Is there a cash-flow timing premium?

Dominik Walter[*] Rüdiger Weber[‡]

This version: December 29, 2024

Abstract

Rather than merely capturing the timing of cash-flows, *equity duration* is also driven by stock-specific discount rates. We find that established empirical measures of equity duration predict returns mechanically because they use market prices, i.e. functions of the stock's true discount rate (that may reflect mispricing). We propose new measures of cash-flow timing that are not susceptible to this critique. These discount-rate free measures are better predictors of cash-flow timing but–in contrast to established, discount-rate contaminated measures–indicate an unconditionally flat relationship between cash-flow timing and average returns. However, in recessions (expansion episodes), there is a negative (positive) relation between cash-flow timing and average stock returns. These timing premia can be explained by the joint cross-section of profitability, investment, market capitalization and market beta.

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

JEL: G12, G17, G23

[*] University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany. E-mail: d.walter@uni-konstanz.de

[‡] Goethe University, Theodor-W.-Adorno-Platz 3, 60629 Frankfurt am Main, Germany. E-mail: r.weber@finance.uni-frankfurt.de

We thank Martijn Boons, Francesco Franzoni, Andrei Gonçalves, Niels Gormsen, Tobias Hemauer, Robert Korajczyk, Christian Laux, Emmanouil Platanakis, Otto Randl, Riccardo Sabbatucci, Christian Wagner, Michael Weber, Josef Zechner, as well seminar participants at Vienna (WU and University of Vienna), the University of Muenster, and the 2022 AWG, the 2022 DGF, the 2022 New Zealand Finance Meeting, the 2022 AFBC, the 2023 SGF, the 2023 AFFI, and the 2024 EFMA participants for their comments, insights and discussion. We particularly thank Shan Chen, Tao Li, Huafeng (Jason) Chen, and John Campbell for providing replication details. Dominik Walter gratefully acknowledges financial support from the Austrian Science Fund (FWF) based on the grant number DOC 23-G16 and 10.55776/DOC202.

1 Introduction

Recent empirical evidence indicates an unconditionally flat relation between stock returns and the timing of cash-flows to equity. Structural models, which are estimated using data from a large cross-section of stocks (Giglio et al., 2021; Jankauskas et al., 2021), suggest that this relation between stock returns and cash-flow timing is unconditionally close to flat (or slightly upward-sloping). In sharp contrast, the direct evidence on the joint distribution of individual stocks' equity duration and mean returns indicates a strong negative relation (Dechow et al., 2004; Weber, 2018; Gonçalves, 2021b).

In this paper, we reconcile these findings by investigating the conceptual and empirical relation between stock-specific equity duration, cash-flow timing, and discount rates. Analogously to bond duration (Macaulay, 1938), equity duration is best understood as a measure of a stock's *discount-rate sensitivity* rather than the *timing of its cash flows*, which is just one determinant of sensitivity besides the *level of discount rates*. Discount-rate levels enter established empirical duration measures via the use of market prices. This is problematic because of the mechanically negative relation between a stock's discount rate level and its discount-rate sensitivity: A stock's price $P = \frac{D}{R}$ is a hyperbolic function of its discount rate R. Intuitively, the price declines when the discount rate rises ($\frac{\partial P}{\partial R} < 0$), but it declines more strongly for low levels of R, i.e., $\frac{\partial^2 P}{\partial R^2} > 0$. That is, for low discount rates (c.p. high prices), prices are more sensitive to changes in discount rates. Hence, sorts on market-implied discount-rate sensitivity, such as established equity duration measures, generate mechanically negative sorts on expected returns, irrespective of the shape of the term structure of equity premia.

To address this concern, we disentangle the influence of discount rates from the influence of cash-flow timing for equity duration measures in the literature. We find that unconditionally negative return spreads between high and low duration stocks are exclusively driven by discount-rate levels, rather than cash-flow timing. Conversely, our new measures of pure cash-flow timing – which yield comparable spreads in future cash flow growth – have an unconditionally flat relation to mean returns. This flat relation between stock specific measures of cash-flow timing and mean returns is consistent with the results from Giglio et al. (2021), who estimate a structural model with cross-sectional data. Moreover, we do find a negative relation between cash-flow timing and returns in recessions, while the relation tends to be positive in expansions. These results are qualitatively consistent with the implication of a consumption-based asset pricing model with regime-switching dynamics (see, e.g., Bansal et al., 2021).[1]

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 discount rate: $P_t = \sum_{s=1}^{T} \frac{C_{t+s}}{R^s}$.[2] The sensitivity of prices with respect to changes in the discount rate is typically assessed using *duration* (DUR). Initially introduced for bonds by Macaulay (1938), DUR can be estimated for equity (see Dechow et al., 2004; Weber, 2018; Gonçalves, 2021b) using observables. It is given by:

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

Expressed verbally, duration measures 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 depends negatively on 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 mean returns.

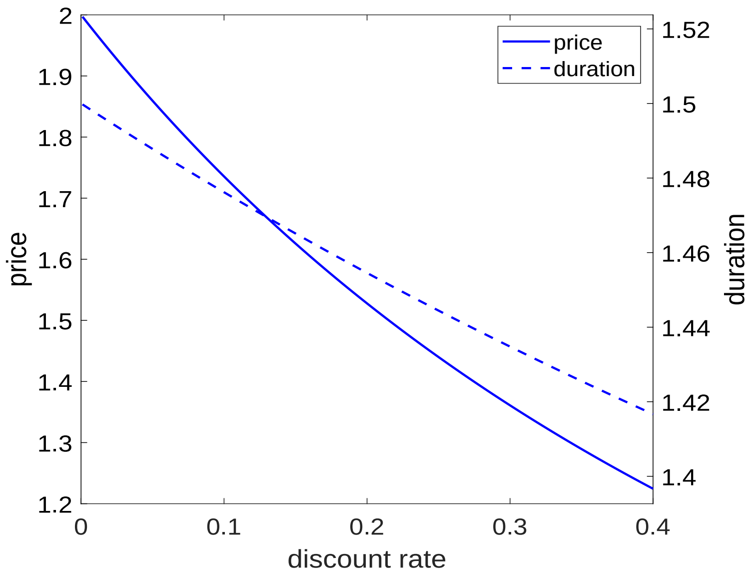
Intuitively, the issue stems from the convexity of discounting and is easily seen from a two-period model. In Figure 1, we plot the time zero price of assets (solid blue line) along with their duration (dashed blue line) as a function of their discount rate. All assets have identical payoffs of one in each period ($C_1 = C_2 = 1$). When computing duration as in (1), the payoff in $t = 1$ receives a weight of $\frac{1}{1+R^{-1}}$, whereas the payoff in $t = 2$ is assigned a weight of $\frac{1}{1+R}$, i.e., weights decrease over time but are increasing (decreasing) in the discount rate for early (late) cash flows. Hence, when holding the timing of cash flows constant, duration decreases in the discount rate. Graphically, comparing two assets with the exact same cash-flow profile but different discount rates (two points on the blue lines in Figure 1) shows 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).

[1]Note that Giglio et al. (2021) and Bansal et al. (2021) investigate hold to maturity returns of dividend strips to infer the relation between cash-flow timing and returns.

[2]Here, P_t denotes the price of the asset at t, C_τ is the (expected) cash flow at τ. For ease os exposition, the discount rate applicable to time τ cashflows $R_{t,\tau}$, is assumed to be flat, i.e. $R_{t,\tau} = R^{\tau-t}$.

Figure 1: Prices, discount rates and duration

This figure shows the prices of assets with payoffs $C_1 = C_2 = 1$, but different discount rate levels, and the corresponding duration measure. The price is given by $P = {}^1/_R + {}^1/_{R^2}$, and duration by $DUR = \frac{1}{1+R^{-1}} + \frac{2}{1+R}$.



Because they use market prices (that reflect discount rates), equity duration measures (see, e.g., Dechow et al., 2004; Weber, 2018; Gonçalves, 2021b) mechanically assign long (short) duration to expensive (cheap) stocks that have low (high) expected returns. Thus, standard duration measures do not give an unbiased measure of cash-flow timing. Hence, studying their correlation with mean returns is not suitable for drawing conclusions about the relation between cash-flow timing and expected returns, let alone the term structure of the equity premium. This notwithstanding, we want to emphasize that this is not a critique of equity duration measures per se. Our concern is most relevant when relating equity duration measures to mean returns in order to infer the relation between cash-flow timing and expected returns. This interpretation of duration is common in the literature.[3]

We proceed as follows: We start by discussing the concept of duration in more detail from a theoretical angle, where we abstract from empirical issues and highlight that duration and discount rate levels are inevitably linked.

In the next step, we point out how established empirical duration measures confound information on cash-flow timing and discount rate levels. We show how to overcome this entanglement of

[3] See, e.g., Gormsen (2021) who relates Dechow et al. (2004) equity duration to mean returns and interprets these findings as cross-sectional evidence regarding the equity term structure.

discount-rate and cash flow timing information by replacing market-price information in the respective measures. In particular, the seminal measure by Dechow et al. (2004) and Weber (2018) uses market prices in lieu of cash flow forecasts after a finite forecast horizon (in which cash flows are forecast using an autoregressive model). This approach fully assigns higher prices to higher future cash flows (rather than lower discount rates). We introduce new versions of this duration measure, in which we replace the market price with the price implied by the forecasts of the autoregressive model and a uniform discount rate. Hence, cross-sectional differences in our new cash-flow timing measure are exclusively due to differences in forecast future cash flows. Compared to the original Dechow et al. (2004) duration measure, sorts on the new resulting measures of cash-flow timing yield comparable or larger spreads in realized future cash flows but do not induce a mechanical relation to mean returns. Gonçalves's (2021b) version of equity duration uses a market-implied discount rate, yielding a mechanically negative relation to mean returns due to the negative relation between duration defined as in Equation (1) and the discount rate we derive in Section 2.1. Moreover, when estimating the vector autoregressive process (VAR) used for forecasting cash flows in a pooled regression, one confounds cross-sectional persistence with time-series persistence in cash flows. This leads to an overestimation of cash flow growth of high market-to-book firms. The reason is that these firms are persistently more profitable than value firms but their profitability declines over time. In pooled regressions, the former relation leads to an overestimation of the link between high market-to-book firms and future cash flows (similar to the mechanism in De la O et al., 2023) and ultimately to a link between high market prices and long duration that is not driven by cash-flow timing. We overcome these issues by replacing market-implied discount rates with a uniform discount rate, controlling for firm-level effects in the VAR estimation, or leaving out market prices in the forecasts. Again, the resulting measures yield similar spreads in cash-flow growth but do not have a mechanical relation to mean returns.

We find that the relation between returns and our new measures of pure cash-flow timing, is negative only in recessions, slightly positive in marked expansion episodes and flat, unconditionally. In contrast, portfolio sorts on the original duration measures with a mechanical relation to discount rates yield negative return spreads, irrespective of the business cycle. Sorts on both, duration and timing measures generate similar spreads in realized future cash flow growth. Our results can be explained by the cyclicality of the standard asset pricing factors that are related to the late timing of cash flows. In particular, late timing stocks have currently low profitability and high investment which both imply low expected returns, particularly in recessions. Because late timing stocks also have factor exposures that imply high average returns (in particular large market betas), there are on average no significant timing premia.

Related literature. Our paper contributes to the literature on equity duration and cash-flow timing starting with Dechow et al. (2004) who adapt the concept of duration (Macaulay, 1938) to the equity setting. As described above, the Dechow et al. (2004) equity duration assumes that, after a finite forecast horizon, the remaining market value of the stock is paid out as a level perpetuity. Thus, market prices enter the calculation and conflate a measure of timing with one of discount rates. Weber (2018) thoroughly studies the relation between Dechow et al. (2004)-type duration and expected stock returns in the cross-section. He finds a negative relation between equity duration and mean returns and suggests a behavioral explanation based on mispricing. Broadly in line with this reasoning, we find that the observed negative relation is solely driven by discount rates. However, our findings indicate that the heightened valuations are unrelated to timing because sorts on pure cash-flow timing do not generate unconditional return spreads. Gonçalves (2021b) builds on Dechow et al. (2004) but extends the forecast horizon to 1000 years using a VAR and assigns to each stock its market price-implied discount rate. He finds a negative relation between duration and mean returns and suggests that this can be explained by a reinvestment risk premium. While his duration measure gives an arguably more accurate measure of duration, the use of market prices to determine discount rates induces a negative cross-sectional relation between the measure and mean returns, irrespective of the true shape of the term structure. We show that unconditionally, there is no significant relation between versions of Gonçalves (2021b) equity duration that do not use market prices and mean returns. 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 analyst earnings 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. In a separate analysis, Gormsen and Lazarus (2019) find that for single-stock dividend futures, mean returns decline in maturity, as do CAPM alphas. We find evidence consistent with the latter but not with the former result. Other duration measures in the literature are either conceptually similar to Dechow et al.'s (see, e.g. Chen, 2011; Chen and Li, 2018), do not consider cash flows to shareholders (Schröder and Esterer, 2016), or are not forward-looking (see, e.g., Da, 2009). We discuss these measures in Section 2.2.5.

Our paper reconciles single-stock measures of cash flow timing with the recent literature on the equity term structure. In particular, our unconditional results are in line with Giglio et al. (2021) who estimate a stochastic discount factor using cross-sectional data and find a mostly flat 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.

While we acknowledge that there may be a disconnect between the aggregate market term structure and the returns on stocks with different cash-flow timing, our findings differ somewhat from what one would expect given the earlier literature on the unconditional term structure of the equity premium (Van Binsbergen et al., 2012; Van Binsbergen and Koijen, 2017). Using dividend derivative data, this literature finds an on average downward-sloping term structure. While we do not find an unconditionally negative relation to mean returns, we do find that CAPM betas increase and CAPM alphas decrease with timing. This is because, as we show in Section 5, there is a rich cross-sectional factor structure related to cash-flow timing that the CAPM alone cannot capture, e.g., the relation of cash-flow timing to profitability. In contrast, the Fama and French (2015) model which captures this factor structure, does not yield significant alphas. 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 of hold-to-maturity equity returns is 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 on on-period returns are qualitatively consistent with these predictions. Using a 2003 to 2019 sample of one-year returns on dividend futures for four major equity indices, Gormsen (2021) finds that long maturity claims have higher one-period returns than short maturity claims in recessions. In contrast, we use a long sample spanning 57 years of return data on common equity and find that late timing stocks have lower mean returns than early timing stocks in recessions. Most importantly, using recessions as an indicator of real economic activity avoids another mechanical relation between the price dividend ratio of the market and the returns on an asset that is similar to the market. As we discuss in Section 5.4 below, using the dividend price ratio rather than real economic indicators, we find results in line with Gormsen (2021).

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 positive relationship between discount-rate free measures of cash-flow timing and the market-to-book ratio in the cross section. This is driven by the joint cross-sectional distribution of profitability (with low profitability pointing towards late timing), investment (with high investment pointing towards late timing) and the book-to-market ratio which tends to be low for stocks with low profitability. These results are in line with a contemporaneous paper by De la O et al. (2023) who find that the dispersion in price-earnings ratios is explained by differences in expected returns rather than cash flows.

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 any empirical issues. We then turn to established empirical measures of equity duration such as those by Dechow et al. (2004); Weber (2018); Gonçalves (2021b). We show that, by using market price information, all commonly employed measures of duration do not only capture the timing of cash flows but induce a mechanically negative relation between duration and mean returns that holds irrespective of the shape of the equity term structure. To fix this, we propose new versions of the established equity duration measures that do not induce a such mechanical relation.

2.1 Duration

Macaulay (1938) duration quantifies the timing of a bond's cash flows. Specifically, DUR, as defined in Equation (1) above 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 the cross section of duration to that of returns. This is because duration is decreasing in the discount rate. Therefore, on average, and 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 for the duration formula. Even if we perfectly knew all inputs, we would find that more expensive assets with low discount rates, have higher duration. Thus, a negative relation between duration and expected returns in the cross-section is not surprising because the duration measure already depends negatively on discount rates. We overcome this issue 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. The intuition behind this analytical result is that late cash flows C_s that would raise DUR to a higher level get less weight when the discount rate is higher because higher discount rates increase (decrease) the weight of early (late) cash flows. 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). As a side note, for bonds, the influence of cross-sectional differences in discount rate levels on cross-sectional differences in discount-rate sensitivity is much weaker because coupon payments tend to reflect discount rate levels themselves. To see this, replace C_s in $P = \sum_s \frac{C_s}{R^s}$ with R and take the derivative with respect to R. In the next subsection, we discuss how established measures of equity duration mix up the influence of discount rates and cash-flow timing and suggest measures of pure cash-flow timing based on the original measures by Dechow et al. (2004) and Gonçalves (2021b).

2.2 Empirical measures of equity duration

As opposed to bond coupons and principal payments, equity cash flows 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 computing bond duration. Similarly, the equity 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. Overall, all the established measures induce such a relation. We propose new measures that do not use market price information (as in Dechow et al.'s (2004) and Gonçalves's (2021b) measure) and which avoid the pitfalls of pooled VAR estimations (as in Gonçalves (2021b)). In each case, we start out with the original measure and then replace all potentially problematic parts in order to identify if there is indeed a relation between cash-flow timing and mean returns. The details of the empirical estimation are left to Internet Appendix IA1.

2.2.1 Dechow et al. (2004) and Weber (2018) equity duration: DUR^{DSS}

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 C ("cash flows") into earnings (E) and changes to book equity (BE):

$$C_t = E_t - (BE_t - BE_{t-1}). \tag{7}$$

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

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

To forecast future cash flows C, Dechow et al. (2004) assume that ROE and EG follow mean reverting processes, which are modeled by the following first-order auto-regressive 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. After this finite forecasting horizon, the present value of these forecast payments, $\sum_{s=1}^{T} \frac{C_{t+s}}{R^s}$, is 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:

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

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 DUR^{DSS} attributes a high observed market price, P, in Equation (11) entirely to high cash flows in the distant future, rather than to a stock's low discount rate level. Formally, DUR^{DSS} rises monotonically in P:

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

because, by definition, $s \leq T$. Intuitively, higher prices might reflect higher future cash flows and thus justify a positive relation between DUR and market prices. However, P_j is also a decreasing function of the true, unobserved discount rate $\tilde{R}_j$. Hence, two stocks V and G with the exact same cash flow profile $\{C_t\}$ 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 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 Our versions of the Dechow et al. (2004) equity duration without market-implied information

We propose two variations of the equity duration measure used by Dechow et al. (2004) and Weber (2018) where we replace each stock's market price P_j with the price implied by the model forecasts in order to disentangle the influence of discount rates and cash-flow timing. We label theses measures with TIM to indicate that they are measures of pure cash-flow timing.

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

$$TIM_{j,t}^{DSS} = \frac{1}{P_{j,t}^{FIP}} \cdot \left[\sum_{s=1}^{T} \frac{s \cdot C_{j,t+s}}{(1+r)^s} + \left(T + \frac{1+r}{r-g} \right) \cdot \left[P_{j,t}^{FIP} - \sum_{s=1}^{T} \frac{C_{j,t+s}}{(1+r)^s} \right] \right] \tag{13}$$

$P_{j,t}^{FIP}$ corresponds to the price of stock j that is implied by the model, i.e.

$$P_{j,t}^{FIP} = \sum_{s=1}^{T} \frac{C_{j,t+s}}{(1+r)^s} + \frac{C_{j,T} \cdot (1+g)}{(1+r)^T \cdot (r-g)}, \tag{14}$$

where g is the model implied long-run cash-flow growth of six percent and $T = 15$. 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 (13) differs slightly from DUR^{DSS} in Equation (11), because 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.

Dechow et al. (2004) cash-flow timing with forecast-implied prices (stock-specific long-run growth): $TIM^{DSS-SLG}$. We want to make sure that any potentially inferior performance of versions of the Dechow et al. (2004) is not due to discarding information about cash-flows beyond the forecast horizon T. Specifically, we use a variety of forecast variables to estimate a stock-specific long-run growth rate g used in Equation (14) by applying a LASSO approach as in Tengulov et al. (2019). The resulting measure is called $TIM^{DSS-SLG}$ *(Dechow et al. (2004) cash-flow timing with forecast-implied prices including stock-specific long-run growth rates)*. Moreover, we want to avoid having a mechanical relation between the long-run growth rate g and discount rates in this measure of *cash-flow timing*. Therefore, we exclude predictors based on market price information from Tengulov et al. (2019) when we estimate the long-run growth rate g. We also estimate a version that uses market price information and find qualitatively similar results. We follow the procedure in Tengulov et al. (2019) to estimate these stock specific long-run growth rates as we describe in Internet Appendix IA2.

2.2.3 Gonçalves (2021b) equity duration: DUR^{GON}.

Gonçalves (2021b) develops the concept of cash-flow duration further by extending the forecast horizon to a thousand years using a 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. In addition, using market prices to forecast cash flows in a VAR potentially confounds the cash flow forecasts with discount rate information. Consequently, there is a mechanically negative relation between the Gonçalves (2021b) duration measure and expected returns.

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

$$\frac{\mathbb{E}_t[C_{t+h}]}{BE_t} = \mathbb{E}_t\big[\big(e^{CPROF_{t+h}-EG_{t+h}} - 1\big) \cdot e^{\sum_{\tau=1}^{h} EG_{t+\tau}}\big], \tag{15}$$

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 (2021b) estimates future values for $CPROF$ and EG in Equation (15) with a VAR:

$$s_{j,t} = \Gamma s_{j,t-1} + u_{j,t}, \tag{16}$$

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, $CPROF$, EG and ten other predictors, described in Internet Appendix IA1. Note that Γ and Σ do not vary across firms. Thus, cross-sectional variation in the cash-flow forecasts at t is determined by the state variables $s_{j,t}$, some of which are based on market prices (i.e., book-to-market, payout yield and sales yield). Using estimates Γ and Σ, scaled expected cash flows can be expressed as

$$\frac{\mathbb{E}_t[C_{t+h}]}{BE_t} = \left(e^{(\mathbf{1}_{CPROF}-\mathbf{1}_{EG})'\Gamma^h \cdot s_t + v_1(h)} - 1\right) \cdot e^{\mathbf{1}'_{EG}\left(\sum_{\tau=1}^{h}\Gamma^\tau\right)\cdot s_t + h\cdot v_2(h)}, \tag{17}$$

where $\mathbf{1}_x$ is defined as a selector vector such that $\mathbf{1}_x s_t = x_t$. Moreover, v_1 and v_2 are parameters that do not vary in the cross-section, because they only depend on Γ, Σ and h. After forecasting future expected cash flows, Gonçalves (2021b) estimates discount rates $dr_{j,t}$ by choosing them such that each firm's (j) model-implied market-to-book ratio equals the observed market-to-book ratio $\frac{ME_{j,t}}{BE_{j,t}}$:

$$\frac{ME_{j,t}}{BE_{j,t}} = \sum_{h=1}^{\infty}\left(e^{(\mathbf{1}_{CPROF}-\mathbf{1}_{EG})'\Gamma^h \cdot s_{j,t} + v_1(h)} - 1\right) \cdot e^{\mathbf{1}'_{EG}\left(\sum_{\tau=1}^{h}\Gamma^\tau\right)\cdot s_{j,t} + h\cdot v_2(h) - h\cdot dr_{j,t}}. \tag{18}$$

In this step, one takes the cash flow forecast from (17) 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:

$$DUR_{j,t}^{GON} = \left(\frac{BE_{j,t}}{ME_{j,t}}\right) \sum_{h=1}^{\infty} h \left(e^{(\mathbf{1}_{CPROF} - \mathbf{1}_{EG})' \Gamma^h s_{j,t} + v_1(h)} - 1 \right) e^{\mathbf{1}'_{EG} \left(\sum_{\tau=1}^{h} \Gamma^\tau \right) s_{j,t} + h \cdot v_2(h) - h dr_{j,t}}. \quad (19)$$

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 (2021b) estimates the market discount rate by matching cash-flow forecasts to market prices. Thereby, market prices enter the duration measure in Equation (19) explicitly through different discount rates, giving an arguably more 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 (2021b) 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.[4]

2.2.4 Versions of the Gonçalves (2021b) equity duration with varying degrees of market-implied information

As for the Dechow et al. (2004) measure, we take out discount-rate related information from the Gonçalves (2021b) duration measure to distinguish between discount rate-driven and timing-driven duration. Moreover, we address potential issues with pooled VAR estimates.

Gonçalves (2021b) cash-flow timing with a uniform discount rate: TIM^{GON}. Most obviously, discount rate information enters DUR^{GON} through firm-specific discount rates $dr_{j,t}$, calibrated to match the respective market price. We thus replace these stock-specific discount rates for each stock by a uniform discount rate $dr_{j,t}$ of 12% and the market price of each stock $P_{j,t}$ with the price

[4] 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).

implied by the cash flow forecasts and the 12% discount rate. However, stock-specific discount rate information also enters by including market prices in the state variable vector s in the VAR (16). This can lead to a systematic relation between the cash-flow forecasts and discount rates and thus confound DUR^{GON} with discount-rate information if the VAR is estimated with pooled regressions as in Gonçalves (2021b).

To understand this, note that pooled estimations that do not account for unconditional cross-sectional differences between stocks confound persistence in the time series with persistence in the cross section. This was shown, e.g., by Chen et al. (2013). In the setting of DUR^{GON}, and when investigating the link of duration and returns, the problem can arise when market prices are related to cross-sectional differences in the levels of cash flows. Take for instance growth stocks with low book-to-market equity ratios. It is well known that growth stocks have higher earnings to book equity, as compared to value stocks. This *cross-sectional* relation persists in future periods, i.e. growth stocks continue to be more profitable than value stocks. However, there tends to be no persistence in the *time series*: as shown by Fama and French (1995) and Chen (2017), the profitability of growth stocks tends to decline whereas that of value stocks tends to increase. I.e., there is only little persistence and value stocks have larger earnings *growth*. Crucially, duration aims to capture the dynamics (early vs. late), rather than the level of cash flows (high vs. low). Therefore, mistaking the cross-sectional persistence *in levels* for time-series persistence *in dynamics* will inflate the estimated future cash flows to stocks with high values of variables that are positively related to high cash flow *levels* in the cross section – such as the market-to-book ratio. If such a predictor is moreover mechanically related to discount rates – such as the market-to-book ratio – this could yield a negative link between returns and duration that is not due to later cash-flow timing.

To avoid the overestimation of cash-flows, which becomes relevant for market based state variables, we exclude state variables in s which are based on market information: Specifically, we do not include the book-to-market ratio, payout yield, sales yield (i.e. the sales-to-price ratio) and market leverage. To obtain a measure of pure *cash-flow timing* we assign a uniform discount rate of 12% and replace the market price with the forecast implied price for all stocks.[5] Hence, market price information does not enter this measure at all. We denote this measure TIM^{GON} (*Gonçalves (2021b) cash-flow*

[5] Results using other discount rates are similar.

timing with no market price information).

To put the effect of stock specific discount rates and market based state variables in the VAR into perspective we construct two additional versions of the Gonçalves (2021b) duration measure, presented in Appendix A4. First, we only replace the stock specific discount rates and market prices as described above and thereby obtain a measure of equity duration that still includes market based information through the state variables: $DUR^{GON-UDR}$ (*Gonçalves (2021b) equity duration with a uniform discount rate*). In addition to this alternation, we follow Chen et al. (2013) and demean all state variables in the VAR at the firm level (akin to firm fixed effects). By taking out unconditional cross-sectional differences, the VAR only measures the dynamics in state variables while still allowing for cross-sectional level differences in forecast cash flows through different values of the vector s. We call this alternative measure $TIM^{GON-UDR*}$ (*Gonçalves (2021b) cash-flow timing with a uniform discount-rate and firm-level demeaned VAR estimation*).

