**Title:** How do good, bad, and systemic bond downgrades affect dividend policy?

**Keywords:** Dividend Policy, Dividend Smoothing, Cost of Debt, Credit Ratings

**JEL Classifications:** G24, G32, G35

**Authors:**

- **Konstantinos Kakouris,** PhD candidate, Department of Industrial Management and Technology, University of Piraeus, 80 M. Karaoli & A. Dimitriou Str., Piraeus GR 185 34, Greece. kkakouris@unipi.gr
- **Evangelos Charalambakis,** Researcher, Economic Analysis and Research Department, Bank of Greece, 21 E. Venizelos Av., Athens GR 102 50, Greece. echaralambakis@bankofgreece.gr
- **Dimitrios Psychoyios, Corresponding author,** Department of Industrial Management and Technology, University of Piraeus, 80 M. Karaoli & A. Dimitriou Str., Piraeus GR 185 34, Greece. dpsycho@unipi.gr

**How do good, bad, and systemic bond downgrades affect dividend policy?**

## Abstract

We analyze a sample of US firms that consistently paid dividends from 1995 to 2016 to examine the impact of corporate credit rating changes on dividend smoothing behavior. Focusing on the type of news a credit rating change might convey to the capital market, we classify bond downgrades into bad, good, and systemic, and document an asymmetric effect of bond downgrades on dividend smoothing. Bad downgrades are negatively associated with dividend smoothing, whereas good downgrades are positively associated with dividend smoothing. In addition, systemic downgrades associated with exogenous events have a negative impact on dividend smoothing. Likewise, we find that bond upgrades related to outstanding financial performance have a negative impact on dividend smoothing, whereas bond upgrades

attributed to successful acquisitions, leverage decreases, or exogenous events have no impact on dividend smoothing. We conclude that the reason behind a bond rating change is crucial when a firm determines its dividend smoothing policy.

# Table of Contents

# Tables

## 1. Introduction

Announcements of Credit Rating Agencies (CRAs) influence manager's payout decisions when corporate ratings alter. Khieu and Pyles (2016) support that downgraded firms reduce dividend payments while upgraded firms do not change dividends. Asimakopoulos et al. (2021) find an asymmetric effect of credit rating change on dividend smoothing. Aivazian et al. (2006) show that managers take the type of debt into account when making dividend policy decisions and conclude that rated firms prefer "sticky" dividend payments than non – rated firms. Moreover, Brav et al. (2005) mention that managers are willing to cut dividends to reduce the possibility of a rating downgrade and Grullon et al. (2002) notice that credit ratings change around dividend change. However, previous studies on dividend smoothing ignore the announcement of a bond rating change, which clearly elaborates the reason that underlines this change.

Focusing on the announcements of credit rating changes, this paper fills in this gap in the literature by examining in depth the effect of credit rating changes on dividend

smoothing decisions taking into consideration the information that each type of bond rating change might convey. In particular, we show whether and how good, bad and systemic bond downgrades significantly impact on manager's dividend smoothing decisions. Despite the prevalence and importance of dividend smoothing, little is known about the interaction between credit ratings and dividend smoothing. To the best of our knowledge, this is the first paper to reveal the role of the bond rating change announcement in understanding the interaction between a credit rating change and dividend smoothing.

A credit rating change is an event filled with information for the downgraded or upgraded firm as it captures firms' new economic conditions and conveys unavailable information to public (Dichev & Piotroski, 2001; Kisgen, 2006). Following Goh and Ederington (1993) our empirical analysis is based on the assumption that not all bond downgrades signal bad news for the market. We argue that the decomposition of bond downgrades into "bad," "good," and "systemic," and bond upgrades into three types is necessary because bond rating downgrades and upgrades can signal different information to investors.

Holthausen and Leftwich (1986) find that the CRAs convey information to capital markets and they notice that not all downgrades influence abnormal stock returns symmetrically. Goh and Ederington (1993) support that not all downgrades convey bad news to stockholders. They notice that downgrades because of wealth transfer from bondholders to shareholders delivers good news to capital markets and conclude that downgrades as well as upgrades can not be treated as homogeneous groups. Similar studies support that there is an announcement effect for credit rating downgrades and CRAs' announcement impact on bond and stock market (Hand et al., 1992; Wansley

et al, 1992; Hite & Warga, 1997; Goh & Ederington, 1999; Norden & Weber, 2004; Finnerty et al, 2013).

We classify downgrades in bond ratings that are associated with either a firm's deteriorating earnings or a firm's sales decline as "bad," because they convey bad news to stockholders, bondholders, and potential investors. Bond rating downgrades characterized as "good" are related to a wealth transfer from bondholders to stockholders, such as debt-financed acquisitions or other profitable investments. Finally, bond downgrades are considered "systemic" if the latter occurs because of exogenous circumstances, such as politics, economic environment, or terrorist attack.

We then separate bond upgrades into three categories based on their information content. First, bond upgrades linked to strong and excellent financial performance. We hypothesize that managers may feel confident in a firm's performance and do not need to continue dividend smoothing to signal a positive message to investors through the firm's payouts. Second, bond upgrades related to successful acquisitions or deleveraging; and third, systemic bond upgrades that occur owing to exogenous factors, such as improved industry conditions or global economic environment.

Our analysis provides novel evidence that the information embedded in a bond rating change significantly matters when a firm decides to follow a dividend smoothing policy. The results confirm our hypotheses. We find heterogeneous effects of bond rating downgrades on dividend smoothing. In particular, while bad downgrades are negatively associated with dividend smoothing good downgrades have a strong and positive impact on dividend smoothing. We also show that firms smooth less when bond downgrades are systemic, i.e., caused by exogenous events.

With respect to bond upgrades, we find that firms smooth less if their bond rating is upgraded because of strong and high financial performance, consistent with our

hypothesis. Additionally, our findings suggest that there is no association between bond upgrades that refer to successful acquisitions or leverage decreases and dividend smoothing. Finally, we find no evidence on the impact of systemic bond upgrades on dividend smoothing.

