The Short-Duration Premium in the Stock Market: Risk or Mispricing?*

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Abstract

Theoretical models explaining the short-duration premium typically introduce additional risk factors for short-duration assets. We provide high-frequency evidence that duration premia associated with revisions of economic growth and interest rate expectations are consistent with these models. However, they fail to explain the pronounced short-duration premium at earnings announcements. We show that the trading activity of sentiment-driven investors raises prices of long-duration stocks, which lowers their expected returns and results in the short-duration premium. Long-duration stocks have the lowest institutional ownership, exhibit the largest earnings forecast errors, and are most overvalued. This overvaluation is consequently corrected at earnings announcements.

JEL classification: G12, G14, G40

Keywords: Equity Term Structure, Duration Premium, Mispricing, Limits to Arbitrage, High-Frequency Identification, Post-Earnings-Announcement Drift, Information Diffusion, Analyst Forecasts

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1. Introduction

The *short-duration premium* underlies a variety of common risk factors such as value, low risk, investment, and profitability. Gormsen and Lazarus (2021) show that these factors share a common theme: they invest in short-duration and sell long-duration stocks. The short-duration premium translates to a downward-sloping equity term structure, wherein stocks that are expected to generate most of their cash-flows in the distant future earn lower returns today. Leading equilibrium models suggest otherwise: in these models, duration premia are either absent altogether or increasing in stock duration. These predictions are consistent with the idea that distant cash-flows are more uncertain. Recent theoretical asset pricing models try to explain this puzzle by introducing additional sources of risk for short-term stocks (Gormsen, 2021; Gonçalves, 2021a).

In this paper, we use pre-scheduled public news announcements to empirically assess whether the premium for short-duration stocks arises because of higher risk or if alternative explanations better fit the data. Answering this question is crucial for understanding the economic mechanisms of the equity term structure and the existence of major risk factors in empirical asset pricing. We find that neither the duration-dependent response to interest rate nor to economic news can explain the short-duration premium. Instead, we provide evidence that long-duration stocks are prone to being overpriced as a result of the sentiment-driven trading behavior of non-institutional investors, which can explain not only the existence of the unconditional short-duration premium, but also its variation over time.

We use a simple decomposition of stock returns over a narrow time frame to show that differences in the return pattern of long- and short-duration stocks depend on changes in expected future growth rates, risk premia, and the level of interest rates. Revisions in these expectations reveal how investors process information. Beside the model-free decomposition, we derive hypotheses about the reaction of duration premia to unexpected shocks in growth rates, discount rates, and dividends within the model of Gormsen (2021). The model is a recent risk-based attempt to explain both the unconditional short-duration premium and its time variation. We show that the return sensitivity to growth rate shocks is positive and increasing in a stock's duration, while it is negative and decreasing for interest rate shocks. Shocks to aggregate dividends or idiosyncratic earnings shocks should not affect duration-dependent returns. Our working assumption is that the news component of public announcements presents valuable information for investors to learn about these determinants, leaning on a large and growing part of the financial literature (Liang, 2003; Lucca and Moench, 2015; Savor and Wilson, 2013, 2014; Ai, Han, Pan, and Xu, Forthcoming, 2021). In sum, instead of starting with the shape of the equity term structure and then linking it to the economy, we seek to identify the economic forces behind the duration premium.

We establish that the duration premium between 1995 and 2019 crucially depends on releases of material information. It is furthermore essential which information is released (Figure B1 in the appendix): average returns are slightly increasing in the stock's duration for macroeconomic news announcements, which comprise FOMC meetings, as well as releases of nonfarm payroll (NFP) and gross domestic product (GDP) numbers. This positive duration premium is consistent with the predictions of leading consumption-based asset pricing models. Furthermore, we identify a possible reason for the average negative slope put forth by Van Binsbergen, Brandt, and Koijen (2012): the duration premium is significantly negative surrounding individual earnings announcements and the average non-announcement day. We confirm this descriptive evidence using panel regressions with more than six million stock-day observations.

We test to which extent the empirical behavior is in line with a risk-based explanation. Therefore, we hypothesize that news released at NFP and GDP announcements primarily convey information about aggregate growth rates and FOMC announcements about future discount rates. In both cases, the instantaneous impact of a change in either determinant should accumulate over the term structure. Accordingly, long-duration stocks should react more to both types of information. Empirically, we rely on intraday return dynamics surrounding the announcement time to investigate how stocks of different cash-flow duration respond to surprising information about the current and future level of interest rates (FOMC announcements) and indicators of economic health (NFP and GDP releases). High-frequency return responses allow us to cleanly identify the desired effects, while blending out the impact of other information (Gürkaynak, Sack, and Swanson, 2005). In line with a risk-based explanation, we find that better-than-expected future economic growth and lower-than-expected future interest rates have a disproportionate and positive effect on long-duration stocks, as advocated by equilibrium models.

Investigating a behavioral explanation for the empirical short-duration premium, we provide three stylized facts: first, institutional ownership is significantly lower for long-duration stocks. As a result, the prices of long-duration stocks are potentially less efficient, as institutional investors possess a greater ability to process information (Boehmer and Kelley, 2009; Boehmer and Wu, 2013; Chang, Hsieh, and Wang, 2015). Second, long-duration stocks are on average most overpriced, according to the mispricing measure by Stambaugh, Yu, and Yuan (2015). At the same time, various retail attention proxies are elevated for long-duration stocks. Third, long-duration stocks experience the largest forecast errors at earnings announcements. As earnings announcements provide particularly reliable information about the firm (Liang, 2003) and attract the attention of well-informed investors, we hypothesize that these stocks experience the largest price corrections around earnings announcements.

Consistent with these stylized facts, we can show that the short-duration premium realizing on earnings announcement days is exclusive to stocks with low levels of institutional ownership and those that are overvalued. The returns of long-duration stocks are significantly negative on these days, as their overvaluation is corrected. This translates to higher returns for short-duration stocks, or a short-duration premium on earnings announcements. For stocks with high levels of institutional ownership and those that are less likely overpriced, only a higher earnings surprise elevates returns of short-duration stocks. Current earnings surprises are more informative for these stocks, as they represent a larger share of the stock's expected lifetime cash-flows, which prompts a greater return response.

Our findings suggest that the mispricing of long-duration stocks is at least partially corrected at earnings announcements, as the announcement triggers informed investors to attend to the stock. In line with this, we find that the price correction of long-duration stocks is large, confined to the earnings announcement day with no subsequent reversal, and exclusive to stocks with low institutional ownership.

We hypothesize that non-institutional investors show particular interest in long-duration stocks, driving up their prices today and pushing future expected returns downward. The information released at earnings announcements and the spotlight it puts on the firm prompts better informed investors to correct this overvaluation. To test this, we extend the analysis of Weber (2018) to daily data. We find that the short-duration premium is particularly pronounced after periods of high market sentiment, driven exclusively by low returns of long-duration stocks. This evidence is supportive of our hypothesis: long-duration stocks are overvalued due to an elevated interest by non-institutional investors in periods of high sentiment. Accordingly, expected returns are low, which explains the existence of the unconditional short-duration premium.

In a recent paper, Gormsen (2021) and Bansal, Miller, Song, and Yaron (2021) show that duration premia are countercyclical: they are positive in bad but negative in good states. As in Gormsen (2021), we too find a negative, albeit insignificant, coefficient for the log dividend-price ratio. As soon as we include market sentiment in the analysis, however, the impact of the dividend-price ratio vanishes, while market sentiment significantly predicts the time-variation of the duration premium. Our evidence suggests that the time variation of the duration premium is better explained by cyclical trading of sentiment investors than it is by a risk-based explanation. For instance, Gormsen (2021) introduces two priced risk factors to explain this time-variation. Our analysis suggests an alternative mechanism: retail traders with biased expectations purchase long-duration stocks during good times, which inflates their prices, and ultimately results in a premium for short-duration stocks. In contrast to recently introduced models which match the average downward-sloping equity term structure by introducing additional risk factors (Gormsen, 2021; Gonçalves, 2021a), the mechanism proposed and empirically motivated in this paper has one major advantage: it predicts an upward-sloping term structure when sentiment-driven investors with biased expectations leave the market, well in line with the predictions of leading theoretical asset pricing models (van Binsbergen and Koijen, 2017).

In additional analyses, we show that if news released at earnings announcements contains a higher share of information about current and future cash-flows, the short-duration premium increases. We also show that our results cannot be explained by a stock's ex-ante sensitivity to the upcoming news release (Ai et al., Forthcoming, 2021) or a stock's sensitivity to aggregate volatility (Ang, Hodrick, Xing, and Zhang, 2006). Lastly, we provide a battery of additional robustness checks relating to the empirical setup, extending the sample period, and including microcaps.

Related Literature

Our paper adds to multiple strands of the literature. The first concerns the shape of the equity term structure. Van Binsbergen et al. (2012) use dividend strips extracted from S&P 500 options to show that the implied equity term structure is on average downward-sloping, while most established equilibrium asset pricing models imply a positive slope. Using more granular data from the cross-section of stock returns, Gonçalves (2021b) shows that the term structure instead exhibits a pronounced hump, especially after controlling for the market exposure. Cassella, Golez, Gulen, and Kelly (2021) show that the shape varies substantially over time and can be linked to optimism about long-term cash-flows. Weber (2018) also argues that market participants are overly optimistic about long-duration stocks, which leads to low ex-post returns and a downward sloping equity term structure. We add to this by showing that the shape of the equity term structure depends on news releases and most importantly on which type of news is released. The optimism of non-institutional investors culminates in a significant price correction at earnings announcements. In contrast to Gormsen (2021), who links the time-variation of the equity term structure to the price-dividend ratio, we show that the time-variation is better explained by aggregate market sentiment, suggesting that sentiment-driven investors play a crucial role in the differential pricing of short- and long-duration stocks.

With this, we add to the second stream of the literature, which investigates how biased expectations of investors impacts current market prices and future expected returns. For example, Stambaugh, Yu, and Yuan (2012) show that the returns of anomaly portfolios are higher following high market sentiment. Stambaugh et al. (2015) propose a stock-specific composite mispricing score, using eleven anomalies commonly associated with limits to arbitrage. In this study, we show that returns of long-duration stocks are depressed following high market sentiment, whereas short-duration stocks are not impacted by sentiment. The overvaluation of long-duration stocks with a comparably low institutional ownership stake is consequently corrected at earnings announcements, in line with the idea that the presence of institutional investors leads to more efficient price formation (Boehmer and Kelley, 2009; Boehmer and Wu, 2013; Chang et al., 2015). Together, this translates to a large short-duration premium after periods of high sentiment and stresses the importance of the ability of institutions to process financial information and impound it into market prices.

Lastly, we add to the literature investigating the impact of public news announcements. For FOMC announcements, Bernanke and Kuttner (2005) establish that the aggregate stock market reacts not to target rate changes but only to surprise rate changes. Savor and Wilson (2014) show that the CAPM approximately holds only on FOMC announcement days, and Lucca and Moench (2015) document a persistent pre-FOMC announcement drift, which poses a puzzle to many existing explanation attempts. Hu, Pan, Wang, and Zhu (2022) extend this research to many other macroeconomic news announcements, and Savor and Wilson (2013) show that returns are higher on days of macroeconomic news releases, which Ernst, Gilbert, and Hrdlicka (2019) attribute to a sample selection bias. Liang (2003) argues that earnings announcements provide particularly reliable information about the firm. At the same time, the announcement prompts informed investors to attend to the stock and correct potential misvaluations. For example, Campbell, Ramadorai, and Schwartz (2009) and Alexander, Peterson, and Beardsley (2014) show that institutional investors can anticipate earnings surprises.

2. Decomposing Duration Premia

2.1. *Theory*

This study aims to investigate determinants of the shape of the equity term structure. We examine the return impact of public news announcements conditional on the duration of stocks. Our definition of equity duration is analogous to the Macaulay Duration in the bond market, defined as the expected time it takes for an investment to repay itself.

