Payout Smoothing and Investment Responsiveness

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Abstract

This study examines payout smoothing, its evolution over time, and its implications for investment policy. Though not to the same extent they smooth dividends, firms smooth share repurchases, and repurchase smoothing has increased significantly over the past four decades. Meanwhile, dividend smoothing has remained relatively steady, even slightly decreasing. To determine if payout smoothing restricts investment, we estimate firm-level investment responsiveness as a function of payout smoothing using plausibly exogenous industry-level measures of investment opportunities and changes in downstream production. Firms that historically smooth payouts are significantly less responsive to investment opportunities. This finding generally applies to the smoothing of "flexible" repurchases and is highly robust for the smoothing of dividends and total payouts. Our evidence supports the notion that firms are willing to forfeit some investments to maintain prior payout levels.

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Payout policy and financial flexibility—the ability to respond to profitable investment opportunities as they arise—are inextricably linked. For instance, repurchases have displaced dividends to become the primary form of shareholder payout among US firms, and managers claim their affinity for repurchases stems from their flexibility (Brav, Graham, Harvey, and Michaely, 2005). Yet, the extent to which managers exercise flexibility in their payout policy is unknown.

Understanding the link between payout policy and financial flexibility is important because it informs the ongoing debate among politicians, journalists, and scholars regarding the merits of shareholder payouts. Proponents claim that firms set payout policy after investment policy and that dividends and repurchases thus represent an efficient way to give shareholders excess cash. Removing excess cash from managers' disposal is prudent because it reduces the agency costs associated with free cash flow. Opponents fear that firms determine payout policy before selecting investments. They argue that prioritizing payouts leads firms to forfeit lucrative, long-term projects. If managers indeed exercise flexibility in their payout policy, foregoing them when necessary to fund profitable projects, then payouts do not occur at the expense of investments. Alternatively, if managers oppose trimming payouts, then some investments will go unfunded—especially within firms that cannot rely on external capital to finance projects.

In this study, we explore payout flexibility through the lens of payout "smoothing." Studies dating back to the seminal work of Lintner (1956) show dividend smoothing is pervasive and persistent. Past dividends are the primary determinant of future dividends. We first expand on this line of work by also examining the link between current and past repurchases. If repurchases are indeed flexible, as managers claim, then firms may not smooth them at all. At a minimum, repurchases should be less smooth than dividends.

Using a broad set of publicly traded US firms from 1983 to 2022, we estimate payout smoothing using coefficients from first-order autoregressive (AR(1)) models. We scale total payout, dividends, and repurchases by total assets and regress them on their respective lag.

The models' slope coefficients, which we dub the "smoothing coefficients," represent the relation between current payout and lagged payout. We find that a one percentage point increase in total payout last year is associated with a 0.62 percent increase in total payout this year. Consistent with dividends smoothing being more prevalent than repurchase smoothing, we estimate a dividend smoothing coefficient equal to 0.86 versus a repurchase smoothing coefficient of 0.53. This repurchase smoothing coefficient is nonetheless noteworthy. It implies that a one percentage point increase in repurchases last year is associated with over half of a percentage point increase this year. Next, we augment our models with control variables often associated with payout policy, including lagged measures of cash holdings, profitability, leverage, firm size, age, and sales growth. The coefficients associated with lagged payout remain relatively stable with the addition of these controls, dropping only slightly to 0.55 for total payout, 0.83 for dividends, and 0.48 for repurchases.

In addition to the slope coefficients, the adjusted R^2 of these models are informative. We learn that last year's payout substantially explains current payout. Last year's total payout explains 36% of the variation in this year's total payout, but explanatory power differs across dividends and repurchases. Lagged dividends explain 73% of the variation in current dividends whereas lagged repurchases only explain 26% of the variation in current repurchase. While past repurchases carry less explanatory power than past dividends, past repurchases still explain future repurchases better than cash, profitability, firm size, leverage, age and sales growth combined. These findings point to repurchases being more flexible than dividends but not independent of prior values.

Our subsequent analysis splits firms by payout style. Our baseline sample includes all types of payout firms, but we also examine smoothing within positive payout firms only, firms that pay dividends only, firms that repurchase only, and firms that both pay dividends and repurchase during our sample period. We show that smoothing coefficients do not meaningfully change when we condition on the sample of positive payout firms: We estimate smoothing coefficients of 0.54 for total payout, 0.83 for dividends, and 0.48 for repurchases. We also examine firms that both pay dividends and repurchase stock. Since these firms use both payout methods, we may expect them to distribute more permanent cash flows through dividends (and therefore smooth dividends more) and reserve distributions of transitory cash flows for repurchases (and therefore smooth repurchases less). Yet, our coefficients are relatively stable within this subsample; in fact, the dividend smoothing coefficient is slightly lower (0.80) and the repurchase coefficient slightly higher (0.49) than in our baseline sample. These results are not consistent with firms that use both payout methods smoothing payouts differently. Finally, we examine subsamples of firms that only pay dividends or only pay repurchases. We may expect firms that only pay dividends to embed flexibility in their dividend policy and firms that only repurchase to be more willing to smooth repurchases. While we identify some evidence of dividend-only firms smoothing less (their dividend smoothing coefficient equals 0.74), we do not observe more repurchase smoothing within repurchase-only firms. Repurchase-only firms actually smooth repurchases less than firms with other payout styles (their repurchase smoothing coefficient equals 0.42-).

Next, we examine time trends in payout smoothing. Our data begin in 1983, the year after the Securities and Exchange Commission enacted Rule 10b-18 to provide safe harbor for repurchases. We use 1983 as our base year and examine whether payout smoothing increases over time by adding a time trend variable and its interaction with lagged payout to our scaled payout regressions. Coefficients on the trend variable capture the change in payout *level* over time. Interaction coefficients denote the change in payout *smoothing* over time. We find that total payout (as a percentage of assets) has not risen significantly from 1983 to present. Payout smoothing, however, has significantly increased over time. At the beginning of our sample, the total payout smoothing coefficient is 0.39. On average, it rises at a pace of 0.07 per decade. This rise in payout smoothness is attributable to a surge in the smoothness of repurchases, not dividends. We estimate repurchase smoothing to be only 0.22 when our sample begins. But it increases at a rapid rate of 0.12 per decade. Dividends, in contrast, become slightly less smooth during our sample period. Dividend smoothing begins at 0.87 but declines by 0.02 per decade. These findings suggest that, while dividends are clearly smoother than repurchases, repurchase smoothness has increased substantially over time. Firms anchoring more on prior repurchases is consistent with an increasing reluctance to cut repurchases. If sustaining repurchases comes at the expense of investments, this is cause for concern.

We confirm these time trends hold without imposing linearity. Specifically, we run regressions over five-year windows, then one-year windows. Total payout smoothing coefficients rise over time, from 0.37 during the first five years of our sample (1983-1987) to 0.67 during the last five years (2018-2022). Dividends do not contribute to this trend. Dividend smoothness declines, if anything, from 0.89 at the beginning of our sample to 0.83 by the end. Repurchase smoothing instead follows an upward trend, from 0.18 in the mid-1980s to 0.62– most recently.

Next, we examine the implications of payout smoothing. Of particular concern is whether firms maintain payouts at the expense of investment. To answer this question, we examine whether firms that smooth payouts are less responsive to investment opportunities. We gauge investment responsiveness by regressing firm-level investments (capital expenditure and research and development) on proxies for investment opportunities and their interaction with an indicator for high historical payout smoothing. We create three proxies for investment opportunities: firm-level market-to-book ratio calculated following Frank and Goyal (2009) and Farre-Mensa and Ljungqvist (2016), the industry average of this market-to-book ratio, and an industry-level proxy for changes in downstream demand calculated from the Input-Output Accounts from the Bureau of Economic Analysis (BEA). We lag these investment opportunities measures by one year relative to our investments measures. We calculate historical payout smoothing by running rolling prior 10-year window regressions of payout (total payout, dividends, or repurchases) on lagged payout by firm. This process generates payout smoothing metrics at the firm-year level. We create an indicator variable for firms with "high" (top quartile) payout smoothing. In the investments regressions, the investment opportunities coefficient represents investment responsiveness, and the coefficient associated with the interaction of investment opportunities and high payout smoothing captures whether firms that smooth payouts respond to investment opportunities differently.

We find that firms that smooth payouts are less responsive to investment opportunities than firms that do not smooth payouts. A one standard deviation increase in firm-level investment opportunities is associated with a 3.4% increase in investments (as a percentage of assets) relative to the mean within firms that do not aggressively smooth total payouts. But this marginal effect is reduced by 19% to 2.8% for firms that traditionally smooth payouts. The results are robust to the inclusion of firm and year fixed effects, as well as time-varying firm-level controls. When using firm-level market-to-book to proxy for investment opportunities, we find a dampening effect of payout smoothing on investment responsiveness for both dividends and repurchases, with the dividend smoothing effect being slightly stronger. These findings are consistent with firms sacrificing a portion of available investments to sustain prior payout levels.

We next use industry averages of market-to-book to proxy for investment opportunities. By using industry averages, we effectively remove some of the firm-specific factors that could be correlated with the error terms in our model and thereby contribute to endogeneity. We continue to find that firms that smooth payouts are significantly less responsive to investment opportunities. When industry-level investment opportunities rise, firms that heavily smooth payouts increase R&D and capital expenditures 29% less than firms that do not. In these specifications the results hold across dividend and repurchase smoothing.

