Cash Flow Duration and the Term Structure of Equity Returns

Michael Weber

Booth School of Business, University of Chicago, Chicago, IL, USA and NBER. e-Mail: michael.weber@chicagobooth.edu. Phone: 773-702-1241.

Abstract

The term structure of equity returns is downward-sloping: stocks with high cash flow duration earn 1.10% per month lower returns than short-duration stocks in the cross section. I create a measure of cash flow duration at the firm level using balance sheet data to show this novel fact. Factor models can explain only 50% of the return differential, and the difference in returns is three times larger after periods of high investor sentiment. Analysts extrapolate from past earnings growth into the future and predict high returns for high-duration stocks following high-sentiment periods, contrary to ex-post realizations. I use institutional ownership as a proxy for short-sale constraints, and find the negative cross-sectional relationship between cash flow duration and returns is only contained within short-sale constrained stocks.

Keywords:
Dividend Strips, Short-sale constraints, Anomalies, Sentiment
JEL classification: E43; G12; G14

1. Introduction

The term structure of equity returns is downward-sloping. van Binsbergen, Brandt, and Koijen [64] show that a synthetically created short-term asset that only pays dividends in the near-term future has higher returns than the market index, which is a claim to the stream of all future dividends. Their finding is puzzling because all leading asset-pricing models, such as the external-habit-formation model of Campbell and Cochrane [15], the long-run risk model of Bansal and Yaron [9], and the rare disaster model of Barro [10] and Gabaix [35] instead imply an upward-sloping or flat-term structure of equity returns (see Lettau and Wachter [46]). An active literature develops new equilibrium asset-pricing models to rationalize the downward-sloping term structure (see, e.g., Belo, Collin-Dufresne, and Goldstein [11] and

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Ai, Croce, Diercks, and Li [1]).[1]

van Binsbergen et al. [64] use a sample from 1996 to 2009 that contains two major recessions and stock market downturns. The term structure of interest rates often inverts during adverse macroeconomics periods. Ait-Sahalia, Karaman, and Mancini [2] show the term structure of risk premia is downward-sloping during recessions but flat or upward-sloping during normal times. Alternative explanations for the downward-sloping term structure of risk premia are differential taxation between dividends and capital gains (see Schulz [59]) and market microstructure noise (see Boguth, Carlson, Fisher, and Simutin [13]).

One avenue for disentangling these potentially conflicting explanations is to wait for twenty years and perform an out-of-sample test. Instead, I tackle this problem by resorting to the cross section of stock returns. Recent equilibrium models typically refer to the value premium to motivate their analysis, and argue that growth stocks have high cash flow duration but low returns. Rather than relying on indirect inference via the value premium, I create a direct measure of cash flow duration at the firm level using balance sheet data. I sort stocks into ten portfolios with increasing cash flow duration. Low-duration stocks outperform high-duration stocks by 1.10% per month, but have lower CAPM betas consistent with results in van Binsbergen et al. [64]. Exposure to classical risk factors cannot explain the novel cross section either.[2] The difference in returns between low- and high-duration stocks is three times larger after periods of high investor sentiment, and excess returns of high-duration stocks load positively on changes in sentiment.

Market participants might be overly optimistic about the prospects of high-duration stocks. Analysts expect stocks with high cash flow duration to grow twice as fast over the following five years compared to low-duration stocks. This difference in growth forecasts shrinks by more than 50% over the next five years. Analysts seem to extrapolate from past earnings growth into the future. High-duration stocks indeed grew substantially faster in the past than low-duration stocks, but they have the same growth in earnings over the following five years. Standardized earnings surprises corroborate overly excessive

[1]See also Croce, Lettau, and Ludvigson [21]; Corhay, Kung, and Schmid [20]; Favilukis and Lin [33]; Lopez, Lopez-Salido, and Vazquez-Grande [49]; Andries, Eisenbach, and Schmalz [4]; and Marfè [52], among others. van Binsbergen and Koijen [66] provide an excellent overview of this fast-growing literature.

[2]A conditional consumption CAPM as in Lettau and Ludvigson [44], a consumption CAPM with ultimate consumption risk as in Parker and Julliard [57] and Malloy, Moskowitz, and Vissing-Jørgensen [50], or downside risk as in Lettau, Maggiori, and Weber [45] also cannot explain the duration-sorted cross section.

growth expectations for high-duration stocks.

Earnings forecasts and forecasts for long-term growth in earnings are central ingredients for my duration measure, but my empirical analysis focuses on returns. I follow Asness et al. [6] and create implied expected returns using analysts' forecasts for target prices to see whether a systematic expectational error might explain the downward-sloping term structure of equity returns. Mean returns and three-factor alphas increase in cash flow duration after periods of high investor sentiment, but slope downward after periods of low investor sentiment in stark contrast to realized returns following period of high and low investor sentiment. These findings add a cross-sectional dimension to the market-wide evidence of Greenwood and Shleifer [37] and show that expectational errors vary with investor sentiment.

I also study volatility-managed portfolios following Moreira and Muir [54]. The strategy takes on less risk when variance was high recently. Volatility management increases the return spread between high- and low-duration stocks and factor model cannot explain any of the variation in returns across volatility-managed duration portfolios. Moreira and Muir [54] show leading asset pricing models cannot explain the returns of volatility-managed portfolios further raising the bar for risk-based explanations to rationalize the downward-sloping term structure of equity returns.

Impediments to short selling might explain why rational arbitrageurs do not take sufficiently large short positions in possibly overpriced high-duration stocks. I follow Nagel [55] and use institutional ownership, the fraction of shares institutions hold, as a proxy for short-sale constraints to test this hypothesis empirically.[3] I find evidence consistent with mispricing. The spread in excess returns is strongest among stocks that are potentially the most short-sale constrained: low-duration stocks outperform high-duration stocks on average by 1.32% per month in the lowest institutional ownership class. The difference in returns monotonically decreases in institutional ownership to a statistically insignificant 0.15% per month for potentially unconstrained stocks. Short-sale constraints only matter for high-duration stocks, which are potentially overpriced; they do not matter for short-duration stocks. The results hold for both small and large stocks, but also among value and growth stocks.

[3] Choi, Jin, and Yan [18] provide empirical evidence consistent with the premise that institutional ownership measures short-sales constraints. Institutional ownership proxies for the supply of lendable shares. An alternative proxy for short-sale constraints are shorting fees, which are a function of the supply and demand for shorting or short interest, which proxies for the demand. I discuss in detail the advantages and disadvantages of the different measures in Section 4.

My findings complement and extend evidence in van Binsbergen et al. [64] and van Binsbergen, Hueskes, Koijen, and Vrugt [65], who use dividend futures and strips with maturities of up to 10 and a sample period of 12 years. Similar to their work, I find high average returns and volatilities at the short end of the term structure, lower CAPM betas for short duration assets, and the value factor explains only part of the return difference between low and high duration stocks. I complement their work because my cross-sectional data allow me to study longer duration assets and a longer sample period. The average duration at the stock level is 19 years in my sample from 1963 to 2014 and ranges between 6 and 24 years at the portfolio level.

Exposure to untested risk factors might explain the cross section of stocks sorted on cash flow duration. Ultimately, variation in the quantity or price of risk is observationally equivalent to variation in sentiment and institutional ownership is an equilibrium outcome. My findings, however, raise the bar for novel models to be consistent with the facts I present in this paper and the puzzling findings in van Binsbergen et al. [64] and van Binsbergen et al. [65]: Why is the risk premium so high for assets with low duration, even at the very short end of the term structure?

2. Data

Stock return data come from the Center for Research in Security Prices (CRSP) monthly stock file. I follow standard conventions and restrict my analysis to common stocks of firms incorporated in the United States trading on NYSE, Amex, or Nasdaq. I exclude financials ($6000 \leq \text{SIC} < 7000$) and utilities ($4900 \leq \text{SIC} < 5000$). To account for the delisting bias in the CRSP database, I investigate the reason for the stocks' disappearance. If a company is delisted for cause (delisting codes 400-591) and has a missing delisting return, I follow the findings in Shumway [60] and assume a return of -30%. In some cases, CRSP reports delisting returns several months after the security stopped trading. In these instances, I pro-rate the delisting return over the intervening period as in Cohen, Polk, and Vuolteenaho [19]. Market equity (ME) is the total market capitalization at the firm level.

Balance sheet data are from the Standard and Poor's Compustat database. I define book equity (BE) as total stockholders' equity plus deferred taxes and investment tax credit (if available) minus the book value of preferred stock. Based on availability, I use the redemption value, liquidation value, or par value (in that order) for the book value of preferred stock. I prefer the shareholders' equity number as reported by Compustat. If these data are not available, I calculate shareholders' equity as the sum of common and preferred equity. If neither of the two are available, I define shareholders' equity as the difference between total assets and total liabilities. I supplement the book-equity data with hand-collected book-equity data from Moody's manual used in Davis, Fama, and French [24]. The book-to-market (BM) ratio of year t is then the book equity for the fiscal year ending in calendar year $t-1$ over the market equity as of December $t-1$.

I define the payout ratio (PR) as net payout over net income. Net payout is the sum of ordinary dividends and net purchases of common and preferred stock. Return on equity (ROE) is the ratio of income before extraordinary items over lagged book equity. Sales growth ($Sales\_g$) is the percentage growth rate in net sales. As for the book-to-market ratio, I calculate these numbers for the fiscal year ending in calendar $t-1$. Age is the number of years a firm has been in Compustat. To alleviate a potential survivorship bias due to backfilling, I require that a firm has at least two years of Compustat data.

I obtain data on institutional ownership from the Thomson Reuters 13F (TR-13F) database. These data include quarterly observations on long positions of mutual funds, hedge funds, insurance companies, banks, trusts, pension funds, and other entities with holdings of more than $100 million of 13F assets. I calculate the institutional ownership ratio (IOR) by first summing the holdings of all reporting institutions at the security level and then dividing by the total shares outstanding from CRSP. If a common stock is on CRSP but not in the TR-13F database, I assign an institutional ownership ratio of 0. I use the CRSP cumulative adjustment factor to account for stock splits and other distributions between the effective ownership date and the reporting date. The TR-13F database carries forward institutional reports up to eight quarters. In calculating the institutional ownership ratio, I only keep the holding data as they first appear in the database.

Data on analyst forecasts for earnings per share, long-term growth in earnings, price targets, and realized five-year growth in earnings come from the Institutional Brokers Estimates System (I/B/E/S).

The five Fama & French factors, the momentum factor, and the one-month Treasury-bill rate come from the Fama & French data library on Ken French's webpage.

2.1. *Cash Flow Duration*

We can interpret the one-period return of any portfolio as the return to a portfolio of cash flows with different maturities. Hansen, Heaton, and Li [39] estimate a vector autoregression for consumption and earnings growth and extract dividend growth from book-to-market sorted portfolios to study the long-run risk of value and growth portfolios. They find that value stocks have higher long-run consumption risk than growth stocks, similar to findings in Campbell and Vuolteenaho [16].[4]

Instead of modeling the riskiness of cash flows, Lettau and Wachter [46] directly model the timing of cash flows to study the risk premium of claims to cash flows with different maturities. They model a cross section of firms which have different shares of aggregate dividends similar to Santos and Veronesi [58]. Growth firms pay off more of their cash flows in the distant future and have higher cash flow duration compared to value stocks. The stochastic discount factor in Lettau and Wachter [46] features a priced shock to aggregate dividends and a shock to discount rates which is not priced. Their model implies that growth firms covary more with the discount rate shock and value firms have a higher comovement with the cash flow shock, which can rationalize the value premium we observe in the data.

Both Hansen, Heaton, and Li [39] and Lettau and Wachter [46] study the riskiness and timing of cash flows through the lens of book-to-market sorted portfolios. These portfolios might not provide a large spread in duration. Instead, I construct a direct measure of cash flow duration and show that my results hold both within value and growth stocks (see discussion in Section 4. 4.5).

My empirical strategy closely follows the intuition of Lettau and Wachter [46] in directly modeling the timing of cash flows. *Dur* is the implied cash flow duration measure of Dechow, Sloan, and Soliman [27]. Dechow et al. [27] develop this measure and show that stocks with high cash flow duration have low returns. They do not study exposure to risk factors, time variation in the slope, or the effect of short-sale constraints, but instead posit that investors in the stock market have a long holding period horizon.

Dur resembles the traditional Macaulay duration for bonds and hence reflects the weighted average

[4] See also Bansal, Dittmar, and Lundblad [8]; Parker and Julliard [57]; and Malloy et al. [51].

time to maturity of cash flows. The ratio of discounted cash flows to price determines the weights:

$$Dur_{i,t} = \frac{\sum_{s=1}^{T} s \times CF_{i,t+s}/(1+r)^s}{P_{i,t}}, \tag{1}$$

where $Dur_{i,t}$ is the duration of firm i at the end of fiscal year t, $CF_{i,t+s}$ denotes the cash flow at time $t+s$, $P_{i,t}$ is the current price, and r is the expected return on equity. The expected return on equity is constant across both stocks and time. Allowing for firm-specific discount rates ceteris paribus amplifies cross-sectional differences in the duration measure because high-duration firms tend to have lower returns on equity (see Panel B of Table 1 and Table 2). Firm-specific discount rates, however, would not change the ordering, and hence had no effect on my later results. The relative ranking is also insensitive to changes in the level of r.[5]

Contrary to bonds, stocks do not have a well-defined finite maturity, $t+T$, and cash flows are not known in advance.

Therefore, I split the duration formula into a finite detailed forecasting period and an infinite terminal value and assume the latter is paid out as level perpetuity to deal with the first complication.[6] This assumption allows me to write equation (1) as

$$Dur_{i,t} = \frac{\sum_{s=1}^{T} s \times CF_{i,t+s}/(1+r)^s}{P_{i,t}} + \left(T + \frac{1+r}{r}\right) \times \frac{P_{i,t} - \sum_{s=1}^{T} CF_{i,t+s}/(1+r)^s}{P_{i,t}}. \tag{2}$$

To tackle the second complication, I assume clean surplus accounting, start from an accounting identity, and forecast cash flows via forecasting return on equity (ROE), $E_{i,t+s}/BV_{i,t+s-1}$, and growth in book

[5] Variation over time in return on equity r does not affect the cross-sectional ordering which is the main focus of the paper. We can interpret a constant r for a given sorting year t as the average return on equity over the forecasting horizon. I discuss robustness checks in Section 3.

[6] As long as the finite forecasting horizon is sufficiently long to account for extraordinary growth opportunities at the firm and industry levels, the assumption that cash flows are paid out as level annuity has no impact on my results. A potentially terminal growth rate would be constant and therefore had no impact on my cross-sectional ordering.

equity, $(BV_{i,t+s} - BV_{i,t+s-1})/BV_{i,t+s-1}$:

$$CF_{i,t+s} = E_{i,t+s} - (BV_{i,t+s} - BV_{i,t+s-1}) \tag{3}$$

$$= BV_{i,t+s-1} \times \left[\frac{E_{i,t+s}}{BV_{i,t+s-1}} - \frac{BV_{i,t+s} - BV_{i,t+s-1}}{BV_{i,t+s-1}}\right]. \tag{4}$$

I model returns on equity and growth in equity as autoregressive processes based on recent findings in the financial statement analysis literature (see Dechow et al. [27]). I estimate autoregressive parameters using the pooled CRPS–Compustat universe and assume ROE mean reverts to the average cost of equity (Nissim and Penman [56]). Nissim and Penman [56] also show that past sales growth is a better predictor of future growth in book equity than past growth in book equity. I assume that growth in book equity mean reverts to the average growth rate of the economy with a coefficient of mean reversion equal to average historical mean reversion in sales growth.

The book-to-market ratio and cash flow duration are often used interchangeably. A linear relationship between the book-to-market ratio and duration exists under the assumptions that ROE immediately mean reverts and that no growth occurs in the book value of equity. I will later show that my measure of cash flow duration contains information over and above the book-to-market ratio.