To understand why news releases impact stocks differently depending on their expected duration, consider a general decomposition of equity yields for stock S over horizon n. Following van Binsbergen (2020), define the average dividend growth over the next n years as

$$g_t^n = \frac{1}{n}\mathbb{E}_t\left[\log\frac{D_{t+n}}{D_t}\right]. \tag{1}$$

The present value of future dividend payments is as follows:

$$P_t^n = D_t \times e^{n(g_t^n - y_t^n - \theta_t^n)}, \tag{2}$$

where $y_{t,n}$ denotes the current yield of a zero bond with maturity n, and $\theta_{t,n}$ the implied dividend risk premium. The current stock price is simply the sum over the present value of all dividend strips:

$$S_t = D_t \times \sum_{n=0}^{\infty} \exp[n(g_t^n - y_t^n - \theta_t^n)]. \tag{3}$$

From this, we calculate the stock's average duration as the weighted sum of future cash flows:

$$
\begin{aligned}
Dur &= \sum_n \omega_{t,n} \times n \\
&= \sum_n \frac{P_t^n}{S_t} \times n \\
&= \frac{D_t}{S_t} \sum_n \exp[n(g_t^n - y_t^n - \theta_t^n)] \times n. \qquad (4)
\end{aligned}
$$

A stock's duration today is a function of the current dividend yield, and expected discounted growth in future dividends. Duration Dur and the current stock price S_t both depend on future dividend growth g, the current yield of long-term government bonds y, and horizon-specific dividend risk premiums θ, which are further analyzed by van Binsbergen (2020). We may also express the n-period bond yield as the sum of today's risk-free rate and a term premium, i.e. $r_t + (y_t^n - r_t)$. Since we are interested in how stocks with different duration react to macroeconomic news, consider stock price changes ΔS_{t+1} in a narrow time window around the news release, for which the current dividend is locally fixed, i.e. $\Delta D_{t+1} \approx 0$, and the change in horizon $\Delta n \approx 0$. Given Equation (3), the stock's raw return depends on changes in expected future growth rates g, changes to the yield curve, y, and changes in the risk premium of future dividends, θ:

$$
\begin{aligned}
\Delta S_{t+1} &\approx D_t \times \sum_{n=0}^{\infty} \big(\exp[n(g_t^n + \Delta g_{t+1}^n - y_t^n - \Delta y_{t+1}^n - \theta_t^n - \Delta\theta_{t+1}^n)] \\
&\qquad - \exp[n(g_t^n - y_t^n - \theta_t^n)]\big) \\
&= \sum_{n=0}^{\infty} D_t \times \big[\exp[n(g_t^n - y_t^n - \theta_t^n)] \times (\exp[n(\Delta g_{t+1}^n - \Delta y_{t+1}^n - \Delta\theta_{t+1}^n)] - 1)\big] \\
\frac{\Delta S_{t+1}}{S_t} &\approx \sum_{n=0}^{\infty} \underbrace{\frac{P_t^n}{S_t}}_{\omega_{t,n}} \times \big[\exp[n(\Delta g_{t+1}^n - \Delta y_{t+1}^n - \Delta\theta_{t+1}^n)] - 1\big] \qquad (5)
\end{aligned}
$$

Stock returns are a function of revisions in the expectations of growth rates, interest rates, and risk premia across future horizons $n \in [0, \infty]$. From this decomposition, we can derive hypotheses for the effects of shocks to expected growth and interest rates. As long as the released information about future growth rates and interest rates prompts agents to shift their expectations about these variables, long-duration stocks will be affected more since the effect on stock returns accumulates over maturity n. This leads to the hypothesis that stocks are positively exposed to shocks to growth expectations, with a stronger effect on long-duration stocks. The opposite applies to interest rate shocks, which negatively impact with stock returns and should have an outsized effect on long-duration stocks.

The Model by Gormsen (2021). We can find an analogous duration-dependent return response in theoretical advances aimed at finding an explanation for the short-duration premium. For instance, Gormsen (2021) has recently proposed a theoretical model that explains the unconditional short-duration premium, as well as its temporal variation. For this, Gormsen (2021) models two sources of risk, dividend and discount rate risk. In the model, the expected return of an n-maturity claim is given by

$$\mathbb{E}[r_{t+1}^{n} - r^{f}] + \frac{1}{2}var(r_{t+1}^{n}) = \lambda_d - \lambda_{x,t} \tag{6}$$

The dividend risk premium λ_d is decreasing in n, driving the unconditional short-duration premium, whereas $\lambda_{x,t}$ is time-varying, increasing in n and dominates dividend risks in bad times, which leads to an upward-sloping term structure.

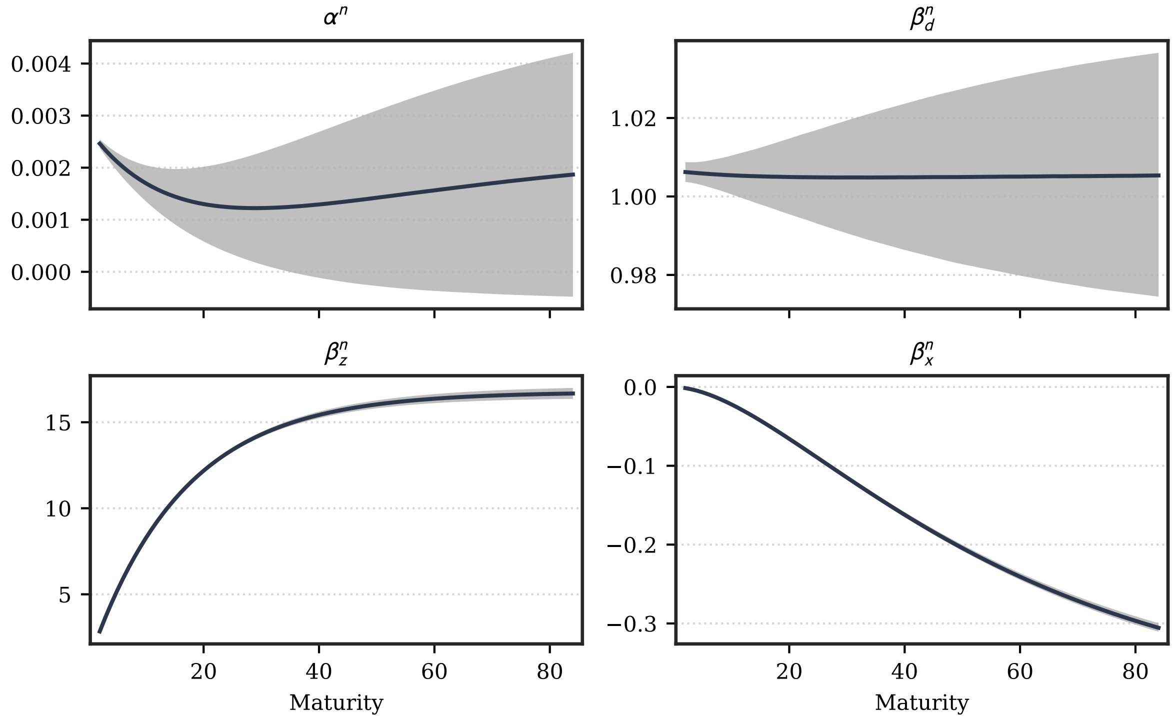
We can derive model-implied realized returns[1] of an n-maturity strip as:

$$\begin{aligned} r_{t+1}^{n} - r^{f} + \frac{1}{2}var(r_{t+1}^{n}) = \\ \lambda_d - \lambda_{x,t} + (\Delta d - E_t[\Delta d]) + B_z^{n-1}(\Delta z - E_t[\Delta z]) + B_x^{n-1}(\Delta x - E_t[\Delta x]). \end{aligned} \tag{7}$$

Realized returns depend on four terms: first, the aforementioned dividend and discount rate risk premia. Then, the responses to unexpected shocks to a) dividends d, b) the long-run dividend growth component z, and c) the price of discount rate risk x. The sensitivity to z-shocks B_z^{n-1} is positive and increasing in maturity n, such that long-term strips are affected more. Conversely, the sensitivity to x-shocks B_x^{n-1} is negatively increasing in n. The returns of long-term dividend strips will react *more negatively* to a

[1]We provide details about the derivation and simulation in Appendix C.

Fig. 1. **Model-Implied Realized Returns of Equity Strips**



This figure presents the model-implied response of realized equity strip excess returns to unexpected shocks. We simulate 10,000 paths of 100 years each and estimate the coefficients in (8) of unexpected dividend shocks (β_d^n), growth rate shocks (β_z^n), discount rate shocks (β_x^n), and a constant (α^n) for different maturities (in months). The black line is the median estimate, while the gray-shaded area denotes the 2.5^{th} and 97.5^{th} percentile.

higher discount rate. The response to short-term dividend news is independent of n.

To see the model-implied response to news about d, z and x, we simulate 10,000 paths with 100 years at a monthly frequency and estimate the following regression:

$$R_t^n - R^f = \alpha^n + \beta_d^n(\Delta d_t - E_t[\Delta d]) + \beta_z^n(\Delta z_t - E_t[\Delta z]) + \beta_x^n(\Delta x_t - E_t[\Delta x]) + \varepsilon_t^n. \quad (8)$$

We report the estimated coefficients in Figure 1. The unconditional return response α^n is decreasing in n, the response to aggregate dividend shocks ($\beta_d^n > 0$) is positive but maturity-independent, the response to shocks in long-run growth positive and monotonically increasing ($\beta_d^z > 0$), and the response to discount rate shocks is monotonically decreasing in n ($\beta_d^x < 0$).

2.2. *Empirical Identification using News Announcements*

We use the decomposition in Equation (5) and the implications from the model by Gormsen (2021) to guide our analysis of news announcement effects on the equity term structure and use public news announcements to isolate the differential return response for stocks with varying duration in a narrow interval around the release time. We consider a wide range of news announcements, which we cluster into three "types". First, we consider Federal Open Market Committee (FOMC) announcements, which provide information about current and future monetary policy (MP). Bernanke and Kuttner (2005) show that surprise target rate changes primarily affect discount rates. Their impact accumulates over the repayment horizon, and consequently should affect long-duration stocks the most.

The second group of announcements comprises those of GDP and nonfarm payroll figures (ECON).[2] Savor and Wilson (2013) find that investors demand higher risk premia on days with ECON announcements. Surprisingly good news about the economy may increase expectations of growth rates g. In the model of Gormsen (2021), the associated return impact accumulates over maturity n, thereby raising prices of long-duration stocks the most. In sum, both MP and ECON surprises should impact long-duration stocks more.

The third group are stock-specific earnings announcements, which provide information about current and potentially future firm-specific earnings. Liang (2003) show that earnings announcements are a particularly important and reliable source of information about a company. In the model of Gormsen (2021), this earnings information is not priced and consequently does not influence returns. However, if we assume that earnings surprises for individual firms are a noisy proxy for aggregate dividends, the model implies a duration-*independent* return response.

[2]We do not include the second and third estimates of GDP, as they are typically considerably less informative. According to the St. Louis Fed, revisions of advanced estimates "may lie in the period over which they are measuring or in the methods used for their collection' but follow 'no obvious pattern". See `https://www.stlouisfed.org/on-the-economy/2014/may/do-revisions-to-gdp-follow-patterns`.

3. Empirical Design

3.1. Data Sources

Stock Data We use daily stock price data provided by CRSP and intraday return data from the NYSE TAQ database between January 1995 and June 2019. Following the literature on cross-sectional asset pricing, we limit our sample to stocks with share codes 10 and 11, trading on the NYSE, AMEX, and NASDAQ (exchange codes 1, 2, 3, 31, 32, 33) and exclude utilities (SIC code between 4900 and 4949) and financials (SIC code between 6000 and 6999). We use trade prices and require that stocks have at least one valid trade per day. To limit the influence of microstructure noise, we follow Gonçalves (2021b) and exclude microcaps, which we define as stocks that fall below the first NYSE market capitalization quintile. Since NYSE stocks have historically been larger than those trading on the other two exchanges, this filter drops around 52% of observations. Finally, we apply a set of filters to assure data quality. For the daily return sample, we require at least 252 observations. In the high-frequency sample, we require that each stock has traded on at least 30 announcements of monetary policy and economic activity.[3] Additionally, we merge the daily stock data with Refinitiv I/B/E/S estimates to obtain data on standardized unexpected earnings.

Duration We follow the methodology of Gonçalves (2021b) and estimate duration using accounting data from COMPUSTAT in a VAR(1) model with 12 state variables that capture the dynamics of the expected future payout, $\mathbb{E}_t[PO_{j,t+n}]$. Duration for stock j is then defined as

$$Dur_{j,t} = \frac{BE_{j,t}}{ME_{j,t}} \times \sum_{n=0}^{\infty} \mathbb{E}_t[PO_{j,t+n}]e^{-nd_{j,t}} \times n, \tag{9}$$

[3] We follow Barbon, Beckmeyer, Buraschi, and Moerke (2021) in the cleaning procedure for the TAQ trade data.

where $d_{j,t}$ is the discount rate, n is the horizon, and $\frac{BE_{j,t}}{ME_{j,t}}$ stock j's value book-to-market (Fama and French, 1993).[4] Figure B2 in the Appendix shows the average duration over time for market capitalization-sorted quintile portfolios. We limit the start date of our analysis to 1995 for two reasons: First, our high-frequency dataset starts in 1995. Second, average duration measures have stayed relatively constant after 1995, which potentially facilitates the identification of announcement effects on the equity term structure.