The remainder of this paper is organized as follows. In Section 2, we review the literature on dividend smoothing and we develop our hypotheses. In sections 3 and 4, we present the data and methodology, respectively. In section 5 and 6, we illustrate our results and in section 7, we conclude.

## 2. Related Literature and Hypotheses Testing

### *2.1. Related literature*

There is no direct reason why firms pay dividends or why some firms prefer "sticky" dividend payments. Allen and Michaely (2003) notice that dividends only fell twice over the period of 1972 – 1998, compared to earnings, which they fell 5 times in the same period. Brockman et al. (2022) notice that investors, value dividend smoothing firms more than non-smoothing firms.

Lintner (1956) develops a partial adjustment model where firms partially change dividend payments to achieve their target. Dividend smoothing is a corollary of these payout policy adjustments. He introduces the speed of dividend adjustment to measure the rate of dividend smoothing, where a higher rate reflects lower dividend smoothing and vice versa.

Since Lintner's (1956) seminal paper, dividend smoothing in corporate finance has been widely documented. Similar to Lintner, Fama and Babiak (1968) suggest that firms prefer to follow a dividend smoothing approach. Gombola and Liu (1993) report that managers tend to follow a dividend smoothing approach because they believe that dividend stability reflects cash flow stability. The dividend smoothing phenomenon

seems to be valid across recent years. Brav et al. (2005), characterize dividends as "conservative", and Hoang and Hoxha (2016) document that debt absorbs shocks to smooth a firm's payouts. Several studies suggest that managers intend to provide shareholders with a stable stream of predictable dividends and are willing to raise external capital or forego investment opportunities and positive NPV projects to avoid cutting dividends (see, for example, Lintner, 1956; Fama & Babiak, 1968; Allen & Michaely, 2003; Brav et al., 2005; Hoang & Hoxha, 2016; and Balli et al., 2022).

Recent studies indicate that the speed of adjustment is declining year over year (see, for example, Leary & Michaely, 2011; and Andres & Hofbaur, 2017). Andres and Hofbaur (2017) argue that firms adopt steady quarterly payments to stockholders, and show that the board of directors makes payout decisions every year for the next four quarters. Their findings suggest that this may be the reason for dividend smoothing increases over time.

Another literature strand focuses on theoretical models based on market frictions, such as agency costs and information asymmetry, to explain firms' preference for dividend smoothing (see, Bhattacharya, 1979; Easterbrook, 1984; Miller & Rock, 1985; Fudenberg & Tirole, 1995; Brav et al., 2005)(Bhattacharya, 1979; Brav et al., 2005; Easterbrook, 1984; Fudenberg & Tirole, 1995; Miller & Rock, 1985). Chemmanur et al. (2010) find support for both information asymmetry and agency models. Leary and Michaely's (2011) empirical study shows that, while information asymmetry proxies are inversely related to dividend smoothing, agency conflicts force firms to smooth their dividends more. Javakhadze et al. (2014) also provide evidence that asymmetric information and agency problems are associated with dividend payout policy.

Similarly, empirical studies shed light on dividend smoothing, analyzing quantitative proxies for the information asymmetry theory, agency theory and absorbing mechanisms of financial shocks (Leary & Michaely, 2011; Lambrecht & Myers, 2012; Javakhadze et al., 2014; Brockman et al., 2022). However, information asymmetry and agency proxies, such as firm size, age, tangibility, or growth opportunities, do not directly capture the impact of credit ratings on dividend policy (Chemmanur et al., 2010).

A group of papers has examined the interaction between debt and dividend policy. Graham and Harvey (2001) and Kisgen (2006) assert that credit rating changes impact capital structure. Kisgen (2006) show that Chief Financial Officers are concerned about credit rating changes adjusting capital structure around a corporate debt rating change. In effect, corporate financial or investment decisions are affected by credit rating changes. In addition, Khieu and Pyles (2012) argue that bond ratings play a significant role in managers' financing decisions, because bond ratings significantly affect a firm's external financing costs. The authors show that upgraded firms increase their capital expenditures and downgraded firms reduce both dividends and capital expenditures. Aivazian et al. (2006) find that the type of debt (private or public) influences payout decisions, and show that rated firms, smooth dividends more than non-rated firms. Asimakopoulos et al. (2021) findings suggest that credit rating changes have an asymmetric impact on dividend smoothing. In particular, using Moody's and Fitch rating data, they find that dividend smoothing marginally increases under a credit rating upgrade. However, using Standard and Poor's data, the positive impact on dividend smoothing under a credit rating upgrade is not significant. Additionally, using Standard and Poor's data, they estimate a significant negative impact on dividend smoothing under a credit rating downgrade. Our paper differentiates with the study of

Asimakopoulos et al. (2021) by focusing on the reason that lies behind a bond rating downgrade or upgrade embedded in its announcement building on the work of Goh and Ederington (1993). In particular, we formulate our hypotheses on the association between a bond rating change and dividend smoothing given that a bond rating downgrade or upgrade can convey a different signal to investors.

### *2.2. Hypotheses testing*

We formulate our hypotheses focusing on the information disclosed in the credit rating announcement of a credit rating change. Goh and Ederington (1993), among others, provide evidence that not all credit rating downgrades convey the same information to the market. Based on this evidence, we argue that the impact of bond rating downgrades on dividend smoothing is not the same across all bond downgrades on the grounds that bond downgrades convey different signals to the investors.

A credit rating downgrade can be associated with deteriorating financial prospects reflected in its sales or earnings conveying a negative signal to stockholders and bondholders. Many studies document a negative stock and bond market reaction to bond downgrades; see, for example, Holthausen and Leftwich (1986), Wansley and Clauretie (1984), Hand, Holthausen and Leftwich (1992), Matolksy and Lianto (1995), Hite and Warga (1997), Norden and Weber (2004), Gande and Parsley (2005), Behr and Güttler (2008), Bannier and Hirsch (2010), Jorion and Zhang, (2010) and Chung et al. (2012). Ederington and Goh (1998) find that both actual earnings and forecasts of future earnings tend to decline following bond rating downgrades. Goh and Ederington (1999) find that market reacts differently for downgrades on investment and non-investment grade. They also show that markets reaction is stronger to rating downgrades from investment grade to non-investment grade. In addition, Jagannathan et al. (2000) document that, even if managers are reluctant to change dividend policies

and cut dividends, a very weak financial and operating performance forces them to reduce dividend smoothing. Considering these findings, we develop the first hypothesis.

