative portfolio. The case of how positive cash flow shocks and negative discount rate shocks drive the association between the growth portfolio and the aggressive portfolio is analogous.



(a) Correlation with dINV

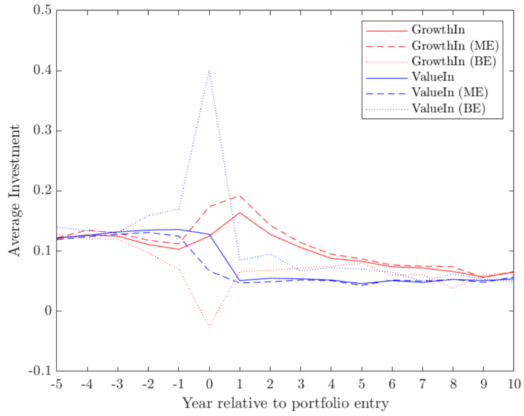


(b) Correlation with INV

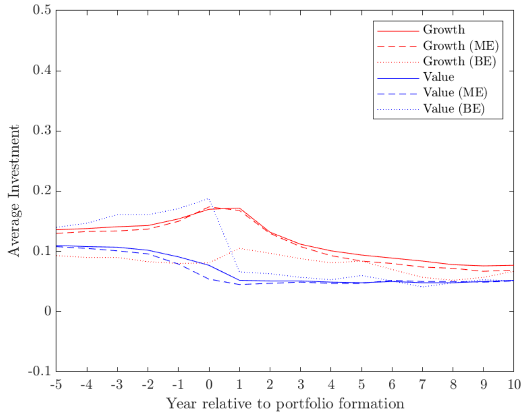
Figure 2

Correlation between Book-to-Market and Investment

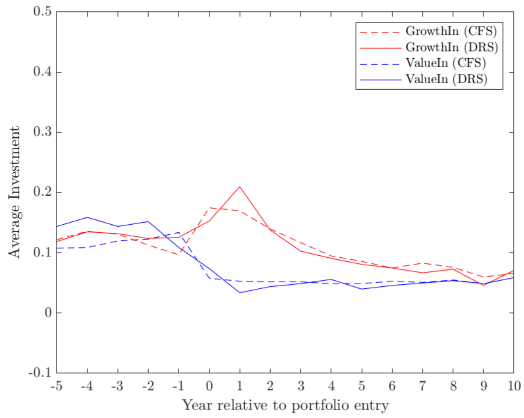
Panel A of this figure displays time-series averages of annual cross-sectional rank correlations of the change in investment (dINV) and of the change in the book-to-market ratio (dBM) with past (up to five years), contemporaneous, and future (up to ten years) changes in investment. Panel B displays time-series averages of annual cross-sectional rank correlations of investment (INV) and of the book-to-market ratio (BM) with past (up to five years), contemporaneous, and future (up to ten years) investment. Variables are measured at the end of each June from 1963 to 2019. INV and BM are calculated as described in Appendix A and are both in log-terms. dINV and dBM are the annual changes in INV and BM, respectively.



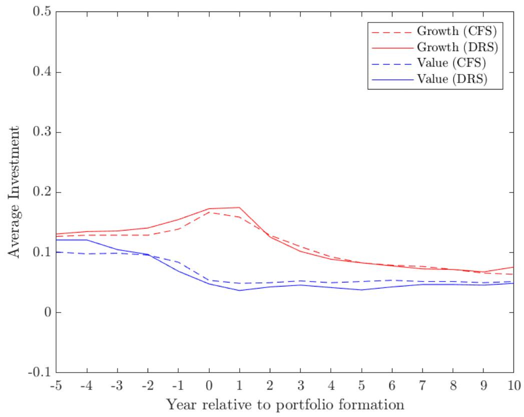
(a) Incoming HML Stocks (ME vs. BE)



(b) All HML Stocks (ME vs. BE)



(c) Incoming HML Stocks (CFS vs. DRS)

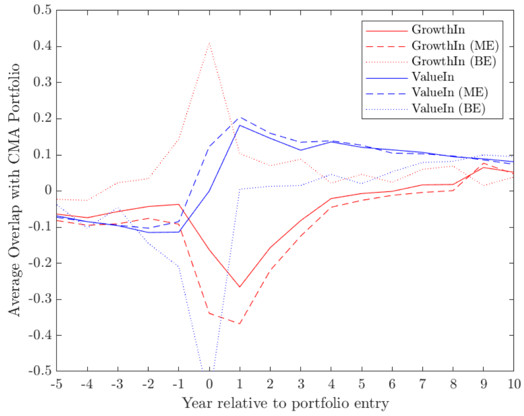


(d) All HML Stocks (CFS vs. DRS)

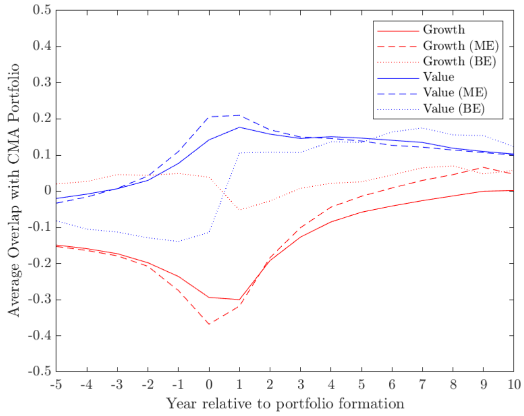
Figure 3

Average Investment of Value and Growth Portfolios' Stocks

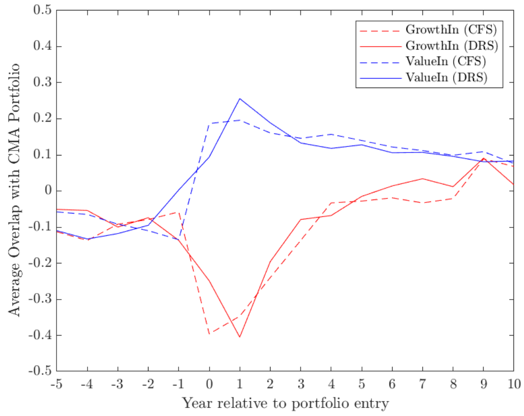
This figure displays time-series averages of portfolios' weighted average past (up to five years), contemporaneous, and future (up to ten years) investment. Investment is calculated as described in Appendix A, is measured at the end of each June from 1963 to 2019, and is winsorized at the 0.5% and 99.5% levels. Panel A displays the results for the portfolios consisting of all incoming value (ValueIn) and growth (GrowthIn) stocks as well as their market-channel (ValueIn (ME) and GrowthIn (ME)) and book-channel (ValueIn (BE) and GrowthIn (BE)) subsets. Panel B displays the results for the entire value and growth portfolios as well as their market-channel (Value (ME) and Growth (ME)) and book-channel (Value (BE) and Growth (BE)) subsets. Panel C displays the results for the portfolios consisting of incoming discount rate shock-driven value (ValueIn (DRS)) and growth (GrowthIn (DRS)) stocks and incoming cash flow shock-driven value (ValueIn (CFS)) and growth (GrowthIn (CFS)) stocks. Panel D displays the results for the portfolios consisting of all discount rate shock-driven value (Value (DRS)) and growth (Growth (DRS)) stocks and all cash flow shock-driven value (Value (CFS)) and growth (Growth (CFS)) stocks. The construction of the portfolios and the classification of value and growth stocks are described in Sections 3.2 and 4.3. Stocks are weighted proportionally the same as in the aggregate value and growth portfolios, respectively.



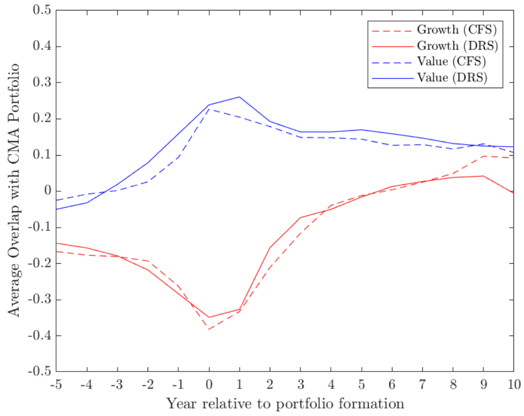
(a) Incoming HML Stocks (ME vs. BE)



(b) All HML Stocks (ME vs. BE)



(c) Incoming HML Stocks (CFS vs. DRS)

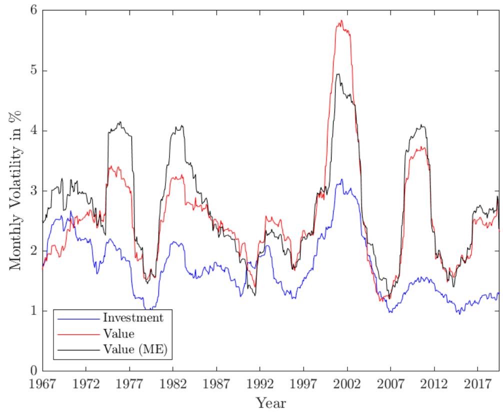


(d) All HML Stocks (CFS vs. DRS)

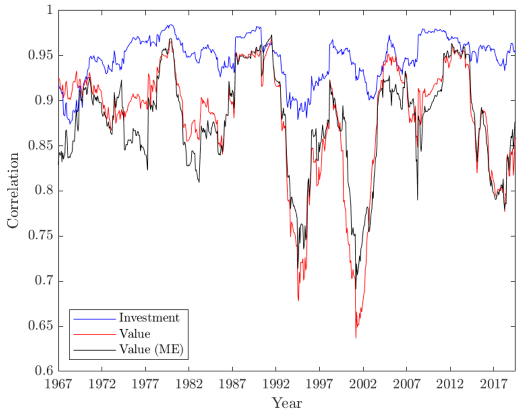
Figure 4

Average Overlaps of Value and Growth Portfolios with CMA Portfolios

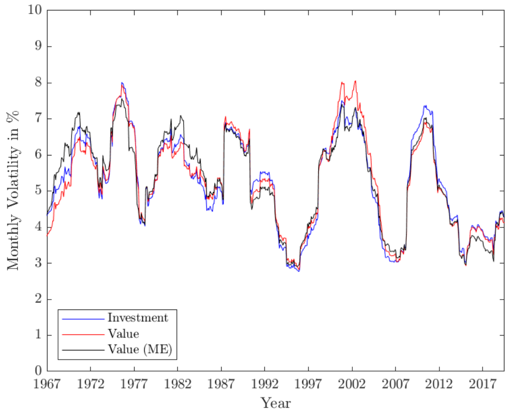
This figure displays time-series averages of portfolios' overlaps with past (up to five years), contemporaneous, and future (up to ten years) CMA portfolios. The overlap of a portfolio with a CMA portfolio is the weighted fraction of the portfolios' stocks that are in the respective conservative portfolio minus the weighted fraction of the portfolios' stocks that are in the respective aggressive portfolio. Panel A displays the results for the portfolios consisting of all incoming value (ValueIn) and growth (GrowthIn) stocks as well as their market-channel (ValueIn (ME) and GrowthIn (ME)) and book-channel (ValueIn (BE) and GrowthIn (BE)) subsets. Panel B displays the results for the entire value and growth portfolios as well as their market-channel (Value (ME) and Growth (ME)) and book-channel (Value (BE) and Growth (BE)) subsets. Panel C displays the results for the portfolios consisting of incoming discount rate shock-driven value (ValueIn (DRS)) and growth (GrowthIn (DRS)) stocks and incoming cash flow shock-driven value (ValueIn (CFS)) and growth (GrowthIn (CFS)) stocks. Panel D displays the results for the portfolios consisting of all discount rate shock-driven value (Value (DRS)) and growth (Growth (DRS)) stocks and all cash flow shock-driven value (Value (CFS)) and growth (Growth (CFS)) stocks. The construction of the portfolios and the classification of value and growth stocks are described in Sections 3.2 and 4.3. Stocks are weighted proportionally the same as in the aggregate value and growth portfolios, respectively.