2.2.5 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 discounted future cash-flows match the respective stock price. Consequently, the measure introduces a mechanical relation to discount rates. We label this measure as DUR^{CH} in the following. Similar to versions of the Dechow et al. (2004) duration measure, we construct a version of the Chen (2011) duration measure with a uniform discount rate of 12% and forecast implied prices for all stocks: TIM^{CH}. On top of these alternations, we estimate forecast implied prices with stock-specific growth rates in the spirit of Tengulov et al. (2019). We denote this measure with TIM^{CH-SLG}.

In a more recent contribution, Chen and Li (2018) build on the Dechow et al. (2004) equity duration measure and modify it in two ways. First, Chen and Li (2018) include additional forecast variables to predict return on equity and book equity growth. Second, Chen and Li (2018) 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. Therefore, we repeat the same alternations as in TIM^{DSS} and

$TIM^{DSS-SLG}$ and investigate two versions of the Chen and Li (2018) duration measure excluding market information. We label these measures of cash-flow timing with TIM^{CL} and TIM^{CL-SLG}.

Other measure depart from Dechow et al.'s general framework. 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 suitable for testing the relation between cash-flow timing and expected stock returns.

Gormsen and Lazarus (2019) relate duration to various stock market anomalies. It is worth noting that their notion of duration 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. They find a negative relation between CAPM alphas and long-term growth (or its fitted values) but not for excess returns in portfolio sorts. Finally, Schröder and Esterer (2016) suggest equity duration and timing measures based on the dynamics of residual income. This approach differs from estimating the dynamics of future cash flows to shareholders which has a direct relation to stock prices and is the focus of this paper.

3 Data

We obtain data on stock prices, shares outstanding and returns, which we adjust for delisting following Shumway (1997), from the Center for Research in Security Prices. Our sample consists of all common U.S. stocks with share codes 10 and 11 that are listed on NYSE, Amex or Nasdaq. Stocks in the financial and utility sectors (SIC codes 4900-4999 and 6000-6999) are excluded because they typically have different balance sheet patterns compared to stocks in industrial sectors. We obtain annual accounting data from Compustat and match them for fiscal years ending in $t-1$ to return data from July in year t to June in year $t+1$ (see Fama and French, 1992). Moreover, we only include Compustat observations that have at least two previous observations in this database to avoid a backfilling bias (Fama and French, 1992). Data on the Chicago Fed National Activity Index (CFNAI), the NBER recession indicator, GDP-growth, the one-month and 10-year treasury yield are from the Federal Reserve Bank of St. Louis. Lastly, we use data for the Fama and French (2015) factor model from Kenneth French's website.[6]

We precisely follow Weber (2018) and Gonçalves (2021b) to construct the original measures

[6]We thank Kenneth French and the Federal Reserve Bank of St. Louis for providing these datasets.

DUR^{DSS} and DUR^{GON}. The construction of our cash-flow timing measures without discount rate information follows from Section 2.2 and we explain all construction details in Internet Appendix IA1. To see how these equity duration measures relate to expected returns, we sort the cross-section of stocks at the end of each June into deciles based on NYSE breakpoints of the corresponding measure. We rebalance these portfolios monthly to control for delistings. The sample for DUR^{DSS} and TIM^{DSS} starts in January 1964. In contrast, the sample for $TIM^{DSS-SLG}$, DUR^{GON}, and TIM^{GON} begins in January 1974 to have sufficient observations to estimate the long-term growth rate g or Γ for the first cross-section in 1974. Our sample ends in December 2020 for all measures.

4 Empirical analysis

Having established the duration measures, we now study their empirical properties. First, we test whether sorts on the measures indeed generate a spread in future cash-flow growth and second whether 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 the slope of the equity term structure had been suggested to depend on the business cycle (see, e.g., Bansal et al., 2021). We pay particular attention to the differences between measures of pure cash-flow timing and those that use market-implied discount rates.

4.1 Cash flows

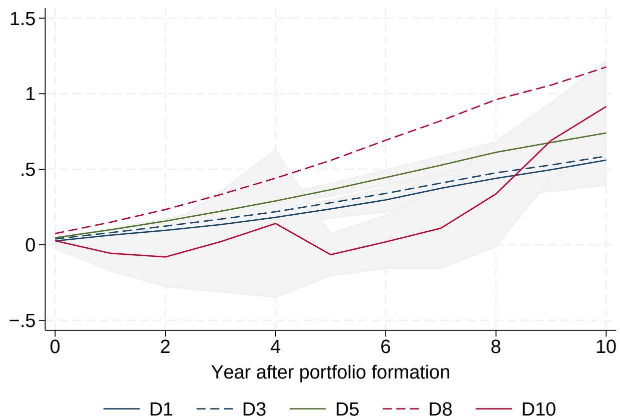
We start by "backtesting" whether the equity duration measures indeed generate spreads in realized payouts and cash-flow growth in the years after portfolio formation. First, in Figure 2, we conduct an analysis akin to Figure 1 in Gonçalves (2021b) where we plot the cumulative payouts of the duration-sorted portfolios in the years after portfolio formation relative to their book value at the formation date.[7] Intuitively, early-timing indicates that most of the cash-flows to shareholders are distributed in the near-term future. Thus, early-timing portfolios should have higher payouts in the years after portfolio formation compared to late-timing portfolios, which should pay out more in the more distant future. Figure 2 indicates that our new discount-rate free measures are consistent with this intuition.

[7] In Figure 1 in Gonçalves (2021b), the denominator is market equity, rather than book equity which induces an unnecessary relation to market discount rates.

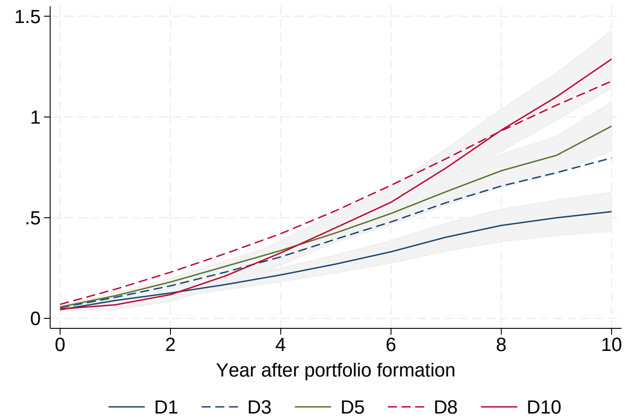
Figure 2: Payouts relative to book-equity of duration/timing-sorted portfolios.

We sort stocks in each June of year t into deciles based on the duration measure specified in each panel. We depict for deciles 1, 3, 5, 8, and 10 the cumulative net payouts in the ten years after portfolio formation relative to book equity at portfolio formation. 95 % confidence intervals are depicted in gray (Newey and West, 1987).

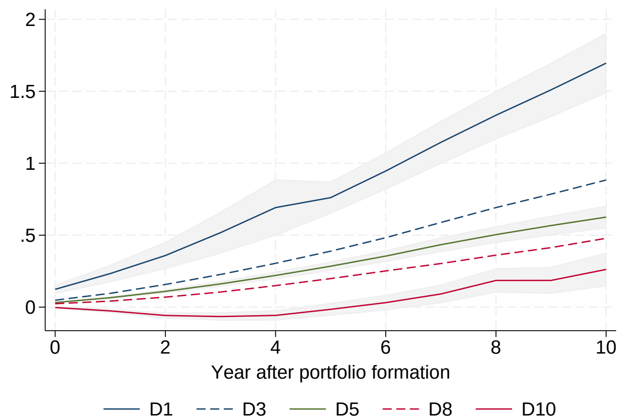
Panel A: DUR^{DSS}



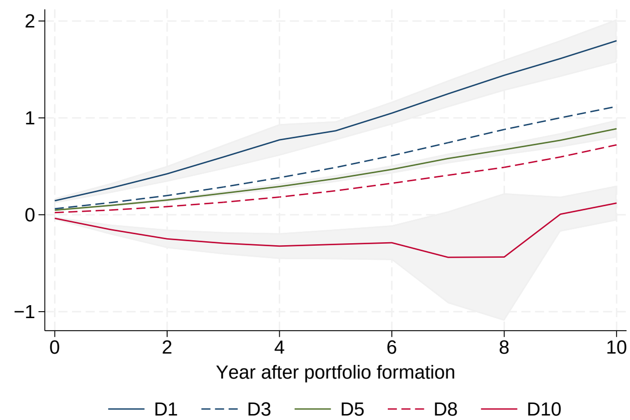
Panel B: DUR^{GON}



Panel C: TIM^{DSS}



Panel D: $TIM^{DSS-SLG}$



Panel E: TIM^{GON}

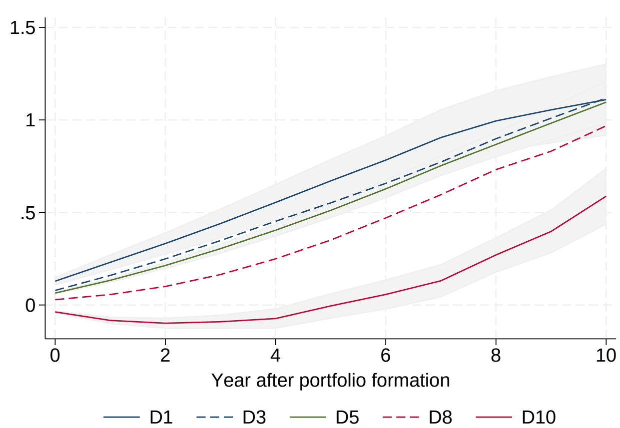


Table 1: Realized cash-flows of duration/timing-sorted portfolios.

This table shows realized cash flows for portfolios sorted on equity duration measures. Panel *A* shows these realized growth rates for equity duration measures including discount rate information and Panel *B* for equity duration measures excluding discount rate information. Realized growth rates correspond to the average EBITDA growth and cash-flow to equity growth (CFEG) in the five years $(t, t+5)$ after portfolio formation. All growth rates are annualized and in percent per year. Newey and West (1987) corrected t-statistics with 6 lags are in brackets and the time period is from January 1964 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel *A*: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
$\text{EBITDA}_{t,t+5}$	5.37	5.76	6.99	7.56	8.33	8.96	10.1	11.6	14.6	14.2	**8.85**
	(13.1)	(15.1)	(19.9)	(20.6)	(24.6)	(25.2)	(31.1)	(34.0)	(33.5)	(29.8)	**(22.3)**
$\text{CFEG}_{t,t+5}$	13.7	14.1	13.8	14.7	14.6	13.7	15.2	16.0	18.0	16.7	**3.02**
	(18.5)	(19.3)	(16.7)	(19.3)	(19.9)	(17.9)	(20.7)	(22.0)	(19.4)	(16.9)	**(3.56)**
					DUR^{GON} equity duration						
$\text{EBITDA}_{t,t+5}$	6.69	6.93	7.37	7.61	8.43	8.53	9.33	10.2	11.8	13.5	**6.80**
	(16.6)	(17.7)	(18.4)	(18.9)	(22.8)	(22.5)	(25.0)	(25.1)	(25.6)	(31.3)	**(25.9)**
$\text{CFEG}_{t,t+5}$	15.4	16.3	15.3	15.8	15.7	16.9	15.2	16.9	17.8	19.2	**3.83**
	(18.3)	(23.5)	(22.1)	(20.8)	(18.4)	(23.0)	(17.8)	(18.5)	(18.2)	(18.3)	**(3.74)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
$\text{EBITDA}_{t,t+5}$	8.00	7.70	7.56	6.95	7.71	7.90	8.40	9.82	12.8	16.2	**8.16**
	(24.3)	(23.8)	(24.8)	(22.0)	(23.4)	(25.3)	(23.6)	(25.3)	(31.2)	(37.8)	**(26.9)**
$\text{CFEG}_{t,t+5}$	15.2	15.0	14.0	13.7	16.0	14.7	14.4	14.8	16.3	18.5	**3.24**
	(17.9)	(17.3)	(17.4)	(19.5)	(19.5)	(21.6)	(18.9)	(19.2)	(20.7)	(19.6)	**(5.00)**
					$TIM^{DSS-SLG}$ equity duration						
$\text{EBITDA}_{t,t+5}$	6.03	6.55	6.40	6.69	6.94	7.64	8.21	9.78	12.3	15.1	**9.05**
	(16.8)	(18.0)	(17.1)	(19.4)	(19.8)	(21.3)	(21.5)	(24.7)	(29.3)	(25.2)	**(21.8)**
$\text{CFEG}_{t,t+5}$	13.6	15.3	14.7	15.5	15.4	17.1	17.4	16.3	18.1	21.5	**7.88**
	(13.6)	(15.1)	(17.7)	(18.1)	(17.8)	(19.0)	(21.8)	(18.7)	(21.6)	(21.4)	**(9.73)**
					TIM^{GON} equity duration						
$\text{EBITDA}_{t,t+5}$	7.79	7.50	7.75	8.40	8.28	8.39	9.49	9.42	10.2	12.2	**4.38**
	(16.3)	(19.2)	(20.4)	(23.3)	(22.0)	(23.8)	(21.9)	(27.0)	(25.3)	(25.6)	**(10.3)**
$\text{CFEG}_{t,t+5}$	10.5	14.5	16.4	17.8	19.1	19.7	18.1	18.5	17.8	13.9	**3.38**
	(12.2)	(19.4)	(23.2)	(19.3)	(22.6)	(22.7)	(21.9)	(22.9)	(18.6)	(13.8)	**(3.95)**

In contrast, DUR^{DSS} and DUR^{GON} generate less clear payout profiles. In line with these findings, we also find that dividend and repurchase ratios are larger for portfolios with an early cash-flow timing, while stock issuance scaled by book equity, and thus cash distributions from shareholders to the firm, increase with cash-flow timing (Tables A3-A5 in the Appendix). These patterns are less clear for discount-rate contaminated equity duration measures (Tables A1-A2 in the Appendix).

Second, we inspect the growth rates of duration-sorted portfolios in the five years after portfolio formation in Table 1. Intuitively, while portfolios with late cash-flow timing should have relatively low payouts in the near future, they should also have relatively high growth rates of these future cash-flows compared to portfolios with relatively early cash-flow timing. Consistent with this intuition, we find that cash-flow growth – both in terms of earnings (as studied by Weber (2018)), and cash-flows to equity (the quantity that is forecast by the duration measures) – increases with equity duration measures.[8] Overall, we find that while discount-rate contaminated as well our new discount-rate free measures indicate a positive relation with cash-flow timing, the relation tends to be stronger for our discount-rate free measures.

4.2 Unconditional Returns

Next, we study the unconditional relation of the equity duration measures to mean returns. In Table 2, we present monthly mean returns, Fama and French (2015) five-factor alphas, and Sharpe ratios for each of the duration-sorted portfolios. In Panel A, we show the results for the two original duration measures DUR^{GON} and DUR^{DSS}, which use market price information. DUR^{GON} and DUR^{DSS} 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 (2021b).

The modified versions of the duration measures that do not use discount-rate contaminated information do not indicate a negative relation with mean returns (Panel B): The generated return spreads and Sharpe ratios for measures excluding market-implied discount rate information are small and statistically insignificant.[9] The insignificant spread for TIM^{DSS} and $TIM^{DSS-SLG}$ indicates that

[8]Growth rates and spreads are similar if we calculate the growth rates over the 10 years after portfolio formation, see Table A6 in the Appendix. Moreover, we also obtain similar growth rates if we investigate the growth of dividends and repurchases in Table A7 in the Appendix.

[9]We obtain similar results if we calculate the breakpoints used to assign stocks into portfolios over the full sample

Table 2: Unconditional returns of duration/timing-sorted portfolios.

This table shows monthly average returns in excess of the risk-free rate and mean pricing errors (α^{FF5}) relative to the Fama and French (2015) five-factor model for portfolios sorted on equity duration measures. Mean excess returns are calculated from January 1964 until December 2020 (depending on data availability), are value weighted and reported in percent per month. Numbers in brackets are Newey and West (1987) t-statistics with 6 lags. Moreover, we report 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: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
r^e	0.85	0.78	0.81	0.78	0.58	0.61	0.65	0.65	0.66	0.41	**-0.45**
	(4.04)	(4.02)	(4.24)	(4.37)	(3.39)	(3.32)	(3.88)	(3.59)	(3.18)	(1.47)	**(-2.18)**
α^{FF5}	0.03	0.01	0.04	0.07	-0.08	-0.12	-0.01	0.04	0.12	-0.07	**-0.10**
	(0.38)	(0.10)	(0.53)	(0.81)	(-1.06)	(-1.74)	(-0.10)	(0.72)	(1.87)	(-0.55)	**(-0.67)**
SR_{ann}	0.53	0.53	0.58	0.57	0.44	0.46	0.49	0.48	0.44	0.21	**-0.32**
					DUR^{GON} equity duration						
r^e	1.06	0.91	0.99	0.86	0.97	0.76	0.74	0.81	0.69	0.36	**-0.70**
	(4.71)	(4.46)	(4.93)	(3.99)	(4.46)	(4.17)	(3.87)	(4.45)	(3.19)	(1.42)	**(-3.41)**
α^{FF5}	0.09	0.05	0.15	-0.03	0.15	-0.00	-0.04	0.10	-0.07	-0.28	**-0.37**
	(0.79)	(0.51)	(1.63)	(-0.41)	(1.61)	(-0.04)	(-0.60)	(1.36)	(-1.06)	(-3.58)	**(-2.61)**
SR_{ann}	0.65	0.64	0.68	0.59	0.66	0.55	0.55	0.61	0.47	0.22	**-0.55**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
r^e	0.62	0.64	0.59	0.58	0.59	0.64	0.61	0.55	0.65	0.76	**0.14**
	(3.17)	(3.58)	(3.33)	(3.14)	(3.34)	(3.37)	(3.45)	(2.83)	(2.96)	(2.69)	**(0.73)**
α^{FF5}	0.05	0.13	0.01	-0.02	-0.05	0.02	-0.07	-0.05	-0.07	0.05	**-0.01**
	(0.92)	(2.47)	(0.09)	(-0.25)	(-0.74)	(0.24)	(-0.92)	(-0.67)	(-0.79)	(0.40)	**(-0.06)**
SR_{ann}	0.44	0.49	0.44	0.43	0.43	0.44	0.44	0.39	0.40	0.39	**0.11**
					$TIM^{DSS-SLG}$ equity duration						
r^e	0.76	0.66	0.78	0.67	0.73	0.75	0.86	0.67	0.76	0.64	**-0.12**
	(3.56)	(3.34)	(3.92)	(3.16)	(3.74)	(3.21)	(3.83)	(2.77)	(3.16)	(1.98)	**(-0.54)**
α^{FF5}	0.14	0.06	0.09	-0.09	0.07	-0.02	0.20	-0.03	0.04	-0.05	**-0.19**
	(2.08)	(0.90)	(1.07)	(-1.16)	(0.73)	(-0.22)	(2.28)	(-0.27)	(0.40)	(-0.38)	**(-1.25)**
SR_{ann}	0.54	0.48	0.56	0.46	0.48	0.48	0.55	0.40	0.45	0.31	**-0.09**
					TIM^{GON} equity duration						
r^e	0.73	0.67	0.67	0.71	0.89	0.72	0.64	0.72	0.89	0.55	**-0.18**
	(3.79)	(3.75)	(3.09)	(3.71)	(4.33)	(3.47)	(3.10)	(3.08)	(3.62)	(1.85)	**(-1.03)**
α^{FF5}	-0.13	-0.06	0.01	0.05	0.24	0.06	-0.05	-0.02	0.09	-0.34	**-0.20**
	(-1.52)	(-0.78)	(0.15)	(0.76)	(2.63)	(0.76)	(-0.64)	(-0.16)	(0.92)	(-3.30)	**(-1.48)**
SR_{ann}	0.57	0.52	0.48	0.53	0.59	0.48	0.43	0.46	0.53	0.28	**-0.14**

the negative relation of the Dechow et al. (2004) duration measure with stock returns mostly derives from the use of market prices, which are a function of discount rates. Thus, the negative relation to stock returns in the cross-section is due to discount rate sensitivity rather than cash-flow timing. Moreover, the insignificant spread for TIM^{GON} indicates that the spread generated by DUR^{GON} is due to matching discount rates to market prices and due to using market prices as state variables in the VAR which can induce an overestimation of cash-flows of expensive growth stocks in pooled estimations. These pooled estimations mistake cross-sectional persistence in cash-flow *levels* with time-series persistence in cash-flow *dynamics*.

To gauge the effect of matching discount rates to market prices and that of using market prices in the VAR, we compare results obtained from sorting on $DUR^{GON-UDR}$ (where we only replace the market implied discount rate) and $TIM^{GON-UDR*}$ (where we moreover demean all state variables in the VAR at the firm level to take out the effects of cross-sectional persistence). While the resulting cash flow growth is comparable for both measures (see Table A17 in the Appendix), the return spread of Gonçalves (2021b)-sorted portfolios of -0.70% per month is markedly reduced to -0.43% once we use a uniform discount rate across all stocks (Table A18 in the Appendix). Similar to what we found for TIM^{GON}, this spread becomes insignificant once we include firm fixed in the VAR by demeaning state variables for each firm (measure $TIM^{GON-UDR*}$). This suggests that the spread in mean returns generated by DUR^{GON} is to similar degrees due to discount rate matching and an overestimation of the cash-flow growth of expensive low book-to-market stocks.

Turning to longer holding periods, we also find statistically insignificant spreads for holding periods of up to five years (see Table IA4 in the Internet Appendix). Moreover, 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 2.2.5, see Table IA7 in the Internet Appendix.

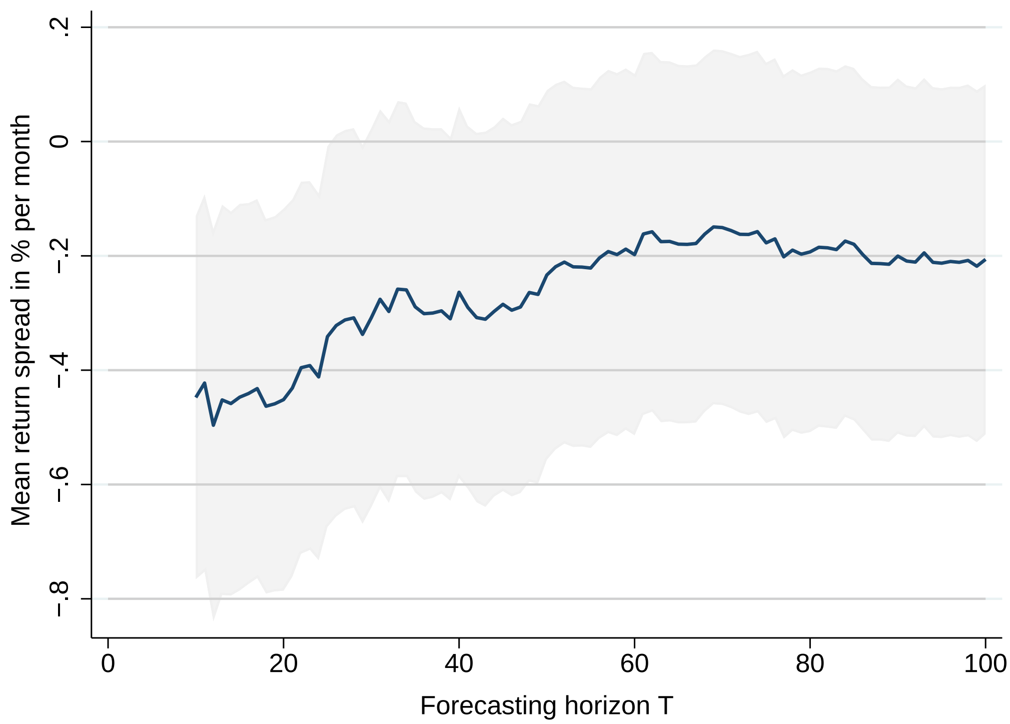
Summing up, we find that the negative relation of equity duration measures based on the construction of Dechow et al. (2004) or Gonçalves (2021b) is mainly due to the discount-rate sensitivity which in turn is driven by discount rate levels. We illustrate the impact of using discount rate information in Figure 3 where we show the return spread in DUR^{DSS}-sorted portfolios with different

period, as in Gormsen (2021), see Table IA5.

forecasting horizons T. As we increase the forecasting horizon, the influence of the market price P vanishes such that for horizons $T > 30$, there is no significant spread left. Alternative measures of pure cash-flow timing based on the construction of Dechow et al. (2004) or Gonçalves (2021b) do not indicate a significant relation to subsequent mean returns. This is in line with an unconditionally flat term structure of equity.

Figure 3: Mean return spread of DUR^{DSS} for different forecasting horizons T.

This figure depicts the mean return spread (in % per month) of the equity duration measure DUR^{DSS} following Dechow et al. (2004) and Weber (2018) for different lengths of the forecasting horizon T in Equation (11). 90 % confidence intervals correspond to Newey and West (1987) corrected standard errors and are depicted in gray.



4.3 Conditional Returns

We now turn to conditional returns. In expansion (recession) episodes, the predictions of a long-run risk model with regime switching dynamics (Bansal et al., 2021) imply an upward (downward) sloping equity term structure. We start by considering returns conditional on low economic growth (r^{low}) in Table 3, 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.[10] Both, the discount-rate contaminated measures (Panel A) as well as the measures that do not use discount-rate information (Panel B) generate negative spreads of similar magnitude in duration-sorted portfolio returns when conditioning on such episodes of low growth. This is consistent with the empirical finding in Gonçalves (2021b) that the long-short return differential is more negative when the cross-sectional dispersion is larger (which tends to be the case in recessions, see Figure IA-3 in the Internet Appendix of Gonçalves, 2021b).[11] Gormsen (2021) also conducts an analysis of the cyclicality of long-short duration returns using a double sort on DUR^{DSS} and the book-to-market ratio. Somewhat in contrast to Gonçalves (2021b), he finds that the long-short portfolio has higher returns when the dividend-price ratio of the market is high (which tends to be in recessions). We reconcile these results with ours in Section 5.4 below.

As shown in the rightmost column of Table 3, the negative relation between duration and mean returns in recessions is significantly different from all other months for these measures. In Appendix A1 we show analogous results for NBER recessions in Table A12. All in all, our empirical results suggest a downward-sloping equity term structure in recessions.

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. The results are shown in Table 3. While the original, discount-rate contaminated duration measures indicate negative spreads, the duration measures that do not use discount-rate information generate mostly positive (mostly insignificant) spreads. In Table A13 in the Appendix, we show analogous results for quarters with high GDP growth. During such marked expansion episodes, we find overall positive spreads for our measures of cash-flow timing. Thus, our empirical results on conditional returns are in line with the empirical observation of a positive slope of the term structure during expansions (when focusing on hold-to-maturity returns Van Binsbergen et al., 2013; Giglio et al., 2021; Bansal et al., 2021; Ulrich et al., 2022). Our results are somewhat in contrast with Gormsen's. Using different dividend derivatives he finds a positive relation between the market's price-dividend ratio and the term premium. We reconcile our results

[10] 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 IA3 in the Internet Appendix.

[11] Given DUR^{GON}'s strong, positive relation to the market-to-book-ratio, this is also in line with the predictive power of the book-to-market ratio in the time series (see, e.g., Baba Yara et al., 2020).

Table 3: Returns of duration/timing-sorted portfolios conditional on the CFNAI.