*H1: Bad credit rating downgrades negatively affect dividend smoothing.*

Goh and Ederington (1993) document that credit rating downgrades can convey good news to the capital market, because they can increase a firm's value through a wealth transfer from bondholders to shareholders. In particular, they argue that if a rating agency anticipates an increase in leverage this will shift wealth from bondholders to stockholders. This will cause bond prices to fall and equity prices to rise. Holthausen and Leftwich (1986) find that a downgrade within rating classes does not result in negative market reactions

[1]. Maxwell and Stephens (2003) and Maxwell and Rao (2003) show that downgrades can result from large stock buyback programs and spin offs. These corporate decisions have negative implications for bondholders, but do not imply the same for stockholders. Spin offs and stock repurchases transfer wealth from bondholders to stockholders; hence, the market reacts positively under the wealth transfer hypothesis (Handjinicolaou & Kalay, 1984; Maxwell & Rao, 2003; Maxwell & Stephens, 2003). In addition, Harford et al. (2009) report that a leverage increase could underlie a credit rating downgrade, because acquisitions are mainly funded with debt. However, following a large merger, firms immediately attempt to reduce the excess debt.

In addition, dividend payments convey information about a firm's permanent earnings (Handjinicolaou & Kalay, 1984; Guay & Harford, 2000; Ham et al., 2020). Consequently, firms endeavor to absorb negative or positive shocks through debt and investment policies to smooth payouts (see, Hoang & Hoxha, 2016).

Brav et al. (2005) document that a dividend cut discourages investors, but a dividend increase may not be sustainable in the future. Dewenter and Warther (1998) report that managers are not eager to decrease or increase dividends because dividend cuts are costly for the firm, and dividend increases may not last long term. Thus, we expect that, following a good credit rating downgrade, managers would follow a dividend smoothing policy to signal that the firm remains solvent, and its value will increase regardless of a debt-financed acquisition or other investment strategy. Thus, our second hypothesis:

*H2: Good credit rating downgrades positively affect dividend smoothing.*

Exogenous components, such as economic environment and industry conditions, are not directly related to a firm's financial performance (Blanchard et al., 1994; Lamont, 1997; Campello et al., 2010). However, a firm's exterior environment plays a significant role in a credit rating agency's decision to change a bond's credit rating. A deteriorated external environment may constrain a firm from issuing more debt owing to anticipated financial difficulties resulting from broad economic conditions (Ahmed et al., 2014). Campello et al. (2010) find that constrained and unconstrained firms decline dividend pay outs during economic recessions. Based on these findings, we develop our third hypothesis:

*H3: Systemic credit rating downgrades negatively affect dividend smoothing.*

Announcements of a positive change in credit ratings suggest that upgrades are generally associated with excellent financial and operating performance, strong earnings, and successful acquisitions. Under these circumstances, firms may reduce dividend smoothing because there is no need for the firm to convey information to its stockholders and bondholders as this is already embedded in the price of its stock.

Previous studies show that dividend smoothing is negatively related to profitability; see, for example, Javakhadze et al. (2014). Leary and Michaely (2011) find that firms tend to follow a reduced dividend smoothing policy in response to positive earnings. In addition, in the case of a bond upgrade the firm is less risky. There is evidence that high-risk firms exhibit dividend smoothing behavior (Kumar & Lee, 2001). Moreover, the probability of default declines when there is a bond upgrade. Given that the decline in the default risk is attributed to the increase in firm's value, then both bond and equity prices will increase. As a result, there would be no agency conflicts between stockholders and bondholders as both of them would gain from the bond upgrade. Leary and Michaely (2011) document that firms that are subject to agency conflicts smooth dividends more. Finally, while managers are reluctant to cut or increase dividends in response to current or future negative market reactions (Brav et al., 2005; Hoang & Hoxha, 2016), Larkin et al. (2017) report that a volatile dividend policy with a number of changes over the years does not cause negative market reactions. They find that only the first dividend reduction has a negative effect on the market. Thus, our fourth hypothesis.

*H4: Any type of credit rating upgrade negatively affects dividend smoothing.*

## 3. Data

We collect annual financial data for the US firms from COMPUSTAT and quarterly dividend data from CRSP. We focus on quarterly dividends because most US firms pay dividends on a quarterly basis.[2] We limit our sample period to between 1995 and 2016, because credit rating change announcements are available from 1995 forward on S&P Global Ratings. We choose annual data for firm characteristics and aggregated quarterly dividends into annual, as suggested in the literature on dividend smoothing (see for example, Li & Zhao, 2008; Leary & Michaely, 2011; and Fliers, 2019).

The CRSP database also provides a distribution code that identities every paid dividend. Thus, we only collect cash dividends with distribution code 1232, for data cohesion. Collecting cash dividends with distribution code 1232 minimizes the possibility of including other types of dividends, which may have biased our results because of outliers. To manage possible outliers, we winsorize all firm-specific variables, including dividends, at the first and ninety-ninth percentiles.

Previous dividend smoothing studies restrict their sample to firms with positive and consecutive dividend payments. Fernau and Hirsch (2019) show that previous studies use different time spans for dividend payments, ranging from 3 to 122 years, with an average of more than 20 years. We limit our study sample to firms that pay a dividend within at least 20 years because we need to analyze the dividend smoothing behavior under heterogeneous credit rating changes. There is likely a sufficiently long period for investigating dividend smoothing, since there is a lower possibility of considering non-smoothing firms (Copeland, 1968; Omar & Rizuan, 2014).

