Is there an equity duration premium?

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Abstract

Equity duration is a measure of discount-rate sensitivity that is driven by both, stock-specific *cash-flow timing* and stock-specific *discount-rate levels*. Established measures of equity duration using market-price information derive their predictive power for returns from using market-implied discount rates. We introduce new measures of pure cash-flow timing which disentangle discount-rate level from cash-flow timing information. Our results indicate an unconditionally flat relationship between timing and average returns. However, it turns out that in recessions (expansion episodes), there is a negative (positive) relation between cash-flow timing and average stock returns.

Keywords: Equity duration, cash flow timing, term structure of equity, cross-section of expected returns

JEL: G12, G17, G23

1 Introduction

Recent empirical evidence indicates an unconditionally flat relation between stock returns and cash-flow timing. Structural models estimated using a cross-section of stocks (Giglio et al., 2021; Jankauskas et al., 2021) as well as aggregate market dividend strips (Bansal et al., 2021) suggest that stocks with cash-flows in the more distant future have lower returns only in recessions. Unconditionally, these papers find the term structure of equity to be flat (or slightly upward-sloping). In sharp contrast, the direct evidence on the joint distribution of individual stocks' equity duration and returns indicates a strong negative relation (Dechow et al., 2004; Weber, 2018; Gonçalves, 2021).

In this paper, we reconcile these findings by investigating the conceptual and empirical relation between duration, cash-flow timing and discount rates for stock-specific equity duration measures. Analogously to bond duration (Macaulay, 1938), equity duration is typically understood as both, a measure of cash-flow timing but also of the stock's discount-rate sensitivity. We find that due to the use of market prices in the construction of established empirical duration measures, unconditionally negative return spreads between high and low duration stocks are only due to discount rate sensitivity, rather than cash-flow timing. Moreover, this link is due to the mechanically negative relation between a stock's discount rate and its discount-rate sensitivity. Intuitively, this negative relation is due to stocks with lower discount rates (higher prices) being more sensitive to changes in discount rates, i.e. the fact that the price of an asset $P = \frac{D}{R}$ is more strongly-downward sloping as a function of R for low values of R. Hence, sorts on discount-rate sensitivity generate sorts on expected returns irrespective of the shape of the equity term structure.

Our empirical results show that this mechanical relation between discount-rate levels and sensitivity is the driver behind the unconditionally negative relation between mean returns and established cash-flow duration measures that use market-price information. Conversely, we find that discount-rate free measures of pure cash-flow timing have no unconditional relation to discount rates. Hence, the joint distribution of duration measures and returns does not support the notion of an unconditionally downward-sloping term structure of equity.

However, we do find a negative relation between cash-flow timing and returns in recessions, while the relation is positive in expansions. These results are qualitatively consistent with the implication of consumption-based asset pricing models that do allow for less persistent dynamics (see, e.g., Bansal et al., 2021).

The link between discount rate levels and discount rate sensitivity follows from the discounted cash flow representation of asset prices. The price of an asset can be expressed as the sum of (expected) future cash flows, each discounted at the applicable, risk adjusted discount rate: $P_t = \sum_{s=1}^{T} \frac{C_{t+s}}{R^s}$.[1] The sensitivity of prices with respect to changes in the discount rate is typically assessed using *duration* (DUR). Initially introduced for fixed income securities by Macaulay (1938), DUR is readily available for bonds and can be estimated for equity (see Dechow et al., 2004; Weber, 2018; Gonçalves, 2021) using observables. It is given by:

$$DUR_t = \frac{1}{P_t} \cdot \sum_{s=1}^{T} s \cdot \frac{C_{t+s}}{R^s} = \sum_{s=1}^{T} s \cdot \frac{C_{t+s}}{R^s} \left(\sum_{s=1}^{T} \frac{C_{t+s}}{R^s} \right)^{-1} = \sum_{s=1}^{T} w_s \cdot s \tag{1}$$

Expressed verbally, duration gives the weighted average payment date of an asset. The weights $w_s = \frac{C_{t+s}}{R^s} / \left(\sum_{s=1}^{T} \frac{C_{t+s}}{R^s} \right)$ are determined by each discounted payment's contribution to the total sum of discounted cash flows, i.e., the price P_t.

This weighting implies that a stock's duration is not only determined by the timing of its cash flows but also by the level of its discount rate, which we formally derive in Section 2.1. This entanglement becomes relevant once we study the relation of duration measures and subsequent mean returns. Because duration measures and mean returns are both functions of discount rates, their empirical relation is potentially mechanical. Our empirical analysis confirms this concern.

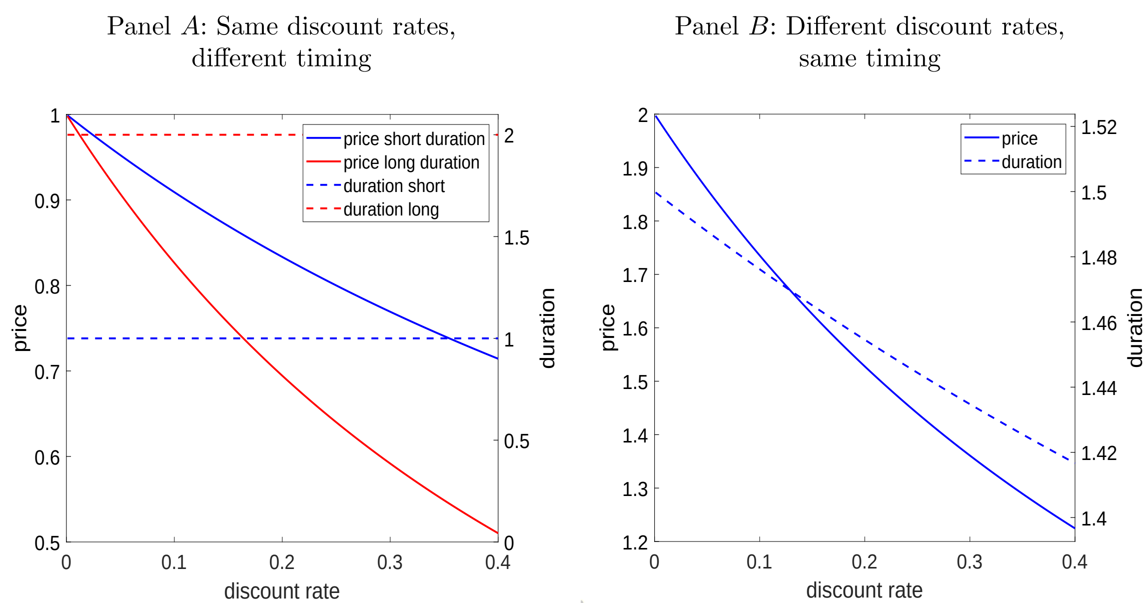
Intuitively, the issue stems from the convexity of discounting and is easily seen from a two-period model. Figure 1 plots asset prices and duration as defined in Equation (1) as a function of discount rates. In the left-hand side graph, we show the price of two assets with

[1]Here, P_t denotes the price of the asset at t, C_τ is the cash flow at τ and $R_{t,\tau}$ denotes the time t discount rate applicable to time τ cash flows which for ease of exposition we assume to be flat, i.e. $R_{t,\tau} = R^{\tau - t}$.

identical discount rates and which both have total payoffs of one unit. The difference is that the red asset pays one unit at time $t = 2$ and the blue asset pays one unit at time $t = 1$. Because of compounded discounting, the (red) long-duration asset is more sensitive to changes in the discount rate, as indicated by the steeper slope of the price function. However, because each asset has payoffs in one period only, the duration measure is not affected by the level of the discount rate (as shown by the horizontal dashed line depicting DUR at DUR=1 and DUR=2, independent of the level of the discount rate on the x-axis). Hence, the differences in duration in Panel A represent differences in timing only.

Figure 1: Prices, discount rates and duration

Panel A shows the prices of two assets, r (red) with payoffs $C_{r,1} = 0$ and $C_{r,2} = 1$, and and b (blue) with payoffs $C_{b,1} = 1$ and $C_{b,2} = 0$, respectively. Panel B shows the price of just one asset with payoffs $C_1 = C_2 = 1$ as a function of the discount rate and plots the corresponding duration measure.



When assets have cash flows in more than one period, duration confounds timing and discount-rate information.

The interpretation of DUR as a pure measure of timing breaks down in the case of payoffs in multiple periods which is the norm in real-world settings. This can be seen from Panel B

in Figure 1 which plots the durations and prices of an asset with identical payoffs of one at time $t = 1$ and time $t = 2$ as functions of the discount rate. Because the division by the price in Equation (1) does not fully correct for the effect of discount rates on the level of the sum in (1), duration decreases in the discount rate. Comparing two assets (points on the blue lines in the right-hand side graph) with the exact same cash-flow profile but different discount rates would suggest that the cheaper asset (with the higher expected return) has a lower duration. This is indicated by the dashed blue line that is decreasing in the discount rate, along with the asset's price (solid blue line).

Because they use market prices (that reflect discount rates) to compute cash-flow duration, established measures from the literature mechanically assign longer durations to expensive stocks (with low expected returns) and shorter durations to cheap stocks (with high expected returns). Thus, standard duration measures do not give an unbiased measure of cash-flow timing. An empirical analysis of duration and mean returns is inapt to draw conclusions about the relation between cash-flow timing and expected returns. This notwithstanding, we want to emphasize that this concern becomes only relevant once we analyze mean returns and equity duration measures and is not a critique on equity duration measures per se. Equity duration measures are useful in other applications and accurately measure discount-rate sensitivity.

In order to understand what drives the relation between duration and mean returns, we have to disentangle the cash-flow timing component from the discount rate component in duration measures as we do in Section 3.4.

We proceed as follows: First, we discuss the concept of duration in more detail from a theoretical angle, abstracting from empirical issues. We examine the properties of established equity duration measures from the literature and show that the established duration measures confound information on cash-flow timing and discount rate levels. We then introduce versions of these measures that do not rely on market price-implied discount rates and thereby overcome the confoundedness of the established measures with discount rates. Empirically, we show that when separating timing and discount-rate sensitivity there is no unconditional relation between cash-flow timing and mean returns but a mechanical relation between discount-rate induced duration and discount rates. Using non-discount-rate confounded measures, we find that the relation between returns and these pure timing measures is negative only in recessions, positive in marked expansion episodes and unconditionally flat. These findings are consistent with the predictions of the classic asset pricing literature featuring long-run risks or habit formation.

Our paper contributes to the literature on equity cash-flow duration starting with Dechow et al. (2004) who introduced the concept of equity-implied duration, henceforth referred to as DUR^{DSS}. For DUR^{DSS}, one forecasts cash flows up to a finite horizon and then assumes the remaining market value of the stock is paid out as a level perpetuity. This way, market values enter the calculation and conflate a measure of timing with one of discount rates. The concept is further refined in Weber (2018) who thoroughly studies the relation between Dechow et al. (2004)-type duration and the cross-section of expected stock returns. He finds a negative relation between duration and mean returns and suggests a behavioral explanation based on mispricing. In line with this reasoning, we find that the negative relation is solely driven by discount rates (which are, by definition, low for overpriced stocks). However, our findings indicate that this overvaluation is unrelated to timing since sorts on pure timing measures do not generate unconditional return spreads. Gonçalves (2021) extends the concept by providing more evolved forecasts of cash flows, extending forecast horizons to 1000 years and by assigning to each stock its market price-implied discount rate. While this measure (henceforth referred to as DUR^{GON}) gives an arguably more accurate measure of duration, the use of market prices to determine discount rates induces a mechanically negative cross-sectional relation between DUR^{GON} and mean returns. We show that when using market prices to forecast cash flows but refraining from matching discount rates to market prices, there is no unconditionally negative relation between duration and mean returns. This indicates that the spread in DUR^{GON}-sorted portfolios is not due to the use of superior market-price information in the cash-flow forecasts. In a recent contribution, Gormsen and Lazarus (2019) relate analysts' cash-flow forecasts to stock characteristics commonly used as cross-sectional return predictors. They find a negative relation between CAPM alphas and long-term growth forecasts (or its fitted values) but not for excess returns in portfolio sorts. In contrast, we rely on broadly available accounting variables to forecast cash flows and avoid the use of market prices that contain discount-rate information.

Our paper reconciles single-stock measures of cash flow timing with the recent literature on the equity term structure. In particular, our results are in line with Giglio et al. (2021) who estimate a stochastic discount factor using cross-sectional data in order to infer the term structure of equity risk premia. In a related paper, Jankauskas et al. (2021) estimate future cash-flows of stocks using analyst forecasts and fit the parameters of a term structure model by matching forecast-implied prices with market prices.

Conversely, our findings do not lend support to the findings from the earlier literature on the unconditional term structure of the equity premium such as Van Binsbergen et al. (2012); Van Binsbergen and Koijen (2017). Using dividend strips data from 1996 to 2009, they find an on average downward-sloping term structure. Similar to Cochrane (2017), Bansal et al. (2021) argue that the dividend strip data is not representative for the long-run balance of economic growth. They find that the term structure is indeed downward-sloping only in recessions and upward-sloping in expansions, in line with recent findings by Ulrich et al. (2022) who use analyst forecasts to estimate dividend growth. Our results are qualitatively consistent with these predictions. We acknowledge that there may be a disconnect between discount rates of firms with different cash-flow timing and discount rates of claims to aggregate market cash-flows with different cash-flow timing.

On a related note, we show that previous evidence using market price contaminated measures of duration should not be interpreted as evidence for either a downward or an upward-sloping equity term structure. In this vein, our paper is related to recent findings that cast doubt on the duration-based explanation of the value premium, such as Golubov and Konstantinidi (2019) or Chen (2017). Contrary to the received wisdom that stocks with low book-to-market equity ratios have late cash-flow timing, we find that there is no clear relationship between discount-rate free measures and the book-to-market ratio in the cross section.

The rest of the paper is organized as follows: In Section 2, we analyze the theoretical concept of duration and popular empirical measures for equity cash-flow duration. Section 3 presents the data and results of our empirical analysis, which are thoroughly discussed in section 4. Section 5 concludes.

2 Duration, empirical measures of duration and the cross-section of stock returns

In the following, we first discuss duration from a conceptual point of view and examine its relation to discount rates from a theoretical perspective, abstracting from empirical issues that we turn to subsequently in Section 2.2. These empirical issues are driven by the interpretation of duration as a measure of cash-flow timing when using discount rate-contaminated market price information. All commonly employed measures of duration induce such a mechanical relation. This includes the duration measures employed in Dechow et al. (2004), Weber (2018) and Gonçalves (2021). Therefore – while there is nothing wrong with the measures per se – measures that use market-price information do not provide clear-cut evidence regarding the joint cross-section of cash flow timing and expected returns (or the overall term structure of the equity premium).

2.1 Duration

Macaulay (1938) duration aims to quantify the timing of a bond's cash flows and thereby also the lockup of capital and consequently the sensitivity of the bond price with respect to changes in the interest rate. Specifically, DUR as defined in Equation (1) provides a weighted average payment date with each weight w_s determined by the contribution of each payment C_s to the total value of the bond $P = \sum_s \frac{C_{t+s}}{R^s}$, $w_s = \left(\sum_s \frac{C_{t+s}}{R^s}\right)^{-1} \frac{C_{t+s}}{R^s}$. This weighting is not innocuous when relating duration cross-sectionally to returns. This is because duration is decreasing in the discount rate such that on average, irrespective of cash-flow timing, there is a mechanically negative relation between duration and mean returns. This issue has nothing to do with estimating any of the inputs to the duration formula. Even if we perfectly knew all inputs (and we'll see in the next subsection that this is a difficult task), we would find that more expensive assets with low discount rates, have higher duration. We overcome this issue in this paper by excluding market price-related information in the computation of duration.

Formally, the issue can be seen from the derivative of DUR with respect to R (here we already plug in the true price of the asset, $P = \sum_s \frac{C_s}{R^s}$ with $t = 0$ for notational convenience).

$$\frac{\partial DUR}{\partial R} = -\left(\sum_{s=1}^{T} \frac{C_s}{R^s}\right)^{-2} \left(-\sum_{s=1}^{T} s \cdot \frac{C_s}{R^{s+1}}\right) \sum_{s=1}^{T} s \frac{C_s}{R^s} - \left(\sum_{s=1}^{T} \frac{C_s}{R^s}\right)^{-1} \sum_{s=1}^{T} s^2 \frac{C_s}{R^{s+1}} \tag{2}$$

$$= \frac{1}{R} DUR^2 - \left(\sum_{s=1}^{T} \frac{C_s}{R^s}\right)^{-1} \left(\sum_{s=1}^{T} s^2 \frac{C_s}{R^{s+1}}\right) \tag{3}$$

$$= \frac{1}{R} \left(\sum_{s=1}^{T} \frac{C_s}{R^s}\right)^{-2} \left[\left(\sum_{s=1}^{T} s \frac{C_s}{R^s}\right)^2 - \left(\sum_{s=1}^{T} s^2 \frac{C_s}{R^s}\right) \sum_{s=1}^{T} \frac{C_s}{R^s}\right] \tag{4}$$

The expression in (4) is negative if the term in square brackets is negative. This term can be expressed as

$$\sum_{s=1}^{T} \left(s \frac{C_s}{R^s}\right)^2 + 2 \sum_{i<j, j \leq T} i \frac{C_i}{R^i} j \frac{C_j}{R^j} - \sum_{s=1}^{T} \left(s \frac{C_s}{R^s}\right)^2 - \sum_{i<j, j \leq T} (i^2 + j^2) \frac{C_i}{R^i} \frac{C_j}{R^j} \tag{5}$$

$$= \sum_{i<j, j \leq T} \frac{C_i}{R^i} \frac{C_j}{R^j} (2ij - i^2 - j^2) = - \sum_{i<j, j \leq T} \frac{C_i}{R^i} \frac{C_j}{R^j} (i - j)^2, \tag{6}$$

which is negative for all $T > 1$ and when there are positive payments in different periods i and j. Intuitively, cash flows C_s with higher values of s that would raise DUR to a higher level get less weight when the discount rate is higher. Consequently, when comparing two assets with the same expected cash-flows but different discount rates (for example because one is more risky than the other), one would always assign the longer duration to the one with the lower discount rate and hence the higher price. Thus, DUR is a biased measure of cash-flow timing (even if we knew all expected cash flows and the true discount rate). In the next subsection, we discuss attempts at the empirical implementation of equity cash-flow duration and suggest remedies to their confoundedness with discount rates.

2.2 Empirical measures of equity duration

As opposed to bond coupons and principal payments, cash flows from equity are unknown and thus have to be forecast. It is therefore considerably more difficult to compute the weighted average payment date of a stock as compared to bond duration. Similarly, the discount rate is not observable but has to be estimated.

In the following, we discuss measures of equity duration that have been proposed in the literature. We pay particular attention to how a stock's true discount rate enters the respective duration measures and thereby leads to a mechanical relation between the measure and expected stock returns. The details of the empirical estimation are left to the empirical Section 3.

2.2.1 Dechow et al. (2004) and Weber (2018) implied equity duration

Dechow et al. (2004) first transferred the concept of duration to equity, which was later adapted by Weber (2018) for studying the cross-section of duration and stock returns. It is based on decomposing a firm's net distributions to shareholders CF ("cash flows") into two distinct parts, earnings and changes to book equity:

$$CF_t = E_t - (BE_t - BE_{t-1}), \tag{7}$$

with earnings E and book equity BE. When earnings exceed the change in book equity, $BE_t - BE_{t-1}$, the firm distributes cash to shareholders, i.e., cash flows are positive. But the firm can also *receive net cash flows* from shareholders, e.g. by selling shares on the stock market (which would result in a rise in book equity), making cash flows in (7) negative. Equation (7) can be expressed in terms of return on equity, ROE, and equity growth, EG, by factoring out BE_{t-1}.

$$CF_t = BE_{t-1} \cdot \left[\frac{E_t}{BE_{t-1}} - \frac{(BE_t - BE_{t-1})}{BE_{t-1}}\right] = BE_{t-1} \cdot \left[ROE_t - EG_t\right] \tag{8}$$

To forecast future cash flows CF, Dechow et al. (2004) assume that ROE and EG follow mean reverting processes, which are modeled by the following first-order autoregressive processes:

$$ROE_t = \beta_{roe} + \rho_{roe} ROE_{t-1} + \varepsilon_t^{roe} \tag{9}$$

$$EG_t = \beta_{eg} + \rho_{eg} EG_{t-1} + \varepsilon_t^{eg} \tag{10}$$

Dechow et al. (2004) as well as Weber (2018) forecast cash flows for horizons T of 10 and 15 years, respectively. The present value of these forecast payments, $\sum_{s=1}^{T} \frac{CF_{t+s}}{R^s}$, is then subtracted from the price (equaling present value of all future cash flows) and assumed to be paid out as a level perpetuity. Such a perpetuity has duration $T + \frac{R}{R-1}$. Hence, the Dechow et al. (2004) duration for each stock j at time t can be computed as:

$$DUR_{j,t}^{DSS} = \frac{1}{P_{j,t}} \cdot \left[\underbrace{\sum_{s=1}^{T} \frac{s \cdot CF_{j,t+s}}{R^s}}_{\text{Finite horizon}} + \underbrace{\left(T + \frac{R}{R-1}\right) \cdot \left[P_{j,t} - \sum_{s=1}^{T} \frac{CF_{j,t+s}}{R^s} \right]}_{\text{Infinite horizon}} \right] \tag{11}$$

The discount rate R is assumed to be the same for all stocks. At first sight, this circumvents the problem of higher discount rates for some stocks leading to mechanically lower DUR. But it implies that DUR^{DSS} attributes a high observed market price, P, entirely to high cash flows in the distant future, rather than to a stock's low discount rate level. This is because DUR^{DSS} rises monotonically in P:

$$\frac{\partial DUR_j^{DSS}}{\partial P_j} = \frac{\left(T + \frac{R}{R-1}\right) \sum_{s=1}^{T} \frac{CF_{j,t+s}}{R^s} - \sum_{s=1}^{T} \frac{s \cdot CF_{j,t+s}}{R^s}}{P_j^2} > 0, \tag{12}$$

because, by definition, $s \leq T$. Intuitively, higher prices might reflect higher future cash flows and thus justify a positive relationship between DUR and market prices. However, P_j is also a decreasing function of the true discount rate $\tilde{R}_j$. Hence, two stocks V and G with the exact same cash flow profile $\{CF_t\}$ but with growth stock G being more expensive than value stock V, G will be assigned a higher DUR^{DSS} than V and will tend to have lower returns going forward. While innocuous in many applications, this relation becomes problematic when studying the cross-sectional relation of cash-flow timing and returns (which reflect $\tilde{R}_j$). Our results presented in Section 3.4 show that indeed the cross-sectional return spread generated by sorts on DUR^{DSS} as shown by Dechow et al. (2004) and Weber (2018) is not driven by the cash flow forecasts but by the relation between $\tilde{R}_j$ and $DUR_j = f(P(\tilde{R}_j))$ as a function of $\tilde{R}_j$.