This table shows monthly excess returns for duration-sorted portfolios conditional on the Chicago Fed National Activity Index (CFNAI) from January 1974 to December 2020. r^{high} (r^{low}) are monthly excess returns if the CFNAI is higher (lower) compared to the 75th (25th) quantile. Returns are value weighted and in percent per month. 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*: **Equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
r^{low}	0.32	0.67	0.72	0.57	0.34	0.57	0.86	0.71	0.75	-0.15	**-0.48**	**0.07**
	(0.56)	(1.27)	(1.41)	(1.16)	(0.76)	(1.23)	(1.93)	(1.54)	(1.46)	(-0.21)	**(-1.01)**	**(0.16)**
r^{high}	1.29	0.80	0.72	0.74	0.51	0.59	0.23	0.46	0.32	0.19	**-1.10**	**-0.73**
	(2.65)	(1.70)	(1.57)	(1.69)	(1.19)	(1.31)	(0.52)	(1.03)	(0.65)	(0.33)	**(-2.66)**	**(-1.46)**
						DUR^{GON} equity duration						
r^{low}	0.80	0.65	0.68	0.60	0.69	0.58	0.73	0.74	0.63	-0.08	**-0.87**	**-0.24**
	(1.37)	(1.32)	(1.34)	(1.11)	(1.33)	(1.28)	(1.60)	(1.68)	(1.26)	(-0.13)	**(-2.01)**	**(-0.57)**
r^{high}	1.06	0.76	0.97	0.84	1.23	0.70	0.48	0.46	0.20	0.00	**-1.06**	**-0.46**
	(2.04)	(1.63)	(2.08)	(1.87)	(2.72)	(1.45)	(1.13)	(1.01)	(0.43)	(0.00)	**(-2.59)**	**(-1.04)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**												
						TIM^{DSS} equity duration						
r^{low}	0.75	0.51	0.50	0.20	0.36	0.27	0.39	0.14	0.17	0.37	**-0.38**	**-0.70**
	(1.50)	(1.09)	(1.02)	(0.39)	(0.74)	(0.50)	(0.80)	(0.28)	(0.29)	(0.56)	**(-0.97)**	**(-1.66)**
r^{high}	0.39	0.49	0.56	0.41	0.87	0.49	0.47	0.42	0.61	1.03	**0.65**	**0.65**
	(0.82)	(1.16)	(1.21)	(0.98)	(1.96)	(1.07)	(1.12)	(0.99)	(1.12)	(1.58)	**(1.72)**	**(1.45)**
						$TIM^{DSS-SLG}$ equity duration						
r^{low}	0.73	0.66	0.71	0.41	0.41	0.32	0.34	0.08	0.30	-0.18	**-0.91**	**-1.08**
	(1.48)	(1.34)	(1.43)	(0.79)	(0.76)	(0.57)	(0.63)	(0.13)	(0.50)	(-0.26)	**(-2.26)**	**(-2.49)**
r^{high}	0.37	0.38	0.31	0.52	0.49	0.63	0.67	0.68	0.62	0.99	**0.62**	**0.95**
	(0.81)	(0.90)	(0.72)	(1.12)	(1.04)	(1.32)	(1.31)	(1.21)	(1.19)	(1.51)	**(1.57)**	**(2.06)**
						TIM^{GON} equity duration						
r^{low}	0.69	0.46	0.34	0.44	0.66	0.41	0.58	0.44	0.55	-0.26	**-0.95**	**-1.04**
	(1.57)	(1.08)	(0.70)	(0.98)	(1.31)	(0.76)	(1.08)	(0.80)	(0.92)	(-0.35)	**(-2.04)**	**(-2.45)**
r^{high}	0.57	0.52	0.63	0.61	0.60	0.55	0.34	0.37	0.72	0.48	**-0.09**	**0.11**
	(1.34)	(1.21)	(1.42)	(1.44)	(1.29)	(1.19)	(0.70)	(0.77)	(1.42)	(0.79)	**(-0.27)**	**(0.25)**

with those in Gormsen (2021) in Section 5.4 below. Summing up, our empirical evidence is consistent with the theoretical prediction of a negative (positive) slope of the equity premium term structure during recession (expansion) states.

5 Discussion

Having established a set of results on timing and duration-sorted portfolios, we next discuss some implications of our results. In particular, we discuss why we do not find an unconditional timing premium and whether discount-rate sensitivity can explain our results. We briefly discuss a model of the cross section of stocks that yields pro-cyclical return differentials. Finally, we reconcile our evidence on the cyclicality of cross-sectional return differentials with the evidence from dividend derivatives. We start by discussing how the different duration and timing measures relate to one another.

5.1 Relation of different duration and timing measures

The pure timing measures TIM^{DSS}, $TIM^{DSS-SLG}$, and TIM^{GON} lead to a radically different sorting of stocks as compared to the original measures DUR^{GON} and DUR^{DSS}. As shown in Table 4, the pairwise rank correlation coefficients - which indicate to what extent the sorting according to different measures coincide - are high *within* 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. This is illustrated by the correlation of the duration measures with the book-to-market ratio. For instance, whereas DUR^{GON} has a rank correlation with the market-to-book ratio of 60%, it is roughly zero for TIM^{GON}, which does not use market price information. Discount-rate free measures based on DUR^{DSS} even have a positive rank correlation with the book-to-market ratio.

This is perhaps surprising given that the market-to-book ratio is often understood as a proxy for cash-flow timing (e.g., in 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 value stocks

Table 4: Correlations between duration/timing measures.

Panel A shows the time-series average of rank correlations between the respective equity duration measures and the book-to-market ratio (BM). 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 January 1964 - December 2020 for DUR^{DSS}, TIM^{DSS}, BM, and to January 1974 - December 2020 for $TIM^{DSS-SLG}$, DUR^{GON}, and TIM^{GON}.

	DUR^{DSS}	DUR^{GON}	TIM^{DSS}	$TIM^{DSS-SLG}$	TIM^{GON}
Panel A: **Rank correlations**					
DUR^{GON}	0.51				
TIM^{DSS}	0.30	-0.15			
TIM$^{DSS-SLG}$	0.45	0.00	0.77		
TIM^{GON}	0.19	0.44	0.14	0.22	
BM	-0.47	-0.60	0.53	0.25	-0.02
Panel B: **Return Correlations**					
DUR^{GON}	0.52				
TIM^{DSS}	0.10	-0.29			
TIM$^{DSS-SLG}$	0.33	-0.04	0.67		
TIM^{GON}	0.42	0.25	0.36	0.46	
BM	-0.45	-0.64	0.54	0.24	0.04

have similar cash-flow growth as growth stocks in buy-and-hold portfolios and markedly stronger cash-flow growth in the standard case of rebalanced portfolios. At a macro level, Hansen and Heaton (2008) show that dividends from a value portfolio have historically grown more relative to aggregate consumption than those from a growth portfolio. Most importantly, note that duration is about the dynamics of cash flows over time rather than absolute levels. So while growth stocks do have higher profitability on average – and may have higher *levels* of cash flows in the future that contribute to high market values – this is not necessarily important for duration or timing as it refers to the relative importance of distant future cash flows relative to near-future cash flows. Indeed, Fama and French (1995) show that the profitability of growth stocks falls after the formation period while asset growth tends to rise. Both of these facts should indicate that cash flows to shareholders are lower in the future relative to the present. Our results are in line with these findings.[12] Finally, De la O et al. (2023) show that the relation between future profitability and the current market-to-book ratio is driven by the cross-sectional relation between market-to-book ratios and profitability in levels. Their analysis is conceptually similar to ours using stock-level demeaned variables in the VAR which takes out that

[12] In Figure IA2 in the Internet Appendix, we show that in our sample, too, growth (value) stocks tend to have falling (rising) profitability after the formation date. This indicates, if anything, a positive relation between value and timing and a negative relation between profitability and timing in the cross-section.

cross-sectional relation.

5.2 Why is there no timing premium?

Further examining the cross section of cash flow-timing and stock characteristics can shed light on why there is no (unconditional) timing premium. As a starting point, consider that cash flows to equity are given by $C = B\left(\frac{E}{B} - \frac{\Delta B}{B}\right)$. Stocks with currently low cash flows relative to the future have currently low profitability (low values of $\frac{E}{B}$) and high investment (high values of book equity growth ΔB). As can be seen in Tables A3-A5 in the Appendix, the discount rate-free measures generate strong negative spreads in profitability and generally positive spreads in investment.[13]

That said, both the spread in investment and that in profitability should (all else equal) lead to lower returns for late cash-flow timing stocks. But not all else is equal: highly profitable firms tend to be growth stocks with high market-to-book equity values (see Table 8 in Fama and French, 2015). Moreover, late timing stocks have higher market betas, lower market capitalization and higher SMB betas. Therefore, while yielding significant Fama and French (1993) three-factor (FF3) model alphas (Table A9), the Fama and French (2015) five factor (FF5) alphas are insignificant (Table A10) because the RMW and CMA exposures are captured by the model.

This is different for the discount-rate contaminated, established duration measures. These do not generate as clean a sort on profitability (or timing for that matter, see Section 4.1) because they assign any stock with low discount rates to long duration portfolios, including growth stocks which tend to have high profitability and investment. Moreover, any positive (negative) pricing error of the FF5 model will tend to put the stock into a higher (lower) duration portfolio. Hence, sorts on these measures generate FF5 alphas.

The strong exposure to profitability of portfolios sorted on discount rate free duration measures also sheds some light on our findings regarding the cyclicality of returns. As mean returns on low profitability and high investment stocks tend to be strongly cyclical, stocks with a late timing – and relatively low current profitability and high investment – tend to have low expected returns during

[13]To understand why the patterns in profitability are more pronounced than those in investment, note that highly profitable firms tend to invest much. Hence, perhaps because profitability is more persistent than investment, it has a stronger impact on cash-flow timing measures and the spreads in asset growth tend to be weaker than those in profitability. Correspondingly, portfolios with later cash-flow timing have lower RMW betas across all cash-flow timing measures, whereas the evidence is less clear for CMA, see Table A10 in the Appendix.

recessions. To test whether our unconditional and conditional findings can be explained within the Fama and French (2015) five-factor model, we also calculate expected returns implied by the Fama and French (2015) model for each high-minus-low duration portfolio in Table A11. While the expected returns are unconditionally close to zero, they are negative during recession episodes and markedly positive during all other months. Thus, the cyclical spread between late and early timing stock returns can be explained by exposure to FF5 factors. While the FF5 model may be understood as a mostly descriptive model, several economic mechanisms could explain why stocks with short cash-flow timing have higher returns only in recessions. In Section IA6 in the Internet Appendix, we present a reduced-form model of the cross-section of stocks in the style of Gormsen (2021). In our model, firms with higher exposure to persistent dividend growth have later cash-flow timing. On the one hand, such stocks earn higher risk premia for this cash-flow exposure. On the other hand, because innovations to persistent and local dividend growth are negatively correlated (as in Gormsen, 2021), late timing stocks are a hedge against local dividend risk. Because this risk is higher in recessions, the "cross-sectional term structure" is downward-sloping in recessions but upward-sloping in low-volatility expansion times.[14] When volatility is at its long-run mean, the two effects roughly cancel out, leading to flat unconditional return differentials.

5.3 Discount-rate sensitivity

The literature on the pricing of cash-flows with different timing suggests that discount rate sensitivity shapes the slope of equity term premia. For example, Gonçalves (2021b) suggests a version of the ICAPM with expected return variation commanding a positive market price of risk whereas Gormsen (2021) specifies a stochastic discount factor with constant cash-flow risk and a negative market price of risk for expected return variation. Gonçalves's model yields a negative relation between cash-flow timing and expected returns because late-timing stocks appreciate more strongly when the discount rate drops. In his model, this is a bad state of the world and, as a hedge, late timing stocks are expensive. By contrast, low discount rates indicate a good state of the world in Gormsen's (2021) model which, all else equal would indicate a positive relation of cash-flow timing and expected returns.

[14] A positive exposure of late timing stocks to volatility and (persistent) cash-flow growth is largely consistent with the stylized facts that late timing stocks have low profitability and high investment stocks which, according to Cooper and Maio (2019), proxies for positive exposure to volatility and growth state variables.

However, on average this is counteracted by a downward sloping term structure of dividend risk.

To see if these theories are consistent with our findings of a zero unconditional timing premium, we compute the discount-rate betas and cash-flow betas of all duration-sorted portfolios following Campbell and Vuolteenaho (2004). Table 5 shows that discount rate betas increase in absolute value in all duration and timing measures. In two out of three cases, the generated spreads are larger for our new, discount-rate free measures shown in Panel B. The picture looks markedly different when considering the cash-flow betas. These decrease in the discount-rate contaminated measures DUR^{GON} and DUR^{DSS} but increase in our discount-rate free measures. The most likely explanation is that the discount-rate contaminated measures induce a sort on prices and stocks with low cash-flow beta tend to have low prices (according to the reasoning in Campbell and Vuolteenaho (2004). Therefore, stocks with low cash-flow beta tend to end up in the high duration portfolios (see also Table 4 in Gonçalves (2021b)). Conversely, cash-flow news, estimated as the residual from unexpected returns that are not due to discount-rate news, are not restricted to news about near-term cash flows. In fact, stocks with later cash-flow timing *should* react more strongly to persistent cash-flow news.

As an alternative to the Campbell and Vuolteenaho (2004) discount-rate betas whose estimation is sensitive with respect to the specification of the VAR (see Chen and Zhao, 2009), we also compute betas with respect to an observable component of discount rates, the risk free rate: $r_{i,t} = a + b_1 \cdot \Delta R_{f,1m,t} + b_2 \cdot \Delta R_{f,10y,t}$, where r is the return on the portfolio and $\Delta R_{f,1m,t}$ and $\Delta R_{f,10y,t}$ denote changes in treasury yields of one month and 10 years, respectively. The results are presented in Table A16 in the Appendix. As one would expect, b_1 coefficients are negative and larger in absolute terms for low duration and early timing portfolios (perhaps because stocks with more near-term cash-flows react more strongly to short-maturity discount rate changes). Conversely, b_2 coefficients are generally positive (indicating a cash-flow news component of long-term yields suggested by general equilibrium asset pricing, see, e.g., Bansal and Yaron, 2004) and larger in absolute terms for late-timing and higher-duration stocks (perhaps because stocks with more distant future cash-flows react more strongly to long-maturity discount rate changes).[15] Again, the pattern is more pronounced for discount-rate free timing measures. Overall, the results using treasury yields are in line with those using Campbell and Vuolteenaho (2004) betas.

[15]DUR-GON (and to a lesser degree the Gonçalves (2021b)-type measures) is an outlier in this respect with low DUR-GON stocks reacting more strongly (and positively) to long-term yield changes.

Table 5: Discount rate and cash-flow betas of duration/timing-sorted portfolios.

This table shows discount rate and cash-flow betas of duration-sorted portfolios as in Campbell and Vuolteenaho (2004). The sample ranges from 1964 to 2018 due to data availability and the discount rate and cash-flow news proxies are replicated following Campbell and Vuolteenaho (2004). The coefficients are estimated jointly.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**	Δ
Panel A: **Equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
β_{DR}	-0.95	-0.92	-0.89	-0.91	-0.85	-0.88	-0.91	-0.95	-1.10	-1.37	**-0.41**	
											(-4.78)	
β_{CF}	1.15	1.10	1.09	0.95	0.90	0.97	0.94	0.95	1.00	1.08	**-0.07**	
											(-0.84)	
						DUR^{GON} equity duration						
β_{DR}	-0.93	-0.87	-0.92	-0.96	-0.97	-0.92	-0.90	-0.93	-1.03	-1.18	**-0.25**	
											(-3.65)	
β_{CF}	1.11	1.06	0.99	1.00	1.05	0.86	0.97	0.95	0.94	1.04	**-0.07**	
											(-1.09)	
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**												
						TIM^{DSS} equity duration						
β_{DR}	-1.01	-0.93	-0.98	-0.98	-0.96	-1.01	-0.93	-0.90	-1.11	-1.25	**-0.23**	**0.18**
											(-3.15)	**(3.06)**
β_{CF}	0.85	0.87	1.04	1.01	1.04	1.08	0.98	1.08	1.17	1.21	**0.36**	**0.44**
											(4.97)	**(3.59)**
						$TIM^{DSS-SLG}$ equity duration						
β_{DR}	-1.00	-0.97	-0.95	-1.00	-1.00	-1.05	-1.05	-1.10	-1.13	-1.36	**-0.36**	**0.05**
											(-5.67)	**(0.76)**
β_{CF}	0.86	0.92	1.05	1.06	1.02	1.05	1.12	1.05	1.03	1.01	**0.15**	**0.22**
											(2.35)	**(1.91)**
						TIM^{GON} equity duration						
β_{DR}	-0.79	-0.86	-0.94	-0.91	-1.06	-1.06	-1.05	-1.08	-1.19	-1.34	**-0.55**	**-0.30**
											(-6.90)	**(-4.60)**
β_{CF}	0.92	0.92	0.92	0.96	0.97	0.93	0.97	0.99	1.09	1.26	**0.34**	**0.42**
											(4.27)	**(3.37)**

In conjunction with our finding that, unconditionally, there is no relation between mean returns and cash-flow timing, the results from Table 5 suggest that a positive market price of discount rate risk alone cannot explain our result. However, in conjunction with a positive market price of cash-flow risk (or market risk, to stay within the Gonçalves (2021b) framework), the two effects could offset each other yielding on average no timing premium. The negative market price of discount-rate risk suggested in Gormsen (2021) is hard to reconcile with the negative spread in discount-rate betas and a positive spread in cash-flow betas since both would suggest an unconditionally positive relation between cash-flow timing and mean returns.

To further examine these theories for the cash-flow timing premium, we turn to their predictions for the conditional term structure. Gormsen (2021) suggests that the market-price of discount-rate risk is negative and countercyclical while the market price of cash-flow risk is positive and constant. Given our results in Table 5, such a specification would suggest that expected returns on late-timing stocks are higher in a recession—which is inconsistent with our empirical evidence in Section 4.3.[16]

5.4 Relation of our findings to existing evidence on dividend derivatives

Overall, our result that one-period return differentials between late and early timing equity cash flows are pro-cyclical seems at odds with the evidence on one-period dividend claim returns presented in Gormsen (2021). There are several potential reasons for this. For example, there may be a disconnect between the market as a whole measured with S&P500 returns and the cross-section of stocks; or it could be that dividends may be priced differently from overall firm net payouts which also include equity issuance and share repurchases. We find that our findings are very similar when excluding share repurchases and issuances in the computation of our measures (see Table IA9) or when only including S&P500 stocks (see Table IA10). However, we find results that are in line with Gormsen's when regressing long-short return differentials on the market dividend-price ratio, see Table A14 in the Appendix.[17] These results suggest that using a real economic indicator leads to different results than using a valuation ratio as an indicator for the business cycle. Indeed, using the monthly dividend strip strategy returns provided by Van Binsbergen et al. (2012), we find that returns on the short-run dividend claim has higher returns than the S&P500 only in recession episodes whereas a regression on the dividend-price ratio yields a positive coefficient (see Table A15). Both, the market dividend price ratio and real economic indicators are valid measures of the cycle, so why do the two have different implications for the cyclicality of the term structure? One natural reason is as follows: Since

[16]While Gonçalves (2021b) shows that his measure exhibits more strongly negative return differentials in recession (technically, Gonçalves (2021b) shows that cross-sectional dispersion is countercyclical and that timing premia are particularly negative when cross-sectional dispersion is high), the model does not feature explicit time variation in expected returns. However, Gonçalves (2021a) features an ICAPM-type model with explicit dynamics. Here, time-varying risk aversion makes the effect of market risk stronger in "bad times" (which late timing stocks have higher exposure to), leading to an upward sloping term premium while the market price of discount rate risk ("reinvestment risk") is specified to be constant. Hence, the market risk effect dominates, leading to countercyclical term premia in that model.

[17]This does not hold for the discount-rate contaminated duration measures of Dechow et al. (2004) and Gonçalves (2021b). Note that Gormsen (2021) finds a positive relation between the dividend-price ratio and Dechow et al. (2004) duration sorted portfolio returns in Table 7 of Gormsen (2021). However, this result is obtained in a double sort on duration and the book-to-market ratio. This roughly amounts to taking out the discount-rate effect and is therefore akin to using our timing measures, with the difference that Gormsen (2021) considers returns in excess of maturity-matched treasury bonds. See our analogous results for a double sort on DUR^{DSS} and the book-to-market ratio akin to Gormsen's Table 7 in Table IA8 in the Internet Appendix.

the discount rate reflected in the market dividend price ratio is more closely related to the discount rate of distant future dividend claims than it is to to near-future dividend claims, it has a higher coefficient in a regression of long-term dividend claims on the dividend-price ratio than in a regression of short-term dividend claims (see, e.g., also Table 3 in Gormsen, 2021).

6 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 is no unconditionally monotonic relation between duration measures and subsequent returns.

We introduce versions of the Dechow et al. (2004); Weber (2018) and Gonçalves (2021b) 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. Our findings indicate that 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 can explain these findings within the framework of the (Fama and French, 2015) model: We find that while having low profitability and high investment (suggesting low mean returns), stocks with late cash flows have higher market betas as well as higher SMB and somewhat higher HML betas (all else equal suggesting high returns). On aggregate, these effects cancel out, leading to close to zero unconditional spreads between stocks with late and early average payout dates. As the profitability premium is countercyclical and the investment premium is cyclical, the model predicts also a negative (positive) relation between cash-flow timing and expected returns during recessions (expansions).

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 negative relation of established measures of equity duration with mean returns is 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 premium term structure.

Moreover, duration measures that do not use market-implied discount rate information are, if anything, slightly positively related to the book-to-market equity ratio. This result is in line with evidence by Chen (2017) and more seasoned evidence in Fama and French (1995) regarding the cash flow dynamics of value and growth stocks. This suggests that cash-flow timing does not (fully) explain the value anomaly.

References

Baba Yara, F., M. Boons, and A. Tamoni (2020): "Value Return Predictability across Asset Classes and Commonalities in Risk Premia*," *Review of Finance*, 25, 449–484.

Bansal, R., S. Miller, D. Song, and A. Yaron (2021): "The term structure of equity risk premia," *Journal of Financial Economics*, 142, 1209–1228.

Bansal, R. and A. Yaron (2004): "Risks for the Long-Run: A Potential Resolution of Asset Pricing Puzzles," *Journal of Finance*, 59, 1481–1509.

Boudoukh, J., R. Michaely, M. Richardson, and M. R. Roberts (2007): "On the importance of measuring payout yield: Implications for empirical asset pricing," *The Journal of Finance*, 62, 877–915.

Campbell, J. Y., C. Polk, and T. Vuolteenaho (2010): "Growth or glamour? Fundamentals and systematic risk in stock returns," *The Review of Financial Studies*, 23, 305–344.

Campbell, J. Y. and T. Vuolteenaho (2004): "Bad beta, good beta," *American Economic Review*, 94, 1249–1275.

Chen, H. (2017): "Do cash flows of growth stocks really grow faster?" *The Journal of Finance*, 72, 2279–2330.

Chen, H. J. (2011): "Firm life expectancy and the heterogeneity of the book-to-market effect," *Journal of Financial Economics*, 100, 402–423.

Chen, L., Z. Da, and X. Zhao (2013): "What drives stock price movements?" *Review of Financial Studies*, 26, 841–876.

Chen, L. and X. Zhao (2009): "Return decomposition," *The Review of Financial Studies*, 22, 5213–5249.

Chen, S. and T. Li (2018): "A unified duration-based explanation of the value, profitability, and investment anomalies," *Profitability, and Investment Anomalies (November 26, 2018)*.

Cochrane, J. H. (2008): "The Dog That Did Not Bark: A Defense of Return Predictability," *Review of Financial Studies*, 21, 1533–1575.

——— (2017): "Macro-finance," *Review of Finance*, 21, 945–985.

Cooper, I. and P. Maio (2019): "Asset growth, profitability, and investment opportunities," *Management Science*, 65, 3988–4010.

Da, Z. (2009): "Cash Flow, Consumption Risk, and the Cross-section of Stock Returns," *Journal of Finance*, 64, 923–956.

Davis, J. L., E. F. Fama, and K. R. French (2000): "Characteristics, Covariances, and Average Returns: 1929 to 1997," *Journal of Finance*, 55, 389–406.

De la O, R., X. Han, and S. Myers (2023): "The Return of Return Dominance: Decomposing the Cross-section of Prices," .

De La O, R. and S. Myers (2021): "Subjective cash flow and discount rate expectations," *The Journal of Finance*, 76, 1339–1387.

Dechow, P. M., R. G. Sloan, and M. T. Soliman (2004): "Implied Equity Duration: A New Measure of Equity Risk," *Review of Accounting Studies*, 18, 197–228.

Fama, E. F. and K. R. French (1992): "The Cross-Section of Expected Stock Returns," *Journal of Finance*, 47, 427–465.

——— (1993): "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33, 3–56.

——— (1995): "Size and Book-to-Market Factors in Earnings and Returns," *The Journal of Finance*, 50, 131–155.

——— (2015): "A five-factor asset pricing model," *Journal of Financial Economics*, 116, 1 – 22.

Fama, E. F. and J. D. MacBeth (1973): "Risk, return, and equilibrium: Empirical tests," *Journal of political economy*, 81, 607–636.

Giglio, S., B. T. Kelly, and S. Kozak (2021): "Equity term structures without dividend strips data," *Available at SSRN 3533486*.

Golubov, A. and T. Konstantinidi (2019): "Where Is the Risk in Value? Evidence from a Market-to-Book Decomposition," *The Journal of Finance*, 74, 3135–3186.

Gonçalves, A. S. (2021a): "Reinvestment risk and the equity term structure," *The Journal of Finance*, 76, 2153–2197.

——— (2021b): "The short duration premium," *Journal of Financial Economics*.

Gormsen, N. J. (2021): "Time Variation of the Equity Term Structure," *The Journal of Finance*, 76, 1959–1999.

Gormsen, N. J. and E. Lazarus (2019): "Duration-driven returns," *Available at SSRN 3359027*.

Hansen, L. and J. Heaton (2008): "Consumption Strikes Back? Measuring Long-Run Risk," *Journal of Political Economy*, 116, 260–302.

Jankauskas, T., L. Baele, and J. Driessen (2021): "The Implied Equity Term Structure," *Available at SSRN 3771261*.

Jylha, P. and M. Ungeheuer (2021): "Growth Expectations out of WACC," *Available at SSRN 3618612*.

Lettau, M. and J. A. Wachter (2007): "Why Is Long-Horizon Equity Less Risky? A Duration-Based Explanation of the Value Premium," *Journal of Finance*, 62, 55–92.

Macaulay, F. R. (1938): "Front matter to" Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856"," in *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*, NBER, 15–6.

Newey, W. and K. West (1987): "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55, 703–708.

Novy-Marx, R. (2013): "The other side of value: The gross profitability premium," *Journal of financial economics*, 108, 1–28.

Schröder, D. and F. Esterer (2016): "A new measure of equity and cash flow duration: the duration-based explanation of the value premium revisited," *Journal of Money, Credit and Banking*, 48, 857–900.

Shumway, T. (1997): "The delisting bias in CRSP data," *The Journal of Finance*, 52, 327–340.

Tengulov, A., J. Zechner, and J. Zwiebel (2019): "Valuation and Long-Term Growth Expectations," *Available at SSRN 3488902*.

Ulrich, M., S. Florig, and R. Seehuber (2022): "A Model-Free Term Structure of U.S. Dividend Premiums," *The Review of Financial Studies*, hhac035.

Van Binsbergen, J., M. Brandt, and R. Koijen (2012): "On the timing and pricing of dividends," *American Economic Review*, 102, 1596–1618.

Van Binsbergen, J., W. Hueskes, R. Koijen, and E. Vrugt (2013): "Equity yields," *Journal of Financial Economics*, 110, 503–519.

Van Binsbergen, J. H. and R. S. Koijen (2017): "The term structure of returns: Facts and theory," *Journal of Financial Economics*, 124, 1–21.

Vuolteenaho, T. (2002): "What drives firm-level stock returns?" *The Journal of Finance*, 57, 233–264.

Weber, M. (2018): "Cash flow duration and the term structure of equity returns," *Journal of Financial Economics*, 128, 486–503.

Zou, H. (2006): "The adaptive lasso and its oracle properties," *Journal of the American statistical association*, 101, 1418–1429.