**Table 1:** Number of credit rating events.

| | S&P's explanation | Number of Events |
|---|---|---|
| Total Downgrades | | 317 |
| Bad | Weak operating performance, deterioration in earnings & cash flows etc. | 88 |
| Good | Debt – financed expansion, change in firm's leverage, transfer wealth from bondholders to stockholders etc. | 129 |
| Systemic | terrorist attacks, external economic environment etc. | 69 |
| The rest | No reason, no announcement, more than one reason | 31 |
| Total Upgrades | | 180 |
| Type 1 | Strong operating performance, amelioration in earnings, cash flows etc. | 104 |
| Type 2 | Successful acquisitions, Debt – financed expansion, change in firm's leverage, transfer wealth from bondholders to stockholders etc. | 26 |
| Type 3 | external economic environment, etc. | 17 |
| The rest | No reason, no announcement, more than one reason | 33 |

**Notes:** The table illustrates reasons underlying credit rating changes provided by S&P's along with the number of such events in our sample from 1995-2016.

We choose Standard & Poor's rated firms. Following previous studies, we also exclude utilities (SIC codes 4900–4999) and financial industries (SIC codes 6000–

6999) (Chemmanur et al., 2010; Khieu & Pyles, 2016; Fliers, 2019; Asimakopoulos et al., 2021)(Asimakopoulos et al., 2021; Fliers, 2019). Our final sample comprises 139 US firms and 3,038 firm-year observations from 1995 to 2016.

We search S&P's announcements for key words to classify downgrades and upgrades into three types, with each type separated into two subsets. Up1 (Type 1 upgrade) and Down1 (bad downgrade) represent the Type 1 credit rating change subsets; Up2 (Type 2 upgrade) and Down2 (good downgrade) represent the Type 2 credit rating change subsets; Up3 (Type 3 upgrade) and Down3 (systemic downgrade) represent the credit rating change Type 3 subsets; and Up4 and Down4 represent the remaining credit rating changes subsets.

The key words for Type 1 credit rating upgrades are "improvement in financial performance" or "strong profitability"; the key words for credit rating downgrades classified as bad are "poorer financial performance" or "weak profitability." From a stockholder's perspective, a downgrade because of deteriorating earnings or performance signals bad news. Decreased leverage and successful acquisitions are the key reasons for credit rating upgrades classified as Type 2, while increased leverage and debt-financed acquisitions are the key reasons for credit rating downgrades classified as good. A downgrade resulting from acquisitions or mergers is bad news for bondholders, but not for stockholders because firms transfer wealth from bondholders to stockholders; thus, this type of downgrade is characterized as a good sign for stockholders. Industry conditions, politics, economic environment, or terrorist attacks are the main key words for both downgrades and upgrades classified as systemic and Type 3, respectively. All other downgrades and upgrades either do not have announcements or the reason is not clear. We end up with 497 rating changes between 1995 and 2016 — 317 credit rating downgrades and 180 upgrades. We can not

categorize 64 rating changes because of missing announcements or other reasons. There are 31 unclassified credit rating downgrades and 33 unclassified upgrades, which are excluded from the empirical analysis; see, Table 1.

## 4. Methodology

### *4.1. Lintner model*

First, we test the existence of dividend smoothing behavior using Lintner's (Lintner, 1956) model, shown in Equation (1).

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + e \quad (1)$$

$DPS_{i,t}$ is the annual dividend per share of firm i at time t, $DPS_{i,t-1}$ is the annual dividend per share of firm i at time t – 1, and $EPS_{i,t}$ is the annual earnings per share of firm i at time t. We calculate dividend speed of adjustment (SOA), which is the inverse metric of dividend smoothing, as $1 - a_1$. In other words, as SOA increases, dividend smoothing decreases.

### *4.2. Lintner model with credit rating change*

To address the impact of credit rating changes on dividend smoothing, we follow an empirical design with two parts. First, we test the impact of credit rating downgrades and upgrades on dividend smoothing as:

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

$Down_{i,t}$ and $Up_{i,t}$ are dummy variables of firm i at time t, equal to 1 in case of a downgrade or an upgrade, respectively. SOA is calculated as $1 - (a_1 + b_1)$ under a credit rating downgrade and $1 - (a_1 + b_2)$ under a credit rating upgrade.

Second, all downgrades and all upgrades are not the same. Goh and Ederington (1993) report that credit rating downgrades/upgrades should not be considered homogeneous. They classify downgrades into two main groups based on Moody's

announcements and the same for upgrades. Building on their work, we split downgrades into three main groups and did the same for upgrades. We add another group to distinguish components that are not directly related to a firm's performance or decision making, such as external global economic environment. This results in eight different types of credit rating changes; six main types and two minor types. To examine the dividend smoothing behavior for each type, we construct two equations. We use Equation (3) to estimate dividend smoothing behavior for the downgrade subgroups and Equation (4) to estimate dividend smoothing behavior for the upgrade subgroups.

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + e \quad (3)$$

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4)$$

$Down1_{i,t}$, $Down2_{i,t}$, $Down3_{i,t}$ and $Down4_{i,t}$ are dummy variables of firm i at time t, equal to 1 in case of a downgrade resulting from bad news, good news, systemic reasons, or miscellaneous/no reason, respectively. $Up1_{i,t}$, $Up2_{i,t}$, $Up3_{i,t}$ and $Up4_{i,t}$ are dummy variables of firm i at time t, equal to 1 in case of an upgrade resulting from a firm's excellent performance, leverage change, systemic reasons, or miscellaneous/no reason, respectively.