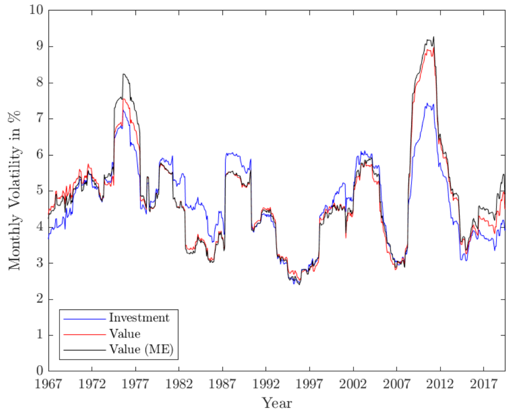
(a) Volatility



(b) Correlation



(c) Volatility Short Legs



(d) Volatility Long Legs

Figure 5
Factor Volatilities

Panel A of this figure displays the three-year moving volatility of the investment, value, and market-channel value factors. Panel B displays the three-year moving correlations between the factors' long and short legs. Panel C (D) displays the three-year moving volatility of the factors' short (long) legs. The sample period is from June 1967 to December 2019.

Table 1
Decomposition of Cross-Sectional Variation in Book-to-Market

This table displays the time-series averages of the percentage contributions of lagged book-to-market (BM), book equity changes (dBE), and market equity changes (dME) to the total cross-sectional variation in book-to-market. Book-to-market is measured at the end of each June and is calculated as described in Appendix A. At the end of June of each year t, we decompose the cross-sectional variance in book-to-market for $k = 1, ..., 5$ as follows:

$$var(BM_{i,t}) = cov(BM_{i,t}, BM_{i,t-k}) + \sum_{s=0}^{k-1} cov(BM_{i,t}, dBE_{i,t-s}) + \sum_{s=0}^{k-1} cov(BM_{i,t}, -dME_{i,t-s})$$

The percentage contributions are calculated by dividing the three terms on the right side of the equation by $var(BM_{i,t})$. The annual percentage contributions are averaged across the sample period from 1963 to 2019. "Full Sample" uses all common US stocks traded on the NYSE, AMEX, or NASDAQ. "Incoming HML Stocks" uses only stocks that are newly entering the value and growth portfolios in the respective year (see Section 3.2 for more details).

	Full Sample			Incoming HML Stocks		
	$\mathrm{BM_{i,t\text{-}k}}$	$\sum \mathrm{dBE_{i,t\text{-}s}}$	$-\sum \mathrm{dME_{i,t\text{-}s}}$	$\mathrm{BM_{i,t\text{-}k}}$	$\sum \mathrm{dBE_{i,t\text{-}s}}$	$-\sum \mathrm{dME_{i,t\text{-}s}}$
1	81.5	0.2	18.3	1.5	24.0	74.6
2	71.0	−1.5	30.5	7.6	29.4	63.1
3	63.9	−3.1	39.2	12.0	31.0	57.0
4	58.2	−4.7	46.4	14.1	30.8	55.1
5	53.1	−5.7	52.6	13.2	33.1	53.7

Table 2
Cross-Sectional Estimation of Profitability Shocks and Residual Returns

Panel A of this table displays time-series averages of regression coefficients from the cross-sectional profitability model of Hou and van Dijk (2019). The regressions are estimated at the end of each June from 1964 to 2019 using common US stocks traded on the NYSE, AMEX, or NASDAQ with total assets above \$10 million and book equity above \$5 million. The dependent variable is operating income-to-total assets as measured at the end of June. The independent variables are market-to-book value of assets (FV/AT), a dummy variable that equals one if the firm does not pay dividends (DD), the dividend-to-book equity ratio (D/BE), and operating income-to-total assets (OI/AT). The independent variables are lagged by one year with respect to the dependent variable. The variables are constructed as described in Appendix A and are measured at the end of June. Multiplying the estimated coefficients from an annual regression with the contemporaneous independent variables yields a prediction for firms' operating income-to-total assets across the next fiscal year. Panel B displays the time-series average of the regression coefficient from the annual regressions of stocks' returns on their estimated profitability shocks. The regressions are estimated at the end of each June from 1964 to 2019 using all common US stocks traded on the NYSE, AMEX, or NASDAQ. The dependent variable is the cross-sectionally demeaned compounded return across the previous fiscal year. The independent variable is the cross-sectionally demeaned profitability shock across the previous fiscal year. Stocks' profitability shocks are calculated as their realized operating income-to-total assets across the previous fiscal year minus their predicted operating income-to-total assets for this fiscal year. R^2 is the average adjusted R-squared across all annual regressions. t-statistics are reported in parentheses. In Panel A, t-statistics are based on Newey-West (1987) heteroskedasticity-robust standard errors with five lags.*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Panel A: Profitability Shock Estimation						Panel B: Residual Return Estimation	
	Intercept	FV/AT	DD	D/BE	OI/AT	R^2	PS	R^2
Coefficient	0.0155***	0.0064**	−0.0128***	0.0675***	0.7187***	0.613	1.3341***	0.079
	(7.37)	(2.14)	(−4.50)	(3.65)	(40.55)		(7.72)	

Table 3
Market Equity Changes, Book Equity Changes, and Investment

This table displays time-series averages of regression coefficients from annual Fama-MacBeth (1973) regressions. The regressions are estimated at the end of each June from 1963 to 2019 using all common US stocks traded on the NYSE, AMEX, or NASDAQ. The dependent variable is contemporaneous investment. The independent variables are book-to-market (BM), lagged book-to-market (Lagged BM), the change in book equity (dBE), the change in market equity (dME), and net issues (NI). The variables are constructed as described in Appendix A, are measured at the end of June, and are winsorized at the 0.5% and 99.5% levels. dBE and dME are the annual changes in the book equity and the market equity, respectively, that are used in the calculation of BM. A subscript $t-l$ indicates that the respective variable is lagged by l years. Lagged BM is BM lagged by one (two, three, four, five) years if the previous one (two, three, four, five) annual dBE and dME are included. The regressions are estimated with weighted least squares, whereby the stocks' weights correspond to their market capitalizations at the end of June of the respective year. R^2 is the average adjusted R-squared across all annual regressions. T is the number of annual Fama-MacBeth (1973) regressions. t-statistics are reported in parentheses and are computed using Newey-West (1987) heteroskedasticity-robust standard errors with five lags. Boldface indicates significance at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Intercept	**0.087**	**0.038**	**0.034**	**0.030**	**0.028**	**0.026**	**0.047**	**0.044**	**0.039**	**0.035**	**0.032**
	(10.99)	(6.56)	(5.45)	(4.44)	(3.79)	(3.50)	(7.67)	(7.18)	(5.87)	(5.17)	(4.89)
BM	**−0.044**										
	(−7.10)										
Lagged BM		**−0.027**	**−0.022**	**−0.019**	**−0.018**	**−0.017**	**−0.031**	**−0.026**	**−0.022**	**−0.020**	**−0.018**
		(−7.53)	(−5.81)	(−5.02)	(−4.78)	(−4.34)	(−10.46)	(−7.96)	(−6.51)	(−6.01)	(−5.28)
dBE		**0.418**	**0.400**	**0.393**	**0.396**	**0.397**	**0.355**	**0.340**	**0.334**	**0.338**	**0.337**
		(16.15)	(14.75)	(13.31)	(14.78)	(15.75)	(14.31)	(12.82)	(11.80)	(13.46)	(14.31)
dBE_{t-1}			**0.044**	**0.030**	**0.033**	**0.029**		**0.035**	**0.027**	**0.032**	**0.032**
			(4.13)	(3.36)	(3.56)	(3.40)		(3.61)	(2.76)	(3.08)	(3.00)
dBE_{t-2}				**0.039**	**0.032**	**0.029**			**0.042**	**0.043**	**0.043**
				(3.58)	(3.51)	(2.98)			(4.27)	(5.00)	(4.50)
dBE_{t-3}					**0.019**	**0.018**				**0.022**	**0.022**
					(2.45)	(2.31)				(2.66)	(2.46)
dBE_{t-4}						−0.001					0.004
						(−0.11)					(0.42)
dME		**0.087**	**0.081**	**0.080**	**0.076**	**0.075**	**0.056**	**0.054**	**0.053**	**0.050**	**0.047**
		(7.57)	(7.43)	(7.38)	(7.62)	(7.50)	(8.72)	(8.60)	(8.17)	(8.78)	(9.02)
dME_{t-1}			**0.055**	**0.052**	**0.052**	**0.049**		**0.063**	**0.062**	**0.063**	**0.060**
			(7.66)	(7.14)	(6.71)	(7.05)		(9.46)	(8.82)	(8.84)	(8.82)
dME_{t-2}				**0.044**	**0.042**	**0.042**			**0.050**	**0.049**	**0.049**
				(7.28)	(7.19)	(6.73)			(9.13)	(8.75)	(8.06)
dME_{t-3}					**0.027**	**0.029**				**0.028**	**0.030**
					(4.38)	(4.39)				(4.38)	(4.33)
dME_{t-4}						**0.028**					**0.029**
						(5.50)					(6.18)
NI							**0.362**	**0.360**	**0.363**	**0.365**	**0.370**
							(7.29)	(6.43)	(6.16)	(5.79)	(5.69)
NI_{t-1}								**−0.057**	**−0.089**	**−0.093**	**−0.100**
								(−2.69)	(−3.72)	(−3.97)	(−4.19)
NI_{t-2}									**−0.046**	**−0.078**	**−0.082**
									(−3.80)	(−7.39)	(−5.91)
NI_{t-3}										−0.018	**−0.022**
										(−1.29)	(−2.22)
NI_{t-4}											−0.016
											(−0.99)
R^2	0.091	0.461	0.484	0.496	0.504	0.504	0.492	0.515	0.529	0.541	0.543
T	57	56	55	54	53	52	56	55	54	53	52

Table 4
Market Equity Changes, Book Equity Changes, and Investment Factor Correlation

This table displays time-series averages of regression coefficients from annual Fama-MacBeth (1973) regressions. The regressions are estimated at the end of each June from 1963 to 2018 using all common US stocks traded on the NYSE, AMEX, or NASDAQ. The dependent variable is the correlation with the investment factor across the next 12 months. The independent variables are investment (INV), book-to-market (BM), lagged book-to-market (Lagged BM), the change in book equity (dBE), and the change in market equity (dME). The variables are constructed as described in Appendix A, are measured at the end of June, and are winsorized at the 0.5% and 99.5% levels. dBE and dME are the annual changes in the book equity and the market equity, respectively, that are used in the calculation of BM. A subscript $t-l$ indicates that the respective variable is lagged by l years. Lagged BM is BM lagged by one (two, three, four, five) years if the previous one (two, three, four, five) annual dBE and dME are included. The regressions are estimated with weighted least squares, whereby the stocks' weights correspond to their market capitalizations at the end of June of the respective year. R^2 is the average adjusted R-squared across all annual regressions. T is the number of annual Fama-MacBeth (1973) regressions. t-statistics are reported in parentheses and are computed using Newey-West (1987) heteroskedasticity-robust standard errors with five lags. Boldface indicates significance at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Intercept	**−0.079**	**−0.070**	**−0.067**	**−0.063**	**−0.056**	**−0.054**	**−0.064**	**−0.062**	**−0.059**	**−0.051**	**−0.051**
	(−3.45)	(−3.08)	(−2.92)	(−2.70)	(−2.34)	(−2.22)	(−2.89)	(−2.77)	(−2.57)	(−2.22)	(−2.13)
BM	**0.059**										
	(8.45)										
Lagged BM		**0.053**	**0.050**	**0.049**	**0.050**	**0.049**	**0.050**	**0.047**	**0.047**	**0.048**	**0.047**
		(6.93)	(6.04)	(5.89)	(5.83)	(5.44)	(6.46)	(5.71)	(5.61)	(5.54)	(5.18)
dBE		**−0.046**	**−0.029**	**−0.022**	**−0.022**	**−0.019**	0.013	0.021	**0.023**	**0.024**	**0.026**
		(−2.19)	(−1.80)	(−2.23)	(−2.29)	(−2.16)	(0.83)	(1.39)	(1.89)	(2.22)	(2.74)
dBE_{t-1}			0.017	0.020	**0.029**	**0.025**		0.024	0.024	**0.033**	**0.028**
			(1.00)	(1.32)	(2.44)	(2.11)		(1.43)	(1.58)	(2.82)	(2.48)
dBE_{t-2}				**0.026**	**0.022**	**0.026**			**0.030**	**0.025**	**0.028**
				(1.88)	(1.70)	(2.38)			(2.16)	(1.94)	(2.51)
dBE_{t-3}					0.021	0.014				0.024	0.016
					(1.28)	(0.82)				(1.46)	(0.98)
dBE_{t-4}						**0.028**					**0.029**
						(1.92)					(2.02)
dME		**−0.099**	**−0.101**	**−0.101**	**−0.098**	**−0.098**	**−0.087**	**−0.092**	**−0.092**	**−0.090**	**−0.091**
		(−9.49)	(−9.11)	(−8.35)	(−7.58)	(−7.44)	(−9.85)	(−9.20)	(−8.25)	(−7.29)	(−7.21)
dME_{t-1}			**−0.097**	**−0.100**	**−0.104**	**−0.101**		**−0.090**	**−0.094**	**−0.097**	**−0.095**
			(−10.68)	(−10.23)	(−9.44)	(−9.81)		(−9.96)	(−9.73)	(−9.11)	(−9.34)
dME_{t-2}				**−0.068**	**−0.066**	**−0.065**			**−0.062**	**−0.060**	**−0.059**
				(−7.78)	(−7.63)	(−7.21)			(−7.67)	(−7.41)	(−6.97)
dME_{t-3}					**−0.057**	**−0.054**				**−0.054**	**−0.051**
					(−7.64)	(−6.88)				(−7.16)	(−6.49)
dME_{t-4}						**−0.050**					**−0.047**
						(−6.82)					(−6.39)
INV							**−0.144**	**−0.129**	**−0.122**	**−0.123**	**−0.119**
							(−7.69)	(−7.65)	(−6.92)	(−6.66)	(−6.50)
R^2	0.311	0.378	0.414	0.439	0.455	0.468	0.400	0.432	0.455	0.470	0.482
T	56	55	54	53	52	51	55	54	53	52	51