Options and Institutional Stock Ownership We gather data from OptionMetric's IvyDB US database for equity options written on the stocks in our daily sample. Additionally, we obtain institutional stock ownership data derived from 13-F filings from Thomson Reuters.

3.2. Descriptive Statistics

Table 1 provides summary statistics for the ten duration-sorted portfolios for our daily sample from 1995 through June 2019. We first note the large dispersion in duration for the stocks considered. While the bottom 10% of stocks on average have a duration of 28 years, the top 10% have a duration of about 155 years, roughly three to five times the duration van Binsbergen (2020) estimates for the S&P 500. Second, we note that the log-market capitalization of the stocks is roughly comparable across duration portfolios. The average number of stocks in each portfolio is around 110, for a total of around 1090 stocks per day.[5]

Average returns decrease in the average duration, confirming the overwhelming evidence of a downward-sloping equity term structure.[6] Consistent with market evidence put forth by van Binsbergen and Koijen (2017), the average CAPM-β increases with the

[4] We download the data from Andrei Goncalves website, while we describe the estimation in more detail in Appendix A.

[5] This number may appear low. However, we rigorously exclude stocks with low market capitalization, which already discards more than half of our sample, and regard only those for which we can obtain a duration estimate. These numbers rely on information from Compustat, which may not be available for all stocks. We show that our results hold in a broader sample in the Internet Appendix.

[6] van Binsbergen and Koijen (2017) provide an extensive list of theoretical attempts to explain the downward slope of the equity term structure.

Table 1: **Summary Statistics of Duration Portfolios**

This table presents summary statistics of ten duration-sorted portfolios from 1995 to June 2019. The table reports average duration (Dur), log market size (Size), the average number of unique stocks each month (Stock), annualized returns (Return), volatilities (Std.), Sharpe ratios (SR) and full sample market betas (Beta). Returns and volatilities are in %.

	Dur	log Size	N	Returns	SD	SR	Beta
Lo	27.989	14.020	111	0.118	0.209	0.563	0.996
2	37.513	14.262	111	0.137	0.202	0.676	1.026
3	43.271	14.426	111	0.132	0.200	0.661	1.030
4	47.147	14.698	111	0.132	0.195	0.679	1.020
5	51.473	14.796	110	0.123	0.198	0.622	1.043
6	55.599	14.892	110	0.125	0.201	0.620	1.050
7	60.971	14.978	110	0.112	0.214	0.524	1.086
8	68.329	14.874	110	0.093	0.217	0.426	1.104
9	81.598	14.735	109	0.097	0.235	0.413	1.159
Hi	154.509	14.527	106	0.080	0.269	0.297	1.298

duration of the stock in the cross-section. The beta spread between the high and low duration portfolio is around 0.20, rendering short duration assets "safe" when judged by their sensitivity to systemic risk proxied by market excess returns. As measured by the return volatility, long-duration stocks appear riskier, with an annualized volatility of 26.9%. Lower gross returns and higher return variation correspond to a significantly lower Sharpe ratio for long-duration stocks.

4. Evidence of Duration Premia

We now assess how stock prices react to the news provided at the different announcement days, conditional on the stock's duration. Table 2 reports the results for which we use the following panel regression setup:

$$r_{i,t} - r_{f,t} = \beta_D Dur_{i,t} + \sum_A \left[\beta_X^A X_{i,t}^A + \beta_{X,D}^A (X_{i,t}^A \times Dur_{i,t})\right] + \beta_C C_{i,t} + \epsilon_{i,t}, \qquad (10)$$

where $r_{i,t} - r_{f,t}$ is the daily excess stock return, X is an array of dummies, indicating the presence of a public news announcement on day t. Announcement types are summarized by $A \in$ [MP,ECON,EARN]. $Dur_{i,t}$ is stock i's log-duration, standardized cross-sectionally

Table 2: **Daily Excess Returns on Unconditional News Announcements**
This table reports coefficients from panel regressions of daily excess stock returns on the stock's log duration, dummy variables indicating economic (ECON), monetary policy (MP), or earning news (EARN), and interaction terms. Duration is cross-sectionally standardized. Control variables include the betas from 252-day rolling window regressions on the Fama and French (2015) five factors and momentum. The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dur	−0.013	−0.014	−0.014	−0.016	−0.013	−0.015
	(−3.07)	(−3.32)	(−3.84)	(−4.09)	(−3.03)	(−3.97)
MP	0.262	0.262	0.252	0.252	0.264	0.254
	(2.43)	(2.43)	(2.43)	(2.43)	(2.46)	(2.47)
× Dur		0.019		0.019	0.020	0.020
		(1.14)		(1.14)	(1.25)	(1.24)
ECON	0.165	0.165	0.170	0.170	0.163	0.167
	(2.28)	(2.28)	(2.40)	(2.40)	(2.25)	(2.36)
× Dur		0.041		0.041	0.037	0.037
		(3.38)		(3.38)	(3.02)	(3.01)
EARN	0.164	0.164	0.164	0.164	0.161	0.160
	(4.90)	(4.92)	(5.24)	(5.26)	(4.86)	(5.17)
× Dur		−0.128		−0.128	−0.132	−0.132
		(−5.16)		(−5.19)	(−5.22)	(−5.25)
Controls	No	No	No	No	Yes	Yes
Time FE	No	No	Yes	Yes	No	Yes
Entity FE	Yes	Yes	Yes	Yes	Yes	Yes
N	6,607,603	6,607,603	6,607,603	6,607,603	6,436,659	6,436,659
R^2	0.071	0.075	0.071	0.075	0.075	0.073

at each time t. Standardizing allows for an easy interpretation of the coefficient β_D, such that it denotes the average return spread between two stocks with a difference in their duration of one cross-sectional standard deviation. Our main interest lies is in the interaction between $Dur_{i,t}$ and dummies $X^A_{i,t}$, which measures the *additional* duration premium earned around a specific announcement type. $C_{i,t}$ collects a set of control variables. We include the betas from the Fama and French (2015) five-factor model plus momentum estimated from 252-day rolling window regressions. To control for time-invariant characteristics and the state of the economy, we also include entity and date fixed effects. We cluster standard errors at the firm and year-month level.

On the average non-announcement day, daily stock returns are negatively related to duration. Estimates range from −1.3 bps to −1.6 bps per day for a two standard deviation cross-sectional difference in duration, which confirms the existence of a short-duration premium in our dataset. The average return response to all three types of announcements is positive. In the most conservative model in column (6), it amounts to 27 bps for MP, 17 bps for ECON, and 16 bps for EARN days. These results are statistically significant at the 5% level over all model specifications and agree with previous findings in the literature (Bernard and Thomas, 1989a; Savor and Wilson, 2013).

Does the slope of the equity term structure depend on the information released on a given day? We find strong affirmative evidence. On monetary policy announcement days (MP), there is a positive albeit insignificant impact of *Dur* on realized returns. We cannot reject the null that duration premia on MP days coincide with the unconditional premium. However, adding up the two reveals that the total duration spread on MP days is indistinguishable from zero: the equity term structure is flat for monetary policy announcements. The duration-dependent response on ECON days is positive. A two standard deviations duration spread leads to 8.1 bps to 8.2 bps higher daily excess returns (t-values > 3.0). This additional, duration-specific response is larger than the average short duration premium, such that the equity term structure slopes upward on these days.

For earnings announcements, we find the most robust response of duration premia. A two standard deviation cross-sectional difference in duration translates into an *additional* return response of short-duration stocks of 26 bps. Results are highly significant with t-statistics below -5.[7]

4.1. High-Frequency Response to Macroeconomic Announcements

Following the risk-based decomposition in Equation (5), we hypothesize that better-than-expected economic growth and lower-than-expected interest rate expectations lead to higher returns for long-duration stocks compared to short-duration stocks. For this, we study stock returns in a high-frequency window surrounding the release time of public

[7] These findings are confirmed in Figure B1, which shows average returns on (non-)announcement days.

Table 3: **High-Frequency Regressions on Monetary Policy and Economic News**
This table reports coefficients from panel regressions of high-frequency excess stock returns on the stock's log duration, expected and surprising shocks derived from the policy indicator measure of Nakamura and Steinsson (2018) at FOMC announcement days and a economic long-term measure derived from Bloomberg median forecasts (Scotti, 2016), estimated in (12). Duration is cross-sectionally standardized. Returns and explanatory variables are measured 10 minutes before and 20 minutes after the FOMC announcement and 120 minutes after the market opening for ECON announcements. Control variables include the betas from 252-day rolling window regressions on the Fama and French (2015) five factors and momentum. The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t}^{\text{intraday}} - r_{f,t}$.

	MP			ECON		
Dur	−0.006	−0.006	−0.003	0.018	0.010	0.008
	(−1.58)	(−1.51)	(−0.97)	(1.76)	(0.87)	(0.74)
Δx^e	0.343	0.343	0.341	0.304	0.304	0.253
	(1.91)	(1.91)	(1.91)	(1.17)	(1.17)	(0.86)
× Dur		0.015	0.015		0.084	0.086
		(0.87)	(0.87)		(2.27)	(2.34)
Δx^p	−5.105	−5.105	−5.104	0.384	0.384	0.322
	(−5.22)	(−5.22)	(−5.20)	(0.92)	(0.92)	(0.74)
× Dur		−0.350	−0.359		0.141	0.141
		(−2.66)	(−2.72)		(2.33)	(2.33)
Controls	No	No	Yes	No	No	Yes
N	171,202	171,202	171,202	330,204	330,204	330,204
R^2	5.238	5.262	5.352	0.124	0.135	0.172

news announcements and estimate the following regression model:

$$r_{i,t}^{\text{intraday}} - r_{f,t} = \beta_D Dur_{i,t} + \beta_{x^e} x_t^e + \beta_{x^e,D}(x_t^e \times Dur_{i,t}) + \beta_{x^p} x_t^p + \beta_{x^p,D}(x_t^p \times Dur_{i,t}) + \beta_C C_{i,t} + \epsilon_{i,t}, \quad (11)$$

where $r_{i,t}^{\text{intraday}} - r_{f,t}$ is the high-frequency excess stock return, $Dur_{i,t}$ stock i's cross-sectionally standardized log duration at t, x_t^e the expected news component of the upcoming announcement and x_t^p information about the path of future interest rates (Nakamura and Steinsson, 2018) or revisions in growth rates. We again include control variables $C_{i,t}$ and fixed effects.

For **monetary policy announcements**, let Δi^p measure implicit "forward guidance" provided at a FOMC meetings, in the spirit of Nakamura and Steinsson (2018). It captures revisions in investor expectations about the level of *future* interest rates. We measure the interest rate path shock Δi^p as well as stock returns in a window from 10 minutes before to 20 minutes after the announcement time.[8] Results are provided in the left panel of Table 3. In line with risk-based impounding of news about future interest rates, we find both a negative unconditional coefficient to Δi^p, as well as an additional negative response of long-duration stocks. A 1% increase in expected future interest rates translates to negative returns of -5.1% across all stocks and an additional duration-based return spread of roughly -0.72% for two stocks whose duration differs by two standard deviations. The expected news component released at monetary policy announcements has no impact on stock returns or the duration-specific return component.

Since **announcements of economic activity** (GDP and NFP) are typically released before the stock market opens, we measure stock returns from last day's close until 120 minutes after the opening. We choose this interval to account for the trade-off between noisy returns at the market open and a sufficiently narrow identification window. Following Scotti (2016), we proxy expectations $\Delta\overline{g}^e$ using Bloomberg median forecasts of GDP growth and employment numbers in advance of GDP and NFP announcements, respectively. Analogous to monetary policy's forward guidance, we aim to measure changes in the expectations of future economic activity $\Delta\overline{g}^p$. Due to the lack of a time structure of survey forecasts, we calculate $\Delta\overline{g}^p$ as:

$$\Delta\overline{g}^p_t = \Delta\overline{g}^e_{t+1} - \Delta\overline{g}^r_t, \tag{12}$$

i.e., the difference of the expectation of economic activity at $t+1$ and the realized change today. Crucially, this definition assumes that the participants of Bloomberg surveys immediately update their forecast at announcement day t and do not substantially change this expectation until $t+1$. However, as we only look at a high-frequency period following the *current* announcement, the economic information that becomes available between t and $t+1$ may only affect $\Delta\overline{g}^p_t$ but not the return response $r^{\text{intraday}}_{i,t}$ around the time-t

[8]We download the data from Emi Nakamura's webpage.