ROE has an AR(1) coefficient of 0.41 and BV of 0.24. I assume a discount rate r of 0.12, a steady-state average cost of equity of 0.12, an average long-run nominal growth rate of 0.06, and a detailed forecasting period of 15 years.[7] All my findings are robust to reasonable permutations of these values and to a pre-estimation of these parameters and out-of-sample portfolio sorts (see discussion in Section 3).

My sample period is July 1963 until June 2014. The sample is restricted from July 1981 until June 2014, when I make use of the institutional ownership data; July 1982 to June 2009, when I employ I/B/E/S data on earnings forecasts, realized five year growth, and long term growth forecast; and July 2001 to June 2014, when I employ I/B/E/S forecasts on price targets. To minimize the impact of outliers,

[7] Variation in expected inflation could affect the expectations about the long-run nominal growth rate of the economy, but should also affect the nominal discount rate. As stocks are claims on real assets, changes in inflation expectations should not affect the value of the firm. Table 5 reports results for five subsamples of ten years each. Return differences between high- and low-duration stocks are similar across different subsamples.

I winsorize all variables at the 1% and 99% levels.

2.2. Descriptive Statistics

Table 1 reports summary statistics in Panel A and cross-sectional correlations for various firm characteristics and return predictors in Panel B. I calculate all statistics annually and then average over time.

The average payoff horizon implied by stock prices is about nineteen years. An average standard deviation of five years hints at substantial cross-sectional heterogeneity in this variable. Institutions hold about 40% of all shares during my sample period, and the average firm size is $2.1 billion.

Panel B shows that duration is strongly negatively correlated with book-to-market.[8] In addition, high cash flow duration is associated with low payout rates, return-on-equity, and firm age, but high growth in sales. No linear association exists between duration and institutional ownership or size. The institutional ownership ratio is strongly positively correlated with size.

Low-duration stocks tend to be industrial and manufacturing companies, whereas high-duration stocks were mainly in the software and internet sector in the 1990s and the bio-sciences sector in the 2000s. Table A.1 in the online appendix reports five low- and high-duration firms in 1996 and 2004.

3. Duration and the Term Structure of Equity Returns

3.1. Portfolios Sorted on Duration

At the end of June each year t from 1963 to 2013, I sort stocks into 10 deciles based on duration for the fiscal year ending in calendar year $t-1$. I rebalance portfolios on an annual basis and weight returns within portfolio equally.[9] Figure 1 plots the time-series average annual portfolio return as a function of the average median portfolio duration. This figure exhibits a negative relationship between duration and holding-period return: low-duration stocks in portfolio 1 have, on average, a one-year holding-period return of 25%. The high-duration stocks in the last basket, on the contrary, earn less than 10% per annum.

[8] Table 12 shows that my findings continue to hold within both value and growth stocks, indicating that duration has information over and above book-to-market.

[9] The online appendix reports all results for value-weighted returns.

I regress excess returns at the portfolio level on various risk factors to test whether traditional risk factors can explain the downward-sloping term structure of equity returns,

$$R_{i,t} = \alpha_i + \sum_s \beta_{i,s} X_{i,s,t} + \epsilon_{i,t}, \tag{5}$$

where $R_{i,t}$ is excess return of portfolio i at time t, α_i is a model-specific pricing error, and $\beta_{i,s}$ is the time-series loading of returns on risk factor s, $X_{i,s}$, such as size.

Panel A of Table 2 presents monthly mean excess returns, OLS regression coefficients, and pricing errors for the CAPM with standard errors in parentheses for equally weighted portfolio returns. We see in the first line of the table that excess returns monotonically decrease in cash flow duration. In contrast to the negative relationship for returns, duration is strongly positively related to CAPM betas. High-duration stocks have a CAPM beta of 1.41 compared to low-duration stocks, which have an exposure to the market of only 1.05. Decreasing returns and increasing exposure to the market result in a monotonic negative relationship between duration and pricing errors. A strategy going long low-duration stocks and shorting high-duration stocks (D1–D10 in the following) leads to a statistically significant excess return of 1.29% per month.

Panel B reports monthly Sharpe ratios for the duration-sorted portfolios. The hedge portfolio going long low-duration stocks and shorting high-duration stocks has a monthly Sharpe ratio of 0.22 which compares favorably to the monthly Sharpe ratios of the Fama & French five factors, which have monthly Sharpe ratios of 0.11 (market), 0.09 (size), 0.13 (value), 0.12 (profitability), and 0.16 (investment) during my sample period.

Panel C contains results for value-weighted returns. Size and magnitude of return premia are economically and statistically similar to the equally-weighted returns. The similarity between equally-weighted and value-weighted returns is expected as size and duration are almost uncorrelated (see Table 1).

Panel D shows that delisting returns are not driving my results. If I do not account for delisting returns, the long-short portfolio return is 1.03% per month compared to the baseline of 1.10% per month.

The CAPM has little explanatory power in the modern sample period (see, e.g., Campbell and

Vuolteenaho [16]).[10] Table 3 reports alphas for the Fama & French three-factor model, the three-factor model augmented with a momentum factor, and the Fama & French five-factor model (Fama and French [32]). The Fama & French three-factor alpha of the D1–D10 strategy is 0.84% per month, the four-factor alpha is 0.66% per month, and the five-factor alpha is still a highly statistically significant 0.48% per month. I report factor loadings in the online appendix to conserve space (see Table A.7 to Table A.9). Stocks with high cash flow duration tend to have similar loadings on the market, size (SMB), and momentum as low-duration stocks, but they have lower loadings on value (HML), profitability (RMW), and investment (CMA).

3.2. ***Sensitivity and Subsample Analysis***

The duration measure I present in Section 2 depends on assumptions regarding the persistence in ROE and sales growth, the long-run growth rate in sales and ROE, the discount rate, and the detailed forecasting horizon. Figure 2 reports excess returns of a long-short portfolio for 11 different values of each parameter. Specifically, the discount rate ranges between 0.07 and 0.17 (baseline 0.12), the detailed forecast horizon between 10 and 20 years (baseline 15), the sales growth persistence between 0.09 and 0.36 (baseline 0.2411), the ROE persistence between 0.15 and 0.65 (baseline 0.4067), the steady-state growth rate in sales between 0.01 and 0.11 (baseline 0.06), and the steady-state growth rate in ROE between 0.07 and 0.17 (baseline 0.12).

The red line in each panel shows the excess return for the baseline parameter values. We see in the top panels of Figure 2 that assumptions regarding the discount rate or the detailed forecasting horizon barely affect the slope of the term structure of equity returns.

In the middle panels, we see moving from a sales growth persistence of 0.09 to a persistence of 0.36 increases the cross-sectional returns premium from 1.01% to 1.24% per month, whereas increasing the persistence in ROE lowers the return premium from 1.30% to 0.62%.

In the bottom panels, we see the cross-sectional return premium is most sensitive to extreme assumptions regarding the long-run sales growth and ROE. Increasing the long-run nominal growth

[10] One exception is the cross section of stocks sorted on price stickiness (see Weber [68] and Gorodnichenko and Weber [36]). Price stickiness and cash flow duration are uncorrelated in my sample.

rate of the economy from a baseline of 6% to 11% cuts the duration premium in half. Decreasing the long-run ROE from 12% to 7% instead lowers the excess return by a similar amount.

Table 4 reports excess returns at the portfolio level for economically reasonable variations of parameter values. Overall, over a wide range of parameter values, we find an economically large and statistically significant downward-sloping term structure of equity returns. The duration premium seems a pervasive feature of the data which alleviates concerns of estimation uncertainty driving the results.

So far, I have used full sample estimates for the autoregressive parameters of the cash flow model. The evidence so far indicates the downward-sloping term structure of equity returns is a robust feature of the data and reasonable parameter variations have little impact on the results. To make sure one can indeed trade on the duration sorts, row (12) of Table 4 reports excess returns for an out-of-sample exercise. Specifically, I first estimate parameters from 1963 until 1982, use these updated parameters to calculate duration at the firm level, and then sort stocks into portfolios from 1983 until the end of my sample. Also in this out-of-sample exercise, we see a pronounced downward-sloping term structure of equity returns with low-duration stocks earning an average excess return of 1.21% per month higher than high-duration stocks.

3.3. ***Time Variation***

The predictive power of many return characteristics varies over time. Recent examples are the disappearance of the size premium or the momentum crash (see Daniel and Moskowitz [23] and Freyberger, Neuhierl, and Weber [34]).

Table 5 reports average monthly excess returns at the portfolio level decade by decade. Across decades, we see an average monthly duration premium of more than 1% per month. The only exception is the very first decade from 1963 to 1973, during which the difference in returns between low- and high-duration stocks is merely 0.69% per month, which is still economically large and statistically significant.

The term structure of interest rates often inverts during adverse macroeconomic periods. Ait-Sahalia, Karaman, and Mancini [2] show that the term structure of risk premia is downward-sloping during recessions, but flat or upward-sloping during normal times. Figure 3 is a time series plot of annual excess returns for the low- minus high-duration portfolio (blue line) and the market excess return (red dash-dotted line). Both excess returns show substantial variation over time. During stock market downturns in the earlier part of the sample up to 2001, we also see in the cross section of equity returns a more pronounced downward-sloping pattern resulting in a large duration premium. During the recent financial crisis, instead, low-duration stocks fell more than high-duration stocks, and we observe an upward-sloping term structure of equity returns and a negative duration premium. The two time series have a negative correlation of -29.17%, which increases in absolute value to -36.33% when the sample ends in June 2007.

There is substantial variation over time in the duration premium. Over longer periods, such as decades, there is a robustly positive downward-sloping term structure of equity returns. The downward slope was steepest during times of low market returns in the earlier part of the sample, but we observe an upward-sloping term structure during the onset of the recent financial crisis. The market return fell sharply, as did the duration premium.

3.4. ***Volatility-Managed Duration Portfolios***

Moreira and Muir [54] create volatility managed portfolios and show they earn large alphas across several leading asset pricing models. Specifically, they scale returns by lagged realized variance. The strategy takes on less risk when variance was high recently. They find large alphas when they regress the scaled factor on the original factor or several factors raising the bar for risk-based explanations. Their results indicate increases in Sharpe ratios relative to the original factor and an expansion of the mean-variance frontier. Moreira and Muir [54] only focus on scaled factors but did not study the cross-sectional implications of volatility management.

Table 6 reports mean returns and alphas relative to several factor models for volatility-managed duration portfolios.[11] We see that volatility managed duration portfolios imply a downward-sloping term structure of equity returns with a monthly return difference between high- and low-duration portfolios of 1.46% per month, which is even larger than the excess return for unscaled portfolios. When we correct for exposure to market risk, the long-short excess return increases to 1.58% per month.

Interestingly, controlling for the three Fama & French factors, the three-factor model augmented with momentum or the five Fama & French factors has no impact on the return spread at all. Excess

[11] I thank an anonymous referee for suggesting this analysis.

returns are 1.31%, 1.26%, and 1.25%, which stands in contrast to the unscaled duration portfolios in Table 3.

Moreira and Muir [54] show leading asset pricing models such as the habit formation model of Campbell and Cochrane [15], the long run risk model of Bansal and Yaron [9], and the intermediary-based asset pricing models such as He and Krishnamurthy [40] cannot explain the returns of volatility managed portfolios, further raising the bar for risk-based explanations to rationalize the downward-sloping term structure of equity returns.

3.5. ***Variation with Investor Sentiment***

The results so far show that exposure to traditional risk factors does not suffice to explain the lower returns of high-duration stocks compared to low-duration stocks. I now investigate a potential mispricing explanation for this finding. I present Fama & French three-factor adjusted monthly excess returns following periods of high and low investor sentiment. Stambaugh et al. [62] argue that anomalies should be stronger following periods of high investor sentiment if mispricing is at the root of the anomaly.[12] In periods of high investor sentiment, the views of investors about the prospects of many stocks could be overly optimistic, leading to temporal overpricing. This effect should be strongest for stocks that are hard to value. A positive return to the D1–D10 strategy should be larger after periods of overpricing and be mainly attributable to the short leg.[13]

The mean level of the sentiment index of Baker and Wurgler [7] determines periods of high and low investor sentiment. Following Stambaugh et al. [62], I define a high-sentiment month as one in which the sentiment index was above the mean value in the previous month.

Table 7 presents Fama & French-adjusted excess returns following periods of high and low investor sentiment in Panel A. The benchmark-adjusted excess returns conditional on high and low sentiment are the estimates of α_H and α_L in the following equation:

$$R_{i,t} = \alpha_{i,H} d_{H,t} + \alpha_{i,L} d_{L,t} + \beta_{Market} Market_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \epsilon_{i,t}, \tag{6}$$

[12] Stambaugh, Yu, and Yuan [63] show that investor sentiment and arbitrage asymmetry can also explain the idiosyncratic volatility puzzle (see Ang, Hodrick, Xing, and Zhang [5]).

[13] High-duration firms tend to be younger firms with negative payout ratios and returns on equity, but historically strong growth in sales, and are therefore potentially difficult to value (see Table 1).

where $d_{H,t}$ and $d_{L,t}$ are dummies indicating high- and low-investor-sentiment months.

A strong negative relationship exists between duration and Fama & French-adjusted excess returns in high-sentiment months: the D1–D10 strategy earns a highly statistically significant abnormal return of 1.32% per month. Looking at the numbers for the individual portfolios, we see almost 90% of this abnormal return is due to the large negative risk-adjusted return for the high-duration portfolio. The profitability of the D1–D10 strategy is reduced by a factor of 3 to 0.46% in low-sentiment months.

Comparing the results within portfolios across high- and low-sentiment months indicates high-duration stocks could be prone to overpricing in periods of high investor sentiment. High-duration stocks earn negative risk-adjusted returns after periods of high sentiment. No abnormal returns occur in either direction following periods of low sentiment for high-duration stocks.

Panel B of Table 7 measures the relationship of changes in the sentiment index and abnormal portfolio returns. I run separate time-series regressions for each of the 10 portfolios of Fama & French-adjusted returns on changes in the sentiment index. I find that low- and intermediate-duration portfolios show no significant relationship, whereas high-duration portfolios load strongly on changes in the sentiment index. This evidence lends further support to temporary overpricing of high-duration stocks.

3.6. ***Analyst Expectations: Earnings Forecasts***

Table 8 reports historical cash-flow fundamentals and analyst forecasts.[14] Panel A presents the evolution of the average portfolio long-term earnings growth (LTG) forecast from June of year t until June of year $t+4$. LTG is a forecast of the growth rate in earnings per share before extraordinary items over the next three to five years. LTG for year t increases monotonically in duration from 13% for low-duration stocks to about 26% for portfolio D10. This forecast remains fairly stable for low-duration stocks as we look at years $t+1$ until $t+4$. On the contrary, for high duration-stocks, LTG falls by 7% over the next four years.[15]

The drop in expected long-term growth of high-duration stocks could be due to overly optimistic

[14] Analysts mainly cover large companies, and therefore the following results might not be representative for the universe of CRPS/Compustat stocks considered so far. In untabulated results, I also find a downward-sloping term structure of equity returns for the subset of IBES firms.

[15] I report results for all firms with non-missing LTG forecasts for all periods. Results are unchanged if I look at all firms with non-missing forecasts at any point in time.

initial forecasts or mean reversion in earnings. To discriminate between these two explanations, I report realized five-year growth in earnings between years $t-6$ to $t-1$ and t to $t+5$ in Panel B. For the pre-portfolio-formation period, we see again a strong positive association between realized five-year growth in earnings and duration. Low-duration stocks grow on average by 7%, whereas high-duration stocks grow by 31%. This difference in growth rates disappears over the following five years; both high- and low-duration stocks grow at an annual rate of roughly 10% per annum. This finding hints at an extrapolation bias in analyst forecasts for the long-term growth prospects of high-duration firms and further indicates that market participants are overly optimistic in their perceptions of the prospects of high-duration stocks.