Table 5

Comovement of Subsets of the Value Factor Portfolio with the Investment Factor

This table displays characteristics as well as factor model regression results for subsets of the HML portfolio over the period from July 1964 to December 2019. The HML portfolio is reformed annually at the end of each June and is constructed as described in Section 3.2. The following subsets of the HML portfolio are considered: (1) market- and book-channel stocks (Total), (2) market-channel stocks (ME), (3) discount rate shock-driven market-channel stocks (ME (DRS)), (4) cash flow shock-driven market-channel stocks (ME (CFS)), and (5) book-channel stocks (BE). The subsets are constructed as described in Section 4.3. These subsets of the HML portfolio are further split into subsets consisting only of stocks that are contemporaneously in the corresponding leg of the CMA portfolio (i.e. in the conservative (aggressive) portfolio in the case of value (growth) stocks), indicated by a superscript "CMA-overlap", and into subsets consisting only of stocks that are contemporaneously not in the corresponding leg of the CMA portfolio (i.e. not in the conservative (aggressive) portfolio in the case of value (growth) stocks), indicated by a superscript "CMA-non-overlap". Column "%" reports the subsets' average size as a percentage of the size of the subset that consists of all market- and book-channel stocks. "Overlap" are the time-series averages of the subsets' overlaps with the contemporaneous CMA portfolio, calculated as the weighted fraction of the subsets' stocks that are in the conservative portfolio minus the weighted fraction of the subsets' stocks that are in the aggressive portfolio, divided by two. ρ^{CMA} are the correlations of the subsets' monthly returns with the investment factor. α, β^{MP}, β^{SMB}, β^{RMW}, β^{CMA}, and R^2 are from the regressions of the subsets' monthly returns on the four-factor model consisting of the market (MP), size (SMB), profitability (RMW), and investment (CMA) factors. α is in percentage terms. t-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	%	Overlap	ρ^{CMA}	α	β^{MP}	β^{SMB}	β^{RMW}	β^{CMA}	R^2
Total	100.0	0.207	0.599	0.06	0.02	0.04	0.05	0.92***	0.357
				(0.65)	(0.69)	(1.15)	(1.08)	(17.96)	
ME	79.5	0.287	0.648	0.10	0.00	0.09***	0.03	1.06***	0.423
				(1.05)	(−0.15)	(2.76)	(0.69)	(20.22)	
ME (DRS)	29.9	0.294	0.576	0.27**	−0.01	0.20***	0.10*	1.11***	0.353
				(2.48)	(−0.31)	(5.03)	(1.88)	(17.25)	
ME (CFS)	43.8	0.304	0.590	−0.05	0.00	0.07**	−0.06	1.02***	0.353
				(−0.52)	(0.16)	(2.08)	(−1.20)	(17.34)	
BE	20.5	−0.076	0.189	−0.23	0.09**	−0.20***	0.17**	0.44***	0.075
				(−1.61)	(2.57)	(−4.00)	(2.50)	(5.43)	
$\text{Total}^{\text{CMA-overlap}}$	38.2	1.000	0.783	0.08	0.01	0.04	0.05	1.40***	0.612
				(0.98)	(0.55)	(1.46)	(1.30)	(29.88)	
$\text{ME}^{\text{CMA-overlap}}$	33.3	1.000	0.772	0.12	0.01	0.06*	0.03	1.45***	0.597
				(1.35)	(0.44)	(1.96)	(0.68)	(28.90)	
$\text{ME}^{\text{CMA-overlap}}$ (DRS)	13.1	1.000	0.611	0.26**	0.04	0.18***	0.09	1.41***	0.387
				(2.02)	(1.14)	(4.01)	(1.47)	(19.20)	
$\text{ME}^{\text{CMA-overlap}}$ (CFS)	17.8	1.000	0.686	−0.07	0.00	0.06	−0.04	1.48***	0.471
				(−0.59)	(0.12)	(1.58)	(−0.75)	(22.24)	
$\text{BE}^{\text{CMA-overlap}}$	5.0	1.000	0.424	−0.24	0.02	−0.15**	0.34***	1.23***	0.210
				(−1.29)	(0.44)	(−2.31)	(3.80)	(11.26)	
$\text{Total}^{\text{CMA-non-overlap}}$	61.8	−0.319	0.341	−0.01	0.02	0.05	0.05	0.54***	0.115
				(−0.07)	(0.85)	(1.36)	(1.02)	(9.02)	
$\text{ME}^{\text{CMA-non-overlap}}$	46.2	−0.274	0.399	0.04	−0.01	0.13***	0.01	0.65***	0.170
				(0.41)	(−0.31)	(3.35)	(0.12)	(10.46)	
$\text{ME}^{\text{CMA-non-overlap}}$ (DRS)	16.8	−0.320	0.334	0.22	−0.05	0.23***	0.08	0.72***	0.132
				(1.47)	(−1.23)	(4.43)	(1.22)	(8.40)	
$\text{ME}^{\text{CMA-non-overlap}}$ (CFS)	26.1	−0.245	0.328	−0.07	0.00	0.12***	−0.05	0.58***	0.119
				(−0.62)	(0.15)	(2.81)	(−0.96)	(8.44)	
$\text{BE}^{\text{CMA-non-overlap}}$	15.5	−0.467	0.031	−0.21	0.10**	−0.16***	0.14*	0.15	0.019
				(−1.27)	(2.47)	(−2.74)	(1.73)	(1.57)	

Table 6

Spanning Regressions

This table displays results from spanning regressions that aim to explain different versions of the investment factor (INV) with the market factor (MP), the size factor (SMB), the profitability factor (RMW), and different versions of the value factor (VAL) as well as different versions of the value factor with the market factor, the size factor, the profitability factor, and different versions of the investment factor. The sample period is from July 1964 to December 2019. The first two columns of each row depict which versions of the investment and value factors are used in the respective spanning regressions. "standard" refers to the usual factors as described in Section 3.2. "ME" ("BE") refers to a value factor that keeps only value and growth stocks that are classified as market-channel (book-channel) value and growth stocks (the classification of stocks is described in Section 4.3) in the portfolios that are used for its construction. "sc,M" indicates that the respective factor is scaled such that it has the same volatility as the other factor and that its mean is adjusted to equal its original mean. "t,orth" indicates that the factor is first orthogonalized with respect to the market, size, and profitability factors, and then rescaled such that it has the same mean and standard deviation as originally. "c=x" indicates that the respective factor is scaled such that its volatility equals the volatility it would have if its short and long legs would exhibit a correlation of x across the sample period. "exIn" indicates that incoming stocks are excluded from the factor's portfolios (see Section 3.2 for the identification of incoming stocks). "exIn2" indicates that incoming stocks that are not also incoming stocks in the other factor's portfolios are excluded from the factor's portfolios. ρ is the correlation between the respective value and investment factors. μ and σ are the factors' monthly mean returns and volatilities. α^{INV} (α^{VAL}) depicts the dependent factor's unexplained average return when accounting only for the exposure to the investment (value) factor. μ, σ, α, α^{INV}, and α^{VAL} are in percent. R^2 is the regression's adjusted R-squared. t-statistics are reported in parentheses. Boldface indicates significance at the 10% level.

				Dependent Factor: Investment									Dependent Factor: Value								
	INV	VAL	ρ	μ	σ	α	β^{MP}	β^{SMB}	β^{RMW}	β^{VAL}	R^2	α^{VAL}	μ	σ	α	β^{MP}	β^{SMB}	β^{RMW}	β^{INV}	R^2	α^{INV}
(1)	standard	standard	0.661	**0.21**	1.82	**0.34**	**−0.17**	−0.03	**−0.15**		0.171		**0.30**	2.75	**0.36**	**−0.15**	0.01	**0.08**		0.066	
				(2.93)		(5.20)	(−11.15)	(−1.21)	(−4.81)				(2.79)		(3.38)	(−6.20)	(0.22)	(1.65)			
(2)	standard	ME	0.651	**0.21**	1.82	**0.34**	**−0.17**	−0.03	**−0.15**		0.171		**0.35**	2.87	**0.45**	**−0.17**	0.05	−0.08		0.058	
				(2.93)		(5.20)	(−11.15)	(−1.21)	(−4.81)				(3.17)		(4.09)	(−6.62)	(1.17)	(−1.50)			
(3)	standard	BE	0.215	**0.21**	1.82	**0.34**	**−0.17**	−0.03	**−0.15**		0.171		−0.03	3.35	−0.03	−0.01	**−0.11**	**0.16**		0.027	
				(2.93)		(5.20)	(−11.15)	(−1.21)	(−4.81)				(−0.21)		(−0.24)	(−0.49)	(−2.42)	(2.54)			
(4)	standard	standard	0.661	**0.21**	1.82	**0.20**	**−0.11**	**−0.03**	**−0.18**	**0.41**	0.525	0.09	**0.30**	2.75	0.00	0.03	0.04	**0.24**	**1.05**	0.465	0.08
				(2.93)		(3.92)	(−9.11)	(−1.79)	(−7.76)	(22.25)		(1.61)	(2.79)		(−0.04)	(1.32)	(1.34)	(6.22)	(22.25)		(1.00)
(5)	standard	ME	0.651	**0.21**	1.82	**0.17**	**−0.11**	**−0.05**	**−0.12**	**0.37**	0.495	0.08	**0.35**	2.87	0.09	0.01	**0.08**	**0.08**	**1.05**	0.427	0.14
				(2.93)		(3.34)	(−8.69)	(−2.49)	(−4.94)	(20.65)		(1.40)	(3.17)		(1.05)	(0.42)	(2.47)	(1.90)	(20.65)		(1.60)
(6)	standard	ME	0.651	**0.21**	1.82	**0.10**	**−0.11**	**−0.05**	**−0.12**	**0.59**	0.495	0.00	**0.35**	1.82	**0.19**	0.01	**0.05**	**0.05**	**0.67**	0.427	**0.21**
		(sc,M)		(2.93)		(1.86)	(−8.69)	(−2.49)	(−4.94)	(20.65)		(−0.01)	(5.00)		(3.36)	(0.42)	(2.47)	(1.90)	(20.65)		(4.00)
(7)	standard	ME	0.651	**0.21**	1.82	**0.15**	**−0.11**	**−0.05**	**−0.12**	**0.43**	0.495	0.06	**0.35**	2.50	**0.13**	0.01	**0.07**	**0.07**	**0.92**	0.427	**0.16**
		(c=0.89)		(2.93)		(2.96)	(−8.69)	(−2.49)	(−4.94)	(20.65)		(1.03)	(3.64)		(1.65)	(0.42)	(2.47)	(1.90)	(20.65)		(2.22)
(8)	standard	ME	0.651	**0.21**	1.82	0.08	**−0.11**	**−0.05**	**−0.12**	**0.63**	0.495	−0.01	**0.35**	1.70	**0.20**	0.01	**0.05**	**0.05**	**0.62**	0.427	**0.22**
		(c=0.95)		(2.93)		(1.58)	(−8.69)	(−2.49)	(−4.94)	(20.65)		(−0.27)	(5.34)		(3.79)	(0.42)	(2.47)	(1.90)	(20.65)		(4.46)
(9)	standard	ME	0.626	**0.21**	1.82	0.07				**0.40**	0.388	0.07	**0.35**	2.87	**0.15**				**0.99**	0.388	**0.15**
	(t,orth)	(t,orth)		(2.93)		(1.17)				(20.65)		(1.17)	(3.17)		(1.66)				(20.65)		(1.66)
(10)	standard	ME	0.633	**0.21**	1.83	**0.19**	**−0.11**	−0.01	**−0.15**	**0.35**	0.480	0.08	**0.37**	2.97	0.10	0.02	−0.01	**0.16**	**1.05**	0.411	0.14
		(exIn)		(2.99)		(3.47)	(−9.07)	(−0.76)	(−6.02)	(19.64)		(1.49)	(3.18)		(1.04)	(0.79)	(−0.31)	(3.63)	(19.64)		(1.61)
(11)	standard	ME	0.655	**0.21**	1.82	**0.17**	**−0.11**	−0.01	**−0.13**	**0.37**	0.498	0.07	**0.35**	2.88	0.10	0.02	−0.02	**0.10**	**1.06**	0.431	0.14
		(exIn2)		(2.93)		(3.23)	(−9.01)	(−0.63)	(−5.21)	(20.81)		(1.39)	(3.17)		(1.19)	(0.90)	(−0.49)	(2.31)	(20.81)		(1.60)