2.2.2 Gonçalves (2021) equity duration

Gonçalves (2021) further develops the concept of cash-flow duration by extending the forecast horizon to a thousand years using a vector-autoregressive (VAR) model and by endogenizing the employed discount rate. In particular, the discount rate for each stock is calibrated such that the present value of the forecast cash flows equals the observed market price. While this matching procedure does yield a coherent estimate of cash flow duration, it is still the case that with identical expected cash flows, the measure would assign a longer duration to the stock with the higher market price. Consequently, there is a mechanically negative relation between the Gonçalves (2021) duration measure and expected returns.

The measure builds upon the same clean surplus accounting relationship in Equation (7) as Dechow et al. (2004), reformulated in exponential terms:

$$\begin{aligned}\frac{\mathbb{E}_t[CF_{t+h}]}{BE_t} &= \mathbb{E}_t\left[\frac{E_{t+h}}{BE_t} - \frac{BE_{t+h} - BE_t}{BE_t}\right] = \mathbb{E}_t\left[\left(1 + \frac{E_{t+h}}{BE_{t+h-1}} - \frac{BE_{t+h}}{BE_{t+h-1}}\right)\prod_{\tau=1}^{h-1}\frac{BE_{t+\tau}}{BE_{t+\tau-1}}\right] \\ &= \mathbb{E}_t\left[\left(e^{CPROF_{t+h}-EG_{t+h}} - 1\right)\cdot e^{\sum_{\tau=1}^{h} EG_{t+\tau}}\right] \qquad (13)\end{aligned}$$

where $CPROF_t$ is the natural logarithm of earnings (here defined as net payouts plus the change in book equity) scaled by book equity of the previous period and EG_t is the natural logarithm of book equity growth. Following Vuolteenaho (2002) and Campbell et al. (2010), Gonçalves (2021) estimates future values for $CPROF$ and EG in Equation (13) with the following VAR:

$$s_{j,t} = \Gamma s_{j,t-1} + u_{i,t} \qquad (14)$$

where $u_{j,t} \overset{i.i.d.}{\sim} \mathcal{N}(0, \Sigma)$ and $s_{j,t}$ is a vector of firm characteristics including a constant, $CPROF_t$,

EG_t and ten other predictors (see Section 3.3 for details). The VAR in (14) is estimated by pooling together all observations, applying a recursive window. Importantly, Γ and Σ do not vary across firms. Thus, cross-sectional variation in the cash-flow forecasts at t is determined by state variables $s_{j,t}$. Using estimates Γ and Σ, scaled expected cash flows can be expressed as

$$\frac{\mathbb{E}_t[CF_{t+h}]}{BE_t} = \left(e^{(\mathbf{1}_{CPROF}-\mathbf{1}_{EG})'\Gamma^h \cdot s_t + v_1(h)} - 1\right) \cdot e^{\mathbf{1}'_{EG}\left(\sum_{\tau=1}^{h}\Gamma^\tau\right)\cdot s_t + h\cdot v_2(h)}, \tag{15}$$

where $\mathbf{1}_x$ is defined as a selector vector such that $\mathbf{1}_x s_t = x_t$. $v_i(h)$ are parameters that do not vary cross-sectionally, since they only depend on Γ, Σ and h. After forecasting future expected cash flows, Gonçalves (2021) estimates discount rates $dr_{j,t}$ by choosing it such that each firm's (j) model-implied market-to-book ratio equals the observed market-to-book ratio $\frac{ME_{j,t}}{BE_{j,t}}$:

$$\frac{ME_{j,t}}{BE_{j,t}} = \sum_{h=1}^{\infty}\left(e^{(\mathbf{1}_{CPROF}-\mathbf{1}_{EG})'\Gamma^h \cdot s_{j,t} + v_1(h)} - 1\right) \cdot e^{\mathbf{1}'_{EG}\left(\sum_{\tau=1}^{h}\Gamma^\tau\right)\cdot s_{j,t} + h\cdot v_2(h) - h\cdot dr_{j,t}} \tag{16}$$

In this step, one takes the cash flow forecast from (15) as given and assigns stocks with high prices a relatively low discount rate. Consequently, these low discount rates translate into high values of duration, calculated as:

$$DUR_{j,t}^{GON} = \left(\frac{BE_{j,t}}{ME_{j,t}}\right)\sum_{h=1}^{\infty} h\left(e^{(\mathbf{1}_{CPROF}-\mathbf{1}_{EG})'\Gamma^h s_{j,t} + v_1(h)} - 1\right)e^{\mathbf{1}'_{EG}\left(\sum_{\tau=1}^{h}\Gamma^\tau\right)s_{j,t} + h\cdot v_2(h) - hdr_{j,t}} \tag{17}$$

Unlike in Dechow et al. (2004), where discount-rate information enters through stock prices (and price differences are thus entirely attributed to differences in cash flows), Gonçalves (2021) estimates the market discount rate by matching cash-flow forecasts to market prices. Thereby, market prices enter the duration measure in Equation (17) explicitly through different discount rates, giving an arugably accurate estimate of cash-flow duration. However, as shown in Section 2.1 above, simply because *any* duration measure depends on the level of the discount rate used to compute the measure, DUR^{GON} yields a mechanical relation between duration and expected returns that has nothing to do with the timing of cash-flows but with the relation between the discount rate and the discount rate sensitivity. Gonçalves (2021) also suggests other measures, namely the "expected payback period" (EPP) and a log-linearized version of duration, ($llDur$) that do not require a discount rate to be specified. However, these do not give a discount-rate free assessment of cash-flow timing, either.[2] Again, none of this is problematic if we understand duration as a measure of discount rate sensitivity driven by the absolute level of discount rates rather than by cash-flow timing. However, this means that we must not interpret these findings in the context of the term structure of equity.

2.2.3 Other duration measures

Over the years, several adaptations of duration measures have been introduced. Chen (2011) adapts the Dechow et al. (2004) measure such that cash-flows to equity in (7) reflect default risk. Moreover, he replaces the uniform discount rate with one that, similarly to DUR^{GON}, calibrates stock-specific discount rates such that they match the respective stock price. Consequently, the measure introduces a mechanical relation between market prices and the duration measure. We label this measure with DUR^{CH} in the following.

In a more recent contribution, Chen and Li (2018) build on DUR^{DSS} and modify it in two ways. Firstly, Chen and Li (2018) include further forecast variables to predict return on equity and book equity growth. Secondly, the authors assume that the net payouts from the infinite horizon are distributed as a growing perpetuity. We denote this measure of equity duration by DUR^{CL}. The general issue of including discount-rate information through market prices is not tackled.

Da's (2009) measure of duration does not use discount rate information but is based on ex-post observations of cash flows and therefore not apt for testing the relation between cash-flow timing and *expected* stock returns.

[2]The *expected payback time*, EPP, is the number of years until the cumulative sum of forecast cash flows equals the market value. With a higher market value, this number is higher. Consequently, when considering two stocks with the same forecasted cash flows but different prices, the stock with the higher market value is assigned the longer duration. The second measure, $llDur$, is explicitly the negative of the log-linear approximation of the derivative of the stock's market value with respect to the discount rate (which in itself depends on the market-to-book ratio, a function of market discount rates).

In a recent contribution, Gormsen and Lazarus (2019) relate "duration" to various stock market anomalies. It is worth noting that their notion of duration actually refers to analysts' long-term growth forecasts, i.e. forecast for earnings over the next five years and is therefore conceptually different from duration in the sense of Macaulay. Most of the broad cross-sectional analysis in that paper is based upon the fitted values of a regression of analyst growth forecasts on well-known cross-sectional return predictors such as CAPM betas. They find a negative relation between CAPM alphas and long-term growth (or its fitted values) but not for excess returns in portfolio sorts. Recent evidence by Jylha and Ungeheuer (2021) suggests that analysts' forecasts of long-run cash-flow growth are not only biased upwards but also "mechanically" related to stocks' CAPM betas.[3] It is hence unclear if the use of analysts' long-term growth forecasts is only informative about cash-flow timing or rather also a measure of potentially priced correlation with the market.

3 Empirical analysis

As shown in Section 2, the established empirical measures of duration are not pure measures of cash flow timing. In this section, we investigate whether the cross-sectional spread in discount rates (proxied by mean returns) that is generated by the measures is due to the forecast cash flows or rather due to the use of market prices that are shaped by the object of interest – discount rates. To this end, we introduce new measures of cash-flow duration that build on the established ones but leave out discount-rate confounded information. We discuss the specifics of the construction of the measures both with and without the use of market-implied discount rate information in Sections 3.2 and 3.3. Then we investigate their empirical relation with discount rates in Section 3.4. Before that, we present the data and the sample selection criteria in the following Section 3.1.

[3]Jylha and Ungeheuer (2021) show that analysts systematically assign higher long-run cash-flow growth to stocks with higher beta and argue that this is in order to reconcile higher betas with higher stock prices.

3.1 Data and Sample Construction

To forecast future cash flows to shareholders in Equation (7) we use annual data from COMPUSTAT, winsorized at the 1% and 99% level to reduce the impact of outliers. We obtain data on stock prices, shares outstanding and returns from the Center for Research in Security Prices (CRSP). Our sample consists of all common U.S. stocks with share codes 10 and 11 which are listed on NYSE, Amex or Nasdaq. Stocks in the financial and utility sectors (SIC codes 4900-4999 and 6000-6999) are excluded since they typically have different balance sheet patterns compared to industrial sectors. Nevertheless, our results are robust to their inclusion (not tabulated). Moreover, we require a minimum of two yearly COMPUSTAT observations for a stock to be included in our sample to mitigate backfilling concerns (Fama and French, 1993). Lastly, we include delisting returns following Shumway (1997). Due to the availability of accounting values from COMPUSTAT our sample period runs from January 1963 to December 2020 for measures based on the Dechow et al. (2004) duration concept. For measures based on the Gonçalves (2021) duration concept, our analysis covers the time period from July 1973 to December 2020.

3.2 Construction of Dechow et al. (2004) implied equity duration

To forecast future cash flows to shareholders in Equation (8), we use COMPUSTAT data on income before extraordianry items (IB) for earnings, data on sales (SALE) and book equity. Book equity follows the construction of Davis et al. (2000) which can be found in the Appendix A.1. Similar to Davis et al. (2000) we add hand collected book equity data from Moody's manual. Market prices are defined by multiplying the CRSP items shares outstanding (item SHROUT) and price per share (PRC). The autoregressive parameters are estimated from a pooled regression over our sample period and can be found in Table 1.[4] Results using either the parameters

[4] We also estimate the AR (1) parameters ρ_{ROE} and ρ_{BEG} on distinct industry levels (Fama and French 17,30 or 49 industries) and with an expanding window. Using these industry specific AR (1) parameters or industry specific AR (1) parameters with an expanding window, yields quantitatively very similar results compared to what we tabulate in Section 3.4.

in Dechow et al. (2004) or Weber (2018) are quantitatively similar. Note that we follow Dechow et al. (2004) and Weber (2018) and use sales growth data to estimate the AR (1) coefficient for book equity growth (EG). As in Dechow et al. (2004), ROE is assumed to revert to the long run cost of equity (μ_{roe}) which is set to 12 %. Equity growth (EG) reverts to the long-run macroeconomic growth rate (μ_{eg}), which equals 6 %.

The forecast values of ROE and EG implied by the autoregressive relations (9) and (10) are plugged into the definition of cash flows (8) and subsequently used to compute DUR^{DSS} using Equation (11). Observations of DUR^{DSS} from fiscal years ending in $t-1$ (COMPUSTAT item FYR) are then matched with stock returns from July in year t to June in year $t+1$. This procedure follows Fama and French (1992) and ensures that investors have enough time to incorporate accounting information into prices. At the end of every June, we sort the cross-section into deciles based on NYSE breakpoints of the DUR^{DSS} measure. These portfolios are held from July in year t to June in year t+1.

3.2.1 Versions of DUR^{DSS} without confounding discount-rate information

Duration with forecast-implied prices (uniform long run growth): DUR^{FIP}. For the first measures, we replace the price in Equation (11) with a price that is implied by three components: a uniform discount rate, a long-run growth forecast equal to the long-run mean implied by the autoregressive processes and the cash flow forecasts used in the first part of (11). We call this measure DUR^{FIP} (Dechow et al. (2004) duration with forecast-implied prices).

$$DUR_{j,t}^{FIP} = \frac{1}{P_{j,t}^{FIP}} \cdot \left[\sum_{s=1}^{T} \frac{s \cdot CF_{j,t+s}}{(1+r)^s} + \left(T + \frac{1+r}{r-g} \right) \cdot \left[P_{j,t}^{FIP} - \sum_{s=1}^{T} \frac{CF_{j,t+s}}{(1+r)^s} \right] \right] \quad (18)$$

with $P_{j,t}^{FIP}$ defined as the price of the stock computed as implied by the model, i.e.

$$P_{j,t}^{FIP} = \sum_{s=1}^{T} \frac{CF_{j,t+s}}{(1+r)^s} + \frac{CF_{j,T} \cdot (1+g)}{(1+r)^T \cdot (r-g)}, \quad (19)$$

where g is the model implied long-run cash-flow growth of six percent and $T = 15$.[5] Note that the uniform long run growth rate for cash flows to equity does not introduce cross-sectional variation. Thus, cross-sectional variation is solely driven by the cash flow forecasts for the first 15 years. Moreover, we assume for both versions that cash flows after the finite forecasting horizon are distributed as a growing perpetuity. Thus, Equation (18) differs slightly from DUR^{DSS} in Equation (11), since Dechow et al. (2004) and Weber (2018) assume that cash flows after the forecasting horizon T are distributed as a level perpetuity. Results, however, are quantitatively similar.

Duration with forecast-implied prices (stock-specific long run growth): $DUR^{FIP-TZZ}$**.** We want to make sure that any potentially inferior performance of versions of the Dechow et al. (2004) is not due to discarding market price information about cash-flows beyond the forecast horizon T. While it is empirically impossible to say clearly whether a price is high due to high future cash flows or low discount rates, we can try to account for the cash-flow information in prices. Specifically we use a variety of forecast variables (including ones that are based on market prices) to estimate a stock-specific long-run growth rate g in Equation (19). We do so using a LASSO approach as in Tengulov et al. (2019). The resulting measure is called $DUR^{FIP-TZZ}$ (forecast-implied prices, Tengulov-Zechner-Zwiebel). Details on the forecasting variables and selected explanatory variables can be found in Appendix B. A separate Bayesian LASSO approach shows that the dividend yield, financial constraints as measured by Whited and Wu (2006) and GDP growth are important predictors for long-run growth in EBITDA. Moreover, the posterior distributions for the local shrinkage parameters reveal that asset growth, capital intensity and the amount of firms entering an industry are important predictors, though not as important as the former ones.[6]

[5] Since model implied prices can become negative, we find that 7 % of observations for DUR^{FIP} and 4 % of observations for $DUR^{FIP-TZZ}$ have negative implied prices. We exclude these observations from the respective sample.

[6] Note that our adaptive LASSO approach selects mostly all predictors as shown in Figure B.1 in Appendix B. Therefore, we implement a Bayesian LASSO approach with a normal gamma and Horseshoe prior to investigate which variables are important predictors.

3.3 Gonçalves (2021) duration

To forecast future cash flows to equity (15), we use the following 12 state variables for the vector $s_{i,t}$, suggested by Gonçalves (2021):

Valuation Measures

Book-to-Market:	$BM_{i,t} = log\left(\frac{BE_{i,t}}{ME_{i,t}}\right)$
Payout Yield:	$POY_{i,t} = log\left(1 + \frac{PO_{i,t}}{ME_{i,t}}\right)$
Sales Yield:	$SY_{i,t} = log\left(\frac{SALE_{i,t}}{ME_{i,t}}\right)$

Capital Structure Measures

Market Leverage:	$MLEV_{i,t} = log\left(\frac{BD_{i,t}}{ME_{i,t} + BD_{i,t}}\right)$
Book Leverage:	$BLEV_{i,t} = log\left(\frac{BD_{i,t}}{AT_{i,t}}\right)$
Cash Holdings:	$CASH_{i,t} = log\left(\frac{CHE_{i,t}}{AT_{i,t}}\right)$

Growth Measures

BE Growth:	$EG_{i,t} = log\left(\frac{BE_{i,t}}{BE_{i,t-1}}\right)$
Asset Growth:	$AG_{i,t} = log\left(\frac{AT_{i,t}}{AT_{i,t-1}}\right)$
Sales Growth:	$SG_{i,t} = log\left(\frac{SALE_{i,t}}{SALE_{i,t-1}}\right)$

Profitability Measures

Clean Surplus Prof.:	$CPROF_{i,t} = log\left(1 + \frac{PO_{i,t} + \Delta BE_{i,t}}{BE_{i,t-1}}\right)$
Return on Equity:	$ROE_{i,t} = log\left(1 + \frac{E_{i,t}}{\frac{1}{2}BE_{i,t} + \frac{1}{2}BE_{i,t-1}}\right)$
Gross Profitability:	$GPA_{i,t} = log\left(1 + \frac{G_{i,t}}{\frac{1}{2}AT_{i,t} + \frac{1}{2}AT_{i,t-1}}\right)$

where BE is book equity defined by Davis et al. (2000) and ME is market equity from CRSP. We follow Boudoukh et al. (2007) to construct net payouts (PO), as described in the Appendix A.2. SALE and AT correspond to the COMPUSTAT items sales and total assets, respectively. BD represents total book debt defined as the sum of items DLTT and DLC, while CHE are cash holdings (item CHE). E corresponds to income before extraordinary items (item IB) and G measures gross profits (SALE - COGS) as described in Novy-Marx (2013) . We follow Gonçalves (2021) and deflate all raw level quantities by the Consumer Price Index (CPI). [7]

Thereafter, we estimate Γ and the covariance matrix of firm-demeaned residuals (Σ) from the VAR in Equation (14) by pooling together all observations with an expanding window.

[7] We follow Gonçalves (2021) and impose the following selection criteria: Any negative item $AT, BE, ME, SALE, CHE, BD$ and DVC is set to missing. Moreover, we set to missing values of $BE, CHE,$ andBD larger than A. Similar to Vuolteenaho (2002) any BE value higher than $(50 \cdot ME)$ or smaller than $(\frac{1}{50} \cdot ME)$ is set to missing. Profitability ratios are trimmed at -99 %. Lastly, all state variables are winsorized at the 1% and 99 % level.

Specifically, we weight each cross-section by the corresponding number of firms when estimating the VAR. As in Gonçalves (2021), we exclude the 20% smallest stocks by NYSE breakpoints when estimating the VAR. Moreover, we follow Gonçalves (2021) and obtain the elements in Γ corresponding to the intercepts such that the long run expectations of the state variables in the vector $s_{i,t}$ equal the product of Γ and the vector of cross-sectional medians for each state variable. Note that market equity in the state variables for the VAR corresponds to the market equity at the end of each fiscal year. Estimates for Γ, Σ and the steady state growth rates over the full sample period can be found in Table C.1 in Appendix C. The autoregressive parameters for $CPROF$ and BEG (the corresponding elements in the Γ matrix) show little variation over the course of the sample for most state variables, see Figure C.1 in Appendix C.

In order to compute the Gonçalves (2021) duration measure DUR^{GON} in Equation (17), we solve equation (16) for the discount rate $dr_{j,t}$ with a root finding algorithm. Using the same time convention as Fama and French (1992), cash flow forecasts are from fiscal years ending in calendar year $t-1$ and market equity is from the end of December in year $t-1$. Subsequently, we form portfolios at the end of every June by sorting the cross-section into deciles based on NYSE breakpoints of the DUR^{GON} measure. These portfolios are held from July in year t to June in year $t+1$.

3.3.1 Versions of DUR^{GON} without confounding discount-rate information

As for the Dechow et al. (2004) measure, we again take out discount-rate related information from the duration measure to distinguish between discount rate-driven and timing-driven duration and its respective relation to mean stock returns. We start off by not only assigning exogenous uniform discount rates but also by taking out all predictor variables that contain market prices (and hence discount rate information). In a next step, we allow for market prices as predictor variables but still refrain from matching the applied discount rate to market prices.

Duration with forecast-implied prices (uniform long run growth) and without market price information: $DUR^{GON-NMI}$. We first compute Gonçalves's duration but constrain the set of predictor variables in the vector s and exclude the book-to-market ratio, payout yield, sales yield (i.e. the sales-to-price ratio) and market leverage. I.e. market price information does not enter the measure. Moreover, in order to be consistent with DUR^{DSS}, we assign a fixed discount rate of 12% for all stocks.[8] We call this measure $DUR^{GON-NMI}$ ("no market price information").

Duration with forecast-implied prices (uniform long run growth): $DUR^{GON-NDR}$. We want to understand the role of market price information for forecasting cash flows, independently of its use in determining the discount rate in Gonçalves (2021) duration.

We therefore introduce a new version of DUR^{GON} where we use all available information from the original s vector (including market prices) but simply do not match the employed discount rate to market prices and rather use a 12% discount rate as for $DUR^{GON-NMI}$. We call the resulting measure $DUR^{GON-NDR}$. If $DUR^{GON-NMI}$ lacks important cash flow information contained in market prices, then the new measure that uses the same information for forecasting as the original DSS^{GON} should be both a good predictor for cash flows and also generate a spread in mean returns.

3.4 Empirical analysis

Having established the duration measures, we now study their empirical properties. First, by testing whether sorts on the measures indeed generate a spread in future cash flow growth and second whether we find that they also generate a spread in mean returns. We examine return spreads both unconditionally and conditional on whether economic growth is high or low because economic growth had been suggested to determine the slope of the equity premium term structure in standard asset pricing models.

[8] Results using other discount rates are similar (not tabulated).

3.4.1 Cash flows

In Table 2, we show how the different measures of equity duration relate to future cash flow growth over the next 5 to 10 years. To the extent that duration is related to the timing of cash flows, we would expect that stocks with higher duration have higher future earnings growth (Panels A and B) and higher future cash-flow to equity growth (Panels C and D). As shown in Panel A, the two original measures of equity duration by Dechow et al. (2004) and Gonçalves (2021) generate an almost monotonic relation between the duration measures and earnings growth over the next 5 to 10 years. This suggests that DUR^{DSS} and DUR^{GON} indeed measure the timing of earnings. The picture is a bit less clear-cut for *cash flows to equity growth* (CFEG), the measure of cash flows actually estimated in the models. As shown in Panel C, the generated spread is much lower and even negative for DUR^{GON} over a ten-year horizon. This already points towards the influence of raising equity which results in negative cash flows to equity and is influenced by capital costs (discount rates). For the duration measures that do not use discount rate-confounded information, we see similarly marked spreads for earnings growth (Panel B) and overall significant spreads for CFEG (Panel D). Overall, both the discount-rate confounded and the alternative measures relate to future cash-flow growth over the next 5 to 10 years.