Panel C corroborates this finding looking at three different measures of standardized earnings surprises following Livnat and Mendenhall [48].[16] $SUE1$ uses a rolling seasonal random walk model for expected earnings, $SUE2$ excludes special items, and $SUE3$ uses IBES-reported analyst forecasts and actuals. Stocks with low cash flow duration have a positive median earnings surprise across all three measures. High-duration stocks, on the other hand, have negative or 0 median earnings surprises. Research in accounting associates earnings that just meet analyst forecasts with earnings management (see Skinner and Sloan [61] and Burgstahler and Eames [14]).

3.7. ***Analyst Expectations: Implied Return Forecasts***

Earnings forecasts and forecasts for long-term growth in earnings are central ingredients for my duration model in Section 2. My empirical analysis, however, focuses on returns of portfolios sorted on duration. A direct way to see whether errors in expectations might be at the core of the downward-sloping term structure of equity returns is to look at return expectations. I follow Asness et al. [6] and create implied expected returns using analyst target prices. Target prices are an analyst's forecast for the stock price one year into the future.

Panel A of Table 9 reports consensus price targets scaled by book value of equity and price targets scaled by the current price minus 1, that is, implied return forecasts. Similar to Asness et al. [6] for high-quality stocks, I find that analysts forecast higher future prices relative to book value for high-duration stocks. The results for target prices scaled by book value is consistent with the notion that high-duration

[16] See also Birru [12]. I thank Justin Birru for suggesting this test.

stocks warrant higher prices.

However, analysts' implied return forecasts do not vary with my measure of cash-flow duration. Analysts forecast an average expected return of 16% during my sample period for high- and low-duration stocks. The evidence for price target implied returns is inconsistent with the lower ex-post realized returns for high-duration stocks, similar to findings in Asness et al. [6].

Panels B and C study the variation of mean target price implied returns and Fama & French three-factor alphas of these implied returns with investor sentiment to see whether a systematic expectational error exists. Greenwood and Shleifer [37] find across six datasets that investors' return expectations are positively correlated with past returns and the level of the stock market, but negatively correlated with model-based expected returns inconsistent with rational expectations. We see both mean returns and three-factor alphas are upward-sloping after periods of high investor sentiment, but downward-sloping after periods of low investor sentiment. The results for analysts' return forecasts are in stark contrast to realized returns following periods of high investor sentiment (see Table 7). The evidence adds a cross-sectional dimension to the market-wide evidence of Greenwood and Shleifer [37] and shows that expectational errors vary with investor sentiment.

4. Short-Sale Constraints and the Term Structure of Equity Returns

The previous section illustrates that overpricing could be at the core of a downward-sloping term structure of equity returns. For overpricing to persist temporarily, however, rational arbitrageurs have to be restrained from taking sufficiently large short positions to correct the mispricing (see Miller [53]).

In this section, I investigate whether the low returns of high-duration stocks are concentrated among short-sale-constrained stocks as proxied by low institutional ownership. I first verbally describe the testable implications. I then motivate institutional ownership as a proxy for short-sale constraints, and analyze the interplay of duration and short-sale constraints. I close this section by briefly discussing the robustness of my results.

4.1. ***Hypotheses***

Hypothesis 1. *The positive abnormal return of going long low-duration stocks and short high-duration stocks (D1–D5 in the following) should be contained in portfolios with low institutional ownership.*

Hypothesis 1 is a direct implication of the Miller [53] theory. Divergence of opinion about the future prospects of difficult-to-value, high-duration stocks paired with short-sale constraints leads first to overpricing and then to low returns once the mispricing is corrected. If the downward-sloping term structure of equity returns is due to mispricing, the negative relationship between duration and returns should become weaker with less binding short-sale constraints.

Hypothesis 2. *High-duration portfolios should drive the differences in returns of the D1–D5 strategy across categories of institutional ownership.*

Hypothesis 2 follows from the fact that short-sale constraints allow for overpricing, but not for underpricing. If a specific stock is underpriced, sophisticated investors can take sufficiently large long positions independent of short-sale constraints. Furthermore, short-duration stocks pay off most of their cash flows in the near-term future, have high returns on equity and low growth in sales, and are therefore unlikely candidates for overpricing.

4.2. ***Institutional Ownership and Short-Sale Constraints***

Institutional and cultural considerations potentially restrict short-sale activities of institutional investors. Almazan, Brown, Carlson, and Chapman [3] report that charters restrict about 70% of mutual funds to pursue any short-selling activities, and only 2% actually do sell short. Restricted institutions also do not synthetically engineer short positions. Koski and Pontiff [43] report that only 21% of equity mutual funds make use of any derivative instruments. Therefore, the only possibility for institutions to express negative opinions about the outlook of specific stocks is to reduce existing long positions. Once institutions have sold their positions completely, they have to sit on the sidelines and their negative opinions are no longer reflected in market prices. A direct implication of these arguments is that arbitrage capital increases in institutional ownership.

Contrary to the centralized market for shorting NYSE stocks in the early 20$^{\text{th}}$ century, nowadays short sellers have to search for a stock lender in opaque shorting markets. A lower level of stock loan supply therefore implies tighter short-sale constraints due to higher search cost (see Duffie, Gârleanu, and Pedersen [30]). D'Avolio [25] shows that institutional ownership is the most important cross-sectional determinant of stock loan supply. He also reports that custody banks that engage in stock lending on behalf of their institutional clients are the most reliable stock lenders, whereas discount brokers are the least dependable.

Short sellers could also have a preference for borrowing stocks from institutional owners. Dechow, Hutton, Meulbroek, and Sloan [26] highlight that short squeezes, the recall of stock loans by lenders, are less likely for stocks with high institutional ownership. In addition, transaction and borrowing costs also decrease in institutional ownership.

These arguments indicate that short-sale constraints are tighter and the cost of shorting is higher for stocks with low institutional ownership.

Institutional ownership is of course an endogenous variable. Institutional ownership has increased substantially over my sample period which, ceteris paribus, should have increased the stock loan supply and lowered short-selling costs. ETFs and index funds drove a large part of the increase in institutional ownership in recent years. My cross-sectional prediction should continue to hold, however, as cash flow duration and index inclusion are almost orthogonal. These passive institutions also just replicate an index and are therefore not actively trading against potential mispricings of stocks.

Stock-lending fees are an alternative measure for short-sale constraints (see Drechsler and Drechsler [29]). Equity lending data are, however, not available before 2004, as opposed to data on institutional ownership, which start in 1980 and Markit makes available to researchers only indicative fee data rather than the actual fee data Drechsler and Drechsler [29] use.

4.3. ***Descriptive Statistics***

Table 1 illustrates that institutional ownership and size are strongly positively correlated. Many return anomalies are stronger within smaller stocks, potentially because of lower liquidity and higher transaction costs (Griffin and Lemmon [38] and Israel and Moskowitz [41]). I follow Nagel [55] to purify my proxy for short-sale constraints from confounding size effects, and sort on residual institutional ownership.[17] In each sorting year, I run a cross-sectional regression of logit-transformed institutional ownership on a constant, the natural logarithm of size, $\log(ME)$, as well as log size squared and use the

[17] Wang [67] and Stambaugh et al. [63], among many other papers, also use residual institutional ownership as a proxy for short-sale constraints.

residual, $RIOR_{it}$, of this regression as my sorting variable:

$$\log \frac{IOR_{it}}{1 - IOR_{it}} = \alpha + \beta_1 \log(ME) + \beta_2 (\log(ME))^2 + RIOR_{it}. \quad (7)$$

I replace institutional ownership ratios below 0.0001 and above 0.9999 with these threshold values. In addition, I also delete the 20% smallest stocks from my sample.[18]

Table A.2 provides time-series averages of annual cross-sectional means of firm characteristics for the 25 portfolios sorted on duration and residual institutional ownership. At the end of June each year t from 1981 to 2013, I sort all common stocks listed on NYSE, AMEX, and NASDAQ above the 20% size percentile into quintiles based on duration for all firms with fiscal years ending in calendar year $t-1$. I intersect these quintiles with an independent sort on residual institutional ownership as of December $t-1$. Using a six-month time lag for institutional ownership ensures that short-term outperformance of institutional trades does not drive my results (see Chen et al. [17]).

Panel A shows that low-duration stocks in portfolio D1 have on average a duration of about 11 years, whereas high-duration firms have an average duration of roughly 25 years. Duration within duration sorts, on the other hand, is constant across residual institutional ownership classes. Panel B captures the negative correlation between duration and book-to-market, and suggests that institutions tend to hold stocks with higher book-to-market ratios. Panel C verifies that institutional ownership is quite homogeneous within the residual institutional ownership category, but varies substantially with residual institutional ownership. According to Panels D and E, high-duration stocks have lower or even negative payout ratios and returns on equity, whereas no strong relationship with residual institutional ownership exists. Across portfolios of residual institutional ownership, high-duration stocks have higher sales growth and tend to be younger than low-duration stocks (Panels F and G). Sales growth and the number of years a firm has been on Compustat is fairly stable within portfolios of the same duration. As for size in Panel G, I find an inverse U-shaped relationship with residual institutional ownership similar to Nagel [55].

[18] Jones and Lamont [42] point out that controlling for confounding size effect can be crucial to disentangling the cost of short selling from size effects. Excluding the quintile of the smallest stocks also ensures my findings are not driven by the stock-picking skills of institutions. Lewellen [47] shows that institutions in the aggregate have little stock-picking skills, and institutional ownership has no predictive power for returns. For micro caps, however, he finds a quarterly abnormal return of 0.57%.

However, compared to the variation of size in the CRSP universe, the variation of size across sorts on residual ownership is negligible. The sorting on residual ownership is therefore successful in engineering variation in my short-sale-constraints proxy, independent of size.

Overall, the double sorting generates portfolios that are fairly similar across residual institutional ownership portfolios, whereas they exhibit large variation across duration categories. High-duration stocks tend to have characteristics that Baker and Wurgler [7] and Griffin and Lemmon [38] associate with speculative, hard-to-value stocks that are prone to divergence of opinion. Daniel et al. [22] draw on the insights from the psychology literature (see, e.g., Einhorn [31]) and argue mispricing should be stronger for stocks requiring more judgement in valuing them and for which feedback on this evaluation is ambiguous in the short run. They mention as an example stocks for which the bulk of cash flows is expected to be paid out far ahead in the future. In the next subsection, I test whether short-sale constraints keep smart money out of the market so that market prices temporarily reflect only the opinions of the most optimistic investors, leading first to overpricing and then to negative abnormal returns once this overpricing is corrected.

4.4. ***Effect of Short-Sale Constraints on the Term Structure of Equity Returns***

Table 10 reports monthly mean excess returns for the 25 portfolios. We see a pronounced downward-sloping term structure of equity returns for stocks with low residual institutional ownership, which are potentially the most short sale constrained. Low-duration stocks earn an excess return of 1.02% per month. The return decreases monotonically in duration. High-duration stocks earn an excess return of -0.30% per month. The spread in excess returns for the two extreme-duration portfolios is 1.32% per month and highly statistically significant.[19]

Focusing on the long-short portfolio in the last column, we see excess returns decrease monotonically in residual institutional ownership. For stocks that are potentially the least short-sale constrained, the long-short portfolio has a statistically insignificant excess return of 0.15% per month, confirming Hypothesis 1. The difference in returns across residual institutional ownership portfolios of more than

[19]The results in Table 10 do not directly map into the results of Table 2 as stocks have to be above the 20% size percentile and the sample starts in 1981 rather than 1963.

1% per month comes entirely from variation in returns for high-duration stocks. Excess returns increase from -0.30% to 0.94% from low to high residual institutional ownership, as predicted by Hypothesis 2. Low-duration stocks, on the other hand, exhibit no variation with the proxy of short-sale constraints. Institutional ownership only matters for stocks that are potentially prone to differences in opinion. A strategy going long the low-residual institutional ownership portfolio and short the high-residual institutional ownership portfolio (I1 - I5) earns an insignificant excess return of -0.08% for stocks with low cash flow duration. This spread decreases monotonically to a highly significant -1.24% per month for high-duration stocks. This finding is in line with the prediction of the Miller [53] theory. Differences in opinion paired with short-sale constraints lead to temporal overpricing. High-duration, short-sale constrained stocks earn low returns once the overpricing is corrected. The data do not back the alternative hypothesis that institutional ownership reflects smart money. Returns increase in residual institutional ownership only for stocks within the highest duration categories.[20]

Stocks with similar duration but different degrees of residual institutional ownership have similar fundamentals (see Table A.2). Therefore, it is unlikely that specific investment styles or superior analysis and information of institutions drive the heterogeneous effect of institutional ownership across duration categories. Nevertheless, I correct for the portfolios' exposure to risk in the following to rule out covariances with risk factors explain the pattern in excess returns presented in Table 10.[21]

Correcting for market exposure does not materially change any of the previous findings for excess returns. Table A.3 in the online appendix shows that the D1–D5 strategy earns a risk-adjusted excess return of 1.61% per month for stocks with low institutional ownership. This differential decreases to a statistically insignificant 0.40% for stocks that are potentially the least short sale constrained.

The CAPM has little explanatory power after 1963. Adjusting for exposure to the three Fama & French risk factors has no significant impact on pricing errors. We see in Table A.4 in the online appendix that the abnormal excess returns of the long-short portfolio decrease monotonically in institutional

[20] Another alternative is that short-sale constraints are also more binding for high-duration stocks. Diether, Lee, and Werner [28], however, show that short-selling activity is higher for growth stocks.

[21] Lewellen [47] shows that even though institutions as a whole have no stock-picking skills for large stocks, different types of institutions have modest ability compared to the CAPM. Controlling for book-to-market and momentum, however, subsumes this effect.

ownership, resulting in a spread across institutional ownership categories of 1.22% per month. This spread is even slightly larger than the spread in raw or CAPM-adjusted excess returns.[22] Adjusting as well for momentum reduces pricing errors for high-duration stocks, while having minor impacts for other categories. The D1–D5 abnormal return is reduced to a highly significant 0.94% per month within the class of low residual institutional ownership stocks. For the least short-sale-constrained stocks, this differential abnormal return is -0.10% per month and statistically indistinguishable from zero (see Table A.5 in the online appendix). Table A.6 in the online appendix reports five-factor alphas. The difference in alphas of the long-short portfolios between high- and low-duration stocks is again more than 1% per month and highly statistically significant.

Tables A.15 to A.19 report the factor loadings for the 25 portfolios. CAPM betas increase from about 1 for low-duration stocks to about 1.45 for high-duration stocks. This pattern is independent of institutional ownership. For the Fama & French three-factor model, high-duration stocks have higher exposure to market risk and load stronger on size (SMB), but show less common variation with value (HML). Again, factor loadings are remarkably similar across categories of residual institutional ownership. High-duration stocks also tend to load more negatively on momentum. The difference in exposure to market risk and size (SMB) for high- versus low-duration stocks vanishes for the five-factor model. High-duration stocks tend to load more negatively on value (HML), profitability (RMW), and investment (CWA).

My results are consistent with a mispricing explanation for the negative cross-sectional relationship between cash flow duration and stock returns in the cross section: the interplay between short-sale constraints and differences in opinion is what seems responsible for a large part of the empirical regularity that high-duration stocks earn lower returns compared to low-duration stocks. Exposure to untested risk factors might, however, explain the cross section of stocks sorted on cash flow duration. Independent of my findings, the puzzle of van Binsbergen et al. [64] and van Binsbergen et al. [65] remains: Why do very short-term assets have such a high risk premium?

[22] Nevertheless, differences in mean excess returns compared to differences in factor loadings largely drive the effect.

4.5. Robustness

I perform several robustness checks to corroborate my previous results and distinguish them from findings in the literature. Table 11 contains Fama-French-adjusted pricing errors conditional on size. I first sort all stocks into two bins based on market capitalization. Within each size bin, I then sort firms into tertiles based on duration, which I then intersect with an independent sort on residual institutional ownership. Panel I reports Fama-French alphas for small stocks, whereas Panel II contains alphas for large stocks. For both small and large stocks, we see a pronounced downward-sloping term structure of equity returns for the lowest residual institutional ownership portfolios. The differential in abnormal returns between high- and low-duration stocks is 1.45% per month for small stocks and 0.72% for large stocks. This differential abnormal return again decreases in residual institutional ownership, leaving a highly significant spread of 1.52% between high- and low-residual institutional ownership categories for small stocks and 0.52% for large stocks.