Our final measure of investment opportunities is derived from changes in downstream demand. We use the Input-Output Supply tables from the Bureau of Economic Analysis (BEA) to calculate annual percentage changes in production across each industry. We then use the BEA Use tables to determine downstream industries and weight the production change of each downstream industry by the proportion of the upstream industry's products used by the downstream industry. The weighted average of changes in downstream production generates a proxy for change in downstream demand for the focal upstream industries. Changes in downstream demand represent a plausibly exogenous proxy for investment opportunities since the opportunities are created by growth in other industries. Indeed, after increases in downstream demand firms invest significantly more: A one standard deviation increase in investment opportunities is associated with a 6.5% increase in investment activity relative to the mean. Our main findings are similar: Firms that smooth payouts are 20.1% less responsive to changes in downstream demand than other firms. Using changes in downstream demand as our investment opportunities proxy, however, we find that the negative relation between payout smoothing and investment responsiveness is concentrated within dividend smoothers. Firms that heavily smooth dividends are significantly less responsive to investment opportunities driven by changes in downstream demand while firms that smooth repurchases are not.

Our findings make important contributions to two streams of the literature. First, we add to the payout smoothing literature. Though well established and vast, this literature mainly focuses in the smoothness of dividends. Studies show that, when setting dividend policy, firms anchor heavily on prior dividends (e.g., Lintner, 1956; Fama and Babiak, 1968; Skinner, 2008; Brav, Graham, Harvey, and Michaely, 2005; Leary and Michaely, 2011; Von Eije and Megginson, 2008; Ellahie and Kaplan, 2021). Other studies aggregate dividends and repurchases and show that total payouts tend to be less volatile than dividends only (Skinner, 2008; Von Eije and Megginson, 2008; Lambrecht and Myers, 2012; Ellahie and Kaplan, 2021), suggestive of managers using repurchases more flexibly than dividends, as they claim to do when surveyed (Brav, Graham, Harvey, and Michaely, 2005). We first add to this line of research by quantifying and tracing repurchase smoothing behavior through time. We show that prior repurchases levels are significant determinants of future levels and that this time-series relation has strengthened in recent years. Given the importance of repurchases in modern payout policy, studying how firms prioritize sustaining historical repurchase levels is crucial to understanding payout policy decisions more broadly.

Our findings also inform the debate on the how firms rank payout policy and investment policy. Although CFOs report that maintaining dividend levels is on par with investment policy but that they determine repurchases amounts after investment decisions (Brav, Graham, Harvey, and Michaely, 2005), empirical evidence on the payout-investment hierarchy is surprisingly scarce. Notable exceptions include Almeida, Fos, and Kronlund (2016), who document declines in investment and employment following EPS-motivated share repurchases, and Brockman et al. (2022) who, in contrast, argue that repurchases do not lead to drop in investments or downward analyst revisions of capital expenditure forecasts. We contribute to this literature by creating firm-level smoothing metrics that provide a reasonable method for identifying firms most likely to prioritize sustaining payouts. We then use this proxy to establish that, when investment opportunities arrive, firms that historically smooth payouts are less responsive than other firms.

The remainder of the paper is organized as following. Section 1 reviews the background literature on payout smoothing and the potential link between payout policy and investment policy. Section 2 discusses our data and results pertaining to the prevalence and time trends of payout smoothing. Section 3 explores whether payout smoothing impedes investment, then Section 4 concludes.

1. Background Literature Review

1.1. Do firms smooth payouts?

Payout smoothing has been of interest to finance researchers for many decades (e.g., Lintner, 1956; Fama and Babiak, 1968). The key finding of the seminal Lintner (1956) study is that firms tend to follow a stable dividend payout ratio. Smooth dividends are a result of using the current dividend rate as a critical benchmark in setting dividend policy and avoiding dividend increases that may need to be reversed in the future.

Dividend smoothing is not a relic of the past. It persists in modern settings (e.g., Skinner, 2008; Brav, Graham, Harvey, and Michaely, 2005; Leary and Michaely, 2011). Moreover, dividend smoothing is not limited to US stock markets; firms also smooth dividends in the European Union (Von Eije and Megginson, 2008) and beyond (Ellahie and Kaplan, 2021).

The evidence on trends in dividend smoothing is mixed. Brav, Graham, Harvey, and Michaely (2005) document a substantial increase in dividend smoothing in the US from the 1950s to the twenty-first century. Von Eije and Megginson (2008) also find an increase in dividend smoothing within EU firms from the late 1990s to the early 2000s. In contrast, Skinner (2008) documents a decline in both dividend and total payout smoothing from 1980–1994 to 1995–2005 in the US.

While much work has focused on the causes and consequences of dividend smoothing, much less is known about repurchase smoothing. One reason for this is that repurchases were essentially non-existent until 1982 when the Securities and Exchange Commission instituted Rule 10b-18, which provided companies with safe harbor against stock price manipulation claims related to buying back stock, provided that manner, timing, price, and volume conditions are met. Therefore, early work on payout smoothing did not examine repurchase smoothing because few firms engaged in this form of distribution to shareholders. Another likely reason for the dearth of studies on repurchase smoothing is that, although dividends are often characterized as "sticky," managers, and perhaps academic researchers too, tend to view repurchases as "flexible" (Brav, Graham, Harvey, and Michaely, 2005).

Nonetheless, several studies do incorporate repurchases into smoothing metrics and show that firms smooth total payout less than dividends alone (Skinner, 2008; Von Eije and Megginson, 2008; Lambrecht and Myers, 2012; Ellahie and Kaplan, 2021). These findings hint at firms smoothing repurchases less than dividends, consistent with repurchases being a more flexible payout form than dividends. Using EU firms, Von Eije and Megginson (2008) study repurchase smoothing in isolation, as we do. They document an increase in both dividend and repurchase smoothing from 1996-2000 to 2001-2005.

1.2. Why do firms smooth payouts?

Firms smooth payouts, but why do they do so? After all, absent taxes and transaction costs, investors can create homemade dividends themselves by selling shares. Prior studies, summarized below, propose three main theoretical justifications for payout smoothing: asymmetric information between managers and shareholders, agency conflicts between managers and shareholders, and tax clienteles.

One possible driver of dividend smoothing is information asymmetry. This friction arises from managers possessing superior knowledge about the firm's future prospects compared to shareholders. Several studies have examined the signaling role of dividends in mitigating information asymmetry. The Kumar (1988) model explains why dividends have nontrivial information effects even though dividends are smoothed and do not generally predict future firm performance: They signal the quality of a firm's future prospects. In the Kumar and Lee (2001) model, because dividend changes only signal significant variations in a firm's permanent earnings, the smoothness of dividends relates to their information content. Similarly, Guttman, Kadan, and Kandel (2010) show that, because firms tend to follow a "partially pooling" dividend policy in which they maintain the same dividend payment across a range of actual realized earnings, dividend changes must be driven by large variations in earnings. Further, Baker, Mendel, and Wurgler (2016) propose a behavioral explanation for smoothing: Investors view current dividend payments as reference points. Investors therefore expect past dividends to continue and react negatively to dividend cuts. Finally, Acharya and Lambrecht (2015) predict smoothing increases with the degree of information asymmetry between insiders and outsiders because insiders manage shareholder expectations through both income and payout smoothing. Consistent with the above theories, Michaely and Roberts (2012) show that private firms, which have low or zero information gaps between managers and owners, smooth dividends less than public firms.

Agency conflicts that arise from diverging interests between managers and shareholders may also influence dividend smoothing. Lambrecht and Myers (2012, 2017) propose that managers prefer smooth rents, which cannot be obtained without smoothing payouts. A novel prediction is that Lintner's model should better fit total payout than dividend payout. In the Wu (2018) model managers do not maximize firm value because of career concerns (e.g. turnover threats), while information asymmetries do not allow shareholders to impose optimal policies. When earnings are low, turnover risk increases and managers are reluctant to cut dividends to avoid worsening their status. When earnings are particularly good, dividend hikes are not undertaken given that turnover risk is low. The result is dividend smoothing. Finally, DeMarzo and Sannikov (2016) assume both managers and shareholders use a firm's current performance to gain insights into its future performance. Thus, managers are incentivized to build information rents by reducing current performance and expectations about future performance. In turn, managers build optimal principal-agent contracts to control information rents and improve incentives. One implication of such contracts is that mature firms tend to pay dividends and smooth them.

Lastly, the interplay between agency conflicts and tax clienteles may also lead to dividend smoothing. Allen et al. (2000) purport that firms use dividends to attract institutional investors, who are more likely to gather information and monitor firms. Smoothing arises because firms cannot afford to reduce dividends given the benefits of attracting institutions and the negative signal that such an action would send about the quality of the firm. Consistent with these predictions, Larkin et al. (2017) show that institutional investors tend to prefer firms that smooth dividends while retail investors do not.

1.3. The effects of payout smoothing

It is evident that firms smooth payouts, but what are the implications of payout smoothing? One strand of the literature studies the valuation effects of payout smoothing and presents mixed evidence. Larkin et al. (2017) find no significant relationship between a firm's dividend-smoothing behavior and its stock's expected return or market valuation. Conversely, using a large, international set of firms, Brockman et al. (2022) find that the market value of dividends is significantly higher for firms that smooth dividends more, especially in countries with weak investor protection.

The focus of our study is the impact of payout smoothing on investment policy. Theoretically, firms set investment policies first, and distribute payouts only with residual cash flows. But CFO survey evidence from Brav, Graham, Harvey, and Michaely (2005) suggests that managers view investment decisions as on par with maintaining dividends. Managers want to maintain dividends because stock price reactions to dividend cuts can be severe. Alternatively, the same survey reveals that managers perceive repurchases as more flexible.