Table 7

Return Prediction with Decomposed Book-to-Market and Investment

This table displays time-series averages of regression coefficients from monthly Fama-MacBeth (1973) regressions. The regressions are estimated at the end of each month from June 1963 to November 2019 using all common US stocks traded on the NYSE, AMEX, or NASDAQ. The dependent variable is the return in excess of the one-month T-bill rate across the next month. The independent variables are book-to-market (BM), lagged book-to-market (Lagged BM), the change in book equity (dBE), the change in market equity (dME), a dummy that equals one if dME is cash flow shock-driven (D^{CFSme}), a dummy that equals one if dME is discount rate shock-driven (D^{DRSme}), investment (INV), lagged investment (Lagged INV), the change in investment (dINV), a dummy that equals one if dINV is cash flow shock-driven (D^{CFSinv}), a dummy that equals one if dINV is discount rate shock-driven (D^{DRSinv}), market equity (ME), operating profitability (OP), momentum (MOM), and short-term reversal (STR). The independent variables are constructed as described in Appendix A as well as in Section 4.3, are measured at the end of the most recent June (except ME, MOM, which are measured at the end of each month), and are winsorized at the 0.5% and 99.5% levels. dBE and dME are the annual changes in the book equity and the market equity, respectively, that are used in the calculation of BM. A subscript $t - l$ indicates that the respective variable is lagged by l years. Lagged BM (INV) is BM (INV) lagged by one (two, three, four, five) years if the previous one (two, three, four, five) annual dBE and dME (dINV) are included. The regressions are estimated with weighted least squares, whereby the stocks' weights correspond to their market capitalizations at the end of the respective month. If Dummies is "Yes", the discount rate shock dummies with respect to dME respectively the discount rate shock dummies with respect to dINV are also on their own included in the regressions. R^2 is the average adjusted R-squared across all monthly regressions. T is the number of monthly Fama-MacBeth (1973) regressions. t-statistics are reported in parentheses. Boldface indicates significance at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Intercept	**0.007**	**0.008**	**0.008**	**0.008**	**0.008**	**0.008**	**0.010**	**0.011**	**0.011**	**0.011**	**0.011**	**0.011**	**0.008**	**0.008**	**0.008**	**0.008**	**0.008**	**0.008**
	(2.17)	(2.31)	(2.44)	(2.31)	(2.45)	(2.29)	(3.01)	(3.25)	(3.28)	(3.17)	(3.15)	(3.17)	(2.60)	(2.53)	(2.61)	(2.30)	(2.42)	(2.33)
BM	**0.001**												0.001					
	(1.81)												(1.30)					
Lagged BM		0.001	0.000	0.000	0.000	0.000								0.001	0.000	0.001	0.001	0.001
		(1.04)	(0.38)	(0.49)	(0.28)	(0.22)								(0.96)	(0.58)	(0.86)	(0.68)	(0.73)
dBE		−0.001	−0.002	−0.002	−0.002	−0.001								−0.001	−0.001	−0.001	0.000	0.000
		(−1.05)	(−1.59)	(−1.47)	(−1.13)	(−0.67)								(−1.05)	(−0.81)	(−0.65)	(−0.32)	(−0.01)
dBE_{t-1}			0.001	0.001	0.001	0.001									0.002	0.002	0.002	0.002
			(0.45)	(0.60)	(0.45)	(0.49)									(1.21)	(1.17)	(1.19)	(1.46)
dBE_{t-2}				0.002	0.001	0.001										0.001	0.000	0.001
				(1.22)	(0.53)	(0.68)										(0.58)	(−0.22)	(0.77)
dBE_{t-3}					0.000	0.001											0.000	0.001
					(0.11)	(0.40)											(0.14)	(0.65)
dBE_{t-4}						0.000												−0.001
						(−0.10)												(−0.77)
$dME \times D^{CFSme}$		−0.001	−0.001	−0.001	−0.001	−0.001								−0.001	−0.001	−0.001	−0.001	−0.001
		(−0.42)	(−0.65)	(−0.61)	(−0.40)	(−0.36)								(−0.65)	(−0.74)	(−0.50)	(−0.47)	(−0.66)
$dME_{t-1} \times D^{CFSme}{}_{t-1}$			0.000	0.001	0.000	−0.001									0.000	0.000	0.000	−0.001
			(0.25)	(0.51)	(−0.06)	(−0.34)									(0.22)	(0.28)	(−0.10)	(−0.43)
$dME_{t-2} \times D^{CFSme}{}_{t-2}$				−0.001	0.000	0.000										−0.001	−0.001	0.000
				(−0.51)	(−0.05)	(0.23)										(−0.74)	(−0.36)	(−0.01)
$dME_{t-3} \times D^{CFSme}{}_{t-3}$					0.000	−0.002											−0.001	−0.002
					(−0.11)	(−0.90)											(−0.82)	(−1.36)
$dME_{t-4} \times D^{CFSme}{}_{t-4}$						0.000												−0.001
						(−0.16)												(−0.33)
$dME \times D^{DRSme}$		**−0.003**	**−0.002**	**−0.002**	**−0.003**	−0.002								**−0.003**	**−0.002**	**−0.002**	**−0.003**	**−0.002**
		(−2.10)	(−1.81)	(−1.71)	(−1.96)	(−1.60)								(−1.99)	(−1.71)	(−1.82)	(−1.90)	(−1.80)
$dME_{t-1} \times D^{DRSme}{}_{t-1}$			−0.001	−0.001	−0.001	−0.001									−0.001	−0.001	−0.001	−0.001
			(−0.92)	(−1.00)	(−1.05)	(−1.10)									(−0.88)	(−0.94)	(−0.90)	(−0.79)
$dME_{t-2} \times D^{DRSme}{}_{t-2}$				**−0.003**	**−0.003**	**−0.003**										**−0.002**	−0.002	**−0.002**
				(−2.04)	(−2.08)	(−2.39)										(−1.80)	(−1.50)	(−1.84)
$dME_{t-3} \times D^{DRSme}{}_{t-3}$					−0.001	−0.002											0.000	−0.001
					(−1.05)	(−1.49)											(−0.05)	(−0.60)
$dME_{t-4} \times D^{DRSme}{}_{t-4}$						−0.001												**−0.003**
						(−1.04)												(−2.31)

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
INV							**−0.006**						**−0.004**					
							(−3.40)						(−2.46)					
Lagged INV								**−0.008**	**−0.009**	**−0.008**	**−0.007**	**−0.008**		−0.002	−0.004	−0.002	0.001	0.002
								(−3.08)	(−2.94)	(−2.41)	(−1.89)	(−1.93)		(−0.81)	(−1.59)	(−0.54)	(0.17)	(0.41)
$\text{dINV}\times\text{D}^{\text{CFSinv}}$								**−0.004**	**−0.004**	**−0.005**	**−0.004**	**−0.003**		0.000	−0.002	−0.003	−0.002	−0.001
								(−2.14)	(−2.55)	(−2.80)	(−2.25)	(−1.65)		(−0.24)	(−1.28)	(−1.61)	(−0.92)	(−0.48)
$\text{dINV}_{\text{t-1}}\times\text{D}^{\text{CFSinv}}{}_{\text{t-1}}$									**−0.007**	**−0.007**	**−0.008**	**−0.007**			**−0.005**	**−0.005**	**−0.005**	**−0.004**
									(−3.04)	(−3.24)	(−3.86)	(−3.24)			(−2.19)	(−2.08)	(−1.95)	(−1.67)
$\text{dINV}_{\text{t-2}}\times\text{D}^{\text{CFSinv}}{}_{\text{t-2}}$										**−0.008**	**−0.009**	**−0.009**				−0.003	−0.004	−0.005
										(−2.63)	(−3.18)	(−3.13)				(−1.05)	(−1.20)	(−1.64)
$\text{dINV}_{\text{t-3}}\times\text{D}^{\text{CFSinv}}{}_{\text{t-3}}$											**−0.007**	**−0.008**					0.000	−0.002
											(−2.29)	(−2.67)					(−0.09)	(−0.56)
$\text{dINV}_{\text{t-4}}\times\text{D}^{\text{CFSinv}}{}_{\text{t-4}}$												**−0.007**						0.000
												(−2.05)						(0.10)
$\text{dINV}\times\text{D}^{\text{DRSinv}}$								**−0.007**	**−0.008**	**−0.008**	**−0.009**	**−0.007**		−0.002	−0.002	−0.002	−0.003	−0.002
								(−2.95)	(−3.18)	(−3.04)	(−3.34)	(−2.76)		(−0.77)	(−1.04)	(−0.96)	(−1.44)	(−0.79)
$\text{dINV}_{\text{t-1}}\times\text{D}^{\text{DRSinv}}{}_{\text{t-1}}$									**−0.011**	**−0.012**	**−0.012**	**−0.012**			**−0.007**	**−0.007**	**−0.007**	**−0.008**
									(−3.65)	(−3.97)	(−3.83)	(−4.03)			(−2.47)	(−2.67)	(−2.66)	(−2.95)
$\text{dINV}_{\text{t-2}}\times\text{D}^{\text{DRSinv}}{}_{\text{t-2}}$										**−0.012**	**−0.014**	**−0.014**				−0.005	**−0.007**	**−0.008**
										(−3.61)	(−4.27)	(−4.30)				(−1.44)	(−2.12)	(−2.54)
$\text{dINV}_{\text{t-3}}\times\text{D}^{\text{DRSinv}}{}_{\text{t-3}}$											**−0.013**	**−0.015**					**−0.007**	**−0.008**
											(−3.65)	(−4.07)					(−1.84)	(−2.05)
$\text{dINV}_{\text{t-4}}\times\text{D}^{\text{DRSinv}}{}_{\text{t-4}}$												**−0.009**						0.000
												(−2.24)						(0.05)
ME	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	0.000	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	**−0.001**	0.000
	(−1.69)	(−2.01)	(−2.24)	(−2.02)	(−1.90)	(−1.54)	(−2.40)	(−2.50)	(−2.54)	(−2.36)	(−2.29)	(−2.22)	(−1.99)	(−2.05)	(−2.18)	(−1.82)	(−1.72)	(−1.58)
OP	**0.005**	**0.004**	**0.003**	**0.004**	**0.003**	**0.003**	**0.003**	**0.003**	**0.003**	**0.003**	0.002	0.002	**0.004**	**0.004**	**0.003**	**0.004**	**0.003**	**0.003**
	(3.37)	(2.74)	(2.36)	(2.38)	(1.90)	(2.07)	(2.33)	(2.21)	(1.96)	(2.10)	(1.56)	(1.13)	(2.96)	(2.83)	(2.35)	(2.62)	(2.15)	(2.40)
MOM	**0.007**	**0.006**	**0.006**	**0.005**	**0.005**	**0.004**	**0.007**	**0.006**	**0.006**	**0.005**	**0.005**	**0.004**	**0.006**	**0.006**	**0.006**	**0.004**	**0.004**	**0.004**
	(3.56)	(3.41)	(3.18)	(2.55)	(2.40)	(2.23)	(3.52)	(3.22)	(3.10)	(2.37)	(2.31)	(2.11)	(3.39)	(3.28)	(3.05)	(2.31)	(2.19)	(2.08)
STR	**−0.029**	**−0.034**	**−0.036**	**−0.038**	**−0.039**	**−0.042**	**−0.028**	**−0.029**	**−0.032**	**−0.032**	**−0.033**	**−0.034**	**−0.031**	**−0.035**	**−0.039**	**−0.040**	**−0.041**	**−0.043**
	(−6.15)	(−7.01)	(−7.65)	(−7.96)	(−8.01)	(−8.51)	(−5.73)	(−5.95)	(−6.38)	(−6.43)	(−6.34)	(−6.48)	(−6.59)	(−7.42)	(−8.19)	(−8.49)	(−8.51)	(−9.00)
Dummies	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
R^2	0.178	0.197	0.212	0.225	0.239	0.254	0.170	0.179	0.187	0.195	0.205	0.215	0.184	0.208	0.228	0.247	0.267	0.287
T	678	666	654	642	630	618	678	666	654	642	630	618	678	666	654	642	630	618