Table 12 reports results for a similar exercise with book-to-market as a conditioning variable. The previous findings hold both for growth stocks in Panel I and value stocks in Panel II. A negative relation between duration and returns only exists for the most constrained portfolios.

The online appendix also contains all portfolio returns for value-weighted portfolio returns. Results are similar to the equally weighted returns discussed in the main body of the paper.

5. Conclusion

I construct a measure of cash flow duration at the firm level using financial statement data. Portfolios of stocks sorted into deciles based on the measure of cash flow duration exhibit a spread in returns between low- and high-duration stocks of more than 1% per month. Low-duration stocks have a monthly mean excess return of 1.45%, whereas high-duration stocks earn 0.32% per month. Exposure to classical risk factors cannot explain this pattern in returns. A portfolio long low-duration stocks and short high-duration stocks earns a statistically significant five-factor alpha of 0.48% per month. The return of this arbitrage portfolio varies substantially with investor sentiment. It is three times higher after periods of high investor sentiment.

The variation in the return differential with investor sentiment indicates that mispricing could explain the downward-sloping term structure of equity returns. I study the earnings expectations of market participants and find that (a) analysts have overly optimistic growth forecasts in fundamentals for high-duration stocks, which they adjust downwards over time; (b) analysts extrapolate from past earnings growth into the future; and (c) high-duration stocks have negative earnings surprises and seem to engage in earnings management.

Earnings expectations are central ingredients for my proxy of cash flow duration, but my empirical analysis focuses on returns of portfolios sorted on duration. I follow Asness et al. [6] and study analysts' price targets and show that (a) analysts assign higher prices to high-duration stocks and (b) target-price-implied returns do not vary with cash flow duration, but (c) analysts' forecasts for expected returns are upward sloping after periods of high investor sentiment and downward sloping after periods of low investor sentiment, in sharp contrast to ex-post realized returns. The evidence adds a cross-sectional dimension to the market-wide evidence of Greenwood and Shleifer [37] and shows that expectational errors vary with investor sentiment and could explain parts of the downward-sloping term structure of equity returns.

Mispricing can only persist in the presence of limits to arbitrage. I provide evidence that the interplay between differences of opinion and short-sale constraints drives my results. Within short-sale-constrained stocks, I find a statistically and economically large spread in excess returns between high- and low-duration stocks of more than 1.32% per month. On the contrary, no difference in returns occurs across duration categories for unconstrained stocks, consistent with models of rare disaster (Barro [10] and Gabaix [35]).

In line with my proposed explanation for the empirical facts, returns do not vary with short-sale constraints for short-duration stocks. Any variation in returns is driven by high-duration portfolios, which exhibit a spread in excess returns across categories of short-sale constraints of more than 1% per month without differing in firm characteristics or exposure to risk factors.

Although correcting for standard risk factors has no impact on any of these conclusions, exposure to other risk factors might still explain the negative relation between cash flow duration and returns. Variation in the quantity or price of risk is observationally equivalent to variation in investor sentiment.

My findings complement and extend evidence in van Binsbergen et al. [64] and van Binsbergen, Hueskes, Koijen, and Vrugt [65]. These papers use clean measures of duration, but the dividend strips and futures data they use limit their analysis to a short sample and assets with duration of only up to 10 years. Using information in the cross section of stock returns, I am able to study a large time series and assets with duration of more than 25 years.

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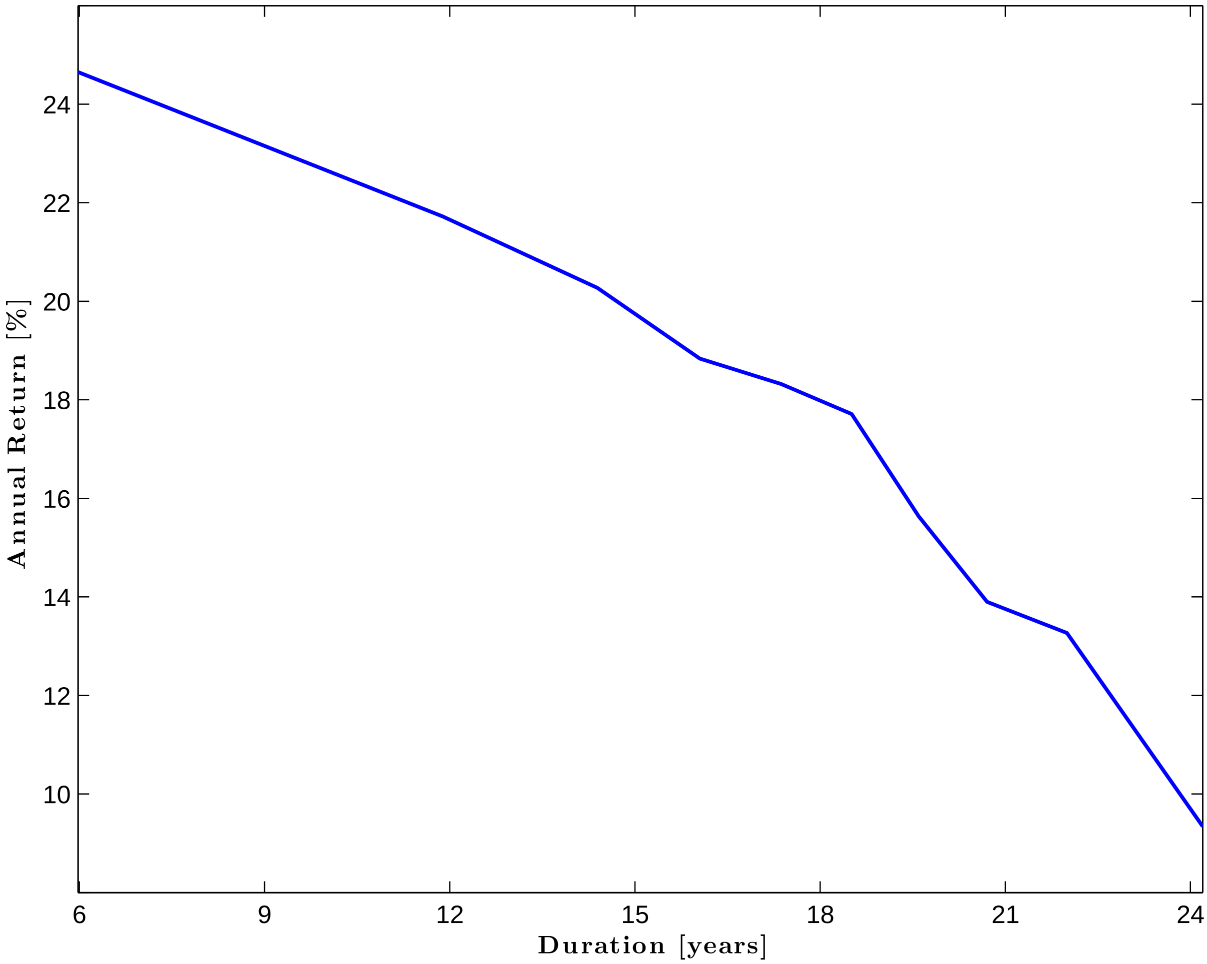
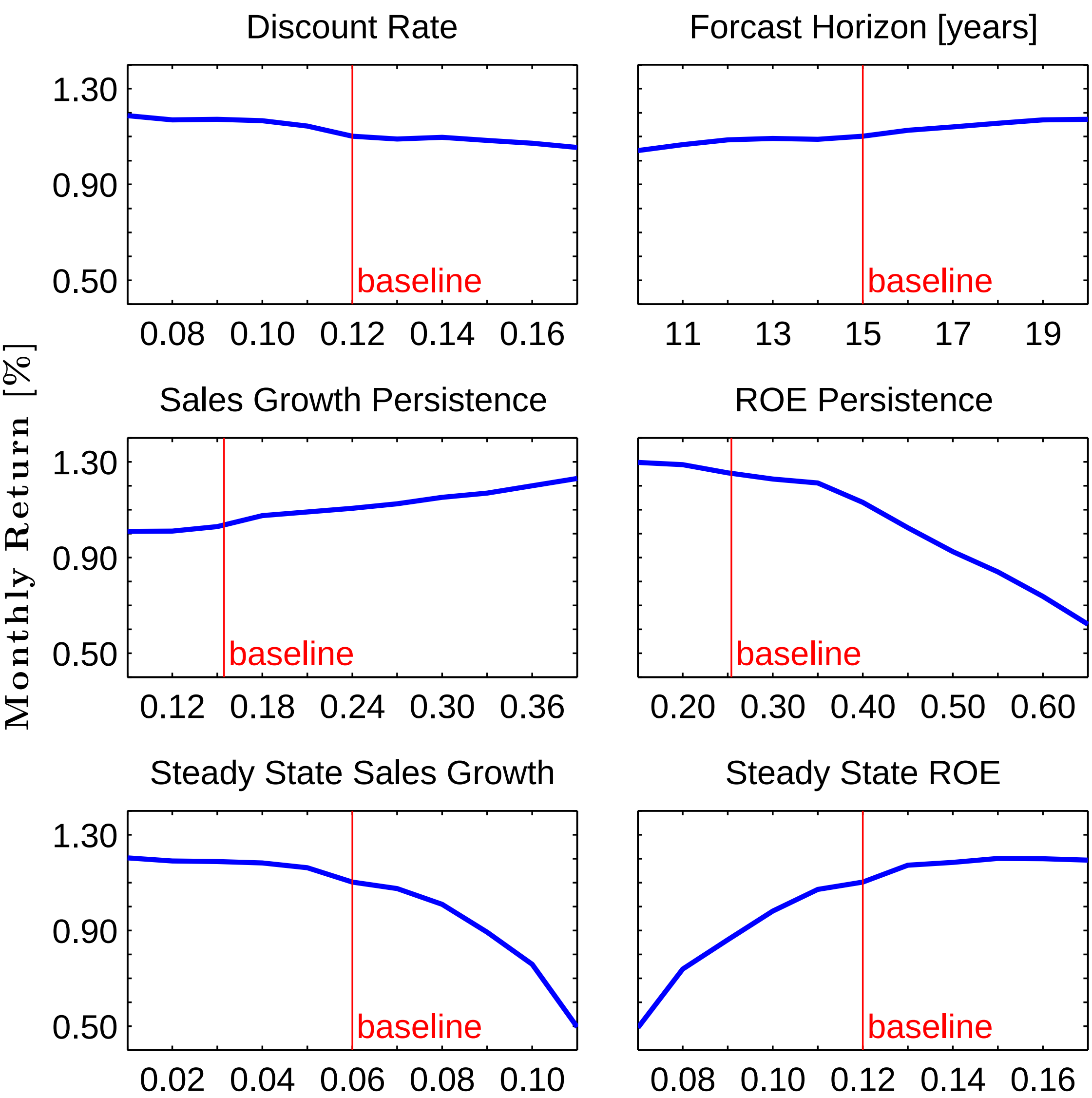
Figure 1: **Average Term Structure of Equity**



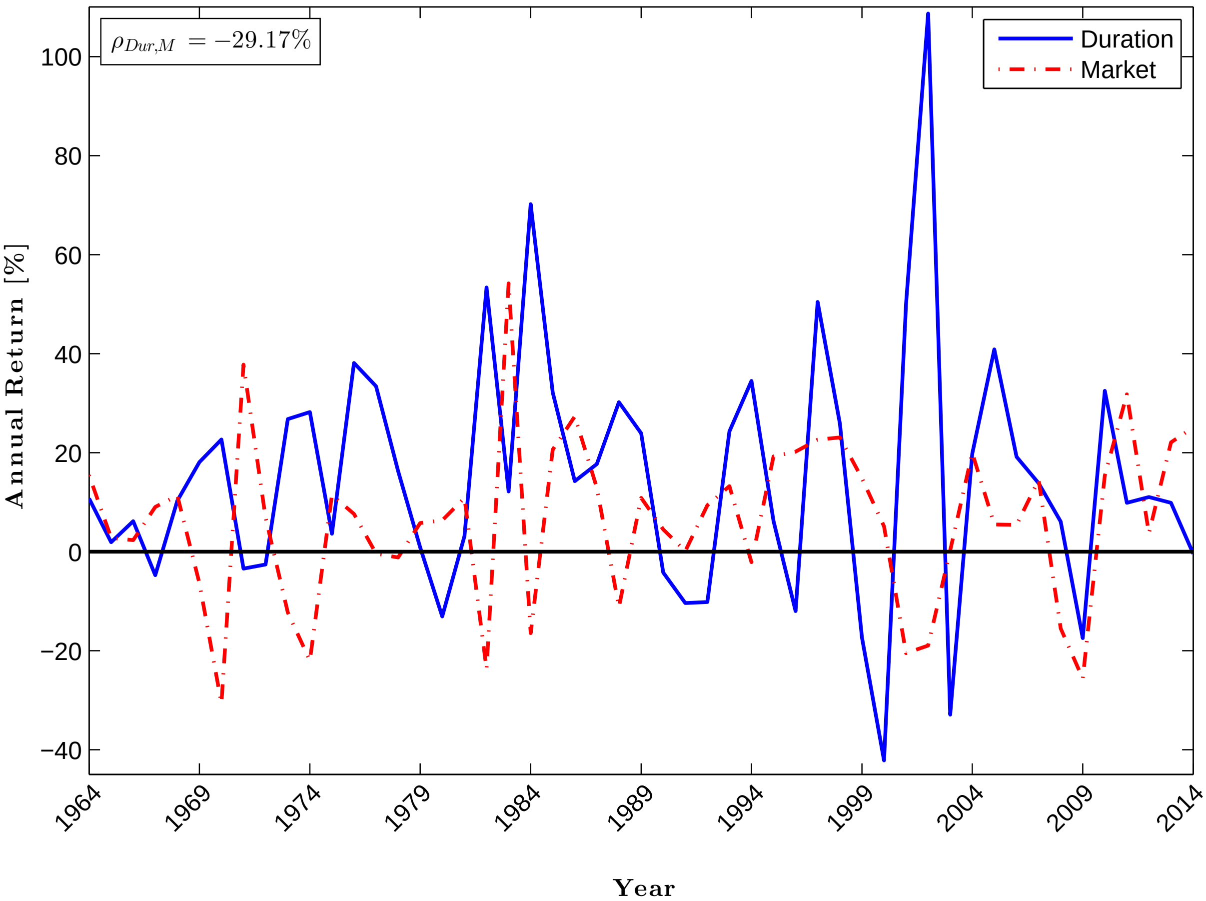
This figure plots the time series average annual portfolio return as a function of the average median portfolio cash flow duration. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

Figure 2: **Sensitivity Analysis**



This figure plots monthly long-short excess returns for variations in the parameter values I use to construct cash flow duration at the firm level (see equation (2)). I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

Figure 3: **Time Series of Returns**



This figure plots annual long-short excess returns based on 10 cash flow duration sorted portfolios (blue line) and the market excess return (red dash-dotted line). I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

Table 1: **Summary Statistics and Correlations for Firm Characteristics and Return Predictors**

This table reports time series averages of annual cross-sectional means and standard deviations for firm characteristics and return predictors in Panel A and contemporaneous correlations of these variables in Panel B. Dur is cash-flow duration; BM is the book-to-market ratio; IOR is the fraction of shares institutions hold; PR is net payout over net income; ROE is return on equity; Sales_g is sales growth; ME is the market capitalization in millions; and Age is the number of years a firm has been on Compustat. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. The sample period is June 1981 to June 2014. I only use stocks above the 20^{th} size percentile.