Appendix

A1 Characteristics of equity duration measures

Table A1: Characteristics of Dechow et al. (2004) duration-sorted portfolios.

This table shows characteristics of portfolios sorted on the Dechow et al. (2004) equity duration measure. All characteristics are value weighted, while Newey and West (1987) t-statistics with 6 lags are printed in brackets. We winsorize each characteristic in each year at the 1% and 99% quantile. The definitions of all characteristics are documented in the Internet Appendix IA3. The observation period is from January 1964 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Duration	10.72	14.39	15.89	16.93	17.80	18.59	19.38	20.32	21.57	26.73	**16.01**
											(24.93)
	Panel *A*: **Payout characteristics**										
Dividend ratio	0.28	0.34	0.37	0.39	0.40	0.41	0.41	0.44	0.37	0.22	**-0.06**
											(-3.08)
Repurchase ratio	0.17	0.19	0.20	0.23	0.23	0.26	0.28	0.32	0.31	0.13	**-0.04**
											(-1.68)
Issuance ratio	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.04	0.09	**0.08**
											(11.36)
Total payout ratio	0.04	0.05	0.05	0.06	0.07	0.07	0.09	0.11	0.09	-0.02	**-0.06**
											(-5.51)
	Panel *B*: **General characteristics**										
Market beta	1.08	1.00	0.98	0.98	0.96	0.97	0.99	1.01	1.14	1.33	**0.25**
											(6.58)
Size	21.74	22.09	22.38	22.46	22.61	22.77	22.88	22.87	22.89	22.04	**0.30**
											(1.68)
Book-to-market	1.27	0.99	0.83	0.72	0.62	0.53	0.44	0.35	0.29	0.43	**-0.84**
											(-16.57)
Asset growth	0.15	0.14	0.12	0.11	0.12	0.12	0.13	0.13	0.18	0.28	**0.13**
											(5.38)
Profits-to-assets	0.27	0.29	0.31	0.33	0.35	0.36	0.41	0.45	0.47	0.37	**0.10**
											(5.58)
Operating profitability	0.33	0.30	0.30	0.31	0.33	0.34	0.36	0.40	0.39	0.17	**-0.15**
											(-5.24)
Return on equity	0.18	0.15	0.15	0.15	0.16	0.17	0.18	0.20	0.18	-0.09	**-0.27**
											(-9.53)
Book equity growth	0.28	0.18	0.14	0.12	0.12	0.12	0.12	0.11	0.14	0.28	**0.00**
											(-0.02)

Table A2: Characteristics of Gonçalves (2021b) duration-sorted portfolios.

This table shows characteristics of portfolios sorted on the Gonçalves (2021b) equity duration measure. All characteristics are value weighted, while Newey and West (1987) t-statistics with 6 lags are printed in brackets. We winsorize each characteristic in each year at the 1% and 99% quantile. The definitions of all characteristics are documented in the Internet Appendix IA3. The observation period is from January 1974 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Duration	13.06	19.99	25.09	29.64	33.81	37.94	42.66	48.18	56.02	76.05	**62.99**
											(32.84)
	Panel *A*: **Payout characteristics**										
Dividend ratio	0.30	0.30	0.30	0.34	0.35	0.39	0.40	0.39	0.34	0.31	**0.01**
											(0.51)
Repurchase ratio	0.36	0.30	0.31	0.34	0.31	0.29	0.31	0.34	0.36	0.30	**-0.06**
											(-2.68)
Issuance ratio	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.06	**0.05**
											(14.75)
Total payout ratio	0.06	0.07	0.07	0.09	0.08	0.10	0.11	0.11	0.13	0.08	**0.02**
											(2.36)
	Panel *B*: **General characteristics**										
Market beta	1.03	1.01	1.05	1.04	1.04	0.96	0.98	1.01	1.05	1.18	**0.14**
											(4.87)
Size	21.00	21.76	21.93	22.31	22.55	23.17	23.19	23.21	23.41	23.13	**2.13**
											(12.21)
Book-to-market	1.44	0.95	0.80	0.71	0.66	0.57	0.48	0.42	0.35	0.30	**-1.14**
											(-12.63)
Asset growth	0.05	0.08	0.10	0.10	0.11	0.12	0.12	0.13	0.17	0.27	**0.22**
											(12.86)
Profits-to-assets	0.50	0.48	0.46	0.43	0.41	0.41	0.43	0.41	0.41	0.32	**-0.18**
											(-6.03)
Operating profitability	0.25	0.29	0.31	0.33	0.33	0.36	0.37	0.38	0.40	0.35	**0.10**
											(8.84)
Return on equity	0.11	0.13	0.14	0.15	0.15	0.17	0.18	0.20	0.21	0.16	**0.06**
											(8.50)
Book equity growth	0.07	0.09	0.12	0.10	0.12	0.13	0.12	0.14	0.16	0.26	**0.19**
											(11.82)

Table A3: Characteristics of TIM^{DSS}-sorted portfolios.

This table shows characteristics of portfolios sorted on TIM^{DSS}, a version of the Dechow et al. (2004) equity duration measure where market prices are replaced by the model implied cash-flow forecasts discounted at a uniform discount rate and assuming a uniform long-run growth. All characteristics are value weighted, while Newey and West (1987) t-statistics with 6 lags are printed in brackets. We winsorize each characteristic in each year at the 1% and 99% quantile. The definitions of all characteristics are documented in the Internet Appendix IA3. The observation period is from January 1964 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Duration	13.87	16.03	17.02	17.77	18.42	19.08	19.82	20.86	22.76	41.32	**27.45**
											(16.89)
	Panel *A*: **Payout characteristics**										
Dividend ratio	0.33	0.35	0.32	0.35	0.36	0.41	0.49	0.69	0.62	0.23	**-0.10**
											(-4.22)
Repurchase ratio	0.30	0.25	0.26	0.24	0.22	0.23	0.28	0.40	0.34	0.08	**-0.22**
											(-7.55)
Issuance ratio	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	**0.01**
											(5.17)
Total payout ratio	0.18	0.09	0.07	0.05	0.04	0.04	0.03	0.02	0.01	0.00	**-0.18**
											(-11.19)
	Panel *B*: **General characteristics**										
Market beta	1.04	1.00	1.02	1.00	1.01	1.02	1.03	1.07	1.19	1.32	**0.28**
											(10.12)
Size	23.21	23.32	23.04	22.74	22.55	22.49	22.45	22.23	21.54	21.15	**-2.07**
											(-25.24)
Book-to-market	0.24	0.34	0.41	0.53	0.61	0.70	0.79	0.88	1.00	1.03	**0.79**
											(13.33)
Asset growth	0.19	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.15	0.21	**0.02**
											(1.05)
Profits-to-assets	0.57	0.47	0.42	0.37	0.34	0.31	0.29	0.26	0.25	0.24	**-0.33**
											(-32.90)
Operating profitability	0.61	0.41	0.34	0.30	0.28	0.26	0.23	0.21	0.18	0.13	**-0.48**
											(-33.72)
Return on equity	0.35	0.22	0.18	0.15	0.13	0.11	0.09	0.06	0.03	-0.08	**-0.43**
											(-31.14)
Book equity growth	0.24	0.14	0.14	0.12	0.12	0.11	0.10	0.09	0.12	0.20	**-0.04**
											(-1.52)

Table A4: Characteristics of $TIM^{DSS-SLG}$-sorted portfolios.

This table shows characteristics of portfolios sorted on $TIM^{DSS-SLG}$, a version of the Dechow et al. (2004) equity duration measure where market prices are replaced by the model implied cash-flow forecasts discounted at a uniform discount rate but allowing for a stock-specific growth rate similar to Tengulov et al. (2019). All characteristics are value weighted, while Newey and West (1987) t-statistics with 6 lags are printed in brackets. We winsorize each characteristic in each year at the 1% and 99% quantile. The definitions of all characteristics are documented in the Internet Appendix IA3. The observation period is from January 1974 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Duration	9.26	10.81	11.77	12.62	13.44	14.41	15.78	18.05	23.13	161.90	**152.64**
											(22.61)
	Panel *A*: **Payout characteristics**										
Dividend ratio	0.32	0.32	0.33	0.33	0.43	0.32	0.37	0.38	0.30	0.15	**-0.17**
											(-8.91)
Repurchase ratio	0.37	0.32	0.31	0.37	0.40	0.34	0.33	0.38	0.27	0.13	**-0.24**
											(-8.86)
Issuance ratio	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.07	**0.04**
											(10.17)
Total payout ratio	0.19	0.10	0.07	0.06	0.06	0.04	0.04	0.03	0.02	-0.02	**-0.22**
											(-16.09)
	Panel *B*: **General characteristics**										
Market beta	1.00	1.01	1.02	1.08	1.07	1.16	1.14	1.18	1.23	1.36	**0.36**
											(11.66)
Size	23.71	23.31	23.07	22.45	22.65	22.24	22.25	21.94	22.00	21.46	**-2.26**
											(-17.34)
Book-to-market	0.29	0.37	0.45	0.54	0.57	0.60	0.64	0.70	0.70	0.69	**0.40**
											(20.05)
Asset growth	0.16	0.14	0.15	0.13	0.15	0.15	0.18	0.17	0.22	0.35	**0.19**
											(5.71)
Profits-to-assets	0.53	0.49	0.45	0.42	0.42	0.40	0.37	0.36	0.34	0.27	**-0.26**
											(-24.35)
Operating profitability	0.55	0.37	0.34	0.31	0.29	0.28	0.27	0.25	0.24	0.12	**-0.43**
											(-24.54)
Return on equity	0.33	0.21	0.18	0.15	0.14	0.13	0.11	0.09	0.06	-0.06	**-0.39**
											(-23.01)
Book equity growth	0.19	0.14	0.18	0.13	0.14	0.15	0.18	0.17	0.21	0.34	**0.15**
											(3.65)

Table A5: Characteristics of TIM^{GON}-sorted portfolios.

This table shows characteristics of portfolios sorted on a version of the Gonçalves (2021b) equity duration measure, TIM^{GON}, that uses neither market-implied discount rates nor any market-price related state variables in the VAR. All characteristics are value weighted, while Newey and West (1987) t-statistics with 6 lags are printed in brackets. We winsorize each characteristic in each year at the 1% and 99% quantile. The definitions of all characteristics are documented in the Internet Appendix IA3. The observation period is from January 1974 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Duration	25.34	27.27	28.49	29.51	30.50	31.60	32.93	34.68	37.42	57.71	**32.37**
											(17.22)
	Panel *A*: **Payout characteristics**										
Dividend ratio	0.41	0.40	0.41	0.38	0.37	0.35	0.35	0.35	0.26	0.22	**-0.20**
											(-11.47)
Repurchase ratio	0.47	0.39	0.35	0.31	0.30	0.31	0.33	0.24	0.19	0.16	**-0.32**
											(-10.79)
Issuance ratio	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.09	**0.07**
											(10.80)
Total payout ratio	0.21	0.14	0.14	0.10	0.09	0.07	0.06	0.04	0.01	-0.04	**-0.25**
											(-14.00)
	Panel *B*: **General characteristics**										
Market beta	0.90	0.92	0.97	0.99	1.04	1.09	1.09	1.14	1.21	1.32	**0.43**
											(17.98)
Size	23.09	23.39	23.45	23.20	22.99	23.07	22.96	22.54	22.21	22.15	**-0.93**
											(-10.93)
Book-to-market	0.61	0.55	0.50	0.49	0.50	0.50	0.53	0.56	0.59	0.58	**-0.03**
											(-0.54)
Asset growth	0.03	0.07	0.10	0.11	0.12	0.15	0.15	0.19	0.23	0.51	**0.48**
											(14.58)
Profits-to-assets	0.40	0.41	0.43	0.42	0.42	0.41	0.41	0.38	0.36	0.26	**-0.14**
											(-3.97)
Operating profitability	0.43	0.38	0.39	0.36	0.35	0.33	0.33	0.31	0.30	0.25	**-0.19**
											(-4.83)
Return on equity	0.23	0.20	0.20	0.18	0.17	0.17	0.15	0.14	0.11	0.05	**-0.18**
											(-6.89)
Book equity growth	0.03	0.08	0.11	0.11	0.13	0.15	0.15	0.20	0.23	0.51	**0.48**
											(12.50)

Table A6: Realized cash-flows of duration/timing-sorted portfolios after 10 years from portfolio formation.

This table shows realized cash flows of portfolios sorted on equity duration measures. Panel A shows these realized growth rates for equity duration measures including discount rate information and Panel B for equity duration measures excluding discount rate information. Realized growth rates correspond to the average EBITDA growth and cash-flow to equity growth (CFEG) in the ten years $(t, t+10)$ after portfolio formation. All growth rates are annualized and in percent per year. Newey and West (1987) corrected t-statistics with 6 lags are in brackets and the time period is from January 1964 to December 2020 depending on data availability.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
$\text{EBITDA}_{t,t+10}$	6.02	6.46	6.94	7.20	7.77	8.04	8.81	9.86	11.6	11.5	**5.47**
	(20.4)	(27.7)	(33.1)	(30.5)	(34.1)	(37.6)	(43.4)	(43.8)	(39.3)	(35.6)	**(22.1)**
$\text{CFEG}_{t,t+10}$	9.42	10.3	9.83	9.42	10.5	9.72	10.7	11.7	12.3	11.2	**1.77**
	(22.4)	(23.4)	(22.4)	(21.0)	(26.3)	(24.7)	(27.4)	(24.1)	(24.9)	(21.2)	**(4.10)**
					DUR^{GON} equity duration						
$\text{EBITDA}_{t,t+10}$	6.71	6.50	6.80	6.98	7.45	7.63	7.86	8.50	9.22	10.5	**3.81**
	(27.7)	(30.0)	(32.1)	(32.9)	(38.8)	(48.1)	(38.1)	(37.7)	(28.8)	(39.1)	**(22.0)**
$\text{CFEG}_{t,t+10}$	10.7	10.5	10.8	11.3	11.6	11.5	11.3	11.1	12.3	11.7	**1.07**
	(21.4)	(25.2)	(23.6)	(25.2)	(27.0)	(24.3)	(25.6)	(22.1)	(23.1)	(19.9)	**(1.83)**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
$\text{EBITDA}_{t,t+10}$	7.60	7.63	7.23	7.33	7.64	7.62	8.08	8.72	10.5	12.3	**4.67**
	(26.5)	(32.2)	(31.2)	(37.0)	(38.1)	(38.2)	(37.5)	(37.7)	(39.5)	(40.3)	**(21.0)**
$\text{CFEG}_{t,t+10}$	10.7	11.3	10.6	10.1	10.4	10.4	10.2	10.5	10.9	11.5	**0.87**
	(25.2)	(26.0)	(25.4)	(22.8)	(27.3)	(22.6)	(22.1)	(22.9)	(24.0)	(23.1)	**(2.70)**
					$TIM^{DSS-SLG}$ equity duration						
$\text{EBITDA}_{t,t+10}$	6.03	6.37	6.43	6.57	6.75	7.22	7.77	8.29	9.97	11.6	**5.59**
	(26.1)	(26.3)	(34.9)	(33.9)	(36.1)	(33.5)	(36.3)	(42.4)	(35.2)	(26.0)	**(15.0)**
$\text{CFEG}_{t,t+10}$	10.0	11.3	11.8	11.2	10.9	11.4	10.6	10.4	12.5	12.9	**2.84**
	(18.9)	(22.6)	(26.9)	(21.2)	(24.4)	(24.7)	(21.9)	(21.5)	(21.6)	(23.6)	**(6.14)**
					TIM^{GON} equity duration						
$\text{EBITDA}_{t,t+10}$	7.18	6.69	6.87	7.36	7.20	7.54	8.11	8.21	8.70	9.85	**2.67**
	(26.3)	(32.3)	(33.8)	(47.1)	(39.1)	(38.0)	(37.1)	(31.7)	(32.3)	(29.7)	**(9.71)**
$\text{CFEG}_{t,t+10}$	8.69	9.80	11.1	12.2	12.2	13.1	13.2	12.3	12.3	8.73	**0.04**
	(18.1)	(23.2)	(28.3)	(28.5)	(30.2)	(26.2)	(25.1)	(22.8)	(20.4)	(13.1)	**(0.08)**

Table A7: Realized dividend growth of duration/timing-sorted portfolios.

This table shows realized dividend growth rates for portfolios sorted on equity duration measures. Panel *A* shows these realized dividend growth rates for equity duration measures including discount rate information and Panel *B* for equity duration measures excluding discount rate information. Realized dividend growth rates correspond to the average payout growth (DVG) in the five $(t, t+5)$ or ten $(t, t+10)$ years after portfolio formation. Payouts correspond common dividends and share repurchases. All growth rates are annualized and in percent per year. Newey and West (1987) corrected t-statistics with 6 lags are in brackets and the time period is from January 1964 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel *A*: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
$\text{DVG}_{t,t+5}$	10.2	9.64	10.9	11.4	10.6	11.8	13.9	14.8	17.5	16.6	**6.42**
	(11.7)	(11.6)	(12.9)	(14.1)	(15.5)	(14.4)	(15.6)	(17.5)	(19.7)	(14.5)	**(8.23)**
$\text{DVG}_{t,t+10}$	8.78	8.39	8.95	9.16	9.55	10.1	11.0	12.1	14.1	14.0	**5.22**
	(18.0)	(20.9)	(25.4)	(24.7)	(29.7)	(30.2)	(28.2)	(28.5)	(38.3)	(24.4)	**(14.0)**
					DUR^{GON} equity duration						
$\text{DVG}_{t,t+5}$	8.06	10.2	11.4	12.2	11.7	12.9	13.5	14.0	16.3	18.9	**10.9**
	(9.60)	(11.4)	(12.4)	(13.7)	(13.6)	(15.5)	(14.4)	(15.8)	(17.6)	(20.6)	**(19.8)**
$\text{DVG}_{t,t+10}$	7.55	8.16	9.21	10.2	10.2	10.4	11.2	11.8	13.1	14.3	**6.75**
	(18.5)	(22.2)	(22.7)	(24.3)	(29.0)	(31.6)	(29.4)	(24.7)	(28.4)	(30.2)	**(20.2)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
$\text{DVG}_{t,t+5}$	13.3	13.1	12.0	12.0	12.9	12.0	11.9	11.0	12.1	15.3	**2.04**
	(15.7)	(14.9)	(14.8)	(16.3)	(16.3)	(14.0)	(12.5)	(12.2)	(11.4)	(14.1)	**(2.28)**
$\text{DVG}_{t,t+10}$	10.8	11.2	10.6	10.2	10.4	10.1	9.82	9.49	9.82	12.2	**1.30**
	(22.6)	(28.4)	(26.8)	(25.0)	(28.9)	(26.0)	(22.3)	(20.1)	(21.8)	(22.2)	**(2.19)**
					$TIM^{DSS-SLG}$ equity duration						
$\text{DVG}_{t,t+5}$	11.7	12.2	11.9	12.0	12.2	12.8	13.1	12.3	14.1	17.3	**5.53**
	(14.7)	(14.4)	(13.6)	(14.8)	(14.1)	(13.8)	(13.6)	(12.7)	(13.5)	(13.2)	**(5.29)**
$\text{DVG}_{t,t+5}$	11.7	12.2	11.9	12.0	12.2	12.8	13.1	12.3	14.1	17.3	**5.53**
	(14.7)	(14.4)	(13.6)	(14.8)	(14.1)	(13.8)	(13.6)	(12.7)	(13.5)	(13.2)	**(5.29)**
					TIM^{GON} equity duration						
$\text{DVG}_{t,t+5}$	4.99	9.15	10.4	12.0	13.1	14.5	14.8	16.4	17.9	18.4	**13.5**
	(6.28)	(11.3)	(13.1)	(14.5)	(13.8)	(16.5)	(15.3)	(16.8)	(16.6)	(16.9)	**(19.5)**
$\text{DVG}_{t,t+10}$	5.75	7.53	8.83	9.96	10.4	12.2	11.9	12.8	13.9	14.9	**9.15**
	(15.5)	(22.1)	(23.8)	(26.5)	(27.6)	(31.5)	(25.7)	(27.1)	(27.9)	(23.5)	**(19.5)**

A2 Alphas and factor exposures of equity duration measures

Table A8: CAPM alphas of duration/timing-sorted portfolios.

We regress the value-weighted excess returns of duration-sorted portfolios on the market factor from January 1964 to December 2020. This table shows the corresponding factor exposure for the market factor (MKT) and CAPM alphas (α^{CAPM}). The market factor is from Kenneth French's website. In brackets are Newey and West (1987) t-statistics with 6 lags and the alpha is denoted in percent per month.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
MKT	1.05	1.02	0.96	0.94	0.91	0.94	0.93	0.98	1.08	1.28	**0.24**
	(25.29)	(26.26)	(27.68)	(33.96)	(31.60)	(31.92)	(35.49)	(45.41)	(55.51)	(32.05)	**(3.69)**
α^{CAPM}	0.26	0.21	0.28	0.25	0.07	0.08	0.12	0.10	0.05	-0.32	**-0.58**
	(2.22)	(1.89)	(2.44)	(2.47)	(0.83)	(0.99)	(1.55)	(1.54)	(0.57)	(-2.25)	**(-2.78)**
					DUR^{GON} equity duration						
MKT	1.00	0.91	0.97	1.00	1.01	0.94	0.94	0.94	1.03	1.15	**0.15**
	(21.01)	(26.26)	(26.24)	(25.85)	(29.26)	(24.41)	(37.93)	(32.84)	(38.37)	(38.41)	**(2.13)**
α^{CAPM}	0.40	0.31	0.36	0.21	0.30	0.15	0.13	0.20	0.01	-0.39	**-0.79**
	(2.65)	(2.49)	(3.15)	(1.75)	(2.89)	(1.40)	(1.54)	(2.69)	(0.14)	(-3.99)	**(-3.71)**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
MKT	1.01	0.94	0.99	0.99	0.99	1.03	0.96	0.97	1.16	1.31	**0.30**
	(43.10)	(59.34)	(51.60)	(66.65)	(54.36)	(46.84)	(32.26)	(42.97)	(38.19)	(32.41)	**(5.84)**
α^{CAPM}	0.05	0.11	0.04	0.03	0.03	0.06	0.07	0.00	0.00	0.02	**-0.03**
	(0.62)	(1.76)	(0.59)	(0.44)	(0.44)	(0.78)	(0.82)	(0.03)	(0.04)	(0.13)	**(-0.18)**
					$TIM^{DSS-SLG}$ equity duration						
MKT	0.99	0.97	0.97	1.02	1.03	1.08	1.08	1.12	1.15	1.35	**0.36**
	(52.99)	(47.10)	(40.86)	(47.56)	(32.01)	(48.03)	(42.04)	(37.79)	(38.71)	(30.09)	**(6.77)**
α^{CAPM}	0.11	0.03	0.14	0.00	0.06	0.05	0.15	-0.07	0.01	-0.24	**-0.35**
	(1.32)	(0.34)	(1.86)	(0.01)	(0.60)	(0.53)	(1.61)	(-0.63)	(0.10)	(-1.53)	**(-1.83)**
					TIM^{GON} equity duration						
MKT	0.83	0.88	0.97	0.93	1.05	1.05	1.06	1.08	1.18	1.38	**0.55**
	(20.97)	(30.87)	(36.49)	(46.98)	(42.38)	(52.34)	(37.93)	(49.99)	(39.70)	(37.65)	**(9.28)**
α^{CAPM}	0.18	0.09	0.04	0.10	0.20	0.03	-0.05	0.01	0.12	-0.36	**-0.54**
	(1.84)	(1.12)	(0.38)	(1.63)	(2.48)	(0.42)	(-0.62)	(0.13)	(1.10)	(-3.65)	**(-3.81)**

Table A9: Fama and French (1993) alphas of duration/timing-sorted portfolios.

This table shows the intercept (α^{FF3}) and Fama and French (1993) factor exposures of duration-sorted portfolios. We estimate the intercept and factor exposures by regressing value-weighted excess returns of duration-sorted portfolios on the Fama and French (1993) three-factor model from January 1964 to December 2020. Numbers in brackets correspond to Newey and West (1987) t-statistics with 6 lags and the alpha (α^{FF3}) is denoted in percent per month.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel A: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
MKT	1.07	1.04	0.99	0.98	0.93	0.97	0.95	0.98	1.05	1.18	**0.11**
	(37.57)	(35.60)	(42.54)	(47.44)	(29.30)	(42.32)	(41.47)	(50.21)	(59.37)	(30.42)	**(2.14)**
SMB	0.25	0.17	0.11	0.02	0.02	-0.04	-0.08	-0.08	-0.07	0.26	**0.01**
	(4.16)	(3.38)	(3.03)	(0.51)	(0.35)	(-1.05)	(-2.47)	(-2.29)	(-2.54)	(4.62)	**(0.06)**
HML	0.57	0.40	0.39	0.28	0.16	0.13	-0.01	-0.14	-0.35	-0.37	**-0.94**
	(10.22)	(8.11)	(6.52)	(5.07)	(2.37)	(2.18)	(-0.16)	(-3.26)	(-10.53)	(-5.94)	**(-10.06)**
α^{FF3}	0.05	0.06	0.14	0.16	0.02	0.04	0.13	0.15	0.17	-0.22	**-0.28**
	(0.62)	(0.77)	(1.73)	(1.93)	(0.20)	(0.56)	(1.87)	(2.60)	(2.50)	(-1.76)	**(-1.78)**
					DUR^{GON} equity duration						
MKT	0.97	0.89	0.96	1.02	1.03	0.93	0.95	0.94	1.02	1.11	**0.13**
	(32.37)	(28.62)	(29.61)	(40.61)	(36.27)	(22.94)	(48.47)	(38.94)	(45.98)	(44.85)	**(3.10)**
SMB	0.56	0.35	0.31	0.15	0.08	0.10	-0.05	-0.04	-0.10	-0.07	**-0.63**
	(11.39)	(7.51)	(6.27)	(2.94)	(2.51)	(1.25)	(-1.18)	(-1.72)	(-3.47)	(-1.87)	**(-10.52)**
HML	0.49	0.27	0.28	0.31	0.19	0.04	0.03	-0.05	-0.17	-0.37	**-0.86**
	(9.43)	(4.62)	(5.40)	(4.45)	(3.76)	(0.53)	(0.44)	(-0.94)	(-3.08)	(-8.73)	**(-10.95)**
α^{FF3}	0.19	0.19	0.23	0.09	0.23	0.12	0.13	0.22	0.07	-0.27	**-0.46**
	(1.78)	(1.86)	(2.47)	(1.08)	(2.60)	(1.20)	(1.60)	(3.13)	(1.06)	(-3.62)	**(-3.35)**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
MKT	0.99	0.93	1.00	0.99	1.01	1.04	0.97	0.96	1.12	1.20	**0.20**
	(46.10)	(60.77)	(51.12)	(63.28)	(53.83)	(49.38)	(36.58)	(43.09)	(42.08)	(31.43)	**(4.35)**
SMB	-0.13	-0.06	-0.13	0.02	-0.07	0.02	0.06	0.14	0.32	0.61	**0.74**
	(-3.16)	(-2.64)	(-3.68)	(0.65)	(-2.00)	(0.51)	(1.44)	(3.52)	(8.18)	(13.62)	**(11.83)**
HML	-0.29	-0.20	-0.12	0.05	0.02	0.09	0.15	0.19	0.19	0.09	**0.38**
	(-7.22)	(-9.13)	(-4.02)	(1.74)	(0.48)	(2.47)	(3.25)	(4.70)	(4.62)	(1.37)	**(4.36)**
α^{FF3}	0.16	0.18	0.09	0.01	0.03	0.03	0.01	-0.07	-0.09	-0.07	**-0.23**
	(2.19)	(3.35)	(1.56)	(0.12)	(0.45)	(0.36)	(0.18)	(-0.87)	(-1.01)	(-0.54)	**(-1.39)**
					$TIM^{DSS-SLG}$ equity duration						
MKT	0.99	0.96	0.97	0.99	1.01	1.05	1.03	1.04	1.09	1.23	**0.24**
	(53.93)	(54.02)	(39.99)	(43.09)	(31.87)	(48.15)	(47.06)	(35.91)	(33.82)	(27.51)	**(4.58)**

Continued on next page

Table A9: Fama and French (1993) alphas of duration/timing-sorted portfolios.