The SOA under any type of downgrade was calculated by $1 - (a_1 + b_j)$ using Equation (**3**), where j = 1, 2, 3, 4, depending on whether there is a bad downgrade, good downgrade, systemic downgrade, or other downgrade, respectively. The same formula

is used for upgrades where the coefficients are generated by Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (\mathbf{4}).$$

We further extend the Lintner model by introducing earnings per share as an interaction term to examine a firm's behavior under current operations. Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (\mathbf{2}),$$

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e$$

(3) and (**4**) are converted into:

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e \quad (5)$$

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (6)$$

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e \quad (7)$$

We use earnings per share as an interaction term to measure how dividends react to current earnings under any type of credit rating change. For instance, the reaction of dividends in current earnings is given by $a_2 + c_1$ under a bad downgrade (Down1) from Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (\mathbf{6}).$$

SOA is calculated as in Equations (2), (3), and

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4).$$

## 5. Empirical Results

### *5.1. Lintner model*

Table 2 displays the results from the classical Lintner model using eight different econometric techniques. The results from the Lintner model in its simplest form are shown in the first column. We estimate a very small SOA equal to 0.079 (1 – 0.921). There is also a very high persistence between current and lagged dividend payments, with the coefficient on lagged dividends per share equal to 0.92. In the next three columns, we estimate SOA considering industry fixed effects, year fixed effects, and both industry and year fixed effects. The results presented in the second, third, and fourth column are similar to the simplest empirical specification in Column 1. SOA ranged from 0.080 to 0.091. Next, we estimate dividend smoothing accounting for firm fixed effects and firm-year fixed effects. SOA ranged from 0.146 to 0.205. While SOA is in line with that documented in previous studies, we still do not consider possible autocorrelation issues.[3] Therefore, we address this limitation and estimate dividend smoothing while controlling for autocorrelation. The results are displayed in Column 7; SOA is 0.210. The last column uses the econometric technique of feasible generalized least squares. Since the results are unaltered, we use fixed effects with autocorrelated errors in the remaining empirical analysis.

**Table 2:** Different econometric techniques for the Lintner model.

| | basic | ind. fe | year fe | ind. & year fe | firm fe | firm & year fe | firm fe & AR | FGLS |
|---|---|---|---|---|---|---|---|---|
| $DPS_{t-1}$ | 0.921*** | 0.920*** | 0.911*** | 0.909*** | 0.854*** | 0.795*** | 0.790*** | 0.790*** |
| | (125.45) | (123.52) | (120.78) | (118.66) | (79.52) | (66.38) | (19.93) | (65.73) |
| $EPS_t$ | 0.0371*** | 0.0373*** | 0.0349*** | 0.0350*** | 0.0406*** | 0.0369*** | 0.0413*** | 0.0413*** |
| | (16.42) | (16.41) | (15.50) | (15.50) | (15.82) | (14.53) | (10.19) | (15.17) |
| Constant | 0.00317 | 0.00370 | 0.0192** | 0.0201** | 0.0585*** | 0.125*** | 0.143* | 0.143** |
| | (0.37) | (0.43) | (2.23) | (2.31) | (5.04) | (9.83) | (1.85) | (2.19) |
| Obs. | 3024 | 3024 | 3024 | 3024 | 3024 | 3024 | 3024 | 3024 |

**Notes:** The table reports the results of Equation (1) with different econometric techniques. The first column is the basic model; we use fixed effects models from Columns 2 to 6; we correct for autocorrelated errors in Column 7 using fixed effects with autocorrelated errors to solve possible econometric problems; we test Equation (1) using feasible generalized least squares in Column 8. $DPS_{t-1}$ is the annual lagged dividend per share and $EPS_t$ is the annual earnings per share. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

## *5.2. Lintner model with credit rating downgrade and upgrade*

Table 3 illustrates the results of Equations

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

and

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i.t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e$$

(**5**). We estimate the dividend smoothing behavior under a credit rating downgrade and upgrade and find that both downgrades and upgrades negatively affect dividend smoothing behavior, although the impact of a downgrade on dividend smoothing was not statistically significant. Our negative upgrade coefficient (-0.137) is negative and statistically significant at the 1% level, implying a strong negative impact on dividend smoothing under an upgraded event. The SOA is 0.330 (1 – (0.807 – 0.137)), indicating less dividend smoothing under a credit rating upgrade. The outcome of Column 2 in Table 3 supports these results, although the estimated coefficients' magnitudes are greater compared to Column 1, suggesting that the impact of a credit rating upgrade on dividend smoothing is even larger than that shown in Column 1. In Column 2, the SOA is 0.422 and the earnings coefficient of interaction

term was positive and statistically significant at the 1% level under a credit rating upgrade (0.0352). The significant positive earnings coefficient indicates that firms prefer to adjust dividends much more quickly in response to increased earnings (0.0739, from 0.0387 + 0.0352). This is in line with the evidence on less dividend smoothing for bond upgrades.

**Table 3:** Lintner model with downgrades and upgrades.

| Equations | (2) | (5) |
|---|---|---|
| $DPS_{t-1}$ | 0.807*** | 0.817*** |
| | (20.82) | (20.96) |
| $Downgrade_t * DPS_{t-1}$ | -0.0178 | -0.0178 |
| | (-1.20) | (-0.89) |
| $Upgrade_t * DPS_{t-1}$ | -0.137*** | -0.239*** |
| | (-4.96) | (-5.06) |
| $Downgrade_t * EPS_t$ | | -0.00163 |
| | | (-0.19) |
| $Upgrade_t * EPS_t$ | | 0.0352*** |
| | | (3.19) |
| $EPS_t$ | 0.0420*** | 0.0387*** |
| | (10.33) | (8.59) |
| Constant | 0.126* | 0.122 |
| | (1.65) | (1.59) |
| Obs. | 3024 | 3024 |

**Notes:** We calculate the impact of credit rating change on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

in the first column and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i.t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e \quad (5)$$

in the second column. We use the econometric technique of fixed effects with autocorrelated errors. "$Downgrade_t$" and "$Upgrade_t$" are dummy variables equal to 1 in case of downgrade and upgrade, respectively. $DPS_{t-1}$ is the annual lagged dividend per share, and $EPS_t$ is the annual earnings per share. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

These results are not surprising. Even if firms convey information about their future prospects for permanent earnings through dividends (Ham et al., 2020), managers of upgraded firms have greater growth opportunities than those of downgraded firms. Thus, these firms may prefer to hold cash and reduce dividend smoothing for possible future investment opportunities (Khieu & Pyles, 2016). We find empirical support for this argument. In particular, in Table 4, the upgraded firms are more profitable with

higher growth opportunities. Moreover, the financial status of an upgraded firm is reflected on Altman's Z-score mean value, which is equal to 4.188. This indicates a solid financial performance, and the possibility of bankruptcy seems unlikely. Hence, it seems that excellent operating performance and increasing earnings outweigh dividend policy instability, which is consistent with Kumar and Lee's (2001) study showing that a dividend smoothing policy is more pronounced for high-risk firms. We also find that upgraded firms are younger with a lower payout ratio, lower leverage, and higher liquidity than downgraded firms. In summary, firms reduce dividend smoothing levels under a credit rating upgrade and adjust their dividend more quickly to increased earnings.