	Dur	BM	IOR	PR	ROE	Sales_g	ME	Age
	Panel A. Means and Standard Deviations							
Mean	18.77	0.67	0.44	-0.01	0.05	0.22	2125	17.59
Std	5.37	0.53	0.23	2.10	0.54	0.59	6197	11.46
	Panel B. Contemporaneous Correlations							
Dur		-0.70	-0.08	-0.10	-0.39	0.34	0.04	-0.19
B/M			-0.01	0.08	-0.04	-0.16	-0.11	0.11
IOR				0.06	0.18	-0.10	0.22	0.26
PR					-0.05	-0.24	0.08	0.20
ROE						-0.02	0.10	0.09
Sale_g							-0.04	-0.20
ME								0.30

Table 2: **Mean Excess Returns of 10 Portfolios sorted on Duration**

Panel A reports monthly mean excess returns, time series factor loadings (β), and pricing errors (α) for the CAPM for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses in Panel A. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. Panel B reports monthly Sharpe Ratios, Panel C reports results for value-weighted portfolio returns, and Panel D for equally-weighted portfolio returns without including delisting returns.

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
	Panel A. Mean-Excess Returns and CAPM										
Mean	1.43	1.24	1.14	1.04	1.00	0.97	0.81	0.68	0.62	0.32	1.10
SE	(0.25)	(0.24)	(0.24)	(0.23)	(0.24)	(0.24)	(0.25)	(0.26)	(0.30)	(0.35)	(0.20)
β_{CAPM}	1.05	1.06	1.08	1.10	1.13	1.15	1.19	1.26	1.39	1.41	-0.36
SE	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.05)	(0.04)
α_{CAPM}	0.90	0.71	0.60	0.49	0.43	0.39	0.21	0.05	-0.08	-0.39	1.29
SE	(0.17)	(0.14)	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)	(0.13)	(0.17)	(0.24)	(0.19)
	Panel B. Monthly Sharpe Ratios										
Sharpe Ratio	0.23	0.21	0.20	0.18	0.17	0.16	0.13	0.11	0.08	0.04	0.22
	Panel C. Value-weighted Returns										
Mean	1.04	0.87	0.88	0.83	0.74	0.62	0.55	0.55	0.43	-0.04	1.08
SE	(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.19)	(0.22)	(0.31)	(0.24)
	Panel D. No Delisting Returns										
Mean	1.49	1.27	1.17	1.07	1.02	0.98	0.83	0.70	0.67	0.47	1.03
SE	(0.25)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.30)	(0.35)	(0.20)

Table 3: **Fama & French Factor Alphas of 10 Portfolios sorted on Duration**

This table reports pricing errors (α) for the Fama & French three-factor model ($\alpha_{F\&F3}$), the three-factor model augmented with momentum ($\alpha_{F\&F4}$), and the Fama & French five-factor model ($\alpha_{F\&F5}$) for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
$\alpha_{F\&F3}$	0.46	0.34	0.26	0.18	0.17	0.15	0.03	-0.03	-0.08	-0.38	0.84
SE	(0.10)	(0.08)	(0.07)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.11)	(0.19)	(0.15)
$\alpha_{F\&F4}$	0.60	0.48	0.38	0.31	0.30	0.32	0.20	0.16	0.18	-0.07	0.66
SE	(0.10)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.10)	(0.18)	(0.15)
$\alpha_{F\&F5}$	0.49	0.35	0.26	0.17	0.17	0.16	0.07	0.07	0.14	0.01	0.48
SE	(0.10)	(0.08)	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.10)	(0.17)	(0.14)

Table 4: **Mean Excess Returns of 10 Portfolios sorted on Duration (robustness)**

This table reports monthly mean excess returns with OLS standard errors in parentheses for variations of the parameter values used to calculate duration in Section 2. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

		Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
(1)	$r = 0.10$	1.45	1.23	1.13	1.06	1.00	0.95	0.81	0.68	0.66	0.28	1.17
		(0.25)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.30)	(0.35)	(0.20)
(2)	$r = 0.14$	1.42	1.24	1.13	1.03	1.04	0.94	0.84	0.64	0.65	0.33	1.10
		(0.25)	(0.24)	(0.23)	(0.24)	(0.23)	(0.24)	(0.24)	(0.26)	(0.31)	(0.35)	(0.20)
(3)	$ar_{roe} = 0.30$	1.48	1.21	1.13	1.12	0.98	0.97	0.80	0.73	0.56	0.25	1.23
		(0.26)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.29)	(0.35)	(0.20)
(4)	$ar_{roe} = 0.50$	1.34	1.30	1.10	1.06	0.97	0.95	0.82	0.65	0.66	0.42	0.93
		(0.25)	(0.23)	(0.23)	(0.24)	(0.23)	(0.24)	(0.25)	(0.26)	(0.31)	(0.36)	(0.20)
(6)	$roe_{ss} = 0.10$	1.40	1.27	1.12	1.04	1.01	0.96	0.81	0.67	0.61	0.36	1.04
		(0.25)	(0.24)	(0.23)	(0.24)	(0.23)	(0.24)	(0.25)	(0.26)	(0.31)	(0.35)	(0.20)
(5)	$roe_{ss} = 0.14$	1.45	1.24	1.11	1.08	0.99	0.95	0.82	0.70	0.65	0.26	1.18
		(0.25)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.29)	(0.35)	(0.20)
(9)	$ar_{sg} = 0.20$	1.42	1.25	1.14	1.02	1.01	0.95	0.80	0.70	0.63	0.33	1.09
		(0.25)	(0.24)	(0.24)	(0.23)	(0.24)	(0.24)	(0.25)	(0.26)	(0.30)	(0.35)	(0.20)
(10)	$ar_{sg} = 0.30$	1.45	1.22	1.13	1.07	1.03	0.97	0.81	0.67	0.59	0.30	1.15
		(0.25)	(0.24)	(0.23)	(0.23)	(0.24)	(0.24)	(0.25)	(0.26)	(0.30)	(0.35)	(0.20)
(7)	$sg_{ss} = 0.08$	1.44	1.23	1.13	1.07	0.98	0.96	0.81	0.71	0.64	0.26	1.18
		(0.25)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.29)	(0.35)	(0.20)
(8)	$sg_{ss} = 0.04$	1.40	1.25	1.15	1.04	0.97	0.96	0.82	0.67	0.62	0.39	1.01
		(0.25)	(0.24)	(0.23)	(0.24)	(0.23)	(0.24)	(0.25)	(0.26)	(0.31)	(0.35)	(0.20)
(11)	$horizon = 10$	1.39	1.26	1.12	1.07	0.96	0.94	0.83	0.67	0.60	0.41	0.98
		(0.25)	(0.24)	(0.23)	(0.24)	(0.23)	(0.24)	(0.24)	(0.27)	(0.31)	(0.35)	(0.20)
(12)	pre-estimation	1.36	1.18	1.05	0.98	0.96	0.90	0.74	0.61	0.59	0.14	1.21
		(0.31)	(0.29)	(0.29)	(0.29)	(0.29)	(0.30)	(0.30)	(0.33)	(0.40)	(0.49)	(0.29)

Table 5: **Mean Excess Returns of 10 Portfolios sorted on Duration (subsamples)**

This table reports monthly mean excess returns with OLS standard errors in parentheses for different subsamples. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
Panel A. July 1963 – June 1973											
Mean	0.91	0.82	0.73	0.73	0.51	0.43	0.29	0.15	0.12	0.23	0.69
SE	(0.53)	(0.51)	(0.51)	(0.52)	(0.50)	(0.51)	(0.52)	(0.53)	(0.56)	(0.57)	(0.25)
Panel B. July 1973 – June 1983											
Mean	2.17	1.87	1.78	1.66	1.63	1.70	1.54	1.40	1.35	0.83	1.34
SE	(0.67)	(0.63)	(0.61)	(0.61)	(0.61)	(0.63)	(0.64)	(0.66)	(0.69)	(0.74)	(0.39)
Panel C. July 1983 – June 1993											
Mean	0.96	0.79	0.66	0.49	0.58	0.44	0.18	0.06	-0.11	-0.41	1.37
SE	(0.46)	(0.45)	(0.47)	(0.48)	(0.49)	(0.50)	(0.50)	(0.51)	(0.57)	(0.68)	(0.35)
Panel D. July 1993 – June 2003											
Mean	1.38	1.27	1.15	0.98	1.08	0.98	0.90	0.83	0.74	0.28	1.10
SE	(0.49)	(0.48)	(0.50)	(0.47)	(0.52)	(0.53)	(0.58)	(0.68)	(0.91)	(1.12)	(0.76)
Panel E. July 2003 – June 2014											
Mean	1.68	1.44	1.37	1.33	1.19	1.26	1.09	0.94	0.95	0.64	1.04
SE	(0.61)	(0.56)	(0.53)	(0.52)	(0.50)	(0.50)	(0.50)	(0.50)	(0.56)	(0.69)	(0.34)

Table 6: **Mean Returns and Alphas of 10 Portfolios sorted on Duration: Volatility-managed Portfolios**

This table reports mean returns and pricing errors (α) for the CAPM (α_{CAPM}), the Fama & French three-factor model ($\alpha_{F\&F3}$), the three-factor model augmented with momentum ($\alpha_{F\&F4}$), and the Fama & French five-factor model ($\alpha_{F\&F5}$) for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. Portfolio returns are scaled by the previous months realized variance as in Moreira and Muir [54]. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
Mean	1.99	1.68	1.60	1.50	1.53	1.44	1.28	1.13	1.15	0.99	1.46
SE	(0.25)	(0.24)	(0.24)	(0.23)	(0.24)	(0.24)	(0.25)	(0.26)	(0.30)	(0.35)	(0.20)
α_{CAPM}	1.58	1.29	1.20	1.12	1.11	1.02	0.87	0.67	0.65	0.44	1.58
SE	(0.20)	(0.19)	(0.19)	(0.19)	(0.18)	(0.19)	(0.20)	(0.20)	(0.24)	(0.29)	(0.20)
$\alpha_{F\&F3}$	1.36	1.12	1.02	0.98	0.99	0.90	0.76	0.61	0.55	0.34	1.31
SE	(0.19)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.19)	(0.19)	(0.23)	(0.27)	(0.19)
$\alpha_{F\&F4}$	1.26	1.03	0.92	0.87	0.85	0.79	0.62	0.46	0.40	0.19	1.26
SE	(0.19)	(0.19)	(0.18)	(0.19)	(0.18)	(0.18)	(0.19)	(0.19)	(0.23)	(0.27)	(0.19)
$\alpha_{F\&F5}$	1.20	0.95	0.87	0.84	0.85	0.76	0.61	0.44	0.37	0.20	1.25
SE	(0.19)	(0.19)	(0.18)	(0.19)	(0.18)	(0.18)	(0.19)	(0.19)	(0.23)	(0.28)	(0.19)

Table 7: **Fama & French Alphas of 10 Portfolios sorted on Duration Conditional on Investor Sentiment**

This table reports benchmark-adjusted mean excess returns following periods of high and low investor sentiment in Panel A, as well as sentiment betas in Panel B for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. I define high and low sentiment periods by the mean level of the sentiment index of Baker and Wurgler [7]. Sentiment betas are the time series factor loadings of the benchmark-adjusted mean excess returns on a constant and changes in the sentiment index. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I use the Fama & French three-factor model as benchmark. The sample period is July 1965 to December 2010 due to the availability of the sentiment index.

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
					Panel A. Sentiment Alphas						
$\alpha_{HighSent}$	0.17	0.20	0.20	0.10	0.11	0.05	-0.11	-0.20	-0.41	-1.15	1.32
	(0.15)	(0.12)	(0.10)	(0.10)	(0.09)	(0.10)	(0.10)	(0.11)	(0.17)	(0.29)	(0.24)
$\alpha_{LowSent}$	0.77	0.49	0.34	0.25	0.21	0.23	0.15	0.12	0.19	0.31	0.46
	(0.15)	(0.12)	(0.10)	(0.09)	(0.09)	(0.10)	(0.10)	(0.11)	(0.16)	(0.28)	(0.23)
					Panel B. Sentiment Betas						
β_{Sent}	0.24	0.18	0.05	0.02	0.02	0.02	0.09	0.19	0.37	0.62	-0.38
	(0.10)	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.11)	(0.20)	(0.16)

Table 8: **Earnings Growth of 10 Portfolios sorted on Duration**

This table reports time series averages of long-term earnings growth (LTG) forecasts in Panel A, mean realized five-year growth in earnings per share (EG) in Panel B, and standardized earnings surprising (SUE) following Livnat and Mendenhall [48] in Panel C for ten portfolios sorted on duration. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1982 to 2006 into deciles based on duration for all firms with fiscal years ending in year t-1. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. The realized earnings, earnings forecast, and earnings estimates data come from the Institutional Brokers' Estimate System (I/B/E/S) for the June statistical periods. The sample period is June 1982 to June 2009 due to the availability of the I/B/E/S data.

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
				Panel A. Long Term Earnings Growth Forecasts							
LTG_t	13.08	13.53	14.30	15.12	15.34	16.29	16.92	18.22	20.15	25.73	−12.65
LTG_{t+1}	12.96	13.41	14.07	14.61	15.01	15.67	16.30	17.29	18.98	23.44	−10.48
LTG_{t+2}	12.92	13.34	13.95	14.34	14.54	15.26	15.84	16.55	17.87	21.50	−8.58
LTG_{t+3}	12.83	13.11	13.72	14.03	14.18	14.87	15.30	15.77	17.08	19.96	−7.13
LTG_{t+4}	12.92	12.75	13.37	13.68	13.82	14.33	14.82	15.19	16.31	18.75	−5.83
				Panel B. Realized 5 Year Growth in Earnings							
$EG_{t-6:t-1}$	6.95	7.91	10.47	10.53	13.14	16.15	16.81	20.43	23.50	30.56	−23.60
$EG_{t:t+5}$	10.11	7.37	9.00	8.46	8.74	9.74	8.71	9.17	9.93	10.85	−0.74
				Panel C. Standardized Earnings Surprises							
$SUE1_t$	0.23%	0.18%	0.21%	0.26%	0.28%	0.24%	0.15%	0.03%	−0.11%	−0.47%	0.70%
$SUE2_t$	0.18%	0.15%	0.19%	0.26%	0.28%	0.21%	0.14%	0.02%	−0.11%	−0.46%	0.64%
$SUE3_t$	0.0380%	0.0220%	0.0300%	0.0180%	0.0280%	0.0200%	0.0290%	0.0140%	0.0000%	0.0000%	0.0380%

Table 9: **Price Targets of 5 Portfolios sorted on Duration**

This table reports time series averages of analysts twelve-months ahead price target scaled by the book value of equity (PTB) and by the market price minus 1 (PTB) in Panel A, mean price-target implied expected excess returns following periods of high and low investor sentiment Panel B, and benchmark-adjusted mean price-target implied expected excess returns following periods of high and low investor sentiment Panel C for five portfolios sorted on duration. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1982 to 2006 into deciles based on duration for all firms with fiscal years ending in year t-1. I define high and low sentiment periods by the mean level of the sentiment index of Baker and Wurgler [7]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. The realized earnings, earnings forecast, and earnings estimates data come from the Institutional Brokers' Estimate System (I/B/E/S) for the June statistical periods. I use the Fama & French three-factor model as benchmark. The sample period is July 2001 to June 2014 due to the availability of the target price data in Panel A and July 2001 to December 2010 due to the availability of the sentiment index.