Still open for debate is whether firms distribute payouts at the expense of investment. Almeida, Fos, and Kronlund (2016) exploit the discontinuity in repurchases around the zero earnings per share surprise threshold to examine the real effects of repurchases. They identify declines in capital expenditures, research and development, and employment around this threshold. These results support the narrative that payouts—at least share repurchases motivated by earnings management—erode long-term investments. In contrast, Brockman et al. (2022) find little evidence that repurchases lead to drops in real investments. They further note that analysts do not revise capital expenditure forecasts downward around repurchases.

1.4. Contribution

We add to the aforementioned studies in several important ways. The first is quantifying and tracking repurchase smoothing to ultimately show that repurchases are not fully flexible. Most prior studies focus heavily on dividends, either aggregating total payouts or examining dividends in isolation, thereby ignoring repurchases altogether. This approach is understandable for earlier studies, conducted during times when repurchases represented a tiny portion of payout. It is also sensible to focus on dividend smoothing because concerns about sacrificing investment to preserve payouts may only apply to "sticky" dividends, not to "flexible" repurchases. Nevertheless, given the explosive growth in repurchases in recent decades, it is critical to understand how managers determine them and not unreasonable to think that their usage may have shifted with time. We contribute to this literature by highlighting that repurchase flexibility is limited: We show that prior repurchase activity explain more variation in repurchases than cash, profitability, age, sales growth, firm size, market-to-book, and leverage combined. Further, though not yet matching dividend smoothness, repurchase smoothness has increased significantly over time.

Moreover, we believe our primary contribution is to the debate on the merits on payouts, in particular share repurchases, which have recently come under intense scrutiny for potentially occurring at the expense of investments. First off, our payout smoothing metrics allow us to pinpoint the set of firms arguably most at risk of foregoing investments in favor of payouts. Next, we contribute to this important debate by exploiting plausibly exogenous changes in investment opportunities to determine whether a negative relation between investments and payouts is due to payouts *causing* drops in investments. Our key takeaway is that firms that prioritize maintaining payouts are less responsive to investment opportunities.

2. Quantifying Payout Smoothing

2.1. Payout and firms controls: Data sources and summary statistics

We source our data on payout, investment levels, and firm controls from CRSP and Compustat. We begin collecting data in 1983, the year after the SEC granted repurchase safe harbor provisions through Rule 10b-18, and continue until 2022. We restrict our sample to stocks with a share code of 10 or 11 that are listed on one of the three major US exchanges (exchange code = 1-3). Additionally, we require non-missing current values for net income (ni), stock price (prcc), number of shares outstanding (csho), and total assets (at). Because our primary payout metrics are lagged payouts scaled by beginning-of-year assets, we require three years of continuous data for a firm to enter our sample. We include both financial and utility firms in our sample but conduct robustness checks to assess their impact on our findings.

Table 1 presents summary statistics for our variables. It begins with our primary payout metrics. We scale all baseline payout measures by lagged total assets (at) but show robustness to scaling by lagged market capitalization (prcc*csho) instead. *Repurchases* are defined as the purchase of common and preferred stock (prstkc) minus the decrease in the value of preferred stock outstanding, if any. Preferred stock is defined using either redemption (pstkrv), liquidation (pstkl), or par value (pstk) of preferred stock, in order of preference. *Dividends* are total common stock dividend (dvc). *Total payout* is the sum of repurchases and dividends. To mitigate the effect of outliers or potential data errors in Compustat, we winsorize these ratios at the 1st and 99th percentiles.

Each year the average firm spends the equivalent of 1.3% of assets on repurchases and 0.8% of assets on dividends. Median repurchase and dividend values are zero, however, indicating that these values are skewed. In fact, of all firm-years, 60.2% are associated with zero repurchases while the top decile of firms buy back 3.9% of assets in the year. 59.5% of firm-years are associated with zero dividends, but the top decile distributes dividends equal to 2.8% of assets or more. 67.7% of firms pay either repurchases or dividends and therefore have non-zero total payout. The average firm pays out the equivalent of 2.2% of assets in repurchases and dividends, and firms at the 90th percentile distribute 6.4% of assets per year.

Next, we summarize our firms controls, all winsorized at the 1st and 99th percentiles. *Cash* is cash and cash equivalents (che), scaled by lagged assets. The average firm holds 19.0% of its assets in cash and cash equivalents. The relation between cash and payout levels is theoretically ambiguous. On one hand, we may expect "cash cows" to adopt more aggressive payout policies to mitigate the agency costs associated with excess cash. On the other hand, if a firm typically distributes a large portion of earnings, then cash holding may remain lower. In relation to payout smoothing, firms with more cash on hand may smooth payouts more because their high cash reserves already provide the financial flexibility necessary to meet investment needs. *Return on assets* (*ROA*) is net income (ni), scaled by lagged total assets. The average firm's ROA is -2.8% while the median firm's ROA is 2.1%. If firms target payout ratios, i.e., payout as a percentage of earnings, then we expect profitable firms to pay out more. To the extent that profitability captures maturity, we expect more profitable firms to pay out more and to smooth payouts more. *Age* is the number of years the firm appears in the Compustat database. The average (median) firm in our sample has been publicly traded for 16 years (12 years). We expect older firms to distribute more cash to shareholders and to be more likely to smooth payouts. *Sales growth* is the change in sales (sale), divided by lagged sales. On average, firms in our sample are growing at a rate of 14.7% annually. Sales growth should also correlate with the firm's stage of the life cycle as well as its investment opportunities. Firms in the early, growth stage likely distribute less cash to shareholders and may smooth payout less to maintain financial flexibility for investment needs.[1] We capture firm size using market capitalization, which we calculate as the year-end closing price (prcc_f) times the number of shares outstanding (csho). We then adjust *market cap* for inflation and report it in millions of December 2022 dollars. The average firm in our sample has a market value of over $3 billion. *Leverage* is the sum of long-term debt (dltt) and total debt in current liabilities (dlc), scaled by lagged assets. The average (median) firm has a leverage ratio of 0.259 (0.198).

2.2. Baseline first-order autoregressive models

We begin by examining the extent to which firms smooth payout. Table 2 presents the results of our first-order autoregressive models of total payout, dividends, and repurchases. The coefficient associated with lagged payout is 0.615 for total payout, 0.860 for dividends, and 0.525 for repurchases. All are highly statistically significant. While dividends dominate repurchases in terms of autocorrelation and explanatory power, repurchases are quite persistent nonetheless. When we augment the models with lagged firm characteristics to control

[1] In addition to controlling for age and profitability, investment responsiveness regressions in Appendix Table A6 control for Hoberg and Maksimovic (2022) life cycle stages. Although our sample size is greatly reduced, our main takeaways hold.

for other determinants of annual payout levels, AR(1) coefficients for payout decrease only slightly and adjusted R^2 values barely increase. The addition of all of these controls increases the explanatory power of the models of total payout and repurchases only by three percentage points, and the explanatory power of the model of dividends by a trifling 0.5%, from 73.1% to 73.6%. In fact, comparing untabulated regressions of payout on firm controls alone to regressions of payout on lagged payout alone reveals that last year's payout has more explanatory power than all firm controls combined. Adjusted R^2 values of payout regressions on firm controls alone versus lagged payout alone are 0.137 versus 0.358 for total payout, 0.153 versus 0.731 for dividends, and 0.083 versus 0.260 for repurchases. This implies that the payout autocorrelation is not only robust to controlling from time-varying, firm-level factors related to payout; critically, last year's payout explains this year's payout better than cash, leverage, firm size, profitability, age, and sales growth combined. In sum, yesterday's payout policies are significantly correlated with and explain substantial variation in today's payout policies.

Coefficients on control variables generally take on expected signs. Firms with more cash on hand and higher profits tend to distribute more cash to shareholders. These findings are consistent with firms with higher potential agency costs of free cash flow ridding themselves of excess cash. Firms with high leverage ratios pay out less. More levered firms may desire more financial flexibility and therefore retain more cash, or levered firms may oppose further increasing their debt to equity ratio through shareholder distributions. Large firms pay out more. Large firms are more prone to information asymmetry and may use payouts to signal firm quality. Firm size may also correlate with a later stage in the firm's life cycle. Age and sales growth rates more directly proxy for life cycle stage: Older firms and firms with slower growth rates distribute more cash to shareholders than younger, high-growth firms that may need to retain cash for future growth opportunities.

We explore the robustness of Table 2 results in the appendix. To begin, Table A2 shows robustness to scaling payout levels by lagged market capitalization instead of lagged assets.

Dividing by market cap has the advantage of being interpreted as payout yield, i.e., dollars of payout over dollars (price) per share. Smoothing coefficients decrease slightly, mainly due to repurchases. Using models with firms controls, we see that coefficients estimated with firm controls fall from 0.389 to 0.281 for total payout and 0.287 to 0.158 for share repurchases while the dividend coefficient only falls from 0.736 to 0.721. This decline in autocorrelation is likely due to market values fluctuating substantially more than book values. For this reason, we believe models scaling by assets rather than market cap better captures changes due payout levels rather than changes caused by the scale factor.

Appendix Table A3 shows robustness to excluding financials and utilities from our sample. Despite payout policy within banks and utilities being regulated, we initially include these firms in our sample because their payouts are often economically important. Excluding them, however, does not meaningfully impact our interpretations. Coefficients in models with firms controls fall only negligibly. We examine payout smoothing within financial and utilities directly in appendix Table A4. Financials and utilities smooth payout slightly more than industrials. Overall, the choice to include or exclude financials and utilities does not impact our main takeaways.