**Table 4:** T – test for difference in means (downgrade – upgrade).

| | Downgrade | Upgrade | Difference |
|---|---|---|---|
| Size | 22.744 | 22.707 | -0.037 |
| Age | 45.779 | 43.311 | -2.468* |
| Asset Tangibility | 0.319 | 0.325 | 0.006 |
| Earnings Volatility | 0.041 | 0.043 | 0.003 |
| Cash to Total Assets | 0.059 | 0.071 | 0.012** |
| Market-to-Book Ratio | 1.593 | 1.950 | 0.357*** |
| Payout Ratio | 0.674 | 0.339 | -0.336*** |
| Free Cash Flow | 0.082 | 0.112 | 0.030*** |
| Profitability | 0.130 | 0.174 | 0.044*** |
| Dividend Yield | 0.029 | 0.015 | -0.014*** |
| Leverage | 0.318 | 0.242 | -0.077*** |
| Retained Earnings | 0.340 | 0.333 | -0.007 |
| Liability | 0.261 | 0.260 | -0.001 |
| Liquidity | 0.374 | 0.405 | 0.031* |
| Financial Deficit | 0.053 | 0.040 | -0.012 |
| Altman's Z – Score | 3.051 | 4.188 | 1.137*** |

**Notes:** We perform a t-test for difference in means of firm-specific characteristics for upgraded and downgraded firms. The firm-specific variables are defined in Appendix A. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

### *5.3. Lintner model with types of credit rating downgrades*

We illustrate how different types of credit rating downgrades impact on dividend smoothing. The results from Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + e \quad (3)$$

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e$$

and (**6**) are presented in Table 5. The estimation in Column 2 of Table 5 presents the same model as Column 1, including the interaction term of earnings per share. In line with our hypotheses, not all downgrades have the same impact on dividend smoothing. From an investor's perspective, the first two types—Down1 (bad downgrade) and Down2 (good downgrade)—include bad news and good news, respectively. The third group (Down3) involves systemic downgrades related to external factors, and the fourth (Down4) includes all remaining downgrade types. Table 5 reports the results for dividend smoothing behavior following any type of credit rating downgrade. The lagged dividends' coefficients are significantly negative under bad news (-0.0612) and systemic (-0.0737) downgrades, and positive (0.0401) under good news downgrades. In other words, while firms smooth their dividends less under bad news and systemic downgrades, they smooth dividends more under good news downgrades. The SOAs of bad and systemic credit rating downgrades are 0.2682 and 0.2807, respectively. Likewise, SOA is 0.1669 under good downgrades, indicating that firms prefer dividend smoothing and have a tendency to increase it. Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + e$$

(3)shows that the absolute increase of dividend smoothing under a good credit rating downgrade is smaller than the absolute decrease of dividend smoothing under the other two types of credit rating downgrades. Thus, a credit rating downgrade resulting from bad implications for stockholders and systemic reasons has a stronger impact on managers' decisions about their dividend smoothing policies. These results

are consistent with our first three hypotheses, that the impact of credit rating downgrades on dividend smoothing is asymmetric.

We also confirm the asymmetric impact using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (\mathbf{6})$$

in Column 2 of Table 5, where we include the earnings per share as an interaction term. We document that the impact on dividend smoothing of a good credit rating downgrade is even greater; the coefficient of the lagged dividend is 0.119. We also show that the coefficient of earnings per share as an interaction term under a good credit rating downgrade is significantly negative at the 1% level of significance. This indicates that firms adjust their dividend payments more slowly in response to increased earnings (0.0037), verifying increased dividend smoothing.

**Table 5:** Augmented Lintner model – downgrades.

| Equations | (3) | (6) |
|---|---|---|
| $DPS_{t-1}$ | 0.793*** | 0.791*** |
| | (19.73) | (19.76) |
| $Down1_t * DPS_{t-1}$ | -0.0612** | -0.0459* |
| | (-2.53) | (-1.72) |
| $Down2_t * DPS_{t-1}$ | 0.0401* | 0.119*** |
| | (1.75) | (3.19) |
| $Down3_t * DPS_{t-1}$ | -0.0737** | -0.0752** |
| | (-2.29) | (-2.19) |
| $Down4_t * DPS_{t-1}$ | -0.00618 | 0.0127 |
| | (-0.20) | (0.37) |
| $Down1_t * EPS_t$ | | -0.0156 |
| | | (-1.10) |
| $Down2_t * EPS_t$ | | -0.0374*** |
| | | (-2.96) |
| $Down3_t * EPS_t$ | | 0.0104 |
| | | (0.51) |
| $Down4_t * EPS_t$ | | -0.0144 |
| | | (-0.94) |
| $EPS_t$ | 0.0393*** | 0.0411*** |
| | (9.53) | (9.40) |
| Constant | 0.139* | 0.136* |
| | (1.78) | (1.75) |
| Obs. | 3024 | 3024 |

**Notes:** We calculate the impact of credit rating downgrades on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + e \quad (3)$$

in the first column and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (6)$$

in the second column. We use the econometric technique of fixed effects with autocorrelated errors. "$Down1_t$", "$Down2_t$", "$Down3_t$" and "$Down4_t$" are dummy variables equal to 1 in case of bad, good, systemic and other credit rating downgrades, respectively. $DPS_{t-1}$ is the annual lagged dividend per share and $EPS_t$ is the annual earnings per share. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

Khieu and Pyles (2016) and Asimakopoulos et al. (2021) find that a credit rating downgrade negatively affects dividend payments and dividend smoothing, respectively. However, similar to Goh and Ederington (1993) our results imply that not all downgrades have negative effect; the negative impact on dividend smoothing results

from bad and systemic downgrades. Managers are not comfortable with an inflexible dividend policy, and prefer to discontinue the dividend smoothing behavior. Regarding systemic downgrades, we provide evidence that managers are also concerned about the exterior economic environment or legal and political issues, which do not directly affect a firm's financial performance. Under these circumstances, managers favor a flexible dividend policy, avoiding any sudden and mandatory dividend cut in the future that will be detrimental to the firm's image (Allen & Michaely, 2003; Brav et al., 2005; Larkin et al., 2017).