	Low Dur	D2	D3	D4	D5	D1–D5
	Panel A. Scaled Price Targets					
PTB	1.78	2.75	3.18	3.86	8.11	-6.33
PTP	16.83	15.83	14.92	14.66	16.85	-0.03
	Panel B. Sentiment Means					
$mean_{HighSent}$	16.73	17.32	17.21	17.95	22.13	-5.41
	(1.15)	(0.97)	(0.95)	(0.91)	(1.04)	(0.76)
$mean_{LowSent}$	17.88	15.45	14.87	14.09	15.43	2.44
	(1.01)	(0.85)	(0.83)	(0.80)	(0.91)	(0.67)
	Panel C. Sentiment Alphas					
$\alpha_{HighSent}$	16.49	16.94	16.82	17.49	21.61	-5.12
	(1.09)	(0.87)	(0.87)	(0.83)	(0.98)	(0.74)
$\alpha_{LowSent}$	18.81	16.53	15.84	15.05	16.32	2.48
	(0.96)	(0.77)	(0.77)	(0.73)	(0.87)	(0.66)

Table 10: **Mean Excess Returns of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports monthly mean excess returns for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
Mean	Low RIOR	1.02	0.84	0.75	0.47	-0.30	1.32
		(0.29)	(0.29)	(0.29)	(0.33)	(0.45)	(0.27)
	RIOR2	1.08	0.96	0.85	0.73	0.25	0.83
		(0.29)	(0.28)	(0.28)	(0.29)	(0.42)	(0.24)
	RIOR3	1.09	0.97	0.95	0.78	0.47	0.62
		(0.29)	(0.28)	(0.28)	(0.31)	(0.42)	(0.26)
	RIOR4	1.04	1.02	0.91	0.64	0.52	0.52
		(0.28)	(0.29)	(0.30)	(0.33)	(0.43)	(0.27)
	High RIOR	1.09	1.01	0.93	0.76	0.94	0.15
		(0.31)	(0.31)	(0.31)	(0.33)	(0.42)	(0.26)
	RIOR1 – RIOR5	-0.08	-0.17	-0.18	-0.29	-1.24	1.17
		(0.13)	(0.13)	(0.12)	(0.13)	(0.22)	(0.23)

Table 11: **Fama - French Alphas of 9 Portfolios sorted on Duration and Residual Institutional Ownership (conditional on size)**

This table reports pricing errors (α) for the Fama & French three-factor model for nine portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses, separately for small stocks in Panel I and large stocks in Panel II. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into two baskets based on size, and within each bin I sort stocks into tertiles based on duration for all firms with fiscal years ending in year t-1. I intersect these tertiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	High Dur	D1–D3	Low Dur	D2	High Dur	D1–D3
		Panel I. Small Stocks				**Panel II. Large Stocks**			
$\alpha_{F\&F}$	Low RIOR	0.98	0.30	-0.47	1.45	0.14	0.04	-0.58	0.72
		(0.21)	(0.20)	(0.30)	(0.23)	(0.08)	(0.08)	(0.13)	(0.13)
	RIOR2	0.59	0.31	0.15	0.44	-0.06	0.03	-0.08	0.02
		(0.15)	(0.14)	(0.27)	(0.20)	(0.09)	(0.08)	(0.11)	(0.11)
	High RIOR	0.58	0.44	0.65	-0.07	-0.02	0.04	-0.22	0.20
		(0.16)	(0.15)	(0.31)	(0.25)	(0.10)	(0.10)	(0.12)	(0.13)
	RIOR1–RIOR3	0.40	-0.13	-1.13	1.52	0.16	0.00	-0.36	0.52
		(0.17)	(0.15)	(0.22)	(0.27)	(0.09)	(0.08)	(0.14)	(0.14)

Table 12: **Fama - French Alphas of 9 Portfolios sorted on Duration and Residual Institutional Ownership (conditional on book-to-market)**

This table reports pricing errors (α) for the Fama & French three-factor model for nine portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses, separately for growth stocks in Panel I and value stocks in Panel II. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into two baskets based on book-to-market, and within each bin I sort stocks into tertiles based on duration for all firms with fiscal years ending in year t-1. I intersect these tertiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	High Dur	D1–D3	Low Dur	D2	High Dur	D1–D3
		Panel I. Growth Stocks				**Panel II. Value Stocks**			
$\alpha_{F\&F}$	Low RIOR	0.06	-0.08	-0.90	0.95	0.81	0.40	0.19	0.63
		(0.14)	(0.14)	(0.26)	(0.21)	(0.17)	(0.11)	(0.20)	(0.17)
	RIOR	0.15	0.06	-0.33	0.47	0.36	0.24	0.29	0.07
		(0.08)	(0.08)	(0.22)	(0.22)	(0.12)	(0.09)	(0.15)	(0.12)
	High RIOR	0.08	-0.10	0.15	-0.07	0.53	0.18	0.38	0.14
		(0.09)	(0.09)	(0.21)	(0.22)	(0.16)	(0.12)	(0.18)	(0.15)
	RIOR1–RIOR3	-0.02	0.02	-1.05	1.03	0.29	0.22	-0.20	0.48
		(0.14)	(0.13)	(0.19)	(0.19)	(0.14)	(0.10)	(0.14)	(0.18)

Online Appendix:

Cash Flow Duration and the Term Structure of Equity Returns

Michael Weber

Not for Publication

Table A.1: **Firm Names**

This table reports five exemplary firm names for companies in the low- and high-duration portfolio in 1996 and 2004.

Panel I. 1996		**Panel II. 2004**	
Low Duration	High Duration	Low Duration	High Duration
Adolph Coors	EA Industries	Adolph Coors	Enzo Biochem
Continental	Peoplesoft	Continental	Adobe Systems
Chesapeake	America Online	Chesapeake	Neurocrine Bioscs
United Industrial	Symantec	General Motors	Penwest Pharma
Amcast Industrial	McAfee	SCS Transportation	Martek Bioscs

Table A.2: **Summary Statistics of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports time series averages of annual cross sectional means for firm characteristics and return predictors used in the subsequent analysis for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR). I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersected these quintiles with an independent sort on residual institutional ownership as of December t-1. Dur is cash flow duration; BM is the book-to-market ratio; IOR is the fraction of shares institutions hold; RIOR is the residual in a cross sectional regression of IOR on size; PR is net payout over net income; ROE is return on equity; Sales_g is sales growth; ME is the market capitalization in millions; and Age is number of years a firm has been on Compustat. I obtain institutional ownership information from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20th size percentile.

	Duration					Duration				
	Low	D2	D3	D4	High	Low	D2	D3	D4	High
	Panel A. Dur					**Panel B. BM**				
Low RIOR	10.87	17.23	19.41	21.20	25.04	1.21	0.74	0.53	0.35	0.24
RIOR 2	11.70	17.19	19.38	21.18	24.61	1.21	0.75	0.53	0.35	0.27
RIOR 3	11.79	17.19	19.37	21.15	24.67	1.25	0.77	0.54	0.36	0.30
RIOR 4	11.48	17.14	19.38	21.13	24.47	1.34	0.80	0.57	0.41	0.33
High RIOR	11.18	17.10	19.36	21.13	24.53	1.47	0.87	0.63	0.45	0.40
	Panel C. IOR					**Panel D. PR**				
Low RIOR	0.21	0.24	0.26	0.25	0.15	0.08	0.10	0.14	-0.14	-1.04
RIOR 2	0.37	0.41	0.44	0.45	0.34	0.29	0.30	0.19	0.00	-0.51
RIOR 3	0.42	0.48	0.52	0.53	0.42	0.25	0.21	0.08	-0.09	-0.75
RIOR 4	0.45	0.52	0.55	0.57	0.48	0.32	0.15	-0.02	-0.25	-0.74
High RIOR	0.55	0.60	0.63	0.64	0.59	0.27	0.06	-0.25	-0.48	-1.12
	Panel E. ROE					**Panel F. Sales_g**				
Low RIOR	0.42	0.16	0.16	0.17	-0.49	0.12	0.11	0.14	0.20	0.73
RIOR 2	0.27	0.14	0.15	0.18	-0.31	0.06	0.09	0.13	0.20	0.59
RIOR 3	0.20	0.12	0.14	0.16	-0.31	0.05	0.09	0.14	0.20	0.58
RIOR 4	0.16	0.10	0.12	0.13	-0.31	0.04	0.09	0.14	0.21	0.56
High RIOR	0.12	0.09	0.11	0.12	-0.35	0.03	0.09	0.14	0.22	0.51
	Panel G. AGE					**Panel H. ME**				
Low RIOR	17.10	19.14	18.99	17.12	10.99	1639	1905	2588	2834	1224
RIOR 2	21.34	22.69	22.34	19.92	12.72	2304	2854	3791	4953	2451
RIOR 3	20.99	22.26	20.73	18.74	12.51	1565	2229	3022	4568	2529
RIOR 4	20.20	20.34	18.30	15.75	11.73	673	1305	1915	3251	1633
High RIOR	17.96	17.05	14.99	12.75	11.16	305	566	1151	1311	955

Table A.3: **CAPM Alphas 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports pricing errors (α) for the CAPM for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
α_{CAPM}	Low RIOR	0.37	0.17	0.06	-0.29	-1.23	1.61
		(0.19)	(0.16)	(0.15)	(0.18)	(0.32)	(0.26)
	RIOR2	0.40	0.26	0.14	-0.01	-0.69	1.09
		(0.17)	(0.14)	(0.12)	(0.12)	(0.26)	(0.23)
	RIOR3	0.41	0.28	0.24	0.00	-0.47	0.88
		(0.17)	(0.14)	(0.13)	(0.14)	(0.26)	(0.25)
	RIOR4	0.40	0.33	0.18	-0.17	-0.40	0.79
		(0.17)	(0.16)	(0.15)	(0.16)	(0.28)	(0.26)
	High RIOR	0.42	0.30	0.21	-0.02	0.03	0.40
		(0.20)	(0.18)	(0.18)	(0.18)	(0.27)	(0.24)
	RIOR1 – RIOR5	-0.05	-0.13	-0.15	-0.28	-1.26	1.21
		(0.14)	(0.13)	(0.12)	(0.13)	(0.22)	(0.23)

Table A.4: **Fama - French Alphas of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports pricing errors (α) for the Fama & French three-factor model for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, and Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios. Dur is cash flow duration. RIOR is the residual in a cross-sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
$\alpha_{F\&F}$	Low RIOR	0.16	0.06	0.00	-0.22	-1.01	1.17
		(0.13)	(0.13)	(0.11)	(0.14)	(0.24)	(0.21)
	RIOR2	0.17	0.12	0.05	0.03	-0.47	0.64
		(0.12)	(0.09)	(0.08)	(0.09)	(0.18)	(0.18)
	RIOR3	0.12	0.05	0.14	0.05	-0.24	0.36
		(0.11)	(0.09)	(0.09)	(0.09)	(0.18)	(0.18)
	RIOR4	0.13	0.12	0.05	-0.14	-0.16	0.29
		(0.11)	(0.09)	(0.10)	(0.11)	(0.20)	(0.20)
	High RIOR	0.08	0.10	0.06	0.01	0.13	-0.05
		(0.13)	(0.11)	(0.11)	(0.13)	(0.20)	(0.20)
	RIOR1–RIOR5	0.08	-0.04	-0.05	-0.23	-1.14	1.22
		(0.13)	(0.13)	(0.12)	(0.13)	(0.22)	(0.23)

Table A.5: **Four Factor Alphas of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports pricing errors (α) for Fama & French three-factor model augmented with momentum for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
$\alpha_{4Factor}$	Low RIOR	0.38	0.28	0.19	0.05	-0.56	0.94
		(0.12)	(0.11)	(0.10)	(0.12)	(0.22)	(0.20)
	RIOR2	0.35	0.25	0.22	0.20	-0.10	0.45
		(0.11)	(0.08)	(0.07)	(0.08)	(0.16)	(0.18)
	RIOR3	0.29	0.18	0.26	0.24	0.09	0.20
		(0.10)	(0.09)	(0.08)	(0.08)	(0.16)	(0.18)
	RIOR4	0.28	0.25	0.22	0.08	0.17	0.11
		(0.10)	(0.09)	(0.09)	(0.09)	(0.18)	(0.20)
	High RIOR	0.29	0.28	0.25	0.19	0.39	-0.10
		(0.12)	(0.10)	(0.10)	(0.12)	(0.19)	(0.21)
	RIOR1–RIOR5	0.09	0.00	-0.06	-0.14	-0.95	1.04
		(0.13)	(0.13)	(0.12)	(0.14)	(0.22)	(0.23)

Table A.6: **Five Factor Alphas of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports pricing errors (α) for the Fama & French five-factor model for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ stocks minus the one-month Treasury bill rate. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
$\alpha_{5Factor}$	Low RIOR	0.23	0.14	0.08	-0.04	-0.43	0.66
		(0.14)	(0.13)	(0.11)	(0.14)	(0.23)	(0.19)
	RIOR2	0.17	0.07	0.02	0.07	-0.07	0.24
		(0.12)	(0.09)	(0.09)	(0.09)	(0.17)	(0.16)
	RIOR3	0.13	-0.04	0.07	0.12	0.05	0.08
		(0.11)	(0.09)	(0.09)	(0.10)	(0.18)	(0.18)
	RIOR4	0.12	0.02	-0.01	-0.01	0.14	-0.02
		(0.11)	(0.09)	(0.10)	(0.11)	(0.20)	(0.19)
	High RIOR	0.05	0.03	0.02	0.05	0.40	-0.35
		(0.13)	(0.11)	(0.12)	(0.13)	(0.20)	(0.20)
	RIOR1–RIOR5	0.17	0.11	0.06	-0.09	-0.83	1.01
		(0.14)	(0.13)	(0.12)	(0.14)	(0.23)	(0.24)

Table A.7: **Fama & French 3 Factor Loadings of 10 Portfolios sorted on Duration**

This table reports time series factor loadings (β) for the Fama & French three-factor model for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.95	0.96	0.97	0.99	1.01	1.02	1.03	1.06	1.12	1.08	-0.13
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)
β_{SMB}	1.03	0.94	0.92	0.87	0.85	0.85	0.85	0.86	0.99	1.21	-0.18
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)
β_{HML}	0.53	0.43	0.37	0.32	0.22	0.17	0.04	-0.16	-0.39	-0.49	1.02
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)

Table A.8: **Fama & French 4 Factor Loadings of 10 Portfolios sorted on Duration**

This table reports time series factor loadings (β) for the Fama & French three-factor model augmented by momentum for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, and Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.92	0.93	0.95	0.97	0.98	0.99	1.00	1.02	1.07	1.02	-0.10
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.04)	(0.04)
β_{SMB}	1.03	0.94	0.92	0.87	0.85	0.85	0.85	0.86	0.99	1.21	-0.19
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.06)	(0.05)
β_{HML}	0.48	0.38	0.33	0.27	0.17	0.12	-0.02	-0.23	-0.48	-0.60	1.08
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.06)	(0.05)
β_{Mom}	-0.15	-0.17	-0.14	-0.15	-0.15	-0.18	-0.19	-0.21	-0.29	-0.35	0.20
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.04)

Table A.9: **Fama & French 5 Factor Loadings of 10 Portfolios sorted on Duration**

This table reports time series factor loadings (β) for the Fama & French five-factor model for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.95	0.95	0.97	0.99	1.01	1.01	1.03	1.03	1.07	1.01	-0.06
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)
β_{SMB}	1.00	0.93	0.92	0.88	0.85	0.85	0.83	0.81	0.87	0.98	0.02
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.06)	(0.05)
β_{HML}	0.52	0.44	0.35	0.32	0.21	0.20	0.07	-0.10	-0.29	-0.36	0.88
	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.08)	(0.07)
β_{RMW}	-0.10	-0.04	-0.02	0.05	-0.01	0.00	-0.08	-0.23	-0.54	-1.01	0.90
	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.05)	(0.09)	(0.07)
β_{CMA}	0.02	-0.01	0.04	-0.01	0.01	-0.05	-0.06	-0.13	-0.20	-0.27	0.29
	(0.07)	(0.06)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.07)	(0.12)	(0.10)

Table A.10: **CAPM Loadings of 10 Portfolios sorted on Duration: Volatility-managed Portfolios**

This table reports time series factor loadings (β) for the Fama & French three-factor model for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. Portfolio returns are scaled by the previous months realized variance as in Moreira and Muir [54]. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.81	0.76	0.79	0.76	0.83	0.82	0.82	0.91	1.00	1.10	-0.26
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.04)

Table A.11: **Fama & French 3 Factor Loadings of 10 Portfolios sorted on Duration: Volatility-managed Portfolios**