Finally, Appendix Table A5 illustrates the relation between payout smoothing, as defined in this study, and "speed of adjustment," a metric used in the prior literature. The main takeaway is that payout smoothing equals one minus speed of adjustment. There are two key differences in estimation. The dependent variables in our payout smoothing regressions are payout *levels* and smoothing equals the coefficient associated with lagged payout. In constrast, the dependent variables in estimations of speed of adjustment are *changes in* payout, and speed of adjustment equals *the additive inverse* of the estimated coefficient on lagged payout. We chose to report payout smoothing for ease of interpretation; a higher lagged payout coefficient implies more smooth payouts, and a lower coefficient implies less smooth payouts.

2.3. Payout smoothing by payout style

Table 3 examines payout smoothing across firms based on their payout behavior throughout the entire sample period. We characterize firms into payout "style" groups according to whether or not they ever pay a dividend or ever conduct a repurchase.

Our first payout style group—positive payout—comprises firms that either paid a dividend or repurchased stock at some time during our sample period. Stated differently, this group excludes firms that never pay a dividend or repurchase stock. Eliminating these firms is important to ensure that our smoothing estimates are not driven by persistent zeros. They are not. In payout regressions with firm controls, coefficients on the corresponding lagged payout metric decrease but not substantially. The smoothing coefficient on total payout only falls to 0.541, on dividends to 0.831, and on repurchases to 0.457.

Next we condition on firms that both pay a dividend and repurchase stock at least once during the sample period. Within this group that uses both forms of payout, we may expect dividend smoothing to be more prevalent but repurchase smoothing to be less pronounced because these firms may distribute permanent cash flows through regular, steady dividends and temporary cash flows through more erratic repurchases (Guay and Harford, 2000; Jagannathan, Stephens, and Weisbach, 2000). Instead, we in fact observe that firms that both pay dividends and repurchases smooth dividends somewhat less and repurchases slightly more than other firms, if anything. Overall, we do not observe a substantial difference in payout smoothing within these firms.

Lastly, we condition on firms that only pay dividends or only repurchase stock. We may expect firms that only pay dividends (and never repurchase stock) to build more flexibility into their dividend policy and thereby smooth less. Alternatively, firms that only repurchase (and never pay a dividend) may have more dividend-like, smooth repurchases. This may hold if over time firms repurchase stock instead of initiating a dividend (Grullon and Michaely, 2002). We find that firms that only pay dividends indeed smooth less. Their dividend smoothing coefficient is only 0.746. This finding is consistent with firms that only pay dividends using dividends more flexibly. We do not find, however, that firms that repurchase only smooth repurchases more. The repurchase smoothing coefficient on firms that repurchase is only 0.417. In sum, while firms that pay dividends only use them more flexibly than other firms, firms that repurchase only do not smooth repurchases more than other firms.

2.4. Time trends in payout smoothing

Next we examine trends in payout smoothing in Table 4. Specifically, we augment our payout smoothing models with a linear trend variable, which equals the year minus 1983, and an interaction of this variable and last year's payout. Our coefficient of interest is the coefficient associated with the interaction of the trend variable and lagged payout. This coefficient represents the average annual change in payout smoothing. The coefficient associated with the linear trend by itself represents average annual changes in payout levels (payout scaled by assets) during our sample period. In these regressions, the coefficient on lagged payout estimates payout smoothing during our baseline year of 1983.

Payout smoothing has become more common over time. The baseline coefficient associated with total payout smoothing equals 0.391, but this coefficient increases by 0.0073 per year, or 0.073 per decade. Dividend smoothing does not drive the increases in payout smoothing. In fact, dividend smoothing has declined over time at a rate of about 0.020 per decade. In contrast, repurchase smoothing has increased significantly at a rate of 0.012 per year.

The analyses in Table 4 impose a linear trend in payout smoothing, but smoothing may not necessarily change at a constant rate over time. Table 5 instead shows smoothing by five-year intervals. Panel A shows that total payout smoothing has almost doubled from 0.368 during our first time period (1986-1987) to 0.666 most recently (2018-2022). Firms begin smoothing more in the mid-1990s, then even more during the early 2000s. We then observe a decline in smoothing in 2008-2012, during the financial crisis, following by a rise in smoothing over the last decade.

Panels B and C illustrate that time trends in smoothing differ substantially across dividends and share repurchases. Dividend smoothing has remained relatively constant across time, if anything, decreasing. Dividend smoothing was highest at the beginning of our sample, with a coefficient on lagged dividends equal to 0.892, and lowest from 2013 to 2017 at 0.782. The dividend smoothing coefficient associated with the most recent five years equals 0.830. In contrast, repurchase smoothing has increased substantially, and almost monotonically, over time. We estimate repurchase smoothing to be 0.180 at the beginning of our sample period (1983-1987) but it climbs to 0.616 by the end of our sample. Repurchase smoothing increases over each five-year period, with the exception of 2008-2012. Overall, repurchases clearly drive the increase in total payout smoothing.

Figure 1 also illustrates trends in payout smoothing. It graphs coefficients estimated from regressions of payout variables on lagged payout interacted with year indicators beginning in 1988. We exclude the first five-year period (1983-1987) to serve as the baseline payout smoothing coefficient. The graphed interaction coefficients represent the difference in payout smoothing during the year shown relative to the baseline beginning time period.

Again, we observe that total payout smoothing has increased over time and that repurchases drive this increase. Panel A shows that smoothing increases in 1992, remains relatively steady throughout the 1990s, climbs during the early 2000s, plunges during the financial crisis of 2008 and 2009, then rebounds and hovers between 0.1 and 0.4 greater than the baseline smoothing coefficients. Panel B illustrates trends in dividend smoothing, relative to the 1983-1987 baseline time period. Dividend smoothing does not follow a clear trend over time. That said, it is worth noting that most coefficients (29 out of 35) are significantly negative. This implies that firms tend to smooth dividends less than they did at the beginning of our sample. Panel C shows that repurchase smoothing has trended upward over time, at first in a nearly linear fashion until 2006 then more irregularly. All but more coefficient is significantly positive.

Collectively, our evidence shows that payout smoothing has increased substantially over time. Firms today do not smooth dividends more than in the past. If anything, firms smooth dividends less than before. This stands in stark contrast to the smoothing trends in repurchases. Repurchases smoothing increases consistently throughout the 1990s and early 2000s and has remained elevated since the 2008/2009 financial crisis.

3. Do Firms Sacrifice Investment to Smooth Payouts?

3.1. Historical smoothing and investments: Data sources and summary statistics

Table 6 presents summary statistics for our investment, investment opportunities, and historical payout smoothing variables. We apply the same screens described in Section 2.1 to our CRSP and Compustat samples.

Investment is calculated from Compustat variables as the sum of research and development expenditures (xrd) and capital expenditures (capx), scaled by lagged total assets (at). The average (median) firm invests 10.1% (5.8%) of the value of assets each year, and the top decile of firms spends 24.7% of the value of assets. In contrast, the bottom decile of firms barely invests at all.

To gauge firms' responsiveness to investment opportunities, we use multiple proxies for investment opportunities. Following Frank and Goyal (2009) and Farre-Mensa and Ljungqvist (2016), our first proxy is market-to-book ratio defined as year-end closing price (prcc_f) times common shares used to calculate earnings per share (cshpri), plus the liquidation value of preferred stock (pstkl), plus long-term debt (dltt) and short-term debt (dlc), minus deferred taxes and investment tax credits (txditc), all scaled by total assets (at). The average firm's market value of equity and debt is about 1.5 times the value of its assets. We use this metric at the firm-level and aggregate it to the industry level, excluding the focal firm, by three-digit historical SIC code. If historical codes are unavailable, we use current codes.

Our second investment opportunities proxy is derived from the summary tables of the

Bureau of Economic Analysis (BEA) Input-Output (I-O) Accounts.[2] Because these tables are not consistently formatted until the late 1990s and have a reporting lag, this dataset only spans from 1998 to 2021. Δ*Downstream demand* measures changes in downstream industry demand, in the spirit of Bartelsman, Caballero, and Lyons (1994), Maksimovic and Phillips (2001), and Phillips and Zhdanov (2012). Specifically, we first calculate the annual percentage change in the production level related to the activities of the focal industry for each industry in the BEA's supply summary tables. We then weight the production change of each downstream industry by the proportion of the focal upstream industry's products used by the downstream industry. The focal upstream industry is excluded from its own downstream industries. The weighted average of changes in downstream production level generates our proxy for demand changes for the focal upstream industries. We merge with Compustat using the Industry Codes and Aggregations in the Industry Economic Accounts table from the BEA. Mean and median changes in downstream demand are 3.1% and 3.4%, respectively. Changes in downstream demand vary, with the 10^{th} percentile at 0.0% and the 90^{th} at 6.2%.

Finally, we summarize historical payout smoothing. Payout smoothing is estimated using firm-level regressions over rolling prior 10-year windows. We require at least three years of historical payout data, which limits our sample to 1987 to 2021. That is, for each firm i at year t, historical payout smoothing is estimated from year t-10 to t-1 as follows:

$$Payout_{i,t} = \beta_1 Payout_{i,t-1} + \beta_2 ROA_{i,t} + \epsilon_{i,t} \tag{1}$$

The β_1 estimated from the above regression is firm i's historical smoothing coefficient at year t. *Payout* is total payout, dividends, or repurchases, scaled by lagged assets, and ROA is net income (ni), scaled by lagged assets.

Payout smoothing varies substantially across firms. Using total payout, we observe that

[2] https://www.bea.gov/data/industries/input-output-accounts-data

the average firm-year is associated with a payout smoothing coefficient of 0.138 while bottom-decile firms exhibit negative smoothing (-0.346) and top-decile firms positive display smoothing (0.724). Average historical dividend smoothing at the firm-year level is greater is 0.217 and varies from zero at the 10^{th} percentile to 0.831 at the 90^{th} percentile. Repurchase smoothing is much lower on average (0.057) but also varies substantially from -0.344 at the 10^{th} percentile to 0.492 at the 90^{th} percentile. Taken together, our historical payout smoothing measures at the firm-year level are consistent with our aggregate measure in that firms tend to smooth dividends more than repurchases. These measures, however, highlight the substantial variation in smoothing behavior across firm-year observations, which we will exploit next to examine the relation between payout and investment responsiveness.