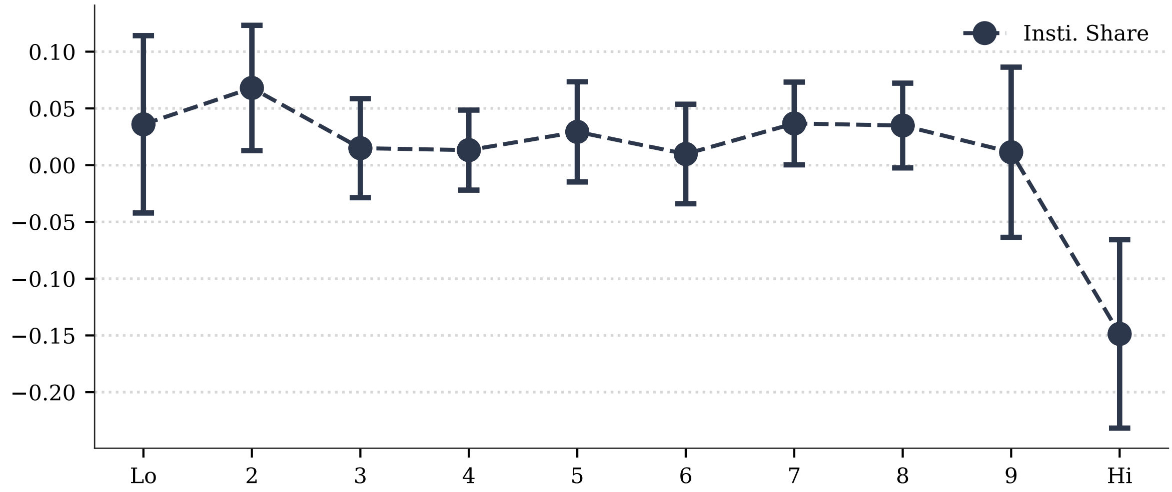
announcement. While Δg^p does not impact high-frequency announcement returns itself, its interaction with *Dur* does, see Table 3. Stocks with longer duration realize higher returns around the news announcement: a two standard deviation duration spread leads to additional returns of 0.28%.

Our empirical identification using announcement surprises hinges on the assumption that these surprises lead to revisions in the expectations of the determinants of stock returns. In line with this, we find a negative, maturity-specific response to interest rate path shocks, as well as a positive, maturity-specific response to information about economic prospects (see Table 3). The empirical and model-implied maturity-dependent return responses agree and support the conjecture that the *dominant* news component is about interest rates for MP and about growth rates for ECON announcements. The return response to both types of macroeconomic announcements is in line with the model's predictions and a risk-based explanation. However, contrary to the predictions made by the model of Gormsen (2021) and the decomposition in Equation (5), we find that earnings announcements play a dominant role for the magnitude and existence of the short-duration premium.

5. Behavioral Biases, Mispricing and Sentiment

Equity duration premia are flat or positive on macroeconomic announcement days but significantly negative if company-specific earnings news is released. Empirically, we have tied the high-frequency response of the duration premium to investors learning about future interest rates and the expected economic trajectory. However, prevailing theoretical asset pricing models fail to find an explanation for the short-duration premium on earnings announcements, which constitute a large part of the premium. In this section, we test if instead behavioral biases and the presence of sentiment-driven investors can explain the short-duration premium.

Fig. 2. **Share of Institutional Stock Ownership**



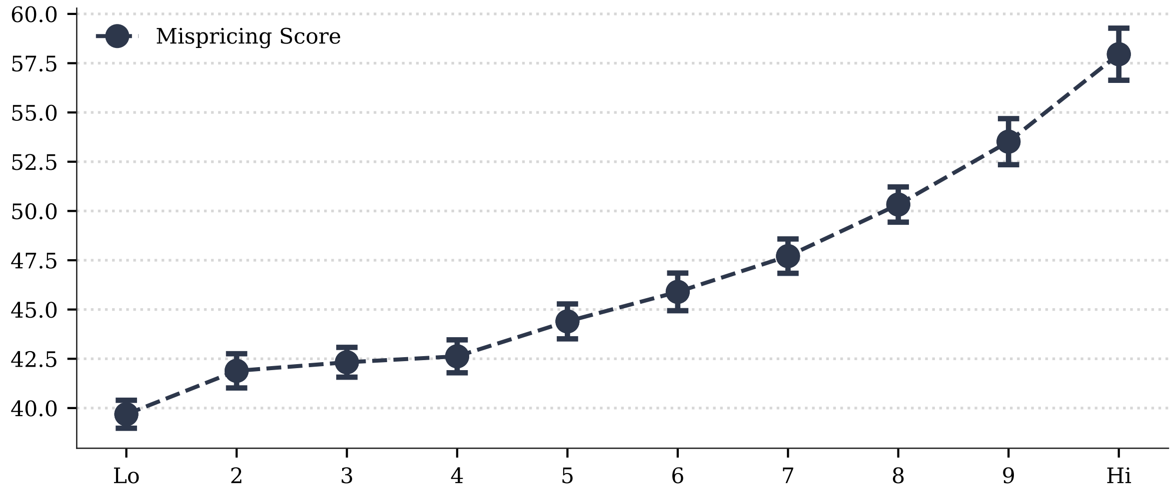
This figure shows the average standardized share of stock ownership of 13-F investors of duration-sorted portfolios, as well as a symmetric one standard-deviation confidence bound. The institutional ownership share is cross-sectionally standardized. The sample period is from January 1995 to December 2018.

5.1. New Facts about Long-Duration Stocks

The recent literature has focused on short-duration stocks and in which dimensions they are potentially more risky than long-duration stocks. In contrast, we put our focus on long-duration stocks and present a number of novel facts which suggest that they play a pivotal role in explaining the unconditional short-duration premium.

Long-Duration Stocks have the Lowest Institutional Ownership Share. It is well established that the presence of institutional investors increases the efficiency of market prices (Boehmer and Kelley, 2009; Boehmer and Wu, 2013). They possess a greater ability to process information and thus diffuse it faster (Chang et al., 2015). To this end, Campbell et al. (2009) and Alexander et al. (2014) show that institutional investors can anticipate earnings surprises. We therefore investigate whether the share of institutional ownership differs in stocks with different duration, for which we provide first visual evidence in Figure 2. The average institutional ownership level is highest for stocks with the shortest duration and lowest for long-duration stocks. As far as institutional investors possess an increased ability to process information, we expect lower

Fig. 3. **Average Mispricing Score of Duration-sorted Portfolios**



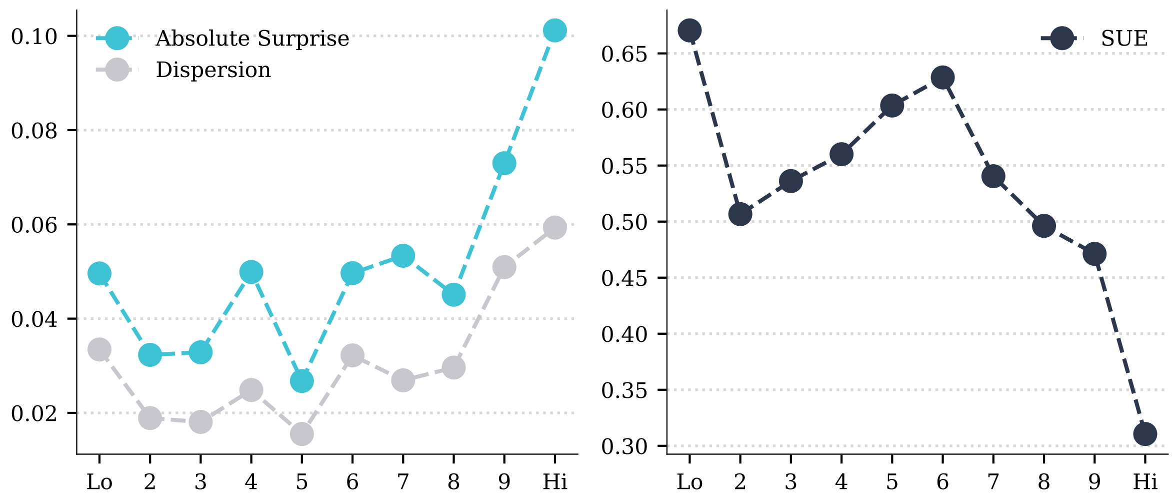
This figure shows the average mispricing score following Stambaugh et al. (2015) for the ten duration portfolios, as well as a symmetric one standard-deviation confidence bound. The sample period is from January 1995 to December 2016, limited by the availability of the mispricing score taken from Robert Stambaugh's website: `https://finance.wharton.upenn.edu/~stambaug/`.

price efficiency and a higher propensity for price biases for long-duration stocks.

Long-Duration Stocks are Overpriced and Attract Retail Attention. Stambaugh et al. (2015) propose a stock-level mispricing measure by a combined ranking of eleven anomaly firm characteristics. A higher mispricing score indicates that the respective stock is expected to be more overvalued relative to the remaining cross-section. In Figure 3, we show the average Stambaugh et al. (2015) mispricing score for each duration decile portfolio, as well as its standard deviation over time. We find a uniform increase in the average mispricing score as we increase the duration of the stocks considered. At the same time, the time-series fluctuation of the average portfolio mispricing score is small. The mispricing score of the long-duration stock is more than 18 points higher than for the average short-duration stock, suggesting that long-duration stocks are in fact on average more overvalued.

Long-duration stocks are held less by institutional investors. The literature has also proposed multiple measures of retail attention for individual stocks. Bali, Cakici, and Whitelaw (2011) show that stocks that experience a large positive return in the preceding

Fig. 4. **Average Earning Forecast Surprises and Dispersion**



This figure shows average forecast surprises, forecast dispersion, and standardized unexpected earnings (SUE) of duration-sorted portfolios. Forecast surprises are the difference of the realized earnings per share and analysts' forecasts, while the dispersion is the standard deviation of all analysts' forecasts. SUE is the ratio of forecast surprises and dispersion. All variables are standardized using the full sample. The sample period is from 1995 to June 2019.

21 trading days underperform in the next month and link their MAX measure to lottery preferences of retail investors. Cosemans and Frehen (2021) show that stocks with the largest *absolute* returns over the last preceding 21 trading days attract more attention by retail investors, which leads to their overvaluation, in line with salience theory. Another proxy proposed is the maximum daily volume over the last 21 trading days, consistent with the evidence put forth by Gervais, Kaniel, and Mingelgrin (2001) that higher volume increases a stock's visibility. For all proxies, Figure B3 shows that long-duration stocks on average attract more attention from retail investors.

Long-Duration Stocks Exhibit the Largest Earnings Forecast Errors. Earnings announcements are an important source of information for pricing individual stocks (Liang, 2003). The information provided may impact stock prices in two ways: first, by providing a reliable signal for current and future cash flows that investors use to adjust their beliefs and second, by resolving uncertainty associated with these estimates.

We follow the literature and define SUE as

$$\text{SUE}_{i,t} = \frac{surp_{i,t}}{\sigma(\text{SUE}_{i,t})}, \tag{13}$$

where *surp* denotes the analyst earnings forecast error and σ(SUE) the dispersion in analysts' forecasts. The left panel of Figure 4 shows that cash-flows for long-duration stocks are on average harder to pin down: we find that analysts disagree more when forecasting their earnings. At the same time, the average absolute earnings surprise is by far the highest for these stocks. Hence, it is rather the long-duration stocks which receive significant news that potentially triggers large price adjustments. In the right panel of Figure 4 we find the largest standardized surprises for short- and the smallest for long-duration stocks. Short-duration stocks have a higher degree of earnings news for the same level of analyst uncertainty. It raises the question whether this may drive the short-duration premium.

5.2. Earnings Surprises, Price Efficiency, and Duration Premia

News about current cash-flows are potentially more important for short-duration stocks, as these stocks are expected to realize a larger chunk of their lifetime cash-flows in the near future. In contrast, the model of Gormsen (2021) suggest that shocks to today's dividends have a maturity-*independent* impact on realized returns. To investigate the impact of earnings surprises on duration premia, we regress earnings announcement returns on a stock's duration, SUE, and the interaction of the two. We consider a cross-sectionally standardized measure of SUE. Specifically, we compare the SUE of firm i on earnings day t with the distribution of SUE measured over the last quarter. While this does not perfectly coincide with a firm's fiscal quarter, it allows us to account for shifts in the average level of surprises as well as its dispersion over time. This approach puts the surprise figures across firms and over time on an equal footing: particularly positive earnings numbers for a target firm may be even more surprising during an otherwise abysmal earnings season.