Table 8

Average Returns and Alphas on Subsets of the Value and Investment Factor Portfolios

Panel A of this table displays average monthly returns and monthly five-factor alphas (in percent) on long-short portfolios across the period from July 1964 to December 2019. At the end of each June, all common US stocks are first sorted into quintiles with respect to their market equity. The breakpoints for the sorts are based only on NYSE stocks. Second, the size quintiles are intersected with the aggregate value, growth, conservative, and aggressive portfolios, with the market- (ME) and book-channel (BE) subsets of the value and growth portfolios, and with the cash flow shock-driven (CFS) and discount rate shock-driven (DRS) subsets of the value, growth, conservative, and aggressive portfolios. The construction of the aggregate value, growth, conservative, and aggressive portfolios is described in Section 3.2, the construction of their subsets is described in Section 4.3. The stocks in each of these portfolios are in each month value-weighted based on their market capitalizations at the beginning of the respective month. The table displays the returns and alphas of strategies that go, within each size quintile, long in value stocks and short in growth stocks (HML) respectively long in conservative stocks and short in aggressive stocks (CMA). The column "Avg" displays results when the returns of a given sort are in each month averaged across the ME quintiles. Panel B (C) displays the same results when the first sort is with respect to investment (book-to-market) rather than market equity. t-statistics are reported in parentheses. In Panel D, the first sort is again with respect to market equity, but discount rate shock-driven conservative (aggressive) stocks are excluded from the value (growth) portfolios, and discount rate shock-driven value (growth) stocks are excluded from the conservative (aggressive) portfolios. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Controlling for Size

	Mean Returns						Five-Factor Alphas					
	Q1	Q2	Q3	Q4	Q5	Avg	Q1	Q2	Q3	Q4	Q5	Avg
HML	0.63***	0.35***	0.31**	0.18	0.12	0.32***	0.32***	0.07	−0.03	−0.14**	−0.16**	0.01
	(4.52)	(2.66)	(2.38)	(1.44)	(0.90)	(2.84)	(4.22)	(0.99)	(−0.50)	(−2.03)	(−2.42)	(0.50)
HML ME	0.44***	0.42***	0.26**	0.24*	0.24	0.32***	0.15	0.18*	0.00	−0.03	−0.03	0.06
	(3.32)	(3.13)	(1.96)	(1.82)	(1.55)	(2.96)	(1.52)	(1.88)	(−0.03)	(−0.28)	(−0.29)	(1.24)
HML BE	0.38*	−0.42*	0.25	−0.24	0.00	−0.01	0.13	−0.71***	0.04	−0.19	−0.07	−0.16*
	(1.65)	(−1.71)	(1.14)	(−1.25)	(0.02)	(−0.06)	(0.62)	(−3.09)	(0.17)	(−1.00)	(−0.38)	(−1.73)
HML ME - HML BE	0.06	0.84***	0.00	0.50**	0.22	0.33***	0.02	0.89***	−0.05	0.18	0.00	0.22**
	(0.25)	(3.40)	(0.01)	(2.44)	(1.06)	(3.02)	(0.10)	(3.58)	(−0.23)	(0.89)	(0.02)	(2.15)
HML ME (DRS)	0.70***	0.66***	0.53***	0.22	0.41**	0.49***	0.40**	0.28	0.22	−0.17	0.15	0.16**
	(3.63)	(3.31)	(2.94)	(1.27)	(2.26)	(3.85)	(2.27)	(1.58)	(1.45)	(−1.13)	(0.96)	(2.05)
HML ME (CFS)	0.10	0.18	0.08	0.26*	0.08	0.13	−0.24	−0.01	−0.10	0.15	−0.20	−0.08
	(0.53)	(1.14)	(0.51)	(1.84)	(0.46)	(1.16)	(−1.44)	(−0.08)	(−0.83)	(1.39)	(−1.63)	(−1.18)
HML ME (DRS) - HML ME (CFS)	0.68***	0.27	0.46**	−0.01	0.33*	0.36***	0.71***	0.06	0.32*	−0.31*	0.34*	0.24**
	(3.68)	(1.40)	(2.45)	(−0.07)	(1.77)	(3.72)	(3.65)	(0.28)	(1.66)	(−1.74)	(1.81)	(2.45)
CMA	0.42***	0.20**	0.13	0.05	0.17	0.19***	0.42***	0.08	−0.03	−0.23***	−0.18***	0.01
	(5.36)	(2.46)	(1.43)	(0.50)	(1.55)	(2.92)	(6.28)	(1.34)	(−0.43)	(−3.16)	(−3.12)	(0.70)
CMA (DRS)	0.41***	0.39***	0.20	0.15	0.37***	0.30***	0.24*	0.18*	0.00	−0.15	0.07	0.07
	(3.32)	(3.39)	(1.64)	(1.22)	(2.88)	(4.02)	(1.96)	(1.65)	(0.02)	(−1.43)	(0.70)	(1.33)
CMA (CFS)	0.22**	0.04	−0.10	0.03	0.01	0.04	0.22**	0.00	−0.17*	−0.08	−0.33***	−0.07
	(1.99)	(0.38)	(−0.95)	(0.32)	(0.07)	(0.61)	(2.04)	(0.01)	(−1.79)	(−0.87)	(−3.09)	(−1.60)
CMA (DRS) - CMA (CFS)	0.18	0.35**	0.30**	0.12	0.36**	0.26***	0.01	0.18	0.18	−0.07	0.41**	0.14*
	(1.20)	(2.41)	(2.09)	(0.83)	(2.23)	(3.43)	(0.08)	(1.18)	(1.20)	(−0.48)	(2.48)	(1.84)

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Panel B: Controlling for Investment

	Mean Returns						Five-Factor Alphas					
	Q1	Q2	Q3	Q4	Q5	Avg	Q1	Q2	Q3	Q4	Q5	Avg
HML	0.25*	0.21	0.20	0.28*	0.16	0.22**	0.13	−0.02	0.01	−0.01	−0.32***	−0.04
	(1.88)	(1.58)	(1.53)	(1.85)	(0.96)	(2.06)	(1.13)	(−0.23)	(0.06)	(−0.08)	(−2.92)	(−1.13)
HML ME	0.25	0.17	0.24	0.27	0.46**	0.28**	0.10	−0.05	0.03	0.05	0.05	0.04
	(1.49)	(1.04)	(1.52)	(1.48)	(2.44)	(2.32)	(0.66)	(−0.36)	(0.27)	(0.37)	(0.33)	(0.55)
HML BE	−0.08	0.18	0.07	0.13	−0.02	0.06	−0.01	0.05	−0.07	−0.08	−0.21	−0.08
	(−0.30)	(0.73)	(0.29)	(0.51)	(−0.08)	(0.43)	(−0.05)	(0.21)	(−0.27)	(−0.30)	(−0.84)	(−0.71)
HML ME - HML BE	0.30	−0.06	0.13	0.14	0.48*	0.22*	0.11	−0.14	0.08	0.15	0.26	0.12
	(1.07)	(−0.23)	(0.50)	(0.52)	(1.65)	(1.68)	(0.39)	(−0.50)	(0.28)	(0.52)	(0.88)	(0.91)
HML ME (DRS)	0.43**	0.35*	0.11	0.27	0.63***	0.35**	0.31	0.14	−0.04	−0.01	0.14	0.09
	(1.98)	(1.66)	(0.55)	(1.29)	(2.70)	(2.55)	(1.41)	(0.72)	(−0.25)	(−0.04)	(0.69)	(0.91)
HML ME (CFS)	0.04	−0.03	0.20	0.19	0.39*	0.15	−0.19	−0.30	0.02	0.02	0.04	−0.09
	(0.19)	(−0.16)	(1.11)	(0.91)	(1.70)	(1.20)	(−1.00)	(−1.63)	(0.11)	(0.13)	(0.17)	(−1.06)
HML ME (DRS) - HML ME (CFS)	0.47*	0.30	−0.10	0.08	0.24	0.19*	0.55*	0.37	−0.06	−0.03	0.13	0.18
	(1.71)	(1.17)	(−0.46)	(0.33)	(0.91)	(1.67)	(1.95)	(1.41)	(−0.29)	(−0.13)	(0.46)	(1.50)

Panel C: Controlling for Book-to-Market

	Mean Returns						Five-Factor Alphas					
	Q1	Q2	Q3	Q4	Q5	Avg	Q1	Q2	Q3	Q4	Q5	Avg
CMA	−0.02	0.09	0.25**	0.07	0.14	0.11	−0.41***	−0.04	0.11	−0.04	0.12	−0.05
	(−0.13)	(0.86)	(2.27)	(0.67)	(1.08)	(1.61)	(−4.54)	(−0.42)	(1.19)	(−0.38)	(0.94)	(−1.31)
CMA (DRS)	0.18	0.15	0.44***	0.18	0.02	0.19**	−0.17	−0.04	0.36**	0.02	0.04	0.04
	(1.08)	(1.08)	(2.88)	(1.27)	(0.13)	(2.37)	(−1.13)	(−0.32)	(2.40)	(0.14)	(0.24)	(0.63)
CMA (CFS)	0.02	−0.01	0.05	−0.10	0.20	0.03	−0.38***	−0.17	−0.05	−0.14	0.16	−0.12
	(0.10)	(−0.03)	(0.36)	(−0.65)	(1.21)	(0.37)	(−2.63)	(−1.20)	(−0.38)	(−0.91)	(0.97)	(−1.58)
CMA (DRS) - CMA (CFS)	0.16	0.15	0.39*	0.28	−0.17	0.16	0.22	0.13	0.42*	0.16	−0.12	0.16
	(0.77)	(0.77)	(1.84)	(1.35)	(−0.70)	(1.38)	(1.04)	(0.65)	(1.88)	(0.74)	(−0.46)	(1.36)

Panel D: Excluding each others' Discount Rate Shock-Driven Stocks

	Mean Returns						Five-Factor Alphas					
	Q1	Q2	Q3	Q4	Q5	Avg	Q1	Q2	Q3	Q4	Q5	Avg
HML ME (DRS)	0.77***	0.53***	0.48***	0.10	0.39*	0.44***	0.45***	0.29	0.20	−0.22	0.09	0.15*
	(4.50)	(2.67)	(2.58)	(0.52)	(1.93)	(3.54)	(2.99)	(1.58)	(1.19)	(−1.38)	(0.54)	(1.83)
CMA (DRS)	0.36***	0.27**	0.10	0.04	0.36***	0.23***	0.21*	0.14	−0.07	−0.20*	0.08	0.03
	(2.99)	(2.56)	(0.83)	(0.31)	(2.77)	(3.32)	(1.73)	(1.36)	(−0.59)	(−1.86)	(0.70)	(0.65)

Table 9
Factor Correlations

This table displays correlations between the monthly returns on the market (MP), size (SMB), profitability (RMW), value (HML), market-channel value (HML ME), book-channel value (HML BE), discount rate shock-driven value (HML ME (DRS)), cash flow shock-driven value (HML ME (CFS)), investment (CMA), discount rate shock-driven investment (CMA (DRS)), cash flow shock-driven investment (CMA (CFS)) factors. The sample period is from July 1964 to December 2019.