3.2. Are payout smoothers less reactive to investment opportunities?

Table 7 shows how payout smoothing relates to firms' responsiveness to investment opportunities. We regress investment on investment opportunities, an indicator for high (top quartile) historical payout smoothing, and their interaction. We include firm-level controls summarized in Table 1. All models include firm fixed effects and Models (4)-(6) also include year fixed effects. Standard errors are clustered by firm and fiscal year.

Our regressions show that firms that historically smooth payouts are less responsive to investment opportunities. When investment opportunities are high, firms respond by investing significantly more. For low payout smoothers, a one standard deviation increase in market-to-book ratio is associated with a 3.4% increase in investments as a percentage of assets, or 34% as of percentage of mean investments. But this investment hike is attenuated for payout smoothers. For example, Model (1) estimates that firms that smooth total payouts increase investments significantly less than other firms. Payout smoothers are 19% (=0.00443/0.0232) less responsive than other firms. Consistent with dividends being "stickier" than repurchases, the magnitude of the dampening effect of payout smoothing on investment responsiveness is larger for dividends (-0.495%) in Model (2) than for repurchases

(-0.502%) in Model (3). The results are similar in Models (3)-(6), which include year fixed effects, and continue to support the notion that firms that historically smooth payouts are less responsive to investment opportunities.

Table 8 also presents regressions of investment on investment opportunities and payout smoothing, but instead uses a metric for investment opportunities at the *industry-level* (minus the focal firm). We continue to see a dampening of investment responsiveness within firms that historically smooth payouts. The coefficient associated with investment opportunities drops by 29% within firms with high total payout smoothing. In this setting, the effects are similar across dividends and repurchases.

Our final investment opportunities metric relies on changes in downstream demand. The motivation for this measure is that at least some changes in production from downstream industries exogenously generate new demand and therefore investment opportunities within the upstream focal industry. Table 9 presents these results. The coefficient associated with changes in downstream demand implies that a one standard deviation increase in investment opportunities is associated with a 0.65% increase in investments as a percentage of assets, or 6.5% of the mean investment-to-assets ratio. Investment responsiveness is somewhat muted, however, for firms with high payout smoothing: They are 20.1% less responsive. In these models, this negative effect is more pronounced within firms that smooth dividends. High dividend smoothers are 34.7% (23.5%) less responsive using models without (with) year fixed effects. In contrast, firms that smooth repurchases are not significantly less responsive to investment opportunities driven by changes in downstream demand.

Since firm maturity correlates highly with its investment activity, in Appendix Table A6 we more directly control for a firm's stage in the life cycle using the four measures derived by Hoberg and Maksimovic (2022). Including these measures greatly reduces our sample size, by about half. Consistent with expectations, firms in earlier stages invest more. Importantly, our investment responsiveness results are robust to controlling for life cycle.

4. Conclusion

This study examines the extent to which firms smooth payouts, the evolution of payout smoothing over time, and the implications of these innovations in payout smoothing for investment policy. While prior studies establish the prevalence of dividends smoothing, we show that repurchase smoothing has increased over time and is now common practice. Repurchase smoothing has driven the rise in overall payout smoothing over the past four decades.

The ramifications of payout smoothing are theoretically ambiguous. Payout smoothing may benefit shareholders by decreasing information asymmetry between managers and shareholders or mitigating agency concerns associated with free cash flow. Prior literature lends theoretical credence and empirical support for these advantages. Yet, the potential downside of payout smoothing is that firms fixated on maintaining prior payout levels may be tempted to sacrifice investments. We study this potential disadvantage of payout smoothing, which has received much less attention in the literature, and show that, indeed, firms that historically smooth payouts are less responsive to the arrival of investment opportunities.

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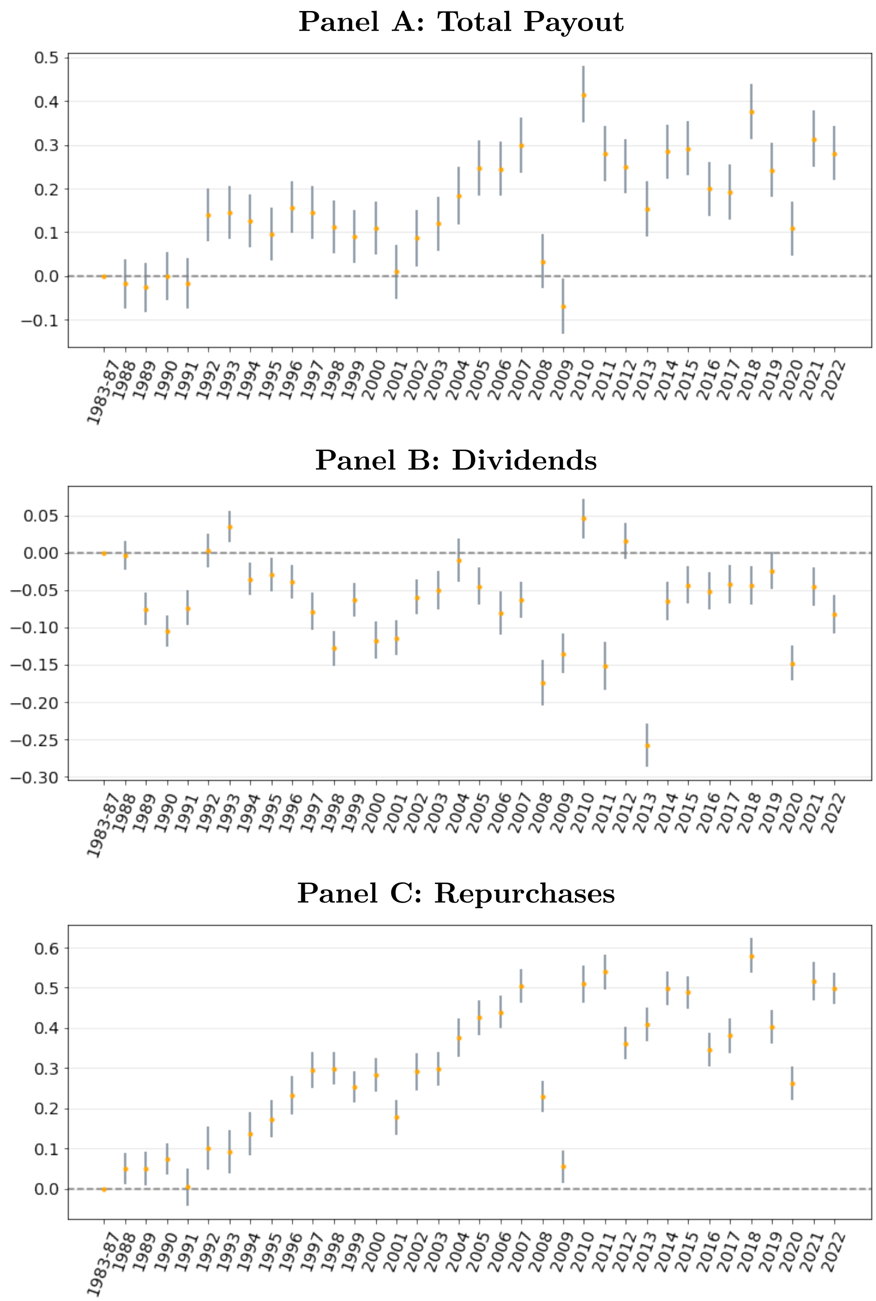

Figure 1. Payout Smoothing Time Trends

The above figures graph changes in payout smoothing relative to a baseline time period of 1983-1987. We graph coefficients associated with the interaction of an indicator for each year after 1987 and lagged payout, along with their 95% confidence intervals.

Table 1. Payout levels and firm controls: Summary Statistics

This table presents summary statistics for payout levels and firm controls. We source our data from CRSP and Compustat from 1983 to 2022. *Repurchases* equals purchases of common and preferred stock minus the change in the value of preferred stock outstanding if the change is negative, scaled by lagged assets. *Dividends* is total common stock dividend, scaled by lagged assets (at). *Total payout* is the sum of *Dividends* and *Repurchases*. *Cash* is cash and equivalents, scaled by lagged total assets. *ROA* is net income, scaled by lagged total assets. *Age* is the number of years the firm appears in Compustat. *Sales growth* is the percentage change in sales. *Market cap* is year-end closing price times the number of shares outstanding, adjusted for inflation and expressed in December 2022 dollars. *Leverage* is the sum of long-term debt and total debt in current liabilities, scaled by lagged total assets. Appendix Table A1 provides more detailed variable definitions.