Table 4: **Panel Regression on Earning Forecast Surprises and Dispersion**

This table reports coefficients from panel regressions of excess stock returns on earnings announcement days on the stock's log duration, standardized unexpected earnings (SUE), and its interaction. Duration and SUE are cross-sectionally standardized. Control variables include the betas from 252-day rolling window regressions on the Fama and French (2015) five factors and momentum. We split the sample based on average standardized institutional ownership share (columns 3 and 4) and average standardized mispricing scores (columns 5 and 6). The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)	(5)
Dur	−0.096	−0.015	−0.173	−0.108	−0.064
	(−3.87)	(−0.50)	(−4.27)	(−3.03)	(−1.60)
SUE	0.631	0.613	0.649	0.644	0.529
	(36.76)	(29.79)	(25.05)	(26.16)	(24.11)
Dur × SUE	−0.039	−0.072	0.000	−0.003	−0.129
	(−2.11)	(−3.19)	(0.01)	(−0.11)	(−4.57)
Insti. Share	-	High	Low	-	-
Mispricing	-	-	-	High	Low
Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
N	98,728	62,963	35,765	44,602	43,212
R^2	2.493	2.847	2.362	1.873	2.960

The coefficient of SUE in column (1) of Table 4 shows that positive earnings surprises are followed by a positive return response. The interaction between SUE and duration is significantly negative: positive earnings surprises lead to higher returns for short-duration stocks, such that a two standard deviation difference in duration translates to 7.8 bps higher returns on the announcement day. This result is consistent with rational updating of beliefs after a positive earnings surprise, as current cash-flows represent a larger share of the sum of all future cash-flows for stocks with shorter duration. Prices of these stocks consequently respond more to surprises in today's earnings. At the same time, the unconditional return impact of duration is negative and highly significant, stressing that SUE alone cannot explain the short-duration premium on earnings announcement days.

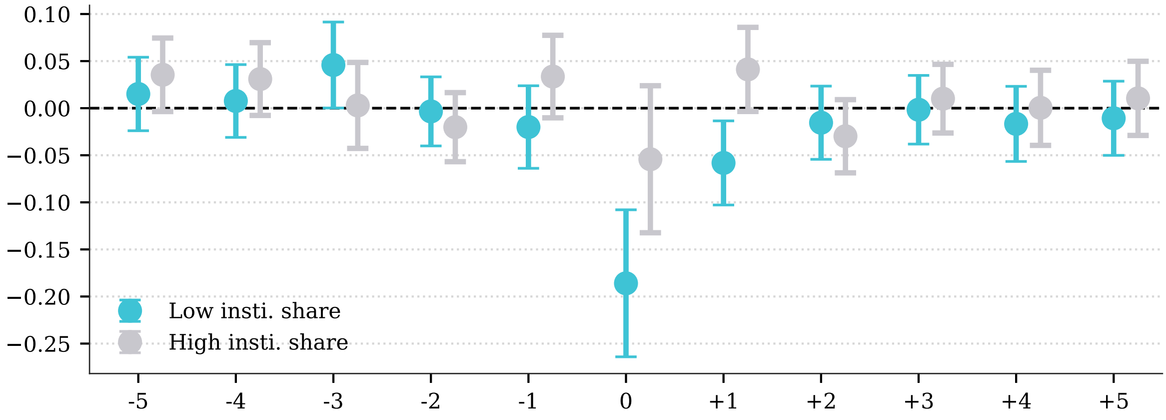
Next up, we introduce the stylized facts described in Section 5.1 and partition our sample by the share of institutional ownership and the Stambaugh and Yuan (2017) mispricing score. Specifically, columns (2) and (3) of Table 4 repeat the previous exercise but for two subsamples, split by the mean institutional ownership in a given quarter.

For stocks with a high institutional ownership share (column 2), we again find a positive return response to positive earnings surprises, as well as an additional but negative response for stocks with short duration. As discussed before, this is in line with rational updating of beliefs. What is intriguing here is that we find no evidence of a duration-driven return response apart from its interaction with the earnings surprise. The results for stocks with low institutional interest (column 3) show the opposite: the interaction between SUE and duration is insignificant – both statistically and economically – whereas the return impact of duration alone is negative and highly significant.

In columns (4) and (5) of Table 4, we provide evidence based on subsamples of stocks with high vs. low mispricing scores. A high mispricing score suggests that the stock is *relatively* more overpriced. Consistent with the evidence using institutional ownership, the regression coefficient for duration is negative and highly significant for overpriced stocks (column 4), but insignificant for less overpriced stocks. At the same time, the interaction between duration and SUE has no return impact among overpriced stocks, whereas it does for stocks in the subsample with low mispricing scores. Together, these results suggest that increased investor attention for the target firm due to the upcoming announcement prompts institutional investors to step in and correct the overvaluation of long-duration stocks. For larger institutional ownership, instead, the duration-driven return response solely depends on the surprise component of earnings, consistent with rational information processing.

Post-Earnings Announcement Reversal. Long-duration stocks are overvalued, driven by a comparative lack of institutional ownership. This overvaluation is consequently corrected at earnings announcements, which bring about additional publicity and attention by institutional investors for the respective company (Liang, 2003). We now investigate the speed at which the overvaluation of long-duration stocks is corrected. Furthermore, if what we observe on earnings announcements is indeed a correction of mispricing, we should observe no reversal effects of this pattern in the subsequent days, which instead points towards over- or underreaction. To this end, we follow the literature on the post-

Fig. 5. **Duration Premia around Earnings Announcement**



This figure shows coefficients from panel regressions of daily excess stock returns on the interaction of the stock's log duration with dummy variables denoting the days between five days before (-5) and after (+5) the earnings announcement. Duration is cross-sectionally standardized. The sample period is from January 1995 to June 2019. The whiskers represent the 95% confidence interval computed using standard errors clustered at the firm and day level.

earnings-announcement drift (PEAD), which describes the empirical phenomenon of a continuing return drift for several weeks *after* the release of earnings numbers (Bernard and Thomas, 1989b, 1990). Specifically, we set up the following regression:

$$r_{i,t} - r_{f,t} = \sum_{\tau=-5}^{5} \gamma_\tau \times \text{EARN}_{i,t+\tau} \times \text{Dur}_{i,t} + \epsilon_{i,t}. \tag{14}$$

In Figure 5 we plot the corresponding coefficients γ_τ for $\tau \in [-5, +5]$, which capture the duration response around the earnings announcement on day t.

The evidence is clear: on the announcement day, as well as the following day we find a correction of the overvaluation of long-duration stocks in the form of a pronounced short-duration premium. Crucially, this occurs only in the subsample of stocks with a low share of institutional ownership. Stocks with high institutional interest experience no price correction, indicating that there existed no comparative mispricing between long- and short-duration stocks before the announcement. These results suggest that the mispricing correction on earnings release days is swift and not subsumed by a subsequent reversal.

5.3. *The Duration Premium and Sentiment-driven Trading*

Earnings announcements provide particularly reliable information for individual firms. However, long-duration stocks with little institutional interest consistently earn lower returns on earnings announcement days for no reason related to the provided earnings news. We link this finding to a price correction for previously overvalued stocks, assuming a behavioral explanation. This argument also explains the short-duration premium: non-institutional investors show particular interest in long-duration stocks, driving up their prices today, and consequently pushing down future expected returns. Increased attention at earnings announcements, as well as the high reliability of the released information triggers other – better informed – investors to step in and correct the overvaluation, which results in the pronounced short-duration premium on earnings announcement days.

We investigate this line of reasoning in more detail by following Stambaugh et al. (2012), who explain eleven asset pricing anomalies based on short-sale constraints and sentiment-induced overpricing. They argue that in times of high market sentiment, sentiment investors drive prices of the short position of the anomalies up, which consequently lowers their expected returns. If non-institutional investors trade by sentiment, the duration premium is connected to stock-level mispricing, which in turn supports the argument that long-duration stocks are overvalued. In the following, we test three hypotheses derived from this argument: first, the short-duration premium should be most pronounced following high sentiment periods. Second, this effect should be caused by long-duration stocks, as many non-institutional – sentiment-driven – investors own and trade these stocks, leading to their overvaluation. Third, the high share of institutional ownership of short-duration stocks leads to more efficient prices. Consequently, we expect that prices of short-duration stocks are less affected by market sentiment.

To test these hypotheses, we follow Stambaugh et al. (2012) and use the index of Baker and Wurgler (2006) to proxy for aggregate market sentiment.[9] First, we compare average returns of the long and short duration decile portfolios, as well the long-short

[9]With this, we extend the sentiment analysis of Weber (2018) to daily return data.

spread portfolio following periods of high and low market sentiment. We use the median sentiment to partition the sample. Apart from raw returns, we also consider returns in excess of common factor exposure:

$$R_{i,t} = \alpha_L d_{L,t} + \alpha_H d_{H,t} + \beta_{Mkt} Mkt_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \epsilon_{i,t}, \quad (15)$$

where $d_{H,t}$ and $d_{L,t}$ are dummy variables indicating high- and low-sentiment in the previous month, and $R_{i,t}$ is the annualized daily excess return of the lowest, highest, and high-minus-low duration portfolio. Mkt, SMB, and HML are the Fama and French (1993) factors.

Panel A of Table 5 shows that the short-duration premium is particularly pronounced whenever market sentiment was high in the previous month. The difference between the short-minus-long duration premium during states of high and low market sentiment is highly significant for excess returns (14.14% per year, $t = 2.63$) as well as Fama and French (1993)-adjusted returns (10.74% per year, $t = 2.29$). We further see that the short duration premium is negative but insignificant following low investor sentiment. Importantly, only long-duration stocks show a significant response to market sentiment, wherein the benchmark-adjusted high-minus-low sentiment return is statistically significant (-7.86, $t = -2.11$). Returns of short-duration stocks, instead, show no reaction.

Time Variation. A recent paper by Gormsen (2021) shows that duration premia are countercyclical: they are positive in bad but negative in good states.[10] To investigate whether sentiment-driven trading relates to the time variation of the duration premium, we regress it on last month's sentiment, the log dividend-price ratio, or both:

$$R_{i,t} = \alpha + \beta^{Sent} Sent_{t-1} + \beta^{dp} dp_{t-1} + \epsilon_{i,t}. \quad (16)$$

The predictive regressions using sentiment as the sole predictor confirm the results from the portfolio sorts. Market sentiment positively predicts the duration premium at the 5%

[10] A similar finding is given in Bansal et al. (2021).

Table 5: **Duration Premia and Market Sentiment**

This table shows the results from average duration premia and predictive regressions conditional on market sentiment. Panel A shows the average annualized daily excess returns of the duration portfolios following months with high or low market sentiment. Months are classified as to whether the sentiment index was higher or lower than the full sample median. Returns are either excess returns (R) or benchmark-adjusted with the Fama and French (1993) factors (R_{FF}). Panel B shows coefficients from predictive regressions of the market sentiment index and the log dividend-price ratio from the previous month on excess returns. Short (long) duration are the lowest (highest) decile portfolios sorted on duration. Market sentiment is measured by the index of Baker and Wurgler (2006). T-statistics are reported in parentheses using (White, 1980) standard errors in Panel A Newey and West (1987) standard errors with 10 lags in Panel B.

Panel A: Portfolio Sorts									
	Short Dur			Long Dur			Short-Long Dur		
	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
R	13.943	9.847	-4.096	17.113	-1.124	-18.237	-3.17	10.971	14.141
	(1.94)	(1.93)	(-0.47)	(1.93)	(-0.16)	(-1.62)	(-0.79)	(3.07)	(2.63)
R_{FF}	0.714	3.595	2.881	0.023	-7.841	-7.863	0.691	11.435	10.744
	(0.3)	(1.97)	(0.96)	(0.01)	(-3.2)	(-2.11)	(0.19)	(3.85)	(2.29)

Panel B: Predictive Regressions									
	Short Dur			Long Dur			Short-Long Dur		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sent	-2.738		-4.809	-20.916		-22.853	18.178		18.044
	(-0.33)		(-0.57)	(-1.62)		(-1.74)	(2.39)		(2.39)
dp		-6.71	-13.458		19.478	-12.588		-26.188	-0.87
		(-0.2)	(-0.39)		(0.46)	(-0.29)		(-1.38)	(-0.05)
R^2	-0.0	-0.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0
N	6021.0	6021.0	6021.0	6021.0	6021.0	6021.0	6021.0	6021.0	6021.0

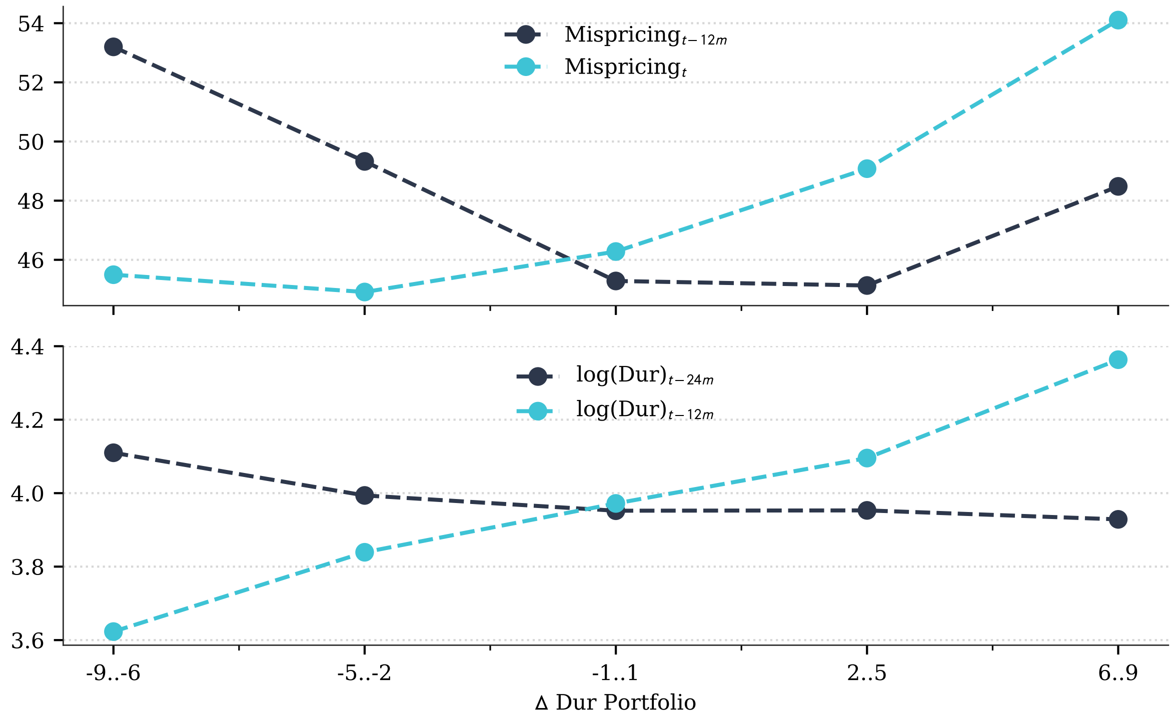
level, caused by higher returns for long-duration (the coefficient of *Sent* is insignificant in this specification, but its economic magnitude is large). Furthermore, market sentiment has no predictive power over excess returns of the short-duration portfolios.