3.4.2 Unconditional Returns

We next turn to unconditional returns, presented in Table 3. For each measure we present the monthly mean raw return, the monthly Fama and French (2015) five-factor alpha, the annual standard deviation and the annual Sharpe ratio.[9] In Panel A, we show the results for the two original duration measures which both exhibit a significantly negative relation between duration and subsequent mean returns and Sharpe ratios. This result is in line with the findings in the original papers by Dechow et al. (2004), Weber (2018) and Gonçalves (2021). Conversely, the versions of these duration measures that do not use discount-rate information

[9] Details for spanning regressions with other factor models can be found in Table D.14 in the Appendix.

do not indicate such a negative relation (Panel B). Moreover, Sharpe ratios for long-short portfolios using these discount-rate free measures are close to zero. This is fully due to a mean spread around zero, because standard deviations are comparable between original and discount-rate free measures of duration. These findings also hold for $DUR^{GON-NDR}$, the version of the Gonçalves (2021) duration that does use market-implied information about future cash flows but does not calibrate discount rates to match market prices. This suggests that the lack of a spread for the non-discount rate confounded measures is not because they leave out important cash-flow information in market prices. The generated return spreads for measures excluding market-implied discount rate information are small and statistically insignificant. None of the measures generate alphas with respect to the Fama and French (2015) model. Additionally, we also find statistically insignificant spreads for longer holding periods up to two years as shown in Table D.8 in Appendix D. This suggests that the negative unconditional return spread documented in Panel A is most likely driven by the mechanical relation between duration and discount rates in the original measures. This becomes evident when analyzing the mean return spread of DUR^{DSS}-sorted portfolios with different forecasting horizons T. As we increase the forecasting horizon of DUR^{DSS} in Equation (11), the relative share of cash flows paid out in the infinite horizon decreases, whereas the share of cash flows distributed in the finite horizon increases. Therefore, the price $P_{j,t}$ of stock j or in other words discount rate information becomes less relevant as we increase the forecasting horizon T. Put differently, as we increase the forecasting horizon T, we expect that our concern of a mechanical relation between the measure and discount rates becomes less relevant. Interestingly, we find that the negative relation between the DUR^{DSS} measure and expected returns in Table 3 increases from -0.45 % to -0.20 % as we increase the forecasting horizon T in Figure 2. In fact, this relation becomes statistically insignificant at the 10 % significance level if we increase the forecasting horizon beyond 20 years. This finding suggests that the negative relation to subsequent returns in the DUR^{DSS} measure is not because of cash flow timing but rather due to discount rate sensitivity.

The finding that there is no unconditional relation between discount rate free equity duration measures and expected returns also carries over to the equity duration measures of Chen (2011) and Chen and Li (2018) mentioned in Section 2.2.3. Consistent with the results of Chen and Li (2018) we find a negative relation between their equity duration measure and subsequent mean returns in Panel A of Table D.7 in Appendix D. Replacing market prices in this equity duration measure with forecast-implied prices in Panel B, we no longer find a statistically significant relation between the measure and subsequent mean returns.[10] The original equity duration measure of Chen (2011) (DUR^{CH}) implies only a weak and insignificant negative relation to subsequent mean returns in Panel A of Table D.7. This can be understood by the following line of reasoning: DUR^{CH} adjusts cash flows to equity for default risk, such that stocks with high default risk are assigned a lower equity duration. In line with evidence in Chen (2011), our results in Table D.1 indicate that DUR^{DSS} stocks in the highest decile have higher default risk, as measured by their Ohlson (1980) O-Score. Therefore, DUR^{CH} is relatively low for stocks with the highest DUR^{DSS} ranks. This leads to a lower return correlation with measures which do not adjust for default risk (such as DUR^{GON} and DUR^{CL}) and consequently to an attenuation of the negative relationship with mean returns which Dechow et al. (2004)-type duration measures otherwise have. Thus, a roughly flat relation to subsequent mean returns can be observed for DUR^{CH} in Panel A of Table D.7. In line with our earlier results on measures of pure timing, the two versions of DUR^{CH} in Panel B, where we use a constant discount rate of 12 % and either forecast prices by a constant growth rate (DUR^{CH-FIP}) or by a stock specific growth rate ($DUR^{CH-FIP-TZZ}$), do not imply a statistically significant relation to subsequent mean returns.

Summing up, we find that the negative relation of equity duration measures based on the construction of Dechow et al. (2004) or Gonçalves (2021) is mainly due to the discount-rate sensitivity which in turn is driven by discount rate levels. Alternative measures of pure cash-flow timing based on the construction of Dechow et al. (2004) or Gonçalves (2021) do not indicate a significant relation to subsequent mean returns. This is in line with an unconditionally flat

[10]Using coefficients from an expanding VAR rather than full sample means as in the baseline measure of Chen and Li (2018) does not change the results (not tabulated).

term structure of equity.

3.4.3 Conditional Returns

We now turn to conditional returns. In expansion (recession) episodes, the empirical results by Giglio et al. (2021) and Ulrich et al. (2022) imply an upward (downward) sloping equity term structure. We start by considering returns conditional on low economic growth (r^{low}) in Table 4, where we focus on months where the Chicago Fed National Activity Index (CFNAI) is below the 25% quantile (corresponding to CFNAI=-0.27) of all observations. The CFNAI provides a monthly level of economic activity and most of the months in the lower quartile are in quarters classified as recession quarters by the NBER. [11] Both the original measures (Panel *A*) and the measures that do not use discount rate information (Panel *B*) generate negative spreads in duration-sorted portfolio returns when conditioning on episodes of such markedly growth. However, this negative relation is significantly more pronounced for discount rate free equity duration measures as shown in Panel *B*. Moreover, this negative relation is statistically different from all other months only for measures of equity duration unrelated to discount rates. In Appendix D we show analogous results for various definitions of low economic growth, including quarters with real GDP growth in the lowest decile in Table D.10 and NBER recessions in Table D.12. These results mostly indicate a negative relation for alternative measures of equity duration with expected returns, which is particularly strong for the Great Recession in 2008/09, the recession in 2001 and the recession of the early 90s (Table D.13 and Figure D.2). Consequently, our empirical results are mostly in line with the theoretical prediction of a negative sloping equity term structure in times of low growth as well as the recent empirical findings regarding this relation by Giglio et al. (2021).

Next, we consider returns during periods of high growth (r^{high}), defined analogously as months where the CFNAI is above the 25th quantile of all observations. While the original,

[11] The CFNAI is calculated from 1967 to 2021 on a monthly basis by the Federal Reserve Bank of Chicago by weighting 85 monthly indicators of national economic activity. Thus, the CFNAI provides a single summary measure which identifies a common component in these indicators. Importantly, the CFNAI index closely tracks periods of economic expansion and contraction as shown by the Chicago Fed and as depicted in Figure D.1 in Appendix D.

discount-rate contaminated duration measures indicate negative spreads, the duration measures that do not use discount-rate information generate positive (and mostly statistically significant) spreads, as shown in Table 4. In Table D.11, we show analogous results for quarters with high GDP growth. During such marked expansion episodes, we find strongly positive and statistically significant spreads. Thus, our empirical results on conditional returns are in line with the empirical observation of a positive slope of the term structure during expansions (Van Binsbergen et al., 2013; Giglio et al., 2021; Bansal et al., 2021; Ulrich et al., 2022).

Summing up, our empirical evidence supports the theoretical prediction of a negative (positive) slope of the equity term structure during recession (expansion) states. Note that the picture based on our conditional analysis is somewhat less clear-cut than e.g. in Giglio et al. (2021). This is not surprising for two reasons. First, by using single stocks rather than characteristics-sorted portfolios, our measure is necessarily more noisy. Secondly, we observe actual realized returns rather than model-implied expected returns when analyzing cash-flow timing on a stock level.

4 Discussion

4.1 Discount-rate sensitivity

As we have argued earlier, duration is best understood as measure of discount-rate sensitivity rather than a measure of cash-flow timing. From a theoretical perspective, as laid out in Section 2, this discount-rate sensitivity is driven by both, the timing of cash flows as well as the level of discount rates.

We start with long-maturity interest rates. To see how the prices of duration-sorted portfolios react to changes in (long-term) interest-rates, we regress monthly returns on different duration-sorted portfolios on the 10-year treasury rate. The results are shown in Table 5. Overall, we find that high-duration portfolios react more strongly to such changes in long-term risk-free rates. Interestingly, the sensitivity is stronger for the discount-rate free measures. Moreover, it is positive, in line with the positive signal about future growth that rises in long-term rates provide.

Intuitively, stocks with long cash flow timing are influenced more strongly by the positive cash-flow news provided by increases in long rates whereas stocks with high discount-rate contaminated measures react more negatively via the discount-rate channel.

For short-term rates (one-month Treasury bill rate), the effect is unambiguously negative, and slightly increasing in absolute size for all duration measures (see Table D.9 in the Appendix). This is in line with the idea that there is not much positive long-term growth information in short-term rates such that the negative effect of discounting is not outweighed by positive growth information.

4.2 Relation of different duration measures

The pure timing measures lead to a radically different sorting of stocks. As shown in Table 6, the pairwise rank correlation coefficients - which indicate to what extent the sorting according to different measures coincide - are high among the respective groups of discount-rate free and discount-rate contaminated measures. Conversely, the rank correlations are much lower between measures from different groups. In other words, a large part of the ranking according to DUR^{DSS} and DUR^{GON} is due to discount-rate levels. Importantly, our new pure timing measures ensure that there is no mechanical link between duration and the cross-sectional differences in valuation, as exemplified by the weak correlation of pure timing measures and the book-to-market ratio (BM) that may be understood as a catch-all measure of valuation levels. Whereas DUR^{GON} has a rank correlation with the market-to-book ratio of 84%, it is 44 % for the version of the Gonçalves (2021) measure that does not choose the discount rate such that model implied prices and market prices coincide. I.e. if anything, the relation between the market-to-book ratio and duration is negative for discount-rate free duration measures. Consequently, as shown in in Panel B, return correlations of the high-minus-low duration portfolios with the HML value factor are close to zero or even change sign for equity duration measures excluding discount rate information. This result persists when controlling for exposure to other risk factors, see Table D.14 in the Appendix.

This is perhaps surprising given that the book-to-market ratio is often understood as a proxy for late cash-flow timing (Lettau and Wachter, 2007). It is less surprising when we consider that the time-variation in valuation ratios is primarily related to variation in discount rates (see, e.g. Cochrane, 2008). Moreover, recent evidence by Golubov and Konstantinidi (2019) suggests that the value premium is not explained by cash-flow timing while Chen (2017) even finds that growth stocks do not have markedly higher cash-flow growth. Our results are in line with these findings.

We explore the relation further by considering the total payout ratio of the original Dechow et al. (2004) duration-sorted portfolios in Panel A of Table D.1. The total payout ratio $(\frac{\text{dividends+repurchases}-\text{equity issuance}}{\text{book equity}})$ is a natural, discount-rate free measure of cash-flow duration that answers the straight-forward question of how much of their book value a firm pays out in given year. As opposed to the market payout ratio $\frac{\text{total payouts}}{\text{market equity}}$, it does not induce discount-rate information. We further look at different components of the payout ratio in Panel A. The dividend ratio $(\frac{\text{dividends}}{\text{earnings}})$ exhibits a humped-shaped pattern, and so does the repurchase ratio $(\frac{\text{repurchases}}{\text{earnings}})$. Crucially however, equity issuance normalized by book equity increases monotonically in DUR^{DSS} and is extremely high for the tenth DUR^{DSS} decile. This highlights the role that discount rates play for DUR^{DSS}. Low discount rates should lead firms to issue more equity. The discount-rate free versions of DUR^{DSS} shown in Tables D.3 and D.4 do not feature such marked relationships between equity issuance and duration. This indicates that discount rates rather than late cash-flow timing due to equity issuance explain the relation. All in all, this results in a marked negative relationship of total payouts with the duration measure. Table D.2 shows a similar pattern for DUR^{GON} whereas the discount-rate free versions presented in Tables D.3, D.4, D.6 and D.5 do not feature such a marked relationship with the issuance ratio.

There is however a case to make for a negative relation between cash-flow timing and discount rates, even in absence of a downward-sloping equity term structure. Importantly, the reasoning behind this rests on causality going the other way, namely that firms with low discount rates can invest more and therefore move more cash flows to the more distant future whereas firms with higher capital costs cannot afford to do so. In that case, despite inducing a mechanical relation, measures of discount rates would be a valuable cross-sectional predictor of cash-flow timing. The fact that the discount-rate contaminated duration measures DUR^{DSS} and DUR^{GON} are positively related to both the issuance ratio (in Panel A of Tables D.1 and D.2, respectively) and investment as measured by asset growth AG (Panel B of Tables D.1 and D.2, respectively) points in this direction.

5 Conclusion

We show that empirical measures of cash-flow duration derive their predictive power for returns from their mechanical relation with discount rates. Without this relation, there's no unconditionally monotonic relation between duration measures and subsequent returns.

We introduce versions of the Dechow et al. (2004); Weber (2018) and Gonçalves (2021) equity duration measures that do not use market prices. Importantly, our empirical analysis shows that while these measures do predict a spread in cash flows, they do not generate unconditional spreads in mean returns. In recessions (expansion periods) there is a negative (positive) spread in subsequent mean returns between stocks with high and low values of these discount-rate free duration measures.

We thereby provide stock-level evidence largely in line with the recent empirical findings of Giglio et al. (2021) and Jankauskas et al. (2021). Our results do not lend support to an unconditionally downward-sloping term structure of equity premia. Importantly, we show that the driver behind the relation of the established measures of equity duration lead to cross-sectional return spreads only due to the mechanical relation between duration measures and prices. We thereby reconcile the earlier findings on the joint distribution of returns and cash-flow duration measures with the recent evidence that suggests an unconditionally flat equity term structure.

Moreover, duration measures that do not use market-implied discount rate information are not significantly negatively related to the book-to-market equity ratio. This suggests that cash-flow timing does not explain the value anomaly as had been suggested by Lettau and Wachter (2007), among others.

Our finding speaks to a wider argument in asset pricing, namely that one should be cautious in using market-price variables to make inference about the relation between such variables and discount rates (see Santos and Veronesi, 2021, for a related argument). Even though asset prices are necessarily endogenous to all kind of firm-level variables in the broadest sense, tautological relations between market-prices and expected returns should be avoided.

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Table 1: Parameters of the AR(1) - process for DUR^{DSS}, $DUR^{DSS-FIP}$ and $DUR^{DSS-TZZ}$

Documented are the paramters for the AR(1) processes for return on equity (ROE) and book equity growth (EG). μ corresponds the long run mean, β to the constant in the AR(1) process and ρ equals the AR(1) coefficient. It holds that $\mu = \frac{\beta}{1-\rho}$.

	μ	β	ρ
ROE	0.12	0.0372	0.69
EG	0.06	0.0486	0.19

Table 2: Realized cash-flows of duration-sorted portfolios

We document measures of realized cash flows for portfolios sorted on equity duration measures. Realized EBITDA growth in Panel A corresponds to mean weighted EBITDA growth of duration portfolios after formation. Panel B documents realized cash flow to equity growth for duration portfolios. All measures are mean weighted and numbers are in percentage, while Newey and West (1987) t-statistics with 6 lags are documented in brackets.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Earnings growth: Original equity duration measures incl. discount rate information**											
					DUR^{DSS} equity duration						
$EBITDA_{t,t+5}$	5.77	6.44	7.16	7.61	8.90	9.30	10.21	11.99	14.86	15.00	**9.23**
	(14.52)	(14.99)	(19.64)	(20.26)	(22.99)	(25.96)	(27.78)	(33.52)	(30.58)	(31.00)	**(24.35)**
$EBITDA_{t,t+10}$	6.38	7.00	7.02	7.62	8.08	8.41	8.97	10.20	12.02	12.11	**5.73**
	(21.79)	(25.35)	(33.09)	(32.64)	(33.73)	(35.48)	(45.05)	(42.49)	(36.47)	(34.65)	**(21.66)**
					DUR^{GON} equity duration						
$EBITDA_{t,t+5}$	6.73	7.15	7.94	8.64	9.21	8.98	9.12	10.17	11.24	12.16	**5.43**
	(16.72)	(16.53)	(17.75)	(19.15)	(23.66)	(24.09)	(21.98)	(26.57)	(28.08)	(29.12)	**(18.21)**
$EBITDA_{t,t+10}$	6.96	6.66	6.99	7.43	7.62	7.85	8.29	8.62	9.10	9.84	**2.88**
	(26.71)	(24.87)	(33.94)	(33.87)	(40.98)	(34.59)	(37.29)	(42.49)	(36.33)	(34.27)	**(16.64)**
Panel B: **Earnings growth: Equity duration measures excl. discount rate information**											
					DUR^{FIP} equity duration						
$EBITDA_{t,t+5}$	8.46	8.01	7.72	7.75	7.90	8.38	8.60	10.50	13.68	16.49	**8.03**
	(24.17)	(21.73)	(25.95)	(22.10)	(23.31)	(21.25)	(22.18)	(25.67)	(28.29)	(33.76)	**(20.93)**
$EBITDA_{t,t+10}$	7.79	7.81	7.64	7.74	7.91	8.24	8.36	9.32	11.06	12.66	**4.86**
	(26.24)	(31.96)	(32.43)	(33.43)	(39.82)	(33.25)	(39.00)	(40.56)	(34.97)	(37.80)	**(16.73)**
					$DUR^{FIP-TZZ}$ equity duration						
$EBITDA_{t,t+5}$	6.07	6.72	6.68	7.05	7.16	7.99	8.30	10.11	13.23	15.79	**9.72**
	(17.19)	(17.12)	(17.53)	(20.14)	(19.09)	(20.02)	(19.63)	(22.76)	(27.97)	(29.95)	**(25.09)**
$EBITDA_{t,t+10}$	6.11	6.69	7.04	6.96	7.38	7.68	8.17	8.95	10.92	12.12	**6.00**
	(23.13)	(27.14)	(29.80)	(30.74)	(30.68)	(37.11)	(33.76)	(33.04)	(31.53)	(29.49)	**(16.99)**
					$DUR^{GON-NMI}$ equity duration						
$EBITDA_{t,t+5}$	7.36	7.05	7.45	7.81	7.63	8.00	8.78	9.95	12.35	14.54	**7.18**
	(19.47)	(18.00)	(19.36)	(22.37)	(19.32)	(19.72)	(19.69)	(18.46)	(24.53)	(29.57)	**(19.62)**
$EBITDA_{t,t+10}$	7.25	6.92	6.92	7.13	7.10	7.44	7.89	8.39	9.87	11.52	**4.28**
	(30.49)	(28.86)	(29.94)	(30.38)	(33.29)	(34.65)	(38.12)	(28.43)	(33.46)	(31.22)	**(14.10)**
					$DUR^{GON-NDR}$ equity duration						
$EBITDA_{t,t+5}$	7.61	7.51	7.52	8.05	8.02	8.39	8.94	10.25	11.56	13.33	**5.73**
	(17.76)	(18.55)	(18.79)	(20.54)	(19.93)	(20.44)	(20.00)	(21.87)	(23.31)	(26.69)	**(11.84)**
$EBITDA_{t,t+10}$	7.40	7.06	7.04	7.12	7.66	7.58	7.96	8.48	9.26	10.88	**3.48**
	(26.31)	(27.65)	(32.00)	(26.37)	(36.65)	(36.27)	(34.76)	(34.96)	(30.56)	(30.22)	**(9.91)**

Continued on next page

Table 2 continued: Realized cash-flows of duration-sorted portfolios

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel *C*: **Cash flows to equity growth: Equity duration measures incl. discount rate information**											
					DUR^{DSS} equity duration						
$CFEG_{t,t+5}$	15.65	15.58	14.83	15.61	16.08	14.67	17.00	16.65	18.58	17.88	**2.24**
	(20.09)	(20.14)	(18.30)	(18.93)	(18.54)	(17.60)	(21.65)	(19.79)	(18.87)	(15.66)	**(2.53)**
$CFEG_{t,t+10}$	10.39	11.49	10.75	10.23	10.49	10.32	11.49	11.65	12.61	11.58	**1.18**
	(22.60)	(19.36)	(21.45)	(24.09)	(25.90)	(23.36)	(26.86)	(24.58)	(22.62)	(19.27)	**(2.30)**
					DUR^{GON} equity duration						
$CFEG_{t,t+5}$	18.50	16.58	16.18	15.89	14.37	16.22	16.65	17.61	17.92	18.97	**0.47**
	(21.47)	(21.00)	(20.32)	(19.28)	(18.08)	(20.96)	(21.36)	(19.93)	(22.91)	(20.43)	**(0.56)**
$CFEG_{t,t+10}$	12.67	11.21	10.96	11.07	11.24	10.92	11.20	11.55	12.67	12.55	**-0.12**
	(23.58)	(21.78)	(24.48)	(24.69)	(24.11)	(23.06)	(23.48)	(27.37)	(23.55)	(24.28)	**(-0.29)**
Panel *D*: **Cash flows to equity growth: Equity duration measures excl. discount rate information**											
					DUR^{FIP} equity duration						
$CFEG_{t,t+5}$	16.26	15.92	15.48	15.49	16.17	15.67	15.68	16.33	17.04	20.81	**4.55**
	(18.43)	(18.63)	(17.62)	(19.68)	(20.41)	(18.95)	(19.71)	(19.34)	(18.53)	(16.89)	**(5.36)**
$CFEG_{t,t+10}$	10.69	11.54	11.39	11.60	10.98	11.00	10.81	11.72	10.99	12.51	**1.82**
	(22.39)	(24.74)	(25.85)	(25.27)	(24.68)	(19.84)	(22.76)	(23.17)	(21.51)	(19.52)	**(4.09)**
					$DUR^{FIP-TZZ}$ equity duration						
$CFEG_{t,t+5}$	12.00	14.91	15.06	16.24	17.12	17.58	17.48	16.93	18.33	20.17	**8.17**
	(12.87)	(17.06)	(16.29)	(20.18)	(19.50)	(19.14)	(19.02)	(18.97)	(19.58)	(17.32)	**(8.79)**
$CFEG_{t,t+10}$	8.93	11.25	12.30	12.45	12.22	11.65	11.31	12.11	11.85	12.19	**3.26**
	(17.07)	(24.65)	(28.38)	(27.21)	(24.61)	(23.19)	(24.52)	(22.98)	(22.18)	(21.66)	**(7.02)**
					$DUR^{GON-NMI}$ equity duration						
$CFEG_{t,t+5}$	15.05	17.44	17.58	16.34	18.26	17.02	16.86	17.64	17.61	18.01	**2.96**
	(14.47)	(20.58)	(20.26)	(20.80)	(24.07)	(20.88)	(20.97)	(23.74)	(21.10)	(17.74)	**(3.41)**
$CFEG_{t,t+10}$	11.13	12.31	12.38	11.86	11.53	12.08	11.98	11.82	11.28	11.57	**0.44**
	(20.66)	(23.86)	(27.17)	(26.25)	(28.64)	(24.76)	(26.38)	(25.43)	(20.75)	(19.50)	**(1.01)**
					$DUR^{GON-NDR}$ equity duration						
$CFEG_{t,t+5}$	15.75	17.84	18.05	17.08	17.32	17.47	16.55	18.77	16.23	17.43	**1.69**
	(14.97)	(19.11)	(21.80)	(21.74)	(19.14)	(27.54)	(25.56)	(21.79)	(20.72)	(19.00)	**(1.97)**
$CFEG_{t,t+10}$	11.37	12.42	12.49	11.79	11.76	11.95	12.05	11.76	11.51	10.86	**-0.51**
	(20.18)	(23.97)	(27.32)	(23.34)	(27.98)	(26.38)	(28.78)	(22.83)	(20.77)	(20.98)	**(-1.13)**