	MP	SMB	RMW	HML	HML ME	HML BE	HML ME (CFS)	HML ME (DRS)	CMA	CMA (CFS)	CMA (DRS)
MP	1.00	0.27	−0.24	−0.26	−0.24	−0.07	−0.20	−0.22	−0.38	−0.19	−0.28
SMB		1.00	−0.35	−0.08	0.00	−0.14	0.01	0.01	−0.09	−0.08	0.03
RMW			1.00	0.12	−0.02	0.15	−0.08	0.01	−0.07	−0.18	0.01
HML				1.00	0.89	0.62	0.81	0.75	0.66	0.52	0.49
HML ME					1.00	0.49	0.89	0.85	0.65	0.48	0.55
HML BE						1.00	0.44	0.38	0.22	0.23	0.11
HML ME (CFS)							1.00	0.63	0.60	0.46	0.48
HML ME (DRS)								1.00	0.59	0.39	0.59
CMA									1.00	0.78	0.78
CMA (CFS)										1.00	0.40
CMA (DRS)											1.00

Table 10

Spanning Regressions with Adjusted Factors

This table displays results from spanning regressions that aim to explain different versions of the investment factor (INV) with the market factor (MP), the size factor (SMB), the profitability factor (RMW), and different versions of the value factor (VAL) as well as different versions of the value factor with the market factor, the size factor, the profitability factor, and different versions of the investment factor. The sample period is from July 1964 to December 2019. The first two columns of each row depict which versions of the investment and value factors are used in the respective spanning regressions. "standard" refers to the usual factors as described in Section 3.2. "ME" refers to a value factor that keeps only value and growth stocks that are classified as market-channe value and growth stocks (the classification of stocks is described in Section 4.3) in the portfolios that are used for its construction. "CFS" refers to an investment (value) factor that keeps only conservative (value) and aggressive (growth) stocks that are classified as cash flow shock-driven conservative (value) and aggressive (growth) stocks in the portfolios that are used for its construction. "DRS" refers to an investment (value) factor that keeps only conservative (value) and aggressive (growth) stocks that are classified as discount rate shock-driven conservative (value) and aggressive (growth) stocks in the portfolios that are used for its construction. ρ is the correlation between the respective value and investment factors. max(SR^2) is the maximum squared Sharpe ratio of a five-factor model that combines the respective value and investment factors with the market, size, and profitability factors. μ and σ are the factors' monthly mean returns and volatilities. α^{INV} (α^{VAL}) depicts the dependent factor's unexplained average return when accounting only for the exposure to the investment (value) factor. μ, σ, α, α^{INV}, and α^{VAL} are in percent. R^2 is the regression's adjusted R-squared. t-statistics are reported in parentheses. Boldface indicates significance at the 10% level.

					Dependent Factor: Investment									Dependent Factor: Value								
	INV	VAL	ρ	max(SR^2)	μ	σ	α	β^{MP}	β^{SMB}	β^{RMW}	β^{VAL}	R^2	α^{VAL}	μ	σ	α	β^{MP}	β^{SMB}	β^{RMW}	β^{INV}	R^2	α^{INV}
(1)	standard	standard	0.661	0.088	**0.21**	1.82	**0.20**	**−0.11**	**−0.03**	**−0.18**	**0.41**	0.525	0.09	**0.30**	2.75	0.00	0.03	0.04	**0.24**	**1.05**	0.465	0.08
					(2.93)		(3.92)	(−9.11)	(−1.79)	(−7.76)	(22.25)		(1.61)	(2.79)		(−0.04)	(1.32)	(1.34)	(6.22)	(22.25)		(1.00)
(2)	standard	ME	0.651	0.090	**0.21**	1.82	**0.17**	**−0.11**	**−0.05**	**−0.12**	**0.37**	0.495	0.08	**0.35**	2.87	0.09	0.01	**0.08**	**0.08**	**1.05**	0.427	0.14
					(2.93)		(3.34)	(−8.69)	(−2.49)	(−4.94)	(20.65)		(1.40)	(3.17)		(1.05)	(0.42)	(2.47)	(1.90)	(20.65)		(1.60)
(3)	standard	CFS	0.601	0.089	**0.21**	1.82	**0.25**	**−0.12**	**−0.04**	**−0.10**	**0.32**	0.442	**0.15**	0.17	3.05	−0.06	0.01	**0.06**	−0.02	**1.02**	0.362	−0.04
					(2.93)		(4.58)	(−9.21)	(−1.95)	(−3.69)	(17.94)		(2.68)	(1.45)		(−0.57)	(0.50)	(1.67)	(−0.38)	(17.94)		(−0.43)
(4)	standard	DRS	0.594	0.097	**0.21**	1.82	**0.16**	**−0.12**	**−0.05**	**−0.14**	**0.29**	0.442	0.05	**0.54**	3.38	**0.25**	0.01	**0.11**	**0.13**	**1.14**	0.360	**0.31**
					(2.93)		(2.90)	(−9.05)	(−2.60)	(−5.39)	(17.93)		(0.89)	(4.14)		(2.24)	(0.27)	(2.81)	(2.49)	(17.93)		(2.92)
(5)	CFS	standard	0.516	0.066	0.07	1.94	0.07	**−0.04**	**−0.08**	**−0.27**	**0.37**	0.346	−0.04	**0.30**	2.75	**0.21**	**−0.08**	**0.07**	**0.26**	**0.76**	0.326	**0.25**
					(0.90)		(1.05)	(−2.70)	(−3.56)	(−9.01)	(15.98)		(−0.64)	(2.79)		(2.29)	(−3.71)	(2.06)	(5.96)	(15.98)		(2.69)
(6)	CFS	ME	0.478	0.073	0.07	1.94	0.06	**−0.04**	**−0.09**	**−0.21**	**0.30**	0.285	−0.04	**0.35**	2.87	**0.32**	**−0.10**	**0.10**	**0.09**	**0.69**	0.256	**0.31**
					(0.90)		(0.89)	(−2.83)	(−3.88)	(−6.86)	(13.32)		(−0.60)	(3.17)		(3.20)	(−4.43)	(2.81)	(1.77)	(13.32)		(3.13)
(7)	CFS	CFS	0.463	0.061	0.07	1.94	**0.12**	**−0.05**	**−0.08**	**−0.19**	**0.27**	0.263	0.02	0.17	3.05	0.16	**−0.10**	**0.08**	−0.01	**0.70**	0.229	0.12
					(0.90)		(1.77)	(−3.31)	(−3.55)	(−6.02)	(12.37)		(0.32)	(1.45)		(1.47)	(−3.78)	(2.14)	(−0.13)	(12.37)		(1.19)
(8)	CFS	DRS	0.393	0.084	0.07	1.94	0.06	**−0.06**	**−0.09**	**−0.23**	**0.21**	0.222	−0.05	**0.54**	3.38	**0.50**	**−0.12**	**0.13**	**0.12**	**0.67**	0.184	**0.50**
					(0.90)		(0.90)	(−3.49)	(−3.79)	(−7.06)	(10.47)		(−0.68)	(4.14)		(4.12)	(−4.23)	(2.91)	(1.98)	(10.47)		(4.13)
(9)	DRS	standard	0.493	0.091	**0.34**	2.07	**0.29**	**−0.10**	**0.07**	**−0.06**	**0.34**	0.280	**0.24**	**0.30**	2.75	0.10	**−0.06**	−0.04	**0.10**	**0.62**	0.263	0.08
					(4.28)		(4.12)	(−5.75)	(2.84)	(−1.70)	(13.34)		(3.46)	(2.79)		(1.06)	(−2.65)	(−1.10)	(2.24)	(13.34)		(0.91)
(10)	DRS	ME	0.554	0.093	**0.34**	2.07	**0.24**	**−0.09**	**0.06**	0.00	**0.37**	0.333	**0.21**	**0.35**	2.87	0.15	**−0.06**	−0.01	−0.06	**0.73**	0.311	0.10
					(4.28)		(3.61)	(−5.29)	(2.35)	(0.03)	(15.64)		(3.19)	(3.17)		(1.56)	(−2.68)	(−0.22)	(−1.30)	(15.64)		(1.09)
(11)	DRS	CFS	0.478	0.089	**0.34**	2.07	**0.32**	**−0.10**	**0.07**	0.02	**0.30**	0.267	**0.29**	0.17	3.05	0.02	**−0.06**	−0.02	**−0.15**	**0.67**	0.239	−0.06
					(4.28)		(4.59)	(−5.95)	(2.59)	(0.68)	(12.78)		(4.15)	(1.45)		(0.18)	(−2.47)	(−0.54)	(−3.05)	(12.78)		(−0.56)
(12)	DRS	DRS	0.585	0.098	**0.34**	2.07	**0.20**	**−0.09**	**0.05**	−0.01	**0.33**	0.368	**0.16**	**0.54**	3.38	**0.25**	**−0.05**	0.01	−0.02	**0.93**	0.342	**0.22**
					(4.28)		(3.01)	(−5.50)	(2.07)	(−0.46)	(17.17)		(2.49)	(4.14)		(2.28)	(−1.87)	(0.19)	(−0.30)	(17.17)		(2.12)

Table 11
Pricing Performance

Panel A of this table displays results from time-series factor model regressions using the Fama-French (2015) five-factor model consisting of the market (MP), size (SMB), profitability (RMW), investment (CMA), and value (HML) factors as well as an adjusted five-factor model that replaces the standard value and investment factors with their discount rate shock-driven versions from Table 10 (HMLdrs and CMAdrs, respectively). The dependent returns are the average HML and CMA returns across the size quintiles from Panel A of Table 8. The sample period is from July 1964 to December 2019. Monthly mean returns (μ) and alphas are in percent. Panel B displays metrics on the models' performance in pricing different sets of test assets. "Val" ("Inv") denotes the set of size quintiles of the value and growth (conservative and aggressive) portfolios. "DRS" ("CFS") denotes the set of size quintiles of the discount rate shock-driven (cash flow shock-driven) subsets of the value, growth, conservative, and aggressive portfolios. "LS" denotes the long-short portfolios obtained by going long the size quintiles of the discount rate shock-driven subsets of the value, growth, conservative, and aggressive portfolios and short the size quintiles of the corresponding cash flow shock-driven subsets. Column "N" displays the number of portfolios in the test asset set. The performance metrics are the GRS statistic of Gibbons et al. (1989) and its associated p-value; the test assets' average absolute alpha (in percent) and the fraction of alphas that are significant on the 5% level; the test assets' average absolute alpha over the average absolute deviation of their mean returns from their mean returns' means as proposed by Fama and French (2015); the test assets' cross-sectional R^2 as employed by Cooper and Maio (2019); and the test assets' average time-series R^2. t-statistics are reported in parentheses. Boldface indicates significance at the 10% level.