In contrast to Gormsen (2021), we find no significant relationship between the duration premium and the log dividend-price ratio using single equities. The coefficient's sign is in line with the story developed in Gormsen (2021) but its magnitude insignificant: bad states with a high dividend-price ratio coincide with a lower annualized short-long duration premia of -26.2% ($t = -1.38$), indicating an upward-sloping term structure. When we also include the market sentiment index, the relationship between the log dividend-price ratio and the duration premium vanishes in full. The coefficient for market sentiment remains unchanged and significant at the 5% level, establishing a tight link between sentiment-driven trading and the sign and magnitude of the duration premium.

The short-duration premium varies over time. Gormsen (2021) explains this fact in a theoretical asset pricing model where stock prices are exposed to two priced risk factors, namely dividend and discount rate risk. The former causes the existence of the short-duration premium unconditionally, while the latter increases in bad economic states and induces a temporarily upward-sloping term structure. Our analysis suggests that an alternative mechanism better matches the data: sentiment-driven investors with biased expectations purchase long-duration stocks during good times, which inflates their prices, pushes expected returns downward, and ultimately results in a premium for short-duration stocks. In bad times, these investors leave the market and the larger capability of institutions to process information translates to more efficient prices also in long-duration stocks. In line with risk-based arguments used in leading equilibrium models, we find a long-duration premium in bad times. In contrast to recently introduced models which match the average downward-sloping equity term structure by introducing additional risk factors (Gormsen, 2021; Gonçalves, 2021a), this mechanism has one major advantage: it predicts an upward-sloping term structure when sentiment-driven investors leave the market, in line with leading theoretical asset pricing models (van Binsbergen and Koijen, 2017). We leave to future research an augmentation of these models with sentiment-driven trading.

An Increase in Duration Leads to Overpricing. Do stocks that migrate from being short- to long-duration become more overpriced? In each month t, we sort stocks into deciles by their cash-flow duration. Next, we form groups by how much a stock's duration deciles *changes* between months $t-24m$ and $-12m$. For example, the duration portfolio of stocks in bucket $-9..-6$ decreased by 6 to 9 deciles in twelve months. Consequently, the stocks used to have a comparably high duration in $t-24m$, but migrated to being short-duration stocks by the end of $t-12m$. The lower panel in Figure 6 shows the

Fig. 6. **Change in Duration vs. Change in Stambaugh and Yuan (2017) Mispricing.**



This figure shows in the upper panel the average change in the Stambaugh and Yuan (2017) mispricing measure over months $t-12m$ to t for stocks for which their cross-sectional duration decile changed over months $t-24m$ to $t-12m$. We separately show results for stocks for which the duration decile changed by $-9..-6$, $-5..-2$, $-1..1$, 2..5 and 6..9 portfolios. In the lower panel we show the average log duration of the stocks in each ΔDur Portfolio.

average log duration for these migration portfolios. While the average duration is fairly similar in month $t-24m$, it decreases (increases) by around -50% ($+40\%$) for stocks in migration portfolio $-9..-6$ (6..9) in the following twelve months. Consistent with an amplified attention paid by sentiment-driven investors, the upper panel of Figure 6 shows that this change in duration translates into a severe increase in the average Stambaugh et al. (2015) mispricing score for stocks that migrated to the long-duration portfolio (6..9) by the end of month t. Conversely, the mispricing score for stocks which decreased most in duration decreases by about eight points *on average*. This finding provides a direct link between a relative overvaluation of stocks with long cash-flow duration.

6. Robustness

In this section, we highlight the robustness of our results.

Cash-flow vs. Discount Rate News. Individual stock returns are dominated by information about cash-flows (Vuolteenaho, 2002; Engelberg, McLean, and Pontiff, 2018; Lochstoer and Tetlock, 2020). Our measure of duration is intimately linked to news about *future* cash-flows. To ascertain that our results are driven by an overvaluation of long-duration stocks and not differences in the pricing of cash-flow news altogether, we apply the return decomposition framework of Campbell and Shiller (1988) to stock returns in the cross-section (Vuolteenaho, 2002). Specifically, we set up the following VAR process using quarterly (q) information:

$$Z_{i,q} = \Gamma Z_{i,q-1} + \varepsilon_{i,q}, \tag{17}$$

where $Z_{i,q}$ is a firm-specific vector containing the stock's return as the first element, the firm's return on equity and its book-to-market ratio. We estimate the VAR using quarterly data, which we obtain from Compustat and CRSP following the construction in Hou, Mo, Xue, and Zhang (2019).

Vuolteenaho (2002) shows that stock returns may be decomposed into cash-flow and discount rate news shocks. We can back out the discount rate (dr) and cash-flow (cf) news components as,

$$dr_{i,q} = e_1' \rho\Gamma(I - \rho\Gamma)^{-1} \varepsilon_{i,q}, \qquad cf_{i,q} = e_1' \left[I + \rho\Gamma(I - \rho\Gamma)^{-1} \right] \varepsilon_{i,q} \tag{18}$$

where I is a 3×3 identity matrix, $e_1 = [1, 0, 0]'$ and $\rho = 0.99$.

The return decomposition requires the use of accounting data, which are at best available at the quarterly frequency. We therefore compute the relative share of cash-flow news realized over quarter q and relate it to the return dynamics on announcement day

Table 6: **Panel Regressions on Share of Cash Flow News**

This table reports coefficients from panel regressions of daily excess stock returns on the stock's log duration, dummy variables indicating economic (ECON), monetary policy (MP), or earning news (EARN), and interaction terms with duration and the cash flow news component (CF Share). We follow Hu et al. (2022) and estimate CF Share using quarterly data according to (19). Duration is cross-sectionally standardized. Control variables include the betas from 252-day rolling window regressions on the Fama and French (2015) five factors and momentum. The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dur	−0.006	−0.005	0.021	0.021	−0.124	−0.118
	(−0.43)	(−0.40)	(2.07)	(2.08)	(−4.62)	(−4.52)
CF Share	0.038	0.038	0.039	0.039	0.222	0.225
	(2.15)	(2.16)	(3.49)	(3.51)	(5.99)	(6.08)
Dur × CF Share		−0.005		−0.000		−0.054
		(−0.45)		(−0.04)		(−2.08)
Announcement	MP	MP	ECON	ECON	EARN	EARN
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	230,220	230,220	399,219	399,219	103,601	103,601
R^2	0.760	0.760	0.490	0.490	-0.033	-0.027

t, which falls within quarter q:

$$\text{CF Share}_{i,t\in q} = \frac{|cf_{i,q}|}{|cf_{i,q}| + |dr_{i,q}|} \tag{19}$$

A higher share of cash-flow news may convey more information about the timing and magnitude of current and future payoffs, translating into changes in expected duration.

The inclusion of CF Share in Table 6 has no impact on how a stock's duration impacts returns unconditionally or for any of the announcement types considered. Instead, a higher level of cash-flow news in a given quarter translates to a positive return response for earnings announcements. Interestingly, the interaction between duration and CF Share is negative and significant. A larger cash-flow news shock translates to a more significant negative return response of long-duration stocks. An earnings announcement that is particularly informative about future cash flows potentially attracts higher attention from institutional investors, which more aggressively correct the overvaluation of these stocks. There is no independent nor duration-dependent impact of CF Share on the macroeconomic announcement days.

Ex-Ante News Sensitivity. We follow Ai et al. (Forthcoming, 2021) to compute a stock-specific ex-ante sensitivity to an upcoming news announcement, using traded option prices. The authors show that stocks with high news sensitivity enjoy significantly higher returns on FOMC announcement days. We measure the ex-ante sensitivity to an announcement on day t as the increase in the stock's short-term at-the-money implied variance in anticipation of the news announcement:

$$\text{EVR} = IV_{t-2} - \text{Median of Historical } IV. \tag{20}$$

Here, IV_{t-2} is the 30-day at-the-money implied variance two days before the announcement to avoid a possible pre-announcement drift (Lucca and Moench, 2015; Hu, Pan, Wang, and Zhu, 2021). We subtract the median of implied variance for days $t-15$ to $t-8$ to capture the near-term increase in IV driven by the upcoming news announcement. We apply the methodology of Ai et al. (Forthcoming, 2021) to multiple types of macroeconomic as well as individual earnings announcements in a panel regression setup.[11]

Table 7 shows that while there is a direct impact of EVR on returns for all three announcement types considered, corroborating the evidence of Ai et al. (Forthcoming, 2021) on FOMC announcements, there is no connection between a stock's ex-ante sensitivity to the announcement and duration.

Sensitivity to Aggregate Volatility. Ang et al. (2006) show that stocks that are more exposed to aggregate volatility earn lower returns. Investors are willing to pay a premium to hedge against worsening investment opportunities at times of heightened uncertainty (Campbell, 1993, 1996; Lo and Wang, 2006). The connection to duration-driven return differences has been brought up by Gonçalves (2021a), who argues that stocks with near-term cash-flows bear substantial *reinvestment risk*, prompting investors

[11] To limit the influence of stale option quotes, we truncate EVR at the 1st and 99th percentile.

Table 7: **Panel Regression on Ex-Ante News Sensitivity**
This table reports coefficients from panel regressions of daily excess stock returns on the stock's log duration, dummy variables indicating economic (ECON), monetary policy (MP), or earning news (EARN), and interaction terms with duration and the ex-ante news sensitivity measure (EVR). We follow Ai et al. (Forthcoming, 2021) and estimate EVR according to (20). Duration is cross-sectionally standardized. Control variables include the betas from 252-day rolling window regressions on the Fama and French (2015) five factors and momentum. The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dur	−0.003	−0.003	0.017	0.017	−0.119	−0.115
	(−0.23)	(−0.23)	(1.75)	(1.74)	(−4.03)	(−3.95)
EVR	0.370	0.370	0.121	0.124	0.215	0.225
	(3.90)	(3.86)	(2.42)	(2.51)	(2.65)	(2.78)
Dur × EVR		0.001		−0.026		−0.096
		(0.02)		(−1.40)		(−1.53)
Announcement	MP	MP	ECON	ECON	EARN	EARN
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	192,769	192,769	340,158	340,158	87,495	87,495
R^2	0.756	0.756	0.385	0.387	0.003	0.008

to demand a risk premium. Suppose investors identify the timing of a firm's cash flows as a propagation channel for incorporating news about macroeconomic quantities in line with Equation (5). In that case, we expect to see a significant relationship between a stock's exposure to aggregate volatility and its duration on announcement days.