SMB	-0.16	-0.10	-0.03	0.13	0.04	0.17	0.16	0.40	0.29	0.47	**0.63**
	(-4.65)	(-2.87)	(-0.58)	(3.06)	(0.99)	(3.74)	(3.97)	(5.97)	(4.60)	(7.01)	**(7.16)**
HML	-0.23	-0.18	-0.05	-0.03	-0.07	0.02	-0.18	-0.09	-0.08	-0.30	**-0.07**
	(-5.84)	(-5.29)	(-1.09)	(-0.70)	(-1.44)	(0.44)	(-4.48)	(-1.34)	(-1.21)	(-5.26)	**(-0.87)**
α^{FF3}	0.20	0.09	0.16	-0.01	0.07	0.02	0.19	-0.09	0.00	-0.20	**-0.40**
	(2.79)	(1.38)	(2.06)	(-0.08)	(0.75)	(0.22)	(2.20)	(-0.86)	(0.00)	(-1.43)	**(-2.27)**
					TIM^{GON} equity duration						
MKT	0.88	0.88	0.99	0.94	1.02	1.03	1.03	1.03	1.14	1.32	**0.45**
	(29.99)	(30.51)	(39.35)	(48.90)	(48.18)	(48.52)	(37.23)	(47.08)	(37.87)	(33.78)	**(7.68)**
SMB	-0.12	-0.05	-0.17	-0.11	0.07	-0.00	0.05	0.20	0.22	0.35	**0.47**
	(-2.06)	(-1.66)	(-6.31)	(-3.79)	(1.50)	(-0.06)	(1.33)	(3.90)	(5.69)	(8.25)	**(6.23)**
HML	0.18	-0.04	-0.09	-0.06	-0.14	-0.14	-0.11	-0.10	-0.06	0.01	**-0.17**
	(2.56)	(-1.17)	(-2.26)	(-1.85)	(-2.90)	(-3.44)	(-2.40)	(-2.04)	(-1.25)	(0.20)	**(-1.64)**
α^{FF3}	0.14	0.11	0.08	0.13	0.23	0.08	-0.02	0.02	0.11	-0.40	**-0.54**
	(1.55)	(1.33)	(1.00)	(2.07)	(3.05)	(1.02)	(-0.25)	(0.20)	(1.05)	(-4.09)	**(-4.00)**

Table A10: Fama and French (2015) alphas of duration/timing-sorted portfolios.

This table shows the intercept (α^{FF5}) and Fama and French (2015) factor exposures of duration-sorted portfolios. We estimate the intercept and factor exposures by regressing value-weighted excess returns of duration-sorted portfolios on the Fama and French (2015) five-factor model from January 1964 to December 2020. Numbers in brackets correspond to Newey and West (1987) t-statistics with 6 lags and the alpha (α^{FF5}) is denoted in percent per month.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel *A*: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
MKT	1.06	1.04	1.01	0.99	0.95	1.01	0.99	1.01	1.06	1.15	**0.09**
	(36.09)	(35.40)	(44.43)	(48.86)	(33.59)	(49.20)	(48.67)	(61.33)	(55.84)	(30.84)	**(1.84)**
SMB	0.31	0.24	0.18	0.09	0.09	0.06	-0.02	-0.03	-0.05	0.15	**-0.16**
	(7.46)	(5.66)	(4.72)	(2.64)	(1.91)	(2.06)	(-0.51)	(-0.98)	(-1.76)	(2.62)	**(-2.31)**
HML	0.58	0.39	0.31	0.22	0.09	0.01	-0.16	-0.23	-0.38	-0.37	**-0.95**
	(9.34)	(7.48)	(5.13)	(4.16)	(1.31)	(0.27)	(-4.03)	(-6.27)	(-9.63)	(-5.22)	**(-10.02)**
RMW	0.17	0.21	0.22	0.21	0.21	0.32	0.19	0.19	0.06	-0.43	**-0.60**
	(2.31)	(3.54)	(3.70)	(3.32)	(2.91)	(5.25)	(2.42)	(3.21)	(1.28)	(-4.99)	**(-5.93)**
CMA	-0.14	-0.06	0.12	0.11	0.13	0.26	0.35	0.22	0.09	-0.05	**0.09**
	(-1.70)	(-0.78)	(1.48)	(1.46)	(1.73)	(4.67)	(4.52)	(4.02)	(1.49)	(-0.46)	**(0.61)**
α^{FF5}	0.03	0.01	0.04	0.07	-0.08	-0.12	-0.01	0.04	0.12	-0.07	**-0.10**
	(0.38)	(0.10)	(0.53)	(0.81)	(-1.06)	(-1.74)	(-0.10)	(0.72)	(1.87)	(-0.55)	**(-0.67)**
					DUR^{GON} equity duration						
MKT	1.00	0.92	0.97	1.04	1.04	0.97	0.99	0.96	1.06	1.11	**0.11**
	(32.70)	(29.22)	(32.11)	(36.94)	(35.30)	(27.74)	(68.39)	(49.60)	(53.96)	(44.14)	**(2.73)**
SMB	0.62	0.43	0.37	0.24	0.16	0.15	0.05	0.05	-0.02	-0.07	**-0.68**
	(12.61)	(9.04)	(8.81)	(5.94)	(4.51)	(2.17)	(1.49)	(1.67)	(-0.65)	(-1.99)	**(-10.25)**
HML	0.31	0.10	0.18	0.21	0.13	-0.10	-0.08	-0.11	-0.26	-0.38	**-0.68**
	(5.61)	(1.48)	(3.18)	(4.80)	(3.45)	(-1.24)	(-1.71)	(-3.15)	(-6.13)	(-7.10)	**(-7.90)**
RMW	0.18	0.24	0.17	0.26	0.20	0.14	0.31	0.27	0.24	0.01	**-0.17**
	(3.53)	(5.11)	(3.12)	(3.27)	(3.35)	(1.45)	(5.13)	(3.50)	(3.91)	(0.24)	**(-1.87)**
CMA	0.18	0.21	0.09	0.11	0.05	0.29	0.20	0.07	0.20	0.03	**-0.15**
	(1.91)	(2.30)	(1.15)	(1.27)	(0.68)	(2.91)	(3.12)	(0.90)	(2.13)	(0.38)	**(-1.17)**
α^{FF5}	0.09	0.05	0.15	-0.03	0.15	-0.00	-0.04	0.10	-0.07	-0.28	**-0.37**
	(0.79)	(0.51)	(1.63)	(-0.41)	(1.61)	(-0.04)	(-0.60)	(1.36)	(-1.06)	(-3.58)	**(-2.61)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
MKT	1.00	0.93	1.02	1.00	1.04	1.05	1.01	0.98	1.13	1.19	**0.19**
	(61.78)	(62.26)	(53.89)	(58.79)	(56.62)	(47.16)	(40.81)	(47.70)	(46.65)	(29.13)	**(4.47)**

Continued on next page

Table A10: Fama and French (2015) alphas of duration/timing-sorted portfolios.

SMB	-0.03	-0.02	-0.07	0.03	-0.03	0.01	0.05	0.09	0.26	0.50	**0.53**
	(-1.12)	(-1.00)	(-2.71)	(1.06)	(-0.99)	(0.28)	(1.20)	(2.56)	(5.71)	(9.65)	**(9.60)**
HML	-0.24	-0.18	-0.12	0.03	-0.05	0.04	-0.03	0.07	0.04	-0.06	**0.18**
	(-7.80)	(-5.93)	(-3.18)	(0.72)	(-1.45)	(0.76)	(-0.53)	(1.72)	(0.58)	(-0.72)	**(1.99)**
RMW	0.39	0.15	0.23	0.04	0.14	-0.06	-0.02	-0.21	-0.25	-0.45	**-0.84**
	(11.00)	(4.40)	(6.55)	(1.24)	(3.53)	(-1.13)	(-0.26)	(-4.10)	(-3.56)	(-5.88)	**(-9.74)**
CMA	-0.11	-0.02	0.02	0.04	0.18	0.12	0.42	0.24	0.28	0.18	**0.29**
	(-2.45)	(-0.46)	(0.42)	(0.70)	(3.36)	(1.87)	(3.97)	(3.38)	(4.10)	(1.62)	**(2.55)**
α^{FF5}	0.05	0.13	0.01	-0.02	-0.05	0.02	-0.07	-0.05	-0.07	0.05	**-0.01**
	(0.92)	(2.47)	(0.09)	(-0.25)	(-0.74)	(0.24)	(-0.92)	(-0.67)	(-0.79)	(0.40)	**(-0.06)**
					$TIM^{DSS-SLG}$ equity duration						
MKT	0.98	0.96	0.99	1.01	1.01	1.06	1.03	1.04	1.09	1.20	**0.22**
	(57.96)	(58.25)	(38.45)	(41.82)	(33.15)	(50.73)	(45.77)	(32.40)	(34.82)	(25.33)	**(4.12)**
SMB	-0.09	-0.06	0.01	0.17	0.04	0.20	0.13	0.33	0.22	0.35	**0.43**
	(-2.44)	(-1.91)	(0.16)	(4.43)	(0.84)	(4.33)	(3.42)	(5.71)	(3.87)	(4.55)	**(4.68)**
HML	-0.17	-0.15	-0.10	-0.12	-0.09	-0.05	-0.23	-0.16	-0.16	-0.34	**-0.17**
	(-3.82)	(-4.33)	(-1.57)	(-2.52)	(-1.25)	(-1.07)	(-4.98)	(-2.29)	(-1.89)	(-4.12)	**(-1.53)**
RMW	0.24	0.14	0.12	0.13	-0.02	0.05	-0.08	-0.20	-0.20	-0.42	**-0.67**
	(5.58)	(3.38)	(1.88)	(2.83)	(-0.21)	(0.77)	(-1.63)	(-2.63)	(-3.44)	(-4.28)	**(-6.05)**
CMA	-0.14	-0.07	0.09	0.14	0.03	0.10	0.08	0.10	0.15	0.05	**0.20**
	(-2.28)	(-1.18)	(1.03)	(1.62)	(0.26)	(1.14)	(1.24)	(1.02)	(1.48)	(0.43)	**(1.36)**
α^{FF5}	0.14	0.06	0.09	-0.09	0.07	-0.02	0.20	-0.03	0.04	-0.05	**-0.19**
	(2.08)	(0.90)	(1.07)	(-1.16)	(0.73)	(-0.22)	(2.28)	(-0.27)	(0.40)	(-0.38)	**(-1.25)**
					TIM^{GON} equity duration						
MKT	0.95	0.93	1.01	0.96	1.02	1.03	1.03	1.03	1.14	1.30	**0.35**
	(35.24)	(36.84)	(36.97)	(51.63)	(51.41)	(40.77)	(45.32)	(45.49)	(35.65)	(32.89)	**(6.16)**
SMB	0.01	-0.00	-0.16	-0.07	0.06	0.02	0.11	0.23	0.24	0.35	**0.34**
	(0.30)	(-0.07)	(-5.26)	(-2.66)	(1.45)	(0.49)	(2.45)	(4.60)	(6.28)	(9.13)	**(6.53)**
HML	-0.04	-0.21	-0.14	-0.09	-0.16	-0.13	-0.09	-0.14	-0.12	0.02	**0.05**
	(-0.83)	(-4.46)	(-3.03)	(-2.80)	(-3.97)	(-2.80)	(-1.68)	(-2.84)	(-2.13)	(0.27)	**(0.64)**
RMW	0.39	0.19	0.05	0.14	-0.05	0.08	0.17	0.10	0.03	-0.07	**-0.46**
	(4.96)	(3.72)	(0.73)	(3.61)	(-0.50)	(1.19)	(2.85)	(1.96)	(0.65)	(-0.96)	**(-3.67)**
CMA	0.48	0.39	0.19	0.10	0.03	-0.05	-0.12	0.00	0.03	-0.14	**-0.62**
	(5.45)	(4.27)	(2.13)	(1.66)	(0.27)	(-0.63)	(-1.19)	(0.07)	(0.51)	(-1.57)	**(-4.41)**
α^{FF5}	-0.13	-0.06	0.01	0.05	0.24	0.06	-0.05	-0.02	0.09	-0.34	**-0.20**
	(-1.52)	(-0.78)	(0.15)	(0.76)	(2.63)	(0.76)	(-0.64)	(-0.16)	(0.92)	(-3.30)	**(-1.48)**

Table A11: Expected returns implied by the Fama and French (2015) factor model.

This table shows expected returns for high-minus-low duration portfolios implied by the Fama and French (2015) five-factor model. We present the average expected return across all months in column one (unconditional), across periods when the CFNAI is below the lower quarter in column two (recession) and in all other months (expansion). We estimate these expected returns by regressing excess returns of duration-sorted portfolios on the Fama and French (2015) factors and calculating expected returns implied by the model.

	Unconditional	Recession	Expansion
TIM^{DSS}	0.15	-0.25	0.25
	(1.17)	(-0.97)	(1.68)
$\text{TIM}^{DSS-SLG}$	0.08	-0.31	0.21
	(0.70)	(-1.27)	(1.55)
TIM^{GON}	0.02	-0.35	0.15
	(0.16)	(-1.09)	(1.08)

A3 Additional tables for equity duration measures

Table A12: Returns for duration/timing-sorted portfolios during NBER recessions.

This table shows 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 January 1974 to December 2020 and returns are value weighted and in percent per month. Δ is 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}	-0.75	-0.38	-0.54	-0.31	-0.52	-0.49	-0.15	-0.21	-0.10	-0.99	**-0.24**	**0.33**
	(-0.71)	(-0.40)	(-0.60)	(-0.35)	(-0.67)	(-0.61)	(-0.20)	(-0.27)	(-0.12)	(-0.87)	**(-0.35)**	**(0.54)**
r_2^{nber}	-0.05	0.12	0.25	-0.01	0.10	0.08	0.45	0.58	0.39	-0.10	**-0.05**	**0.53**
	(-0.04)	(0.11)	(0.25)	(-0.01)	(0.11)	(0.08)	(0.52)	(0.63)	(0.39)	(-0.08)	**(-0.06)**	**(0.75)**
						DUR^{GON} equity duration						
r_1^{nber}	0.08	0.02	0.17	-0.51	-0.38	-0.51	-0.23	-0.09	-0.36	-1.10	**-1.18**	**-0.56**
	(0.08)	(0.02)	(0.19)	(-0.54)	(-0.42)	(-0.65)	(-0.29)	(-0.12)	(-0.41)	(-1.10)	**(-1.70)**	**(-1.01)**
r_2^{nber}	1.09	0.83	1.21	0.27	0.31	0.10	0.23	0.55	0.28	-0.50	**-1.59**	**-0.99**
	(0.93)	(0.80)	(1.23)	(0.25)	(0.30)	(0.13)	(0.24)	(0.62)	(0.27)	(-0.42)	**(-1.97)**	**(-1.57)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**												
						TIM^{DSS} equity duration						
r_1^{nber}	-0.31	-0.23	-0.37	-0.62	-0.55	-0.65	-0.44	-0.47	-0.69	-0.39	**-0.09**	**-0.26**
	(-0.36)	(-0.30)	(-0.45)	(-0.70)	(-0.69)	(-0.70)	(-0.53)	(-0.57)	(-0.69)	(-0.35)	**(-0.14)**	**(-0.46)**
r_2^{nber}	0.38	0.36	0.28	-0.05	0.15	-0.11	-0.10	-0.02	0.09	0.60	**0.22**	**0.09**
	(0.38)	(0.38)	(0.29)	(-0.05)	(0.17)	(-0.11)	(-0.10)	(-0.02)	(0.08)	(0.47)	**(0.31)**	**(0.14)**
						$TIM^{DSS-SLG}$ equity duration						
r_1^{nber}	-0.20	0.08	0.24	-0.21	-0.13	-0.49	-0.13	-1.02	-0.54	-1.21	**-1.01**	**-1.03**
	(-0.24)	(0.10)	(0.28)	(-0.24)	(-0.15)	(-0.52)	(-0.15)	(-1.00)	(-0.52)	(-1.03)	**(-1.64)**	**(-1.81)**
r_2^{nber}	0.52	0.65	0.75	0.78	0.53	0.13	0.67	-0.30	0.23	-0.57	**-1.08**	**-1.07**
	(0.51)	(0.66)	(0.77)	(0.73)	(0.54)	(0.12)	(0.68)	(-0.25)	(0.19)	(-0.41)	**(-1.56)**	**(-1.65)**
						TIM^{GON} equity duration						
r_1^{nber}	-0.36	-0.34	-0.56	-0.22	-0.09	-0.47	-0.47	-0.46	-0.45	-1.48	**-1.12**	**-1.08**
	(-0.47)	(-0.50)	(-0.70)	(-0.29)	(-0.10)	(-0.51)	(-0.52)	(-0.50)	(-0.42)	(-1.17)	**(-1.64)**	**(-1.94)**
r_2^{nber}	0.61	0.07	0.03	0.60	0.58	0.11	0.28	-0.05	0.37	-0.82	**-1.43**	**-1.38**
	(0.72)	(0.09)	(0.03)	(0.64)	(0.54)	(0.11)	(0.26)	(-0.04)	(0.29)	(-0.56)	**(-1.86)**	**(-2.17)**

Table A13: Returns on duration/timing-sorted portfolios in expansions.

This table shows monthly excess returns for portfolios sorted on equity duration measures conditional on expansion periods. The excess return r_1^{exp} corresponds to quarters with higher GDP growth compared to the last 8 quarters, whereas r_2^{exp} is calculated for quarters with the highest 10 % GDP growth. The observation period spans from January 1974 to December 2020 and returns are value weighted and in percent per month. 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*: **Equity duration measures including discount rate information**												
					DUR^{DSS} equity duration							
r_1^{exp}	1.86	1.60	1.51	1.12	1.00	1.11	1.07	1.16	1.57	1.87	**0.01**	**0.61**
	(2.57)	(2.21)	(2.13)	(1.57)	(1.52)	(1.56)	(1.70)	(1.70)	(2.01)	(1.86)	**(0.01)**	**(0.92)**
r_2^{exp}	2.80	1.67	1.63	0.75	1.38	0.99	1.22	1.08	0.77	0.82	**-1.98**	**-1.51**
	(2.85)	(1.64)	(1.73)	(0.78)	(1.44)	(0.97)	(1.45)	(0.95)	(0.60)	(0.70)	**(-1.97)**	**(-1.47)**
					DUR^{GON} equity duration							
r_1^{exp}	2.33	1.93	1.89	1.76	1.64	1.54	0.93	1.37	1.44	1.41	**-0.93**	**-0.26**
	(2.75)	(2.63)	(2.45)	(2.54)	(2.34)	(1.82)	(1.39)	(1.99)	(1.92)	(1.74)	**(-1.45)**	**(-0.44)**
r_2^{exp}	3.90	2.51	2.48	2.07	1.35	0.82	0.93	1.39	1.25	0.40	**-3.50**	**-2.93**
	(3.20)	(2.51)	(2.19)	(1.95)	(1.43)	(0.73)	(0.88)	(1.56)	(0.97)	(0.33)	**(-2.64)**	**(-3.22)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**												
					TIM^{DSS} equity duration							
r_1^{exp}	1.34	1.29	1.41	1.17	1.18	1.30	1.48	1.45	1.84	3.12	**1.77**	**1.84**
	(1.86)	(1.98)	(1.93)	(1.67)	(1.61)	(1.72)	(2.07)	(2.14)	(2.11)	(2.94)	**(2.75)**	**(3.14)**
r_2^{exp}	1.36	1.15	0.97	1.37	1.63	1.16	1.48	1.32	1.94	4.12	**2.75**	**2.73**
	(1.20)	(1.25)	(0.84)	(1.53)	(1.78)	(1.11)	(1.93)	(1.36)	(1.80)	(2.39)	**(2.66)**	**(2.98)**
					$TIM^{DSS-SLG}$ equity duration							
r_1^{exp}	1.34	1.27	1.35	1.58	1.28	1.70	1.85	1.49	1.46	2.40	**1.06**	**1.33**
	(1.93)	(1.92)	(1.96)	(2.11)	(1.69)	(2.25)	(2.27)	(1.57)	(1.72)	(2.14)	**(1.54)**	**(2.19)**
r_2^{exp}	0.97	1.24	1.33	1.87	1.48	1.86	1.48	1.69	1.91	1.87	**0.91**	**1.07**
	(0.82)	(1.25)	(1.57)	(1.72)	(1.42)	(1.61)	(1.36)	(1.83)	(1.93)	(1.16)	**(0.84)**	**(1.13)**
					TIM^{GON} equity duration							
r_1^{exp}	1.39	0.87	1.60	1.42	1.79	1.40	1.23	1.49	2.00	1.97	**0.58**	**0.86**
	(2.15)	(1.26)	(2.18)	(2.13)	(2.30)	(1.93)	(1.53)	(1.93)	(2.44)	(1.95)	**(0.81)**	**(1.43)**
r_2^{exp}	1.99	1.04	2.04	1.32	1.36	1.02	0.92	1.35	1.39	1.70	**-0.29**	**-0.11**
	(2.23)	(1.19)	(1.74)	(1.25)	(1.36)	(1.10)	(0.95)	(1.42)	(1.31)	(1.13)	**(-0.30)**	**(-0.12)**

Table A14: Yearly regressions of duration/timing-sorted portfolio returns on the dividend price ratio.

We regress yearly excess returns of duration/timing sorted portfolios on the dividend price ratio of the previous year (DP_{t-1}) and the contemporaneous market return (MKT_t). Mean excess returns are calculated from 1964 until 2020 (depending on data availability), are value weighted and in percent per year. Numbers in brackets are Newey and West (1987) t-statistics. The dividend price ratio is obtained by dividing dividends on the S&P 500 from the database of Robert Shiller by the market price of the S&P 500.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel *A*: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
DP_{t-1}	23.30	26.92	16.46	20.29	14.64	13.58	9.49	7.68	1.61	10.06	**-7.87**
	(3.82)	(3.76)	(2.93)	(2.55)	(3.25)	(2.50)	(1.50)	(1.01)	(0.14)	(0.67)	**(-0.46)**
					DUR^{GON} equity duration						
DP_{t-1}	22.87	12.30	21.98	22.25	9.20	1.90	14.33	8.42	1.32	5.24	**-13.74**
	(4.44)	(1.85)	(4.03)	(3.49)	(1.20)	(0.31)	(2.06)	(1.29)	(0.14)	(0.33)	**(-0.92)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
DP_{t-1}	7.94	6.80	12.62	15.17	8.45	24.35	17.85	17.75	22.26	26.30	**16.55**
	(0.87)	(0.88)	(1.83)	(1.90)	(1.15)	(4.37)	(3.74)	(2.64)	(3.17)	(2.98)	**(2.05)**
					$TIM^{DSS-SLG}$ equity duration						
DP_{t-1}	11.64	11.27	7.94	14.20	8.53	12.12	13.54	9.24	6.35	23.32	**11.62**
	(0.84)	(1.15)	(0.94)	(1.58)	(0.76)	(0.89)	(1.78)	(0.91)	(0.91)	(1.98)	**(1.51)**
					TIM^{GON} equity duration						
DP_{t-1}	23.30	12.92	17.46	12.02	-3.30	4.48	10.55	20.37	10.42	29.50	**11.65**
	(3.28)	(2.35)	(1.26)	(1.43)	(-0.57)	(0.49)	(1.15)	(1.53)	(0.95)	(2.83)	**(1.74)**

Table A15: Dividend strip returns conditional on the business cycle.

In Panel *A*, we inspect the return differential between the S&P 500 and short term dividend strips from Van Binsbergen et al. (2012) conditional on the CFNAI index and the NBER recession indicator in (Panel *A*). For each indicator we report the mean return of the return differential between the S&P 500 and short term dividend strips when the CFNAI is in its lower quartile (column "CFNAI") and during NBER recessions (column "NBER"). The column Δ indicates the difference of these return differentials during recession months versus all other months. In Panel *B*, we regress the return differential between the S&P 500 and short term dividend strips on the dividend-price ratio of the previous year (DP_{t-1}) and the contemporaneous market return (MKT_t). The sample period is from 1996 until 2009 (sample of Van Binsbergen et al. (2012)) and monthly returns are in percent per month. Numbers in brackets are Newey and West (1987) *t*-statistics with 6 lags for the Panel *B* and correspond to robust standard errors otherwise. We obtain the dividend-price ratio by dividing dividends on the S&P 500 from Robert Shiller by the market price of the S&P 500.

Panel *A*: **CFNAI and NBER recession indicators**

	CFNAI	Δ	NBER recessions	Δ
Recession indicator	-2.43	-2.39	-3.16	-2.86
	(-1.71)	(-1.77)	(-2.47)	(-1.70)

Panel *B*: **DP ratio**

	(1)	(2)
DP_{t-1}	320.60	402.99
	(1.35)	(2.91)
MKT_t		4.03
		(5.26)

Table A16: Interest-rate sensitivity.

We show estimated coefficients b_1 and b_2 from the regression: $r_{i,t} = a + b_1 \cdot \Delta R_{f,1m,t} + b_2 \cdot \Delta R_{f,10y,t}$, where $r_{i,t}$ is the studentized return of the portfolio in month t, $\Delta R_{f,1m,t}$ is the contemporaneous change in the one-month treasury yield and $\Delta R_{f,10y,t}$ is the contemporaneous change in the 10-year treasury yields as provided by the St. Louis Fed FRED database. Numbers in brackets are robust t-statistics.

Measure	IR	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
DUR^{DSS}	$\Delta R_{f,1m,t}$	-240.3***	-221.7***	-229.2***	-230.0***	-245.1***	-223.8***	-234.9***	-220.5***	-219.4***	-226.0***
		(-3.44)	(-3.25)	(-3.17)	(-3.16)	(-3.36)	(-3.03)	(-3.13)	(-2.85)	(-2.80)	(-3.23)
	$\Delta R_{f,10y,t}$	0.17	0.10	0.10	0.05	0.02	0.00	0.00	-0.02	0.03	0.22*
		(1.26)	(0.71)	(0.72)	(0.41)	(0.18)	(0.03)	(-0.02)	(-0.17)	(0.22)	(1.69)
DUR^{GON}	$\Delta R_{f,1m,t}$	-250.4***	-230.6***	-227.2***	-239.4***	-230.8***	-204.0***	-234.1***	-249.5***	-229.9***	-232.7***
		(-3.51)	(-3.15)	(-3.17)	(-3.28)	(-3.22)	(-2.75)	(-3.06)	(-3.20)	(-2.81)	(-2.93)
	$\Delta R_{f,10y,t}$	0.35**	0.24*	0.24*	0.22	0.19	0.18	0.17	0.17	0.12	0.17
		(2.54)	(1.70)	(1.66)	(1.58)	(1.34)	(1.29)	(1.21)	(1.18)	(0.82)	(1.26)
TIM^{DSS}	$\Delta R_{f,1m,t}$	-238.9***	-221.4***	-216.9***	-239.1***	-231.7***	-218.8***	-249.6***	-222.2***	-226.9***	-230.4***
		(-2.97)	(-2.89)	(-2.84)	(-3.27)	(-3.16)	(-3.11)	(-3.45)	(-3.07)	(-3.19)	(-3.29)
	$\Delta R_{f,10y,t}$	-0.03	-0.06	-0.05	-0.01	0.00	0.04	0.08	0.08	0.21	0.27**
		(-0.20)	(-0.48)	(-0.37)	(-0.10)	(0.00)	(0.32)	(0.56)	(0.61)	(1.58)	(2.16)
$TIM^{DSS-SLG}$	$\Delta R_{f,1m,t}$	-242.8***	-241.8***	-228.3***	-228.0***	-215.7***	-245.8***	-244.7***	-236.5***	-228.6***	-229.6***
		(-2.88)	(-3.10)	(-2.98)	(-3.09)	(-2.81)	(-3.27)	(-3.21)	(-3.22)	(-3.02)	(-3.17)
	$\Delta R_{f,10y,t}$	-0.03	0.01	0.06	0.08	0.12	0.15	0.17	0.26*	0.28**	0.34**
		(-0.24)	(0.05)	(0.39)	(0.54)	(0.81)	(1.07)	(1.23)	(1.83)	(1.97)	(2.52)
TIM^{GON}	$\Delta R_{f,1m,t}$	-271.2***	-262.2***	-257.4***	-244.7***	-231.1***	-226.6***	-243.3***	-215.7***	-226.9***	-209.6***
		(-3.33)	(-3.31)	(-3.31)	(-3.23)	(-3.13)	(-3.02)	(-3.29)	(-2.97)	(-3.14)	(-2.98)
	$\Delta R_{f,10y,t}$	0.27*	0.19	0.17	0.18	0.18	0.19	0.22	0.24*	0.24*	0.25*
		(1.89)	(1.29)	(1.12)	(1.27)	(1.25)	(1.41)	(1.59)	(1.73)	(1.70)	(1.80)

A4 Gonçalves (2021b) duration with uniform discount rates and firm fixed effects

We report results for a version of the Gonçalves (2021b) equity duration measure with a uniform discount rate. We label the version with firm fixed effects in the VAR with a star (∗) next to the measure.