Asymmetry is verified when comparing firm characteristics under different types of downgrade. As expected, the financial deficit, as determined by Chang & Dasgupta (2009), has the maximum mean value under a good credit rating downgrade compared to other types of rating change (Table 6). This shows that "good" downgraded firms focus on investments and growth strategies.

**Table 6:** T-test for difference in means.

| Panel A: Bad and Good Downgrades | Bad | Good | Difference |
|---|---|---|---|
| Size | 22.498 | 22.897 | 0.399** |
| Age | 47.091 | 44.504 | -2.587 |
| Asset Tangibility | 0.313 | 0.329 | 0.016 |
| Earnings Volatility | 0.040 | 0.039 | -0.001 |
| Cash to Total Assets | 0.060 | 0.048 | -0.012 |
| Market-to-Book Ratio | 1.422 | 1.796 | 0.373*** |
| Payout Ratio | 0.853 | 0.522 | -0.331*** |
| Free Cash Flow | 0.073 | 0.099 | 0.025*** |
| Profitability | 0.122 | 0.150 | 0.028*** |
| Dividend Yield | 0.032 | 0.024 | -0.008*** |
| Leverage | 0.325 | 0.295 | -0.029* |
| Retained Earnings | 0.354 | 0.373 | 0.019 |
| Liability | 0.267 | 0.264 | -0.004 |
| Liquidity | 0.415 | 0.354 | -0.061*** |
| Financial Deficit | 0.003 | 0.106 | 0.103*** |
| Altman's Z – Score | 3.049 | 3.303 | 0.254 |
| **Panel B: Good and Systemic Downgrades** | **Good** | **Systemic** | **Difference** |
| Size | 22.897 | 22.699 | -0.199 |
| Age | 44.504 | 47.522 | 3.018 |
| Asset Tangibility | 0.329 | 0.335 | 0.006 |
| Earnings Volatility | 0.039 | 0.044 | 0.005* |
| Cash to Total Assets | 0.048 | 0.073 | 0.025*** |
| Market-to-Book Ratio | 1.796 | 1.442 | -0.354*** |
| Payout Ratio | 0.522 | 0.797 | 0.275** |
| Free Cash Flow | 0.099 | 0.058 | -0.040*** |
| Profitability | 0.150 | 0.101 | -0.049*** |
| Dividend Yield | 0.024 | 0.031 | 0.006** |
| Leverage | 0.295 | 0.344 | 0.049*** |
| Retained Earnings | 0.373 | 0.292 | -0.081** |
| Liability | 0.264 | 0.231 | -0.032* |
| Liquidity | 0.354 | 0.366 | 0.012 |
| Financial Deficit | 0.106 | 0.033 | -0.073*** |
| Altman's Z – Score | 3.303 | 2.549 | -0.753*** |

**Notes:** We perform a t-test for difference in means of firm-specific characteristics for type 1 and 2 downgraded firms. The firm-specific variables are defined in Appendix A. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

Furthermore, Standard and Poor's announcements present a pessimistic financial future that underlines poor performance and weak earnings under a bad and systemic downgrade. This is affirmed by the overall financial performance of firms as illustrated in Table 6. Bad and systemic downgraded firms are less profitable, have fewer growth opportunities (low market-to-book ratio), and less free cash flow than good downgraded firms. The dividend payout ratio mean values of bad and systemic downgrades are 0.853 and 0.797, indicating that firms pay more in dividends than their revenues can support. Moreover, Khieu and Pyles (2012) report that managers tend to

hold cash following a credit rating downgrade. Thus, the lower cash holdings by good downgraded firms is unexpected at first glance, but investors do not always applaud a firm's decision to hold excess cash. Khieu and Pyles (2012) also find that investors question a firm's decision to hold cash in preference to investing in positive NPV projects, and conclude that the excess cash seems to be at investors' expense. Thus, the lower cash holdings by good downgraded firms may explain the increased dividend smoothing, which is a friendly corporate policy for investors. Finally, Altman's Z-score for good downgraded firms is greater than for bad and systemic downgraded firms. Thus, the uncertainty around a firm's future prospects and low profitability, low Z–scores and expensive external finance under bad and systemic credit rating downgrades force managers to reduce dividend smoothing behavior and take preventive measures.

### *5.4. Lintner model with types of credit rating upgrade*

We explore the effect of different types of credit rating upgrades on dividend smoothing. The results for Equations

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4)$$

and

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e$$

(**7**)are shown in Table 7. We find that, following a Type 1 (Up1) upgrade, managers tend to reduce dividend smoothing behavior. For any other upgrade case, the lagged dividend coefficients are not statistically significant, suggesting that managers are indifferent to Type 2 and Type 3 credit rating upgrades.

Following a Type 1 credit rating upgrade, the highest SOA is 0.367. In estimating Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e \quad (7),$$

as shown in Column 2 of Table 7, the SOA is even larger, 0.540, implying a very low level of dividend smoothing. This suggests that managers prefer a residual dividend policy under a credit rating upgrade. In addition, the earnings per share coefficient as an interaction term is positive and statistically significant (0.0693) at the 1% level, indicating quicker dividend adjustments in response to increased earnings (0.1085; 0.0392 + 0.0693). This confirms our earlier finding regarding decreased dividend smoothing under credit rating upgrades. We conclude that decreased dividend smoothing under a credit rating upgrade is attributed to Type 1 upgrades.