	N	Mean	Median	P10	P90	Std dev
Payout						
Repurchases	159,781	0.013	0	0	0.039	0.035
Dividends	159,781	0.008	0	0	0.028	0.017
Total payout	159,781	0.022	0.003	0	0.064	0.045
Firm controls						
Cash	159,781	0.190	0.084	0.009	0.510	0.270
ROA	159,781	-0.028	0.021	-0.250	0.130	0.228
Age	159,781	16	12	4	32	12
Sales growth	159,781	0.147	0.070	-0.181	0.452	0.499
Market cap	159,781	3,346	327	20	6,904	9,979
Leverage	159,781	0.259	0.198	0.000	0.582	0.265

Table 2. Payout Smoothing

This table shows payout smoothing coefficients estimated from first-order autoregressive models of payout, scaled by total assets, using data from 1983 to 2022. Appendix Table A1 defines other variables in detail. Standard errors are clustered by firm and fiscal year.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Total payout	Dividends	Repurchases	Total payout	Dividends	Repurchases
Total payout$_{t-1}$	0.615***			0.551***		
	(26.52)			(24.87)		
Dividends$_{t-1}$		0.860***			0.834***	
		(69.46)			(62.46)	
Repurchases$_{t-1}$			0.525***			0.482***
			(18.07)			(17.84)
Cash$_{t-1}$				0.0124***	0.000638***	0.0105***
				(10.62)	(2.844)	(12.74)
Leverage$_{t-1}$				-0.00935***	-0.00213***	-0.00596***
				(-10.19)	(-11.57)	(-7.664)
Market cap$_{t-1}$				4.35e-07***	5.30e-08***	3.50e-07***
				(12.25)	(6.867)	(11.41)
ROA$_{t-1}$				0.0229***	0.00263***	0.0164***
				(13.85)	(7.787)	(12.95)
Age$_{t-1}$				0.000178***	4.50e-05***	4.74e-05**
				(6.959)	(10.22)	(2.543)
Sales growth$_{t-1}$				-0.00132***	-0.000297***	-0.000637***
				(-5.082)	(-4.736)	(-3.089)
Constant	0.00892***	0.00116***	0.00647***	0.00739***	0.00107***	0.00549***
	(22.14)	(10.81)	(17.92)	(13.43)	(9.512)	(10.97)
Observations	159,781	159,781	159,781	159,781	159,781	159,781
Adj. R^2	0.358	0.731	0.260	0.389	0.736	0.287

Table 3. Payout Smoothing by Payout Style

This table shows payout smoothing coefficients by payout style. We first condition on firms that pay a dividend or repurchase during our sample period ("Positive payout"). We then restrict our sample to firms that pay both dividends and repurchases during the sample period ("Both dividends and repurchases"). Finally, we examine subsamples of firms that pay dividends but never repurchase ("Dividends only") and firms that repurchase stock but never pay a dividend ("Repurchases only"). We estimate smoothing coefficients from first-order autoregressive models of payout, scaled by total assets, using data from 1983 to 2022. All regressions include firm controls, defined in Appendix Table A1. Standard errors are clustered by firm and fiscal year.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample:	Positive payout			Both dividends and repurchases			Dividends only	Repurchases only
Payout metric:	Total payout	Dividends	Repurchases	Total payout	Dividends	Repurchases	Dividends	Repurchases
Total payout$_{t-1}$	0.541***			0.553***				
	(24.45)			(25.08)				
Dividends$_{t-1}$		0.831***			0.801***		0.746***	
		(62.15)			(53.74)		(22.59)	
Repurchases$_{t-1}$			0.475***			0.488***		0.417***
			(17.73)			(17.49)		(13.97)
Constant	0.00794***	0.00128***	0.00568***	0.00810***	0.00240***	0.00430***	0.00198***	0.00841***
	(12.28)	(9.688)	(9.891)	(9.080)	(10.33)	(5.978)	(5.816)	(11.43)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	139,967	139,967	139,967	83,932	83,932	83,932	8,240	47,795
Adj. R^2	0.377	0.729	0.281	0.434	0.698	0.319	0.595	0.220

Table 4. Trends in Payout Smoothing

This table examines trends in payout smoothing. We add a trend variable and interaction term to first-order autoregressive models of payout, scaled by total assets, with firm controls. *Trend* equals the year minus 1983. All regressions include firm controls, defined in Appendix Table A1. Standard errors are clustered by firm and fiscal year.

	(1)	(2)	(3)
Payout metric:	Total payout	Dividends	Repurchases
Trend*Payout$_{t-1}$	0.00726***	-0.00200**	0.0118***
	(6.209)	(-2.349)	(8.094)
Payout$_{t-1}$	0.391***	0.872***	0.218***
	(15.11)	(60.80)	(7.102)
Trend	-7.89e-05**	3.06e-06	1.61e-05
	(-2.227)	(0.397)	(0.606)
Constant	0.00915***	0.000892***	0.00581***
	(10.90)	(5.531)	(8.826)
Firm controls	Yes	Yes	Yes
Observations	159,781	159,781	159,781
Adj. R^2	0.395	0.737	0.302

Table 5. Payout Smoothing Over Time

This table shows payout smoothing coefficients estimated from first-order autoregressive models of payout, scaled by total assets, estimated over 5-year periods from 1983 to 2022. All regressions include firm controls, defined in Appendix Table A1. Standard errors are clustered by firm and fiscal year.

Panel A: Total payout

Time period	(1) 1983-1987	(2) 1988-1992	(3) 1993-1997	(4) 1998-2002	(5) 2003-2007	(6) 2008-2012	(7) 2013-2017	(8) 2018-2022
Total payout$_{t-1}$	0.368***	0.394***	0.532***	0.493***	0.628***	0.506***	0.618***	0.666***
	(10.70)	(13.63)	(31.33)	(24.97)	(23.61)	(6.631)	(21.02)	(17.20)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,456	20,879	25,076	25,261	20,571	17,681	15,775	15,082
Adj. R^2	0.209	0.276	0.335	0.318	0.416	0.411	0.505	0.514

Panel B: Dividends

Time period	(1) 1983-1987	(2) 1988-1992	(3) 1993-1997	(4) 1998-2002	(5) 2003-2007	(6) 2008-2012	(7) 2013-2017	(8) 2018-2022
Dividends$_{t-1}$	0.892***	0.822***	0.866***	0.801***	0.841***	0.799***	0.782***	0.830***
	(72.64)	(31.11)	(40.14)	(40.37)	(57.25)	(16.66)	(14.42)	(34.06)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,456	20,879	25,076	25,261	20,571	17,681	15,775	15,082
Adj. R^2	0.852	0.747	0.817	0.760	0.651	0.630	0.705	0.746

Panel C: Repurchases

Time period	(1) 1983-1987	(2) 1988-1992	(3) 1993-1997	(4) 1998-2002	(5) 2003-2007	(6) 2008-2012	(7) 2013-2017	(8) 2018-2022
Repurchases$_{t-1}$	0.180***	0.241***	0.388***	0.443***	0.596***	0.439***	0.599***	0.616***
	(8.769)	(16.44)	(9.862)	(19.46)	(19.16)	(5.709)	(20.14)	(12.99)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,456	20,879	25,076	25,261	20,571	17,681	15,775	15,082
Adj. R^2	0.044	0.099	0.162	0.243	0.366	0.328	0.437	0.421

Table 6. Payout smoothing and investment: Summary Statistics

This table presents summary statistics for our investment and historical payout smoothing variables. *Investment* is the sum of research and development and capital expenditures, scaled by lagged total assets. *Investment opportunities* is market-to-book ratio defined as year-end closing price (prcc_f) times common shares used to calculate earnings per share (cshpri), plus the liquidation value of preferred stock (pstkl), plus long-term debt (dltt) and short-term debt (dlc), minus deferred taxes and investment tax credits (txditc), all scaled by total assets (at). Δ*Downstream demand* represents the weighted average of changes in downstream production. *Payout (Dividend, Repurchase) smoothing* equals the coefficient associated with lagged payout estimated from a firm-level regressions of scaled payout on lagged scaled payout and lagged return on assets. Regressions are estimated by firm over rolling prior 10-year windows and require at least three years of data. We source our payout and investment data, which span from 1987-2021, from Compustat. We calculate our downstream demand from the Bureau of Economic Analysis's (BEA) supply tables over 1999 to 2021. Appendix Table A1 provides more detailed variable definitions.

	N	Mean	Median	P10	P90	Std dev
Investment & Investment opportunities						
Investment	131,204	0.101	0.058	0.001	0.247	0.134
Investment opportunities	131,204	1.467	0.996	0.317	3.002	1.541
ΔDownstream demand	77,650	0.031	0.034	0.000	0.062	0.043
Firm-level historical smoothing						
Payout smoothing	131,204	0.138	0.000	-0.346	0.724	0.678
Dividend smoothing	131,204	0.217	0.000	0.000	0.831	0.411
Repurchase smoothing	131,204	0.057	0.000	-0.334	0.492	0.604

Table 7. Payout Smoothing and Responsiveness to Investment Opportunities at the Firm Level

This table shows how payout smoothing relates to firms' responsiveness to firm-level investment opportunities, using data from 1987 to 2021. We regress investment, defined as the sum of capital expenditures and research and development scaled by lagged total assets, on firm-level *investment* opportunities, an indicator for high (top quartile) historical payout smoothing, and their interaction. *Investment opportunities* are defined following Frank and Goyal (2009) and Farre-Mensa and Ljungqvist (2016) as year-end closing price (prcc_f) times common shares used to calculate earnings per share (cshpri), plus the liquidation value of preferred stock (pstkl), plus long-term debt (dltt) and short-term debt (dlc), minus deferred taxes and investment tax credits (txditc), all scaled by total assets (at). *Payout smoothing* is estimated at the firm level over rolling prior 10-year windows by regressing payout (scaled by lagged assets) on lagged payout and earnings. The smoothing coefficient is the coefficient on lagged payout in this regression. Appendix Table A1 defines these and other variables in more detail. We include firm fixed effects in all models and year fixed effects in Models (4)-(6). Standard errors are clustered by firm and fiscal year.