Table A17: Realized cash-flows of Gonçalves (2021b) duration/timing-sorted portfolios with firm fixed effects in the VAR (in %).

This table shows measures of realized cash flows in percent for portfolios sorted on variations of the Gonçalves (2021b) equity duration measures with a uniform discount rate. We label the version that includes firm fixed effects in the VAR with a star (∗) next to the measure. Realized EBITDA growth corresponds to the average EBITDA growth of duration portfolios in the five $(t, t+5)$ and ten years $(t, t+10)$ after formation. CFEG is the realized cash flow to equity growth (CFEG) of duration sorted portfolios. All growth rates are annualized and in percent per year. Newey and West (1987) corrected t-statistics with 6 lags are printed in brackets. The observation period is from January 1974 to December 2020.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	**D10-D1**
Panel *A*: **Equity duration measures including discount rate information**											
					$DUR^{GON-UDR}$ equity duration						
$\text{EBITDA}_{t,t+5}$	6.72	6.71	7.52	7.64	7.79	9.08	9.69	10.5	11.7	13.3	**6.62**
	(15.3)	(18.2)	(21.1)	(20.3)	(20.3)	(26.5)	(25.9)	(26.9)	(26.9)	(28.0)	**(24.8)**
$\text{EBITDA}_{t,t+10}$	6.62	6.42	6.71	7.01	7.42	7.98	7.98	8.76	9.37	10.1	**3.52**
	(26.8)	(28.0)	(30.9)	(39.9)	(42.5)	(48.3)	(39.1)	(33.9)	(30.1)	(36.7)	**(19.2)**
$\text{CFEG}_{t,t+5}$	13.6	15.4	15.3	17.2	16.9	17.9	19.2	19.2	18.5	15.8	**2.22**
	(16.4)	(19.5)	(21.9)	(20.9)	(20.3)	(19.3)	(21.6)	(22.5)	(18.4)	(13.8)	**(2.05)**
$\text{CFEG}_{t,t+10}$	9.52	10.7	10.9	11.4	12.5	12.2	12.9	12.8	11.7	10.2	**0.70**
	(19.5)	(21.7)	(26.0)	(26.1)	(31.0)	(28.4)	(29.0)	(24.4)	(19.4)	(15.3)	**(1.11)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					$TIM^{GON-UDR*}$ equity duration						
$\text{EBITDA}_{t,t+5}$	7.15	7.00	7.16	7.39	7.93	8.40	9.01	9.76	10.8	13.4	**6.28**
	(17.0)	(16.2)	(17.6)	(18.8)	(18.7)	(24.5)	(23.9)	(27.1)	(27.0)	(31.8)	**(22.5)**
$\text{EBITDA}_{t,t+10}$	7.20	6.39	6.45	6.88	7.10	7.42	7.78	8.35	8.63	10.3	**3.10**
	(26.4)	(27.9)	(30.7)	(32.6)	(38.5)	(34.2)	(39.7)	(44.9)	(36.0)	(34.5)	**(17.2)**
$\text{CFEG}_{t,t+5}$	16.5	15.8	15.4	15.6	15.2	15.4	14.8	16.3	18.2	19.5	**3.01**
	(18.9)	(20.0)	(21.7)	(22.8)	(18.5)	(19.0)	(18.9)	(17.7)	(16.8)	(20.2)	**(3.28)**
$\text{CFEG}_{t,t+10}$	11.4	9.98	10.4	11.0	11.1	11.5	10.3	11.4	11.9	12.5	**1.11**
	(21.9)	(18.5)	(21.6)	(26.3)	(25.3)	(25.3)	(28.3)	(24.0)	(22.4)	(20.9)	**(1.96)**

Table A18: Unconditional returns on Gonçalves (2021b) duration/timing-sorted portfolios with firm fixed effects in the VAR (in %).

This table shows monthly average returns and mean pricing errors (α^{FF5}) relative to the Fama and French (2015) five-factor model for portfolios sorted on variations of the Gonçalves (2021b) equity duration measure. We demean all state variables in the VAR for each firm similar to Chen et al. (2013) and label the corresponding measure with a star. Mean excess returns are calculated from January 1974 - December 2020, are value weighted and reported in percent per month. Numbers in brackets are Newey and West (1987) t-statistics with 6 lags. Moreover, we report 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: **Equity duration measures including discount rate information**											
					$DUR^{GON-UDR}$ equity duration						
r^e	1.04	0.79	0.95	0.73	0.84	0.76	0.73	0.72	0.54	0.61	**-0.43**
	(5.24)	(3.85)	(5.22)	(3.85)	(4.75)	(3.87)	(3.88)	(3.48)	(2.08)	(2.12)	**(-2.18)**
α^{FF5}	0.23	-0.06	0.11	-0.06	0.08	-0.00	-0.10	-0.05	-0.23	-0.11	**-0.34**
	(2.40)	(-0.60)	(1.38)	(-0.65)	(1.02)	(-0.01)	(-1.46)	(-0.82)	(-2.48)	(-0.99)	**(-2.43)**
SR_{ann}	0.73	0.58	0.72	0.54	0.64	0.57	0.54	0.49	0.32	0.32	**-0.34**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					$TIM^{GON-UDR*}$ equity duration						
r^e	0.57	0.77	0.74	0.78	0.73	0.64	0.68	0.68	0.83	0.60	**0.03**
	(2.62)	(3.78)	(3.83)	(3.94)	(3.67)	(3.14)	(3.73)	(3.24)	(3.49)	(2.09)	**(0.17)**
α^{FF5}	-0.18	-0.02	0.03	0.04	-0.00	-0.02	-0.11	-0.13	0.09	-0.14	**0.04**
	(-1.55)	(-0.19)	(0.41)	(0.53)	(-0.03)	(-0.30)	(-1.67)	(-1.73)	(1.20)	(-1.39)	**(0.26)**
SR_{ann}	0.38	0.54	0.54	0.54	0.51	0.46	0.51	0.46	0.54	0.32	**0.03**

Table A19: Correlations between duration/timing measures with and without firm fixed effects in the VAR.

Panel *A* shows the time-series average of rank correlations between the respective equity duration measures and the book-to-market ratio (BM). Panel *B* shows return correlations between high-minus-low portfolios based on the respective equity duration measure and the book-to-market ratio. We label all measures with firm fixed effects in the VAR with a star ($*$). The time period corresponds due to data availability to January 1964 - December 2020 for DUR^{DSS}, TIM^{DSS}, and BM. For all other measures the time period is from January 1974 to December 2020.

	DUR^{DSS}	DUR^{GON}	TIM^{DSS}	TIM$^{DSS-SLG}$	TIM^{GON}	DUR$^{GON-UDR}$	TIM$^{GON-UDR*}$
Panel *A*: **Rank correlations**							
DUR^{GON}	0.51						
TIM^{DSS}	0.30	-0.15					
TIM$^{DSS-SLG}$	0.45	0.00	0.77				
TIM^{GON}	0.19	0.44	0.14	0.22			
DUR$^{GON-UDR}$	0.45	0.84	-0.04	0.09	0.71		
TIM$^{GON-UDR*}$	0.31	0.51	-0.12	0.00	0.59	0.75	
BM	-0.47	-0.60	0.53	0.25	-0.02	-0.42	-0.36
Panel *B*: **Return Correlations**							
DUR^{GON}	0.52						
TIM^{DSS}	0.10	-0.29					
TIM$^{DSS-SLG}$	0.33	-0.04	0.67				
TIM^{GON}	0.42	0.25	0.36	0.46			
DUR$^{GON-UDR}$	0.50	0.75	-0.01	0.18	0.54		
TIM$^{GON-UDR*}$	0.40	0.45	-0.03	0.00	0.49	0.62	
BM	-0.45	-0.64	0.54	0.24	0.04	-0.37	-0.28

Internet Appendix

Is there a cash-flow timing premium?

IA1 Construction of equity duration measures

In this section, we provide additional details on the construction of all empirical measures of equity duration discussed in Section 2. We precisely follow Weber (2018) and Gonçalves (2021b) to construct the original measures DUR^{DSS} and DUR^{GON}.

IA1.1 Details for Dechow et al. (2004)-type equity durations

To forecast future cash-flows to shareholders with Equation (8), (9) and (10), we start by estimating the autoregressive parameters ρ_{roe} and ρ_{eg} separately from a pooled regression over the full sample period. Our estimates can be found in Table IA1 and are fairly similar to those of Weber (2018).[1] We use income before extraordinary items (IB) divided by book-equity for ROE in (9). The definition of book equity follows Davis et al. (2000) and we provide details in Appendix IA3. Moreover, we follow Dechow et al. (2004) or Weber (2018) and use sales growth data (item SALE) for EG to estimate the AR (1) coefficient for book equity growth in (10). As in Dechow et al. (2004), we assume that ROE reverts to the long-run cost of equity (μ_{roe}) of 12 % and equity growth (EG) to the long-run macroeconomic growth rate (μ_{eg}) of 6 %. Thereafter, we plug in ROE and EG measured at time t into the AR 1 processes (9) and (10) to forecast future cash-flows to shareholders at time $t+1$ in Equation (8). In this step, EG is measured by book equity growth. As in Weber (2018), we repeat this procedure for a finite forecasting horizon of 15 years.

Then we estimate the following three versions of the Dechow et al. (2004) equity duration measure: First, we obtain the original measure DUR^{DSS} in Equation (11) using the forecast cash-flows CF, together with a uniform discount rate of 12%, and the market price P from CRSP. Second, we obtain an estimate for TIM^{DSS} in Equation (13) based on the cash-flow forecast CF, a constant

[1] We obtain quantitatively similar results if we either use the parameters in Dechow et al. (2004) or Weber (2018). Moreover, we 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 4.

discount rate of 12% and a model implied price P^{FIP}. We assume a model-implied and uniform long-run growth rate g of 6% when estimating forecast-implied prices in Equation (14). Third, we calculate $TIM^{DSS-SLG}$ precisely as TIM^{DSS} with the only difference that we account for stock specific long-rung growth rates g when estimating forecast implied prices. In general, we follow Tengulov et al. (2019) to estimate g and provide details on the estimation procedure and the selected explanatory variables in Appendix IA2.[2]

Table IA1: AR(1) parameters for Dechow et al. (2004)-type equity durations.

This table shows the parameters for the autoregressive processes of order one (AR(1)) for return on equity (ROE) from Equation (9) and book equity growth (EG) from Equation (10). μ corresponds to the long run mean, β to the constant in the AR(1) process and ρ is the AR(1) coefficient. It holds that $\mu = \frac{\beta}{1-\rho}$. We estimate these coefficients for ROE and EG separately from pooled autoregressions over the full sample period (January 1964 to December 2020).

	μ	β	ρ
ROE	0.120	0.031	0.741
EG	0.060	0.048	0.208

[2]Note that 9.4% of observations for TIM^{DSS} and 5.5% of observations for $TIM^{DSS-SLG}$ have negative forecast-implied prices in our sample. We exclude these observations.

IA1.2 Details for Gonçalves (2021b)-type equity durations

We closely follow Gonçalves (2021b) in all steps and start by forecasting future cash-flows to shareholders in Equation (17) with the following 12 state variables for the vector $s_{j,t}$:

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 as in 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 Appendix IA3. 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 (2021b) and deflate all raw level quantities by the Consumer Price Index (CPI).[3]

Thereafter, we estimate Γ and the covariance matrix of firm-demeaned residuals (Σ) from the VAR in Equation (16) by pooling together all observations with an expanding window. Specifically, we estimate Γ line by line with Fama and MacBeth (1973) cross-sectional regressions that weight each cross-section with the corresponding number of firms in that cross-section. As in Gonçalves (2021b), we exclude the 20% smallest stocks based on NYSE breakpoints when estimating the VAR. Moreover,

[3] We follow Gonçalves (2021b) 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, we winsorize all non-bounded state variables at the 1% and 99 % quantiles of their distributions in every fiscal year.

we follow Gonçalves (2021b) and obtain the intercepts in Γ such that the long-run expectations of the state variables in the vector $s_{j,t}$ equal the product of Γ and the vector of time-series averages 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 IA2. After calculating the VAR-implied parameters v_1 and v_2, we forecast future cash-flows to shareholders in Equation (19) for the next 1000 years.[4] In this step, accounting data is from calendar years ending in $t-1$ and market equity from the end of December in year $t-1$.

Then, we estimate the following three versions of the Gonçalves (2021b) equity duration measure: First, we estimate the original DUR^{GON} measure in Equation (19) based on these forecast cash-flows and a stock specific discount rate $dr_{j,t}$ which we estimate by solving Equation (18) with a root-finding algorithm.[5] Moreover, we calculate TIM^{GON} as in Equation (19) with the forecast cash-flows, a uniform discount rate of 12%, a forecast-implied price for all stocks, and no market based state variables (excluding book-to-market, payout yield, sales yield and market leverage).[6] Lastly, we calculate $DUR^{GON-UDR}$ by replacing stock-specific discount rates with a uniform discount rate of 12% but still include all state variables in the VAR. We also calculate a version of this measure with firm fixed effects in the VAR by demeaning all state variables for each firm: $TIM^{GON-UDR*}$.

[4]Note that we follow Gonçalves (2021b) and shrink the intercepts in Γ to the long-run medians when we calculate v_1 and v_2. This speeds up the convergence of the variance and covariance terms needed for v_1 and v_2. Details on the adjustment can be found in the Appendix of Gonçalves (2021b).

[5]Due to a finite forecast horizon of 1000 years we apply the same approximation for the calculation of equity duration as Gonçalves (2021b). Moreover, we obtain rank correlations of roughly 90 % between our DUR^{GON} estimate and the original equity duration estimates published by Andrei Goncalves. However, we note that small changes in the definition of state variables and in the construction of the VAR can lead to different outcomes. The reasons are twofold: First, small estimation differences in the VAR can have a substantial effect on the convergence of the VAR parameters v_1 and v_2. Second, the VAR is estimated with an expanding window.

[6]Note that roughly 2.5% of forecast implied prices become negative for TIM^{GON} in our sample. We exclude these observations.

Table IA2: VAR parameters for the Gonçalves (2021b) equity duration measure.

Panel *A* shows the Γ matrix from Equation (16) over the full sample period from 1974 to 2020. Panel *B* shows the variance-covariance matrix Σ of firm-demeaned residuals over the full sample period and Panel *C* shows the steady state means of the full sample period (time-series averages of cross-sectional medians).

	Cons	BM	POY	SY	EG	AG	SG	CPROF	ROE	GPA	MLEV	BLEV	CASH
Panel *A*: **Coefficients of Γ**													
BM	-0.07	0.82	0.34	0.01	0.15	0.07	0.00	-0.06	0.08	-0.19	-0.11	0.11	-0.24
		(74.43)	(6.35)	(2.22)	(4.86)	(3.57)	(-0.38)	(-2.24)	(2.15)	(-7.34)	(-3.07)	(3.33)	(-10.19)
POY	0.03	0.02	0.24	0.00	0.01	-0.02	-0.03	-0.01	0.03	0.02	-0.07	0.02	0.00
		(8.93)	(12.00)	(0.75)	(0.61)	(-5.28)	(-8.96)	(-1.40)	(4.37)	(4.96)	(-7.86)	(2.44)	(0.64)
SY	0.04	-0.08	0.34	0.94	0.05	0.35	-0.07	-0.07	-0.05	-0.20	-0.02	-0.06	-0.31
		(-7.44)	(4.85)	(135.79)	(1.59)	(15.20)	(-3.46)	(-2.39)	(-1.74)	(-6.97)	(-1.11)	(-0.87)	(-11.05)
EG	-0.04	-0.12	-0.14	0.03	0.12	0.04	0.12	-0.07	0.09	-0.03	-0.03	0.10	0.02
		(-16.75)	(-2.21)	(9.52)	(7.23)	(2.55)	(10.00)	(-3.10)	(3.13)	(-2.72)	(-0.67)	(3.49)	(0.95)
AG	0.03	-0.06	-0.16	0.00	0.10	0.05	0.11	-0.04	0.02	-0.01	-0.08	0.00	-0.03
		(-11.10)	(-3.87)	(-0.35)	(7.56)	(4.83)	(9.42)	(-3.06)	(1.47)	(-1.09)	(-5.65)	(0.20)	(-2.50)
SG	0.05	-0.04	-0.16	-0.03	0.01	0.28	0.06	-0.06	-0.04	-0.05	0.07	-0.06	-0.04
		(-8.06)	(-4.03)	(-9.02)	(0.65)	(28.57)	(4.38)	(-2.68)	(-3.17)	(-3.79)	(3.48)	(-2.63)	(-2.49)
CPROF	-0.04	-0.07	-0.04	0.03	-0.06	0.02	0.00	0.13	0.34	0.14	-0.14	0.15	-0.03
		(-6.42)	(-0.52)	(5.57)	(-2.44)	(0.55)	(-0.14)	(4.49)	(8.75)	(4.27)	(-3.60)	(4.35)	(-1.13)
ROE	0.01	-0.04	0.07	0.03	-0.03	0.00	-0.02	0.05	0.44	0.13	-0.12	0.04	-0.09
		(-7.15)	(1.58)	(7.16)	(-1.36)	(-0.32)	(-1.21)	(2.01)	(15.44)	(5.65)	(-3.01)	(1.19)	(-5.01)
GPA	0.02	-0.01	-0.01	0.00	0.00	-0.05	0.00	-0.02	-0.05	0.94	-0.01	0.00	0.00
		(-12.06)	(-1.32)	(4.09)	(-1.29)	(-12.62)	(-0.49)	(-2.52)	(-7.05)	(193.47)	(-1.07)	(-0.66)	(0.18)
MLEV	0.04	0.00	0.02	0.00	0.01	0.03	-0.01	0.00	0.01	-0.05	0.81	0.07	-0.06
		(2.90)	(0.75)	(1.13)	(1.19)	(4.45)	(-1.91)	(0.08)	(1.12)	(-9.68)	(65.96)	(5.96)	(-8.04)
BLEV	0.04	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00	0.01	-0.02	0.04	0.84	-0.05
		(1.50)	(-0.50)	(-5.55)	(0.88)	(2.83)	(-1.04)	(-0.26)	(0.28)	(-5.50)	(6.03)	(112.32)	(-9.71)
CASH	0.02	-0.01	-0.02	0.00	-0.01	-0.04	0.01	0.01	-0.02	0.01	0.04	-0.07	0.82
		(-7.64)	(-2.89)	(-5.03)	(-3.43)	(-11.13)	(4.58)	(3.64)	(-3.66)	(2.01)	(7.18)	(-10.74)	(119.05)
Panel *B*: **Variance-covariance matrix (Σ)**													
BM	.	0.127	0.000	0.105	0.014	0.001	-0.005	0.012	0.007	-0.003	0.015	0.000	-0.002
POY	.	0.000	0.004	0.004	-0.006	-0.003	-0.002	0.003	0.001	0.000	0.001	0.001	0.000
SY	.	0.105	0.004	0.149	-0.025	-0.008	0.013	-0.010	-0.007	0.001	0.020	0.005	-0.005
EG	.	0.014	-0.006	-0.025	0.051	0.025	0.015	0.030	0.019	0.001	-0.004	-0.004	0.002
AG	.	0.001	-0.003	-0.008	0.025	0.031	0.017	0.012	0.005	0.000	0.003	0.003	0.000
SG	.	-0.005	-0.002	0.013	0.015	0.017	0.033	0.009	0.006	0.005	0.000	0.000	-0.001
CPROF	.	0.012	0.003	-0.010	0.030	0.012	0.009	0.071	0.033	0.002	-0.002	-0.002	0.000
ROE	.	0.007	0.001	-0.007	0.019	0.005	0.006	0.033	0.061	0.002	-0.002	-0.002	0.000
GPA	.	-0.003	0.000	0.001	0.001	0.000	0.005	0.002	0.002	0.003	-0.001	-0.001	0.000
MLEV	.	0.015	0.001	0.020	-0.004	0.003	0.000	-0.002	-0.002	-0.001	0.007	0.004	-0.001
BLEV	.	0.000	0.001	0.005	-0.004	0.003	0.000	-0.002	-0.002	-0.001	0.004	0.004	-0.001
CASH	.	-0.002	0.000	-0.005	0.002	0.000	-0.001	0.000	0.000	0.000	-0.001	-0.001	0.004
Panel *C*: **Time-series medians of cross-sectional averages**													
Steady states	.	-0.64	0.02	0.08	0.06	0.05	0.06	0.10	0.12	0.31	0.18	0.21	0.08

IA2 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 EBITDA from year t to $t+5$ ($G_{t \to t+5}$) on predictors ($X_{i,j,t}$) from year t:

$$G_{i,t \to t+5} = \alpha_j + \sum_{f=1}^{m} \beta_{f,t+5} \cdot X_{i,j,t} + \epsilon_{i,j,t+5} \tag{20}$$

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 independent variables without requiring specific conditions (oracle property).

In the second step we generate out-of-sample forecasts at time $t+5$ using the estimated parameters $\hat{\beta}_{1,t+5}, \hat{\beta}_{2,t+5}, ..., \hat{\beta}_{m,t+5}$ from the model above. Thus we obtain the long run growth forecasts $\hat{G}_{i,j,t+5 \to t+10}$:

$$\hat{G}_{i,j,t+5 \to t+10} = \hat{\alpha_j} + \sum_{f=1}^{m} \hat{\beta}_{f,t+5} \cdot X_{i,j,t+5} \tag{21}$$

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 ($X_{i,j,t+5}$) at $t+5$ and not only those which have 5 year EBITDA growth information. Consequently, this might dampen the particular selection of surviving firms in the first step.

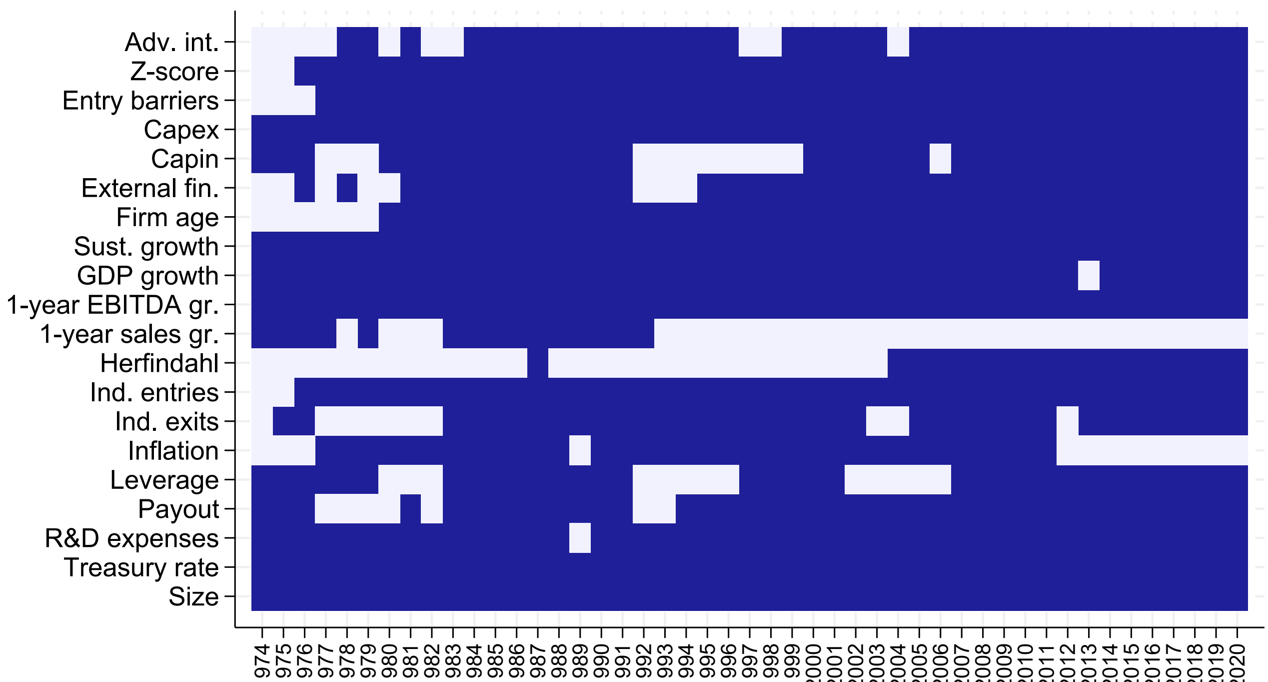
Table IA3: Descriptions for predictive variables used in the LASSO procedure. This table documents the construction of all variables used in the LASSO procedure to predict long term growth rates in EBITDA. All constructions follow Tengulov et al. (2019) and abbreviations in capital letters correspond the to items available at COMPUSTAT.

Variable	Description
Advertising intensity	Advertising expenses scaled by sales ($\frac{XAD_t}{SALE_t}$)
Altmans' Z-score	Z = 3.3*(operating income/assets)+1.4*(retained earnings/assets) +(sales/assets)+1.2*((current assets-current liabilities)/assets) $Z_t = ((3.3 \cdot \frac{OIADP_t}{AT_t} + 1.4 \cdot \frac{RE_t}{AT_t} + \frac{SALE_t}{AT_t} + 1.2 \cdot \frac{ACT_t - LCT_t}{AT_T}$ $\frac{CEQ_t + TXDB_t}{PRCCF_t \cdot CSHO_t}$
Entry barriers	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 $\frac{PPEGT_t}{AT_t}$
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 $\frac{DP_t}{SALE_t}$
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
Sustainable growth	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 $\left(\frac{GDP_t}{GDP_{t-10}}\right)^{0.1} - 1$
EBITDA Growth$_{t \to t+1}$	$\left(\frac{EBITDA_t}{EBITDA_{t-1}}\right) - 1$
EBITDA Growth$_{t \to t+5}$	$\left(\frac{EBITDA_t}{EBITDA_{t-5}}\right)^{0.2} - 1$
Sales Growth$_{t \to t+1}$	$\left(\frac{SALE_t}{SALE_{t-1}}\right) - 1$
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 expenses	Research and development expenses divided by sales $\frac{XRD_t}{SALE_t}$
10-year treasury rate	10 year treasury rate
Size	Natural logarithm of total assets: $ln(AT_t)$

Figure IA1: 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 5-year EBITDA growth. Dark blue indicates the variable was selected in a given year, whereas light blue indicates the variable was not selected in a particular year.