Panel A: Pricing of Value and Investment Premia

		Fama-French (2015) Five-Factor Model							Adjusted Five-Factor Model						
	μ	α	β^{MP}	β^{SMB}	β^{RMW}	β^{CMA}	β^{HML}	R^2	α	β^{MP}	β^{SMB}	β^{RMW}	β^{CMAdrs}	β^{HMLdrs}	R^2
HML	**0.32**	0.01	−0.01	**−0.12**	**0.16**	**0.10**	**0.91**	0.953	−0.03	**−0.05**	**−0.14**	**0.23**	**0.11**	**0.56**	0.615
	(2.84)	(0.50)	(−1.62)	(−13.14)	(12.72)	(5.46)	(78.17)		(−0.36)	(−2.74)	(−5.31)	(6.85)	(2.63)	(22.13)	
HML ME	**0.32**	0.06	−0.01	**−0.06**	−0.01	**0.20**	**0.81**	0.843	−0.04	**−0.04**	**−0.09**	**0.05**	**0.14**	**0.62**	0.718
	(2.96)	(1.24)	(−1.24)	(−3.71)	(−0.28)	(5.97)	(39.04)		(−0.63)	(−2.53)	(−4.29)	(1.81)	(3.93)	(29.68)	
HML BE	−0.01	**−0.16**	0.00	**−0.18**	**0.09**	**−0.55**	**0.96**	0.492	**−0.24**	0.01	**−0.15**	**0.25**	**−0.20**	**0.49**	0.261
	(−0.06)	(−1.73)	(0.12)	(−5.39)	(1.89)	(−7.73)	(21.91)		(−2.08)	(0.41)	(−3.72)	(4.76)	(−3.04)	(12.34)	
HML ME - HML BE	**0.33**	**0.22**	−0.02	**0.12**	**−0.09**	**0.76**	**−0.15**	0.200	**0.20**	**−0.05**	0.06	**−0.20**	**0.34**	**0.13**	0.185
	(3.02)	(2.15)	(−0.66)	(3.38)	(−1.88)	(9.82)	(−3.22)		(1.95)	(−1.94)	(1.63)	(−4.23)	(5.68)	(3.63)	
HML ME (DRS)	**0.49**	**0.16**	0.01	−0.02	**0.09**	**0.29**	**0.81**	0.646	−0.04	0.01	**−0.07**	**0.14**	**0.06**	**0.89**	0.882
	(3.85)	(2.05)	(0.61)	(−0.64)	(2.29)	(4.73)	(21.91)		(−0.80)	(1.18)	(−4.13)	(6.61)	(2.21)	(55.19)	
HML ME (CFS)	0.13	−0.08	−0.03	**−0.08**	**−0.10**	**0.22**	**0.74**	0.675	−0.12	**−0.06**	**−0.11**	−0.06	**0.22**	**0.46**	0.446
	(1.16)	(−1.18)	(−1.60)	(−3.32)	(−3.07)	(4.28)	(23.60)		(−1.33)	(−2.88)	(−3.47)	(−1.37)	(4.31)	(14.65)	
HML ME (DRS) - HML ME (CFS)	**0.36**	**0.24**	0.04	**0.06**	**0.19**	0.06	0.06	0.035	0.08	**0.07**	0.04	**0.20**	**−0.16**	**0.43**	0.284
	(3.72)	(2.45)	(1.58)	(1.76)	(3.93)	(0.86)	(1.40)		(0.95)	(3.62)	(1.38)	(4.97)	(−3.28)	(14.40)	
CMA	**0.19**	0.01	0.00	**−0.05**	0.00	**0.83**	**0.05**	0.920	0.05	**−0.05**	**−0.12**	**−0.10**	**0.45**	**0.13**	0.654
	(2.92)	(0.70)	(0.99)	(−7.48)	(0.18)	(55.94)	(5.98)		(1.19)	(−5.55)	(−8.12)	(−5.34)	(19.01)	(9.22)	
CMA (DRS)	**0.30**	0.07	**0.03**	**0.05**	**0.12**	**0.80**	**0.04**	0.582	−0.02	**0.01**	**−0.03**	**0.03**	**0.77**	**0.09**	0.833
	(4.02)	(1.33)	(2.06)	(2.96)	(4.98)	(20.66)	(1.68)		(−0.56)	(1.84)	(−2.77)	(2.09)	(40.82)	(7.93)	
CMA (CFS)	0.04	−0.07	**0.03**	**−0.08**	**−0.12**	**0.69**	0.01	0.576	0.02	**−0.04**	**−0.12**	**−0.21**	**0.23**	**0.09**	0.267
	(0.61)	(−1.60)	(2.33)	(−4.69)	(−5.20)	(19.93)	(0.63)		(0.28)	(−2.98)	(−5.59)	(−7.44)	(6.48)	(4.33)	
CMA (DRS) - CMA (CFS)	**0.26**	**0.14**	0.00	**0.13**	**0.24**	**0.11**	0.03	0.085	−0.03	**0.06**	**0.09**	**0.24**	**0.54**	0.00	0.364
	(3.43)	(1.84)	(−0.02)	(4.78)	(6.43)	(1.84)	(0.75)		(−0.54)	(3.74)	(3.87)	(8.08)	(14.54)	(−0.08)	

Panel B: Time-Series Pricing Performance

		Fama-French (2015) Five-Factor Model							Adjusted Five-Factor Model						
	N	GRS	p(GRS)	Avg($\lvert\alpha\rvert$)	% Sig	$\frac{\text{Avg}(\lvert\alpha\rvert)}{\text{Avg}(\lvert\mu\rvert)}$	CS-R^2	Avg(R^2)	GRS	p(GRS)	Avg($\lvert\alpha\rvert$)	% Sig	$\frac{\text{Avg}(\lvert\alpha\rvert)}{\text{Avg}(\lvert\mu\rvert)}$	CS-R^2	Avg(R^2)
Val & Inv	20	3.611	0.000	0.091	0.400	0.640	0.622	0.948	3.661	0.000	0.090	0.300	0.633	0.616	0.928
DRS	20	1.565	0.055	0.102	0.150	0.465	0.788	0.853	1.146	0.298	0.090	0.100	0.409	0.818	0.865
CFS	20	2.290	0.001	0.114	0.300	1.088	0.021	0.885	2.053	0.005	0.102	0.200	0.980	0.214	0.866
LS	20	2.602	0.000	0.154	0.250	0.927	0.083	0.071	2.267	0.001	0.126	0.200	0.756	0.226	0.104
Val & Inv & LS	40	2.956	0.000	0.127	0.350	0.373	0.811	0.510	2.869	0.000	0.113	0.275	0.332	0.831	0.518

Table 12
Cash Flow, Discount Rate, and Volatility News Betas of Factors

This table displays cash flow, discount rate, and volatility news betas of the standard (HML), market-channel (HML ME), book-channel (HML BE), discount rate shock-driven (HML ME (DRS)), and cash flow shock-driven (HML ME (CFS)) value factors as well as the standard (CMA), discount rate shock-driven (CMA (DRS)), and cash flow shock-driven (CMA (CFS)) investment factors. The construction of the standard versions of the factors is described in Section 3.2, the construction of the market-channel, book-channel, discount rate shock-driven, and cash flow shock-driven versions of the factors is described in Section 7. The betas are estimated from multivariate time-series regressions that regress the factors' quarterly returns on the quarterly news terms estimated by Campbell et al. (2018). The sample period is from July 1964 to December 2011. t-statistics are reported in parentheses and are calculated based on the approach of Shanken (1992). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Constant	β^{CF}	β^{DR}	β^{V}	R^2
HML	1.14***	0.27***	−0.24***	−0.78***	0.351
	(3.38)	(3.18)	(−5.30)	(−5.79)	
HML ME	1.31***	0.29***	−0.17***	−0.87***	0.288
	(3.52)	(3.15)	(−3.38)	(−5.86)	
HML BE	−0.07	0.44***	−0.15***	−0.41**	0.178
	(−0.17)	(4.43)	(−2.76)	(−2.53)	
HML ME - HML BE	1.37***	−0.15	−0.02	−0.46***	0.068
	(3.60)	(−1.60)	(−0.38)	(−3.03)	
HML ME (DRS)	2.04***	0.22*	−0.21***	−0.76***	0.196
	(4.45)	(1.89)	(−3.36)	(−4.14)	
HML ME (CFS)	0.61	0.32***	−0.18***	−0.83***	0.282
	(1.61)	(3.46)	(−3.46)	(−5.49)	
HML ME (DRS) - HML ME (CFS)	1.44***	−0.11	−0.03	0.07	0.010
	(3.81)	(−1.15)	(−0.64)	(0.45)	
CMA	0.83***	0.06	−0.21***	−0.29***	0.280
	(3.49)	(1.07)	(−6.47)	(−3.09)	
CMA (DRS)	1.25***	0.07	−0.18***	−0.33***	0.199
	(4.57)	(1.06)	(−4.72)	(−3.04)	
CMA (CFS)	0.28	0.12*	−0.12***	−0.21*	0.108
	(1.00)	(1.78)	(−3.17)	(−1.90)	
CMA (DRS) - CMA (CFS)	0.97***	−0.05	−0.06	−0.12	0.023
	(3.17)	(−0.67)	(−1.33)	(−0.98)	

Table 13

Market Equity Changes, Book Equity Changes, and Investment: Different Subsamples

This table displays time-series averages of regression coefficients from annual Fama-MacBeth (1973) regressions. The regressions are estimated at the end of each June from 1968 to 2019 using common US stocks traded on the NYSE, AMEX, or NASDAQ. The dependent variable is contemporaneous investment. The independent variables are five-year lagged book-to-market (Lagged BM), the change in book equity (dBE), and the change in market equity (dME). The variables are constructed as described in Appendix A, are measured at the end of June, and are winsorized at the 0.5% and 99.5% levels. dBE and dME are the annual changes in the book equity and the market equity, respectively, that are used in the calculation of BM. A subscript $t-l$ indicates that the respective variable is lagged by l years. The regressions are estimated with weighted least squares, whereby the stocks' weights correspond to their market capitalizations at the end of June of the respective year. R^2 is the average adjusted R-squared across all annual regressions. T is the number of annual Fama-MacBeth (1973) regressions. Column "All" uses in each annual regression all common US stocks traded on the NYSE, AMEX, or NASDAQ. Column "NSI (MV)" ("NSI (FV)") uses in each annual regression only firms whose net share issues across the next fiscal year are below the 25th or above the 75th percentile (between the 25th and 75th percentile) of NYSE stocks' net share issues. Column "Ret3Y (MV)" ("Ret3Y (FV)") uses in each annual regression only firms whose cumulative three-year ahead returns beginning from the last fiscal year ending are below the 25th or above the 75th percentile (between the 25th and 75th percentile) of NYSE stocks' cumulative three-year ahead returns. Column "MFHS (low)" ("MFHS (high)") uses in each annual regression only firms whose mutual fund hypothetical sales across the previous fiscal year are, in absolute terms, below (above) the median of NYSE stocks' mutual fund hypothetical sales (see Appendix C for the determination of firms' mutual fund hypothetical sales). Column "Payout (Con)" ("Payout (Uncon)") uses in each annual regression only firms whose payout-to-book equity ratios are below (above) the median of NYSE stocks' payout-to-book equity ratios. Column "Rating (Con)" ("Rating (Uncon)") uses in each annual regression only firms that have debt outstanding but no S&P long-term debt rating or their debt is in default (that have no debt outstanding or a S&P long-term debt rating and their debt is not in default). Column "KZ Index (Con)" ("KZ Index (Uncon)") uses in each annual regression only firms whose Kaplan-Zingales index values are above (below) the median of NYSE stocks' Kaplan-Zingales index values. t-statistics are reported in parentheses and are computed using Newey-West (1987) heteroskedasticity-robust standard errors with five lags. Boldface indicates significance at the 10% level.