Dependent variable: Investment Payout smoothing metric:	(1) Total payout	(2) Dividends	(3) Repurchases	(4) Total payout	(5) Dividends	(6) Repurchases
Investment opportunities$_{t-1}$	0.0232***	0.0230***	0.0234***	0.0230***	0.0228***	0.0232***
	(29.01)	(29.07)	(30.58)	(29.62)	(29.68)	(31.04)
Investment opportunities$_{t-1}$	-0.00443***	-0.00495***	-0.00502***	-0.00440***	-0.00497***	-0.00483***
* High payout smoothing$_{t-10,t-1}$	(-7.152)	(-5.863)	(-7.158)	(-7.075)	(-5.974)	(-6.901)
High payout smoothing$_{t-10,t-1}$	0.00406***	0.00647***	0.00540***	0.00407***	0.00604***	0.00538***
	(4.977)	(6.291)	(4.810)	(5.030)	(5.858)	(4.885)
Cash$_{t-1}$	-0.0280***	-0.0280***	-0.0280***	-0.0275***	-0.0275***	-0.0275***
	(-6.472)	(-6.455)	(-6.460)	(-6.356)	(-6.343)	(-6.345)
Leverage$_{t-1}$	-0.0390***	-0.0389***	-0.0387***	-0.0384***	-0.0383***	-0.0382***
	(-13.62)	(-13.60)	(-13.64)	(-13.20)	(-13.19)	(-13.21)
Market cap$_{t-1}$	-8.85e-07***	-8.71e-07***	-8.58e-07***	-8.63e-07***	-8.50e-07***	-8.40e-07***
	(-8.496)	(-8.402)	(-8.472)	(-8.557)	(-8.456)	(-8.541)
ROA$_{t-1}$	-0.0452***	-0.0455***	-0.0451***	-0.0473***	-0.0477***	-0.0472***
	(-5.830)	(-5.873)	(-5.841)	(-6.196)	(-6.239)	(-6.209)
Age$_{t-1}$	-0.00142***	-0.00143***	-0.00142***	-0.00247***	-0.00249***	-0.00246***
	(-13.62)	(-13.63)	(-13.56)	(-3.157)	(-3.192)	(-3.141)
Sales growth$_{t-1}$	0.00691***	0.00697***	0.00686***	0.00628***	0.00634***	0.00624***
	(7.436)	(7.528)	(7.431)	(6.655)	(6.745)	(6.644)
Observations	131,204	131,204	131,204	131,204	131,204	131,204
Adj. R-squared	0.688	0.688	0.688	0.690	0.690	0.690
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE				Yes	Yes	Yes

Table 8. Payout Smoothing and Responsiveness to Investment Opportunities at the Industry Level
This table shows how payout smoothing relates to firm's responsive to industry-level investment opportunities, using data from 1987 to 2021. We regress *investment*, defined as the sum of capital expenditures and research and development scaled by lagged total assets, on industry-level investment opportunities, an indicator for high (top quartile) historical payout smoothing, and their interaction. *Industry investment opportunities* are the industry mean of investment opportunities, defined following Frank and Goyal (2009) and Farre-Mensa and Ljungqvist (2016) as year-end closing price (prcc_f) times common shares used to calculate earnings per share (cshpri), plus the liquidation value of preferred stock (pstkl), plus long-term debt (dltt) and short-term debt (dlc), minus deferred taxes and investment tax credits (txditc), all scaled by total assets (at). Industry classification are based on three-digit historical SIC codes. If historical SIC codes are unavailable, we use current SIC codes. *Payout smoothing* is estimated at the firm level over rolling prior 10-year windows by regressing payout (scaled by lagged assets) on lagged payout and earnings. The smoothing coefficient is the coefficient on lagged payout in this regression. Appendix Table A1 defines these and other variables in more detail. We include firm fixed effects in all models and year fixed effects in Models (4)-(6). Standard errors are clustered by firm and fiscal year.

Dependent variable: Investment Payout smoothing metric:	(1) Total payout	(2) Dividends	(3) Repurchases	(4) Total payout	(5) Dividends	(6) Repurchases
Industry inv opp_{t-1}	0.0163***	0.0168***	0.0174***	0.0136***	0.0141***	0.0146***
	(8.387)	(8.711)	(8.966)	(8.685)	(9.069)	(8.994)
Industry inv opp_{t-1}	-0.00471***	-0.00697***	-0.00762***	-0.00446***	-0.00643***	-0.00713***
* High payout $smoothing_{t-10,t-1}$	(-4.577)	(-6.142)	(-7.227)	(-4.366)	(-5.599)	(-6.536)
High payout $smoothing_{t-10,t-1}$	0.00465***	0.00935***	0.00910***	0.00435***	0.00817***	0.00864***
	(3.661)	(7.088)	(6.014)	(3.454)	(6.119)	(5.640)
$Cash_{t-1}$	-0.0133***	-0.0134***	-0.0136***	-0.0125***	-0.0126***	-0.0127***
	(-3.176)	(-3.210)	(-3.232)	(-2.975)	(-3.006)	(-3.027)
$Leverage_{t-1}$	-0.0442***	-0.0440***	-0.0440***	-0.0440***	-0.0437***	-0.0438***
	(-13.60)	(-13.61)	(-13.60)	(-13.11)	(-13.11)	(-13.09)
Market cap_{t-1}	-2.36e-07**	-2.26e-07**	-2.25e-07**	-2.16e-07**	-2.07e-07**	-2.07e-07**
	(-2.315)	(-2.225)	(-2.232)	(-2.186)	(-2.105)	(-2.121)
ROA_{t-1}	-0.0429***	-0.0432***	-0.0427***	-0.0450***	-0.0453***	-0.0448***
	(-5.172)	(-5.208)	(-5.165)	(-5.492)	(-5.527)	(-5.484)
Age_{t-1}	-0.00179***	-0.00181***	-0.00178***	-0.00269***	-0.00274***	-0.00269***
	(-14.27)	(-14.32)	(-14.09)	(-3.199)	(-3.270)	(-3.184)
Sales $growth_{t-1}$	0.0110***	0.0110***	0.0109***	0.0104***	0.0104***	0.0103***
	(10.25)	(10.25)	(10.18)	(9.752)	(9.754)	(9.698)
Observations	130,483	130,483	130,483	130,483	130,483	130,483
Adj. R-squared	0.662	0.662	0.662	0.664	0.664	0.665
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE				Yes	Yes	Yes

Table 9. Payout Smoothing and Responsiveness to Changes in Downstream Demand

This table shows how payout smoothing relates to firm's responsive to investment opportunities, using data from 1999 to 2021. We regress investment, defined as the sum of capital expenditures and research and development scaled by lagged total assets, on changes in downstream demand, an indicator for high (top quartile) historical payout smoothing, and their interaction. Δ*Downstream demand* represents the weighted average of changes in downstream production. We estimate payout smoothing at the firm level over rolling prior 10-year windows by regressing payout (scaled by lagged assets) on lagged payout and earnings. The smoothing coefficient is the coefficient on lagged payout in this regression. Appendix Table A1 defines these and other variables in more detail. We include firm fixed effects in all models and year fixed effects in Models (4)-(6). Standard errors are clustered by firm and fiscal year.

Dependent variable: Investment Payout smoothing metric:	(1) Total payout	(2) Dividends	(3) Repurchases	(4) Total payout	(5) Dividends	(6) Repurchases
ΔDownstream demand$_{t-1}$	0.152***	0.159***	0.148***	0.204***	0.211***	0.198***
	(4.180)	(3.947)	(3.990)	(5.152)	(4.999)	(4.956)
ΔDownstream demand$_{t-1}$	-0.0305*	-0.0551**	-0.0145	-0.0241	-0.0495*	0.00209
* High payout smoothing$_{t-10,t-1}$	(-1.773)	(-2.190)	(-0.606)	(-1.583)	(-2.008)	(0.0927)
High payout smoothing$_{t-10,t-1}$	-0.000358	0.00338***	3.79e-05	-0.000662	0.00292***	-0.000426
	(-0.308)	(3.195)	(0.0324)	(-0.604)	(2.884)	(-0.391)
Cash$_{t-1}$	-0.0238***	-0.0238***	-0.0238***	-0.0244***	-0.0244***	-0.0243***
	(-5.370)	(-5.387)	(-5.370)	(-5.604)	(-5.618)	(-5.598)
Leverage$_{t-1}$	-0.0477***	-0.0477***	-0.0477***	-0.0484***	-0.0484***	-0.0484***
	(-13.06)	(-13.04)	(-13.03)	(-11.24)	(-11.23)	(-11.21)
Market cap$_{t-1}$	1.93e-07	1.96e-07	1.93e-07	1.59e-07	1.61e-07	1.59e-07
	(1.506)	(1.536)	(1.504)	(1.249)	(1.271)	(1.248)
ROA$_{t-1}$	-0.0657***	-0.0659***	-0.0657***	-0.0684***	-0.0686***	-0.0684***
	(-6.796)	(-6.807)	(-6.803)	(-7.303)	(-7.316)	(-7.313)
Age$_{t-1}$	-0.00155***	-0.00157***	-0.00155***	-0.00230**	-0.00232**	-0.00229**
	(-5.882)	(-5.941)	(-5.906)	(-2.563)	(-2.598)	(-2.553)
Sales growth$_{t-1}$	0.00581***	0.00580***	0.00580***	0.00580***	0.00581***	0.00580***
	(3.417)	(3.424)	(3.415)	(3.441)	(3.448)	(3.442)
Observations	70,463	70,463	70,463	70,463	70,463	70,463
Adj. R-squared	0.728	0.728	0.728	0.731	0.731	0.731
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE				Yes	Yes	Yes

Table A1. Variable Definitions

This table present variable definitions of our variables of interest and control variables. All continuous measures are winsorized at the 1st and 99th percentiles.