We extend the methodology of Ang et al. (2006) to daily return observations. First, we construct a factor-mimicking portfolio (FMP) that is a) tradable and b) maximally correlated with innovations in the CBOE volatility index VIX. Specifically, let the FMP for VIX innovations be denoted as FVIX. It is computed as

$$\text{FVIX} = b'X_t, \quad \text{with} \qquad \Delta\text{VIX}_t = c + b'X_t + u_t. \tag{21}$$

X_t is a matrix of returns on base assets, which are obtained using quintile portfolios sorted on the past sensitivity to innovations in the VIX. In the second step, we use 252-day rolling window regressions to come up with a stock's beta to this tracking portfolio,

Table 8: **Panel Regression on Exposure towards Aggregate Volatility**
This table reports coefficients from panel regressions of daily excess stock returns on the stock's log duration, dummy variables indicating economic (ECON), monetary policy (MP), or earning news (EARN), and interaction terms with duration and exposure towards aggregate volatility β^{VIX}. We follow Ang et al. (2006) and estimate β^{VIX} according to (22). Duration is cross-sectionally standardized. Control variables include the betas from 252-day rolling window regressions on the Fama and French (2015) five factors and momentum. The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dur	−0.006	−0.006	0.027	0.026	−0.127	−0.127
	(−0.36)	(−0.42)	(2.52)	(2.45)	(−4.43)	(−4.44)
β^{VIX}	−0.022	−0.026	0.014	0.010	−0.001	−0.001
	(−1.25)	(−1.48)	(1.27)	(0.97)	(−0.02)	(−0.03)
Dur × β^{VIX}		0.018		0.016		0.002
		(1.83)		(2.43)		(0.07)
Announcement	MP	MP	ECON	ECON	EARN	EARN
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	208,756	208,756	363,480	363,480	94,101	94,101
R^2	0.871	0.880	0.414	0.418	-0.061	-0.061

denoted as β^{VIX}:

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i \text{MKT}_t + \beta_i^{VIX} \text{FVIX}_t + \varepsilon_{t,i} \tag{22}$$

We include β^{VIX} and its interaction with duration in our panel regression setup, conditional on each type of public news announcement.

The results are shown in Table 8. The interaction between *Dur* and β^{VIX} is positive and significant for ECON and MP announcement days: the riskier the stock, the more pronounced the realized long-duration premium. This result is striking, especially on MP days, for which we find no evidence of a long-duration premium for the average announcement. The more a stock is exposed to aggregate volatility risk, the higher the premium that investors demand for being exposed to the timing of its cash flows. In contrast, we neither find a return impact of a stock's exposure to aggregate volatility nor a response of duration premia to changes in this exposure for earnings announcements.

Additional Robustness Checks. We vary the considered sample as an additional robustness exercise. First, we extend the sample to start in June of 1973 and rerun the regression in Equation (10). Table B2 in the Appendix provides the results for 10,333,636 stock-day observations, which increases the sample size by more than 56%. We again find a pronounced short-duration premium unconditionally and on earnings announcement days. In contrast, the response to macroeconomic news announcements still yields a positive or flat slope. In our main analyses, we follow Gonçalves (2021b) and exclude microcaps, measured by the first NYSE size quintile. Including these observations more than doubles the sample size. Table B3 provides the results, which show an even more severe impact of duration on stock returns compared to our baseline results Table 2.

7. Conclusion

We study pre-scheduled public news announcements to answer whether the short-duration premium arises due to risk or an alternative explanation. We find that the duration premium associated with changes in economic growth and interest rate expectations are in line with a risk-based explanation. However, the significant short-duration premium at earnings announcements remains unexplained. In addition, we find that long-duration stocks have on average the lowest institutional ownership, are most overvalued (Stambaugh et al., 2015), and exhibit large forecast errors at earnings announcements.

We can link the short-duration premium to periods of high market sentiment, during which the returns of long-duration stocks are abnormally low. The time-variation of the premium is fully captured by market sentiment rather than the economic state. Furthermore, the price correction of long-duration stocks at earnings announcements only appears in the sub-sample of overvalued stocks and those with low institutional ownership. These findings support the argument that the short-duration premium is not a compensation for risk, but rather the result of sentiment-driven trading by non-institutional investors. These investors primarily buy long-duration stocks in times of high sentiment, leading to inflated prices and subsequently lower expected returns. Institutional investors step in an correct this overvaluation at earnings announcements, which gives rise to the short-duration premium.

In a widely recognized article on future perspectives of asset pricing, Brunnermeier, Farhi, Koijen, Krishnamurthy, Ludvigson, Lustig, Nagel, and Piazzesi (2021) argues in favor of deviating from the rational expectation paradigm. In addition, De La O and Myers (2021) shows that most of the variation of the price-dividend and price-earnings ratio is due to subjective cash flow expectations. In this paper, we associate the existence of the short-duration premium with non-rational beliefs of non-institutional investors. Recent theoretical asset pricing models try to explain the short-duration premium by making short-term stocks riskier (Gormsen, 2021; Gonçalves, 2021a). Our empirical finding suggests that augmenting "standard" models with the beliefs and trading behavior of non-institutional investors may be more appropriate in explaining the downward-sloping and countercyclical equity term structure.

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Appendix A. Estimating Duration

The duration of a stock is the expected time it takes for the repayment of the discounted initial investment (van Binsbergen, 2020). Following the methodology proposed by Gonçalves (2021b), the duration measure is estimated using accounting data from COMPUSTAT in a VAR(1) model with 12 state variables that capture the dynamics of the expected future payout, $\mathbb{E}_t[PO_{j,t+h}]$.

Remember the definition of duration in Equation (4). Considering all payouts as cash flows to investors, we may rewrite the weight of future payouts over horizon n, $\frac{P_{t,n}}{S_t}$ as:

$$\omega_{j,t}^{n} = \frac{\mathbb{E}_t[PO_{j,t+n}]e^{-nd_{j,t}}}{ME_{j,t}}. \tag{A1}$$

Intuitively, $\omega_{j,t}^{n}$ is the fraction of today's investment that is expected to be repaid over horizon n. Here, $PO = D + RP - IS$ is the total payout to investors, including share repurchases (RP) and issuances (IS), and $d_{j,t}$ is the rate that discounts the risky payouts PO, i.e. $d_{j,t} = \bar{g}_{j,t} - \bar{y}_{j,t} - \bar{\theta}_{j,t}$. We abstract from the decomposition in Equation (3) and assume that $d_{j,t}$ is constant for all horizons, representing the *average risk* for the entire investment. This does not, however, change the interpretation of our results, as we are not interested in how duration changes for a single stock, but how stocks of different duration react to macroeconomic news announcements. $d_{j,t}$ is the discount rate that solves the valuation equation:

$$ME_{j,t} = \sum_{n=0}^{\infty} \mathbb{E}_t\left[PO_{j,t_n}\right]e^{-nd_{j,t}} \tag{A2}$$

In this setup, the entire identification strategy boils down to estimating $\mathbb{E}_t[PO_{j,t+n}]$. Under clean-surplus accounting, earnings are defined as the sum of payouts and changes in book equity $CSE_{j,t} = PO_{j,t} + \Delta BE_{j,t}$. This allows us to estimate the expected payoff as:

$$\mathbb{E}_t[PO_{j,t+h}] = \frac{\mathbb{E}_t\left[(e^{cs_{j,t+n}-be_{j,t+n}} - 1)e^{\sum_{\tau=1}^{n} be_{j,t+\tau}}\right]}{BE_{j,t}} \tag{A3}$$

$cs_{j,t+h} = \log\left(1 + \frac{CSE_{j,t}}{BE_{j,t-1}}\right)$ and $be_{j,t+\tau} = \log\left(\frac{BE_{j,t}}{BE_{j,t-1}}\right)$ are estimated through a VAR(1) process (Vuolteenaho, 2002). Using these values, we can back out discount rate $d_{j,t}$ from Equation (A2) and compute $Dur_{j,t}$ as,

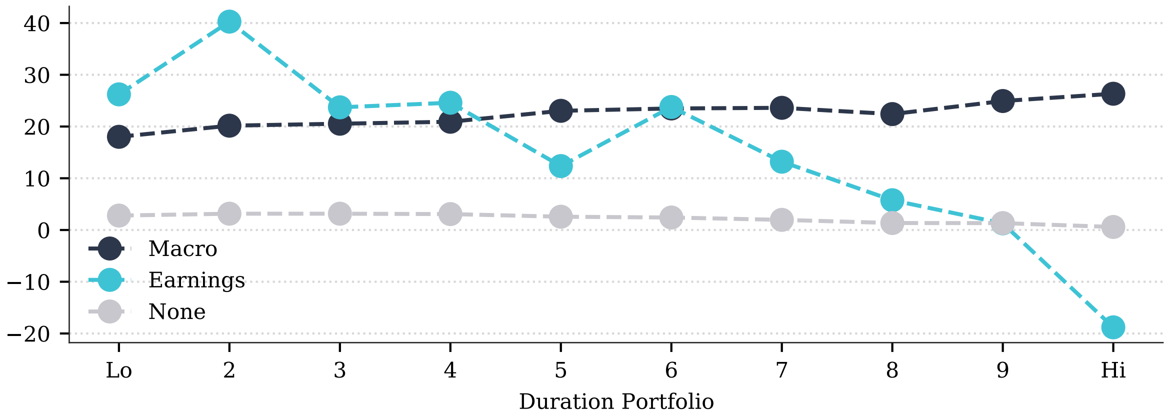
$$Dur_{j,t} = \frac{BE_{j,t}}{ME_{j,t}} \times \sum_{n=0}^{\infty} \mathbb{E}_t[PO_{j,t+n}]e^{-nd_{j,t}} \times n \tag{A4}$$

Equation (9) directly relates the duration of a stock to its "Value", as defined by Fama and French (1993), but differentiates between value and growth stocks with high and low expected payouts in the near future. *Dur* also takes the average riskiness of the investment into account through stock-specific discount rate $d_{j,t}$. Stocks that are deemed riskier today will have a lower duration. In that sense, duration-sorted portfolios are a refinement towards the standard value-growth differentiation (Lettau and Wachter, 2007).

Gonçalves (2021b) uses a VAR(1) process to estimate expected payouts on a per-firm level at the end of June of every year, using a rolling window of ten years of data. He keeps the estimated VAR process fixed for one year and sorts stocks by their duration into portfolios with equal weights per stock. The weights in each portfolio are fixed for a month. This way, we rely only on information that is available ex-ante. In an important distinction to Gonçalves (2021b), we use the estimated duration measure as a conditioning variable to understand *daily* and *intraday* changes to the equity term structure, as opposed to the monthly return horizon frequently used. For these high-frequency observation periods, the duration measures are unlikely to change materially, facilitating the identification of the effects we are trying to isolate: the change in the shape of the equity term structure, given specific sources of macroeconomic news.

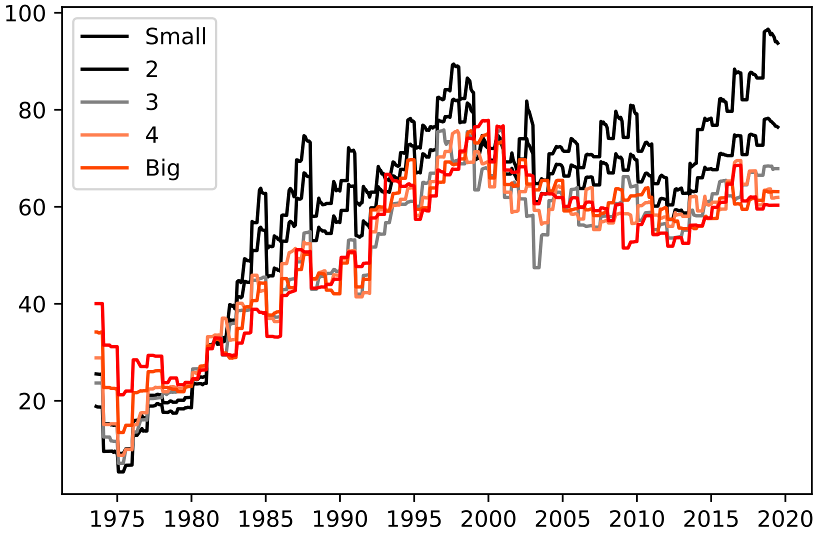
Appendix B. Additional Figures and Tables

Fig. B1. **Average Returns on (Non-)Announcement Days**



This figure shows daily average returns (in bps) of duration-sorted portfolios on days with and without pre-scheduled public news announcement. *Macro* includes announcements of GDP, nonfarm payrolls, and monetary policy, while *Earnings* are stock-specific earnings announcements. *None* reflects all other trading days. The sample period is from 1995 to June 2019.

Fig. B2. **Average Duration over Time**



This figure presents the average duration over time for market capitalization-sorted quintile portfolios in the sample from 1973 to June 2019.