Table 3: Unconditional returns on duration-sorted portfolios

We document monthly average returns and mean pricing error (α) relative to the Fama and French (2015) five-factor model for portfolios sorted on equity duration measures. Mean excess returns are calculated from 07.1963 - 12.2020 (depending on data availability) and are value weighted. Numbers in brackets are Newey and West (1987) t-statistics with 6 lags. Moreover, we report annualized volatilities $\sigma_{ann} = \sigma_{monthly} \cdot \sqrt{12}$ in % and annualized Sharpe ratios $SR_{ann} = (r^e \cdot 12)/(\sigma_{monthly} \cdot \sqrt{12})$.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Original equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
r^e	0.81	0.89	0.77	0.81	0.58	0.63	0.65	0.67	0.67	0.38	**-0.43**
	(3.76)	(4.46)	(4.11)	(4.56)	(3.38)	(3.55)	(3.77)	(3.76)	(3.23)	(1.35)	**(-1.96)**
α^{FF5}	-0.05	0.08	0.01	0.06	-0.11	-0.10	-0.03	0.07	0.12	-0.07	**-0.02**
	(-0.51)	(0.97)	(0.09)	(0.85)	(-1.40)	(-1.38)	(-0.43)	(1.25)	(1.79)	(-0.55)	**(-0.13)**
σ_{ann}	19.4	18.2	16.7	16.4	15.9	15.9	15.9	16.1	18.1	23.4	**17.4**
SR_{ann}	0.50	0.58	0.55	0.59	0.44	0.47	0.49	0.50	0.45	0.19	**-0.29**
					DUR^{GON} equity duration						
r^e	1.06	0.80	0.77	0.73	0.76	0.69	0.72	0.77	0.61	0.49	**-0.56**
	(4.32)	(3.39)	(3.47)	(3.47)	(4.06)	(3.70)	(3.36)	(3.87)	(3.10)	(2.10)	**(-2.54)**
α^{FF5}	0.06	-0.11	-0.11	-0.16	-0.01	-0.07	-0.11	0.08	-0.05	-0.01	**-0.07**
	(0.55)	(-1.04)	(-1.14)	(-1.67)	(-0.14)	(-0.97)	(-1.34)	(0.98)	(-0.80)	(-0.08)	**(-0.47)**
σ_{ann}	20.1	18.6	17.2	17.7	16.6	16	17.1	16.7	16.5	17.8	**15.3**
SR_{ann}	0.63	0.51	0.54	0.49	0.55	0.52	0.51	0.55	0.44	0.33	**-0.44**
Panel B: **Equity duration measures excluding discount rate information**											
					DUR^{FIP} equity duration						
r^e	0.62	0.65	0.58	0.62	0.62	0.64	0.56	0.58	0.68	0.70	**0.08**
	(3.17)	(3.62)	(3.33)	(3.36)	(3.49)	(3.40)	(3.17)	(3.04)	(3.07)	(2.41)	**(0.41)**
α^{FF5}	0.05	0.14	-0.02	0.02	0.00	-0.02	-0.10	-0.04	-0.03	-0.01	**-0.05**
	(0.80)	(2.51)	(-0.32)	(0.33)	(0.02)	(-0.30)	(-1.22)	(-0.53)	(-0.37)	(-0.05)	**(-0.42)**
σ_{ann}	17.0	15.5	16.3	16.2	16.8	16.9	16.8	16.8	20.0	23.9	**15.1**
SR_{ann}	0.44	0.50	0.43	0.46	0.45	0.45	0.40	0.41	0.41	0.35	**0.06**
					$DUR^{FIP-TZZ}$ equity duration						
r^e	0.67	0.70	0.63	0.72	0.77	0.69	0.67	0.90	0.66	0.72	**0.05**
	(3.06)	(3.59)	(2.88)	(3.44)	(3.82)	(3.27)	(2.95)	(3.96)	(2.55)	(2.26)	**(0.22)**
α^{FF5}	-0.04	0.05	0.07	0.02	0.11	0.04	-0.10	0.17	0.02	0.14	**0.18**
	(-0.46)	(0.57)	(0.92)	(0.24)	(1.29)	(0.44)	(-0.88)	(1.73)	(0.15)	(0.98)	**(1.04)**
σ_{ann}	17.0	16.1	17.9	17.6	17.6	18.6	18.4	19.7	20.5	24.0	**16.6**
SR_{ann}	0.47	0.52	0.42	0.49	0.53	0.44	0.44	0.55	0.39	0.36	**0.04**

Continued on next page

Table 3 continued: Unconditional returns on duration-sorted portfolios

					$DUR^{GON-NMI}$ equity duration						
r^e	0.63	0.66	0.43	0.76	0.61	0.67	0.78	0.72	0.76	0.62	**-0.02**
	(3.04)	(3.26)	(1.93)	(3.94)	(2.83)	(3.21)	(3.87)	(3.06)	(3.10)	(2.02)	**(-0.08)**
α^{FF5}	-0.08	0.11	-0.18	0.13	-0.10	-0.02	0.10	-0.00	0.06	0.01	**0.08**
	(-1.00)	(1.39)	(-2.21)	(1.43)	(-1.19)	(-0.21)	(1.11)	(-0.01)	(0.52)	(0.04)	**(0.51)**
σ_{ann}	16.3	16.0	17.2	17.2	18.1	17.4	17.0	18.6	19.3	23.6	**17.8**
SR_{ann}	0.47	0.49	0.3	0.53	0.40	0.46	0.55	0.46	0.47	0.31	**-0.01**
					$DUR^{GON-NDR}$ equity duration						
r^e	0.53	0.65	0.71	0.64	0.66	0.69	0.84	0.78	0.76	0.62	**0.08**
	(2.70)	(3.33)	(3.49)	(3.22)	(3.02)	(3.13)	(3.77)	(3.43)	(3.08)	(2.03)	**(0.34)**
α^{FF5}	-0.19	-0.04	0.07	-0.06	0.11	0.14	0.31	0.01	0.07	-0.03	**0.16**
	(-2.61)	(-0.52)	(0.84)	(-0.79)	(1.33)	(1.48)	(2.70)	(0.14)	(0.72)	(-0.23)	**(0.89)**
σ_{ann}	15.8	16.0	16.8	17.0	18.0	17.8	18.0	18.6	19.6	23.9	**19.2**
SR_{ann}	0.40	0.49	0.51	0.46	0.44	0.46	0.56	0.50	0.46	0.31	**0.05**

Figure 2: Mean Return Spread of DUR^{DSS} conditional on different forecasting horizons T

This figure depicts the mean return spread of the equity duration measure DUR^{DSS} following Dechow et al. (2004) and Weber (2018) conditional on different lengths of the forecasting horizon T. 90 % Confidence intervals correspond to Newey and West (1987) corrected standard errors and are depicted in grey.

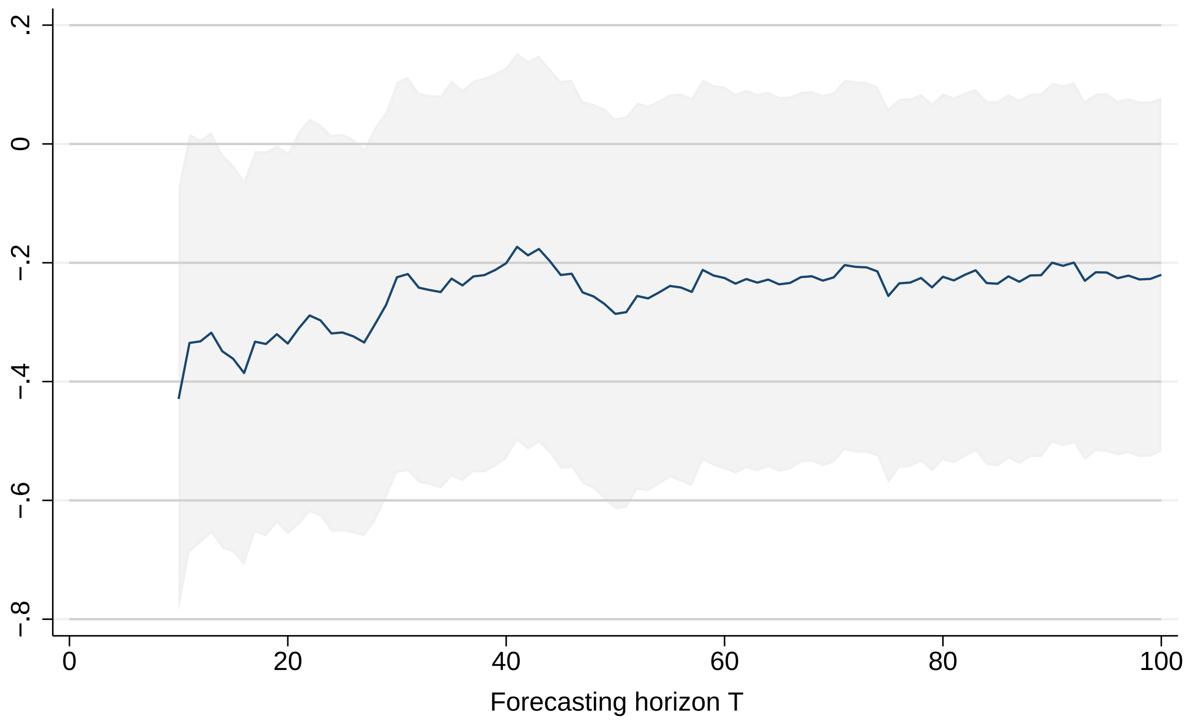


Table 4: Conditional returns for duration-sorted portfolios based on the Chicago Fed National Activity Index (CFNAI)

We document monthly excess returns for portfolios sorted on equity duration measures conditional on the Chicago Fed National Activity Index (CFNAI). r^{high} (r^{low}) are monthly excess returns if the Chicago Fed National Activity Index is higher (lower) compared to the 75th (25th) quantile. The observation period spans from 07.1963 - 12.2020 and returns are value weighted. Δ documents the difference in the high minus low duration portfolio (D10-D1) between the conditional returns documented in each panel and the returns in all other months.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**	Δ
Panel A: **Original equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
r^{low}	0.10	0.60	0.40	0.41	0.23	0.18	0.62	0.43	0.35	-0.53	**-0.63**	**0.22**
	(0.19)	(1.19)	(0.88)	(0.91)	(0.53)	(0.44)	(1.51)	(1.01)	(0.74)	(-0.78)	**(-1.39)**	**(0.47)**
r^{high}	1.21	0.99	0.43	0.81	0.42	0.65	0.44	0.53	0.30	0.31	**-0.91**	**0.51**
	(1.87)	(1.52)	(0.72)	(1.45)	(0.72)	(1.18)	(0.77)	(0.95)	(0.48)	(0.43)	**(-1.78)**	**(0.90)**
						DUR^{GON} equity duration						
r^{low}	0.65	0.66	0.49	0.50	0.46	0.39	0.58	0.68	0.63	0.59	**-0.06**	**-0.57**
	(1.17)	(1.20)	(0.99)	(1.03)	(1.01)	(0.88)	(1.23)	(1.51)	(1.48)	(1.21)	**(-0.16)**	**(-1.38)**
r^{high}	0.65	0.78	0.31	0.27	0.22	0.03	0.15	0.18	-0.09	-0.34	**-0.99**	**0.50**
	(0.85)	(1.13)	(0.45)	(0.38)	(0.30)	(0.05)	(0.20)	(0.24)	(-0.14)	(-0.46)	**(-1.80)**	**(1.06)**
Panel B: **Equity duration measures excluding discount rate information**												
						DUR^{FIP} equity duration						
r^{low}	0.89	0.54	0.49	0.31	0.37	0.33	0.23	0.26	0.11	0.11	**-0.79**	**1.03**
	(1.98)	(1.25)	(1.03)	(0.68)	(0.75)	(0.71)	(0.42)	(0.49)	(0.19)	(0.16)	**(-1.88)**	**(2.40)**
r^{high}	0.41	0.31	0.49	0.37	0.50	0.43	-0.02	0.54	0.70	1.32	**0.91**	**-1.08**
	(0.59)	(0.48)	(0.74)	(0.59)	(0.73)	(0.59)	(-0.03)	(0.82)	(0.81)	(1.34)	**(1.76)**	**(-1.96)**
						$DUR^{FIP-TZZ}$ equity duration						
r^{low}	0.84	1.05	0.62	0.59	0.50	0.31	0.26	0.33	0.35	-0.05	**-0.89**	**1.20**
	(1.89)	(2.36)	(1.24)	(1.19)	(0.92)	(0.58)	(0.52)	(0.57)	(0.61)	(-0.07)	**(-1.99)**	**(2.59)**
r^{high}	0.45	0.25	0.09	0.26	0.05	0.35	0.36	0.16	0.69	1.48	**1.03**	**-1.18**
	(0.60)	(0.36)	(0.12)	(0.34)	(0.06)	(0.48)	(0.43)	(0.18)	(0.80)	(1.25)	**(1.59)**	**(-1.83)**
						$DUR^{GON-NMI}$ equity duration						
r^{low}	0.89	0.57	0.41	0.65	0.23	0.58	0.38	0.17	0.30	-0.29	**-1.18**	**1.42**
	(2.08)	(1.37)	(0.89)	(1.39)	(0.47)	(1.22)	(0.80)	(0.30)	(0.53)	(-0.42)	**(-2.29)**	**(2.87)**
r^{high}	0.17	0.00	0.02	0.17	0.18	0.18	0.37	0.35	0.07	0.54	**0.36**	**-0.57**
	(0.25)	(0.01)	(0.02)	(0.25)	(0.24)	(0.24)	(0.56)	(0.49)	(0.09)	(0.57)	**(0.65)**	**(-0.86)**
						DUR^{NDR} equity duration						
r^{low}	0.73	0.79	0.58	0.56	0.37	0.32	0.49	0.39	0.05	-0.20	**-0.93**	**1.22**
	(1.77)	(1.99)	(1.31)	(1.21)	(0.72)	(0.65)	(0.95)	(0.73)	(0.09)	(-0.29)	**(-1.74)**	**(2.32)**
r^{high}	-0.07	-0.00	-0.11	0.35	0.22	0.71	0.54	0.62	0.37	0.53	**0.60**	**-0.72**
	(-0.11)	(-0.01)	(-0.16)	(0.49)	(0.32)	(0.95)	(0.81)	(0.79)	(0.47)	(0.56)	**(0.98)**	**(-1.04)**

Table 5: Interest-rate sensitivity

This table shows the interest rate sensitivity of duration-sorted portfolios. Specifically, the shown coefficient is the estimated slope coefficient b in the regression

$$r_{i,t} = a + b \cdot \Delta R_{f,t}, \tag{20}$$

where $r_{i,t}$ is the return on the respective portfolio on month t and $\Delta R_{f,t}$ is the contemporaneous change in the 10-year treasury yields as provided by the St. Louis Fed FRED database. Numbers in brackets are t-statistics. MB denotes a sort with respect to the market-to-book ratio.

DUR measure	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
DSS	1.083	0.643	0.503	0.262	-0.00957	0.0855	0.175	0.817	1.423	2.313*
	(1.46)	(0.94)	(0.76)	(0.39)	(-0.01)	(0.12)	(0.24)	(0.96)	(1.49)	(2.16)
GON	1.749*	1.712*	1.591*	1.253	1.383	1.174	1.133	0.948	1.123	1.437
	(2.32)	(2.31)	(2.16)	(1.75)	(1.93)	(1.62)	(1.55)	(1.23)	(1.38)	(1.55)
CL	1.864*	0.855	0.508	0.110	-0.00346	-0.289	-0.151	0.142	1.281	2.701*
	(2.38)	(1.20)	(0.73)	(0.16)	(-0.01)	(-0.43)	(-0.22)	(0.17)	(1.40)	(2.58)
DSS-FIP	-0.0837	-0.307	-0.297	0.0308	0.314	0.402	0.665	1.327*	1.834**	2.331**
	(-0.12)	(-0.46)	(-0.45)	(0.05)	(0.48)	(0.59)	(0.95)	(1.76)	(2.17)	(2.31)
DSS-FIP-TZZ	0.0552	0.0684	0.163	0.591	0.548	0.854	1.363*	1.663**	2.114**	3.187***
	(0.08)	(0.11)	(0.25)	(0.87)	(0.80)	(1.15)	(1.79)	(2.00)	(2.28)	(2.96)
DSS-GON-NMI	0.178	0.377	0.480	0.738	0.935	1.011	1.405*	1.867**	2.565***	3.457***
	(0.25)	(0.56)	(0.70)	(1.08)	(1.35)	(1.45)	(1.94)	(2.41)	(3.03)	(3.30)
DSS-GON-NDR	0.0247	0.353	0.457	0.723	0.885	1.148	1.384*	1.853**	2.631***	3.365***
	(0.04)	(0.51)	(0.67)	(1.05)	(1.30)	(1.62)	(1.88)	(2.45)	(3.12)	(3.26)
CL-FIP	-0.432	-0.223	-0.0810	0.167	0.328	0.561	0.603	1.229	1.448*	2.004**
	(-0.67)	(-0.35)	(-0.12)	(0.25)	(0.47)	(0.80)	(0.82)	(1.62)	(1.79)	(2.20)
CL-FIP-TZZ	-0.206	-0.113	0.0626	0.375	0.446	0.596	1.073	1.403*	2.104**	2.714***
	(-0.32)	(-0.18)	(0.09)	(0.54)	(0.64)	(0.81)	(1.41)	(1.72)	(2.36)	(2.64)
MB	0.350	0.175	0.150	0.348	0.433	0.478	0.867	0.927	1.291*	2.274***
	(0.41)	(0.22)	(0.20)	(0.47)	(0.59)	(0.66)	(1.21)	(1.27)	(1.72)	(2.74)

Table 6: Correlations of duration-sorted portfolios

Panel A documents the time-series average of Spearman rank correlations between the respective equity duration measures and the book-to-market ratio. Panel B shows return correlations between high-minus-low portfolios based on the respective equity duration measure and the book-to-market ratio. The time period corresponds due to data availability to 07.1967 - 07.2020 for DSS, $DSS-FIP$, CL, $CL-FIP$, BM, to 07.1970 - 07.2020 for $DSS-FIP-TZZ$, $CL-FIP-TZZ$, to 07.1973 - 07.2020 for GON, $GON-NDR$ and $GON-NMI$. The time period for CH, $CH-FIP$ and $CH-FIP-TZZ$ spans from 07.1981 - 07.2020. Note that the abbreviations correspond to the respective equity duration measure (DUR left out in the abbreviations below).

Panel A: **Rank correlations**

	DSS	$DSS-FIP$	$DSS-FIP-TZZ$	GON	$GON-NDR$	$GON-NMI$	CL	$CL-FIP$	$CL-FIP-TZZ$	CH	$CH-FIP$	$CH-FIP-TZZ$
$DSS-FIP$	.28											
$DSS-FIP-TZZ$	.35	.72										
GON	.62	-.27	-.10									
$GON-NDR$	.08	.73	.56	-.19								
$GON-NMI$	.18	.74	.59	-.11	.95							
CL	.59	.17	.24	.54	.22	.29						
$CL-FIP$	.22	.76	.62	-.20	.73	.76	.49					
$CL-FIP-TZZ$	.29	.60	.88	-.06	.56	.60	.43	.77				
CH	.50	-.32	-.2	.75	-.29	-.25	.37	-.32	-.21			
$CH-FIP$	.23	.11	-.03	.23	.12	.12	.19	.05	-.09	.43		
$CH-FIP-TZZ$	.30	.19	.41	.22	.17	.19	.24	.16	.35	.38	.73	
BM	-.52	.52	.28	-.84	.52	.44	-.35	.41	.23	-.76	-.2	-.18

Panel B: **Return Correlations**

	DSS	$DSS-FIP$	$DSS-FIP-TZZ$	GON	$GON-NDR$	$GON-NMI$	CL	$CL-FIP$	$CL-FIP-TZZ$	CH	$CH-FIP$	$CH-FIP-TZZ$
$DSS-FIP$	.12											
$DSS-FIP-TZZ$	.36	.63										
GON	.47	-.44	-.18									
$GON-NDR$	.13	.84	.61	-.45								
$GON-NMI$	.23	.86	.67	-.38	.94							
CL	.55	.08	.35	.45	.10	.17						
$CL-FIP$	.07	.83	.62	-.46	.76	.78	.12					
$CL-FIP-TZZ$	.26	.59	.87	-.21	.60	.64	.35	.66				
CH	.32	-.34	-.25	.71	-.37	-.33	.21	-.40	-.28			
$CH-FIP$	.28	.40	.37	-.07	.42	.40	.17	.34	.38	-.01		
$CH-FIP-TZZ$	.49	.62	.83	-.13	.66	.67	.35	.61	.74	-.13	.54	
BM	-.62	.09	-.19	-.55	.06	-.01	-.53	.05	-.16	-.39	-.13	-.31

A Construction of variables

A.1 Book equity

We follow Davis et al. (2000) and define book equity (BE) as shareholders' equity plus deferred taxes and investment tax credit (COMPUSTAT item TXDITC) minus book value of preferred stocks. Missing TXDITC observations are set to zero. Particularly, shareholders' equity is shareholders' equity (SEQ) or common equity (CEQ) plus the carrying value of preferred stocks (PSTK). If the aforementioned data is not available shareholders' equity is computed as total assets (AT) minus total liabilities (LT). The book value of preferred stocks reflects either the redemption value (PSTKRV), the liquidating value (PSTKL) or the carrying value of preferred stocks (PSTK). Following this precise order, we replace the book value of preferred stocks in case one of the aforementioned data items is not available.