	All	NSI (FV)	NSI (MV)	Ret3Y (FV)	Ret3Y (MV)	MFHS (low)	MFHS (high)	Payout (Uncon)	Payout (Con)	Rating (Uncon)	Rating (Con)	KZ Index (Uncon)	KZ Index (Con)
Intercept	**0.026**	**0.029**	**0.025**	**0.028**	**0.029**	**0.018**	**0.015**	**0.029**	**0.024**	**0.028**	**0.025**	**0.022**	**0.032**
	(3.50)	(4.16)	(2.84)	(3.64)	(4.03)	(2.58)	(3.16)	(3.48)	(3.56)	(3.83)	(3.36)	(2.58)	(4.44)
Lagged BM	**−0.017**	**−0.017**	**−0.017**	**−0.015**	**−0.016**	**−0.024**	**−0.021**	**−0.016**	**−0.024**	**−0.015**	**−0.019**	**−0.013**	**−0.023**
	(−4.34)	(−2.64)	(−4.25)	(−4.05)	(−3.48)	(−5.10)	(−5.97)	(−3.45)	(−7.82)	(−4.18)	(−4.41)	(−2.74)	(−6.68)
dBE	**0.397**	**0.441**	**0.374**	**0.428**	**0.383**	**0.422**	**0.404**	**0.398**	**0.437**	**0.428**	**0.370**	**0.481**	**0.329**
	(15.75)	(15.07)	(11.74)	(14.53)	(16.36)	(14.16)	(14.78)	(11.73)	(16.84)	(13.53)	(18.61)	(11.69)	(15.03)
dBE_{t-1}	**0.029**	**0.020**	**0.035**	**0.021**	**0.041**	**0.027**	**0.030**	**0.028**	**0.019**	**0.022**	**0.033**	0.013	**0.037**
	(3.40)	(2.91)	(3.14)	(1.90)	(4.33)	(2.11)	(2.52)	(2.27)	(1.88)	(1.92)	(3.72)	(0.68)	(3.97)
dBE_{t-2}	**0.029**	**0.026**	**0.024**	**0.029**	**0.034**	0.013	0.024	**0.021**	0.014	**0.020**	**0.034**	**0.036**	**0.015**
	(2.98)	(1.86)	(1.77)	(2.07)	(3.20)	(1.51)	(1.49)	(1.84)	(1.10)	(1.85)	(4.17)	(2.44)	(2.08)
dBE_{t-3}	**0.018**	0.018	0.019	0.013	**0.019**	**0.033**	0.008	**0.026**	−0.008	0.010	**0.015**	**0.025**	0.011
	(2.31)	(1.40)	(1.39)	(1.42)	(1.65)	(2.61)	(1.33)	(1.89)	(−1.07)	(1.04)	(2.25)	(1.96)	(1.39)
dBE_{t-4}	−0.001	−0.019	0.012	−0.008	0.007	−0.012	−0.003	−0.012	0.000	0.009	−0.002	0.005	**−0.010**
	(−0.11)	(−1.26)	(1.61)	(−0.82)	(0.71)	(−0.73)	(−0.44)	(−0.78)	(−0.05)	(0.69)	(−0.35)	(0.33)	(−2.04)
dME	**0.075**	**0.069**	**0.079**	**0.067**	**0.072**	**0.079**	**0.073**	**0.072**	**0.063**	**0.062**	**0.087**	**0.078**	**0.066**
	(7.50)	(5.12)	(8.72)	(7.35)	(7.22)	(7.33)	(6.09)	(6.10)	(9.07)	(5.03)	(9.10)	(5.78)	(8.42)
dME_{t-1}	**0.049**	**0.035**	**0.064**	**0.039**	**0.059**	**0.046**	**0.042**	**0.036**	**0.061**	**0.035**	**0.070**	**0.042**	**0.059**
	(7.05)	(5.75)	(6.86)	(4.72)	(6.48)	(6.36)	(6.63)	(3.76)	(14.68)	(3.71)	(8.98)	(4.08)	(12.72)
dME_{t-2}	**0.042**	**0.037**	**0.047**	**0.037**	**0.041**	**0.046**	**0.039**	**0.036**	**0.052**	**0.041**	**0.042**	**0.030**	**0.055**
	(6.73)	(4.26)	(5.79)	(5.52)	(6.19)	(5.14)	(5.47)	(4.75)	(8.60)	(4.85)	(13.12)	(3.42)	(10.24)
dME_{t-3}	**0.029**	**0.027**	**0.031**	**0.028**	**0.027**	**0.028**	**0.037**	**0.025**	**0.038**	**0.034**	**0.023**	**0.018**	**0.034**
	(4.39)	(3.72)	(4.91)	(4.08)	(3.95)	(3.37)	(5.69)	(2.38)	(8.47)	(4.04)	(2.52)	(1.86)	(6.18)
dME_{t-4}	**0.028**	**0.030**	**0.024**	**0.026**	**0.027**	**0.032**	**0.028**	**0.028**	**0.032**	**0.027**	**0.030**	**0.024**	**0.029**
	(5.50)	(5.02)	(4.01)	(4.13)	(7.50)	(4.92)	(4.53)	(4.74)	(5.23)	(4.05)	(5.63)	(3.39)	(4.08)
R^2	0.504	0.510	0.532	0.501	0.531	0.557	0.482	0.452	0.604	0.504	0.517	0.519	0.561
T	52	51	51	50	50	39	39	52	52	52	52	52	52

Table 14

Market Equity Changes, Book Equity Changes, and Investment Factor Correlation: Different Subsamples

This table displays time-series averages of regression coefficients from annual Fama-MacBeth (1973) regressions. The regressions are estimated at the end of each June from 1968 to 2018 using common US stocks traded on the NYSE, AMEX, or NASDAQ. The dependent variable is the correlation with the investment factor across the next 12 months. The independent variables are five-year lagged book-to-market (Lagged BM), the change in book equity (dBE), and the change in market equity (dME). The variables are constructed as described in Appendix A, are measured at the end of June, and are winsorized at the 0.5% and 99.5% levels. dBE and dME are the annual changes in the book equity and the market equity, respectively, that are used in the calculation of BM. A subscript $t-l$ indicates that the respective variable is lagged by l years. The regressions are estimated with weighted least squares, whereby the stocks' weights correspond to their market capitalizations at the end of June of the respective year. R^2 is the average adjusted R-squared across all annual regressions. T is the number of annual Fama-MacBeth (1973) regressions. Column "All" uses in each annual regression all common US stocks traded on the NYSE, AMEX, or NASDAQ. Column "NSI (MV)" ("NSI (FV)") uses in each annual regression only firms whose net share issues across the next fiscal year are below the 25th or above the 75th percentile (between the 25th and 75th percentile) of NYSE stocks' net share issues. Column "Ret3Y (MV)" ("Ret3Y (FV)") uses in each annual regression only firms whose cumulative three-year ahead returns beginning from the last fiscal year ending are below the 25th or above the 75th percentile (between the 25th and 75th percentile) of NYSE stocks' cumulative three-year ahead returns. Column "MFHS (low)" ("MFHS (high)") uses in each annual regression only firms whose mutual fund hypothetical sales across the previous fiscal year are, in absolute terms, below (above) the median of NYSE stocks' mutual fund hypothetical sales (see Appendix C for the determination of firms' mutual fund hypothetical sales). Column "Payout (Con)" ("Payout (Uncon)") uses in each annual regression only firms whose payout-to-book equity ratios are below (above) the median of NYSE stocks' payout-to-book equity ratios. Column "Rating (Con)" ("Rating (Uncon)") uses in each annual regression only firms that have debt outstanding but no S&P long-term debt rating or their debt is in default (that have no debt outstanding or a S&P long-term debt rating and their debt is not in default). Column "KZ Index (Con)" ("KZ Index (Uncon)") uses in each annual regression only firms whose Kaplan-Zingales index values are above (below) the median of NYSE stocks' Kaplan-Zingales index values. t-statistics are reported in parentheses and are computed using Newey-West (1987) heteroskedasticity-robust standard errors with five lags. Boldface indicates significance at the 10% level.

	All	NSI (FV)	NSI (MV)	Ret3Y (FV)	Ret3Y (MV)	MFHS (low)	MFHS (high)	Payout (Uncon)	Payout (Con)	Rating (Uncon)	Rating (Con)	KZ Index (Uncon)	KZ Index (Con)
Intercept	**−0.054**	**−0.047**	**−0.060**	**−0.044**	**−0.065**	−0.034	**−0.055**	**−0.048**	**−0.066**	**−0.060**	**−0.051**	**−0.060**	−0.041
	(−2.22)	(−1.68)	(−2.68)	(−1.65)	(−2.75)	(−1.15)	(−1.89)	(−1.97)	(−2.54)	(−2.24)	(−2.41)	(−2.53)	(−1.57)
Lagged BM	**0.049**	**0.049**	**0.044**	**0.048**	**0.047**	**0.043**	**0.041**	**0.050**	**0.054**	**0.049**	**0.045**	**0.045**	**0.052**
	(5.44)	(5.75)	(4.98)	(4.24)	(6.51)	(3.48)	(4.93)	(4.75)	(7.10)	(4.29)	(7.51)	(3.54)	(5.84)
dBE	**−0.019**	−0.019	**−0.018**	**−0.027**	−0.013	**−0.022**	**−0.012**	**−0.032**	**−0.019**	−0.020	**−0.016**	**−0.040**	−0.011
	(−2.16)	(−1.18)	(−2.03)	(−2.32)	(−1.34)	(−3.86)	(−1.73)	(−2.33)	(−2.23)	(−1.42)	(−1.97)	(−2.27)	(−1.15)
dBE_{t-1}	**0.025**	0.014	**0.031**	0.030	**0.023**	0.001	**0.035**	0.022	**0.035**	**0.047**	0.017	0.018	**0.026**
	(2.11)	(0.95)	(2.64)	(1.61)	(1.86)	(0.08)	(4.03)	(1.25)	(3.71)	(2.22)	(1.60)	(1.09)	(2.16)
dBE_{t-2}	**0.026**	0.020	**0.022**	**0.039**	**0.020**	0.005	**0.045**	0.022	**0.041**	**0.027**	**0.022**	0.010	**0.029**
	(2.38)	(1.27)	(2.28)	(3.13)	(1.65)	(0.43)	(3.39)	(1.61)	(3.85)	(2.13)	(2.33)	(0.62)	(2.85)
dBE_{t-3}	0.014	0.011	0.011	0.017	**0.023**	−0.005	**0.033**	0.030	**0.023**	0.016	0.010	0.025	0.012
	(0.82)	(0.52)	(0.82)	(0.79)	(2.09)	(−0.42)	(2.54)	(1.31)	(2.39)	(1.27)	(0.59)	(1.07)	(1.17)
dBE_{t-4}	**0.028**	0.019	**0.038**	0.029	**0.024**	0.009	**0.019**	0.026	**0.041**	0.022	0.017	0.023	**0.034**
	(1.92)	(1.43)	(2.39)	(1.60)	(1.98)	(0.42)	(2.20)	(1.21)	(3.83)	(0.98)	(1.57)	(1.07)	(2.71)
dME	**−0.098**	**−0.094**	**−0.099**	**−0.097**	**−0.083**	**−0.099**	**−0.108**	**−0.105**	**−0.078**	**−0.104**	**−0.083**	**−0.096**	**−0.093**
	(−7.44)	(−5.66)	(−8.15)	(−8.91)	(−7.54)	(−6.51)	(−4.52)	(−6.55)	(−9.22)	(−6.98)	(−9.10)	(−6.47)	(−8.01)
dME_{t-1}	**−0.101**	**−0.096**	**−0.101**	**−0.110**	**−0.091**	**−0.089**	**−0.112**	**−0.114**	**−0.079**	**−0.110**	**−0.081**	**−0.094**	**−0.091**
	(−9.81)	(−8.57)	(−9.46)	(−8.91)	(−7.91)	(−7.59)	(−7.10)	(−12.88)	(−6.35)	(−8.55)	(−10.91)	(−11.51)	(−5.67)
dME_{t-2}	**−0.065**	**−0.070**	**−0.058**	**−0.072**	**−0.059**	**−0.069**	**−0.068**	**−0.070**	**−0.065**	**−0.072**	**−0.054**	**−0.060**	**−0.065**
	(−7.21)	(−6.23)	(−7.21)	(−6.71)	(−5.29)	(−6.23)	(−7.86)	(−6.74)	(−6.33)	(−7.87)	(−7.85)	(−5.09)	(−6.45)
dME_{t-3}	**−0.054**	**−0.058**	**−0.052**	**−0.053**	**−0.054**	**−0.044**	**−0.050**	**−0.064**	**−0.052**	**−0.063**	**−0.042**	**−0.050**	**−0.052**
	(−6.88)	(−5.12)	(−4.88)	(−5.91)	(−5.46)	(−3.98)	(−4.46)	(−7.78)	(−7.00)	(−7.70)	(−4.94)	(−4.49)	(−4.42)
dME_{t-4}	**−0.050**	**−0.041**	**−0.050**	**−0.050**	**−0.048**	**−0.049**	**−0.044**	**−0.050**	**−0.057**	**−0.055**	**−0.038**	**−0.041**	**−0.054**
	(−6.82)	(−4.99)	(−6.08)	(−4.71)	(−6.14)	(−4.47)	(−5.27)	(−6.60)	(−5.30)	(−5.76)	(−4.68)	(−4.19)	(−4.43)
R^2	0.468	0.494	0.465	0.475	0.525	0.491	0.432	0.463	0.549	0.475	0.472	0.497	0.494
T	51	51	51	50	50	38	38	51	51	51	51	51	51