Table B1: **Monthly Duration Returns and Market Sentiment**

This table shows the results from average duration premia and predictive regressions conditional on market sentiment. Panel A shows the average monthly excess returns of the duration portfolios following months with high or low market sentiment. Months are classified as to whether the sentiment index was higher or lower than the full sample median. Returns are either excess returns (R) or benchmark-adjusted with the Fama and French (1993) factors (R_{FF}). Panel B shows coefficients from predictive regressions of the market sentiment index and the log dividend-price ratio from the previous month on excess returns. Short (long) duration are the lowest (highest) decile portfolios sorted on duration. Market sentiment is measured by the index of Baker and Wurgler (2006). T-statistics are reported in parentheses. They are robust to heteroskedasticity (White, 1980) in Panel A or calculated with Newey and West (1987) standard errors with 5 lags in Panel B.

Panel A: Portfolio Sorts

	Short Dur			Long Dur			Short-Long Dur		
	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
R	1.223	1.085	-0.138	1.481	0.209	-1.272	-0.18	1.232	1.412
	(2.14)	(2.77)	(-0.2)	(2.11)	(0.35)	(-1.39)	(-0.55)	(3.34)	(2.86)
R_{FF}	0.112	0.47	0.358	-0.101	-0.439	-0.338	0.305	1.26	0.955
	(0.49)	(2.62)	(1.21)	(-0.43)	(-1.73)	(-0.97)	(1.06)	(5.12)	(2.57)

Panel B: Predictive Regressions

	Short Dur			Long Dur			Short-Long Dur		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sent	-0.04		-0.253	-1.479		-1.722	1.712		1.65
	(-0.07)		(-0.49)	(-1.96)		(-2.36)	(3.69)		(3.78)
dp		-1.029	-1.384		0.848	-1.578		-2.727	-0.403
		(-0.39)	(-0.5)		(0.24)	(-0.45)		(-1.57)	(-0.3)
R^2	-0.0	-0.0	-0.0	0.01	-0.0	0.01	0.06	0.01	0.06
N	288.0	288.0	288.0	288.0	288.0	288.0	288.0	288.0	288.0

Table B2: **Excess Returns on News Announcements from 1973 to 2019**

This table reports coefficients from panel regressions of daily excess stock returns on stock's log duration, dummy variables indicating economic (ECON), monetary policy (MP), or earning news (EARN), and interaction terms. Duration is cross-sectionally standardized. The sample period is from January 1973 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)
Dur	−0.016	−0.018	−0.017	−0.018
	(−6.56)	(−6.91)	(−7.36)	(−7.70)
MP	0.115	0.115	0.135	0.135
	(1.49)	(1.49)	(2.03)	(2.03)
× Dur		0.014		0.014
		(1.26)		(1.27)
ECON	0.102	0.102	0.107	0.108
	(2.05)	(2.05)	(2.21)	(2.21)
× Dur		0.032		0.032
		(3.81)		(3.81)
EARN	0.131	0.131	0.133	0.133
	(5.00)	(5.03)	(5.45)	(5.49)
× Dur		−0.094		−0.095
		(−4.78)		(−4.82)
Time FE	No	No	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
N	10,333,636	10,333,636	10,333,636	10,333,636
R^2	0.031	0.033	0.031	0.034

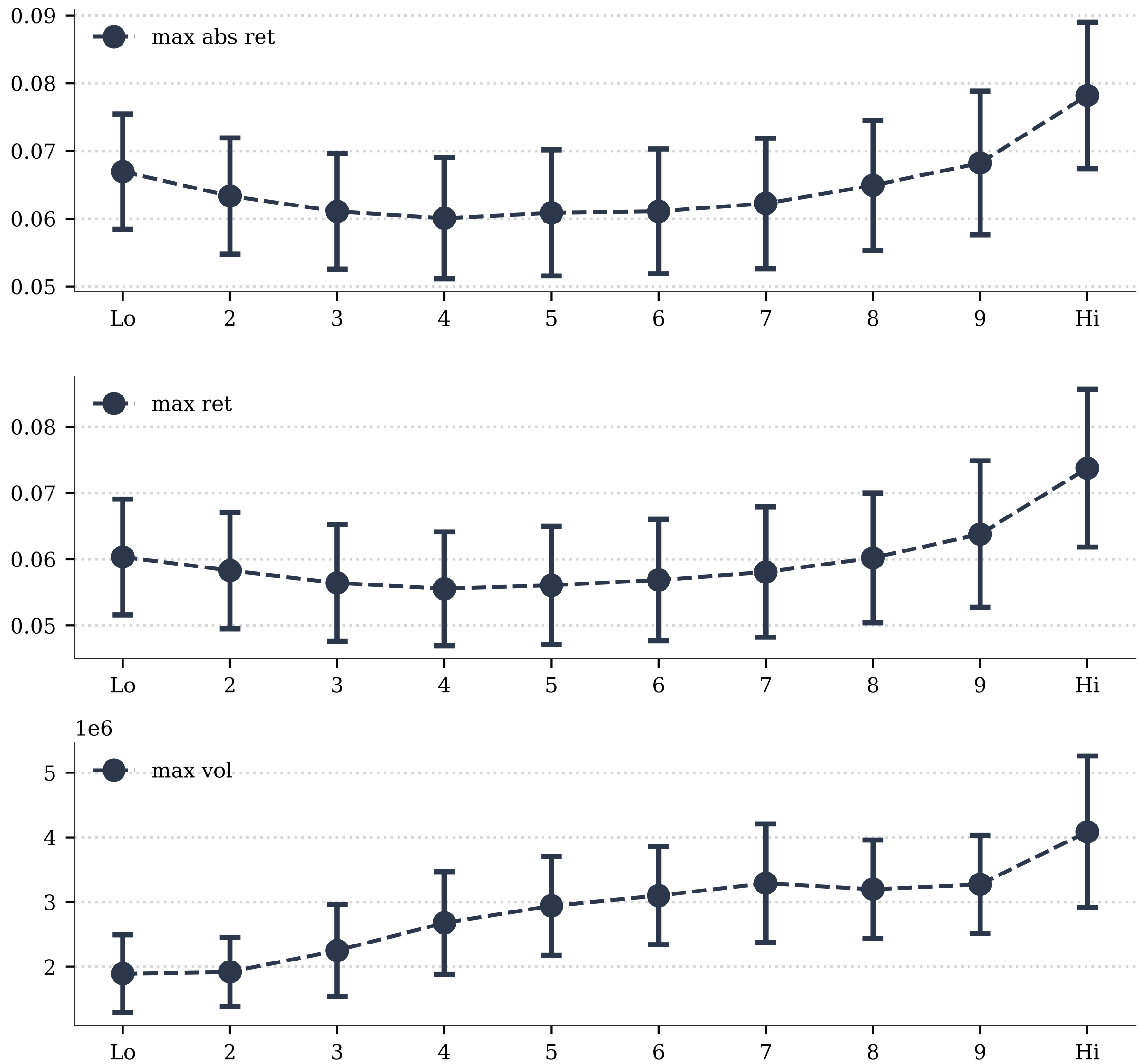
Table B3: **Excess Returns on News Announcements with Micro Stocks**

This table reports coefficients from panel regressions of daily excess stock returns on stock's log duration, dummy variables indicating economic (ECON), monetary policy (MP), or earning news (EARN), and interaction terms. In addition to Table 2, we include micro-stocks in the sample. Duration is cross-sectionally standardized. The sample period is from January 1995 to June 2019. t-statistics are reported in parentheses and are computed using standard errors clustered at the firm and day level. **Dependent variable:** $r_{i,t} - r_{f,t}$.

	(1)	(2)	(3)	(4)
Dur	−0.021	−0.020	−0.025	−0.024
	(−5.01)	(−4.72)	(−6.99)	(−6.56)
MP	0.191	0.191	0.175	0.176
	(2.09)	(2.09)	(2.02)	(2.02)
× Dur		−0.005		−0.005
		(−0.29)		(−0.30)
ECON	0.151	0.151	0.154	0.154
	(2.38)	(2.38)	(2.49)	(2.49)
× Dur		0.040		0.040
		(3.02)		(3.02)
EARN	0.082	0.083	0.083	0.084
	(2.85)	(2.91)	(3.05)	(3.12)
× Dur		−0.227		−0.229
		(−9.48)		(−9.57)
Time FE	No	No	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
N	13,859,922	13,859,922	13,859,922	13,859,922
R^2	0.026	0.030	0.025	0.029

B.1. Proxies for Retail Attention

Fig. B3. **Average Retail Attention Measures for Duration-Sorted Portfolios**



This figure shows the average absolute maximum realized return (Cosemans and Frehen, 2021), the average MAX return measure following Bali et al. (2011), and the maximum daily volume over the last 21 trading days following Cosemans and Frehen (2021) for the ten duration portfolios, as well as a symmetric one standard-deviation confidence bound. The sample period is from January 1995 to June 2019.

Appendix C. Model by Gormsen (2021)

C.1. Realized Returns within the Model

We implement our approach in the recent model of Gormsen (2021) to guide our empirical analysis. The model is one of the first that captures the unconditional downward-sloping equity term structure and its time variation. The dynamics of aggregate dividends Δd, the small but persistent component in dividend growth z_{t+1}, and the price of discount rate risk x_t are given by

$$\Delta d_{t+1} = \mu_g + z_t + \sigma_d \varepsilon_{t+1}, \tag{C5}$$

$$z_{t+1} = \varphi_z z_t + \sigma_z \varepsilon_{t+1} \tag{C6}$$

$$x_{t+1} = (1 - \varphi_x)\bar{x} + \varphi_x x_t + \sigma_x \varepsilon_{t+1}, \tag{C7}$$

where $0 < \varphi_z < 1$, $\sigma_d \sigma_x{}' = 0$, and $0 < \varphi_x < 1 - |\sigma_x|$. ε_{t+1} is a 3x1 vector containing three standard normal shocks. The loadings of each process are summarized in the respective row vectors σ_d, σ_z, and σ_x. The risk-free rate r_f is constant and the stochastic discount factor is denoted by M_{t+1}, where

$$\ln M_{t+1} = m_{t+1} = -r^f - \frac{1}{2}(x_d^2 + x_t^2) - \frac{\sigma_d}{||\sigma_d||}\varepsilon_{t+1}{+}x_t \frac{\sigma_x}{||\sigma_x||}\varepsilon. \tag{C8}$$

The stochastic discount factor contains two priced shocks: the dividend shock and the discount rate shock. Gormsen (2021) shows that the expected excess return of a n-maturity claim is

$$E[r_{t+1}^n - r^f] + \frac{1}{2} var(r_{t+1}^n) = \lambda_d - \lambda_{x,t}. \tag{C9}$$

Thus, expected excess returns contain a dividend and a discount rate risk premium. While the former is constant and decreasing in maturity n, the latter is time-varying and increasing in n. This mechanism allows for an unconditional downward-sloping term structure, where the dividend risk premium dominates the discount rate risk premium.

However, the discount rate risk premium dominates in bad times, inducing an upward-sloping equity term structure.

We derive specific predictions about the reaction of duration premia to specific shocks. The realized return of an n-maturity strip is given by

$$r^n_{t+1} - r^f + \frac{1}{2}var(r^n_{t+1}) = \lambda_d - \lambda_{x,t} + \sigma_d \varepsilon_{t+1} + B_z^{n-1}\sigma_z \varepsilon_{t+1} + B_x^{n-1}\sigma_x \varepsilon_{t+1}. \quad \text{(C10)}$$

Empirically, we can only observe unexpected changes. Thus, we compute within the model unexpected realized changes

$$\Delta d - E_t[\Delta d] = \sigma_d \varepsilon_{t+1} \quad \text{(C11)}$$

$$\Delta z - E_t[\Delta z] = \sigma_z \varepsilon_{t+1} \quad \text{(C12)}$$

$$\Delta x - E_t[\Delta x] = \sigma_x \varepsilon_{t+1}. \quad \text{(C13)}$$

Substituting in (C10) gives

$$r^n_{t+1} - r^f + \frac{1}{2}var(r^n_{t+1}) = \lambda_d - \lambda_{x,t} \quad \text{(C14)}$$

$$+ (\Delta d - E_t[\Delta d]) \quad \text{(C15)}$$

$$+ B_z^{n-1}(\Delta z - E_t[\Delta z]) \quad \text{(C16)}$$

$$+ B_x^{n-1}(\Delta x - E_t[\Delta x]). \quad \text{(C17)}$$

C.2. Simulation

We thankfully rely on the MATLAB code provided by Niels Gormsen as supplementary material to his publication. We use the same calibration as in Table 10 of the published paper and simulate 10,000 paths with 100 years to obtain realized returns of n-maturity strips. We then compute (C11), (C12), (C13) and estimate the following regression model

$$R_t^n - R^f = \alpha^n + \beta_d^n(\Delta d_t - E_t[\Delta d]) + \beta_z^n(\Delta z_t - E_t[\Delta z]) + \beta_x^n(\Delta x_t - E_t[\Delta x]) + \varepsilon_t^n. \quad \text{(C18)}$$

We report the estimated coefficients in Figure 1.