IA3 Construction of additional variables

Asset growth. We estimate the asset growth of each stock from July in year t until June of year $t+1$ from Compustat data as the change in total assets (AT) from the fiscal year ending in $t-1$ to the fiscal year ending in $t-2$:

$$\text{Asset growth} = \frac{AT_{t-1} - AT_{t-2}}{AT_{t-2}}$$

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. Lastly, we follow Davis et al. (2000) and add hand collected book equity data from Moody's manual.

Book equity growth. We estimate the book equity growth of each stock from July in year t until June in year $t+1$ by the percentage growth rate in book equity from the fiscal year ending in $t-2$ until the fiscal year ending in $t-1$.

Book leverage. We follow Fama and French (1992) and construct the book leverage of each stock from July in year t until June in year $t+1$ by the ratio of total assets (AT) and book equity from the fiscal year ending in $t-1$.

Book-to-market ratio. We follow Fama and French (1992) and obtain the book-to-market ratio for each stock from July in year t until June in year $t+1$ by scaling the book equity from the fiscal year ending in year $t-1$ with the market equity from CRSP, which we measure at the end of December in year $t-1$. The market-to-book ratio is then the inverse of this ratio.

Dividend ratio. We calculate the dividend ratio of each stock from July in year t until June in year $t+1$ by the ratio of common dividends (DVC) to income before extraordinary items (IB). Both accounting variables are from the fiscal year ending in $t-1$.

Issuance ratio. We estimate the issuance ratio of each stock from July in year t until June in year $t+1$ as:

$$\text{Issuance ratio} = \frac{SSTK_{t-1} - \mathbb{1}_{\Delta PSTKRV>0}(PSTKRV_{t-1} - PSTKRV_{t-2})}{BE_{t-1}}$$

SSTK corresponds to the sale of common and preferred stock, PSTKRV is the value of preferred stocks outstanding, $\mathbb{1}_{\Delta PSTKRV>0}$ is an indicator being one if the change in PSTKRV is positive and zero otherwise. The time subscripts correspond to the fiscal year ending in the denoted year.

Market beta. In each month t we estimate the market beta for stock j as the slope coefficient from the following regression:

$$r_{j,t} - r_{f,t} = \alpha + \beta \cdot (r_{m,t} - r_{f,t}) + u_t$$

where r_j is the return of stock j, r_f the risk free rate and r_m the market return. We run this regression in each month t using the observations from the previous 60 months. Moreover, we require a minimum of 24 monthly observations for each regression.

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 equity issuances and repurchases starts around 1971, we follow

Boudoukh et al. (2007) and use CRSP information on market equity such that payouts before 1971 are defined as: $PO_{j,t} = DVC_{j,t} - \big((SHROUT_t \cdot CFACSHR_t) - (SHROUT_{t-1} \cdot CFACSHR_{t-1})\big) \cdot \frac{1}{2}\big(\frac{PRC_t}{CFACPR_t} + \frac{PRC_{t-1}}{CFACPR_{t-1}}\big)$. Note that SHROUT is shares outstanding, CFACSHR the cumulative factor to adjust shares outstanding, PRC the price and CFACPR the cumulative factor to adjust the price. Moreover, this market information is only used to estimate the VAR parameters Γ and Σ because cash flow forecasts start in 1973.

Operating profitability. We follow Fama and French (2015) and obtain operating profitability for each stock from July in year t until June in year $t+1$ as:

$$\text{Operating profitability} = \frac{REVT_{t-1} - COGS_{t-1} - XSGA_{t-1} - XINT_{t-1}}{BE_{t-1}}$$

REVT are revenues, COGS costs of goods sold, XSGA selling and administrative expenses, XINT interest expenses, and BE is book equity. All accounting variables are from the fiscal year ending in $t-1$. We replace missing values of COGS, XSGA and XINT with zero as long as at least one of these three accounting variables is available.

Profits-to-assets. We follow Novy-Marx (2013) and estimate gross profits-to-assets for each stock from July in year t to June in year $t+1$ from Compustat data ending in the fiscal year $t-1$:

$$\text{Profits-to-assets} = \frac{REVT_{t-1} - COGS_{t-1}}{AT_{t-1}}$$

REVT are revenues, COGS costs of goods sold and AT total assets.

Repurchase ratio. We estimate the repurchase ratio of each stock from July in year t until June in year $t+1$ as:

$$\text{Repurchase ratio} = \frac{PRSTKC_{t-1} - \mathbb{1}_{\Delta PSTKRV<0}(PSTKRV_{t-1} - PSTKRV_{t-2})}{IB_{t-1}}$$

PRSTKC corresponds to the value of purchased common and preferred stock, PSTKRV is the value of preferred stocks outstanding, $\mathbb{1}_{\Delta PSTKRV<0}$ is an indicator being one if the change in PSTKRV is negative and zero otherwise. The time subscripts correspond to the fiscal year ending in the denoted year.

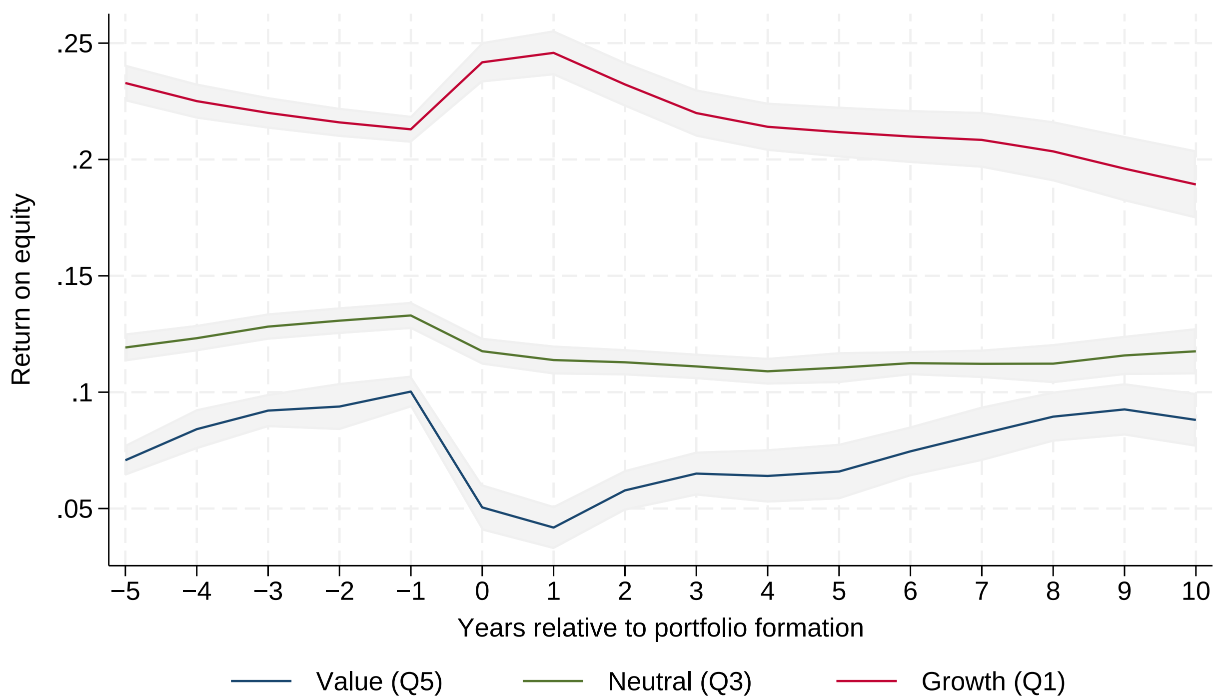
Return on equity . We calculate the return on equity for each stock from July in year t until June in year $t+1$ by scaling income before extraordinary items (IB) from the fiscal year ending in $t-1$ with book equity from the fiscal year ending in $t-2$.

Size. We calculate the size of each stock as the natural logarithm of the market capitalization denoted in U.S. Dollar from CRSP.

Total payout ratio. We estimate the total payout ratio of each stock from July in year t until June in year $t+1$ by dividing net payouts for the fiscal year ending in $t-1$ with the book equity from the fiscal year ending in $t-1$.

Figure IA2: Return on equity for portfolios sorted on the book-to-market ratio.

We sort the cross-section of stocks in each June of year t into quintiles based on the book-to-market ratio. We rebalance these portfolios yearly and investigate for each portfolio in each year t the value-weighted return on equity (ROE) in the 5 years before portfolio formation ($t-1$ to $t-5$) and in the following 10 years after portfolio formation (t to $t+10$). We take the time-series average across all portfolio formation years. We depict these ROE's for the highest quintile (growth), the third quintile (neutral) and the lowest quintile (value) based on the book-to-market ratio. ROE in year t is defined as income before extraordinary items (IB) divided by book equity from year $t-1$ measured as in Davis et al. (2000). 95 % confidence intervals correspond to Newey and West (1987) corrected standard errors and are depicted in gray.



IA4 Unconditional returns of duration/timing sorted portfolios

Table IA4: Returns of duration/timing-sorted portfolios based on holding periods.

This table shows monthly average holding period returns in percent per month for portfolios sorted on equity duration measures over different horizons. I.e. $r^e_{t\rightarrow t+2}$ is the average excess return for a holding period over the next 2 years. Holding period returns are calculated from January 1964 - December 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: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
$r^e_{t\rightarrow t+2}$	0.84	0.80	0.81	0.80	0.67	0.65	0.64	0.63	0.58	0.50	**-0.35**
	(4.68)	(4.98)	(5.13)	(5.43)	(4.52)	(4.09)	(4.13)	(3.79)	(2.95)	(1.98)	**(-1.69)**
$r^e_{t\rightarrow t+3}$	0.82	0.79	0.79	0.76	0.69	0.64	0.63	0.62	0.58	0.54	**-0.28**
	(5.05)	(5.45)	(5.81)	(5.83)	(4.88)	(4.37)	(4.40)	(3.85)	(3.07)	(2.27)	**(-1.36)**
$r^e_{t\rightarrow t+4}$	0.80	0.82	0.79	0.76	0.69	0.63	0.62	0.62	0.57	0.58	**-0.21**
	(5.25)	(6.21)	(5.89)	(5.90)	(5.11)	(4.52)	(4.28)	(3.93)	(3.05)	(2.43)	**(-0.99)**
$r^e_{t\rightarrow t+5}$	0.79	0.79	0.80	0.75	0.69	0.64	0.60	0.60	0.56	0.59	**-0.20**
	(5.31)	(5.93)	(5.99)	(5.85)	(5.03)	(4.50)	(4.07)	(3.79)	(2.85)	(2.44)	**(-0.90)**
					DUR^{GON} equity duration						
$r^e_{t\rightarrow t+2}$	1.00	0.95	0.98	0.90	0.95	0.77	0.75	0.80	0.71	0.34	**-0.65**
	(5.35)	(6.25)	(6.40)	(5.26)	(5.40)	(4.86)	(5.32)	(4.80)	(3.70)	(1.56)	**(-3.31)**
$r^e_{t\rightarrow t+3}$	0.97	0.90	0.94	0.94	0.94	0.75	0.75	0.79	0.71	0.38	**-0.59**
	(5.87)	(6.36)	(6.63)	(6.11)	(5.93)	(5.24)	(5.91)	(4.94)	(3.93)	(1.81)	**(-3.12)**
$r^e_{t\rightarrow t+4}$	0.95	0.89	0.90	0.93	0.90	0.77	0.77	0.76	0.68	0.43	**-0.52**
	(6.17)	(6.75)	(6.25)	(6.98)	(6.34)	(5.87)	(5.92)	(4.88)	(4.00)	(2.00)	**(-2.59)**
$r^e_{t\rightarrow t+5}$	0.94	0.90	0.89	0.91	0.92	0.75	0.76	0.77	0.67	0.44	**-0.50**
	(6.49)	(7.27)	(6.29)	(7.06)	(6.77)	(5.95)	(5.78)	(5.13)	(3.85)	(2.11)	**(-2.49)**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
$r^e_{t\rightarrow t+2}$	0.64	0.61	0.57	0.57	0.61	0.65	0.62	0.57	0.69	0.79	**0.15**
	(3.26)	(3.44)	(3.53)	(3.70)	(3.96)	(4.01)	(4.01)	(3.38)	(3.75)	(3.25)	**(0.88)**
$r^e_{t\rightarrow t+3}$	0.64	0.59	0.59	0.58	0.63	0.64	0.62	0.60	0.69	0.76	**0.13**
	(3.30)	(3.57)	(3.85)	(3.98)	(4.57)	(4.44)	(4.51)	(4.06)	(4.17)	(3.54)	**(0.82)**
$r^e_{t\rightarrow t+4}$	0.65	0.58	0.59	0.60	0.65	0.62	0.60	0.61	0.71	0.75	**0.10**
	(3.41)	(3.56)	(3.98)	(4.51)	(5.03)	(4.56)	(4.50)	(4.35)	(4.46)	(3.74)	**(0.73)**
$r^e_{t\rightarrow t+5}$	0.65	0.56	0.61	0.60	0.63	0.62	0.62	0.62	0.72	0.75	**0.11**
	(3.32)	(3.38)	(4.07)	(4.37)	(4.80)	(4.45)	(4.80)	(4.42)	(4.40)	(3.76)	**(0.82)**
					$TIM^{DSS-SLG}$ equity duration						
$r^e_{t\rightarrow t+2}$	0.78	0.64	0.70	0.75	0.69	0.77	0.86	0.72	0.73	0.69	**-0.09**
	(3.76)	(3.46)	(4.05)	(4.64)	(3.87)	(4.10)	(4.50)	(3.78)	(3.44)	(2.42)	**(-0.48)**
$r^e_{t\rightarrow t+3}$	0.77	0.66	0.69	0.76	0.69	0.78	0.79	0.78	0.72	0.75	**-0.02**
	(3.71)	(3.78)	(3.92)	(4.96)	(3.88)	(4.55)	(4.54)	(4.95)	(3.66)	(3.00)	**(-0.12)**
$r^e_{t\rightarrow t+4}$	0.77	0.66	0.72	0.79	0.71	0.74	0.76	0.79	0.77	0.76	**-0.01**

Continued on next page

Table IA4: Returns of duration/timing-sorted portfolios based on holding periods.

	(3.75)	(3.85)	(4.13)	(5.11)	(4.29)	(4.71)	(4.56)	(5.32)	(4.30)	(3.32)	**(-0.04)**
$r^e_{t\to t+5}$	0.74	0.67	0.71	0.79	0.74	0.75	0.76	0.80	0.78	0.82	**0.07**
	(3.55)	(3.96)	(4.10)	(5.18)	(4.72)	(4.77)	(4.89)	(5.32)	(4.31)	(3.86)	**(0.46)**
					TIM^{GON} equity duration						
$r^e_{t\to t+2}$	0.70	0.61	0.72	0.71	0.91	0.67	0.74	0.66	0.81	0.65	**-0.06**
	(4.49)	(3.92)	(3.61)	(4.37)	(5.06)	(3.74)	(3.82)	(3.57)	(4.52)	(2.50)	**(-0.35)**
$r^e_{t\to t+3}$	0.67	0.65	0.69	0.73	0.88	0.68	0.77	0.69	0.78	0.69	**0.01**
	(4.86)	(4.36)	(3.69)	(4.78)	(5.12)	(4.16)	(4.32)	(3.82)	(4.73)	(2.83)	**(0.10)**
$r^e_{t\to t+4}$	0.65	0.65	0.72	0.73	0.82	0.69	0.78	0.71	0.77	0.71	**0.06**
	(4.88)	(4.66)	(4.05)	(4.62)	(5.17)	(4.35)	(4.53)	(4.05)	(4.94)	(3.10)	**(0.44)**
$r^e_{t\to t+5}$	0.65	0.67	0.70	0.71	0.79	0.70	0.78	0.72	0.77	0.73	**0.08**
	(4.99)	(4.81)	(4.10)	(4.41)	(5.02)	(4.33)	(4.72)	(4.37)	(5.06)	(3.30)	**(0.60)**

Table IA5: Unconditional returns on duration/timing-sorted portfolios with constant breakpoints.

This table shows monthly average returns in excess of the risk-free rate and mean pricing errors (α^{FF5}) relative to the Fama and French (2015) five-factor model for portfolios sorted on equity duration measures. We calculate the breakpoints to assign stocks into portfolios over the full sample period. Mean excess returns are calculated from January 1964 - December 2020, are value weighted and reported in percent per month. Numbers in brackets are Newey and West (1987) t-statistics with 6 lags. Moreover, we report annualized Sharpe ratios $SR_{ann} = (r^e \cdot 12)/(\sigma_{monthly} \cdot \sqrt{12})$ and the lowest constant breakpoint for each quintile.

	D1	D2	D3	D4	D5	**D5-D1**
Panel *A*: **Equity duration measures including discount rate information**						
			DUR^{DSS} equity duration			
r^e	0.74	0.70	0.54	0.53	0.55	**-0.19**
	(3.71)	(3.78)	(3.13)	(2.78)	(2.38)	**(-1.08)**
α^{FF5}	-0.05	-0.02	-0.16	-0.16	-0.01	**0.04**
	(-0.63)	(-0.27)	(-2.61)	(-2.61)	(-0.10)	**(0.34)**
SR_{ann}	0.48	0.51	0.41	0.38	0.34	**-0.16**
Const. breakpoints	0.21	14.79	17.82	19.66	21.38	
			DUR^{GON} equity duration			
r^e	0.90	0.78	0.70	0.62	0.53	**-0.37**
	(3.84)	(3.88)	(3.38)	(2.77)	(2.10)	**(-2.00)**
α^{FF5}	-0.03	-0.01	-0.14	-0.21	-0.28	**-0.24**
	(-0.29)	(-0.15)	(-2.00)	(-2.32)	(-2.32)	**(-1.41)**
SR_{ann}	0.56	0.57	0.49	0.40	0.31	**-0.29**
Const. breakpoints	1.73	17.72	28.57	40.05	54.61	

Continued on next page

Table IA5: Unconditional returns on duration/timing-sorted portfolios with constant breakpoints.

Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**

			TIM^{DSS} equity duration			
r^e	0.61	0.55	0.60	0.60	0.77	**0.16**
	(3.32)	(3.09)	(3.48)	(3.33)	(3.07)	**(1.06)**
α^{FF5}	0.08	-0.03	-0.03	-0.04	0.03	**-0.05**
	(1.91)	(-0.65)	(-0.46)	(-0.65)	(0.27)	**(-0.50)**
SR_{ann}	0.46	0.41	0.45	0.45	0.43	**0.15**
Const. breakpoints	7.11	16.57	18.07	19.38	21.42	
			$TIM^{DSS-SLG}$ equity duration			
r^e	0.71	0.75	0.69	0.72	0.65	**-0.06**
	(3.56)	(3.60)	(3.34)	(3.16)	(2.49)	**(-0.40)**
α^{FF5}	0.10	0.06	-0.01	0.06	-0.04	**-0.14**
	(1.93)	(0.87)	(-0.15)	(0.62)	(-0.43)	**(-1.24)**
SR_{ann}	0.52	0.53	0.49	0.46	0.36	**-0.06**
Const. breakpoints	6.35	11.30	12.88	14.81	19.06	
			TIM^{GON} equity duration			
r^e	0.82	0.37	0.85	0.57	0.49	**-0.46**
	(1.79)	(1.05)	(2.95)	(1.91)	(1.58)	**(-0.86)**
α^{FF5}	0.52	-0.09	-0.03	-0.29	-0.25	**-1.01**
	(0.69)	(-0.33)	(-0.22)	(-1.44)	(-1.45)	**(-1.10)**
SR_{ann}	0.35	0.20	0.46	0.28	0.24	**-0.18**
Const. breakpoints	5.55	17.55	23.60	35.79	45.92	

Table IA6: Unconditional returns of duration/timing-sorted portfolios w/o issuances and repurchases.

This table shows monthly average returns in excess of the risk-free rate and mean pricing errors (α^{FF5}) relative to the Fama and French (2015) five-factor model for portfolios sorted on equity duration measures. For each equity duration measure we take out share repurchases and stock issuances when computing the growth in book equity. Mean excess returns are calculated from January 1964 until December 2020 (depending on data availability), are value weighted and reported in percent per month. Numbers in brackets are Newey and West (1987) t-statistics with 6 lags. Moreover, we report 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: **Equity duration measures including discount rate information**											
					DUR^{DSS} equity duration						
r^e	0.82	0.87	0.78	0.73	0.68	0.63	0.62	0.64	0.67	0.34	**-0.47**
	(3.96)	(4.12)	(3.88)	(3.98)	(3.87)	(3.51)	(3.74)	(3.56)	(3.25)	(1.22)	**(-2.12)**
α^{FF5}	0.01	0.07	-0.06	-0.02	-0.03	-0.13	-0.05	0.01	0.13	-0.14	**-0.15**
	(0.06)	(0.76)	(-0.61)	(-0.20)	(-0.31)	(-1.61)	(-0.67)	(0.12)	(1.76)	(-1.09)	**(-0.88)**
SR_{ann}	0.52	0.57	0.54	0.53	0.50	0.46	0.47	0.48	0.44	0.18	**-0.33**
					DUR^{GON} equity duration						
r^e	1.05	1.10	1.00	0.89	0.81	1.02	0.71	0.77	0.66	0.42	**-0.62**
	(4.83)	(5.23)	(5.05)	(4.09)	(3.87)	(5.08)	(3.68)	(4.19)	(3.39)	(1.68)	**(-2.97)**
α^{FF5}	0.09	0.19	0.12	0.05	-0.06	0.26	-0.11	0.04	-0.00	-0.22	**-0.32**
	(0.83)	(1.74)	(1.51)	(0.57)	(-0.81)	(3.20)	(-1.54)	(0.51)	(-0.02)	(-2.97)	**(-2.23)**
SR_{ann}	0.67	0.74	0.71	0.59	0.57	0.71	0.52	0.58	0.49	0.26	**-0.49**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{DSS} equity duration						
r^e	0.64	0.61	0.60	0.54	0.64	0.64	0.66	0.61	0.70	0.81	**0.16**
	(3.27)	(3.36)	(3.41)	(2.94)	(3.61)	(3.37)	(3.70)	(3.17)	(3.27)	(2.88)	**(0.88)**
α^{FF5}	0.08	0.11	-0.07	-0.09	-0.02	-0.05	-0.01	-0.07	-0.07	0.02	**-0.06**
	(1.35)	(1.98)	(-1.25)	(-1.38)	(-0.27)	(-0.64)	(-0.07)	(-0.96)	(-0.72)	(0.20)	**(-0.45)**
SR_{ann}	0.45	0.46	0.44	0.39	0.44	0.45	0.47	0.43	0.43	0.41	**0.13**
					$TIM^{DSS-SLG}$ equity duration						
r^e	0.78	0.65	0.75	0.72	0.71	0.82	0.83	0.67	0.86	0.62	**-0.16**
	(3.59)	(3.27)	(3.63)	(3.36)	(3.62)	(3.75)	(3.77)	(2.87)	(3.55)	(2.01)	**(-0.75)**
α^{FF5}	0.18	0.01	-0.02	0.02	0.05	0.02	0.09	-0.04	0.11	-0.20	**-0.38**
	(2.47)	(0.12)	(-0.22)	(0.22)	(0.47)	(0.15)	(1.05)	(-0.36)	(1.02)	(-1.58)	**(-2.32)**
SR_{ann}	0.54	0.47	0.53	0.48	0.49	0.53	0.55	0.41	0.51	0.31	**-0.12**
					TIM^{GON} equity duration						
r^e	0.60	0.60	0.58	0.86	0.78	0.64	0.93	0.80	0.97	0.71	**0.11**
	(3.25)	(3.23)	(2.76)	(4.30)	(3.63)	(2.83)	(4.05)	(3.56)	(3.54)	(2.27)	**(0.49)**
α^{FF5}	-0.21	-0.13	-0.08	0.04	0.05	-0.00	0.26	0.09	0.30	-0.03	**0.19**
	(-3.73)	(-2.08)	(-0.78)	(0.46)	(0.63)	(-0.03)	(2.44)	(0.85)	(2.29)	(-0.17)	**(1.16)**
SR_{ann}	0.47	0.46	0.40	0.60	0.52	0.41	0.59	0.51	0.55	0.35	**0.08**

Table IA7: Unconditional returns for portfolios sorted on other equity duration measures.

This table shows monthly average returns and mean pricing error (α^{FF5}) relative to the Fama and French (2015) five-factor model for portfolios sorted on other equity duration measures from 2.2.5. DUR^{CL} corresponds to the Chen and Li (2018) equity duration measure, whereas DUR^{CH} is the Chen (2011) equity duration measure. TIM^{CL} and TIM^{CH} represent the respective equity duration measure with forecast implied prices using a constant growth rate. Moreover, TIM^{CL-SLG} and TIM^{CH-SLG} represent the respective equity duration measure with forecast implied prices using a stock specific growth rate. Value weighted mean excess returns are calculated from January 1964 - December 2020 for the Chen and Li (2018) equity duration measure and from January 1981 - December 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 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: **Equity duration measures including discount rate information**											
					DUR^{CL} equity duration						
r^e	0.92	0.90	0.86	0.83	0.69	0.63	0.60	0.60	0.46	0.27	**-0.65**
	(4.47)	(4.83)	(4.96)	(4.62)	(4.22)	(3.72)	(3.41)	(3.24)	(1.97)	(0.95)	**(-3.11)**
α^{FF5}	0.13	0.10	0.20	0.14	0.05	-0.00	-0.00	0.07	0.01	-0.32	**-0.45**
	(1.44)	(1.44)	(2.34)	(2.07)	(0.78)	(-0.01)	(-0.03)	(1.21)	(0.20)	(-2.84)	**(-2.95)**
SR_{ann}	0.59	0.63	0.64	0.61	0.54	0.47	0.45	0.45	0.27	0.13	**-0.52**
					DUR^{CH} equity duration						
r^e	0.70	0.89	0.85	0.84	0.84	0.71	0.67	0.91	0.76	0.89	**0.19**
	(3.11)	(3.58)	(3.46)	(3.69)	(4.20)	(3.47)	(3.16)	(4.57)	(3.45)	(3.76)	**(1.27)**
α^{FF5}	-0.18	-0.04	-0.13	-0.17	-0.01	-0.13	-0.21	0.05	-0.02	0.17	**0.35**
	(-2.10)	(-0.40)	(-1.14)	(-1.71)	(-0.12)	(-1.48)	(-2.08)	(0.63)	(-0.19)	(2.16)	**(3.31)**
SR_{ann}	0.49	0.57	0.56	0.56	0.60	0.52	0.50	0.68	0.55	0.61	**0.22**
Panel B: **Equity duration measures excluding discount rate information (cash-flow timing)**											
					TIM^{CL} equity duration						
r^e	0.66	0.62	0.63	0.51	0.62	0.67	0.75	0.53	0.58	0.71	**0.05**
	(3.55)	(3.60)	(3.63)	(2.61)	(3.31)	(3.55)	(3.92)	(2.67)	(2.74)	(2.52)	**(0.27)**
α^{FF5}	0.12	0.11	0.03	-0.02	0.09	0.08	0.07	-0.06	-0.04	0.03	**-0.09**
	(2.11)	(1.81)	(0.49)	(-0.35)	(1.06)	(1.11)	(0.76)	(-0.61)	(-0.52)	(0.24)	**(-0.67)**
SR_{ann}	0.50	0.48	0.47	0.36	0.43	0.47	0.51	0.35	0.37	0.36	**0.04**

Continued on next page

Table IA7 Unconditional returns for portfolios sorted on other equity duration measures.