Payout and payout smoothing	
Dividends	Total common stock dividend (dvc), scaled by lagged assets (at). *Source*: Compustat *Unit*: Ratio
Repurchases	Purchases of common and preferred stock (prstkc) minus the change in the value of preferred stock outstanding (pstkrv) if the change is negative, scaled by lagged assets (at). *Source*: Compustat *Unit*: Ratio
Total payout	The sum of *Dividends* and *Repurchases*. *Source*: Compustat *Unit*: Ratio
Payout smoothing	The lagged payout coefficient in a firm-level regression of payout (dividends, repurchases, or total payout) scaled by lagged assets, on lagged scaled payout and lagged return on assets. Regressions are estimated by firm over rolling prior 10-year windows. *Source*: Compustat *Unit*: Continuous
High payout smoothing	An indicator equal to one if *Payout smoothing* is in the top quartile. *Source*: Compustat *Unit*: Binary
Investment and investment opportunities	
Investment	The sum of research and development (xrd) and capital expenditures (capx), scaled by lagged total assets (at). Missing values are set equal to zero. *Source*: Compustat *Unit*: Ratio
Investment opportunities	Following Frank and Goyal (2009) and Farre-Mensa and Ljungqvist (2016), year-end closing price (prcc_f) times common shares used to calculate earnings per share (cshpri), plus the liquidation value of preferred stock (pstkl), plus long-term debt (dltt) and short-term debt (dlc), minus deferred taxes and investment tax credits (txditc), all scaled by total assets (at). *Source*: Compustat *Unit*: Ratio
ΔDownstream demand	Changes in downstream industry demand, in the spirit of Bartelsman, Caballero, and Lyons (1994), Maksimovic and Phillips (2001), and Phillips and Zhdanov (2012). Specifically, we first calculate the annual percentage change in the production level related to the activities of the focal industry for each industry in the BEA's supply summary tables (https://www.bea.gov/data/industries/input-output-accounts-data). We then weight the production change of each downstream industry by the proportion of the focal upstream industry's products used by the downstream industry. The focal upstream industry is excluded from its own downstream industries. The weighted average of changes in downstream production level generates our proxy for demand changes for the focal upstream industries. We merge with Compustat using the Industry Codes and Aggregations in the Industry Economic Accounts table from the BEA. *Source*: Bureau of Economic Analysis (BEA) I-O Tables *Unit*: Weighted average percentage change

Firm controls	
Age	The number of years the firm appears in Compustat *Source*: Compustat *Unit*: Years
Cash	Cash (che) scaled by lagged total assets (at) *Source*: Compustat *Unit*: Ratio
Leverage	The sum of long-term debt (dltt) and total debt in current liabilities (dlc), scaled by lagged total assets (at) *Source*: Compustat *Unit*: Ratio
Market cap	Year-end closing price (prccf) times the number of shares outstanding (csho), adjusted for inflation and expressed in December 2022 dollars *Source*: Compustat *Unit*: $ Millions
ROA	Net income (ni) scaled by lagged total assets (at) *Source*: Compustat *Unit*: Ratio
Sales growth	Sales (sale) divided by lagged sales, minus one *Source*: Compustat *Unit*: Percent change

Table A2. Robustness to Scaling by Market Capitalization
This table verifies the robustness of our baseline payout smoothing results in Table 2 to scaling payout metrics by lagged market capitalization instead of lagged total assets.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Total payout	Dividends	Repurchases	Total payout	Dividends	Repurchases
Total payout$_{t-1}$	0.513***			0.463***		
	(40.46)			(38.00)		
Dividends$_{t-1}$		0.829***			0.812***	
		(50.74)			(47.88)	
Repurchases$_{t-1}$			0.387***			0.363***
			(19.61)			(20.04)
Constant	0.0119***	0.00181***	0.00750***	0.0107***	0.00185***	0.00621***
	(28.94)	(12.50)	(21.81)	(17.85)	(9.850)	(13.03)
Controls	No	No	No	Yes	Yes	Yes
Observations	159,781	159,781	159,781	159,781	159,781	159,781
Adj. R^2	0.258	0.718	0.143	0.281	0.721	0.158

Table A3. Payout Smoothing Excluding Financials and Utilities
This table verifies the robustness of our baseline payout smoothing results in Table 2 to excluding financials and utilities.

Dependent variable:	(1) Total payout	(2) Dividends	(3) Repurchases	(4) Total payout	(5) Dividends	(6) Repurchases
Total payout$_{t-1}$	0.601***			0.523***		
	(25.96)			(23.93)		
Dividends$_{t-1}$		0.860***			0.826***	
		(67.29)			(58.53)	
Repurchases$_{t-1}$			0.516***			0.465***
			(17.87)			(17.44)
Constant	0.0100***	0.00115***	0.00759***	0.00892***	0.00114***	0.00691***
	(20.44)	(9.736)	(17.19)	(13.68)	(8.299)	(10.44)
Controls	No	No	No	Yes	Yes	Yes
Observations	118,933	118,933	118,933	118,933	118,933	118,933
Adj. R^2	0.342	0.729	0.250	0.381	0.736	0.282

Table A4. Payout Smoothing within Financials and Utilities
This table verifies the robustness of our baseline payout smoothing results in Table 2 within financials and utilities.

Dependent variable:	(1) Total payout	(2) Dividends	(3) Repurchases	(4) Total payout	(5) Dividends	(6) Repurchases
Total payout$_{t-1}$	0.675***			0.634***		
	(22.55)			(22.30)		
Dividends$_{t-1}$		0.862***			0.847***	
		(59.45)			(54.99)	
Repurchases$_{t-1}$			0.553***			0.517***
			(14.19)			(14.11)
Controls	No	No	No	Yes	Yes	Yes
Observations	40,848	40,848	40,848	40,848	40,848	40,848
Adj. R^2	0.436	0.739	0.294	0.453	0.741	0.314

Table A5. Speed of Adjustment
This table illustrates the relation between payout smoothing, as defined in this study, and speed of adjustment. The key difference is that dependent variable in regressions estimating payout smoothing coefficients is payout levels while the dependent variable in estimations of speed of adjustment is *change in* payout levels. The speeds of adjustment equal the additive inverse of the payout coefficients, which equal one minus our payout smoothing estimates.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Total payout	Dividends	Repurchases	Total payout	Dividends	Repurchases
Total payout$_{t-1}$	-0.385***			-0.449***		
	(-16.63)			(-20.28)		
Dividends$_{t-1}$		-0.140***			-0.166***	
		(-11.30)			(-12.48)	
Repurchases$_{t-1}$			-0.475***			-0.518***
			(-16.35)			(-19.19)
Constant	0.00892***	0.00116***	0.00647***	0.00697***	0.00108***	0.00509***
	(22.14)	(10.81)	(17.92)	(12.92)	(9.575)	(10.34)
Controls	No	No	No	Yes	Yes	Yes
Observations	159,781	159,781	159,781	159,781	159,781	159,781
Adj. R^2	0.180	0.067	0.223	0.220	0.085	0.252

Table A6. Payout Smoothing and Investment Responsiveness - Robustness to Controlling for Life Cycle

This table shows the robustness of results in Tables 7, 8, and 9 to controlling for the firm's life cycle stage using classifications from Hoberg and Maksimovic (2022).

Dependent variable: Investment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Investment opportunity metric:	Firm-level Frank-Goyal MB			Industry-level Frank-Goyal MB			ΔDownstream demand		
Payout smoothing metric:	Total payout	Dividends	Repurchases	Total payout	Dividends	Repurchases	Total payout	Dividends	Repurchases
Investment opportunities$_{t-1}$	0.0218***	0.0217***	0.0219***	0.0133***	0.0137***	0.0139***	0.205***	0.213***	0.200***
	(22.61)	(22.76)	(23.30)	(5.734)	(5.965)	(5.905)	(5.152)	(5.006)	(4.958)
Investment opportunities$_{t-1}$	-0.00329***	-0.00419***	-0.00348***	-0.00209	-0.00384**	-0.00408***	-0.0250	-0.0508**	0.000110
* High payout smoothing$_{t-10,t-1}$	(-4.270)	(-3.917)	(-4.311)	(-1.627)	(-2.784)	(-2.928)	(-1.662)	(-2.083)	(0.00488)
High payout smoothing$_{t-10,t-1}$	0.00345***	0.00631***	0.00485***	0.00221	0.00624***	0.00581***	-0.000644	0.00285***	-0.000419
	(3.174)	(4.972)	(4.035)	(1.353)	(3.510)	(3.157)	(-0.582)	(2.845)	(-0.380)
Life cycle stage 1$_{t-1}$	0.0547***	0.0548***	0.0547***	0.0655***	0.0655***	0.0651***	0.0713***	0.0715***	0.0714***
	(6.832)	(6.879)	(6.843)	(8.073)	(8.061)	(8.054)	(7.714)	(7.740)	(7.712)
Life cycle stage 2$_{t-1}$	0.0117*	0.0117*	0.0116*	0.0115*	0.0118*	0.0115*	0.0157**	0.0160**	0.0159**
	(2.002)	(2.011)	(1.991)	(1.900)	(1.938)	(1.895)	(2.507)	(2.562)	(2.548)
Life cycle stage 3$_{t-1}$	0.00530	0.00536	0.00514	0.00305	0.00315	0.00307	0.00416	0.00441	0.00429
	(1.048)	(1.060)	(1.020)	(0.570)	(0.586)	(0.573)	(0.767)	(0.819)	(0.793)
Observations	77,911	77,911	77,911	77,343	77,343	77,343	69,666	69,666	69,666
Adj. R-squared	0.744	0.744	0.744	0.721	0.721	0.721	0.732	0.732	0.732
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes