Why Firms Smooth Dividends: Empirical Evidence

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Abstract

While dividend smoothing is taken as an article of faith, little is known about the cross-sectional properties of smoothing policies. We examine firms' dividend smoothing behavior across a wide spectrum of publicly traded firms in the U.S. We find that larger firms, firms with more tangible assets, and firms with lower price volatility and earnings volatility smooth more. The findings also indicate that firms with slower growth prospects and firms that are "cash cows" smooth more. Firms with a more significant presence of institutional investors and firms with higher payout ratios also smooth more. These results are consistent with theories that attempt to explain smoothing as an outcome of agency considerations. Asymmetric information based theories are largely unsupported by the data. The paper also documents a significant asymmetry in smoothing behavior: firms adjust more quickly when dividends are below target than when above target. Firms with low dividend-yields, high market to book ratios, and fewer tangible assets react faster when dividends are below target, while firms with volatile cash flows and low institutional holdings react faster when dividends are above target. Finally, we find that on average firms smooth total payout (dividends and repurchases) much less than they smooth dividends, but the cross-sectional variation in total payout smoothing is greater than that of dividend smoothing alone. Factors that explain dividend smoothing are less successful in explaining the cross-sectional variation in payout smoothing.

1 Introduction

In a classic study, Lintner (1956) showed that dividend-smoothing behavior was widespread. Lintner observed that firms are primarily concerned with the stability of dividends. Firms do not set dividends de novo each quarter. Instead, they first consider whether they need to make any changes from the existing rate. Only when they have decided a change is necessary do they consider how large it should be. Managers appear to believe strongly that the market puts a premium on firms with a stable dividend policy. While Lintner's study was done over 50 years ago and his sample contained only 28 firms, his findings seem to hold for a wide set of firms and more recent time periods (e.g., Fama and Babiak (1968), Brav, Graham, Harvey and Michaely (2005)).

While both survey evidence and empirical evidence suggest that dividend smoothing is a very important ingredient of payout policy, Lintner's study and subsequent studies left almost unanswered the question of what determines a firm's propensity to smooth. Berk and DeMarzo (2007) summarize the current state of our knowledge of dividend smoothing policies by saying that: "While perhaps a good description of how firms *do* set their dividends…there is no clear reason why firms *should* smooth their dividends, nor convincing evidence that investors prefer this practice." Why do firms smooth? And why do some firms smooth more than others? In this paper we extract the empirical implications of dividend smoothing theories and empirically investigate the cross-sectional differences in firms' characteristics as a function of dividend (and total payout) smoothing.

The limited information available on dividend smoothing is surprising especially when compared to our knowledge, both theoretical and empirical, of what determines the level of dividends (see Allen and Michaely (2003) and Kalay and Lemmon (2008) for comprehensive reviews of this literature). Theories of dividend smoothing are primarily based on either asymmetric information (Kumar (1988), Brennan and Thakor (1990), Guttman, Kadan, and Kandel (2007)) or agency considerations (Allen, Bernardo and Welch (2000), Fudenberg and Tirole (1995) and DeMarzo and Sannikov (2008)).

Generally speaking, the implications of the asymmetric information models are that firms facing more uncertainty and greater information asymmetry will tend to smooth more. For example, Kumar (1988) and Guttman et al. (2007) show that dividend smoothing can arise from a coarse signaling equilibrium in a setting where managers have private information about firm value. The agency models' implications are that firms that face greater potential for conflicts of interest between shareholders and managers – those with slower growth, excess cash or weaker monitoring–will smooth more. For example, Allen et al. (2000) propose that a greater concentration of institutional investors (who exert better monitoring than individual investors) will result in more smoothing.

Existing empirical evidence on smoothing behavior suggests that dividend smoothing is prevalent (see for example, empirical evidence by Lintner (1956), Fama and Babiak (1968), Choi (1990)). Moreover, Brav et al. (2005) find that the tendency to smooth dividends has increased over time. Using data from the UK, Michaely and Roberts (2007) report that dividend smoothing is more pronounced in public firms relative to private firms where potential agency issues and information asymmetries are more pronounced. Dewenter and Warther (1998) find that Japanese firms who are members of a Keiretsu group (likely to face lower information asymmetry and conflict of interest) smooth less.

Using a large sample of dividend-paying, US-listed firms we first document significant cross sectional variation in the degree of dividend smoothing, which can not be solely explained by earnings variability. We then provide comprehensive evidence on how firms' characteristics are related to corporations' dividend smoothing policies. Given our findings, we attempt to shed light on why firms smooth their dividends. We also examine "smoothing asymmetry": According to managers (Lintner (1956), Brav et al. (2005)) a major motivation for smoothing is the reluctance to cut dividends. Indeed, empirical papers observe that firms increase dividends more frequently than they cut dividends, but that cuts are more pronounced (e.g., Healy and Palepu (1988), Michaely, Thaler and Womack (1995)). This combined evidence suggests that smoothing behavior may not be symmetric for positive and negative earnings changes, and perhaps not even motivated by the same factors. Finally, given the significant trend to use repurchases (Boudoukh et al. (2007)) and the reduced reliance on dividends (Fama and French (2001), Grullon and Michaely (2002)) we also examine the smoothing behavior of total payout.

Our research provides a number of new results on firms' smoothing policies. We highlight the primary findings here. First, we show that traditional measures of smoothing are biased and are not optimal for discerning cross-sectional differences in policy. One concern arises from the well known small-sample bias in estimating autoregressive models such as Lintner's model (Hurwitz (1950)). Another concern is that many firms' managers suggest that dividend targets today are different from what Linter's model implies (Brav et al (2005)). We propose two alternative smoothing measures and use a simulation exercise to show that they overcome these concerns.

We then document significant cross-sectional variation in dividend smoothing, and an even greater cross-sectional variation in total payout smoothing. Firms clearly do not all follow the same policy with respect to smoothing. We find that smoothing varies not only across firms but also over time. Dividend smoothing has been increasing over the past 50 years, suggesting that managers are more concerned about dividend smoothing today. At the same time total payout smoothing has been going down: Firms are paying out more in the form of share repurchases rather than dividends; and managers allow repurchases to be more volatile than dividends.

Third, we find that younger firms, smaller firms, firms with low dividend yields, firms with high earnings volatility and firms with high return volatility smooth less. These findings suggest that firms facing greater uncertainty and more information asymmetry smooth less, which is inconsistent with the implications of several of the existing asymmetric information models. At the same time, our results indicate that firms that are cash cows, firms with low growth prospects, and firms that are monitored by institutional investors smooth more. This is consistent with several of the implications of the agency theories. Not surprisingly, the results indicate that firms with more persistent earnings smooth less. That is, when earning changes are more permanent, there is less dividend smoothing. Results are robust across different measures of smoothing and empirical methods (e.g., non parametric vs. multivariate regression). We also perform several robustness tests to ensure our results are not influenced by sample selection, the definitions of earnings and dividends, or earnings smoothing behavior.

Fourth, we find smoothing to be highly asymmetric with respect to earnings changes. Dividends adjust much faster to positive earnings news than to negative earnings news: When a firm's dividend is below the target, it is more likely to smooth dividends less and move towards the target, but when its dividend is above target, it is more likely to smooth dividends more and leave them unchanged. On the whole, asymmetric smoothing is more pronounced for firms that face greater information asymmetry (e.g. high market to book, fewer tangible assets, low payout ratio).

Fifth, while total payout smoothing exhibits more cross-sectional variation than dividend smoothing, we find that factors that explain dividend smoothing are less successful in explaining the cross-sectional variation in payout smoothing. Further investigation suggests that this may be because repurchases are only partially motivated by the same factors as dividends. Possibly, other factors such as the availability of investment opportunities and undervaluation of the firm's equity play a role in the repurchase decision as well.

The rest of the paper is organized as follows. Section 2 provides a brief theoretical background. Section 3 deals with a technical but important issue of how to measure smoothing. We employ two measures of smoothing: a modified Lintner's speed of adjustment (SOA) measure and the volatility of the dividend stream relative to the earnings stream. Using a simulation experiment we demonstrate that these measures can distinguish among varying degrees of smoothing in the data and are robust to different specifications of firms' smoothing policies. In Section 4 we describe the data and explain how we extract our sample firms by combining information from CRSP, Compustat and 13F filings over the period 1985 to 2005. We also provide summary statistics regarding firms' dividend and payout policies. In Section 5.1 we discuss changes in smoothing behavior over time. Our main findings concerning cross-sectional differences in dividend smoothing are presented in Section 5.2. We then test the robustness of our results to different empirical specifications in Section 5.3. The issue of asymmetric smoothing is examined in section 5.4. In Section 5.5 we present the results concerning total payout smoothing. Section 6 concludes.

2 Theoretical background

Theoretical work as to why and under what circumstances firms should smooth their dividends is rather limited despite the fact that dividend smoothing is almost an article of faith and was first documented over 50 years ago (Lintner (1956)). Existing models of dividend smoothing can be divided into those that are primarily based on asymmetric information and those that are motivated by agency considerations.

Among asymmetric information models, Kumar (1988), Kumar and Lee (2001) and Guttman, Kadan, and Kandel (2007) offer models in which the dividend serves as a signal of managers' private information about current or future cash flows. However, unlike similar models used to explain the existence of dividends (e.g., Bhattacharya (1979), John and Williams (1985), Miller and Rock (1985)), these authors show the existence of partially (but not fully) revealing equilibria. Firm types within a certain range pool with each other, but separate from firms outside that range. Dynamic extrapolations of these models can then generate dividend smoothing: The wider the ranges over which firms pool, the greater the likelihood of smoothing. Comparative statics suggest smoothing should increase as equity risk factors increase (Kumar and Lee (2001)), as cash flow volatility increases (Kumar (1988)) and as investment opportunities improve and the investment horizon shortens (Gutman et al. (2007)).

In Brennan and Thakor (1990), share repurchases are tax advantaged relative to dividends. However, individual investors, who are less informed, prefer to receive dividend payments to minimize their informational disadvantage when trading against more informed institutional investors.

When information acquisition is endogenous and firms are held mainly by individual investors, small payouts will be made via dividends and large shocks to earnings are distributed via share repurchases. As a result, dividends will be smoother than the underlying earnings stream. Shefrin and Statman (1984) present a behavioral model in which investors consume dividends and save capital gains. As long as investors want to smooth consumption,, their analysis also leads to dividend smoothing. Thus in both models smoothing is a function of the investor clientele – firms with more individual investors will smooth more.

In the second strand of explanations, smoothing arises as a means of mitigating manager-shareholder agency conflicts. Fudenberg and Tirole (1995) study a principal-agent problem in which a risk-averse manager enjoys a private control benefit. The authors show that in such a setting the optimal contract results in the manager losing more from a perception of poor performance than she gains from the upside. This leads her to smooth both earnings and dividends. DeMarzo and Sannikov (2008) examine a setting in which the manager chooses her effort level and both the manager and investor dynamically learn about firm productivity. Under the optimal contract, a smooth dividend policy helps investors learn about firm productivity and induces managerial effort.

In Allen, Bernardo and Welch (2000) institutional investors are valued for their monitoring abilities. Managers can use dividends to attract these investors because of their tax status. Once institutional investors have been attracted, they have the ability to impose a large penalty in response to dividend cuts, so managers are forced to smooth their dividend.

On the whole, theories motivated by asymmetric information generally predict that increases in information asymmetry and risk will increase smoothing (e.g., Kumar (1988), Guttman et. al. (2007)), while models motivated by agency conflicts predict that as the extent of conflict of interest between managers and outside shareholders increases, the use of smoothing will increase to reduce those conflicts.

To test the implications of these theories, we require proxies to measure the extent of information asymmetry, risk, and potential agency conflicts a firm faces. We examine a variety of proxies suggested by prior studies. For example, we use firm size, firm age, asset tangibility and the market-to-book ratio to proxy for the degree of information asymmetry.[1] As proxies for risk, we use the volatility of both earnings and stock returns. We use measures of investment opportunities (market-to-book) and cash flow as well as the degree of institutional shareholdings to proxy for the

[1] See for example Harris and Raviv (1991), and Frank and Goyal (2007).

potential for agency conflicts (e.g. Jensen (1986), John and Knyazeva (2008)). We also use the level of dividend as a proxy for both information asymmetry and agency costs. For example, the level of dividends is part of the Prudent-man rules, suggesting that stocks that pay higher level of dividends are more likely to be held by institutional investors (Brav and Heaton, 1998). The presence of institutional investors may lead to both more information production and better monitoring (Allen et al, 2000).

In addition to the predicted associations between dividend smoothing and information asymmetry or agency conflicts, several of the models make specific predictions about how the degree of smoothing will vary with certain firm characteristics. Guttman et al. (2007) predict that the degree of smoothing will decrease with the investment horizon of investors, which we proxy for with average stock turnover. Finally, Brennan and Thakor (1990) imply that smoothing will be greater in firms with a higher fraction of small investors, which we proxy for with the extent of institutional holdings.

Note that several proxies are predicted to impact smoothing in opposite directions by the different classes of model, providing a potential means of distinguishing which approach is most consistent with the data. For example, using market-to-book (MB) as a proxy for growth opportunities, asymmetric information models predict more smoothing for high MB firms, while agency theories predict greater smoothing among firms with low MB. Similarly, Allen et al. (2000) use an agency-based argument to predict that smoothing will increase with institutional ownership, while in Brennan and Thakor (1990) information asymmetry leads to more smoothing with *lower* institutional holdings.

3 Measures of dividend smoothing

3.1 Speed of Adjustment

The most common measure of smoothing used in prior literature is the speed of adjustment (SOA) from the partial adjustment model of Lintner[2]. The SOA is often estimated (see, for example, Fama and Babiak (1968)) as $\hat{\gamma}$ from the following regression:

$$\Delta D_{it} = D_{it} - D_{it-1} = \alpha + \gamma(D^*_{it} - D_{it-1}) + \epsilon_{i,t} \qquad (1)$$

[2] See e.g. Dewenter and Warther (1998), Brav et al (2005), Skinner (2008).

where $D_{i,t}$ is dividends in year t and $D^*_{it} = TP * E_{it}$ where *TP* represents the target dividend payout ratio and $E_{i,t}$ is the earning in year t. Substituting this expression for D^* into equation (1) yields:

$$\Delta D_{it} = \alpha + \beta_1 D_{i,t-1} + \beta_2 E_{i,t} + \epsilon_{i,t} \quad (2)$$

The speed of adjustment ($\hat{\gamma}$) can then be estimated as $-\hat{\beta}_1$ from equation (2).

In this specification, the target payout ratio, as well as the speed of adjustment, is estimated in the regression. In our empirical analysis below, we control for scale effects by dividing both dividends and earnings by the number of common shares outstanding, following Fama and Babiak (1968) and Brav et al. (2005). While some previous authors (e.g., Fama and French (2002)) scale by book assets, survey evidence in Brav et al. (2005) suggests that the level of dividends per share is the key metric for corporate dividend policy. We also adjust all year-to-year changes in dividends and earnings per share for stock splits, as in Fama and Babiak (1968). This allows us to separate active payout policy from mechanical changes in DPS and EPS that result from a change in the share base.

3.2 Simulation experiment

Two concerns arise with respect to estimating the speed of adjustment via equation (2). First, given the nature of our data, coefficient estimates are subject to the well-known small sample bias in AR(1) models (e.g. Hurwicz (1950)). While we are more concerned with cross-sectional differences in estimated SOAs rather than the level, the difficulty is that the bias is known to be a function of the true SOA. Since the bias increases as the SOA declines (i.e., as the series becomes more persistent), this may obscure cross-sectional differences.

Second, the Lintner model assumes firms follow a particular form of payout policy: i.e., firms have a target payout ratio and the actual payout ratio reverts continuously toward this target. However, survey evidence in Brav et al. (2005) shows that the payout ratio is a less relevant target today than it was in Lintner's time. For example, only 28% of CFOs claim to target the payout ratio, while almost 40% claim to target the level of dividends per share (DPS). This raises the possibility that the model in equation (2) does not accurately describe modern payout policies. If so, it is not clear whether the estimated SOA will provide a reliable measure of dividend smoothing.

To investigate these issues we perform a simulation exercise designed to evaluate the performance of the SOA estimate from equation (2), as well as two alternate measures of smoothing, in our empirical setting. We begin by showing the extent of the small-sample bias in simulated data with features similar to the empirical sample we use below. We then demonstrate that two alternative smoothing measures we propose overcome this problem. Finally, we show that these measures are robust to different assumed forms of payout policy. While we briefly describe the exercise here, details are given in Appendix A.

We first simulate 5 data sets, each with 10 years of data for each of 1,000 firms, where firms follow the Lintner model, but with speeds of adjustment ranging from 0.1 in the first data set to 0.5 in the fifth. We then estimate the SOA using equation (2) for each firm in each of the 5 simulated data sets. We then repeat the process using 20 years per firm and 50 years per firm and repeat the entire process 250 times. Mean SOA estimates for each level of true SOA are plotted as squares in the left-hand column of Figure 1. For comparison, the true SOA used to simulate the data are plotted as the solid line. As expected, the parameter estimates are biased and the bias decreases as the true speed of adjustment increases or as the number of observations per firm increases. However, in our data set (described below), most firms have between 10 and 20 years of data and speeds of adjustment between 0 and 0.2. As seen in Panel A, with only 10 observations per firm, the model produces similar average SOA estimates whether the true adjustment speed is 0.1 or 0.2. In fact, the mean estimated SOA under a true SOA of 0.2 is 0.438, which falls inside the 95% bootstrap confidence interval of estimated SOA [0.402, 0.443] when the true SOA is 0.1.

To address this concern we use two alternative measures of smoothing. As a first alternative, we use a two-step procedure to estimate the SOA in order to improve the precision of our estimates. That is, we first estimate the target payout ratio (TPR_i) as the firm median payout ratio over the sample period, where payout ratio is defined as common dividends divided by net earnings. Using that estimated target, we can construct an explicit deviation from target for each period (dev) and then estimate the speed of adjustment as $\hat{\beta}$ from the following regression:

$$\Delta D_{it} = \alpha + \beta * dev_{i,t} + \epsilon_{i,t} \tag{3}$$

where

$$dev_{i,t} = TPR_i * E_{i,t} - D_{i,t-1}$$

Average SOA estimates using this estimation procedure are plotted as diamonds in the left-hand column of Figure 1. As can be seen, this procedure not only mitigates the bias, but significantly reduces the dependence of the bias on the true SOA. The reduction in bias shown in the figure is highly statistically significant based on bootstrap standard errors. Importantly, even with only 10 observations per firm, the estimated SOA increases monotonically with the true SOA. The reason can be seen by examining the standard deviation of the estimates, plotted in the right-hand column of Figure 1. When estimating SOAs using equation (2), the estimates become much less precise as the true SOA declines. This is because with smaller SOAs, there is less and less variation in D_{t-1}, which inflates the standard error of the SOA estimate. Because the small-sample distribution of the parameter estimates is skewed (plotted as the solid line in Figure 2 for one run of the simulation), this increased dispersion increases the bias.

When using equation (3), however, the SOA is the estimated coefficient on the deviation from target. Since the variation in the deviation reflects the variation in earnings (which is much greater than the variation in dividends), the precision of the estimate is little changed as the true SOA varies. The distribution of estimates based on equation (3) is plotted as the dashed line in Figure 2. We see that the increased precision draws in the long right tail, thus reducing the bias.

As a second alternative, we use a "model-free" non-parametric measure of smoothing. Guttman et al. (2007) define a smooth dividend as one for which the variation in dividends does not reflect the full extent of variation in cash flows. Similarly, Fudenberg and Tirole (1995) describe a smooth earnings or dividend stream as one in which high values are under-reported and low values are over-reported. In this spirit, our alternate measure of smoothing is simply a measure of the volatility of dividends relative to that of earnings.

To construct our measure we first generate a scaled earnings series, defined as the firm median payout ratio times each year's earnings. This scaling is done to control for the effect of the dividend level on the relative volatilities. For example, for two firms with the same earnings volatility and the same percentage change in dividends each year, the one with the higher payout ratio will have a higher ratio of dividend volatility to earnings volatility. Note that this scaling is implicit in the estimation of the Lintner model; since current earnings are multiplied by the target payout ratio (see equation (3)).[3]

We then fit a quadratic time trend to both the split-adjusted dividend and the scaled, split-adjusted earnings series:

$$AdjDPS_{it} = \alpha_1 + \beta_1 * t + \beta_2 * t^2 + \epsilon_{i,t} \quad (4)$$

[3] In unreported analysis we also control for the level effect by including the payout ratio as an independent variable in our regression analysis below rather than scaling the earnings series. Results are very similar.

$$TPR_i * AdjEPS_{it} = \alpha_2 + \gamma_1 * t + \gamma_2 * t^2 + \eta_{i,t} \quad (5)$$

We define our measure as the ratio of the error variances from these two regressions ($\sigma(\epsilon)/\sigma(\eta)$), which we refer to as *Relative Volatility*. We fit a trend line to allow for different types of smoothing behavior. For example, Brav et al (2005) show that some firms target a constant level of DPS while a significant portion (27%) target the growth in DPS. By removing a linear time trend, a firm that pays the same level of DPS each year will have the same degree of smoothing as a firm that increase the dividend by a fixed amount each year. Further including a quadratic term also produces the same degree of smoothing for a firm that increases DPS by the same percentage each year.[4]

We validate this measure by again applying it to the same five simulated data sets used in Panel A of Figure 1 (10 observations per firm). Panel A of Figure 3 plots the mean Relative Volatility as a function of the true SOA. The measure increases monotonically as smoothing declines. This is expected, since under the Lintner model, as SOA increases, the size of each dividend change increases, increasing dividend volatility for a given earnings series.

3.3 Target DPS policy simulation

We next use our simulation to explore the performance of our proposed smoothing measures when dividend changes are not continuous, as assumed by the Lintner model, but change only occasionally. Using the same simulated earnings series, we generate simulated dividend series where the payout policy is based on firms having a target level of dividends per share rather than a target payout ratio. That is, as long as earnings stay within a given range, the dividend is kept at the same level. The firm increases the dividend only if earnings have risen significantly relative to the current dividend and cuts the dividend only if the current level is no longer sustainable. We vary the degree of smoothing across 10 samples by varying the width of the range in which the firm keeps the dividend level unchanged (see Appendix A for details).

Average estimates of the three candidate smoothing measures are plotted in Panel B of Figure 3. Consistent with the previous results, both SOA as estimated via equation (3) and Relative Volatility increase monotonically with the true degree of smoothing, while SOA estimated via equation (2) struggles. The intuition is the same as before. As the width of the range in which firms leave dividends unchanged widens, there are fewer and fewer changes in dividends. As a result the SOA estimate using equation (2) becomes less precise and more biased. On the other hand, as

[4] Results are very similar when using either a linear time trend or a third order polynomial to remove the time trend.

dividend changes become less frequent, the dividend series becomes less volatile and Relative Volatility declines.

Since both the SOA estimated via equation (3) and Relative Volatility mitigate the problems associated with small sample bias and are robust to alternative specifications of dividend policy, for the remainder of the paper we employ these two measures as our measures of smoothing.

4 Data and summary statistics

4.1 Sample selection

Our data set starts with all firms in both CRSP and Compustat databases, excluding financial firms (SIC codes 6000 - 6999) and firms involved in major mergers or acquisitions, for the period 1985 - 2005. This sample period is selected to coincide with the coverage of institutional holdings data in the Thompson 13F database, which we merge with the CRSP/Compustat data.[5]

For our analysis of dividend smoothing behavior, we require that firms be dividend payers and have sufficient data to calculate our smoothing measures. To accomplish these two objectives, we limit the sample to those firms that pay a dividend in at least 10 years during our sample period. See Appendix B for a full description of our sample selection procedure. Removing non-dividend paying firms reduces the number of sample firms from 13,872 to 3,877. Requiring at least 10 years of dividends further reduces the number of sample firms to 1,574. These restrictions exclude many of the smaller firms in the Compustat universe. For example, in 2005 our sample at this stage includes only 18% of the firms in Compustat. However, those firms represent 59% of the market capitalization of all Compustat firms. For our final estimation sample, we also require at least 5 years of non-missing values for all of the proxies for market frictions and control variables discussed in the previous section.[6] After applying all of our screens, the final sample consists of 1,335 firms and 21,400 firm-year observations (an average of 16 years of data per firm).

We recognize that this is clearly not a random sample from the universe of Compustat firms. However, our goal is primarily to form conclusions about dividend smoothing, which naturally limits our analysis (and the scope of our implications) to the sub-population of dividend paying firms.

[5] We consider a longer sample period in Figure 6.
[6] See Appendix C for a full list of variables and their definitions.

Additionally, in our regression analysis below we control for any potential bias resulting from sample selection, with no material affect on our results.

4.2 Summary statistics

We first present some information about the relation between dividend levels and firm characteristics in order to benchmark our sample to prior studies. Table 1 presents the results for the payout ratio (dividends divided by earnings) as a measure of the dividend level, but a similar picture emerges when we use dividend yield. Panel A presents the results for the entire sample (including non-dividend paying firms) and Panel B presents the results for firms who paid a dividend for at least 10 years during our sample period.

Consistent with prior studies (e.g., Grinstein and Michaely (2005)), Table 1 documents that less risky firms -- larger firms, firms with more tangible assets, firms with low beta and lower earnings volatility -- pay higher dividends. Also, firms with lower stock prices (another proxy for riskiness) pay less in dividends. Firms that exhibit higher growth (proxied by both asset growth and by Market-to-Book ratio) pay less dividends and firms with less leverage pay less dividends. Consistent with prior findings, among dividend paying firms, institutional investors prefer to hold firms with low dividends. Panels C (includes zero payers) and D (only positive payers) present similar information for total payout (dividends plus repurchases) and the conclusions are similar: less risky firms and firms with lower growth prospects pay out more relative to their earnings. The only exception is that institutions prefer firms that repurchase their shares and hence total payout is invariant to institutional holdings.

Preliminary summary statistics for our smoothing measures indicate a mean and median speed of adjustment in the sample of 0.14 and 0.11, respectively. This is lower than the 0.37 (0.30) reported by Fama and Babiak (1968).[7] For our sample firms the mean relative volatility of dividends to earnings is 0.48 and the median is 0.34. Panel A of Figure 4, plots the empirical distribution of our estimated smoothing measures. While most speeds of adjustment are rather slow (more than three fourths of the estimated SOAs are less than 0.2), there is a substantial right tail in the distribution. The cross sectional distribution of Relative Volatility is similar to that of SOA, but even more disperse.

To ensure that dividend smoothing is not solely a function of earnings volatility we split the sample into high (above median) and low (below median) earnings volatility groups. Panel B of

[7] Limiting our sample to the Fama and Babiak sample period (1950-1964) we find a median SOA of 0.31 compared with 0.30 in their original study.

Figure 4 plots the empirical distributions of each smoothing measure for each subsample. While firms with high earnings volatility on average smooth less, there is a great deal of overlap in the distributions. Dividend smoothing is found both in firms that experience high earnings volatility and in firms with low earnings volatility. Moreover, not all firms smooth equally even when they experience similar earnings volatility.

Examining the relation between the level of dividends and smoothing is particularly acute since we have to verify that smoothing is not simply a direct function of the level of dividends (for example, firms that pay high dividends smooth and firms that pay low dividends do not smooth). In Panel C of Figure 4 we split our sample into high and low dividend yield groups and show the empirical distribution of our smoothing measures for each subsample. The distributions are similar and there is similar dispersion in smoothing policies among high and low dividend paying firms, though firms that pay high dividends tend to smooth more. But overall, smoothing policies appear to be distinct from the choice of dividend levels.

5 Results

5.1 Dividend smoothing over time

Figure 5 shows how the smoothing of dividends and total payout have evolved over time. Here, we form separate samples each decade, using the same sample selection criteria and screens as described in the previous section. For each decade, we then calculate the SOA using equation (3) and Relative Volatility, as described in Section 3, for each firm in the sample. The median estimated SOA and Relative Volatility for each decade are shown in Panel A. We also include an additional measure: the probability of a dividend decrease conditional on a significant earnings drop. This measure is motivated by the survey results of both Lintner (1956) and Brav et al. (2005) that suggest that firms smooth dividends primarily in order to avoid cutting their dividend. For this measure, a significant earnings drop is defined as a decrease in earnings per share greater in absolute value than the first quartile of earnings changes for a given firm within each decade.

Regardless of the measure used, Panel A clearly shows that firms smooth their dividends significantly more in the 1990s and in the 2000s than they did in the 1960s and 1970s. In fact, dividend smoothing has steadily increased over the last 50 years. However, this trend appears to have leveled off in the last decade as both the Relative Volatility and propensity to cut dividends are both slightly higher in the 1995-2005 period than they were in 1985-1995.

In Panel B we examine the time series pattern of the smoothing of total payout rather than dividends only. That is, wherever we use dividends (both in the sample selection criteria and in the construction of the smoothing measures), we replace them with the sum of common-stock dividends and repurchases of common stock[8]. The results in Panel B show, first, that changes in total payout are more volatile (Relative Volatility) and more responsive to deviations from target (SOA) than are dividends, consistent with the findings of Jagannathan et al. (1999) and Skinner (2008). Also, in contrast to Panel A, the smoothness of total payout has *decreased*, by all measures, over the past three decades.

5.2 Which firms smooth more?

Given that there is considerable cross-sectional variation in smoothing behavior, and given the theoretical predictions developed in Section 2, an examination of the characteristics associated with these differences may offer clues to the underlying motivations for firms to smooth. Therefore, our first step in attempting to understand why some firms smooth dividends more than others is to compare the characteristics of firms with high degrees of smoothing (i.e., low SOA and low Relative Volatility) to those firms that smooth less (high SOA and high Relative Volatility). In Table 2, we first estimate the SOA (using equation (3)) and Relative Volatility for each firm over the sample period 1985 – 2005.[9] We also calculate, for each firm, the median of each firm characteristic discussed in Section 2 over the same period.[10] We then sort firms into quintiles by estimated speed of adjustment (Panel A) and Relative Volatility (Panel B) and report the mean of each firm-median characteristic within each quintile.

The results show that firms that smooth heavily differ systematically from firms that smooth little. This univariate nonlinear analysis suggests that firms that are less risky and face a lower degree of information asymmetry tend to smooth more. For example, we find that firms that smooth the most (low SOA or low Relative Volatility) tend to be significantly larger and older than firms that smooth the least. If larger and older firms are associated with more current and past information

[8] Repurchases are defined as repurchases of common and preferred (Compustat item 115) less the change in value of preferred stock, as in Grullon and Michaely (2002).
[9] We trim the upper and lower 2.5% of each measure to limit the effect of outliers.
[10] For institutional holdings we use the mean rather than median over the sample period. This allows us to differentiate between a firm with no institutional holdings for the entire sample period and a firm that has, say no institutional holdings for 10 out of 18 years.

production (e.g. Frank and Goyal (2003)), this suggests firms facing *lower* information asymmetry smooth more. Additionally, if tangible assets are easier to value than growth options (e.g. Harris and Raviv (1991)), the degree of information asymmetry should increase as asset tangibility declines or as the market-to-book ratio increases. Yet, we find that firms that smooth the most have greater asset tangibility and lower market-to-book ratios. Similarly, firms that smooth more tend to have lower volatility of both cash flows and stock returns. We also investigate the use of equity betas as a proxy for return volatility but find no significant correlation between smoothing and beta. Thus it appears that it is primarily non-systematic risk that influences smoothing behavior.

We also find preliminary evidence that dividend smoothing is more prevalent among firms facing greater potential agency problems. Jensen (1986) suggests that firms with more cash and fewer investment opportunities are likely to face more severe agency conflicts. Our results show that firms that smooth more are more mature (size and age), more likely to be cash cows, and have fewer investment opportunities (market-to-book). These firms also have greater institutional holdings, consistent with the predictions of the agency-based model of Allen, Bernardo and Welch (2000). Similar patterns are observed if we first sort by firm characteristics and examine the degree of smoothing across the characteristic quintiles (unreported). Tentatively, it seems that riskier firms and firms that are more likely to experience a high degree of information asymmetry smooth less, while firms more likely to face costly agency conflicts smooth more.

Of course, many of the variables considered in Table 2 are correlated with one another. Therefore, in Table 3 we turn to a multivariate regression of each smoothing measure (SOA and Relative Volatility) on the same firm-median characteristics considered in Table 2. The specification in columns (1) and (4) excludes the clientele proxies (institutional holdings and stock turnover). Institutional holdings and stock turnover are added in columns (2) and (5) and the payout ratio is added in columns (3) and (6). Since the dependent variable is being measured with error, the error variance in these regressions may not be constant across observations. We therefore use Huber-White heteroskedasticity-robust standard errors throughout[11]. All explanatory variables are standardized, so that the coefficients can be interpreted as the conditional impact on SOA (Relative Volatility) of a one standard deviation increase in the explanatory variable. For example, the coefficient of -0.025 on Age in column (1) implies that a one standard deviation increase in firm age reduces the speed of adjustment on average by 0.025, compared with a sample mean of 0.14.

[11] For robustness, we also estimate our regressions via weighted least squares, using the number of time-series observations for each firm as the weight. Results are very similar and therefore are not reported.

The regression results are generally consistent with the univariate results, although several relationships lose their significance. Payout ratio and institutional holdings are still significantly associated with greater smoothing. Firm age is also associated with greater smoothing, losing significance only for Relative Volatility when the payout ratio is included in the regression. Market-to-book is significantly associated with *less* smoothing across all specifications. Cash flow volatility and return volatility are both associated with less smoothing, although the coefficient on cash flow volatility is only marginally significant. However, this is primarily due to the high correlation between earnings and return volatility (-0.62). When return volatility is excluded from columns 1 – 3, earnings volatility is strongly significant (unreported). Cash Cow retains the same (negative) sign as in the univariate analysis but loses statistical significance in most specifications.

In Table 4, we control for the possibility that sample selection biases our results. That is, firms must pay a series of dividends to measure their smoothing behavior. However, prior evidence suggests the decision to pay a dividend is affected by many of the same factors that are associated with dividend smoothing. To address the possibility of sample selection bias, we first estimate a Tobit regression of the number of dividends paid over the sample period on the list of firm characteristics shown in Table 1, using the full sample of both dividend payers and non-payers (see section 4). We then include the estimated residuals from this regression as a dependent variable when regressing our smoothing measures on firm characteristics.[12] We first note that the coefficient on the first-stage residuals is statistically significant; suggesting that controlling for selection is relevant. More importantly, none of the results are altered by controlling for selection. All variables retain the same sign and significance as in Table 3. Finally, the negative sign suggests that firms that pay more dividends smooth more.

The specification in columns 3 and 6 implicitly assumes that the dividend level is predetermined relative to the smoothing decision. While the level and smoothness may in practice be jointly determined, the underlying theories do not provide any identifying restrictions to solve the potential endogeneity problem. However, several pieces of evidence help to mitigate concerns with respect to any resulting biases in our results. First, we showed previously in Panel C of Figure 4 that dividend smoothing is not unique to low (high) dividend yield firms. Smoothing policies appear to be distinct from the choice of dividend levels. In addition, when we estimate the regressions in Table 3

[12] We also employ a first-stage probit model and include the estimated inverse Mills ratio in the second stage regression. Results are very similar and therefore not reported. Since the determinants of the decision to pay a dividend are similar to those used to describe smoothing, the probit model relies on the non-linearity of the selection equation for identification. In the approach reported, identification is based on variation in the number of dividend payments (see Wooldridge 2002).

separately on high and low dividend subsamples (unreported), the cross-sectional relationships are very similar within each group. Finally, inclusion of the payout ratio in the regressions has little effect on the sign or significance of the other covariates.

As an alternate measure of information asymmetry, we also examine the relationship between return volatility and smoothing at the industry level. That is, under the information-based theories, we would expect smoothing behavior to be more prevalent in environments (i.e., industries) where there is more uncertainty about firm value. We use the average return volatility in an industry to proxy for the information environment. In Figure 6, we first sort industries (defined by 2-digit SIC codes) by the median return volatility within each industry and report the median SOA within each industry. As seen in Figure 6, there is a positive correlation between the level of dividend smoothing in an industry (as measured by SOA) and the average return volatility of firms within that industry. This provides further evidence that firms facing greater informational asymmetries tend to smooth less.

To better relate the empirical results concerning smoothing behavior to the theoretical predictions developed in Section 2, we summarize those empirical results and compare them to their predicted values in Table A below. Overall, the results seem to support the agency-based models, but run counter to the predictions of the information asymmetry models. As seen in Table A, none of the predictions of the asymmetric information models are supported by the data. In fact, those firms for which we would expect information asymmetry to be greatest – young, high growth firms with more volatile cash flows and equity returns – smooth significantly *less*.

Our results also fail to support the predictions generated by the comparative statics of the individual information-based models. For example, Kumar (1988) predicts that firms with more volatile cash flows will smooth more; and Guttman et al. (2007) predict that smoothing will increase with the value of investment opportunities and decrease with the investment horizon of investors. We find the opposite. In addition, the adverse selection model (Brennan and Thakor (1990) implies that because of their informational advantage, institutions will hold shares of firms that smooth their dividend less. The empirical results suggest otherwise.

Our findings are more in line with several of the predictions of the agency-based models. Firms that are more prone to conflicts of interest – mature, low growth, cash cow firms who value institutional monitoring – smooth significantly more. Examining the coefficient magnitudes, we also find that the payout ratio and level of institutional holdings have the largest *economic* impact on smoothing. This seems to lend support to the prediction of Allen, Bernardo and Welch (2000) that firms subject to agency conflicts use smoothing to attract institutions.

Table A: Firm characteristics and dividend smoothing: Summary of empirical results

We summarize the implications from asymmetric information models (Kumar (1988), Guttman et al. (2007), Brennan and Thakor (1990)) and agency models (Allen et al. (2000), Fudenberg and Tirole (1995), DeMarzo and Sannikov (2008)) concerning dividend smoothing. The first column specifies the type of model, the second describes the factor that drives the relation, the third and fourth columns explain the firm characteristic and empirical proxy that we use for the factor. The fifth column specifies the predicted sign on either SOA or Relative Volatility. Columns 6-9 report the estimated sign from the univariate (Table 2) and multivariate (Tables 3 & 4) analyses. * indicates statistical significance at the 5% level. 0 indicates that the sign is not consistent across model specifications.

Model type	**Factor**	**Firm Char.**	**Empirical Proxy**	**Predicted Sign**	**Univariate**		**Multivariate**	
					SOA	**RelVol**	**SOA**	**RelVol**
Asymmetric Information	Extent of Asymmetric Information and risk	Growth opportunities	MA / BA	-	+*	+*	+*	+*
		Firm's age	Years in Compustat	+	-*	-*	-*	-*
		Firm's size	Ln(Assets)	+	-*	-*	-	0
		Tangible assets	PP&E / Assets	+	-*	-*	-	0
		Earnings volatility	sd(EBIT)	-	+*	+*	+*	n.a.
		Return volatility	sd(returns)	-	+*	+*	+*	+*
		Dividend level	Payout ratio	+	-*	-*	-*	-*
	Investor Clientele	Investors horizon	Stock turnover	-	+*	+*	+	+
		Presence of institutional investors	% Institutional holdings	+	-*	-*	-*	-*
Agency	Greater potential conflict of interest	Growth opportunities	MA / BA	+	+*	+*	+*	+*
		Cash cow	Brav et al. (2005) definition	-	-*	-*	0	-*
	Tighter monitoring	Presence of institutional investors	% Institutional holdings	-	-*	-*	-*	-*
		Dividend level	Payout ratio	-	-*	-*	-*	-*

Examining our results, it is tempting to say that perhaps our findings can be explained by the simple fact that firms that *can* smooth (e.g. those with more stable cash flows and lower investment needs) do, while firms that *can't* smooth do not. While appealing in its simplicity, it is unlikely to be the reason for smoothing. First, when a firm experiences a positive earnings shock, it is not forced to increase its dividends. That is, every firm can smooth good news. And when a firm experiences a negative earnings shock it is perhaps true that financially constrained firms may be forced to cut their dividend faster than unconstrained firms. But then those financially constrained firms could have raised dividends by less when earnings where high and then would not have been forced to cut dividends when earnings are low. Smoothing policy, by its very nature is a dynamic policy and has to take into account future payoffs when making today's decisions about dividends.

5.3 Robustness

In this section we describe several attempts to ensure the robustness of our results with respect to variable definitions and model specification. Results are summarized in Table 5. In panel A (B), the first column repeats column 3 (6) of Table 3 for comparison. In the second column, we control for error in the dependent variables by first discretizing the dependent variables into quintiles and estimating the regressions with an ordered Logit model. Results are slightly stronger but overall very similar to the ones reported in Table 3.

In columns 3 and 4 we employ two alternative measures of earnings. The first (column 3) is earnings excluding extraordinary and special items. We follow Skinner (2008) in defining this measure as income before extraordinary items (Compustat item 18) minus special items after tax (60% of item 17), all divided by year-end shares outstanding (item 54). Similar results are obtained using this measure, suggesting that our prior results are not driven by systematic differences in extraordinary or special items.

We also need to investigate the possibility that dividends are smoothed relative to 'true' earnings (i.e., cash flows) and not relative to reported earnings. To this end, we replace earnings per share with operating cash flow per share, using Compustat statement of cash flows data (columns 4 and 5). We use two definitions of cash flows. The first (column 4) includes only funds from operations[13]. The second (column 5) adds the cash flow effect of changes in working capital (excluding short-term debt and cash)[14]. Using these measures corrects for the fact that the actual cash available to pay dividends may not be fully reflected in reported earnings. This also allows us to

[13] Funds from operations is defined as the sum of Income before extraordinary items (item 123), depreciation and amortization (item 125), extraordinary items (item124), deferred taxes (item126), equity in net loss (item 106), loss/gain on sale of PP&E (item 213), other funds from operations (item 217) and the exchange rate effect (item314).

[14] Working capital changes include changes in accounts receivable, accounts payable, inventory, accrued income taxes and other assets and liabilities.

control to an extent for the possibility that firms may smooth reported earnings relative to underlying cash flows. Since the smoothness of dividends is measured relative to that of earnings, cross-sectional differences in the degree of earnings smoothing could influence our results. However, results are again similar. While the market-to-book ratio loses significance in the SOA regression, it retains its significance in the Relative Volatility regression. In addition, the associations with earnings volatility and return volatility are stronger. These results suggest that the differences in smoothing we document are not driven by differences between reported earnings and cash flow.

In column 6, we control more directly for the possibility that dividend smoothing is affected by the degree of earnings smoothing. In this specification we include the income smoothing proxy of Tucker and Zarowin (2006) as an additional control variable[15]. In both Panels A and B we see that firms that smooth earnings more tend to smooth dividends less, suggesting that earnings smoothing and dividend smoothing act to some degree as substitutes. For example, firms may desire a given smoothness of dividends relative to the true earnings stream. To the extent that reported earnings are a smoothed version of true earnings, the dividend stream will be less smooth relative to reported earnings. This intuition is supported by the following test: when we include the income smoothing proxy in the regressions in columns 4 and 5, where SOA is measured relative to operating cash flows, the coefficient on income smoothing becomes negative and statistically insignificant (unreported). More importantly, none of our other results are affected by the inclusion of this earnings smoothing measure. This suggests that our results reflect differences in dividend policy over and above any differences in earnings smoothing behavior.

In column 7, we replace DPS from Compustat with the annual sum of split-adjusted dividends per share obtained from CRSP to ensure that our results are not adversely affected by special dividends. We include here only monthly, quarterly, semi-annual or annual ordinary cash dividends. This reduces slightly the number of sample firms, but has little effect on the results.

In column 8, of Panel A we account for the fact that the SOA is conceptually bounded between 0 and 1. Therefore, we estimate a Tobit model with lower bound at 0 and upper bound at 1. Results are again consistent with those reported in Table 3.

In column 9, we investigate the impact of earnings permanence on dividend smoothing. Lintner (1956) suggests that firms are more likely to adjust their dividend in response to a permanent

[15] Tucker and Zarowin (2006) construct a measure of income smoothing defined as the correlation between discretionary accruals (defined as the residuals from the Jones model as modified by Kothari et al. (2005)) and pre-discretionary income, reverse-ranked within industry and year.

change in earnings than to a temporary one. To capture this effect, we add a measure of earnings persistence and a measure of earnings cyclicality to the regression. To measure earnings persistence, we first estimate an AR(1) model of the split-adjusted EPS by firm. This firm-level estimate is then added as an explanatory variable to the cross-sectional regression. Earnings changes for firms with more persistent earnings series (i.e. higher estimated AR(1) parameters) are more likely to be permanent. We expect such firms to exhibit less dividend smoothing and therefore predict a positive coefficient.

It could also be argued that earnings cyclicality might affect smoothing. If cyclical earnings changes are considered temporary, we would expect firms with more cyclical (or countercyclical) earnings to smooth more. To this end we include each firm's absolute value of earnings beta as a measure of earnings cyclicality. Earnings beta is estimated by time series regression of firm-level net earnings, scaled by assets, on the value-weighted earnings to assets ratio of the CRSP/Compustat universe (excluding financial firms) over the sample period 1985-2005.

The results in column 9 show that, consistent with the prediction, earnings persistence is significantly associated with less smoothing, for both SOA and relative volatility. Earnings cyclicality is associated with more smoothing when smoothing is measured using relative volatility, but is not significant when using SOA. In addition, the other parameter estimates are again unaffected by including these additional controls.

While firm-level smoothing requires a sufficiently long time series to measure precisely, firm characteristics may change over that time period. Thus, for some firms, using median firm characteristics as explanatory variables may not fully capture the relationship between characteristics and smoothing policy. To address this concern, we re-estimate the model on several subsamples that exclude firms with large changes in characteristics over the sample period. That is, for each firm we first divide the observations in the sample period into two halves. We then take the median of a given characteristic within each half and define the change in characteristic as the absolute value of the difference in medians. We then exclude from the sample firms whose absolute change in characteristic ranks in the top two deciles.

We repeat this exercise based on firm size, market-to-book ratio, institutional holdings, and both institutional holdings and market-to-book. For the latter version, we exclude firms that are in the top four absolute change deciles for both institutional holdings and market-to-book. Results based on

SOA are shown in Table 6[16]. As can be seen, the results are very similar across all subsamples. While return volatility or cash flow volatility lose significance in some subsamples, we note that this is largely due to the high correlation between the two. When one or the other is excluded from the regression, the remaining one is highly significant in all samples (unreported).

Finally, the evidence in Figure 5 suggests that on average, smoothing behavior is not constant through time, although changes have been modest during the 1986-2005 sample period. To ensure the robustness of the cross-sectional relationships to changes over time in smoothing behavior, we first split our sample period into two sub-periods, 1986-1995 and 1996-2005. For each sub-period, we then estimate firm-level smoothing measures and estimate the same cross-sectional regressions as in Table 3.[17] Results (unreported) in each sub-sample are very similar to those reported in Table 3.

5.4 Smoothing asymmetry

Previous empirical investigations of dividend smoothing do not distinguish the response of firms to positive earnings shocks from that to negative earnings shocks. However, survey and empirical evidence on dividend changes suggests that firms are more likely to increase their dividend than to cut it, but when dividends are cut, the magnitude of the average cut is more severe than the magnitude of the average dividend increase. We explore this asymmetry in smoothing by estimating the following regression:

$$\Delta D_{it} = \alpha + SOA_{pos} * dev_{i,t} * I[dev > 0] + SOA_{neg} * dev_{i,t} * I[dev < 0] + \epsilon_{i,t} \qquad (6)$$

where

$$dev_{i,t} = TPR_i * E_{i,t} - D_{i,t-1}$$

When the deviation is positive (negative), the firm's lagged dividend is below (above) its target (product of target payout ratio and contemporaneous earnings). *I[dev>0]* is an indicator equal to one when dev_{it} is positive and zero otherwise. Similarly, *I[dev<0]* is an indicator equal to one when dev_{it} is negative and zero otherwise. Thus, we can interpret SOA_{pos} (SOA_{neg}) as the speed at which the firm reverts to its target payout from below (above).

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[16] Results for relative volatility are similar and not reported for brevity.

[17] To ensure sufficient sample size, for this exercise we relax our data requirements slightly, requiring dividend payments in at least 6 out of the 10 years of each sub-period.

Table 7 reports summary statistics for dividend changes and estimated adjustment speeds for the sample as a whole and conditional on a positive or negative deviation from target. Consistent with survey evidence (e.g., Lintner (1956), Brav et al. (2005)), firms are much more likely to increase their dividend (60.1%) than they are to cut the dividend (10.5%), and dividend cuts (18.3 cents per share) are larger on average than dividend increases (9.3 cents per share). Both probabilities and magnitudes are sensitive to the deviation from target. As a firm goes from a positive to a negative deviation, the probability of cutting the dividend increases from 4.0% to 17.3%, while the probability of a dividend increase falls from 75.8% to 43.7%. Similarly, the average size of a dividend cut increases from 11.3 cents to 19.9 cents while the average size of a dividend increase falls from 10.6 cents to 6.9 cents. The net result of these changes in probabilities and magnitudes is that the average change in DPS is 7.6 cents per share when a firm is below target, but close to zero when the dividend is above target. That is, when the deviation is positive, the average firm moves toward target, but when the deviation is negative, the average firm leaves its dividend unchanged.

The asymmetry in the SOA conditional on deviation from target is in line with these summary statistics. Firms respond almost twice as fast when dividends are below target (mean (median) SOA of 0.17 (0.13)) than when dividends are above target (mean (median) SOA of 0.096 (0.049)). Stated slightly differently, it takes on average 3.7 years to close half of the deviation from target following an earnings increase, while it takes 6.8 years to close half of the deviation following an earnings decrease.[18]

We next examine separately the relationship between firm characteristics and positive and negative adjustment speeds in an attempt to better understand the associations discussed in Section 5.2. Summary results are shown in Table 8 and Figure 7. Several interesting patterns emerge. For example, in Tables 2 and 3 we find that firms with higher market-to-book ratios tend to have faster speeds of adjustment (i.e., less smoothing). Examining Figure 7 we find that this result is an outcome of responses to earnings increases rather than to decreases. While there is little change in the responsiveness to negative deviations as market-to-book varies, we find that that higher growth firms are significantly more responsive to positive deviations. Additionally, this effect is concentrated among the top two quintiles. Thus, the positive coefficient on market-to-book found in Table 3 is driven by the willingness of high growth firms (once they start paying dividends) to increase their dividend as earnings increase.

[18] Results are similar when splitting by positive and negative earnings changes rather than deviation from target.

We also find a positive coefficient on cash flow volatility in Table 3. Figure 7 indicates that the responsiveness to positive and negative deviations both increase as cash flow volatility increases.. Thus, more volatile firms appear to smooth less because of their greater willingness to change dividends in either direction.

We also found earlier that firms with higher institutional shareholdings tend to smooth more. The patterns in Table 8 and Figure 7 indicate that this is driven primarily by their responsiveness to negative earnings shocks. Firms with low institutional holdings are much more likely to cut their dividend in response to an earnings drop than are firms with high institutional holdings. We can also see from Figure 7 that the effect on SOA-neg comes primarily from the bottom quintile. That is, it is the firms with no institutional holdings that are much more responsive to earnings declines. Conditional on *some* institutional holdings, there is little relationship. This is again consistent with the agency explanation of Allen, Bernardo, and Welch (2000) that firms maintain their historic dividend level in order to continue to attract institutions as monitors.

5.5 Total payout smoothing vs. dividend smoothing

As documented by Grullon and Michaely (2002), among others, firms have become more reliant on share repurchases than dividends as a means of payout over the past 20 years, and repurchases have been used as a substitute for dividend increases, at least to an extent. At the same time, Brav et al. (2005) surveyed managers and document that the dividend payout ratio has become a less important target over time. Therefore, just as total payout has become a more relevant measure of the level of cash payments by corporations (e.g., Boudoukh et al. 2007), the degree to which firms smooth their total payout (dividends plus share repurchases) may be more relevant for describing current smoothing policies.

Indeed, consistent with the finding of Skinner (2008), we find that total payout is significantly less smoothed than dividends: A median speed of adjustment of 0.38 and Relative Volatility of 1.26 for total payout compared with a median speed of adjustment of 0.11 and Relative Volatility of 0.34 for dividends. Firms smooth their dividends about four times more than they smooth total payout.

Given the potential importance of repurchases in firms' payout policies, it is natural to ask what determines cross sectional differences in the smoothing of total payout, and how these determinants compare to those of dividend smoothing. In Table 9 (univariate analysis) and Table 10 (regression analysis), we repeat the investigation of the previous section using total payout in place of dividends. As can be seen, for most firm characteristics the association with total payout smoothing is in the same direction as that of dividend smoothing, though often statistically weaker. One notable exception is institutional holdings, where higher institutional holdings are now associated with *less* smoothing. Thus, while firms with greater institutional holdings are more likely to smooth their dividends, they also follow a more volatile repurchase policy.

Clearly, the explanatory variables that are derived from dividend smoothing theories (see Section 2) are better able to explain the cross-sectional variation in dividend smoothing than the cross-sectional variation in total payout smoothing (compare for example, Tables 3 for dividend smoothing and Table 10 for payout smoothing). There are several potential reasons for this finding.

One possible difference is that repurchases are more sensitive to earnings changes than are dividends, i.e., repurchases, to an extent, are the residual. Firms that smooth dividends more intensely simply adjust repurchases in response to earnings changes, as suggested by Skinner (2008) and Grullon and Michaely (2002). Firms that smooth dividends less might use repurchases less extensively. For example, Figure 8, Panel A presents the payout policy of two firms: Cascade, Inc. and Helmerich & Payne. Cascade pays dividends but does not repurchase and its SOA is 0.28. Helmerich & Payne follows a strict dividend smoothing policy (with an SOA of 0.01), and uses repurchases to adjust payout to shareholders as earnings change. As a result, the cross-sectional difference in dividend smoothing is larger than the cross-sectional difference in total payout smoothing. If this were the driving factor behind the weaker relationships reported in Tables 9 and 10, we would also expect the cross sectional dispersion in total payout smoothing to be less than that of dividend smoothing. Panels A and B of Figure 9, which plot the distributions of SOA and Relative Volatility for both dividends and total payout, suggest this is not the case. In fact, as measured by the inter-quartile range, the cross-sectional dispersion in SOA for total payout is more than double what it is for dividends: 0.44 vs. 0.18.

In addition, if repurchases are more sensitive to earnings changes we would expect the correlation between total payout and earning changes to be larger than the correlation between earnings changes and dividend changes. To this end, Panel C shows the distribution of the within-firm correlation between earnings and dividend changes for dividends and total payout. Surprisingly, we find that despite a greater dispersion in SOA, the dispersion in correlations is no larger for total payout than it is for dividends. Thus the evidence presented in Figure 9 suggests that for the sample as a whole, repurchases are not more sensitive to earning changes than are dividends.[19]

A second possibility that might explain our results is simply that changes in repurchases are less tied to earnings than dividends are, and, at least to an extent, are motivated by different factors than dividends (e.g., Jagannathan et al. (1999), Skinner (2008)). Panel B in Figure 8 serves as a good illustration of this scenario. A.M. Castle has not been repurchasing its shares. The firm pays dividends and its calculated SOA is 0.22. Cato Corp. on the other hand pays dividend and repurchases its shares. Its dividend SOA is 0.15. However, it is rather clear that its repurchase activity is not motivated by earnings changes and the occasional spikes in repurchases result in a total payout SOA of 1.02. The result is a wider dispersion in total payout SOA (as shown in Figure 9). This evidence points toward the second possibility that repurchases are more volatile than dividends, but not in a way that is tied to earnings changes. This would be the case if a significant portion of repurchase activity is not motivated by differences between the current and targeted payout ratios, but by other factors such as stock undervaluation, lack of investment opportunities, M&A activity, etc.[20] In other words, repurchases are also motivated by unique factors that do not affect dividend policy. Hence, the factors derived from dividend-smoothing theories are less successful in explaining total payout smoothing.

To explore this explanation more formally, recall from equation (3) that SOA is calculated as

$$S\hat{O}A = \frac{\operatorname{cov}(\Delta D, dev)}{\operatorname{var}(dev)} = \frac{\sigma_{\Delta D}}{\sigma_{dev}} \rho(\Delta D, dev)$$

where

$$\begin{aligned} dev_{i,t} &= D^*_{i,t} - D_{i,t-1} \\ &= TPR_i * E_{i,t} - D_{i,t-1} \end{aligned}$$

Using the definition of *dev*, we can further decompose the correlation between dividend changes and the deviation to obtain the following expression for the SOA:

$$S\hat{O}A = \frac{\sigma_{\Delta D}}{\sigma_{dev}} \left[\frac{\sigma_{D^*}}{\sigma_{dev}} \rho(\Delta D, E_t) - \frac{\sigma_{D_{t-1}}}{\sigma_{dev}} \rho(\Delta D, D_{t-1}) \right]$$

[19] As an additional examination we also compare the effect of earnings changes on the likelihood of a dividend cut to their effect on a drop in repurchases. When a firm experiences an earnings decline in year t-1, the likelihood of a dividend cut more than doubles, to 17% from 7% conditional on an earnings increase. The likelihood of a cut in repurchases (conditional on a positive repurchase in t-1) is also higher following an earnings decline than following an earnings increase, but increases only from 56% to 65%.

[20] See Brav et al (2005), Table 6 for a complete list of factors that CFOs claim are important to their company's repurchase decisions. Many of these variables are unique to repurchases and do not appear as motives for dividend decisions.

Thus, we can see there are essentially three elements that impact the SOA. The first (the variance ratio outside the brackets) is essentially a measure of the volatility of payout changes. The second is the correlation between payout changes and earnings, and the third is the degree of negative serial correlation in payout. Any of these elements will increase the rate of mean reversion for a mean-reverting process, but only the second can be interpreted in terms of the sensitivity of payout to earnings.

With this decomposition in mind, we can now look at the data to understand what drives the differences in SOAs between dividends and total payout. Table 11 presents medians of each component for dividends and for total payout. Here we see that the higher SOA for total payout reported earlier is driven by two characteristics of repurchases relative to dividends. First, repurchases (and thus total payout) are simply more volatile than dividends. This is reflected in the higher ratio of the standard deviation of payout to that of the deviation (0.85 for total payout compared to 0.27 for dividends). Second, the negative correlation between payout changes and lagged payout is much greater for total payout (-0.49) than for dividends (-0.16). By contrast, we find that the correlation between payout changes and earnings is greater on average for dividends (0.40) than for total payout (0.16).

It appears then that it is primarily the volatility and lumpiness of repurchases, rather than their sensitivity to earnings, that increases the SOA for total payout. The intuition is that the deviation from target is a function both of earnings changes and of payout changes. When there are large, lumpy repurchases, the deviation becomes highly negative the year following a repurchase. Since the repurchase is lumpy (i.e., reverts to zero the following year), there is also a large decrease in total payout in the year following the repurchase. This induces a positive correlation between the deviation and the change in payout, which raises the estimated SOA.

While some repurchase activity is clearly related to earnings, the cross sectional variation in total payout smoothing is driven more by factors that affect the volatility of repurchases than by factors that affect the sensitivity of repurchases to changes in earnings. This provides a natural explanation for our results with respect to the cross sectional determinants of total payout smoothing: Given that much of repurchase activity is motivated by reasons other than paying out excess earnings (see, for example, Jagannathan, Stephens and Weisbach (2000) and Brav et al. (2005)), we should not necessarily expect repurchase volatility to be associated with the same factors that determine dividend smoothing.

6 Conclusion

In this paper we examine firms' dividend smoothing behavior across a wide spectrum of publicly traded firms in the US. We document a number of new results on firms' smoothing policies. First, we document a significant cross-sectional and time series variation in both dividend and total payout smoothing. Over the past 50 years, dividend smoothing has been increasing, while that of total payout smoothing has been declining. Our main findings are that firms that are younger, smaller, high growth firms with more volatile earnings and returns smooth less, while firms that are more stable, have more excess cash flow, lower growth opportunities and more persistent earnings, smooth more. Investor clientele also plays a role in the smoothing decision, where firms that are held more by institutions smooth more. Taken together, these findings are consistent with several of the predictions of the agency-based models of dividend smoothing, but are less consistent with the implications of the asymmetric information models.

We also find dividend smoothing to be highly asymmetric with respect to earnings changes. Dividends adjust faster to positive earnings news than to negative earnings news: When a firm's dividend is below the target, it is more likely to smooth dividends less and move towards the target, but when its dividend is above target, it is more likely to smooth dividends more and leave them unchanged.

Finally, we find that total payout smoothing exhibits more cross-sectional variation than that of dividends. At the same time, factors that are based on dividend smoothing theories are less successful in explaining the cross-sectional variation in payout smoothing. Further investigation suggests that this may be because repurchases are only partially motivated by the same factors as dividends. Since over the last decade firms' payout is achieved almost as much by repurchases as it is by cash dividends, the smoothing behavior of total payout deserves further attention.

For almost five decades researchers and business educators have taken as given the fact that firms smooth dividends. The findings reported in this paper provide new evidence on what types of firms smooth dividends and perhaps bring us closer to understanding why they do so. At the same time, our findings raise some new and interesting questions. For example, why is the distribution of total payout smoothing much more disperse than that of dividends? Which factors drive this variation? And what drives the asymmetric response to positive and negative earnings shocks? We leave these questions for future research.

Appendix A: Simulation Exercise

The simulation exercise proceeds as follows. We first generate 20 years of earnings data for each of 1,000 firms. The earnings data are generated according to the following AR(1) process:

$$\Delta E_{it} = \delta + \gamma * \Delta E_{i,t-1} + \omega_{i,t} \tag{7}$$

where $\omega \sim N(0, \sigma)$. The parameters δ, γ and σ are set to 0.1, -0.2 and 0.7, respectively, to match those found in our empirical sample (described below). That is, we estimate equation (7) by firm and use the median of the estimated parameters for our simulated data.

Given the simulated earnings data, we then generate corresponding dividend series for each firm according to two different payout policy rules. The first is the partial adjustment model proposed by Lintner:

$$\Delta D_{it} = \beta * (TPR * E_{i,t} - D_{i,t-1}) + \epsilon_{i,t} \tag{8}$$

where TPR, the target payout ratio, is set to 0.3, again to calibrate to our empirical sample. Five data sets are then generated, each with a different value of β (the speed of adjustment), ranging from 0.1 to 0.5. We then estimate SOA, by firm, using equations (2) and (3) for each of the data sets, and calculate the mean and standard deviation of the SOA estimates across firms. We then repeat the process 250 times. Average results across the 250 simulations are shown in Figure 1.

The second payout policy is based on firms having a target level of dividends per share rather than a target payout ratio per se. Thus, dividends evolve according to the following rule:

$$D_{it} = \begin{cases} D_{i,t-1} & -2\gamma < abs(dev/D_{i,t-1}) < \gamma \\ D_{i,t-1} + \eta * dev & (dev/D_{i,t-1}) > \gamma \\ D_{i,t-1} + 1.5 * \eta * dev & (dev/D_{i,t-1}) < -2\gamma \end{cases} \tag{9}$$

where dev is defined as $TPR * E_{i,t} - D_{i,t-1}$, γ represents a tolerance level and η represents an adjustment level (between 0 and 1). Thus, as long as earnings stay within a given range, the dividend is kept at the same level. The firm increases the dividend only if earnings have risen significantly relative to the current dividend ($dev/D_{i,t-1} > \gamma$) and cuts the dividend only if the current level is no longer sustainable ($dev/D_{i,t-1} < -2 * \gamma$). Notice also that we capture an asymmetry in the adjustments that is again calibrated to our sample. That is, firms wait longer to cut a dividend than to raise it, and cut by larger magnitudes on average.

Using the dividend rule in equation (9) we then generate ten data sets by fixing the adjustment fraction (η) at 0.25 (to match the mean dividend adjustment size, scaled by the deviation in our empirical sample) and varying the tolerance level.[21] In our data, conditional on a dividend increase (decrease) and a positive (negative) *dev*, $abs(dev/D_{i,t-1})$ ranges from 0.05 (0.12) at the 10th percentile to 1.13 (1.90) at the 90th percentile. In keeping with this distribution, we generate our ten data sets by varying γ from 0.1 to 1.0. We then estimate SOA for each firm using equations (2) and (3) and calculate the mean of the estimates across firms. We then repeat the process 250 times and report the average across simulations in Panel B of Figure 3.

Appendix B: Sample selection

Our data set starts with all firms in both CRSP and Compustat databases, excluding financial firms (SIC codes 6000 - 6999) and firms involved in major mergers or acquisitions, for the period 1985 - 2005. To limit the sample to firms for which we can calculate our smoothing measures, we start by removing observations before each firm's first positive value for dividends per share (DPS - Compustat data item 21) and after each firm's last positive DPS. Removing non-dividend paying firms reduces the number of sample firms from 13,872 to 3,877. Further removing pre- and post-dividend observations lowers the number of observations per dividend-paying firm from 13.2 to 9.5. From that set of observations, we keep only firms with at least 10 years of continuous, non-missing data for DPS_t, DPS_{t-1}, EPS_t (Compustat data item 58) and the share adjustment factor (data item 27, used to calculate split-adjusted changes in DPS). That further reduces the number of sample firms to 1,574, but increases the average number of observations per firm to 16.4. Restricting the sample to firms with at least 10 years of dividend history excludes many of the smaller firms in the Compustat universe. For example, in 2005 our sample at this stage includes only 18% of the firms in Compustat. However, those firms represent 59% of the market capitalization of all Compustat firms.

We further require that firms have at least 5 years of non-missing values for all of the following characteristics: payout ratio, dividend yield, firm size, firm age, market-to-book ratio, leverage, asset tangibility, cash flow volatility, equity return volatility, institutional holdings and stock turnover. Finally, since we use the firm's median payout ratio as a proxy for its target in equation (5), we further exclude the 94 firms for which the median payout ratio is less than zero or greater than

[21] We also examine fixing the tolerance level and varying the adjustment fraction to create differences in smoothing. Results are similar.

one. After applying all of our screens, the final sample consists of 1,335 firms and 21,400 firm-year observations (an average of 16 years of data per firm).

Appendix C: Variable definitions

Payout ratio: common dividends (data item 21) divided by net income (item 18).

Dividend yield: DPS divided by the year-end share price (item 24).

Firm age: the number of years since the firm first appeared in the Compustat database.

Firm size: the natural log of book assets in constant 1992 dollars.

Market-to-book ratio: the market value of equity (product of items 24 and 25) plus the book value of assets (item 6) minus the book value of equity, all divided by the book value of assets.

Book value of equity: book assets minus book liabilities (item 181) minus preferred stock plus deferred taxes (item 35).

Preferred stock: equals the liquidation value (item 10) if not missing; otherwise we use the redemption value (item 56) if not missing; otherwise the carrying value (item 130).

Leverage: the sum of short-term (data 34) and long-term (data 9) debt divided by book assets.

Asset tangibility: net property, plant and equipment (item 8) scaled by total assets.

Cash flow volatility: for a given firm-year, the standard deviation of the ratio of EBITDA (item 13) to assets over the prior ten years. If fewer than ten prior years of data are available, the standard deviation is calculated using the available data, provided there are at least 5 non-missing observations.

Return volatility: is defined as the annual standard deviation of monthly stock returns (including distributions).

Institutional holdings: Data on institutional share holdings are obtained from Thompson Financial's database of 13F SEC filings. We first sum all shareholdings for each firm-year across all institutions. We then calculate the percent of shares held by institutions by dividing this sum by the total number of shares outstanding, taken from Compustat (item 25).

Stock turnover: the annual average of the ratio of monthly traded volume of shares to total shares outstanding.

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Figure 1
Simulation Results: SOA measures

The Figure displays the results of the simulation experiment described in section 3 and Appendix A. In each data set, T years of earnings are simulated for each of 1,000 firms according to the following AR(1) process: $\Delta E_{it} = 0.1 - 0.2 * \Delta E_{i,t-1} + \omega_{it}$ where ω_{it} is i.i.d. normal with mean 0 and standard deviation 0.7. T is set to 10 years in panel A, 20 in panel B and 50 in panel C. From this simulated earnings series, dividends are generated from a Lintner model: $(\Delta D_{it} = \alpha + \beta * dev_{i,t-1} + \epsilon_{i,t})$ where $dev_{i,t} = TPR_i * E_{i,t} - D_{i,t-1}$, TPR is set to 0.3, ϵ_{it} is i.i.d. normal with mean 0 and standard deviation 0.1 and β is varied, within each panel, from 0.1 (left-most) to 0.5 (right-most). The left-hand plot in each panel shows mean SOA estimates obtained using equation (2) (long-dash and squares, labeled "SOA") and using equation (3) (short-dash and diamonds, labeled "SOA-alt"). The solid line represents the true SOA used to generate the data. The right panel plots the average standard error of the estimated SOA coefficients.

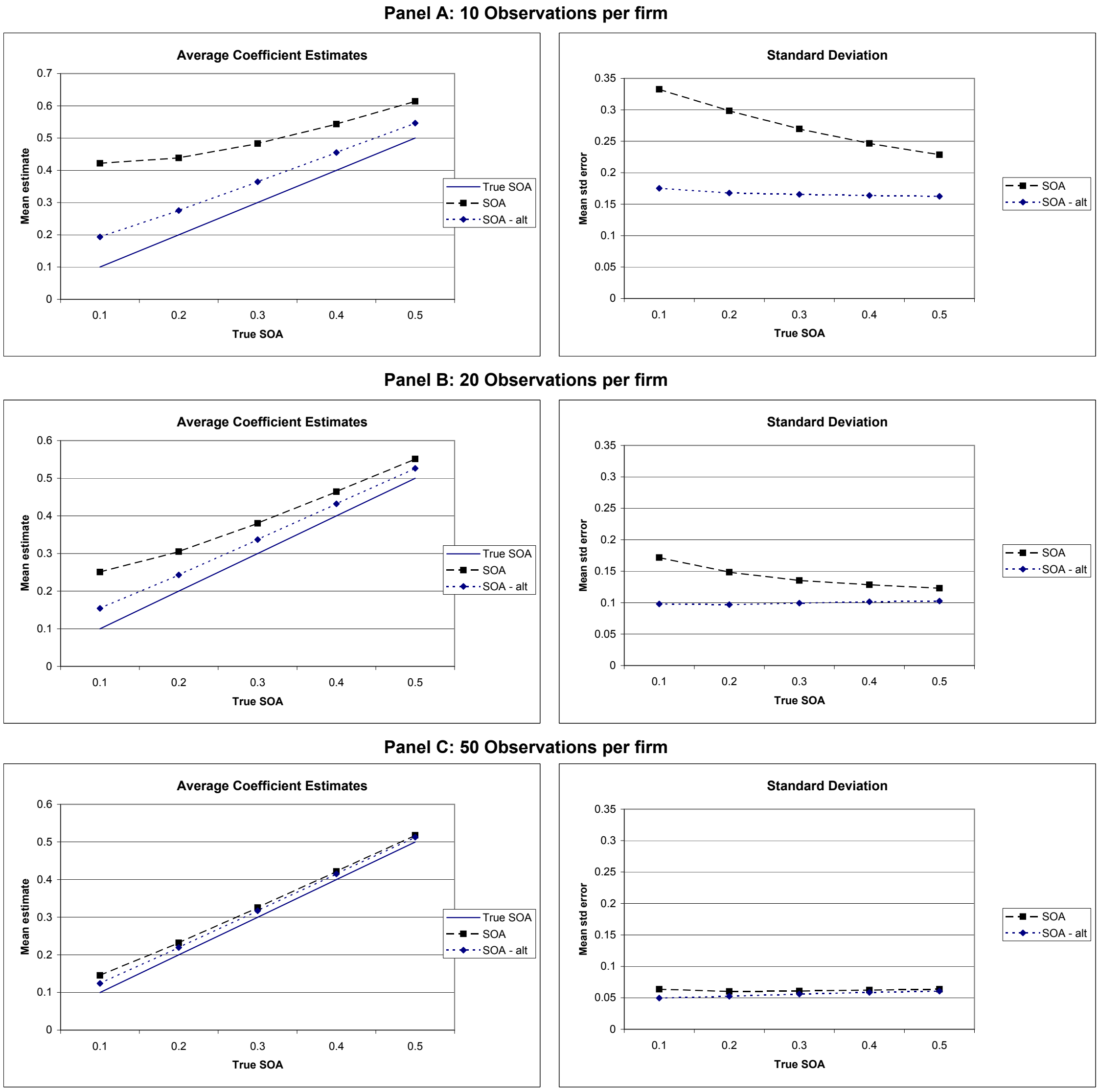


Figure 2

Simulation Results: Distribution of SOA estimates

The Figure displays the results of the simulation experiment described in section 3, Appendix A and figure 2. Each panel plots the histogram of estimated SOAs obtained using equation (2) (solid line, labeled "SOA") and using equation (3) (short-dash, labeled "SOA-alt"). The vertical line represents the true SOA used to generate the data. All simulations use 10 years of data per firm.

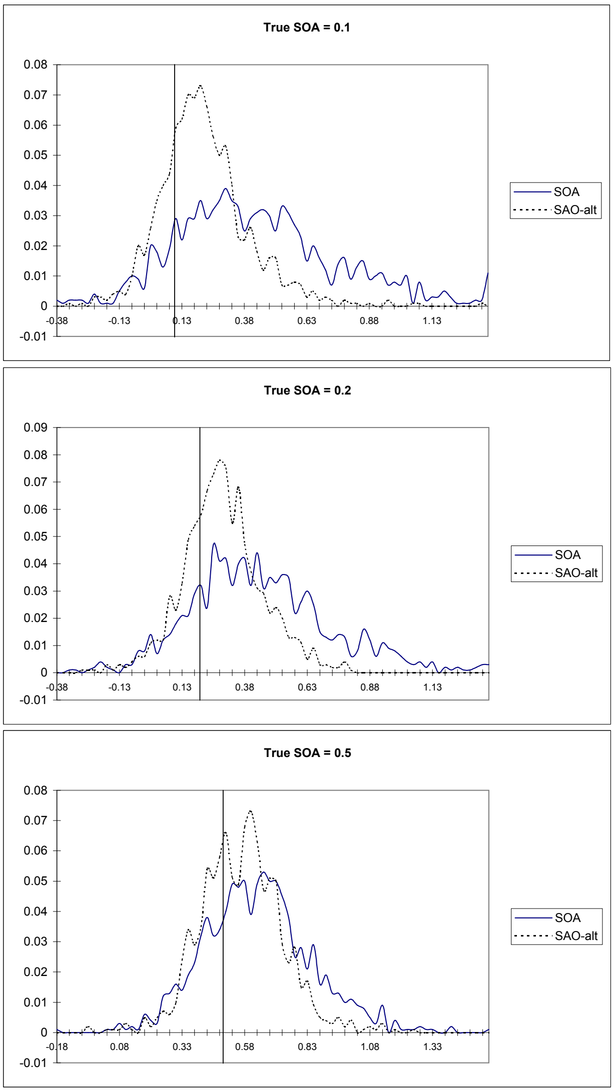


Figure 3

Simulation Results: Relative Volatility

The Figure displays the results of the simulation experiment described in section 3, Appendix A. In panel A, 10 years of dividends per firm are generated according to a Lintner model, as described in Figure 2, with true SOA varying from 0.1 to 0.5. The plot shows the average estimated relative volatility (*RelVol*) across each simulated data set. *RelVol* is defined as the ratio of error variances from the following two regressions: $D_{it} = \alpha_1 + \beta_1 * t + \beta_2 * t^2 + \epsilon_{i,t}$ and $TPR_i * E_{it} = \alpha_2 + \gamma_1 * t + \gamma_2 * t^2 + \eta_{i,t}$. In panel B, 20 years of dividends per firm are simulated according to the following model:

$$D_{it} = \begin{cases} D_{i,t-1} & -2\gamma < abs(dev) < \gamma \\ D_{i,t-1} + \eta * dev & dev > \gamma \\ D_{i,t-1} + 1.5 * \eta * dev & dev < -2\gamma \end{cases}$$

with γ varying from 1.0 (left-most) to 0.1 (right-most). The long-dash line with squares plots the average *RelVol* across simulated data sets. The short-dash line with triangles plots the average SOA estimated using equation (2) in the text and the solid line with diamonds plots the average SOA estimated using equation (3) in the text.

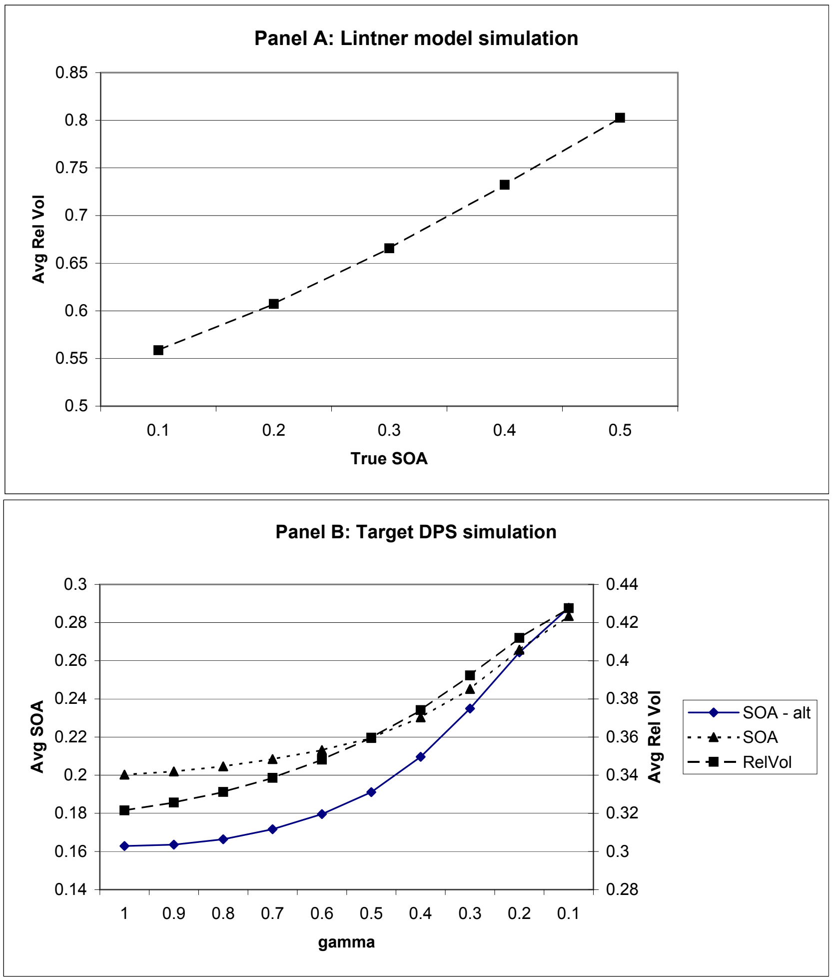
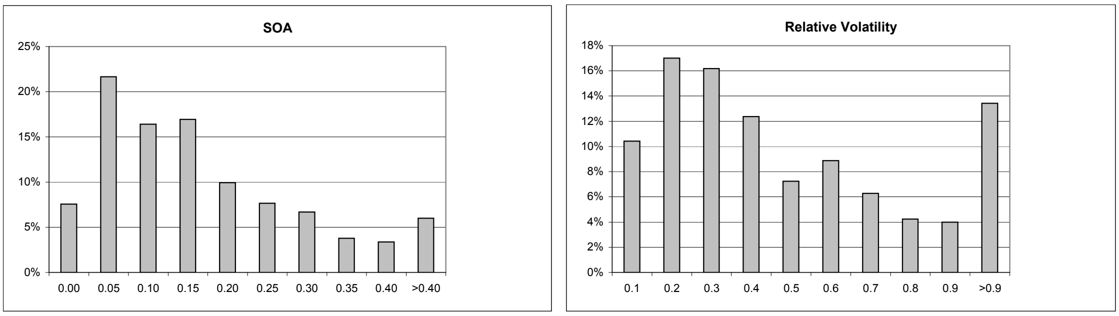


Figure 4

Cross-Sectional Distribution of Smoothing Measures

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. The Figure shows the cross-sectional distributions of *SOA* and *Relative Volatility*. For each firm, *SOA* is estimated as $\hat{\beta}$ from the following regression: $\Delta DPS_{it} = \alpha + \beta * dev_{i,t-1} + \epsilon_{i,t}$ where $dev_{i,t} = TPR_i * EPS_{i,t} - DPS_{i,t-1}$ and TPR_i is defined as the firm-median payout ratio (common dividends divided by net earnings) over the sample period. DPS and EPS are common dividends and earnings per share, respectively, and are taken from Compustat data items 26 and 58. *Relative Volatility* is defined as the ratio of error variances from the following two regressions: $AdjDPS_{it} = \alpha_1 + \beta_1 * t + \beta_2 * t^2 + \epsilon_{i,t}$ and $TPR_i * AdjEPS_{it} = \alpha_2 + \gamma_1 * t + \gamma_2 * t^2 + \eta_{i,t}$ where $AdjDPS_{it}$ and $AdjEPS_{it}$ are split-adjusted DPS and EPS series and TPR_i is the firm median payout ratio.

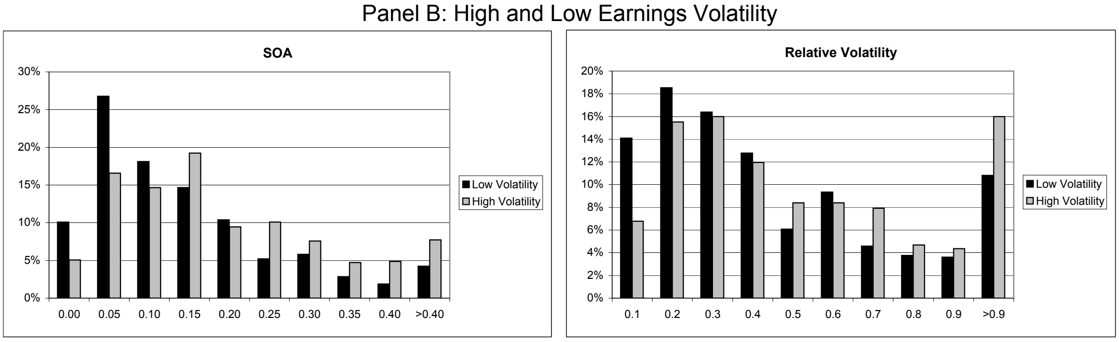
Panel A: Full Sample



Mean	p25	Median	p75
0.14	0.04	0.11	0.22

Mean	p25	Median	p75
0.48	0.18	0.34	0.63

Panel B: High and Low Earnings Volatility



Panel C: High and Low Dividend Yield

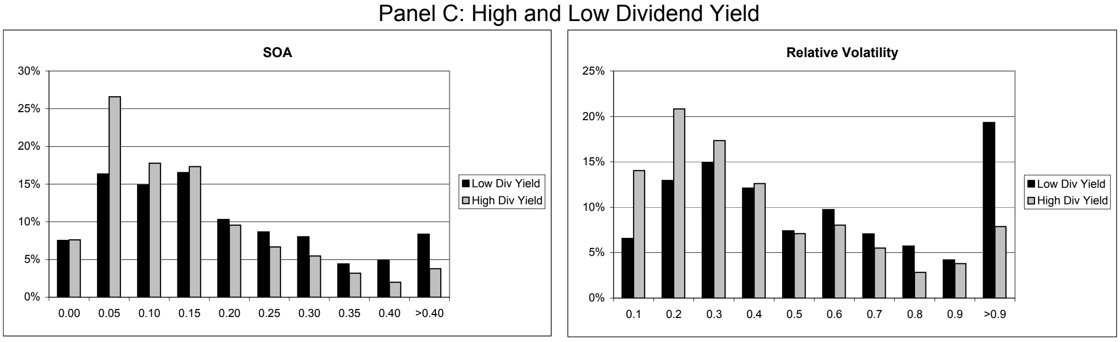


Figure 5

Time Trends in Smoothing Behavior

A separate sample is constructed for each decade, consisting of firms on both Compustat and CRSP files with complete earnings and positive dividend data for each year during the decade, excluding financial firms. The first two plots in Panel A report the median and first and third quartiles of *SOA* and *Relative Volatility*, respectively, for each decade. *SOA* and *Relative Volatility* are defined and estimated as described in Figure 9. The bottom plot reports the fraction of firms in each decade that cut dividends conditional on a significant earnings decline. A dividend cut is defined as a split-adjusted change in dividends per share less than zero. A significant earnings decline is defined as a decrease in earnings per share greater in absolute value than the first quartile of earnings changes for a given firm within each decade. Panel B repeats the exercise substituting the sum of common dividends and common share repurchases for dividends.

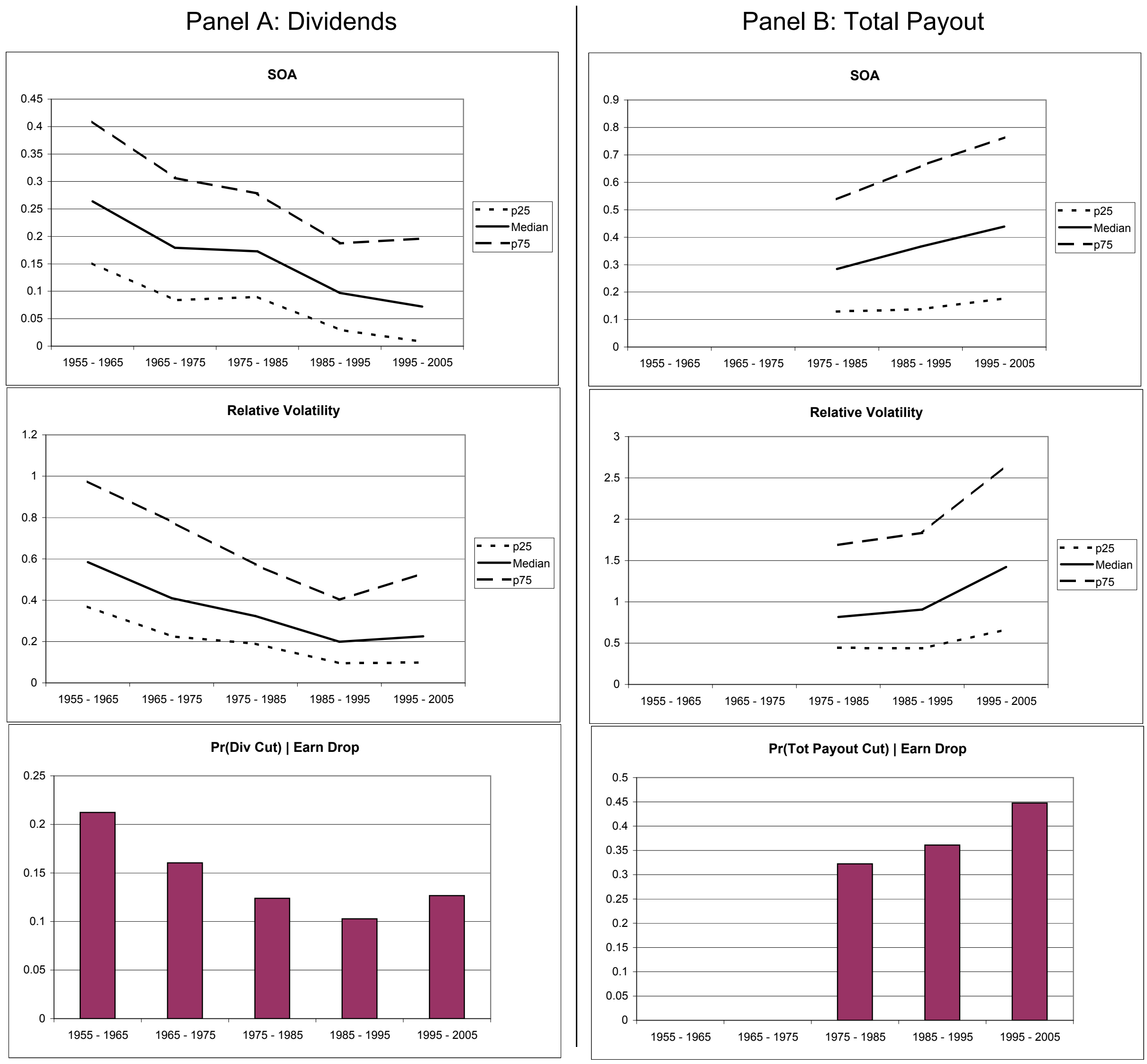


Figure 6

Dividend Smoothing and Return Volatility by Industry

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. For each firm, *SOA* is estimated as described in Figure 5. *Return Volatility* is the annual standard deviation of monthly stock returns (including distributions) for each firm. Industries, defined by 2-digit SIC code, are first sorted by the median *Return Volatility*. Median *SOA* within each industry is plotted in the graph.

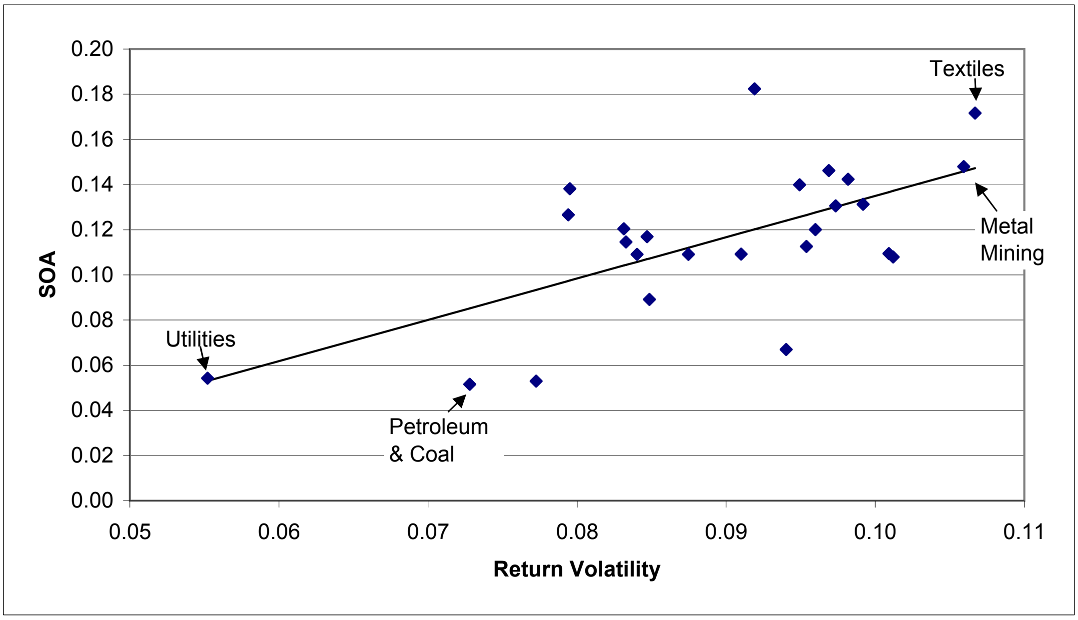


Figure 7

Smoothing Asymmetry and Firm Characteristics

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. Firms are sorted into quintiles based on the median over the sample period of each firm characteristic. The Figure shows for each quintile, the mean of the estimated speeds of adjustment to positive and negative deviations, β_{pos} and β_{neg} from the following regression: $\Delta DPS_{it} = \alpha + \beta_{pos} * dev_{i,t} * I(dev_{i,t} > 0) + \beta_{pos} * dev_{i,t} * I(dev_{i,t} < 0) + \epsilon_{i,t}$ where $dev_{i,t} = TPR_i * EPS_{i,t} - DPS_{i,t-1}$ and TPR_i is defined as the firm-median payout ratio (common dividends divided by net earnings) over the sample period. *Dividend yield* is DPS divided by the year-end share price; *Payout ratio* is defined as common dividends divided by net income; *Size* is the log of book assets in constant 1992 dollars; *MA/BA* is the market value of equity plus the book value of assets minus the book value of equity, all divided by the book value of assets; *Leverage* is the sum of short-term and long-term debt divided by book assets; *Tangibile Assets* is property, plant and equipment scaled by total assets; *CF volatility*, for a given firm-year, is the standard deviation of the ratio of EBITDA to assets over the prior ten years; *Inst. Holdings* are obtained from the Thompson Financial's data base of 13F SEC filings and is defined as the sum of all share holdings for each firm-year across all institutions divided by the total number of shares outstanding.

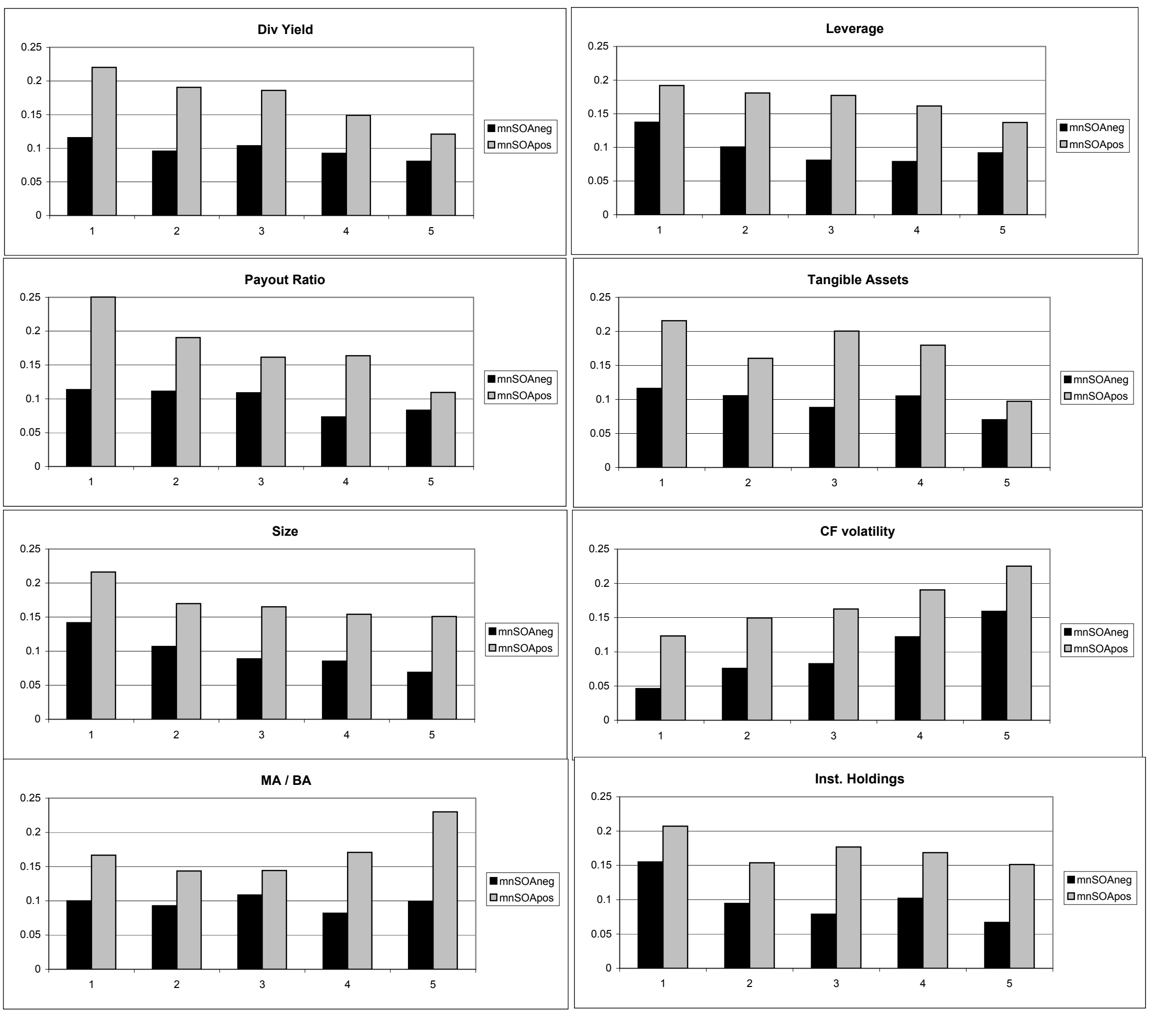


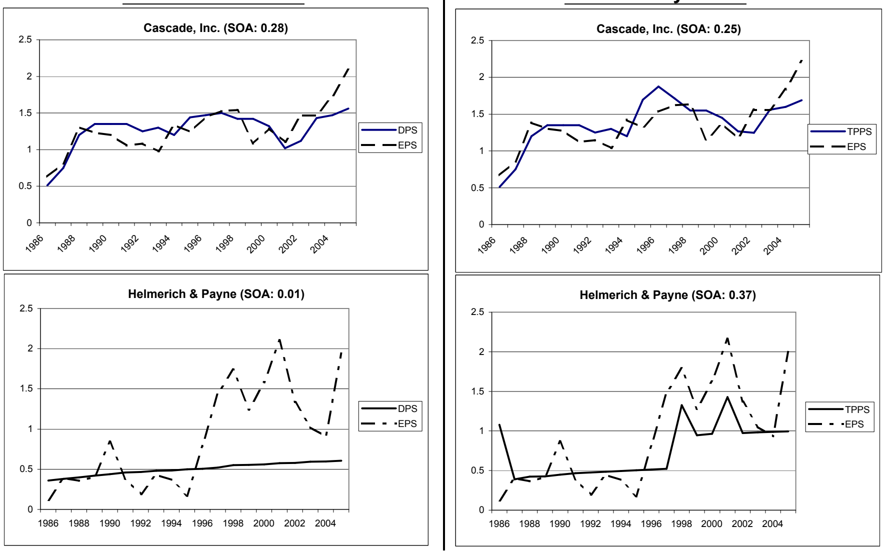
Figure 8

The Impact of Repurchases on the cross-section of SOA

In the left column, the figure shows, for each firm, the split-adjusted common dividends per share and the product of the split-adjusted earnings per share and the firm-median payout ratio. The split adjusted DPS (EPS) series is constructed as described in Figure 1. In the right column, the figure shows the split-adjusted total payout (dividends plus share repurchases) per share and the product of the split-adjusted earnings per share and the firm-median total payout ratio (total payout divided by net income).

Panel A: Repurchases correlated with earnings

Dividends | **Total Payout**



Panel B: Repurchases uncorrelated with earnings

Dividends | **Total Payout**

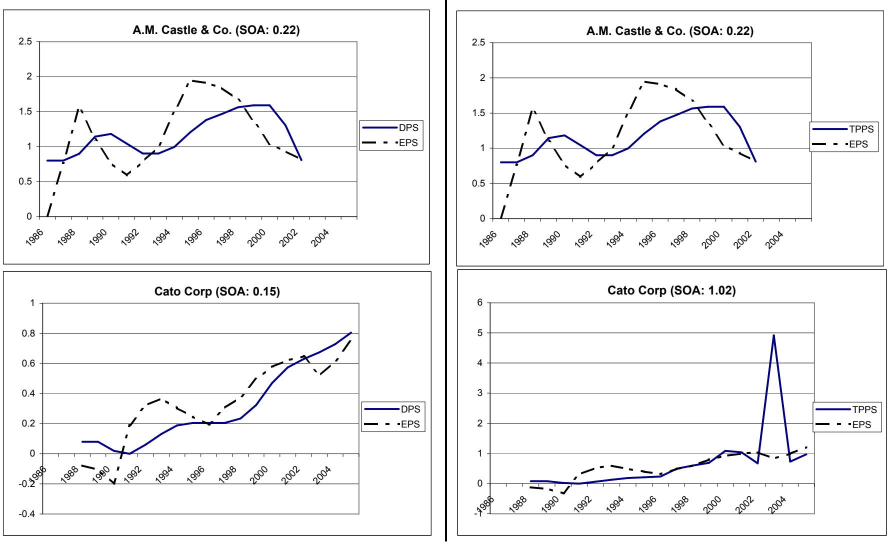
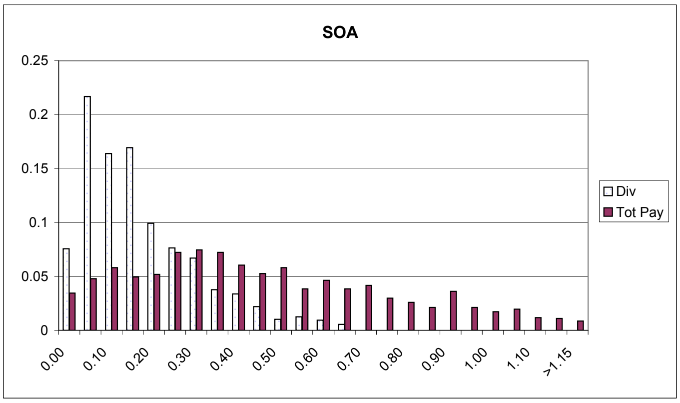


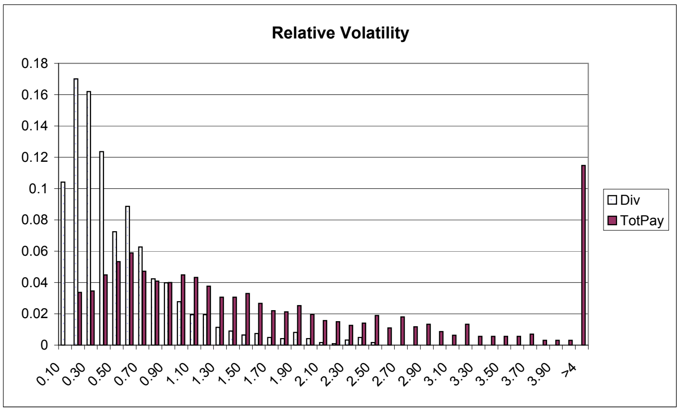
Figure 9

Cross-Sectional Distribution of Dividend & Total Payout Smoothing

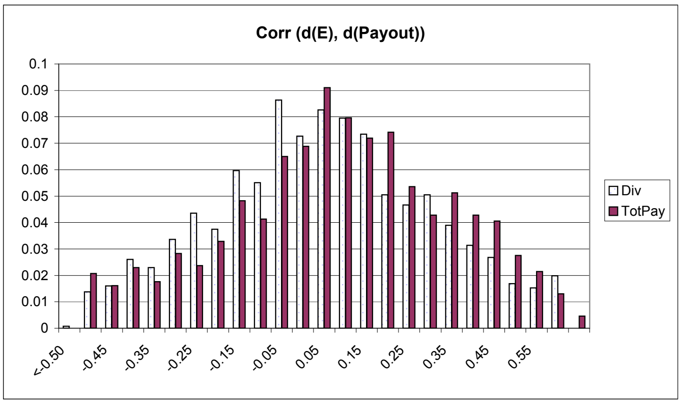
The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. The figure shows the cross-sectional distributions of *SOA* and *Relative Volatility*, defined and estimated as described in Figure 5. The white bars represent the distribution for dividends; the dark bars for total payout (dividends plus repurchases).



	Mean	p25	Median	p75
Dividends	0.14	0.04	0.11	0.22
Total Payout	0.43	0.20	0.38	0.64



	Mean	p25	Median	p75
Dividends	0.48	0.18	0.34	0.63
Total Payout	1.86	0.65	1.26	2.43



	Mean	p25	Median	p75
Dividends	0.07	-0.11	0.07	0.25
Total Payout	0.06	-0.10	0.07	0.24

Table 1
Payout Ratio and Firm Characteristics

The sample comes from the annual Compustat and monthly CRSP files during the period 1985-2005, excluding financial firms. In panels B and D, firms are required to pay a dividend for at least 10 years during the sample period. In each year, firms are first sorted into quartiles based on the lagged value of each characteristic. The mean payout ratio within each quartile is reported. *Payout ratio* is defined as common dividends divided by net income, expressed in percents. *Profitability* is defined as operating income before depreciation scaled by book assets. *Earnings volatility* is the standard deviation of *Profitability* over the prior 10 years. *Asset Tangibility* is defined as tangible assets divided by total book assets. *MA / BA* is the market value of equity (product of items 24 and 25) plus the book value of assets (item 6) minus the book value of equity, all divided by the book value of assets. *Leverage* is long-term debt plus short-term debt divided by book assets. *Asset growth* is the one-year percentage change in book assets. *Inst Holding* is the percent of outstanding common shares held by all institutions reporting on SEC form 13F. Panels A and B report data for dividends only; Panels C and D report data for total payout, defined as common dividends plus repurchases of common stock. The column labeled *t(4-1)* reports the results of a t-test of equal means between the first and fourth quartiles. *** represents a significant difference at the 1% level, ** at the 5% level and * at the 10% level.

Panel A: Dividends: Full sample

	Quartile				
	1	2	3	4	t(4-1)
Book Assets	2.72	6.31	12.14	29.99	***
Earnings Volatility	32.06	16.78	9.22	2.37	***
Profitability	1.85	14.13	20.24	14.27	***
Asset Tangibility	5.39	11.28	16.26	25.42	***
Market-to-Book	18.26	20.05	14.72	9.50	***
Leverage	9.12	12.53	19.67	17.97	***
Asset Growth	11.49	23.33	17.57	7.77	***
Equity Beta	17.02	20.13	16.70	9.38	***
Stock Price	1.15	5.95	15.73	26.99	***
Inst Holding	14.29	13.12	14.62	17.29	***

Panel B: Dividends - Dividend payer sample

	Quartile				
	1	2	3	4	t(4-1)
Book Assets	35.71	37.56	43.35	47.85	***
Earnings Volatility	53.19	41.20	36.78	32.91	***
Profitability	46.40	50.06	38.36	31.69	***
Asset Tangibility	32.55	36.62	38.88	55.87	***
Market-to-Book	49.12	46.21	38.02	32.49	***
Leverage	36.11	36.44	44.96	47.46	***
Asset Growth	44.72	47.77	40.45	32.30	***
Equity Beta	47.82	45.93	39.01	31.40	***
Stock Price	35.64	43.00	45.03	40.01	***
Inst Holding	46.03	43.61	38.83	36.23	***

Panel C: Total Payout - Full sample

	Quartile				
	1	2	3	4	t(4-1)
Book Assets	10.15	18.65	28.41	51.31	***
Earnings Volatility	51.82	36.37	25.66	11.84	***
Profitability	8.88	28.25	36.38	32.53	***
Asset Tangibility	18.95	27.22	33.52	40.96	***
Market-to-Book	34.17	37.34	32.70	23.70	***
Leverage	25.87	28.06	36.83	31.83	***
Asset Growth	28.17	44.02	33.47	19.37	***
Equity Beta	34.23	38.30	34.52	22.98	***
Stock Price	7.52	19.23	33.54	47.76	***
Inst Holding	25.82	25.40	29.75	38.39	***

Panel D: Total Payout - Payer sample

	Quartile				
	1	2	3	4	t(4-1)
Book Assets	50.73	55.26	62.33	68.25	***
Earnings Volatility	68.27	60.99	57.59	53.17	***
Profitability	61.69	65.28	57.19	53.54	***
Asset Tangibility	53.07	58.24	56.95	67.72	***
Market-to-Book	64.36	62.91	58.36	53.32	***
Leverage	56.98	57.10	62.57	60.14	***
Asset Growth	69.19	66.85	56.99	45.63	***
Equity Beta	64.18	63.81	58.95	50.74	***
Stock Price	52.34	59.14	63.18	62.14	***
Inst Holding	59.90	57.26	59.00	60.21	

Table 2
Firm Characteristics across Dividend Smoothing Quintiles

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. For each firm, *SOA* is estimated as $\hat{\beta}$ from the following regression: $\Delta DPS_{it} = \alpha + \beta * dev_{i,t-1} + \epsilon_{i,t}$ where $dev_{i,t} = TPR_i * EPS_{i,t} - DPS_{i,t-1}$ and TPR_i is defined as the firm-median payout ratio (common dividends divided by net earnings) over the sample period. DPS and EPS are common dividends and earnings per share, respectively, and are taken from Compustat data items 26 and 58. *RelVol* is defined as the ratio of error variances from the following two regressions: $AdjDPS_{it} = \alpha_1 + \beta_1 * t + \beta_2 * t^2 + \epsilon_{i,t}$ and $TPR_i * AdjEPS_{it} = \alpha_2 + \gamma_1 * t + \gamma_2 * t^2 + \eta_{i,t}$ where $AdjDPS_{it}$ and $AdjEPS_{it}$ are split-adjusted DPS and EPS series and TPR_i is as defined previously. The split adjusted DPS (EPS) series is constructed by first calculating the split-adjusted change in DPS (EPS) each year. The split adjusted series for year t is then defined as $AdjDPS_{i,t} = DPS_{i,1} + \sum_{i=2}^{t} \Delta DPS_{i,t}$. Firms are then sorted into quintiles based on the estimated *SOA* (panel A) and *RelVol* (panel B). For each quintile, means of the following firm-median characteristics are reported. *Payout ratio* is defined as common dividends divided by net income; *Div yield* is DPS divided by the year-end share price; *Size* is the log of book assets in constant 1992 dollars; *Age* is the number of years since the firm first appeared in the Compustat database; *MA/BA* is the market value of equity plus the book value of assets minus the book value of equity, all divided by the book value of assets; *Leverage* is the sum of short-term and long-term debt divided by book assets; *Asset Tang* is property, plant and equipment scaled by total assets; *sd(EBITDA)*, for a given firm-year, is the standard deviation of the ratio of EBITDA to assets over the prior ten years; *Return vol* is the annual standard deviation of monthly equity returns (including distributions) from *CRSP*; *Inst. Holdings* are obtained from the Thompson Financial's data base of 13F SEC filings and is defined as the sum of all share holdings for each firm-year across all institutions divided by the total number of shares outstanding. *Turnover* is the monthly traded volume of shares divided by total shares outstanding. *Cash Cow* is an indicator equal to one for firms with positive profits, A or better debt rating and a Price/Earnings ratio lower than the median P/E ratio for profitable firms rated A or better. The column labeled *t(5-1)* reports the results of a t-test of equal means between the first and fifth quintiles. *** represents a significant difference at the 1% level, ** at the 5% level and * at the 10% level.

Panel A: Speed of Adjustment

	SOA Quintile						
Characteristic	1	2	3	4	5	t(5-1)	
PayoutRatio	0.441	0.391	0.388	0.322	0.283	-8.34	***
DivYield	0.031	0.027	0.027	0.023	0.020	-7.48	***
FirmAge	29.81	29.59	27.06	25.32	20.20	-9.07	***
Size	6.857	6.822	6.700	6.559	5.934	-5.47	***
MA/BA	1.380	1.422	1.501	1.538	1.657	4.15	***
Leverage	0.268	0.251	0.231	0.235	0.211	-4.41	***
Asset Tang	0.482	0.444	0.427	0.394	0.373	-5.36	***
sd(EBITDA)	0.034	0.040	0.044	0.050	0.052	8.22	***
Return vol.	0.074	0.081	0.082	0.087	0.095	9.64	***
InstHold	37.96	37.33	34.94	34.23	29.00	-4.29	***
Turnover	0.523	0.588	0.545	0.577	0.645	3.24	***
CashCow	0.151	0.130	0.116	0.081	0.054	-5.73	***

Panel B: Relative Volatility

Characteristic	Rel. Vol. Quintile 1	2	3	4	5	t(5-1)	
PayoutRatio	0.456	0.385	0.359	0.331	0.266	-10.8	***
DivYield	0.031	0.027	0.025	0.023	0.019	-8.13	***
FirmAge	29.23	28.53	25.90	25.97	21.59	-6.77	***
Size	6.719	6.805	6.661	6.396	6.192	-3.03	***
MA/BA	1.353	1.437	1.462	1.615	1.634	4.90	***
Leverage	0.263	0.237	0.249	0.221	0.206	-4.56	***
Asset Tang	0.502	0.432	0.396	0.386	0.388	-5.48	***
sd(EBITDA)	0.037	0.044	0.043	0.049	0.049	4.86	***
Return vol.	0.076	0.082	0.085	0.087	0.092	7.11	***
InstHold	36.93	37.63	36.36	31.15	28.89	-3.93	***
Turnover	0.503	0.549	0.586	0.587	0.633	3.57	***
CashCow	0.154	0.147	0.085	0.087	0.060	-5.37	***

Table 3
Dividend Smoothing: Cross-sectional Regressions

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. The dependent variable in columns 1 - 3 is the *SOA* and in columns 4 - 6 *RelVol*, both estimated as described in Table 2. The independent variables are the median firm characteristics over the sample period. Firm characteristic variables are as defined in Table 2. t-statistics, based on White's heteroskedasticity-robust standard errors, are shown in italics.

Dep Var		SOA			Rel Vol	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.147	0.147	0.148	0.488	0.488	0.488
	40.01	*40.23*	*40.42*	*40.91*	*41.08*	*42.45*
Payout Ratio			-0.021			-0.138
			-4.45			*-8.54*
Age	-0.025	-0.020	-0.018	-0.047	-0.028	-0.008
	-5.82	*-4.52*	*-3.94*	*-3.34*	*-1.9*	*-0.56*
Size	-0.005	-0.002	-0.005	-0.003	0.003	-0.012
	-1.06	*-0.43*	*-0.82*	*-0.18*	*0.17*	*-0.68*
MA/BA	0.011	0.014	0.015	0.050	0.062	0.069
	2.16	*2.88*	*3.04*	*3.31*	*4.2*	*4.87*
Leverage	-0.001	-0.002	-0.001	-0.015	-0.015	-0.008
	-0.27	*-0.39*	*-0.16*	*-0.94*	*-0.92*	*-0.5*
Asset Tang	-0.004	-0.007	-0.003	-0.011	-0.018	0.007
	-0.9	*-1.38*	*-0.52*	*-0.69*	*-1.16*	*0.44*
Cash Cow	-0.001	-0.002	0.000	-0.022	-0.023	-0.007
	-0.31	*-0.52*	*0.15*	*-1.84*	*-2.06*	*-0.65*
sd(EBITDA)	0.010	0.008	0.009			
	1.74	*1.54*	*1.63*			
Return Vol	0.020	0.023	0.013	0.060	0.065	0.005
	3.56	*3.68*	*1.95*	*3.35*	*3.33*	*0.23*
Inst. Holding		-0.0195	-0.023		-0.063	-0.090
		-4.53	*-5.45*		*-5.19*	*-7.36*
Turnover		0.0002	0.001		0.003	0.006
		0.03	*0.2*		*0.16*	*0.34*
# Firms	1269	1263	1263	1229	1223	1223
R^2	0.14	0.15	0.16	0.08	0.10	0.16

Table 4
Dividend Smoothing: Sample Selection Corrected Regressions

The sample consists of firms on both Compustat and CRSP files over the period 1985-2005, excluding financial firms. The dependent variable in columns 1 - 3 is the *SOA* and in columns 4 - 6 *RelVol*, both estimated as described in Table 2 for firms with at least 10 years of dividends over the sample period. The independent variables are the median firm characteristics over the sample period. Firm characteristic variables are as defined in Table 2. A first-stage Tobit regression is estimated where the number of dividends paid over the sample period is regressed on the firm characteristics reported in Table 1. *NumDivs Resid* is the estimated residual from the first-stage regression. t-statistics, based on White's heteroskedasticity-robust standard errors, are shown in italics.

Dep Var		SOA			Rel Vol	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.145	0.145	0.145	0.483	0.482	0.480
	40.44	*40.64*	*40.95*	*41.24*	*41.41*	*42.98*
Payout Ratio			-0.021			-0.139
			-4.59			*-8.69*
Age	-0.033	-0.027	-0.024	-0.061	-0.040	-0.023
	-6.56	*-5.16*	*-4.76*	*-3.97*	*-2.47*	*-1.49*
Size	-0.014	-0.010	-0.013	-0.022	-0.013	-0.031
	-2.68	*-1.81*	*-2.27*	*-1.26*	*-0.62*	*-1.6*
MA/BA	0.010	0.014	0.014	0.048	0.059	0.066
	2.08	*2.74*	*2.91*	*3.31*	*4.12*	*4.81*
Leverage	0.002	0.001	0.002	-0.008	-0.009	-0.001
	0.39	*0.2*	*0.47*	*-0.48*	*-0.55*	*-0.03*
Asset Tang	-0.007	-0.009	-0.005	-0.015	-0.022	0.001
	-1.49	*-1.87*	*-1*	*-1.01*	*-1.46*	*0.1*
Cash Cow	-0.001	-0.001	0.001	-0.022	-0.023	-0.007
	-0.22	*-0.4*	*0.29*	*-1.81*	*-2.02*	*-0.59*
sd(EBITDA)	0.009	0.008	0.008			
	1.68	*1.51*	*1.6*			
Return Vol	0.023	0.025	0.015	0.064	0.067	0.009
	4.11	*4.09*	*2.32*	*3.58*	*3.5*	*0.41*
Inst. Holding		-0.0184	-0.022		-0.061	-0.087
		-4.3	*-5.25*		*-5.02*	*-7.2*
Turnover		0.0006	0.002		0.004	0.007
		0.11	*0.29*		*0.23*	*0.43*
NumDivs Resid	-0.020	-0.017	-0.018	-0.041	-0.032	-0.040
	-3.36	*-2.94*	*-3.15*	*-2.11*	*-1.63*	*-2.11*
# Firms	1266	1262	1262	1226	1222	1222
R^2	0.14	0.16	0.17	0.09	0.10	0.16

Table 5

Robustness checks - alternate specifications

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. The dependent variable in panel A (B) is the estimated SOA (Relative Volatility) for each firm, where both are estimated as described in Table 2. The first column in panel A (B) repeats column 3 (6) from Table 3. Column 2 presents the results of an ordered logit estimation where the dependent variable is a discretized version of each smoothing measure. In column 3 we replace EPS with earnings excluding both extraordinary and special items, divided by total shares outstanding. In columns 4 and 5 we replace EPS with operating cash flow per share. In column 4, changes in working capital are excluded, in column 5 they are included in the cash flow definition. In column 6, we include a proxy for the degree of earnings smoothing. *Income Smooth* is the negative correlation between the change in pre-discretionary income and the change in discretionary accruals as calculated in Tucker and Zarowin (2006). In column 7, we replace *Compustat* DPS with the annual sum of all regular ordinary cash dividends from CRSP. In column 8, we estimate a Tobit regression where the SOA is censored at 0 and 1. In column (9) we control for two measures of earnings permanence. *Earn ar(1)* is the estimated $\hat{\rho}$ from the following firm-level time series regression: $AdjEPS_{it} = \alpha + AdjEPS_{it-1} + \epsilon$ where AdjEPS is defined as in Table 2. *Earn beta* is defined as the estimated $\hat{\beta}$ from the following firm-level regression: $Earn/A_{it} = \alpha + \beta MktEarn_{it} + \epsilon$ where Earn/A is defined as net earnings divided by book assets and MktEarn is defined for a given year as the sum of net earnings of all firms on both CRSP and Compustat divided by the sum of book assets. The independent variables are the median firm characteristics over the sample period. Firm characteristic variables are as defined in Table 2. t-statistics, based on White's heteroskedasticity-robust standard errors, are shown in italics.

Panel A: SOA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.148		0.182	0.181	0.113	0.144	0.124	0.144	0.147
	40.42		*42.58*	*38.78*	*29.32*	*40.64*	*32.64*	*39.69*	*26.55*
Payout Ratio	-0.021	-0.281	-0.021	-0.021	-0.015	-0.017	-0.008	-0.021	-0.014
	-4.45	*-4.09*	*-3.89*	*-3.2*	*-2.9*	*-3.62*	*-1.45*	*-4.63*	*-2.84*
Age	-0.018	-0.182	-0.019	-0.039	-0.030	-0.017	-0.009	-0.018	-0.020
	-3.94	*-2.81*	*-3.53*	*-6.6*	*-5.69*	*-3.78*	*-1.99*	*-3.46*	*-4.38*
Size	-0.005	0.037	0.008	0.015	0.025	-0.003	0.010	-0.004	-0.003
	-0.82	*0.45*	*1.18*	*2.07*	*4.28*	*-0.46*	*1.7*	*-0.61*	*-0.57*
MA/BA	0.015	0.210	0.016	0.004	-0.001	0.015	0.005	0.015	0.011
	3.04	*3.19*	*2.99*	*0.71*	*-0.16*	*3.18*	*1.06*	*2.69*	*2.17*
Leverage	-0.001	0.010	0.009	-0.001	-0.013	-0.001	-0.001	-0.001	0.002
	-0.16	*0.14*	*1.64*	*-0.1*	*-2.28*	*-0.17*	*-0.29*	*-0.25*	*0.36*
Asset Tang	-0.003	-0.109	-0.006	0.003	0.026	-0.001	-0.007	-0.003	-0.004
	-0.52	*-1.65*	*-1.06*	*0.46*	*5.12*	*-0.14*	*-1.4*	*-0.76*	*-0.85*
Cash Cow	0.000	-0.027	0.000	-0.003	-0.003	0.002	-0.003	0.000	0.000
	0.15	*-0.47*	*-0.04*	*-0.81*	*-0.9*	*0.49*	*-0.81*	*-0.02*	*0.03*
sd(EBITDA)	0.009	0.168	0.016	0.029	0.032	0.011	0.017	0.010	0.013
	1.63	*2.43*	*2.67*	*4.73*	*5.36*	*2.02*	*3.38*	*2.16*	*2.16*
Return Vol	0.013	0.206	0.019	0.028	0.023	0.016	0.023	0.014	0.014
	1.95	*2.57*	*2.55*	*3.58*	*3.35*	*2.44*	*3.01*	*2.28*	*2.09*
Inst. Holding	-0.023	-0.323	-0.031	-0.020	-0.014	-0.022	-0.020	-0.024	-0.024
	-5.45	*-5.46*	*-6.07*	*-3.71*	*-3.11*	*-5.3*	*-4.95*	*-5.62*	*-5.53*
Turnover	0.001	-0.029	-0.001	-0.006	-0.009	0.001	-0.009	0.001	0.001
	0.2	*-0.39*	*-0.16*	*-0.9*	*-1.59*	*0.22*	*-1.4*	*0.17*	*0.16*
Income Smooth						0.014			
						3.93			
Earn ar(1)									0.017
									4.2
Earn beta									0.004
									0.68
# Firms	1263	1263	1263	1243	1237	1250	1169	1263	1224
R^2	0.16	0.05	0.15	0.21	0.19	0.13	0.13	n.a.	0.18

Panel B: Relative Volatility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)
Constant	0.488		0.646	0.789	0.538	0.478	0.448	0.511
	42.45		*41.93*	*38.61*	*35.5*	*42.57*	*35.63*	*29.36*
Payout Ratio	-0.138	-0.571	-0.142	-0.249	-0.151	-0.131	-0.136	-0.117
	-8.54	*-8.05*	*-6.1*	*-8.03*	*-6.42*	*-8.05*	*-8.25*	*-6.96*
Age	-0.008	-0.051	-0.024	-0.056	-0.011	-0.006	0.001	-0.015
	-0.56	*-0.82*	*-1.24*	*-1.89*	*-0.53*	*-0.4*	*0.04*	*-1.02*
Size	-0.012	0.016	0.010	0.006	0.013	-0.008	-0.006	-0.009
	-0.68	*0.19*	*0.42*	*0.2*	*0.52*	*-0.43*	*-0.32*	*-0.51*
MA/BA	0.069	0.294	0.078	0.091	0.065	0.067	0.064	0.061
	4.87	*4.88*	*3.94*	*3.48*	*3.88*	*4.96*	*4.12*	*4.24*
Leverage	-0.008	-0.016	0.011	0.017	-0.031	-0.008	0.002	-0.003
	-0.5	*-0.25*	*0.54*	*0.61*	*-1.45*	*-0.54*	*0.12*	*-0.19*
Asset Tang	0.007	-0.103	-0.033	0.074	0.100	0.011	0.014	0.003
	0.44	*-1.48*	*-1.62*	*2.51*	*4.27*	*0.69*	*0.91*	*0.17*
Cash Cow	-0.007	-0.099	-0.014	-0.007	-0.003	-0.005	-0.008	-0.010
	-0.65	*-1.67*	*-0.92*	*-0.33*	*-0.2*	*-0.46*	*-0.71*	*-0.94*
Return Vol	0.005	-0.030	0.001	0.066	0.088	0.01	-0.005	0.015
	0.23	*-0.38*	*0.03*	*2.14*	*3.43*	*0.57*	*-0.25*	*0.69*
Inst. Holding	-0.090	-0.443	-0.093	-0.096	-0.086	-0.090	-0.082	-0.094
	-7.36	*-7.68*	*-5.58*	*-3.90*	*-5.13*	*-7.38*	*-6.68*	*-7.73*
Turnover	0.006	0.067	0.002	-0.023	-0.003	0.005	0.015	0.003
	0.34	*0.87*	*0.1*	*-0.85*	*-0.14*	*0.34*	*0.8*	*0.19*
Income Smooth						*0.036*		
						3.17		
Earn ar(1)								0.062
								5.22
Earn beta								-0.032
								-1.89
# Firms	1223	1223	1200	1002	962	1212	923	1185
R^2	0.16	0.05	0.12	0.15	0.16	0.16	0.17	0.18

Table 6
Robustness checks - restricted samples

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. The dependent variable is the estimated SOA for each firm, estimated as described in Table 2. The independent variables are the median firm characteristics over the sample period. Firm characteristic variables are as defined in Table 2. The first column (Baseline) repeats column 3 from Table 3. in column 2, the sample excludes firms with large changes in firm size over the sample period. Changes are calculated as the absolute difference in median firm size over the first half and second half of the sample period for each firm. Large changes are defined as the top two deciles of absolute changes. The sample selection in columns 3 and 4 are analogous, based on the ration of market value of assets to book value and on institutional holdings, both as defined in Table 2. In column 5 we exclude firms that are in both the top four absolute change deciles based on MA/BA and based on institutional holdings. t-statistics, based on White's heteroskedasticity-robust standard errors, are shown in italics.

		Exclusion based on large changes in:			
	Baseline	Size	MA/BA	Inst Hold	Inst Hold & M/B
Constant	0.148	0.144	0.142	0.154	0.147
	40.42	*35.72*	*35.66*	*36.64*	*36.69*
Payout Ratio	-0.021	-0.026	-0.020	-0.025	-0.023
	-4.45	*-4.92*	*-3.76*	*-4.72*	*-4.33*
Age	-0.018	-0.016	-0.018	-0.020	-0.019
	-3.94	*-3.12*	*-3.64*	*-3.98*	*-3.78*
Size	-0.005	-0.008	-0.002	-0.003	-0.001
	-0.82	*-1.28*	*-0.29*	*-0.5*	*-0.16*
MA/BA	0.015	0.014	0.015	0.014	0.014
	3.04	*2.76*	*2.97*	*2.64*	*2.62*
Leverage	-0.001	0.003	0.001	0.000	-0.004
	-0.16	*0.58*	*0.16*	*0.06*	*-0.63*
Asset Tang	-0.003	0.001	-0.006	0.001	-0.003
	-0.52	*0.21*	*-1.14*	*0.17*	*-0.54*
Cash Cow	0.000	-0.001	0.002	0.001	0.000
	0.15	*-0.4*	*0.51*	*0.14*	*-0.12*
sd(EBITDA)	0.009	0.010	0.012	0.008	0.009
	1.63	*1.58*	*2.13*	*1.35*	*1.56*
Return Vol	0.013	0.010	0.012	0.014	0.010
	1.95	*1.37*	*1.57*	*1.86*	*1.36*
Inst. Holding	-0.023	-0.022	-0.024	-0.024	-0.023
	-5.45	*-4.47*	*-5*	*-4.67*	*-4.93*
Turnover	0.001	0.002	0.003	0.001	-0.002
	0.2	*0.29*	*0.47*	*0.08*	*-0.31*
# Firms	1269	1012	1020	1005	1067
R^2	0.16	0.165	0.173	0.17	0.16

Table 7
Smoothing Asymmetry

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. $Pr(Cut)$ ($Pr(Incr)$ is defined as the fraction of firms with a split-adjusted change in dividends per share less (greater) than zero. ΔDPS is the mean change in dividend per share. $\Delta DPS|$ Cut ($\Delta DPS|$ Incr) is the mean change in dividend per share conditional on ΔDPS less (greater) than zero. SOA is defined as in Table 2. The first column presents means for the sample as a whole. The next two columns present means conditional on a positive (negative) deviation from target dividend, where deviation is defined as: $dev_{i,t} = TPR_i * EPS_{i,t} - DPS_{i,t-1}$ and TPR_i is defined as the firm-median payout ratio. SOA conditional on positive and negative deviations are estimated as β_{pos} and β_{neg} from the following regression: $\Delta DPS_{it} = \alpha + \beta_{pos} * dev_{i,t} * I(dev_{i,t} > 0) + \beta_{pos} * dev_{i,t} * I(dev_{i,t} < 0) + \epsilon_{i,t}$.

	All	**Positive Deviation**	**Negative Deviation**	**Signif (Pos - Neg)**
Pr(Cut)	0.105	0.040	0.173	***
Pr(incr)	0.601	0.758	0.437	***
ΔDPS — Cut	-0.183	-0.113	-0.199	***
ΔDPS — Incr	0.093	0.106	0.069	***
ΔDPS	0.037	0.076	-0.004	***
SOA (mean)	0.144	0.170	0.096	***
SOA (median)	0.109	0.132	0.049	***

Table 8
Asymmetric Dividend Smoothing and Firm Characteristics: Univariate

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. *SOA - pos* and *SOA - neg* are defined as in Table 7. Other firm characteristics are defined as in Table 2. Median firm characteristics are calculated for each firm. Firms are then sorted into quintiles based on their median characteristic. For each quintile, means of the estimated *SOA - pos* and *SOA - neg* are reported. The column labeled *t(5-1)* reports the results of a t-test of equal means between the first and fifth quintiles. *** represents a significant difference at the 1% level, ** at the 5% level and * at the 10% level.

		Quintile						
Sort Variable	Measure	1	2	3	4	5	t(5-1)	
PayoutRatio	SOA-neg	0.114	0.111	0.109	0.073	0.083	-1.49	
	SOA-pos	0.250	0.191	0.162	0.164	0.110	-4.96	***
DivYield	SOA-neg	0.116	0.096	0.104	0.092	0.081	-1.78	*
	SOA-pos	0.220	0.190	0.186	0.149	0.121	-3.73	***
Size	SOA-neg	0.142	0.107	0.089	0.085	0.069	-3.87	***
	SOA-pos	0.216	0.170	0.165	0.154	0.151	-2.54	**
FirmAge	SOA-neg	0.135	0.108	0.114	0.079	0.075	-2.37	**
	SOA-pos	0.272	0.187	0.162	0.156	0.137	-4.56	***
M/B	SOA-neg	0.100	0.093	0.109	0.082	0.099	-0.05	
	SOA-pos	0.167	0.144	0.144	0.171	0.230	2.36	**
Lev	SOA-neg	0.137	0.101	0.081	0.079	0.092	-2.17	**
	SOA-pos	0.192	0.181	0.177	0.162	0.137	-2.23	**
Cash	SOA-neg	0.070	0.082	0.088	0.113	0.138	3.38	***
	SOA-pos	0.144	0.161	0.164	0.178	0.209	2.50	**
Tang	SOA-neg	0.116	0.105	0.088	0.105	0.070	-2.50	**
	SOA-pos	0.216	0.160	0.200	0.180	0.097	-5.20	***
sd(EBIT)	SOA-neg	0.046	0.076	0.083	0.122	0.159	6.17	***
	SOA-pos	0.123	0.149	0.162	0.191	0.225	4.04	***
RetVol	SOA-neg	0.067	0.069	0.087	0.122	0.159	4.59	***
	SOA-pos	0.128	0.156	0.156	0.203	0.228	3.79	***
InstHold	SOA-neg	0.155	0.095	0.079	0.102	0.067	-4.64	***
	SOA-pos	0.207	0.154	0.177	0.169	0.151	-2.20	**

Table 9
Firm Characteristics across Total Payout Smoothing Quintiles

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. *SOA*, *RelVol*, and median firm characteristics, all as defined in Table 2, are calculated for each firm, with dividends replaced by the sum of dividends and common share repurchases. Firms are then sorted into quintiles based on the estimated *SOA* (panel A) and *RelVol* (panel B). For each quintile, means of the firm-median characteristics are reported. The column labeled *t(5-1)* reports the results of a t-test of equal means between the first and fifth quintiles. *** represents a significant difference at the 1% level, ** at the 5% level and * at the 10% level.

Panel A: Speed of Adjustment

	SOA Quintile						
Characteristic	1	2	3	4	5	t(5-1)	
TotPayRatio	0.525	0.461	0.486	0.442	0.408	-5.33	***
DivYield	0.031	0.025	0.025	0.022	0.019	-7.40	***
FirmAge	25.88	26.82	27.24	24.70	23.92	-1.72	*
Size	6.505	6.572	6.679	6.360	6.160	-2.01	**
MA/BA	1.405	1.434	1.420	1.537	1.623	3.19	***
Leverage	0.262	0.239	0.237	0.225	0.221	-3.17	***
AssetTang	0.501	0.408	0.419	0.396	0.380	-5.67	***
sd(EBITDA)	0.043	0.045	0.044	0.045	0.049	2.13	**
Return vol.	0.081	0.085	0.086	0.086	0.091	3.93	***
InstHold	29.24	33.10	33.98	32.69	36.78	3.79	***
Turnover	0.557	0.558	0.562	0.547	0.613	1.41	
CashCow	0.127	0.086	0.114	0.095	0.066	-3.57	***

Panel B: Relative Volatility

	Rel. Vol. Quintile						
Characteristic	1	2	3	4	5	t(5-1)	
TotPayRatio	0.531	0.489	0.495	0.458	0.348	-9.67	***
DivYield	0.032	0.027	0.024	0.022	0.015	-12.0	***
FirmAge	26.80	26.39	27.90	25.59	23.12	-3.27	***
Size	6.455	6.646	6.679	6.483	6.087	-2.12	**
MA/BA	1.267	1.294	1.504	1.587	1.767	8.21	***
Leverage	0.266	0.252	0.229	0.229	0.196	-5.98	***
AssetTang	0.474	0.445	0.405	0.384	0.373	-5.05	***
sd(EBITDA)	0.045	0.046	0.044	0.046	0.045	-0.06	
Return vol.	0.083	0.086	0.083	0.087	0.091	3.75	***
InstHold	27.38	30.16	35.04	36.33	37.22	4.85	***
Turnover	0.525	0.554	0.559	0.595	0.598	2.06	**
CashCow	0.115	0.093	0.117	0.102	0.057	-3.79	***

Table 10

Total Payout Smoothing: Cross-sectional Regressions

The sample consists of firms on both Compustat and CRSP files with at least 10 years of total payout (dividends or repurchases) during the period 1985-2005, excluding financial firms. The dependent variable in columns 1 - 3 is the *SOA* and in columns 4 - 6 *RelVol*, both estimated as described in Table 2, with dividends replaced by the sum of dividends and common share repurchases. The independent variables are the median firm characteristics over the sample period. Firm characteristic variables are as defined in Table 2. t-statistics, based on White's heteroskedasticity-robust standard errors, are shown in italics.

Dep Var		SOA			Rel Vol	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.434	0.433	0.434	1.866	1.867	1.879
	52.02	*51.95*	*52.16*	*38.40*	*38.56*	*40.17*
Payout Ratio			-0.034			-0.616
			-3.11			*-9.97*
Age	-0.006	-0.013	-0.006	-0.080	-0.163	-0.042
	-0.61	*-1.25*	*-0.58*	*-1.54*	*-2.79*	*-0.75*
Size	-0.006	-0.005	-0.006	-0.096	-0.070	-0.087
	-0.57	*-0.37*	*-0.46*	*-1.77*	*-1.01*	*-1.32*
MA/BA	0.026	0.024	0.026	0.481	0.463	0.513
	2.41	*2.19*	*2.32*	*6.60*	*6.24*	*7.40*
Leverage	0.002	0.002	0.002	-0.050	-0.051	-0.057
	0.18	*0.16*	*0.15*	*-0.83*	*-0.85*	*-0.97*
Asset Tang	-0.032	-0.029	-0.026	-0.029	-0.002	0.037
	-3.14	*-2.83*	*-2.56*	*-0.49*	*-0.03*	*0.64*
Cash Cow	-0.006	-0.005	-0.002	-0.035	-0.028	0.035
	-0.65	*-0.57*	*-0.16*	*-0.72*	*-0.57*	*0.72*
sd(EBITDA)	-0.005	-0.004	-0.003			
	-0.41	*-0.31*	*-0.28*			
Return Vol	0.020	0.022	0.009	0.025	0.053	-0.189
	1.79	*1.88*	*0.71*	*0.37*	*0.72*	*-2.38*
Inst. Holding		0.0237	0.023		0.233	0.217
		2.63	*2.54*		*4.27*	*4.19*
Turnover		-0.0099	-0.009		-0.109	-0.092
		-0.83	*-0.78*		*-1.57*	*-1.42*
# Firms	1273	1268	1268	1273	1267	1267
R^2	0.04	0.04	0.05	0.09	0.10	0.18

Table 11
Decomposition of SOA

The sample consists of firms on both Compustat and CRSP files with at least 10 years of dividends during the period 1985-2005, excluding financial firms. *SOA* is defined as in Table 2. $\sigma(\Delta Pay)/\sigma(dev)$ is the ratio of the standard deviation of payout to the standard deviation of the deviation from target, where *dev* is defined as: $dev_{i,t} = TPR_i * EPS_{i,t} - DPS_{i,t-1}$ and TPR_i is defined as the firm-median payout ratio. $\rho(\Delta Pay, Earn)$ is the correlation between payout changes and contemporaneous earnings per share. $\sigma(D*)/\sigma(dev)$ is the ratio of the standard deviation of the target dividend to that of the deviation from target, where target dividend is defined as $TPR_i * EPS_{i,t}$. $\rho(\Delta Pay, Pay_{t-1})$ is the correlation between payout changes and one-year lagged payout. $\sigma(Pay_{t-1})/\sigma(dev)$ is the ratio of the standard deviation of one-year lagged payout to that of the deviation from target. All variables are measured at the firm level and cross-sectional medians are reported. In the column labeled *Dividends* (*Total Payout*) payout is defined as only dividends (dividends plus share repurchases).

	Dividends	**Total Payout**	**Signif (Div - TP)**
SOA	0.11	0.38	***
Components:			
$\sigma(\Delta Pay)/\sigma(dev)$	0.27	0.85	***
$\rho(\Delta Pay, Earn)$	0.40	0.16	***
$\sigma(D*)/\sigma(dev)$	0.98	0.78	***
$\rho(\Delta Pay, Pay_{t-1})$	-0.16	-0.49	***
$\sigma(Pay_{t-1})/\sigma(dev)$	0.61	0.82	***