					TIM^{CH} equity duration						
r^e	0.73	0.95	0.79	0.73	0.73	0.77	0.67	0.88	0.87	0.84	**0.11**
	(3.41)	(4.75)	(4.11)	(3.15)	(2.90)	(3.66)	(2.88)	(3.78)	(3.13)	(2.51)	**(0.51)**
α^{FF5}	-0.06	0.18	0.00	-0.03	0.08	-0.12	-0.16	0.04	-0.03	0.07	**0.13**
	(-0.91)	(2.38)	(0.04)	(-0.40)	(0.67)	(-1.54)	(-1.70)	(0.33)	(-0.27)	(0.48)	**(0.78)**
SR_{ann}	0.55	0.74	0.62	0.51	0.49	0.54	0.45	0.59	0.51	0.43	**0.09**
					TIM^{CL-SLG} equity duration						
r^e	0.79	0.75	0.73	0.73	0.78	0.90	0.81	0.84	0.88	0.61	**-0.18**
	(3.97)	(3.70)	(3.41)	(3.61)	(3.72)	(4.24)	(3.46)	(3.82)	(3.32)	(1.96)	**(-0.84)**
α^{FF5}	0.11	0.11	0.08	-0.07	0.12	0.14	0.13	0.14	0.07	-0.08	**-0.19**
	(1.66)	(1.48)	(1.03)	(-0.81)	(1.23)	(1.69)	(1.28)	(1.23)	(0.72)	(-0.57)	**(-1.18)**
SR_{ann}	0.57	0.53	0.51	0.49	0.53	0.59	0.49	0.51	0.49	0.31	**-0.13**
					TIM^{CH-SLG} equity duration						
r^e	0.75	0.93	0.78	0.73	0.73	1.00	0.96	0.99	0.95	0.70	**-0.05**
	(3.37)	(4.63)	(3.51)	(2.99)	(3.14)	(4.67)	(4.14)	(4.04)	(3.01)	(2.24)	**(-0.27)**
α^{FF5}	0.00	0.20	0.06	0.00	-0.08	0.25	0.16	0.26	0.06	-0.01	**-0.01**
	(0.05)	(2.34)	(0.77)	(0.00)	(-0.68)	(2.48)	(1.39)	(2.59)	(0.36)	(-0.08)	**(-0.10)**
SR_{ann}	0.55	0.70	0.56	0.50	0.48	0.71	0.60	0.61	0.52	0.36	**-0.05**

Table IA8: Regressions of double sorted returns of the Dechow et al. (2004) measure on the dividend-price ratio.

Similar to Gormsen (2021) we sort stocks at the end of June in each year into two portfolios (high and low) based on the median book-to-market ratio in each cross-section. Within each of these book-to-market portfolios we sort the cross-section into quintiles according to the Dechow et al. (2004) equity duration measure and report the averages across the high and low book-to-market portfolio for each of these quintiles. Panel *A* shows the mean duration and Panel *B* the mean returns in excess of the risk-free rate. In Panel *C* we follow Gormsen (2021) and regress the returns of each quintile on the dividend-price ratio from the previous period and the contemporaneous market return. The dividend price ratio is from Robert Shiller and we report *t*-statistics based on Newey and West (1987) corrected standard errors. The time period ends in 2015 as in Gormsen (2021).

	D1	D2	D3	D4	D5	**D5-D1**
Panel *A*: **Mean duration in years**						
Duration	13.04	16.45	18.15	20.44	29.81	
Panel *B*: **Mean returns**						
r^e	0.82	0.65	0.67	0.52	0.24	**-0.58**
	(4.11)	(3.47)	(3.77)	(2.43)	(0.79)	**(-2.95)**
Panel *C*: **Regression on the dividend-price ratio**						
DP_{t-1}	13.94	23.23	18.68	17.98	19.47	**15.10**
	(1.33)	(2.27)	(1.56)	(1.66)	(2.28)	**(2.00)**
MKT_t	1.03	1.00	0.95	0.93	0.90	**0.93**
	(21.86)	(22.76)	(22.77)	(29.21)	(27.87)	**(24.51)**

IA5 Returns of duration/ timing-sorted portfolios during recession and expansion episodes

Figure IA3: The 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.

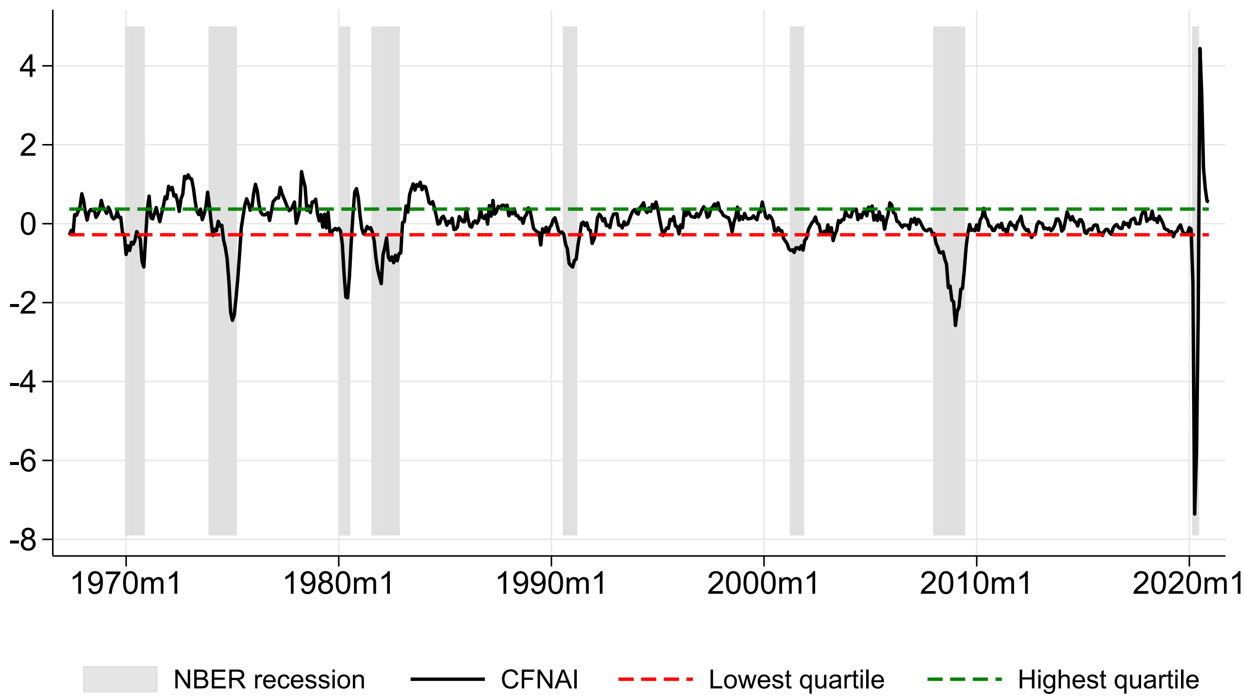


Table IA9: Returns of duration/timing-sorted portfolios conditional on the CFNAI w/o issuances and repurchases.

This table shows monthly excess returns for duration-sorted portfolios conditional on the Chicago Fed National Activity Index (CFNAI) from January 1974 to December 2020. For each equity duration measure we take out share repurchases and stock issuances when computing the growth in book equity. r^{high} (r^{low}) are monthly excess returns if the CFNAI is higher (lower) compared to the 75th (25th) quantile. Returns are value weighted and in percent per month. 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*: **Equity duration measures including discount rate information**												
					DUR^{DSS} equity duration							
r^{low}	0.24	0.72	0.68	0.71	0.58	0.54	0.72	0.76	0.80	-0.23	**-0.47**	**0.11**
	(0.43)	(1.30)	(1.23)	(1.49)	(1.24)	(1.16)	(1.59)	(1.67)	(1.53)	(-0.32)	**(-0.91)**	**(0.22)**
r^{high}	1.38	0.97	0.72	0.68	0.70	0.69	0.31	0.33	0.38	0.13	**-1.25**	**-0.89**
	(2.71)	(2.18)	(1.57)	(1.51)	(1.52)	(1.53)	(0.73)	(0.76)	(0.76)	(0.23)	**(-3.13)**	**(-1.73)**
					DUR^{GON} equity duration							
r^{low}	0.68	0.75	0.93	0.58	0.41	0.71	0.74	0.82	0.67	0.03	**-0.65**	**-0.04**
	(1.25)	(1.48)	(1.88)	(1.08)	(0.82)	(1.43)	(1.64)	(1.87)	(1.42)	(0.05)	**(-1.52)**	**(-0.10)**
r^{high}	1.17	1.06	0.86	1.00	0.75	0.70	0.65	0.61	0.12	0.08	**-1.09**	**-0.59**
	(2.28)	(2.15)	(1.87)	(2.10)	(1.69)	(1.52)	(1.39)	(1.36)	(0.30)	(0.16)	**(-2.79)**	**(-1.33)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**												
					TIM^{DSS} equity duration							
r^{low}	0.76	0.50	0.50	0.27	0.45	0.34	0.40	0.28	0.31	0.40	**-0.36**	**-0.71**
	(1.49)	(1.05)	(1.03)	(0.54)	(0.86)	(0.66)	(0.81)	(0.52)	(0.57)	(0.60)	**(-0.92)**	**(-1.66)**
r^{high}	0.37	0.47	0.63	0.41	0.80	0.56	0.47	0.45	0.77	0.96	**0.59**	**0.55**
	(0.78)	(1.09)	(1.39)	(0.94)	(1.83)	(1.22)	(1.18)	(1.09)	(1.39)	(1.48)	**(1.61)**	**(1.20)**
					$TIM^{DSS-SLG}$ equity duration							
r^{low}	0.73	0.68	0.70	0.39	0.47	0.74	0.45	0.13	0.45	-0.15	**-0.89**	**-0.98**
	(1.46)	(1.39)	(1.37)	(0.73)	(0.95)	(1.34)	(0.85)	(0.22)	(0.75)	(-0.22)	**(-2.26)**	**(-2.31)**
r^{high}	0.36	0.39	0.28	0.58	0.43	0.62	0.51	0.66	0.73	0.90	**0.54**	**0.90**
	(0.77)	(0.96)	(0.65)	(1.22)	(0.92)	(1.28)	(1.07)	(1.20)	(1.41)	(1.40)	**(1.43)**	**(1.98)**
					TIM^{GON} equity duration							
r^{low}	0.49	0.46	0.60	0.57	0.58	0.41	0.74	0.41	0.16	-0.05	**-0.54**	**-0.87**
	(1.10)	(1.01)	(1.15)	(1.13)	(1.08)	(0.77)	(1.33)	(0.77)	(0.26)	(-0.06)	**(-1.08)**	**(-1.92)**
r^{high}	0.30	0.40	0.40	0.67	0.65	0.32	0.84	0.84	1.00	0.59	**0.29**	**0.24**
	(0.73)	(0.98)	(0.95)	(1.46)	(1.44)	(0.63)	(1.60)	(1.63)	(1.76)	(0.96)	**(0.74)**	**(0.50)**

Table IA10: Returns of duration/timing-sorted portfolios conditional on the CFNAI - S&P 500 stocks.

This table shows monthly excess returns for duration-sorted portfolios conditional on the Chicago Fed National Activity Index (CFNAI). We limit our sample to stocks listed on the S&P 500 from January 1974 to December 2020. r^{high} (r^{low}) are monthly excess returns if the CFNAI is higher (lower) compared to the 75th (25th) quantile. Returns are value weighted and in percent per month. 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*: **Equity duration measures including discount rate information**												
						DUR^{DSS} equity duration						
r^{low}	0.46	0.44	0.63	0.04	0.65	0.43	0.56	0.35	0.49	0.15	**-0.30**	**-0.15**
	(0.95)	(0.92)	(1.29)	(0.08)	(1.52)	(0.97)	(1.25)	(0.84)	(1.02)	(0.28)	**(-0.68)**	**(-0.33)**
r^{high}	0.90	0.92	0.75	0.54	0.33	0.58	0.39	0.38	0.19	0.32	**-0.58**	**-0.53**
	(2.09)	(2.23)	(1.97)	(1.50)	(0.90)	(1.42)	(1.02)	(1.00)	(0.48)	(0.77)	**(-1.54)**	**(-1.18)**
						DUR^{GON} equity duration						
r^{low}	0.71	0.80	0.54	0.45	0.86	0.84	0.61	0.67	0.62	0.02	**-0.69**	**-0.23**
	(1.36)	(1.64)	(0.99)	(0.86)	(1.92)	(1.82)	(1.47)	(1.40)	(1.23)	(0.04)	**(-1.59)**	**(-0.51)**
r^{high}	0.77	0.93	0.86	0.89	0.67	0.47	0.44	0.35	0.15	-0.04	**-0.82**	**-0.38**
	(1.56)	(1.98)	(2.00)	(1.92)	(1.52)	(1.00)	(1.00)	(0.79)	(0.33)	(-0.09)	**(-1.93)**	**(-0.81)**
Panel *B*: **Equity duration measures excluding discount rate information (cash-flow timing)**												
						TIM^{DSS} equity duration						
r^{low}	0.34	0.51	0.21	0.28	0.12	0.30	0.19	0.05	0.31	0.22	**-0.12**	**-0.11**
	(0.68)	(1.21)	(0.44)	(0.60)	(0.26)	(0.60)	(0.41)	(0.10)	(0.63)	(0.39)	**(-0.32)**	**(-0.26)**
r^{high}	0.37	0.36	0.60	0.58	0.45	0.64	0.64	0.38	0.42	0.53	**0.15**	**0.25**
	(0.99)	(1.03)	(1.59)	(1.51)	(1.20)	(1.72)	(1.70)	(1.05)	(0.96)	(1.07)	**(0.43)**	**(0.62)**
						$TIM^{DSS-SLG}$ equity duration						
r^{low}	0.93	0.52	0.82	0.30	0.71	0.35	0.62	-0.02	0.08	0.40	**-0.53**	**-0.41**
	(1.92)	(1.05)	(1.59)	(0.60)	(1.42)	(0.66)	(1.11)	(-0.04)	(0.14)	(0.63)	**(-1.30)**	**(-0.97)**
r^{high}	0.19	0.23	0.36	0.51	0.26	0.43	0.36	0.31	0.90	0.69	**0.50**	**0.93**
	(0.40)	(0.55)	(0.86)	(1.09)	(0.61)	(0.89)	(0.75)	(0.63)	(1.71)	(1.32)	**(1.40)**	**(2.07)**
						TIM^{GON} equity duration						
r^{low}	0.76	0.35	0.66	0.25	0.58	0.45	0.43	0.53	0.72	-0.03	**-0.78**	**-0.82**
	(1.69)	(0.85)	(1.41)	(0.51)	(1.26)	(0.86)	(0.79)	(1.04)	(1.28)	(-0.04)	**(-1.80)**	**(-2.04)**
r^{high}	0.54	0.43	0.50	0.44	0.69	0.57	0.21	0.41	0.40	0.29	**-0.25**	**-0.09**
	(1.25)	(0.98)	(1.13)	(0.99)	(1.55)	(1.23)	(0.44)	(0.83)	(0.84)	(0.59)	**(-0.86)**	**(-0.22)**

IA6 A model of the cross section of timing-sorted stocks with cyclical return differentials

In our model, there are two mechanisms that govern the shape of cross-sectional return differences. Firms with higher exposure to persistent dividend growth have later cash-flow timing. On the one hand, stocks with high long-term growth exposure earn higher risk premia for this exposure. On the other hand, because innovations to persistent and local dividend growth are negatively correlated (and positively correlated with cash-flow volatility), late timing stocks are therefore a hedge against local dividend risk (and potentially cash-flow volatility).[7] Because this risk is higher in recessions, the term structure is downward sloping in recessions but upward sloping in low-volatility expansion times. When volatility is at its long-run mean, the two effects roughly cancel out, leading to a flat unconditional return differentials.

Late timing stocks in our model are a hedge against volatility. This is in line with their negative CMA-FF5 exposure and the finding in Cooper and Maio (2019) that the investment factor measures exposure to a volatility state variable. Similarly, late timing stocks have low profitability, which–as in our model–had been shown to be suggest positive exposure to economic growth in Cooper and Maio (2019).

IA6.1 Model setup

Dividends of stock i evolve according to:

$$\Delta d_{i,t+1} = \mu + \phi_i z_t + \sqrt{x_t}\sigma_d \epsilon_{d,t+1} \tag{22}$$

$$z_{t+1} = \rho z_t + \sigma_z(\phi_z \sqrt{x}_t \epsilon_{x,t+1} + \epsilon_{z,t+1} + \phi_d \sqrt{x}_t \epsilon_{x,t+1}) \tag{23}$$

$$x_{t+1} = \bar{x} + \rho_x x_t + \sqrt{x_t}\sigma_x \epsilon_{x,t+1}, \tag{24}$$

with standard-normal shocks ϵ_z, ϵ_d and ϵ_x. Cash-flow timing is governed by exposure to the persistent dividend growth process ϕ_i. The reduced-form log pricing-kernel $\ln(M) = m$ is assumed to be

$$m_{t+1} = -r_f - \frac{1}{2}\lambda_z^2 - \frac{1}{2}\lambda_x^2 x_t - \frac{1}{2}\lambda_d^2 x_t - \lambda_z \epsilon_{z,t+1} - \lambda_d \sqrt{x_t}\epsilon_{d,t+1} + \lambda_x \sqrt{x_t}\epsilon_{x,t+1}, \tag{25}$$

As in Gormsen (2021), the second term is set such that the risk-free rate is a constant r_f. The market prices of risk parameters λ_d, λ_x and λ_z are assumed to be larger than zero, s.t. in line with standard intuition, a state of the world with high volatility of dividends and dividend growth is considered a bad state, associated with a negative market price of risk.

[7] The feature of a positive correlation between volatility and and persistent growth is not needed when the persistence of volatility and the volatility of volatility or the market price of risk is sufficiently high.

IA6.2 Model solution

We impose the Euler equation in terms of price-dividend ratios of "zero-coupon equity" dividend claims with maturities n and $n-1$ under the conjecture of an affine log price-dividend ratio $P_t^{(n)}/D_t = \exp\left(A^{(n)} + B^{(n)} z_t + C^{(n)} x_t\right)$:

$$\frac{P_t^{(n)}}{D_t} = E_t \left[M_{t+1} \frac{D_{t+1}}{D_t} \frac{P_{t+1}^{(n-1)}}{D_{t+1}} \right] \tag{26}$$

$$\exp\left(A^{(n)} + B^{(n)} z_t + C^{(n)} x_t\right) \tag{27}$$

$$\begin{aligned} &= \exp\Bigg(-r_f + \mu + \phi_i z_t + \frac{1}{2} x_t \sigma_d^2 + A^{(n)} + B^{(n)} \rho z_t + \frac{1}{2}\left(B^{(n-1)}\right)^2 (1 + \phi_d^2 x_t + \phi_x^2 x_t)\sigma_z^2 + \\ &\quad C^{(n-1)}(\bar{x} + \rho_x x_t) + \frac{1}{2} x_t \sigma_x^2 \left(C^{(n-1)}\right)^2 - \lambda_d x_t \sigma_d - \lambda_z \sigma_z B^{(n-1)} - \lambda_d x_t \phi_d \sigma_z B^{(n-1)} \\ &\quad + \lambda_x x_t \phi_x \sigma_z B^{(n-1)} + \lambda_x \sigma_x x_t C^{(n-1)} + x_t \sigma_d \sigma_z \phi_d \Bigg) \end{aligned} \tag{28}$$

Matching coefficients yields:

$$A^{(n)} = A^{(n-1)} - r_f + \mu + \frac{1}{2}\left(B^{(n-1)}\right)^2 \sigma_z^2 + C^{(n-1)} \bar{x} - \lambda_z \sigma_z B^{(n-1)}, \tag{29}$$

$$B^{(n)} = \phi_i + B^{(n-1)} \rho \Leftrightarrow \phi_i \frac{1-\rho^n}{1-\rho}, \tag{30}$$

$$\begin{aligned} C^{(n)} &= \frac{1}{2}\sigma_d^2 + \frac{1}{2}\left(B^{(n-1)}\right)^2 \left(\phi_d^2 + \phi_x^2\right)\sigma_z^2 + C^{(n-1)} \rho_x + \frac{1}{2}\sigma_x^2 \left(C^{(n-1)}\right)^2 - \lambda_d \sigma_d \\ &\quad - \lambda_d \phi_d \sigma_z B^{(n-1)} + \lambda_x \phi_x \sigma_z B^{(n-1)} + \lambda_x \sigma_x C^{(n-1)} + \sigma_d \sigma_z \phi_d. \end{aligned} \tag{31}$$

B is positive and rises monotonically in n, i.e. longer-maturity claims are more positively exposed to persistent cash-flow growth. The sign and dependence of C depends on the market prices of risk and the correlation structure of shocks ϵ_d, ϵ_x and ϵ_z governed by coefficients ϕ_x and ϕ_d. As in Gormsen (2021), we suggest a negative correlation between persistent growth z and local growth d, i.e., $\phi_d < 0$. Moreover, cash-flow volatility is likely positively related to cash-flow growth, $\phi_x > 0$. With sufficiently high λ_d and λ_x, this results in a negative but soon increasing C.[8] Together with sufficiently high $r_f - \mu$, this results in a negative A that is declining in n. To sum up, claims with longer maturity are more positively exposed to persistent cash-flow growth, negatively influenced by cash-flow volatility (but less so than short maturity claims) and have overall lower prices than short-maturity claims.

IA6.3 Cyclical returns

Log returns on dividend claims with maturity n are given by

$$r_{t+1}^{(n)} = \ln\left(\frac{P_{t+1}^{(n-1)}}{D_{t+1}} \frac{D_t}{P_t^{(n)}} \frac{D_{t+1}}{D_t}\right) \tag{32}$$

$$= \mathbf{X_t} + B^{(n-1)} \sigma_z \left(\epsilon_{z,t+1} + \phi_d \sqrt{x}_t \epsilon_{d,t+1} + \phi_x \sqrt{x}_t \epsilon_{x,t+1}\right) + C^{(n-1)} \sigma_x \sqrt{x}_t \epsilon_{x,t+1} + \sqrt{x}_t \sigma_d \epsilon_{d,t+1} \tag{33}$$

[8] The increasing feature of C depends upon the positive correlation between volatility and persistent growth. It is not needed for the model mechanism, see Internet Appendix Footnote 7 above.

where $\mathbf{X_t}$ contains all t-measurable terms in $r_{t+1}^{(n)}$. Expected excess log returns are given by

$$-\text{Cov}(m_{t+1}, r_{t+1}^{(n)}) = \lambda_d \sigma_d x_t + \lambda_d \sigma_z B^{(n-1)} \phi_d x_t + \lambda_z B^{(n-1)} \sigma_z - \lambda_x B^{(n-1)} \sigma_z \phi_x x_t - \lambda_x C^{(n-1)} \sigma_x x_t \quad (34)$$

$$= \lambda_d \sigma_d x_t + B^{(n-1)} x_t \left(\lambda_d \sigma_z \phi_d - \lambda_x \sigma_z \phi_x\right) + \lambda_z B^{(n-1)} \sigma_z - \lambda_x C^{(n-1)} \sigma_x x_t \quad (35)$$

The first term changes the level of returns for all maturities depending on the level of x_t, the second term is negative and decreasing in n and x_t if $\lambda_d \sigma_z \phi_d - \lambda_x \sigma_z \phi_x < 0$ which is the case if local dividend growth is negatively correlated with persistent dividend growth and positively with volatility, the third term increases in n and does not depend on x_t and the fourth term is positive and increasing in n and x_t. Because the second term is larger than the fourth (in particular for stocks with higher exposure to persistent growth ϕ_i and thus higher $B^{(n)}$), the term structure is decreasing in high volatility times. Because the third term is increasing in n but does not depend on x_t, it largely offsets this effect in average volatility times, leading to a flat term structure. When the volatility is low, this effect trumps the downward-sloping effect of the second term, leading to an upward-sloping term structure.

Turning to the cross-sectional return differentials R_{LS} that are the focus of this paper, it is enough to consider the last three terms that feature a $B^{(n)}$ term that depends linearly on persistent growth exposure ϕ_i:

$$R_{LS} = \left[B^{(n-1)}(\phi_{\text{high}}) - B^{(n-1)}(\phi_{\text{low}})\right] x_t \left(\lambda_d \sigma_z \phi_d - \lambda_x \sigma_z \phi_x\right) + \lambda_z \left[B^{(n-1)}(\phi_{\text{high}}) - B^{(n-1)}(\phi_{\text{low}})\right] \sigma_z$$
$$+ \lambda_x \sigma_x x_t \left[C^{(n-1)}(B^{(n-1)}(\phi_{\text{low}})) - C^{(n-1)}(B^{(n-1)}(\phi_{\text{high}}))\right] \quad (36)$$

In ‘bad’, volatile, high x times, the first and third term in (36) are particularly negative, leading to a negative return differential between late and early timing stocks. In low volatility times, the effect of the second third term is prevalent, leading to a positive return differential. When x is near its long-run mean, the two effects offset each other and the return differential is close to zero.

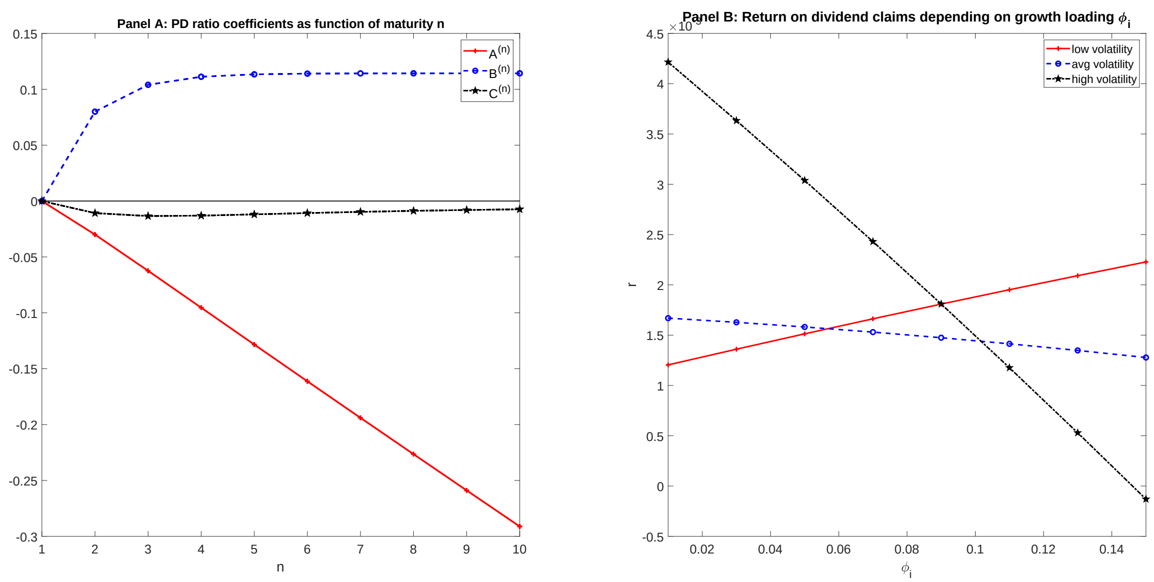


Figure IA4: PD ratio coefficients and conditional mean returns on dividend claims

Panel A: PD-ratio coefficients A, B and C as functions of time to maturity n. Panel B: returns on dividend claims as functions of loading on persistent dividend growth ϕ_i. The parameters are as follows: $\mu = 0.01$, $\phi_i = 0.08$ (in Panel A), $\sigma_d = 0.02$, $\rho_z = 0.3$, $\sigma_z = 0.1$, $\bar{x} = 0.15$, $\rho_x = 0.8$, $\sigma_x = 0.05$, $\phi_x = 0.5$, $\phi_d = -0.5$, $\lambda_d = 0.5$, $\lambda_x = 0.7$, $\lambda_z = 0.1$,$r_f = 0.04$, $x_{low} = 0.1$, $x_{high} = 0.4$.