This table reports time series factor loadings (β) for the Fama & French three-factor model for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. Portfolio returns are scaled by the previous months realized variance as in Moreira and Muir [54]. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.70	0.67	0.69	0.68	0.73	0.73	0.71	0.78	0.83	0.87	-0.11
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)	(0.04)
β_{SMB}	0.73	0.60	0.62	0.52	0.56	0.55	0.58	0.61	0.76	0.99	-0.13
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)	(0.09)	(0.06)
β_{HML}	0.17	0.12	0.14	0.11	0.05	0.05	0.01	-0.09	-0.09	-0.19	0.62
	(0.07)	(0.07)	(0.06)	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.08)	(0.10)	(0.07)

Table A.12: **Fama & French 4 Factor Loadings of 10 Portfolios sorted on Duration: Volatility-managed Portfolios**

This table reports time series factor loadings (β) for the Fama & French three-factor model augmented by momentum for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. Portfolio returns are scaled by the previous months realized variance as in Moreira and Muir [54]. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, and Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.72	0.69	0.71	0.70	0.75	0.75	0.74	0.81	0.86	0.90	-0.10
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)	(0.04)
β_{SMB}	0.73	0.60	0.62	0.52	0.55	0.55	0.58	0.61	0.76	0.99	-0.13
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.09)	(0.06)
β_{HML}	0.21	0.16	0.18	0.14	0.10	0.09	0.05	-0.04	-0.04	-0.13	0.64
	(0.07)	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.08)	(0.10)	(0.07)
β_{Mom}	0.11	0.11	0.12	0.12	0.15	0.13	0.15	0.17	0.17	0.18	0.06
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.04)

Table A.13: **Fama & French 5 Factor Loadings of 10 Portfolios sorted on Duration: Volatility-managed Portfolios**

This table reports time series factor loadings (β) for the Fama & French five-factor model for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. Portfolio returns are scaled by the previous months realized variance as in Moreira and Muir [54]. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
β_{Market}	0.76	0.72	0.74	0.72	0.76	0.76	0.75	0.82	0.88	0.92	-0.10
	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)	(0.07)	(0.05)
β_{SMB}	0.77	0.66	0.66	0.57	0.62	0.61	0.64	0.68	0.84	1.03	-0.09
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.08)	(0.09)	(0.07)
β_{HML}	-0.04	-0.07	-0.04	-0.02	-0.05	-0.07	-0.12	-0.23	-0.26	-0.39	0.62
	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.09)	(0.09)	(0.09)	(0.11)	(0.13)	(0.09)
β_{RMW}	0.20	0.27	0.22	0.24	0.28	0.28	0.28	0.33	0.34	0.16	0.19
	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.11)	(0.14)	(0.10)
β_{CMA}	0.46	0.43	0.39	0.28	0.21	0.24	0.27	0.29	0.36	0.45	0.00
	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.14)	(0.14)	(0.16)	(0.20)	(0.14)

Table A.14: **CAPM Betas of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports time series factor loadings (β) for the CAPM for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20th size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{CAPM}	Low RIOR	1.01	1.05	1.08	1.20	1.46	-0.45
		(0.04)	(0.04)	(0.03)	(0.04)	(0.07)	(0.06)
	RIOR2	1.06	1.09	1.12	1.16	1.47	-0.41
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.05)
	RIOR3	1.06	1.09	1.11	1.21	1.47	-0.41
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.05)
	RIOR4	1.01	1.09	1.15	1.26	1.45	-0.44
		(0.04)	(0.04)	(0.03)	(0.04)	(0.06)	(0.06)
	High RIOR	1.05	1.10	1.14	1.22	1.43	-0.38
		(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.05)
	RIOR1–RIOR5	-0.04	-0.05	-0.06	-0.02	0.03	-0.07
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)

Table A.15: **Fama & French Factor loadings of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports time series factor loadings (β) for the Fama & French three-factor model for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20th size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{Market}	Low RIOR	0.98	1.00	1.00	1.05	1.18	-0.20
		(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.05)
	RIOR2	1.04	1.05	1.07	1.06	1.22	-0.17
		(0.03)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
	RIOR3	1.07	1.09	1.06	1.10	1.21	-0.14
		(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
	RIOR4	1.01	1.05	1.09	1.13	1.17	-0.17
		(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)
	High RIOR	1.06	1.05	1.06	1.07	1.21	-0.16
		(0.03)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)
	RIOR1–RIOR5	-0.08	-0.05	-0.06	-0.02	-0.03	-0.05
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
β_{SMB}	Low RIOR	0.87	0.68	0.74	0.78	1.21	-0.34
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.07)
	RIOR2	0.83	0.70	0.61	0.56	1.05	-0.22
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR3	0.83	0.65	0.68	0.65	1.08	-0.25
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR4	0.86	0.90	0.79	0.84	1.15	-0.29
		(0.04)	(0.03)	(0.04)	(0.04)	(0.07)	(0.07)
	High RIOR	1.00	0.99	0.96	0.92	1.17	-0.16
		(0.04)	(0.04)	(0.04)	(0.04)	(0.07)	(0.07)
	RIOR1–RIOR5	-0.13	-0.31	-0.22	-0.14	0.04	-0.17
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.08)

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Table A.16: **Continued from Previous Page**

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{HML}	Low RIOR	0.40	0.20	0.08	-0.18	-0.52	0.92
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.07)
	RIOR2	0.44	0.27	0.16	-0.11	-0.51	0.95
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR3	0.56	0.44	0.18	-0.12	-0.52	1.08
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR4	0.51	0.40	0.22	-0.10	-0.54	1.06
		(0.04)	(0.03)	(0.04)	(0.04)	(0.07)	(0.07)
	High RIOR	0.67	0.38	0.27	-0.09	-0.27	0.94
		(0.04)	(0.04)	(0.04)	(0.04)	(0.07)	(0.07)
	RIOR1–RIOR5	-0.27	-0.18	-0.18	-0.08	-0.24	-0.02
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.08)

Table A.17: **Four Factor loadings of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports time series factor loadings (β) for the Fama & French three-factor model augmented with momentum for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, and Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{Market}	Low RIOR	0.91	0.94	0.94	0.97	1.05	-0.13
		(0.03)	(0.03)	(0.02)	(0.03)	(0.05)	(0.05)
	RIOR2	0.99	1.01	1.02	1.01	1.11	-0.12
		(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
	RIOR3	1.02	1.05	1.02	1.04	1.12	-0.10
		(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
	RIOR4	0.96	1.01	1.04	1.06	1.07	-0.11
		(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.05)
	High RIOR	0.99	1.00	1.00	1.02	1.14	-0.14
		(0.03)	(0.02)	(0.02)	(0.03)	(0.04)	(0.05)
	RIOR1–RIOR5	-0.08	-0.06	-0.06	-0.05	-0.09	0.01
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
β_{SMB}	Low RIOR	0.89	0.70	0.75	0.80	1.24	-0.35
		(0.04)	(0.04)	(0.03)	(0.04)	(0.07)	(0.07)
	RIOR2	0.84	0.71	0.62	0.57	1.08	-0.23
		(0.04)	(0.03)	(0.02)	(0.03)	(0.05)	(0.06)
	RIOR3	0.84	0.66	0.69	0.67	1.10	-0.26
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.06)
	RIOR4	0.87	0.91	0.81	0.85	1.17	-0.30
		(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.07)
	High RIOR	1.02	1.00	0.97	0.93	1.18	-0.17
		(0.04)	(0.03)	(0.03)	(0.04)	(0.06)	(0.07)
	RIOR1–RIOR5	-0.13	-0.30	-0.22	-0.13	0.06	-0.19
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.08)

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Table A.18: **Continued from Previous Page**

		Low Dur	D2	D3	D4	High Dur	D1–D5
	Low RIOR	0.32	0.12	0.01	-0.28	-0.68	1.00
		(0.04)	(0.04)	(0.04)	(0.04)	(0.08)	(0.07)
	RIOR2	0.37	0.22	0.10	-0.17	-0.65	1.02
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
β_{HML}	RIOR3	0.50	0.39	0.14	-0.19	-0.64	1.14
		(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR4	0.46	0.35	0.15	-0.18	-0.67	1.12
		(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.07)
High	RIOR	0.59	0.31	0.20	-0.16	-0.37	0.96
		(0.04)	(0.03)	(0.04)	(0.04)	(0.07)	(0.07)
	RIOR1–RIOR5	-0.27	-0.19	-0.18	-0.12	-0.31	0.05
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.08)
	Low RIOR	-0.25	-0.26	-0.22	-0.32	-0.52	0.27
		0.03	0.03	0.02	0.03	0.05	0.05
	RIOR2	-0.22	-0.16	-0.20	-0.20	-0.43	0.21
		0.03	0.03	0.02	0.03	0.05	0.05
β_{mom}	RIOR3	-0.19	-0.15	-0.14	-0.22	-0.38	0.19
		0.03	0.03	0.02	0.03	0.05	0.05
	RIOR4	-0.18	-0.15	-0.20	-0.26	-0.39	0.21
		0.03	0.03	0.02	0.03	0.05	0.05
	High RIOR	-0.25	-0.22	-0.22	-0.21	-0.30	0.05
		0.03	0.03	0.02	0.03	0.05	0.05
	RIOR1–RIOR5	0.00	-0.05	0.01	-0.10	-0.22	0.22
		0.03	0.03	0.02	0.03	0.05	0.05

Table A.19: **Five Factor loadings of 25 Portfolios sorted on Duration and Residual Institutional Ownership**

This table reports time series factor loadings (β) for the Fama & French five-factor model for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I weight returns equally and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Dur is cash flow duration. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{Market}	Low RIOR	0.96	0.98	0.98	1.00	1.04	-0.08
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.04)
	RIOR2	1.04	1.07	1.07	1.05	1.12	-0.08
		(0.03)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
	RIOR3	1.06	1.11	1.07	1.07	1.14	-0.08
		(0.03)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
	RIOR4	1.01	1.07	1.10	1.09	1.10	-0.10
		(0.03)	(0.02)	(0.02)	(0.03)	(0.05)	(0.05)
	High RIOR	1.06	1.06	1.07	1.06	1.15	-0.09
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
	RIOR1–RIOR5	-0.10	-0.09	-0.09	-0.05	-0.11	0.01
		(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.06)
β_{SMB}	Low RIOR	0.86	0.67	0.70	0.70	0.90	-0.05
		(0.05)	(0.05)	(0.04)	(0.05)	(0.08)	(0.07)
	RIOR2	0.86	0.74	0.63	0.55	0.83	0.03
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR3	0.85	0.72	0.73	0.64	0.92	-0.07
		(0.04)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)
	RIOR4	0.88	0.95	0.85	0.80	0.96	-0.09
		(0.04)	(0.03)	(0.04)	(0.04)	(0.07)	(0.07)
	High RIOR	1.05	1.04	0.98	0.93	1.01	0.04
		(0.05)	(0.04)	(0.04)	(0.05)	(0.07)	(0.07)
	RIOR1–RIOR5	-0.19	-0.37	-0.28	-0.23	-0.11	-0.08
		(0.05)	(0.05)	(0.04)	(0.05)	(0.08)	(0.09)

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Table A.20: **Continued from Previous Page**

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{HML}	Low RIOR	0.47	0.30	0.13	-0.05	-0.17	0.64
		(0.06)	(0.06)	(0.05)	(0.07)	(0.10)	(0.09)
	RIOR2	0.48	0.25	0.15	-0.06	-0.28	0.76
		(0.05)	(0.04)	(0.04)	(0.04)	(0.08)	(0.07)
	RIOR3	0.59	0.42	0.15	-0.04	-0.35	0.94
		(0.05)	(0.04)	(0.04)	(0.04)	(0.08)	(0.08)
	RIOR4	0.53	0.34	0.21	0.02	-0.39	0.92
		(0.05)	(0.04)	(0.05)	(0.05)	(0.09)	(0.09)
	High RIOR	0.69	0.37	0.25	-0.02	-0.13	0.82
		(0.06)	(0.05)	(0.05)	(0.06)	(0.09)	(0.09)
	RIOR1–RIOR5	-0.22	-0.06	-0.11	-0.03	-0.04	-0.18
		(0.06)	(0.06)	(0.06)	(0.06)	(0.10)	(0.11)
β_{RMW}	Low RIOR	-0.08	-0.08	-0.13	-0.33	-1.13	1.05
		(0.07)	(0.06)	(0.05)	(0.07)	(0.11)	(0.09)
	RIOR2	0.05	0.12	0.07	-0.04	-0.81	0.87
		(0.06)	(0.04)	(0.04)	(0.04)	(0.08)	(0.08)
	RIOR3	0.04	0.24	0.17	-0.08	-0.59	0.63
		(0.05)	(0.04)	(0.04)	(0.05)	(0.08)	(0.09)
	RIOR4	0.06	0.18	0.19	-0.17	-0.66	0.71
		(0.05)	(0.04)	(0.05)	(0.05)	(0.09)	(0.09)
	High RIOR	0.12	0.18	0.07	-0.01	-0.56	0.68
		(0.06)	(0.05)	(0.06)	(0.06)	(0.09)	(0.09)
	RIOR1–RIOR5	-0.20	-0.26	-0.21	-0.32	-0.57	0.37
		(0.06)	(0.06)	(0.06)	(0.06)	(0.11)	(0.11)

Table A.21: **Continued from Previous Page**

		Low Dur	D2	D3	D4	High Dur	D1–D5
β_{CMA}	Low RIOR	-0.12	-0.21	-0.07	-0.18	-0.41	0.28
		(0.09)	(0.09)	(0.08)	(0.10)	(0.15)	(0.13)
	RIOR2	-0.12	0.00	-0.01	-0.10	-0.25	0.13
		(0.08)	(0.06)	(0.06)	(0.06)	(0.11)	(0.11)
	RIOR3	-0.10	-0.05	0.01	-0.16	-0.18	0.08
		(0.07)	(0.06)	(0.06)	(0.06)	(0.12)	(0.12)
	RIOR4	-0.05	0.07	-0.05	-0.22	-0.12	0.07
		(0.07)	(0.06)	(0.07)	(0.07)	(0.13)	(0.13)
	High RIOR	-0.09	-0.04	0.02	-0.16	-0.13	0.04
		(0.09)	(0.07)	(0.08)	(0.09)	(0.13)	(0.13)
	RIOR1–RIOR5	-0.03	-0.17	-0.09	-0.02	-0.28	0.25
		(0.09)	(0.09)	(0.08)	(0.09)	(0.15)	(0.16)

Table A.22: **Fama & French Factor Alphas of 10 Portfolios sorted on Duration (value-weighted)**

This table reports pricing errors (α) for the Fama & French three-factor model ($\alpha_{F\&F3}$), the three-factor model augmented with momentum ($\alpha_{F\&F4}$), and the Fama & French five-factor model ($\alpha_{F\&F5}$) for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
α_{CAPM}	0.46	0.37	0.36	0.32	0.29	0.12	0.02	0.05	-0.18	-0.86	1.32
	(0.14)	(0.12)	(0.10)	(0.09)	(0.09)	(0.08)	(0.07)	(0.07)	(0.09)	(0.19)	(0.24)
$\alpha_{F\&F3}$	0.08	0.04	0.08	0.11	0.11	0.07	0.00	0.13	0.01	-0.57	0.65
	(0.11)	(0.10)	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.09)	(0.17)	(0.19)
$\alpha_{F\&F4}$	0.23	0.17	0.20	0.19	0.19	0.16	0.10	0.25	0.20	-0.22	0.45
	(0.11)	(0.10)	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)	(0.16)	(0.19)
$\alpha_{F\&F5}$	0.07	0.03	0.05	0.09	0.08	0.04	-0.02	0.08	-0.01	-0.32	0.39
	(0.11)	(0.10)	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.09)	(0.16)	(0.18)

Table A.23: **Mean Excess Returns of 10 Portfolios sorted on Duration (robustness, value-weighted)**

This table reports monthly mean excess returns with OLS standard errors in parentheses for variations of the parameter values used to calculate duration in Section 2. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

		Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
(1)	$r = 0.10$	1.06	0.87	0.86	0.84	0.75	0.58	0.60	0.53	0.42	-0.18	1.24
		(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.20)	(0.22)	(0.31)	(0.24)
(2)	$r = 0.14$	0.99	0.89	0.87	0.81	0.77	0.61	0.54	0.54	0.39	-0.18	1.17
		(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.19)	(0.24)	(0.32)	(0.25)
(3)	$ar_{roe} = 0.30$	1.48	1.22	1.20	1.10	1.00	0.97	0.85	0.71	0.57	0.17	1.32
		(0.26)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.27)	(0.33)	(0.19)
(4)	$ar_{roe} = 0.50$	1.47	1.23	1.19	1.09	1.01	0.95	0.85	0.72	0.56	0.18	1.29
		(0.26)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.25)	(0.26)	(0.27)	(0.33)	(0.19)
(6)	$roe_{ss} = 0.10$	0.93	0.90	0.84	0.85	0.71	0.62	0.52	0.51	0.27	-0.21	1.14
		(0.24)	(0.21)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.20)	(0.28)	(0.32)	(0.25)
(5)	$roe_{ss} = 0.14$	1.07	0.87	0.85	0.81	0.71	0.60	0.63	0.51	0.43	-0.07	1.14
		(0.24)	(0.23)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.19)	(0.21)	(0.31)	(0.23)
(9)	$ar_{sg} = 0.20$	1.00	0.88	0.83	0.79	0.74	0.61	0.57	0.54	0.39	-0.15	1.15
		(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.20)	(0.22)	(0.32)	(0.24)
(10)	$ar_{sg} = 0.30$	1.06	0.87	0.85	0.84	0.75	0.62	0.54	0.54	0.38	-0.17	1.23
		(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.19)	(0.23)	(0.32)	(0.25)
(7)	$sg_{ss} = 0.08$	0.96	0.88	0.87	0.84	0.69	0.66	0.52	0.50	0.32	-0.23	1.19
		(0.24)	(0.21)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.20)	(0.27)	(0.32)	(0.24)
(8)	$sg_{ss} = 0.04$	1.07	0.87	0.83	0.81	0.74	0.59	0.61	0.54	0.41	-0.12	1.19
		(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.20)	(0.19)	(0.21)	(0.32)	(0.24)
(11)	$horizon = 10$	0.97	0.88	0.88	0.84	0.71	0.66	0.53	0.51	0.33	-0.22	1.18
		(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.19)	(0.20)	(0.26)	(0.32)	(0.24)

Table A.24: **Mean Excess Returns of 10 Portfolios sorted on Duration (subsamples, value-weighted)**

This table reports monthly mean excess returns with OLS standard errors in parentheses for different subsamples. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
Panel A. July 1963 – June 1973											
Mean	0.39	0.52	0.44	0.58	0.54	-0.03	-0.14	0.08	0.22	0.45	-0.06
SE	(0.46)	(0.44)	(0.39)	(0.40)	(0.37)	(0.36)	(0.39)	(0.38)	(0.42)	(0.38)	(0.34)
Panel B. July 1973 – June 1983											
Mean	1.17	1.23	1.08	1.01	0.68	0.79	0.63	0.58	0.30	-0.27	1.44
SE	(0.62)	(0.55)	(0.53)	(0.51)	(0.47)	(0.47)	(0.49)	(0.50)	(0.53)	(0.60)	(0.50)
Panel C. July 1983 – June 1993											
Mean	1.26	0.93	0.87	0.83	0.53	0.73	0.58	0.55	0.33	-0.62	1.88
SE	(0.49)	(0.44)	(0.47)	(0.46)	(0.43)	(0.47)	(0.45)	(0.47)	(0.54)	(0.67)	(0.49)
Panel D. July 1993 – June 2003											
Mean	0.82	0.70	0.74	0.71	0.97	0.66	0.77	0.70	0.50	-1.04	1.86
SE	(0.51)	(0.54)	(0.47)	(0.45)	(0.44)	(0.46)	(0.46)	(0.44)	(0.60)	(1.10)	(0.85)
Panel E. July 2003 – June 2014											
Mean	1.36	1.05	1.17	0.97	1.08	0.83	0.81	0.81	0.59	0.68	0.67
SE	(0.57)	(0.50)	(0.46)	(0.42)	(0.43)	(0.35)	(0.38)	(0.37)	(0.42)	(0.61)	(0.39)

Table A.25: **Mean Returns and Alphas of 10 Portfolios sorted on Duration: Volatility-managed Portfolios (value-weighted)**

This table reports mean returns and pricing errors (α) for the CAPM (α_{CAPM}), the Fama & French three-factor model ($\alpha_{F\&F3}$), the three-factor model augmented with momentum ($\alpha_{F\&F4}$), and the Fama & French five-factor model ($\alpha_{F\&F5}$) for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. Portfolio returns are scaled by the previous months realized variance as in Moreira and Muir [54]. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24].

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
Mean	1.36	1.20	1.17	1.16	1.11	1.03	0.89	0.87	0.73	0.52	1.31
SE	(0.24)	(0.22)	(0.21)	(0.20)	(0.19)	(0.19)	(0.20)	(0.19)	(0.23)	(0.32)	(0.24)
α_{CAPM}	0.96	0.83	0.81	0.82	0.78	0.70	0.55	0.52	0.35	-0.04	1.40
SE	(0.19)	(0.18)	(0.16)	(0.16)	(0.15)	(0.15)	(0.15)	(0.15)	(0.18)	(0.25)	(0.24)
$\alpha_{F\&F3}$	0.80	0.70	0.69	0.75	0.73	0.70	0.56	0.61	0.46	0.14	0.96
SE	(0.19)	(0.18)	(0.16)	(0.16)	(0.15)	(0.15)	(0.15)	(0.15)	(0.18)	(0.24)	(0.22)
$\alpha_{F\&F4}$	0.75	0.65	0.61	0.64	0.62	0.61	0.45	0.51	0.36	0.08	0.85
SE	(0.20)	(0.18)	(0.17)	(0.17)	(0.16)	(0.15)	(0.16)	(0.15)	(0.19)	(0.25)	(0.23)
$\alpha_{F\&F5}$	0.66	0.61	0.59	0.63	0.63	0.60	0.41	0.41	0.31	0.04	0.83
SE	(0.20)	(0.18)	(0.17)	(0.17)	(0.16)	(0.15)	(0.16)	(0.15)	(0.19)	(0.25)	(0.23)

Table A.26: **Fama & French Alphas of 10 Portfolios sorted on Duration Conditional on Investor Sentiment (value-weighted)**

This table reports benchmark-adjusted mean excess returns following periods of high and low investor sentiment in Panel A, as well as sentiment betas in Panel B for ten portfolios sorted on duration (Dur) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1963 to 2013 into deciles based on duration for all firms with fiscal years ending in year t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. I define high and low sentiment periods by the mean level of the sentiment index of Baker and Wurgler [7]. Sentiment betas are the time series factor loadings of the benchmark-adjusted mean excess returns on a constant and changes in the sentiment index. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I use the Fama & French three-factor model as benchmark. The sample period is July 1965 to December 2010 due to the availability of the sentiment index.

	Low Dur	D2	D3	D4	D5	D6	D7	D8	D9	High Dur	D1–D10
Panel A. Sentiment Alphas											
$\alpha_{HighSent}$	-0.04	0.02	0.00	0.18	0.19	0.17	0.05	0.08	-0.20	-1.33	1.29
	(0.17)	(0.16)	(0.13)	(0.12)	(0.12)	(0.12)	(0.10)	(0.10)	(0.13)	(0.26)	(0.29)
$\alpha_{LowSent}$	0.11	0.09	0.15	0.09	0.04	-0.03	-0.08	0.22	0.20	0.04	0.07
	(0.16)	(0.15)	(0.12)	(0.12)	(0.12)	(0.12)	(0.10)	(0.10)	(0.13)	(0.25)	(0.28)
Panel B. Sentiment Betas											
β_{Sent}	1.38	1.13	0.95	1.06	0.72	0.85	1.06	1.10	1.53	2.76	-1.38
	(0.25)	(0.24)	(0.22)	(0.21)	(0.21)	(0.20)	(0.21)	(0.21)	(0.24)	(0.33)	(0.26)

Table A.27: **Mean Excess Returns of 25 Portfolios sorted on Duration and Residual Institutional Ownership (value-weighted)**

This table reports monthly mean excess returns for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20th size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
Mean	Low RIOR	1.11	0.80	0.71	0.65	0.13	0.98
		(0.32)	(0.26)	(0.28)	(0.29)	(0.42)	(0.31)
	RIOR2	0.95	0.92	0.84	0.79	0.44	0.52
		(0.29)	(0.26)	(0.26)	(0.24)	(0.31)	(0.25)
	RIOR3	0.99	0.80	0.85	0.63	0.30	0.69
		(0.28)	(0.27)	(0.25)	(0.26)	(0.31)	(0.24)
	RIOR4	0.77	0.89	0.60	0.56	0.41	0.36
		(0.28)	(0.27)	(0.26)	(0.27)	(0.37)	(0.31)
	High RIOR	1.06	0.87	0.89	0.67	0.58	0.48
		(0.31)	(0.29)	(0.29)	(0.33)	(0.39)	(0.29)
	RIOR1 – RIOR5	0.06	-0.08	-0.18	-0.02	-0.45	0.50
		(0.26)	(0.19)	(0.24)	(0.24)	(0.27)	(0.35)

Table A.28: **CAPM Alphas 25 Portfolios sorted on Duration and Residual Institutional Ownership (value-weighted)**

This table reports pricing errors (α) for the CAPM for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, and HML is the average return on two value portfolios minus the average return on two growth portfolios. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20th size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
α_{CAPM}	Low RIOR	0.46	0.17	0.06	-0.05	-0.83	1.29
		(0.23)	(0.14)	(0.15)	(0.14)	(0.24)	(0.29)
	RIOR2	0.31	0.28	0.18	0.17	-0.32	0.62
		(0.17)	(0.13)	(0.12)	(0.10)	(0.16)	(0.25)
	RIOR3	0.34	0.16	0.24	-0.05	-0.43	0.77
		(0.16)	(0.15)	(0.13)	(0.10)	(0.18)	(0.24)
	RIOR4	0.13	0.26	-0.02	-0.11	-0.40	0.52
		(0.17)	(0.15)	(0.15)	(0.14)	(0.24)	(0.31)
	High RIOR	0.36	0.19	0.27	-0.05	-0.32	0.67
		(0.18)	(0.16)	(0.19)	(0.21)	(0.23)	(0.29)
	RIOR1 – RIOR5	0.11	-0.02	-0.21	0.00	-0.51	0.62
		(0.26)	(0.19)	(0.25)	(0.25)	(0.27)	(0.35)

Table A.29: **Fama - French Alphas of 25 Portfolios sorted on Duration and Residual Institutional Ownership (value-weighted)**

This table reports pricing errors (α) for the Fama & French three-factor model for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, and Mom is the average return on two high prior return portfolios minus the average return on two low prior return portfolios. Dur is cash flow duration. RIOR is the residual in a cross-sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
$\alpha_{F\&F}$	Low RIOR	0.25	0.02	-0.08	-0.08	-0.60	0.85
		(0.22)	(0.14)	(0.15)	(0.14)	(0.23)	(0.26)
	RIOR2	-0.01	0.09	0.08	0.23	-0.10	0.09
		(0.15)	(0.12)	(0.12)	(0.09)	(0.14)	(0.19)
	RIOR3	0.07	-0.11	0.14	0.05	-0.23	0.30
		(0.14)	(0.13)	(0.12)	(0.09)	(0.17)	(0.20)
	RIOR4	-0.11	0.07	-0.07	0.01	-0.02	-0.08
		(0.15)	(0.14)	(0.15)	(0.13)	(0.21)	(0.25)
	High RIOR	-0.01	0.04	0.18	0.11	-0.10	0.09
		(0.14)	(0.14)	(0.18)	(0.20)	(0.21)	(0.23)
	RIOR1 – RIOR5	0.26	-0.02	-0.27	-0.19	-0.50	0.76
		(0.25)	(0.19)	(0.24)	(0.24)	(0.27)	(0.36)

Table A.30: **Four Factor Alphas of 25 Portfolios sorted on Duration and Residual Institutional Ownership (value-weighted)**

This table reports pricing errors (α) for Fama & French three-factor model augmented with momentum for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I v value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ common stocks minus the one-month Treasury bill rate, SMB is the average return on three small portfolios minus the average return on three big portfolios, HML is the average return on two value portfolios minus the average return on two growth portfolios, RMW is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and CMA is the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
$\alpha_{4Factor}$	Low RIOR	0.51	0.17	0.14	0.13	-0.09	0.60
		(0.22)	(0.13)	(0.14)	(0.14)	(0.19)	(0.26)
	RIOR2	0.19	0.24	0.26	0.28	0.12	0.08
		(0.14)	(0.12)	(0.11)	(0.10)	(0.13)	(0.20)
	RIOR3	0.24	0.00	0.22	0.19	0.04	0.20
		(0.14)	(0.13)	(0.12)	(0.09)	(0.16)	(0.21)
	RIOR4	0.02	0.10	0.06	0.07	0.17	-0.15
		(0.15)	(0.14)	(0.15)	(0.13)	(0.21)	(0.26)
	High RIOR	0.22	0.13	0.23	0.31	0.13	0.09
		(0.12)	(0.15)	(0.19)	(0.20)	(0.21)	(0.24)
	RIOR1 – RIOR5	0.29	0.04	-0.09	-0.18	-0.22	0.51
		(0.25)	(0.19)	(0.24)	(0.24)	(0.27)	(0.36)

Table A.31: **Five Factor Alphas of 25 Portfolios sorted on Duration and Residual Institutional Ownership (value-weighted)**

This table reports pricing errors (α) for the Fama & French five-factor model for twenty-five portfolios sorted on duration (Dur) and residual institutional ownership (RIOR) with OLS standard errors in parentheses. I sort all common stocks listed on NYSE, AMEX, and NASDAQ at the end of June each year t from 1981 to 2013 into quintiles based on duration for all firms with fiscal years ending in year t-1. I intersect these quintiles with an independent sort on residual institutional ownership as of December t-1. I value-weight returns and include delisting returns. If a firm is delisted for cause (delisting code between 400 and 591) and has a missing delisting return, I assume a delisting return of -30% following Shumway [60]. Market is the value-weighted return on all NYSE, AMEX, and NASDAQ stocks minus the one-month Treasury bill rate. Dur is cash flow duration. RIOR is the residual in a cross sectional regression of the fraction of shares held by institutions on size. Institutional ownership information is obtained from the Thomson Reuters 13F database. Financial statement data come from Compustat. For missing Compustat book equity values, I use the Moody's book equity information collected by Davis et al. [24]. I only use stocks above the 20^{th} size percentile.

		Low Dur	D2	D3	D4	High Dur	D1–D5
$\alpha_{5Factor}$	Low RIOR	0.51	0.00	-0.06	-0.16	-0.08	0.59
		(0.23)	(0.14)	(0.16)	(0.15)	(0.23)	(0.27)
	RIOR2	-0.02	0.04	-0.04	0.04	-0.07	0.05
		(0.15)	(0.12)	(0.12)	(0.09)	(0.15)	(0.20)
	RIOR3	0.00	-0.25	-0.12	-0.02	-0.21	0.22
		(0.15)	(0.13)	(0.12)	(0.10)	(0.18)	(0.21)
	RIOR4	-0.14	-0.15	-0.21	-0.08	0.17	-0.32
		(0.16)	(0.14)	(0.15)	(0.14)	(0.22)	(0.26)
	RIOR1–RIOR5	-0.05	-0.13	-0.01	0.11	0.12	-0.17
		(0.14)	(0.15)	(0.18)	(0.21)	(0.22)	(0.24)
	RIOR1–RIOR5	0.56	0.12	-0.06	-0.27	-0.20	0.76
		(0.25)	(0.20)	(0.24)	(0.25)	(0.28)	(0.37)