A.2 Net payouts

We follow Boudoukh et al. (2007) and define net payouts (PO) as dividends on common stock (DVC) plus repurchases minus equity issuance. Repurchases are computed as the purchase of common and preferred stock (PRSTKC) plus any reduction in the value of the net number of preferred stocks outstanding (PSTKRV). Equity issuance reflects the sale of common and preferred stock (SSTK) minus any increase in the value of the net number of preferred stocks outstanding (PSTKRV). The book value of preferred stocks reflects either the redemption value (PSTKRV), the liquidating value (PSTKL) or the carrying value of preferred stocks (PSTK). Following this precise order, we replace the book value of preferred stocks in case one of the aforementioned data items is not available. Since COMPUSTAT data for net equity repurchases starts in 1971, we follow Boudoukh et al. (2007) and use CRSP information on market equity such that $PO_{j,t} = (ME_j, t - ME_{j,t-1})$ before 1971. Note that this market information is only used to estimate the VAR parameters Γ and Σ because cash flow forecasts start in 1973.

B Details on the LASSO procedure

To predict long term growth rates for each stock $i = 1, ..., N$ we follow Tengulov et al. (2019) and firstly regress the annualized growth rate of *sales* from year t to $t + 10$ ($G_{t\to t+10}$) on predictors ($X_{i,j,t}$) from year t:

$$G_{i,t\to t+10} = \alpha_j + \sum_{f=1}^{m} \beta_{f,t+10} \cdot X_{i,j,t} + \epsilon_{i,j,t+10} \tag{B.1}$$

Note that $j = 1, ..., 48$ corresponds to an index capturing the 48 Fama and French Industries and $t = 1, ..., T$ indicates the point in time. Moreover, we estimate this model with industry fixed effects α_j and apply shrinkage by using the Lasso technique. Since Zou (2006) finds that the Lasso technique can be inconsistent if specific conditions for the shrinkage parameter are not met, we estimate the model by adaptive shrinkage proposed by Zou (2006). By using a prediction-optimal tuning parameter, Zou (2006) shows that the adaptive lasso consistently selects idependent variables without requiring specific conditions (oracle property).

In the second step we generate out-of-sample forecasts at time $t + 10$ using the estimated parameters $\hat{\beta}_{1,t+10}, \hat{\beta}_{2,t+10}, ..., \hat{\beta}_{m,t+10}$ from the model above. Thus we obtain the long run growth forecasts $\hat{G}_{i,j,t+10\to t+20}$:

$$\hat{G}_{i,j,t+10\to t+20} = \hat{\alpha_j} + \sum_{f=1}^{m} \hat{\beta}_{f,t+10} \cdot X_{i,j,t+10} \tag{B.2}$$

We repeat this procedure in every fiscal year and implement and expanding window estimation. Moreover, we calculate the predicted growth rates for all companies which have information on predictors ($X_{i,j,t+10}$) at $t + 10$ and not only those which have 10 year sales growth information. Consequently, this might dampen the particular selection of surviving firms in the first step.

Table B.1: Descriptive statistics for predictive variables

This table shows the summary statistics for all variables which we use as predictors for the 10-year growth rate in sales. The sample period is from 1962 to 2019 and the choice of predicting variables follows Tengulov et al. (2019). All variables are windorised at the 1 % tails of each distribution to mitigate the effect of outliers.

	Obs.	Mean	Stdev.	$Q_{0.01}$	$Q_{0.25}$	$Q_{0.50}$	$Q_{0.75}$	$Q_{0.99}$
Advertising intensity	166,826	.01	.04	0	0	0	.01	.19
Asset Growth	154,971	.17	.48	-.52	-.03	.08	.22	2.35
Altmans' Z-score	163,892	1.23	3.58	-13.88	.8	2.01	2.91	5.52
Book-to-Market	162,753	.74	.78	-.47	.28	.54	.98	3.67
Entry barriers	169,697	.48	.21	.15	.33	.45	.59	1.17
Book-equity growth	146,837	.18	.69	-.76	-.03	.09	.21	3.35
β	142,365	1.23	.74	-.35	.77	1.16	1.62	3.51
Capital expenditures	152,412	.21	.32	0	.07	.12	.23	1.69
Capital intensity	166,497	.07	.21	0	.02	.03	.06	1.01
Dividend yield	169,456	.01	.02	0	0	0	.02	.08
Earnings-to-price	169,462	-.07	.53	-2.08	-.04	.04	.08	.29
External financing	152,512	.11	.26	-.48	-.02	.05	.17	1.16
Firm age	163,105	2.04	1.04	0	1.39	2.2	2.83	3.95
Sustainable growth	167,719	-.08	.96	-4.24	-.06	.06	.13	2.61
GDP growth	169,697	.03	.01	.01	.03	.03	.03	.05
1 year EBITDA growth	154,273	.03	1.91	-7.78	-.23	.08	.35	7
10 year sales growth	70,841	.1	.12	-.21	.04	.09	.15	.5
1 year sales growth	152,478	.22	.71	-.72	-.01	.1	.25	3.81
Herfindahl index	169,697	.09	.08	.02	.04	.06	.11	.39
Industry entries	169,697	.08	.07	0	.04	.07	.11	.31
Industry exits	169,697	.05	.07	0	.01	.03	.06	.34
Inflation rate	169,697	.04	.03	0	.02	.03	.04	.14
Leverage	168,361	.23	.21	0	.04	.19	.35	.85
Payout	169,333	.13	.33	-.37	0	0	.18	1.56
R&D expenses	166,826	.36	3.29	0	0	0	.05	8.16
10 year treasury rate	169,697	.05	.04	0	.02	.05	.07	.19
Size	169,696	4.74	2.1	.6	3.22	4.57	6.12	10.02

Figure B.1: Selected variables by Lasso

This figure shows which variables were selected in each year by the Least Absolute Shrinkage and Selection Operator (LASSO) in order to predict 10-year sales growth. Dark blue indicates the variable was selected in a given year, whereas light blue indicates the variable was included in the model selection in a particular year.

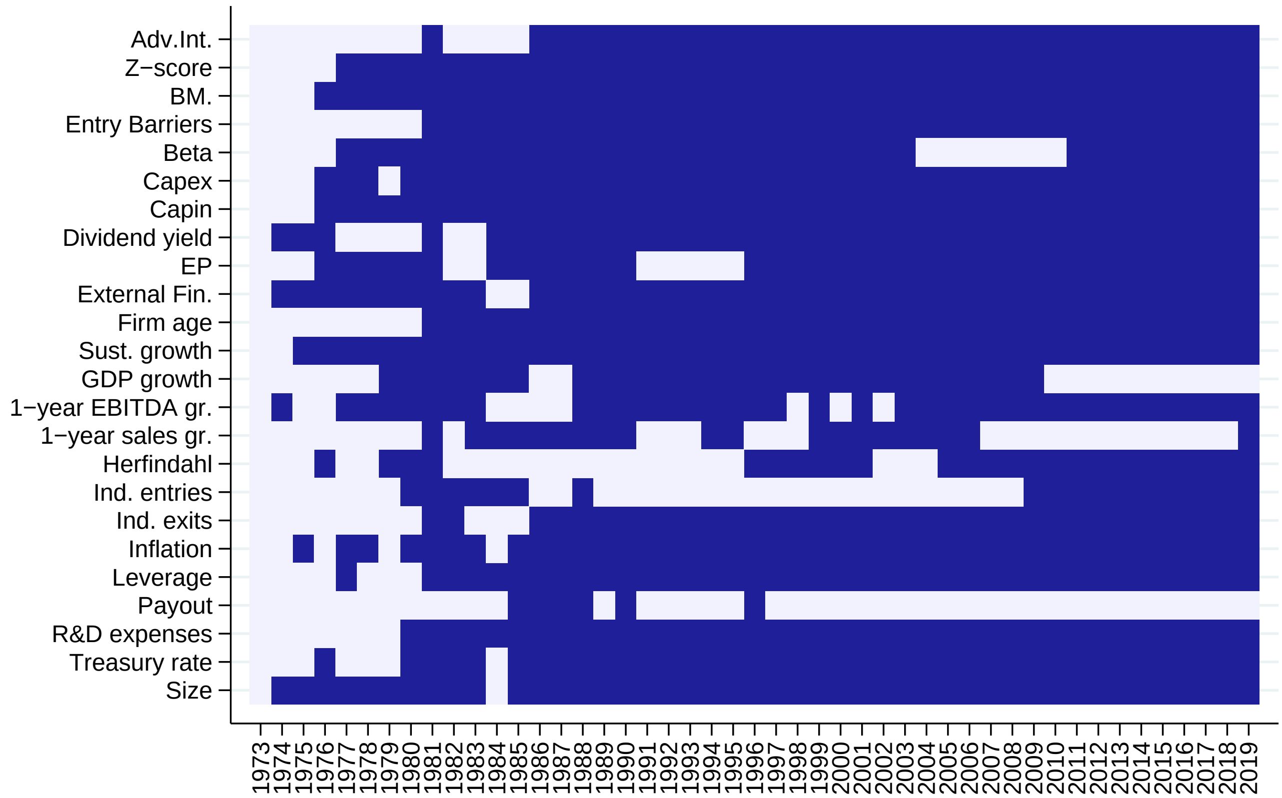


Table B.2: Descriptions for predictive variables used in the LASSO procedure

This table documents the construction of all variables used in the LASSO procedure to predict long term growth rates in EBITDA. All constructions follow Tengulov et al. (2019) and abbreviations in bold letters correspond the to items available at COMPUSTAT.

Variable	Description
Advertising Intensity	Advertising expenses scaled by sales ($\frac{XAD_t}{SALE_t}$)
Asset Growth	Growth in total assets ($\frac{AT_t - AT_{t-1}}{AT_{t-1}}$)
Altmans' Z-score	Z = 3.3*(operating income/assets)+1.4*(retained earnings/assets) +(sales/assets)+1.2*((current assets-current liabilities)/assets) $Z_t = ((3.3 \cdot \frac{OIADP_t}{AT_t} + 1.4 \cdot \frac{RE_t}{AT_t} + \frac{SALE_t}{AT_t} + 1.2 \cdot \frac{ACT_t - LCT_t}{AT_T}$
BM	Common equity plus deferred taxes scaled by the market value of equity $\frac{CEQ_t + TXDB_t}{PRCCF_t \cdot CSHO_t}$
Barriers to Entry	The mean value of property, plant and equipment for each of the 48 Fama and French Industries scaled by the mean value of total assets $\frac{PPEGT_t}{AT_t}$
Beta	Coefficient of regressing excess returns of firm i on the excess market return over the last 60 months, while at least 24 months are required
Capital Expenditures	Capital expenditures scaled by property, plant and equipment in year t-1 $\frac{CAPX_t}{PPEGT_{t-1}}$
Capital Intensity	Depreciation, depletion and amortization expenses scaled by sales $\frac{DP_t}{SALE_t}$
Dividend yield	Common dividends per share scaled by the price per share $\frac{DVC_t}{CSHO_t \cdot PRCCF_t}$
Earnings-to-Price	Income before extraordinary items scaled by market equity $\frac{IBCOM_t}{PRCCF_t \cdot CSHO_t}$
External Financing	Difference between the change in total assets and the change in retained earnings. The difference is then scaled by total assets. $\frac{AT_t - AT_{t-1}}{AT_t} - \frac{RE_t - RE_{t-1}}{AT_t}$
Firm Age	The number of years since the IPO or the number of years with COMPUSTAT listing if the IPO date is missing
Growth rate	Product of return on equity and the plowback ratio $\frac{IBCOM_t}{CEQ_t} \cdot \frac{1 - DVC_t}{IBCOM_t}$

GDP Growth$_{t\to t+10}$	Annualized percentage change in GDP over the last 10 years $\left(\frac{GDP_t - GDP_{t-10}}{GDP_{t-10}}\right)^{0.1} - 1$
EBITDA Growth$_{t\to t+1}$	$\left(\frac{EBITDA_t - EBITDA_{t-1}}{EBITDA_{t-1}}\right) - 1$
EBITDA Growth$_{t\to t+5}$	$\left(\frac{EBITDA_t - EBITDA_{t-5}}{EBITDA_{t-5}}\right)^{0.2} - 1$
Sales Growth$_{t\to t+1}$	$\left(\frac{SALE_t - SALE_{t-1}}{SALE_{t-1}}\right) - 1$
Herfindahl Index	Herfindahl index based on the sales of firm i relative to the sum of sales in the corresponding Fama and French Industry (48).
Industry dummies	Based on the 48 Fama and French Industry definition
Industry Entries	Number of companies entering one of the 48 Fama and French Industries scaled by the total number of firms in the respective Industry
Industry Exits	Number of companies exiting one of the 48 Fama and French Industries scaled by the total number of firms in the respective Industry
Inflation Rate	One year change in the U.S. Consumer Price Index (CPI)
Leverage	Total debt scaled by total assets $\frac{DLC_t + DLTT_t}{AT_t}$
Payout Ratio	Common dividends scaled by income before extraordinary items $\frac{DVC_t}{IBCOM_t}$
R&D Intensity	Research and development expenses divided by sales $\frac{XRD_t}{SALE_t}$
Risk free rate	10 year treasury rate
Size	Natural logarithm of total assets: $ln(AT_t)$

C Details on the VAR

Table C.1: Details on the Vector Autoregressive Process (VAR)

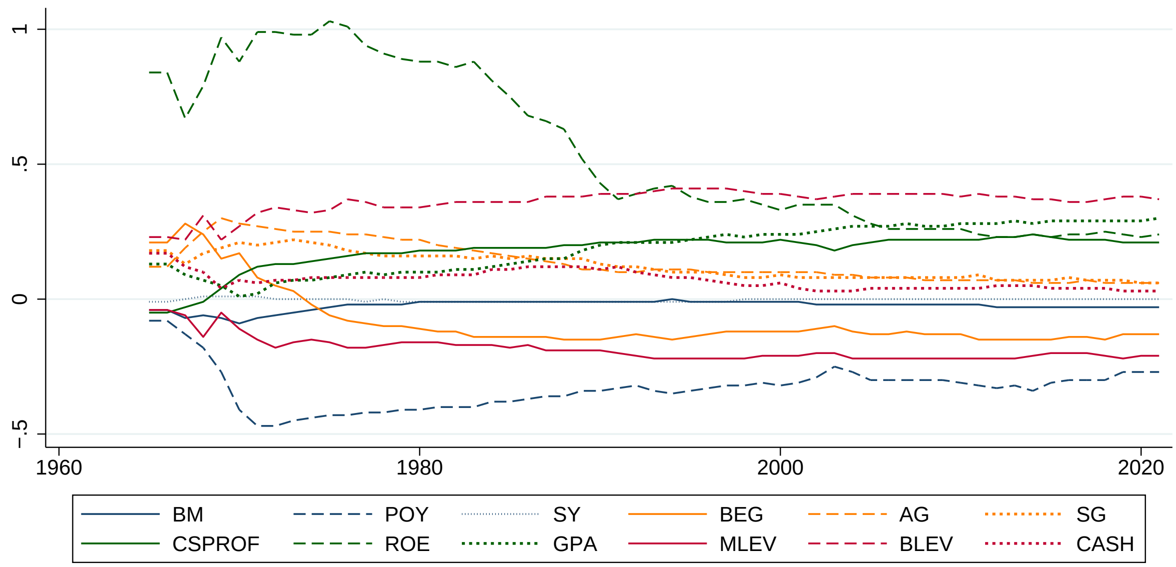
Panel A documents autoregressive coefficients from the Γ matrix over the full sample period. In Panel B we document the variance-covariance matrix Σ of firm-demeaned residuals over the full sample period. Panel C shows the steady state means of the full sample period, which are approximated with the time series medians of cross-sectional averages.

	Cons	BM	POY	SY	EG	AG	SG	CSPROF	ROE	GPA	MLEV	BLEV	CASH
Panel A: **Autoregressive coefficient matrix (Γ)**													
BM	0.11	0.78	0.13	0.00	0.08	0.04	0.01	-0.04	0.06	-0.03	0.12	-0.01	-0.08
		(68.97)	(4.53)	(0.67)	(7.63)	(3.28)	(0.77)	(-4.86)	(9.79)	(-3.24)	(3.00)	(-0.27)	(-7.11)
POY	-0.03	0.02	0.09	0.00	-0.01	0.00	-0.01	0.01	0.03	0.06	-0.08	0.09	0.02
		(12.23)	(9.58)	(1.70)	(-2.68)	(0.13)	(-2.73)	(1.63)	(12.74)	(12.14)	(-8.20)	(9.79)	(3.00)
SY	0.01	-0.03	0.22	0.89	0.03	0.33	-0.04	-0.06	0.09	0.00	-0.08	0.14	-0.27
		(-4.41)	(5.27)	(267.14)	(1.77)	(18.34)	(-3.07)	(-3.4)	(7.8)	(-0.02)	(-2.36)	(4.57)	(-14.30)
EG	0.01	-0.05	-0.02	0.00	0.09	0.04	0.13	-0.02	-0.04	0.11	-0.08	0.2	0.07
		(-15.76)	(-0.79)	(-0.50)	(6.76)	(3.12)	(14.87)	(-1.42)	(-3.75)	(17.25)	(-4.11)	(10.95)	(6.48)
AG	0.01	0.00	0.02	-0.01	0.1	0.05	0.12	-0.02	-0.02	0.09	-0.18	0.16	0.03
		(0.09)	(1.24)	(-10.22)	(11.87)	(5.87)	(17.74)	(-2.06)	(-3.47)	(17.85)	(-13.59)	(12.24)	(4.15)
SG	0.01	0.01	-0.03	-0.03	0.03	0.26	0.07	-0.03	-0.03	0.05	-0.03	0.09	0.02
		(4.97)	(-1.17)	(-20.65)	(2.78)	(27.05)	(7.59)	(-2.45)	(-4.19)	(9.07)	(-1.98)	(6.69)	(2.06)
CSPROF	-0.06	-0.03	-0.27	0.00	-0.13	0.06	0.06	0.21	0.24	0.3	-0.21	0.37	0.03
		(-6.71)	(-5.47)	(0.15)	(-5.46)	(3.39)	(3.74)	(8.45)	(10.41)	(17.11)	(-5.84)	(10.87)	(1.41)
ROE	0.02	-0.01	-0.11	0.01	-0.06	-0.04	-0.02	0.09	0.41	0.19	-0.11	0.09	-0.10
		(-2.73)	(-2.14)	(6.06)	(-2.64)	(-2.41)	(-1.61)	(3.51)	(16.21)	(19.08)	(-4.21)	(4.08)	(-7.38)
GPA	0.05	-0.01	-0.03	0.00	-0.01	-0.04	-0.01	0.00	-0.02	0.9	0.00	-0.01	0.00
		(-12.41)	(-2.86)	(4.92)	(-2.76)	(-15.91)	(-4.34)	(-0.82)	(-7.13)	(334.92)	(-0.43)	(-1.71)	(-0.33)
MLEV	0.03	0.00	0.04	0.00	0.01	0.03	0.00	-0.01	0.01	-0.04	0.77	0.1	-0.05
		(2.34)	(5.63)	(4.81)	(3.56)	(8.04)	(-0.56)	(-2.39)	(6.65)	(-16.12)	(103.51)	(15.3)	(-14.69)
BLEV	0.04	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	-0.02	0.02	0.85	-0.04
		(-1.77)	(2.28)	(-5.42)	(0.32)	(4.3)	(-0.68)	(0.88)	(0.76)	(-7.47)	(2.97)	(147.57)	(-12.34)
CASH	0.02	0.00	-0.01	-0.01	0.00	-0.03	0.01	0.00	-0.02	0.01	0.03	-0.05	0.82
		(-2.69)	(-1.75)	(-9.67)	(-0.52)	(-12.99)	(4.78)	(0.28)	(-10.43)	(4.14)	(4.96)	(-9.93)	(214.33)
Panel B: **Variance-covariance matrix (Σ)**													
BM		.139	.003	.066	.014	.008	.001	.012	.001	-.001	.015	.001	-.002
POY		.003	.002	.006	-.005	-.002	0	.001	0	0	.001	.001	0
SY		.066	.006	.148	-.019	.004	.027	.004	-.002	.004	.023	.009	-.003
BEG		.014	-.005	-.019	.08	.037	.017	.045	.021	0	-.003	-.007	0
AG		.008	-.002	.004	.037	.045	.019	.023	.005	-.001	.008	.008	-.001
SG		.001	0	.027	.017	.019	.045	.021	.006	.006	.002	.002	-.002
CSPROF		.012	.001	.004	.045	.023	.021	.088	.051	.003	-.001	-.005	-.002
ROE		.001	0	-.002	.021	.005	.006	.051	.073	.003	-.004	-.005	.001
GPA		-.001	0	.004	0	-.001	.006	.003	.003	.003	-.001	-.001	0
MLEV		.015	.001	.023	-.003	.008	.002	-.001	-.004	-.001	.009	.006	-.001
BLEV		.001	.001	.009	-.007	.008	.002	-.005	-.005	-.001	.006	.009	-.001
CASH		-.002	0	-.003	0	-.001	-.002	-.002	.001	0	-.001	-.001	.005
Panel C: **Time-series medians of cross-sectional averages**													
Steady-states		.57	.02	.09	.06	.05	.06	.1	.12	.31	.18	.21	.08

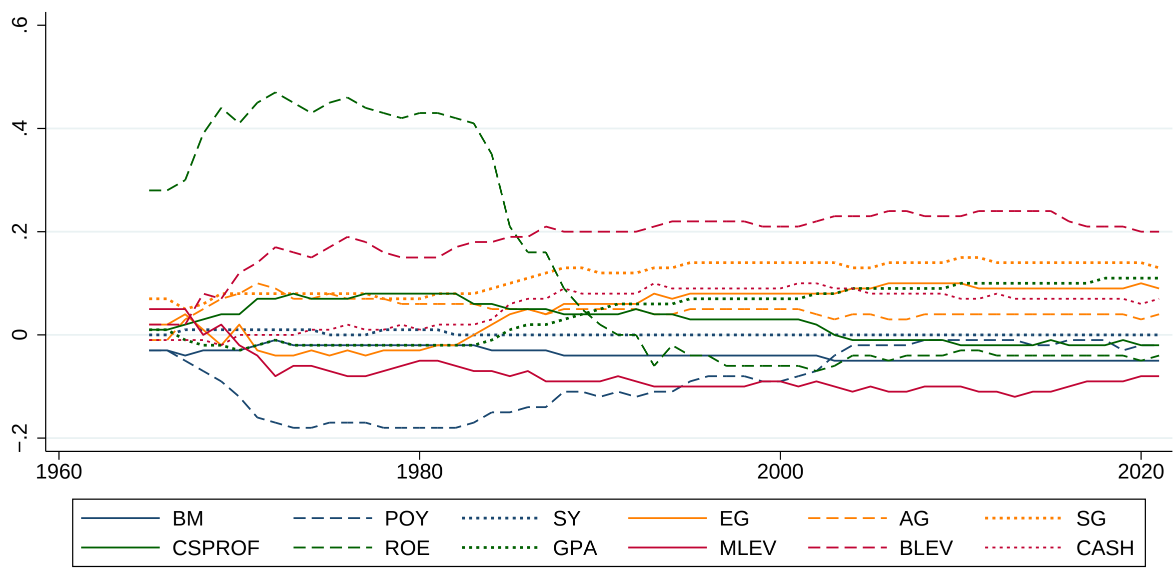
Figure C.1: Γ estimates for $CSPROF$ and EG

Depicted are the autoregressive coefficients from the Γ matrix for the variables $CSPROF$ and EG over time.

(a) *Γ estimates for CSPROF*



(b) *Γ estimates for EG*



D Additional tables

Table D.1: Characteristics of Dechow et al. (2004) duration-sorted portfolios

Characteristics on portfolios sorted on the Dechow et al. (2004) equity duration measure. All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets. β corresponds to the co-movement with the market, ME is market equity in billions, BM is the book-to-market ratio and GPA is gross profits to assets. Moreover, we document the Whited and Wu (2006) Index and the Ohlson (1980) O-Score.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
DUR	10.19	13.06	14.03	14.69	15.23	15.72	16.23	16.81	17.71	22.37	**12.18**
											(28.02)
	Panel A: **Payout characteristics**										
Dividend ratio	0.18	0.24	0.26	0.27	0.28	0.28	0.28	0.26	0.19	0.07	**-0.11**
											(-13.78)
Repurchase ratio	0.17	0.22	0.25	0.27	0.28	0.30	0.32	0.34	0.28	0.06	**-0.11**
											(-14.05)
Issuance ratio	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.05	0.08	0.25	**0.23**
											(15.83)
Total Payout ratio	0.01	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.00	-0.22	**-0.23**
											(-16.67)
	Panel B: **General characteristics**										
β	1.11	1.10	1.11	1.13	1.14	1.15	1.19	1.23	1.30	1.42	**0.30**
											(10.11)
ME	1.01	1.78	2.43	2.30	3.28	3.40	3.88	3.94	3.32	0.62	**-0.40**
											(-3.11)
BM	1.70	1.15	0.97	0.85	0.74	0.67	0.58	0.52	0.48	0.76	**-0.95**
											(-19.77)
AG	0.14	0.12	0.13	0.13	0.14	0.14	0.16	0.18	0.20	0.15	**0.01**
											(0.21)
GPA	0.37	0.38	0.40	0.41	0.42	0.42	0.44	0.44	0.43	0.28	**-0.09**
											(-7.26)
$WW-Index$	-0.19	-0.20	-0.21	-0.21	-0.21	-0.21	-0.21	-0.20	-0.18	-0.12	**0.07**
											(16.87)
$O-score$	-3.13	-3.39	-3.53	-3.58	-3.65	-3.67	-3.73	-3.66	-3.19	-0.34	**2.79**
											(14.29)

Table D.2: Characteristics of Gonçalves (2021) duration-sorted portfolios

Characteristics on portfolios sorted on the Gonçalves (2021) equity duration measure. All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets. β corresponds to the co-movement with the market, ME is market equity in billions, BM is the book-to-market ratio and GPA is gross profits to assets. Moreover, we document the Whited and Wu (2006) Index and the Ohlson (1980) O-Score.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
DUR	17.45	22.70	25.73	28.60	31.65	35.28	39.98	46.93	59.69	124.60	**107.15**
											(24.81)
	Panel A: **Payout characteristics**										
Dividend ratio	0.16	0.19	0.22	0.24	0.23	0.23	0.21	0.19	0.16	0.12	**-0.04**
											(-4.97)
Repurchase ratio	0.19	0.23	0.25	0.24	0.24	0.25	0.26	0.26	0.25	0.22	**0.03**
											(2.31)
Issuance ratio	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.05	0.07	0.21	**0.19**
											(16.89)
Total Payout ratio	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	-0.00	-0.11	**-0.12**
											(-11.18)
	Panel B: **General characteristics**										
β	1.07	1.13	1.13	1.16	1.19	1.20	1.22	1.25	1.27	1.34	**0.27**
											(8.51)
ME	0.38	0.87	1.26	1.52	2.11	2.48	2.74	3.56	4.42	4.27	**3.89**
											(8.16)
BM	1.68	1.25	1.09	0.98	0.90	0.80	0.74	0.63	0.55	0.46	**-1.21**
											(18.74)
AG	0.11	0.11	0.10	0.11	0.11	0.11	0.12	0.13	0.16	0.15	**0.03**
											(3.35)
GPA	0.47	0.39	0.38	0.37	0.38	0.38	0.39	0.40	0.41	0.36	**-0.11**
											(-19.50)
$WW - Index$	-0.16	-0.19	-0.20	-0.20	-0.21	-0.21	-0.20	-0.20	-0.19	-0.15	**0.01**
											(4.14)
$O - score$	-2.85	-2.95	-3.03	-3.06	-3.15	-3.15	-3.20	-3.21	-3.11	-1.65	**1.20**
											(10.72)

Table D.3: Characteristics of $DUR^{DSS-FIP}$ duration-sorted portfolios

Characteristics on portfolios sorted on $DUR^{DSS-FIP}$, a version of the Dechow et al. (2004) equity duration measure where market prices are replaced by an estimate derived from the employed cash-flow forecasts discounted at a uniform rate and assuming uniform long-run growth. All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets. β corresponds to the co-movement with the market, ME is market equity in billions, BM is the book-to-market ratio and GPA is gross profits to assets. Moreover, we document the Whited and Wu (2006) Index and the Ohlson (1980) O-Score.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
$DUR^{DSS-FIP}$	11.15	12.86	13.54	14.03	14.46	14.88	15.36	16.00	17.27	35.71	**24.56**
											(17.48)
	Panel A: **Payout characteristics**										
Dividend ratio	0.16	0.19	0.20	0.22	0.21	0.23	0.24	0.29	0.25	0.08	**-0.08**
											(-8.41)
Repurchase ratio	0.26	0.26	0.27	0.24	0.23	0.23	0.27	0.37	0.29	0.05	**-0.21**
											(-9.94)
Issuance ratio	0.07	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.08	**0.01**
											(3.10)
Total Payout ratio	0.11	0.06	0.05	0.04	0.03	0.02	0.01	0.00	-0.01	-0.06	**-0.17**
											(-10.85)
	Panel B: **General characteristics**										
β	1.24	1.18	1.16	1.15	1.14	1.13	1.14	1.16	1.21	1.34	**0.11**
											(4.35)
ME	5.84	6.31	4.52	3.28	2.41	2.16	1.58	1.14	0.87	0.49	**-5.35**
											(-7.69)
BM	0.41	0.49	0.60	0.68	0.78	0.90	1.06	1.21	1.36	1.32	**0.91**
											(16.26)
AG	0.30	0.20	0.18	0.16	0.14	0.14	0.12	0.11	0.10	0.07	**-0.23**
											(-28.63)
GPA	0.56	0.50	0.47	0.44	0.42	0.39	0.37	0.35	0.33	0.29	**-0.27**
											(-55.66)
$WW-Index$	-0.20	-0.22	-0.22	-0.22	-0.21	-0.21	-0.20	-0.19	-0.17	-0.12	**0.07**
											(29.97)
$O-score$	-4.14	-4.25	-4.11	-3.92	-3.75	-3.58	-3.37	-3.08	-2.54	-0.87	**3.28**
											(54.49)

Table D.4: Characteristics of $DUR^{DSS-FIP-TZZ}$-sorted portfolios

Characteristics on portfolios sorted on $DUR^{DSS-FIP-TZZ}$, a version of the Dechow et al. (2004) equity duration measure where market prices are replaced by an estimate derived from the employed cash-flow forecasts discounted at a uniform rate but allowing for stock-specific growth rate equalling the predicted 5 year growth in EBITDA similar to Tengulov et al. (2019). All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets for the difference between the highest and lowest Decile. Size corresponds to market equity in billions.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
DUR	9.72	11.28	12.05	12.68	13.24	13.83	14.50	15.43	17.18	32.34	**22.60**
											(22.83)
	Panel A: **Payout characteristics**										
$Payout^{Dividends}$	0.23	0.25	0.24	0.23	0.23	0.22	0.24	0.25	0.18	0.05	**-0.18**
											(-14.48)
$Payout^{Repurchases}$	0.30	0.28	0.28	0.25	0.24	0.25	0.30	0.31	0.30	0.07	**-0.23**
											(-11.13)
$Payout^{EquityIssuance}$	0.06	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.04	0.11	**0.05**
											(8.88)
$Payout^{Total}$	0.16	0.09	0.07	0.05	0.04	0.02	0.01	0.00	-0.02	-0.09	**-0.25**
											(-11.58)
	Panel B: **General characteristics**										
β	1.17	1.14	1.14	1.15	1.14	1.16	1.18	1.19	1.22	1.37	**0.20**
											(6.23)
$Size$	12.4	8.87	6.06	4.20	2.88	2.62	1.48	1.22	0.94	0.60	**-11.80**
											(-7.93)
$Book-to-Market$	0.45	0.55	0.63	0.72	0.80	0.86	0.97	1.09	1.20	1.19	**0.74**
											(14.10)
$AssetGrowth$	0.21	0.17	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.10	**-0.12**
											(-10.94)
$Profits-to-Assets$	0.56	0.52	0.49	0.47	0.45	0.44	0.43	0.41	0.39	0.30	**-0.26**
											(-30.47)
$WW-Index$	-0.24	-0.25	-0.24	-0.24	-0.23	-0.21	-0.20	-0.18	-0.16	-0.12	**0.13**
											(34.89)
$O-score$	-4.28	-4.42	-4.34	-4.17	-4.02	-3.82	-3.64	-3.38	-2.82	-0.74	**3.54**
											(40.66)

Table D.5: Characteristics of $DUR^{GON-NMI}$ -sorted portfolios

Characteristics on portfolios sorted on a version of the Gonçalves (2021) equity duration measure, $DUR^{GON-NMI}$, that uses neither market-implied discount rates nor any market-price related state variables in the VAR. Moreover, we do not use any market related state variables in the VAR. All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets. β corresponds to the co-movement with the market, ME is market equity in billions, BM is the book-to-market ratio and GPA is gross profits to assets. Moreover, we document the Whited and Wu (2006) Index and the Ohlson (1980) O-Score.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
DUR	14.64	15.74	16.31	16.75	17.15	17.55	18.00	18.57	19.49	30.17	**15.52**
											(23.32)
	Panel A: **Payout characteristics**										
Dividend ratio	0.22	0.20	0.20	0.20	0.21	0.22	0.24	0.27	0.22	0.07	**-0.15**
											(-9.81)
Repurchase ratio	0.39	0.28	0.27	0.25	0.25	0.26	0.27	0.27	0.22	0.09	**-0.31**
											(-9.34)
Issuance ratio	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.09	**0.05**
											(7.14)
Total Payout ratio	0.15	0.06	0.04	0.03	0.03	0.02	0.01	0.01	-0.01	-0.08	**-0.23**
											(-10.92)
	Panel B: **General characteristics**										
β	1.13	1.12	1.11	1.12	1.12	1.13	1.15	1.17	1.23	1.36	**0.23**
											(5.71)
ME	5.75	4.41	3.81	3.42	2.75	2.98	2.35	2.28	1.65	0.61	**-5.14**
											(-9.43)
BM	0.42	0.59	0.69	0.77	0.86	0.96	1.05	1.15	1.31	1.30	**0.87**
											(13.60)
AG	0.22	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.05	**-0.18**
											(-8.05)
GPA	0.71	0.59	0.51	0.46	0.41	0.37	0.35	0.31	0.29	0.24	**-0.47**
											(-42.21)
$WW-Index$	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21	-0.20	-0.19	-0.13	**0.07**
											(28.72)
$O-score$	-4.61	-4.26	-4.00	-3.76	-3.58	-3.33	-3.13	-2.88	-2.48	-0.76	**3.85**
											(45.93)

Table D.6: Characteristics of $DUR^{GON-NDR}$ -sorted portfolios

Characteristics on portfolios sorted on a version of the Gonçalves (2021) equity duration measure, $DUR^{GON-NDR}$, that does not use market-implied discount rates. All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets. All measures are mean weighted, while Newey and West (1987) t-statistics with 6 lags are documented in brackets. β corresponds to the co-movement with the market, ME is market equity in billions, BM is the book-to-market ratio and GPA is gross profits to assets. Moreover, we document the Whited and Wu (2006) Index and the Ohlson (1980) O-Score.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
DUR	13.44	14.50	15.11	15.61	16.09	16.59	17.17	17.94	19.20	30.81	**17.37**
											(28.50)
	Panel A: **Payout characteristics**										
Dividend ratio	0.22	0.20	0.19	0.20	0.21	0.22	0.25	0.25	0.22	0.07	**-0.15**
											(-10.42)
Repurchase ratio	0.39	0.27	0.24	0.24	0.26	0.26	0.26	0.28	0.24	0.10	**-0.29**
											(-9.23)
Issuance ratio	0.04	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.08	**0.04**
											(6.37)
Total Payout ratio	0.16	0.05	0.04	0.03	0.02	0.02	0.01	0.01	-0.01	-0.07	**-0.22**
											(-11.03)
	Panel B: **General characteristics**										
β	1.13	1.14	1.12	1.13	1.13	1.14	1.15	1.17	1.23	1.34	**0.21**
											(5.06)
ME	5.57	3.92	3.72	2.97	3.04	2.94	2.68	2.48	1.68	0.65	**-4.93**
											(-9.58)
BM	0.38	0.52	0.62	0.70	0.78	0.89	0.98	1.11	1.30	1.55	**1.17**
											(13.04)
AG	0.21	0.17	0.16	0.14	0.13	0.12	0.11	0.11	0.09	0.04	**-0.17**
											(-8.06)
GPA	0.71	0.58	0.50	0.45	0.42	0.38	0.35	0.32	0.29	0.24	**-0.47**
											(-39.48)
$WW-Index$	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21	-0.20	-0.20	-0.19	-0.14	**0.07**
											(27.10)
$O-score$	-4.41	-4.20	-3.91	-3.77	-3.60	-3.39	-3.18	-2.90	-2.45	-0.83	**3.58**
											(41.69)

Table D.7: Unconditional returns for portfolios sorted on other equity duration measures

We document monthly average returns and mean pricing error (α) relative to the Fama and French (2015) five-factor model for portfolios sorted on other equity duration measures from 2.2.3. DUR^{CL} corresponds to the Chen and Li (2018) equity duration measure, whereas DUR^{CH} is the Chen (2011) equity duration measure. DUR^{CL-FIP} and DUR^{CH-FIP} represent the respective equity duration measure with forecast implied prices using a constant growth rate. Moreover, $DUR^{CL-FIP-TZZ}$ and $DUR^{CH-FIP-TZZ}$ represent the respective equity duration measure with forecast implied prices using a stock specific growth rate. Value weighted mean excess returns are calculated from 07.1963 - 12.2020 for the Chen and Li (2018) equity duration measure and from 07.1981 - 12.2020 for the Chen (2011) equity duration measure. Numbers in brackets are Newey and West (1987) corrected t-statistics with 6 lags.Moreover, we report annualized volatilities $\sigma_{ann} = \sigma_{monthly} \cdot \sqrt{12}$ in % and annualized Sharpe ratios $SR_{ann} = (r^e \cdot 12)/(\sigma_{monthly} \cdot \sqrt{12})$.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Original equity duration measures including discount rate information**											
					DUR^{CL} equity duration						
r^e	1.02	1.01	0.96	0.81	0.71	0.64	0.56	0.55	0.63	0.26	**-0.76**
	(3.94)	(4.82)	(4.96)	(4.49)	(4.38)	(4.00)	(3.09)	(3.05)	(2.74)	(0.92)	**(-3.35)**
α^{FF5}	0.02	0.20	0.18	0.09	0.06	-0.01	-0.07	-0.04	0.18	-0.27	**-0.29**
	(0.11)	(1.70)	(1.90)	(0.96)	(0.73)	(-0.07)	(-0.98)	(-0.55)	(2.27)	(-2.23)	**(-1.70)**
σ_{ann}	23.7	19.5	17.8	16.7	15.8	16.2	15.8	16.1	19.1	23.6	**18.3**
SR_{ann}	0.52	0.62	0.64	0.58	0.54	0.47	0.42	0.41	0.40	0.13	**-0.50**
					DUR^{CH} equity duration						
r^e	0.98	0.86	0.85	0.71	0.88	0.69	0.79	0.65	0.62	0.89	**-0.09**
	(3.54)	(3.30)	(3.56)	(3.27)	(4.14)	(2.96)	(3.86)	(3.12)	(2.62)	(3.95)	**(-0.41)**
α^{FF5}	0.15	-0.07	-0.05	-0.12	0.04	-0.14	-0.01	-0.09	-0.12	0.22	**0.07**
	(1.14)	(-0.50)	(-0.55)	(-1.20)	(0.38)	(-1.25)	(-0.16)	(-0.99)	(-1.25)	(2.19)	**(0.38)**
σ_{ann}	19.6	18.7	17.6	17.5	17.3	17.4	15.8	16.4	17.2	16.7	**14.3**
SR_{ann}	0.60	0.55	0.58	0.49	0.61	0.48	0.60	0.48	0.44	0.64	**-0.08**
Panel B: **Equity duration measures excluding discount rate information**											
					DUR^{CL-FIP} equity duration						
r^e	0.68	0.68	0.59	0.61	0.56	0.72	0.70	0.48	0.57	0.65	**-0.02**
	(3.66)	(4.02)	(3.34)	(3.30)	(3.08)	(3.83)	(3.63)	(2.44)	(2.74)	(2.34)	**(-0.13)**
α^{FF5}	0.14	0.14	-0.03	0.08	-0.03	0.13	0.05	-0.11	-0.05	-0.04	**-0.18**
	(2.30)	(2.20)	(-0.45)	(1.16)	(-0.46)	(1.72)	(0.57)	(-1.11)	(-0.59)	(-0.40)	**(-1.45)**
σ_{ann}	15.7	15.8	16.1	16.7	16.6	17.3	17.9	17.7	19.0	23.2	**14.9**
SR_{ann}	0.52	0.52	0.44	0.44	0.41	0.49	0.47	0.33	0.36	0.34	**-0.02**
					DUR^{CH-FIP} equity duration						
r^e	0.66	0.86	0.93	0.74	0.89	0.74	0.71	0.66	0.72	0.74	**0.07**
	(2.63)	(3.56)	(4.21)	(3.28)	(4.22)	(3.68)	(3.01)	(2.96)	(3.39)	(2.63)	**(0.39)**

Continued on next page

Table D.7 continued: Unconditional returns for portfolios sorted on alternative equity duration measures

α^{FF5}	-0.15	0.02	0.09	0.00	0.08	-0.03	-0.01	-0.06	-0.06	0.06	**0.21**
	(-1.23)	(0.13)	(0.90)	(0.01)	(0.90)	(-0.44)	(-0.11)	(-0.73)	(-0.82)	(0.72)	**(1.36)**
σ_{ann}	18.1	17.1	16.3	17.3	15.9	15.7	17.3	17.1	16.9	19.9	**13.1**
SR_{ann}	0.44	0.60	0.69	0.51	0.68	0.57	0.49	0.47	0.51	0.44	**0.07**
						$DUR^{CL-FIP-TZZ}$ equity duration					
r^e	0.63	0.67	0.71	0.63	0.72	0.75	0.71	0.67	0.73	0.48	**-0.16**
	(3.12)	(3.58)	(3.60)	(2.99)	(3.40)	(3.72)	(3.46)	(3.21)	(3.10)	(1.73)	**(-0.82)**
α^{FF5}	-0.10	0.10	0.16	0.05	0.03	0.09	0.09	-0.00	0.06	-0.05	**0.05**
	(-1.29)	(1.15)	(1.61)	(0.58)	(0.29)	(1.09)	(1.07)	(-0.04)	(0.63)	(-0.34)	**(0.31)**
σ_{ann}	16.2	16.3	17.1	17.6	17.7	17.7	17.7	18.2	19.4	22.6	**16.0**
SR_{ann}	0.47	0.49	0.50	0.43	0.49	0.51	0.48	0.44	0.45	0.25	**-0.12**
						$DUR^{CH-FIP-TZZ}$ equity duration					
r^e	0.84	0.73	0.90	0.84	0.90	0.73	0.76	0.81	0.81	0.70	**-0.15**
	(3.52)	(3.21)	(4.03)	(3.99)	(4.05)	(3.17)	(2.99)	(3.30)	(3.32)	(2.35)	**(-0.71)**
α^{FF5}	-0.08	-0.18	0.19	0.03	0.19	0.11	0.07	-0.01	0.09	0.12	**0.21**
	(-0.68)	(-1.54)	(1.54)	(0.22)	(1.37)	(1.19)	(0.73)	(-0.06)	(0.88)	(1.16)	**(1.20)**
σ_{ann}	16.5	16.5	17.8	16.3	17.1	17.5	18.4	18.6	18.8	21.4	**15.5**
SR_{ann}	0.61	0.53	0.61	0.62	0.63	0.50	0.49	0.52	0.52	0.39	**-0.11**

Table D.8: Unconditional returns on duration-sorted portfolios for different holding periods

We document monthly average holding period returns for portfolios sorted on equity duration measures over different horizons. I.e. $r^e_{t\to t+15}$ corresponds to the average excess return for a holding period over the next 15 months. Note that the initial holding period is 12 months in our analysis. Holding period returns are calculated from 07.1963 - 12.2020 and are value weighted. Numbers in brackets are Newey and West (1987) t-statistics.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Original equity duration measures including discount rate information**											
DUR^{DSS} equity duration											
$r^e_{t\to t+15}$	0.96	1.02	0.90	0.96	0.75	0.78	0.84	0.86	0.82	0.44	**-0.52**
	(4.61)	(5.24)	(5.02)	(5.60)	(4.57)	(4.68)	(4.92)	(4.97)	(4.14)	(1.62)	**(-2.39)**
$r^e_{t\to t+18}$	0.98	1.02	0.95	0.96	0.82	0.80	0.87	0.87	0.81	0.44	**-0.54**
	(5.33)	(6.02)	(5.97)	(6.27)	(5.41)	(5.34)	(5.57)	(5.59)	(4.56)	(1.80)	**(-2.70)**
$r^e_{t\to t+21}$	0.97	0.99	0.96	0.96	0.83	0.80	0.85	0.86	0.79	0.44	**-0.52**
	(6.17)	(6.72)	(7.01)	(7.06)	(6.06)	(6.10)	(6.26)	(6.23)	(5.03)	(2.08)	**(-2.93)**
$r^e_{t\to t+24}$	0.97	0.96	0.96	0.95	0.84	0.82	0.84	0.85	0.77	0.44	**-0.53**
	(7.00)	(7.27)	(8.05)	(7.88)	(6.82)	(7.01)	(7.05)	(6.98)	(5.51)	(2.37)	**(-3.35)**
DUR^{GON} equity duration											
$r^e_{t\to t+15}$	1.11	0.96	0.97	0.86	0.92	0.85	0.90	0.92	0.75	0.65	**-0.46**
	(4.80)	(4.40)	(4.78)	(4.37)	(5.25)	(4.90)	(4.46)	(4.96)	(4.09)	(2.95)	**(-2.18)**
$r^e_{t\to t+18}$	1.06	1.01	1.03	0.91	0.92	0.86	0.95	0.92	0.77	0.69	**-0.36**
	(5.11)	(5.33)	(5.78)	(5.13)	(5.81)	(5.42)	(5.29)	(5.56)	(4.71)	(3.44)	**(-1.87)**
$r^e_{t\to t+21}$	1.01	1.02	1.04	0.96	0.91	0.86	0.97	0.90	0.79	0.71	**-0.30**
	(5.60)	(6.18)	(6.55)	(6.14)	(6.46)	(6.14)	(6.24)	(6.17)	(5.48)	(3.95)	**(-1.70)**
$r^e_{t\to t+24}$	0.97	1.03	1.04	0.97	0.92	0.88	0.98	0.89	0.80	0.71	**-0.26**
	(6.09)	(6.99)	(7.35)	(7.11)	(7.28)	(7.16)	(7.20)	(6.94)	(6.35)	(4.48)	**(-1.58)**
Panel B: **Equity duration measures excluding discount rate information**											
DUR^{FIP} equity duration											
$r^e_{t\to t+15}$	0.78	0.80	0.73	0.80	0.80	0.83	0.72	0.70	0.79	0.73	**-0.05**
	(4.08)	(4.59)	(4.21)	(4.54)	(4.71)	(4.61)	(4.15)	(3.81)	(3.69)	(2.70)	**(-0.31)**
$r^e_{t\to t+18}$	0.81	0.83	0.76	0.81	0.82	0.87	0.77	0.69	0.81	0.73	**-0.07**
	(4.59)	(5.27)	(4.76)	(5.22)	(5.35)	(5.42)	(4.85)	(4.14)	(4.27)	(3.13)	**(-0.47)**
$r^e_{t\to t+21}$	0.80	0.83	0.76	0.80	0.80	0.86	0.76	0.68	0.78	0.71	**-0.09**
	(5.05)	(5.91)	(5.45)	(5.90)	(5.99)	(6.17)	(5.46)	(4.63)	(4.77)	(3.51)	**(-0.66)**
$r^e_{t\to t+24}$	0.79	0.81	0.76	0.79	0.80	0.86	0.75	0.67	0.77	0.68	**-0.11**
	(5.53)	(6.38)	(6.20)	(6.59)	(6.78)	(7.01)	(6.11)	(5.23)	(5.40)	(3.85)	**(-0.94)**
$DUR^{FIP-TZZ}$ equity duration											
$r^e_{t\to t+15}$	0.82	0.78	0.71	0.81	0.74	0.89	0.72	0.96	0.69	0.69	**-0.12**
	(4.26)	(4.56)	(3.68)	(4.37)	(3.98)	(4.54)	(3.70)	(4.62)	(3.05)	(2.57)	**(-0.64)**

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Table D.8 continued: Unconditional returns on duration-sorted portfolios for different holding periods

$r^e_{t\to t+18}$	0.86	0.78	0.74	0.82	0.76	0.90	0.75	0.94	0.67	0.69	**-0.16**
	(4.62)	(4.77)	(3.93)	(4.87)	(4.38)	(4.99)	(4.08)	(5.00)	(3.18)	(2.69)	**(-0.87)**
$r^e_{t\to t+21}$	0.88	0.76	0.76	0.80	0.75	0.88	0.76	0.88	0.62	0.68	**-0.20**
	(4.78)	(4.84)	(4.14)	(4.93)	(4.45)	(5.15)	(4.29)	(4.87)	(3.13)	(2.70)	**(-1.12)**
$r^e_{t\to t+24}$	0.90	0.74	0.77	0.78	0.75	0.86	0.75	0.83	0.60	0.66	**-0.24**
	(4.86)	(4.86)	(4.29)	(4.86)	(4.56)	(5.12)	(4.38)	(4.64)	(3.11)	(2.68)	**(-1.36)**
					$DUR^{GON-NMI}$ equity duration						
$r^e_{t\to t+15}$	0.79	0.83	0.58	0.87	0.76	0.82	0.94	0.86	0.90	0.74	**-0.05**
	(3.98)	(4.39)	(2.78)	(4.67)	(3.85)	(4.27)	(5.07)	(3.95)	(3.99)	(2.64)	**(-0.22)**
$r^e_{t\to t+18}$	0.80	0.86	0.63	0.90	0.81	0.87	0.95	0.90	0.92	0.78	**-0.03**
	(4.53)	(5.03)	(3.35)	(5.19)	(4.60)	(5.07)	(5.53)	(4.59)	(4.57)	(3.15)	**(-0.14)**
$r^e_{t\to t+21}$	0.82	0.87	0.67	0.90	0.82	0.88	0.93	0.90	0.89	0.79	**-0.02**
	(5.21)	(5.75)	(4.11)	(5.78)	(5.37)	(5.90)	(5.97)	(5.17)	(5.12)	(3.69)	**(-0.15)**
$r^e_{t\to t+24}$	0.82	0.88	0.71	0.87	0.84	0.90	0.90	0.89	0.88	0.80	**-0.03**
	(5.86)	(6.54)	(4.94)	(6.30)	(6.25)	(6.92)	(6.57)	(5.77)	(5.84)	(4.23)	**(-0.19)**
					$DUR^{GON-NDR}$ equity duration						
$r^e_{t\to t+15}$	0.69	0.85	0.83	0.78	0.82	0.80	0.97	0.93	0.89	0.74	**0.05**
	(3.74)	(4.64)	(4.41)	(4.04)	(3.92)	(3.86)	(4.74)	(4.40)	(3.89)	(2.67)	**(0.24)**
$r^e_{t\to t+18}$	0.71	0.91	0.82	0.80	0.86	0.81	1.00	0.96	0.91	0.81	**0.10**
	(4.24)	(5.58)	(4.67)	(4.45)	(4.67)	(4.28)	(5.51)	(5.02)	(4.47)	(3.31)	**(0.48)**
$r^e_{t\to t+21}$	0.73	0.93	0.81	0.81	0.88	0.79	0.99	0.96	0.88	0.84	**0.11**
	(4.89)	(6.48)	(5.02)	(5.14)	(5.38)	(4.72)	(6.23)	(5.76)	(4.91)	(3.99)	**(0.63)**
$r^e_{t\to t+24}$	0.74	0.95	0.79	0.82	0.90	0.80	0.98	0.95	0.86	0.85	**0.11**
	(5.52)	(7.44)	(5.52)	(5.79)	(6.21)	(5.42)	(6.91)	(6.62)	(5.29)	(4.56)	**(0.64)**

Table D.9: Short-term Interest-rate sensitivity

This table shows the interest rate sensitivity of duration-sorted portfolios. Specifically, the shown coefficient is the estimated slope coefficient b in the regression

$$r_{i,t} = a + b \cdot \Delta R_{f,t}, \tag{D.1}$$

where $r_{i,t}$ is the return on the respective portfolio on month t and $\Delta R_{f,t}$ is the contemporaneous change in the one-month Treasury bill rate as provided by Kenneth French's database. Numbers in brackets are t-statistics. MB denotes a sort with respect to the market-to-book ratio.

DUR measure	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
DSS	-1429.2***	-1252.2***	-1273.4***	-1323.8***	-1195.4***	-1196.5**	-1199.5**	-1400.8**	-1522.2**	-1748.7**
	(-3.61)	(-3.44)	(-3.62)	(-3.73)	(-3.39)	(-3.27)	(-3.08)	(-3.07)	(-2.97)	(-3.06)
GON	-1352.5***	-1309.2***	-1262.8**	-1235.0**	-1165.1**	-1176.8**	-1342.3***	-1341.7**	-1374.9**	-1582.4**
	(-3.39)	(-3.34)	(-3.24)	(-3.26)	(-3.07)	(-3.07)	(-3.48)	(-3.30)	(-3.20)	(-3.23)
CL	-1392.6***	-1374.2***	-1319.2***	-1247.2***	-1220.6***	-1249.2***	-1274.8***	-1380.2**	-1546.2**	-1621.2**
	(-3.32)	(-3.62)	(-3.58)	(-3.51)	(-3.44)	(-3.50)	(-3.41)	(-3.09)	(-3.17)	(-2.88)
DSS-FIP	-1400.5***	-1169.5***	-1189.9***	-1188.7***	-1179.7***	-1313.2***	-1279.7***	-1299.2***	-1478.6***	-1738.0***
	(-3.62)	(-3.25)	(-3.41)	(-3.46)	(-3.35)	(-3.64)	(-3.42)	(-3.22)	(-3.26)	(-3.22)
DSS-FIP-TZZ	-1427.4***	-1246.5***	-1158.1***	-1346.6***	-1279.5***	-1399.0***	-1358.4***	-1397.2***	-1639.5***	-1882.3***
	(-3.94)	(-3.62)	(-3.29)	(-3.75)	(-3.53)	(-3.56)	(-3.35)	(-3.15)	(-3.31)	(-3.27)
DSS-GON-NMI	-1279.1***	-1134.6***	-1221.9***	-1180.3***	-1200.0***	-1178.0***	-1316.7***	-1399.5***	-1365.4***	-1711.0***
	(-3.47)	(-3.17)	(-3.39)	(-3.26)	(-3.29)	(-3.19)	(-3.44)	(-3.41)	(-3.03)	(-3.06)
DSS-GON-NDR	-1275.6***	-1206.8***	-1137.2***	-1234.4***	-1216.1***	-1105.3***	-1352.4***	-1297.0***	-1481.5***	-1647.7***
	(-3.45)	(-3.30)	(-3.14)	(-3.39)	(-3.38)	(-2.94)	(-3.48)	(-3.24)	(-3.31)	(-3.00)
CL-FIP	-1239.5***	-1202.2***	-1300.4***	-1209.6***	-1271.4***	-1248.3***	-1368.1***	-1378.3***	-1468.9***	-1598.8***
	(-3.62)	(-3.57)	(-3.77)	(-3.46)	(-3.45)	(-3.35)	(-3.51)	(-3.40)	(-3.39)	(-3.28)
CL-FIP-TZZ	-1195.7***	-1237.9***	-1182.6***	-1251.2***	-1272.2***	-1267.1***	-1259.8***	-1499.5***	-1591.5***	-1728.0***
	(-3.52)	(-3.63)	(-3.34)	(-3.38)	(-3.41)	(-3.22)	(-3.09)	(-3.43)	(-3.33)	(-3.12)
BM	-1371.7***	-1283.3***	-1352.8***	-1360.1***	-1179.8***	-1368.7***	-1291.2***	-1265.4***	-1506.9***	-1562.7***
	(-2.97)	(-3.03)	(-3.41)	(-3.48)	(-3.02)	(-3.57)	(-3.37)	(-3.25)	(-3.77)	(-3.51)

Figure D.1: Chicago Fed National Activity Index

This figure depicts the 3-month rolling average of the Chicago Fed National Activity Index (CFNAI) alongside with NBER recession months and the lowest quartile of the CFNAI Index.

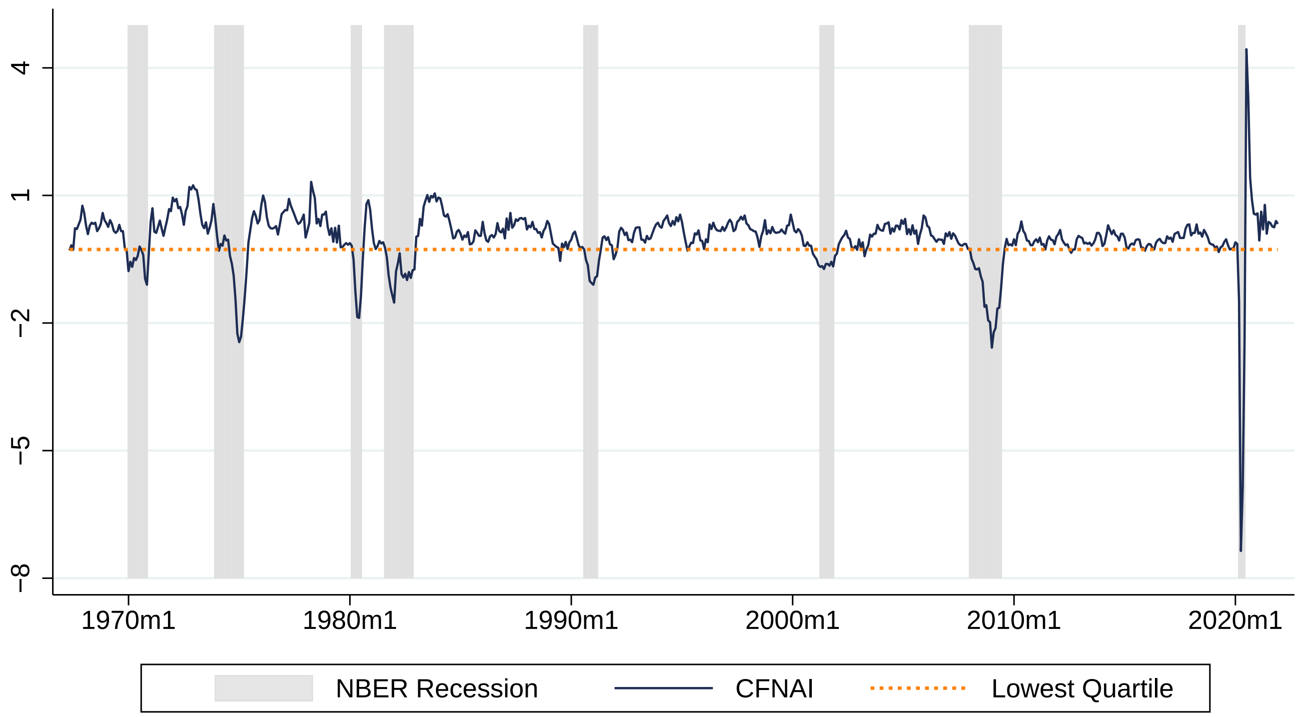


Table D.10: Returns on duration-sorted portfolios in recessions

We document monthly excess returns for portfolios sorted on equity duration measures conditional on recession periods. The excess returns r_1^{rec} correspond to quarters with lower GDP growth compared to the last 8 quarters, whereas r_2^{rec} is calculated for quarters with the lowest 10 % GDP growth. The observation period spans from 07.1963 - 12.2020 and returns are value weighted. Δ documents the difference in the high minus low duration portfolio (D10-D1) between the conditional returns documented in each panel and the returns in all other months.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**	Δ
Panel *A*: **Original equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
r_1^{rec}	-0.68	0.35	-0.21	0.11	-0.35	-0.09	-0.07	-0.15	-0.70	-1.89	**-1.21**	**0.81**
	(-0.93)	(0.49)	(-0.33)	(0.17)	(-0.62)	(-0.16)	(-0.14)	(-0.25)	(-1.15)	(-2.20)	**(-1.85)**	**(1.41)**
r_2^{rec}	-0.89	-0.07	-0.17	-0.19	-0.37	-0.38	-0.07	-0.05	-0.43	-1.87	**-0.98**	**0.51**
	(-0.92)	(-0.08)	(-0.21)	(-0.24)	(-0.49)	(-0.47)	(-0.10)	(-0.06)	(-0.51)	(-1.58)	**(-1.08)**	**(0.77)**
						DUR^{GON} equity duration						
r_1^{rec}	0.40	-0.26	-0.43	-0.65	-0.29	-0.16	-0.28	-0.46	-0.56	-1.29	**-1.68**	**1.29**
	(0.46)	(-0.31)	(-0.58)	(-0.92)	(-0.43)	(-0.26)	(-0.43)	(-0.77)	(-0.86)	(-1.80)	**(-2.58)**	**(2.36)**
r_2^{rec}	0.53	-0.26	-0.38	-0.37	-0.62	-0.55	-0.47	-0.03	-0.37	-1.41	**-1.94**	**1.54**
	(0.48)	(-0.24)	(-0.42)	(-0.41)	(-0.71)	(-0.71)	(-0.53)	(-0.04)	(-0.42)	(-1.40)	**(-2.37)**	**(2.49)**
Panel *B*: **Equity duration measures excluding discount rate information**												
						DUR^{FIP} equity duration						
r_1^{rec}	-0.39	-0.55	-0.37	-0.26	-0.35	-0.76	-0.53	-0.63	-0.73	-0.71	**-0.32**	**0.34**
	(-0.65)	(-0.94)	(-0.59)	(-0.41)	(-0.57)	(-1.27)	(-0.84)	(-1.00)	(-1.07)	(-0.81)	**(-0.56)**	**(0.68)**
r_2^{rec}	-0.43	-0.56	-0.23	-0.47	-0.62	-0.69	-0.55	-0.45	-0.77	-0.26	**0.17**	**-0.23**
	(-0.52)	(-0.72)	(-0.27)	(-0.58)	(-0.74)	(-0.84)	(-0.66)	(-0.54)	(-0.83)	(-0.23)	**(0.24)**	**(-0.40)**
						$DUR^{FIP-TZZ}$ equity duration						
r_1^{rec}	-0.79	-0.15	-1.38	-0.03	-0.52	-1.10	-1.09	-0.69	-1.43	-0.98	**-0.19**	**0.19**
	(-1.28)	(-0.23)	(-1.60)	(-0.04)	(-0.67)	(-1.22)	(-1.37)	(-0.74)	(-1.78)	(-0.90)	**(-0.25)**	**(0.31)**
r_2^{rec}	-0.59	-0.29	-1.07	-0.35	-0.91	-0.89	-1.24	-0.38	-1.43	-1.38	**-0.79**	**0.85**
	(-0.69)	(-0.32)	(-1.05)	(-0.35)	(-0.89)	(-0.76)	(-1.26)	(-0.35)	(-1.27)	(-0.92)	**(-0.87)**	**(1.17)**
						$DUR^{GON-NMI}$ equity duration						
r_1^{rec}	-0.53	-0.76	-0.72	-0.64	-0.96	-0.84	-0.31	-0.88	-1.26	-1.56	**-1.03**	**1.16**
	(-0.83)	(-1.17)	(-0.93)	(-0.86)	(-1.27)	(-1.29)	(-0.46)	(-1.28)	(-1.71)	(-1.56)	**(-1.26)**	**(1.82)**
r_2^{rec}	-0.55	-0.80	-0.51	-0.18	-1.01	-0.95	-0.81	-0.81	-1.03	-1.05	**-0.50**	**0.53**
	(-0.58)	(-0.95)	(-0.54)	(-0.19)	(-1.05)	(-1.09)	(-0.96)	(-0.84)	(-1.07)	(-0.83)	**(-0.51)**	**(0.74)**
						DUR^{NDR} equity duration						
r_1^{rec}	-0.61	-0.70	-0.36	-0.40	-0.83	-1.04	-0.25	-0.40	-1.15	-1.50	**-0.89**	**1.13**
	(-0.99)	(-1.11)	(-0.52)	(-0.60)	(-1.02)	(-1.39)	(-0.32)	(-0.57)	(-1.42)	(-1.46)	**(-1.00)**	**(1.64)**
r_2^{rec}	-0.67	-0.17	-0.51	-0.33	-0.71	-1.30	-0.61	-0.54	-0.66	-0.88	**-0.20**	**0.32**
	(-0.75)	(-0.19)	(-0.58)	(-0.39)	(-0.76)	(-1.41)	(-0.62)	(-0.58)	(-0.66)	(-0.68)	**(-0.18)**	**(0.42)**

Table D.11: Returns on duration-sorted portfolios in expansions

We document monthly excess returns for portfolios sorted on equity duration measures conditional on expansion periods. The excess returns r_1^{exp} correspond to quarters with higher GDP growth compared to the last 8 quarters, whereas r_2^{exp} are calculated for quarters with the highest 10 % GDP growth. The observation period spans from 07.1963 - 12.2020 and returns are value weighted. Δ documents the difference in the high minus low duration portfolio (D10-D1) between the conditional returns documented in each panel and the returns in all other months.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**	Δ
Panel *A*: **Original equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
r_1^{exp}	1.88	1.95	1.41	1.11	1.15	1.11	0.95	1.07	1.22	1.90	**0.02**	**-0.60**
	(2.72)	(2.96)	(2.17)	(1.78)	(1.86)	(1.85)	(1.58)	(1.86)	(1.87)	(2.11)	**(0.03)**	**(-0.96)**
r_2^{exp}	1.52	1.51	0.97	0.62	0.70	0.63	0.41	0.18	0.20	0.84	**-0.68**	**0.19**
	(2.48)	(2.76)	(2.13)	(1.17)	(1.32)	(1.21)	(0.91)	(0.39)	(0.38)	(1.27)	**(-1.03)**	**(0.29)**
						DUR^{GON} equity duration						
r_1^{exp}	2.07	1.77	1.45	1.30	1.39	1.18	1.20	1.25	1.19	1.03	**-1.04**	**0.53**
	(2.52)	(2.40)	(1.91)	(1.68)	(1.90)	(1.73)	(1.51)	(1.66)	(1.65)	(1.42)	**(-1.86)**	**(0.87)**
r_2^{exp}	2.03	1.37	1.04	0.53	0.48	0.72	0.52	0.41	0.46	0.17	**-1.86**	**1.38**
	(2.50)	(1.50)	(1.19)	(0.69)	(0.59)	(0.92)	(0.53)	(0.51)	(0.57)	(0.17)	**(-2.82)**	**(1.74)**
Panel *B*: **Equity duration measures excluding discount rate information**												
						DUR^{FIP} equity duration						
r_1^{exp}	1.26	1.29	1.36	1.13	1.19	1.39	1.22	1.61	2.25	2.93	**1.68**	**-1.90**
	(2.02)	(2.34)	(2.04)	(1.80)	(1.82)	(1.94)	(1.94)	(2.47)	(2.77)	(3.08)	**(2.84)**	**(-3.46)**
r_2^{exp}	0.86	0.84	0.74	0.59	0.57	0.80	0.30	0.17	1.00	1.95	**1.08**	**-1.23**
	(1.48)	(1.75)	(1.32)	(1.11)	(1.05)	(1.38)	(0.74)	(0.32)	(1.50)	(2.18)	**(1.87)**	**(-2.10)**
						$DUR^{FIP-TZZ}$ equity duration						
r_1^{exp}	1.44	1.30	1.36	1.56	1.50	1.44	1.78	1.50	1.21	2.60	**1.16**	**-1.34**
	(2.24)	(2.12)	(1.95)	(2.32)	(1.85)	(1.94)	(1.98)	(1.87)	(1.29)	(2.31)	**(1.49)**	**(-2.10)**
r_2^{exp}	0.94	0.42	0.56	0.64	-0.24	0.47	-0.12	0.44	0.16	1.78	**0.84**	**-0.89**
	(1.09)	(0.59)	(0.68)	(0.75)	(-0.27)	(0.61)	(-0.12)	(0.58)	(0.18)	(1.16)	**(0.78)**	**(-0.99)**
						$DUR^{GON-NMI}$ equity duration						
r_1^{exp}	1.24	1.20	1.26	1.17	1.00	1.23	1.18	1.63	1.87	2.78	**1.54**	**-1.75**
	(1.75)	(1.78)	(1.70)	(1.47)	(1.25)	(1.46)	(1.77)	(2.19)	(2.21)	(2.73)	**(2.04)**	**(-2.50)**
r_2^{exp}	0.81	0.21	0.61	0.73	0.60	0.77	1.08	0.76	0.58	1.93	**1.12**	**-1.22**
	(0.90)	(0.27)	(0.69)	(0.77)	(0.64)	(0.84)	(1.53)	(1.16)	(0.63)	(1.57)	**(1.21)**	**(-1.32)**
						$DUR^{GON-NDR}$ equity duration						
r_1^{exp}	1.15	1.19	1.29	1.16	1.37	1.11	1.61	1.56	2.00	3.13	**1.97**	**-2.11**
	(1.71)	(1.68)	(1.87)	(1.45)	(1.76)	(1.20)	(2.46)	(1.84)	(2.33)	(3.03)	**(2.39)**	**(-2.82)**
r_2^{exp}	0.58	0.73	0.69	0.66	0.34	0.45	0.89	0.75	1.95	2.31	**1.73**	**-1.74**
	(0.71)	(0.90)	(0.88)	(0.67)	(0.42)	(0.37)	(1.27)	(0.77)	(2.16)	(1.81)	**(1.55)**	**(-1.76)**

Table D.12: Conditional returns for duration-sorted portfolios during NBER recessions

We document monthly excess returns for portfolios sorted on equity duration measures conditional on NBER recession periods (r_1^{nber}). Moreover, we document monthly excess returns conditional on NBER recession periods excluding the first recession quarter (r_2^{nber}). The observation period spans from 07.1963 - 12.2020 and returns are value weighted. Δ documents the difference in the high minus low duration portfolio (D10-D1) between the conditional returns documented in each panel and the returns in all other months.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**	Δ
Panel *A*: **Original equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
r_1^{nber}	-0.61	-0.35	-0.30	-0.11	-0.38	-0.41	-0.11	-0.16	-0.24	-0.88	**-0.27**	**-0.27**
	(-0.68)	(-0.44)	(-0.35)	(-0.15)	(-0.53)	(-0.52)	(-0.15)	(-0.23)	(-0.31)	(-0.85)	**(-0.41)**	**(-0.47)**
r_2^{nber}	-0.18	0.11	0.16	0.25	-0.05	-0.29	0.33	0.45	0.31	-0.21	**-0.03**	**-0.46**
	(-0.17)	(0.11)	(0.18)	(0.28)	(-0.06)	(-0.33)	(0.41)	(0.52)	(0.34)	(-0.17)	**(-0.04)**	**(-0.68)**
						DUR^{GON} equity duration						
r_1^{nber}	0.17	-0.36	-0.55	-0.12	-0.58	-0.44	-0.69	-0.11	-0.29	-0.69	**-0.85**	**0.33**
	(0.16)	(-0.35)	(-0.64)	(-0.13)	(-0.70)	(-0.60)	(-0.84)	(-0.14)	(-0.37)	(-0.77)	**(-1.30)**	**(0.59)**
r_2^{nber}	0.91	0.42	-0.05	0.50	-0.16	-0.03	-0.24	0.67	0.37	0.09	**-0.82**	**0.35**
	(0.73)	(0.33)	(-0.04)	(0.48)	(-0.16)	(-0.03)	(-0.25)	(0.73)	(0.39)	(0.08)	**(-1.04)**	**(0.59)**
Panel *B*: **Equity duration measures excluding discount rate information**												
						DUR^{FIP} equity duration						
r_1^{nber}	-0.37	-0.51	-0.44	-0.48	-0.32	-0.44	-0.11	-0.37	-0.54	-0.56	**-0.19**	**0.08**
	(-0.49)	(-0.70)	(-0.60)	(-0.64)	(-0.42)	(-0.55)	(-0.14)	(-0.43)	(-0.57)	(-0.55)	**(-0.35)**	**(0.17)**
r_2^{nber}	0.04	0.15	0.25	0.12	0.13	0.03	-0.15	0.16	-0.01	0.24	**0.20**	**-0.33**
	(0.04)	(0.18)	(0.29)	(0.14)	(0.14)	(0.03)	(-0.15)	(0.17)	(-0.01)	(0.20)	**0.30**	**(-0.56)**
						$DUR^{FIP-TZZ}$ equity duration						
r_1^{nber}	0.07	0.31	0.14	0.18	-0.15	-0.10	0.18	0.01	-0.90	-0.78	**-0.85**	**0.63**
	(0.09)	(0.41)	(0.19)	(0.23)	(-0.18)	(-0.13)	(0.25)	(0.01)	(-0.96)	(-0.78)	**(-1.36)**	**(1.11)**
r_2^{nber}	0.88	0.90	0.80	0.95	0.31	0.33	0.71	0.88	-0.36	-0.80	**-1.68**	**1.52**
	(0.92)	(1.02)	(0.90)	(1.05)	(0.33)	(0.35)	(0.86)	(0.79)	(-0.34)	(-0.70)	**(-2.55)**	**(2.35)**
						$DUR^{GON-NMI}$ equity duration						
r_1^{nber}	-0.30	-0.26	-0.47	-0.12	-0.68	-0.80	-0.22	-0.96	-0.48	-0.51	**-0.21**	**0.21**
	(-0.35)	(-0.36)	(-0.57)	(-0.15)	(-0.74)	(-0.98)	(-0.27)	(-1.00)	(-0.50)	(-0.46)	**(-0.28)**	**(0.32)**
r_2^{nber}	0.51	0.57	0.32	0.50	0.01	-0.24	0.12	-0.35	0.24	0.51	**-0.01**	**0.01**
	(0.49)	(0.66)	(0.32)	(0.54)	(0.01)	(-0.24)	(0.13)	(-0.30)	(0.21)	(0.39)	**(-0.01)**	**(0.02)**
						DUR^{NDR} equity duration						
r_1^{nber}	-0.46	-0.05	-0.43	-0.45	-0.61	-0.58	0.01	-0.62	-0.60	-0.22	**0.24**	**-0.25**
	(-0.56)	(-0.06)	(-0.54)	(-0.59)	(-0.72)	(-0.71)	(0.01)	(-0.71)	(-0.63)	(-0.20)	**(0.17)**	**(-0.59)**
r_2^{nber}	0.35	0.69	0.29	0.42	0.07	0.02	0.41	-0.17	0.05	0.51	**0.16**	**-0.10**
	(0.36)	(0.69)	(0.31)	(0.49)	(0.07)	(0.02)	(0.37)	(-0.17)	(0.04)	(0.39)	**(0.17)**	**(-0.12)**

Table D.13: Details for conditional returns of duration-sorted portfolios based NBER recessions

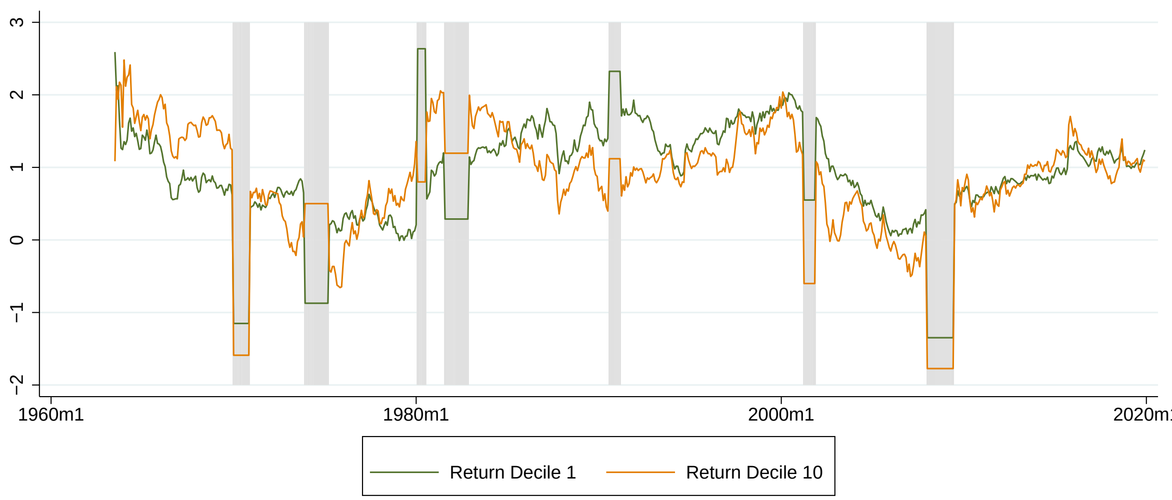
We document mean excess returns for portfolios sorted on equity duration measures conditional on NBER recession and expansion periods. Recession periods are printed in bold face, whereas expansion periods in normal face.The observation period spans from 07.1963 - 12.2020 and returns are value weighted.

	Inc. discount rate info		Exc. discount rate info			
	DUR^{DSS}	DUR^{GON}	DUR^{FIP}	$DUR^{FIP-TZZ}$	$DUR^{GON-NMI}$	$DUR^{GON-NDR}$
07/1963 - 12/1969	0.25 (0.59)		0.35 (0.79)			
01/1970 - 11/1970	**-1.37** **(-1.54)**		**-0.44** **(-0.35)**			
12/1970 - 11/1973	0.19 (0.24)		-1.42 (-1.67)			
12/1973 - 03/1975	**-1.75** **(-0.71)**	**-2.47** **(-1.27)**	**1.37** **(0.83)**		**1.86** **(1.16)**	**2.46** **(1.06)**
04/1975 - 01/1980	-1.49 (-2.47)	-1.90 (-3.82)	1.28 (2.28)	1.29 (2.21)	0.97 (1.64)	1.26 (1.82)
02/1980 - 07/1980	**1.92** **(2.39)**	**0.50** **(0.30)**	**-1.84** **(-1.15)**	**0.88** **(0.38)**	**-1.44** **(-0.93)**	**0.35** **(0.17)**
08/1980 - 07/1981	1.00 (0.91)	-0.38 (-0.46)	-0.60 (-0.88)	0.21 (0.13)	-0.29 (-0.28)	0.53 (0.38)
08/1981 - 11/1982	**-0.84** **(-0.64)**	**-1.51** **(-1.61)**	**0.91** **(0.64)**	**-2.66** **(-3.43)**	**0.46** **(0.35)**	**0.65** **(0.46)**
12/1982 - 07/1990	-1.12 (-2.66)	-0.77 (-2.01)	-0.84 (-2.35)	-0.96 (-2.56)	-0.40 (-1.06)	-0.44 (-1.05)
08/1990 - 03/1991	**0.71** **(0.52)**	**2.07** **(2.33)**	**-1.20** **(-0.68)**	**-0.53** **(-0.32)**	**-2.09** **(-1.15)**	**-1.18** **(-0.76)**
04/1991 - 03/2001	-0.71 (-1.24)	-0.22 (-0.50)	-0.23 (-0.53)	-0.10 (-0.17)	-0.54 (-0.92)	-0.27 (-0.44)
04/2001 - 11/2001	**-0.28** **(-0.12)**	**-0.51** **(-0.24)**	**-1.15** **(-0.46)**	**-1.23** **(-0.41)**	**-1.78** **(-0.43)**	**-1.19** **(-0.29)**
12/2001 - 12/2007	-1.41 (-2.21)	-1.17 (-2.34)	-0.27 (-0.49)	-0.06 (-0.11)	0.01 (0.02)	0.24 (0.40)
01/2008 - 06/2009	**-0.23** **(-0.17)**	**-0.73** **(-0.54)**	**-0.42** **(-0.38)**	**-0.82** **(-0.89)**	**-0.78** **(-0.62)**	**-0.88** **(-0.70)**
07/2009 - 02/2020	0.46 (1.21)	0.530 (1.48)	0.11 (0.33)	0.46 (1.43)	0.32 (0.92)	-0.10 (-0.26)
03/2020 - 04/2020	**6.72** **(1.88)**	**6.23** **(0.90)**	**2.78** **(0.81)**	**4.48** **(0.71)**	**1.51** **(0.38)**	**-2.22** **(-0.53)**

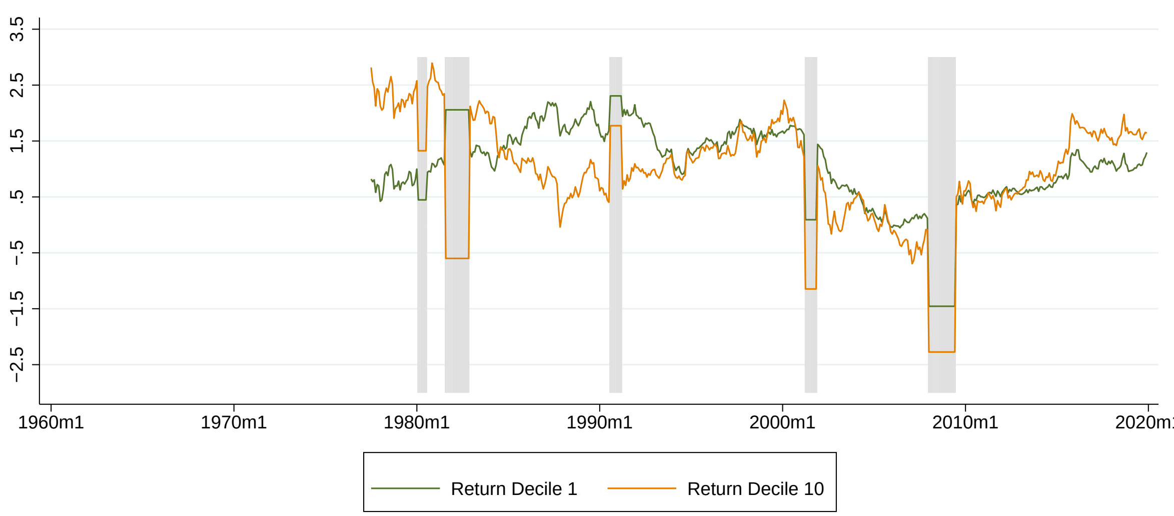
Figure D.2: Returns of the highest and lowest decile over time

Depicted are 2-year rolling averages of the returns for the lowest (D1) and the highest (D10) decile based on our four alternative equity duration measures: DUR^{FIP} in Panel A, $DUR^{FIP-TZZ}$ in Panel B, $DUR^{GON-NMI}$ in Panel C and $DUR^{GON-NDR}$ in Panel D. Since NBER recession periods are typically short and return volatility is high, we show the average over all months for a particular recession.

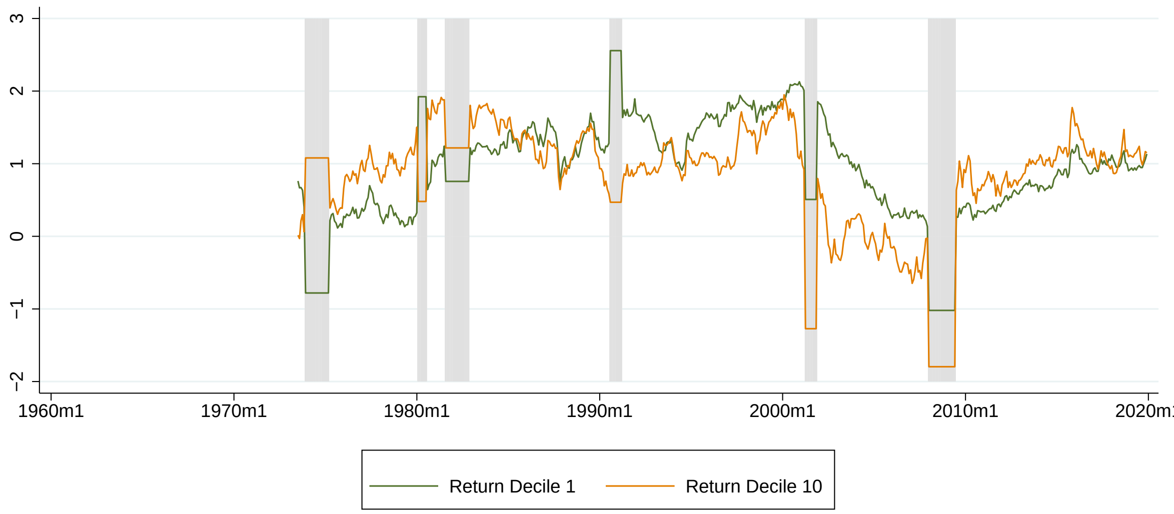
(a) DUR^{FIP} *equity duration measure*



(b) $DUR^{FIP-TZZ}$ *equity duration measure*



(c) *$DUR^{GON-NMI}$ equity duration measure*



(d) *$DUR^{GON-NDR}$ equity duration measure*

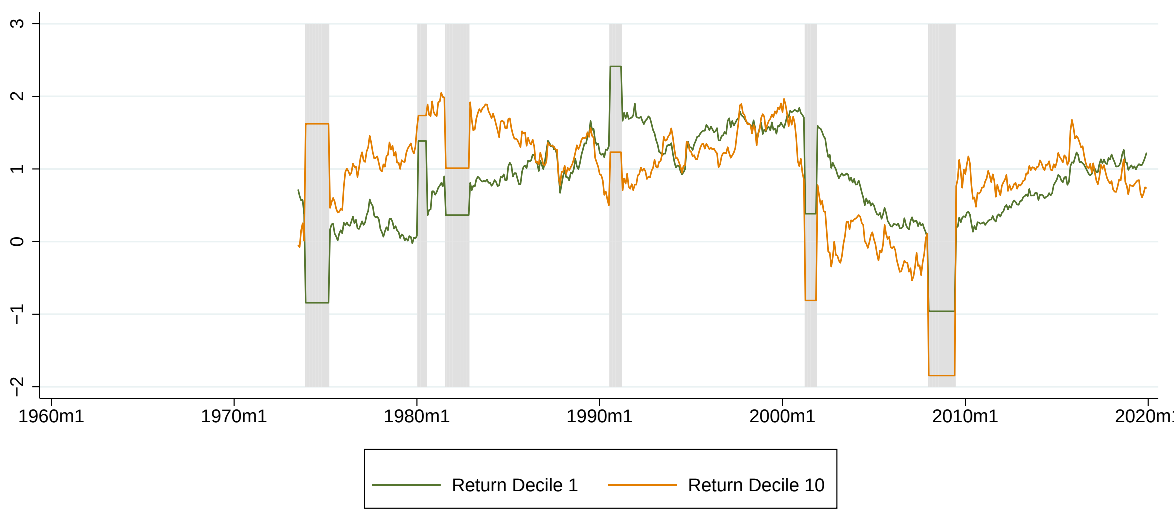


Table D.14: Spanning regressions of equity duration-sorted portfolios on factor models

Spanning regressions of the long-minus-short portfolio sorted on equity duration measures on asset pricing models. Panel A documents the regression on the CAPM, Panel B on the Fama and French (1993) and Panel C on the Fama and French (2015) asset pricing model. Newey and West (1987) t-statistics with 6 lags are in brackets and the intercept α is denoted in percentage points.

	DUR^{DSS}	DUR^{GON}	DUR^{FIP}	$DUR^{FIP-TZZ}$	$DUR^{GON-NMI}$	$DUR^{GON-NDR}$
	Panel A: **Capital Asset Pricing Model (CAPM)**					
α	-0.58	-0.55	-0.12	-0.17	-0.25	-0.16
	(-2.60)	(-2.36)	(-0.64)	(-0.81)	(-1.06)	(-0.61)
β_{MKT}	0.27	-0.02	0.34	0.35	0.39	0.40
	(3.85)	(-0.37)	(6.27)	(5.33)	(4.66)	(4.42)
	Panel B: **Fama and French (1993) three factor model**					
α	-0.24	-0.10	-0.28	-0.17	-0.41	-0.37
	(-1.55)	(-0.76)	(-1.63)	(-0.83)	(-1.99)	(-1.70)
β_{MKT}	0.13	-0.05	0.23	0.23	0.30	0.31
	(2.81)	(-1.36)	(4.74)	(4.16)	(4.45)	(4.32)
β_{SMB}	-0.02	-0.80	0.72	0.51	0.76	0.84
	(-0.23)	(-15.83)	(12.83)	(5.31)	(11.63)	(9.85)
β_{HML}	-1.05	-0.86	0.23	-0.23	0.14	0.26
	(-10.49)	(-13.68)	(2.37)	(-1.81)	(0.79)	(1.28)
	Panel C **Fama and French (2015) five factor model**					
α	-0.02	-0.07	-0.05	0.18	0.08	0.16
	(-0.13)	(-0.47)	(-0.42)	(1.04)	(0.51)	(0.89)
β_{MKT}	0.09	-0.06	0.21	0.17	0.20	0.20
	(1.94)	(-1.51)	(4.78)	(3.51)	(4.23)	(4.11)
β_{SMB}	-0.16	-0.82	0.53	0.25	0.39	0.48
	(-2.15)	(-15.61)	(9.02)	(2.32)	(4.39)	(4.89)
β_{HML}	-1.00	-0.83	0.15	-0.10	0.28	0.44
	(-9.64)	(-10.68)	(1.62)	(-0.68)	(1.93)	(2.67)
β_{CMA}	-0.06	-0.06	0.26	-0.08	-0.05	-0.16
	(-0.41)	(-0.52)	(2.35)	(-0.40)	(-0.24)	(-0.75)
β_{RMW}	-0.65	-0.06	-0.88	-0.98	-1.37	-1.39
	(-6.52)	(-0.76)	(-8.45)	(-7.45)	(-7.41)	(-7.48)