For Type 2 credit rating upgrades, both Equations

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4)$$

and

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e$$

(**7**)imply a negative but non – significant impact on dividend smoothing, as shown Columns 1 and 2 of Table 7. The earnings per share coefficient as an interaction term is negative (-0.0275) and statistically significant, as shown in Column 2 of Table 7. This indicates that firms adjust dividends more slowly in response to increased earnings (0.0117; 0.0392 – 0.0275). For Type 3 credit rating upgrades, we estimate a non – significant positive lagged dividends coefficient. However, the results for Type 2 and 3 credit rating upgrade may be driven from the small number of Type 2 and 3 credit rating upgrade events.

The summary statistics (Table 9) and t-test results (Table 8) from the Type 1 credit rating upgrades show the firms' outstanding performance, as reflected in their high profitability rate (0.181). They also have the highest market-to-book ratio and the lowest payout ratio, indicating high growth opportunities and possible reinvestment of excess income. Their Altman's Z-score mean is the highest of any credit rating change.

Hence, managers may feel confident about a firm's future performance and be more comfortable with a decision to cut or increase the dividend; either way, the superior financial performance outweighs the impact of dividend cuts and supports long-term dividend increases. As Larkin et al. (2017) mention that non-smoothing firms are not penalized for dividend changes. Thus, Hypothesis 4 is not fully confirmed, but is verified under Type 1 credit rating upgrade.

**Table 7:** Augmented Lintner model – upgrades.

| Equations | (4) | (7) |
|---|---|---|
| $DPS_{t-1}$ | 0.808*** | 0.821*** |
| | (21.27) | (21.58) |
| $Up1_t * DPS_{t-1}$ | -0.175*** | -0.361*** |
| | (-4.90) | (-5.43) |
| $Up2_t * DPS_{t-1}$ | -0.0986 | -0.00735 |
| | (-1.63) | (-0.10) |
| $Up3_t * DPS_{t-1}$ | 0.0285 | 0.0659 |
| | (0.47) | (0.45) |
| $Up4_t * DPS_{t-1}$ | -0.0355 | -0.0151 |
| | (-0.91) | (-0.27) |
| $Up1_t * EPS_t$ | | 0.0693*** |
| | | (3.93) |
| $Up2_t * EPS_t$ | | -0.0275** |
| | | (-2.32) |
| $Up3_t * EPS_t$ | | -0.00426 |
| | | (-0.14) |
| $Up4_t * EPS_t$ | | -0.00566 |
| | | (-0.49) |
| $EPS_t$ | 0.0421*** | 0.0392*** |
| | (10.58) | (9.56) |
| Constant | 0.122 | 0.114 |
| | (1.60) | (1.49) |
| Obs. | 3024 | 3024 |

**Notes:** We calculate the impact of credit rating upgrades on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4)$$

in the first column and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e \quad (7)$$

in the second column. We use the econometric technique of fixed effects with autocorrelated errors. "$Up1_t$", "$Up2_t$", "$Up3_t$", and "$Up4_t$" are dummy variables equal to 1 in case of Type 1, Type 2, Type 3, and Type 4 credit rating upgrades, respectively. $DPS_{t-1}$ is the annual lagged dividend per share and $EPS_t$

is the annual earnings per share. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

**Table 8:** T-test for difference in means (Type 1 credit rating change).

| | Bad | Up 1 | Difference |
|---|---|---|---|
| Size | 22.498 | 22.664 | 0.166 |
| Age | 47.091 | 45.683 | -1.408 |
| Asset Tangibility | 0.313 | 0.329 | 0.016 |
| Earnings Volatility | 0.040 | 0.042 | 0.002 |
| Cash to Total Assets | 0.060 | 0.074 | 0.014* |
| Market-to-Book Ratio | 1.422 | 2.121 | 0.699*** |
| Payout Ratio | 0.853 | 0.319 | -0.534*** |
| Free Cash Flow | 0.073 | 0.119 | 0.045*** |
| Profitability | 0.122 | 0.181 | 0.059*** |
| Dividend Yield | 0.032 | 0.016 | -0.016*** |
| Leverage | 0.325 | 0.252 | -0.072*** |
| Retained Earnings | 0.354 | 0.363 | 0.009 |
| Liability | 0.267 | 0.262 | -0.006 |
| Liquidity | 0.415 | 0.419 | 0.004 |
| Financial Deficit | 0.003 | 0.010 | 0.007 |
| Altman's Z - Score | 3.049 | 4.422 | 1.373*** |

**Notes:** We perform a t-test for difference in means of firm-specific characteristics for type 1 upgraded and bad downgraded firms. The firm-specific variables are defined in Appendix A. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

**Table 9:** Summary statistics.

| | EPS | Age | DPS | Cash | Free Cash Flow | Asset Tangibility | Size | Leverage | Profitability | Payout Ratio | Dividend Yield | Market - to - Book Ratio | Retained Earnings | Altman's Z - Score | Liquidity | Liability | Financial Deficit | Earnings Volatility |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Sample | 2.623 | 45 | 0.987 | 0.065 | 0.107 | 0.306 | 22.811 | 0.268 | 0.162 | 0.453 | 0.021 | 1.932 | 0.375 | 3.907 | 0.394 | 0.257 | 0.029 | 0.039 |
| N = 3038 | 2.245 | 48 | 0.820 | 0.047 | 0.105 | 0.255 | 22.658 | 0.247 | 0.155 | 0.333 | 0.019 | 1.628 | 0.345 | 3.497 | 0.387 | 0.239 | 0.014 | 0.034 |
| Downgrade | 1.341 | 46 | 0.940 | 0.059 | 0.082 | 0.319 | 22.744 | 0.318 | 0.130 | 0.674 | 0.029 | 1.593 | 0.340 | 3.051 | 0.374 | 0.261 | 0.053 | 0.041 |
| N = 317 | 1.450 | 48 | 0.820 | 0.035 | 0.079 | 0.270 | 22.693 | 0.306 | 0.126 | 0.466 | 0.025 | 1.359 | 0.308 | 2.830 | 0.370 | 0.247 | 0.014 | 0.035 |
| Upgrade | 3.340 | 43 | 0.805 | 0.071 | 0.112 | 0.325 | 22.707 | 0.242 | 0.174 | 0.339 | 0.015 | 1.950 | 0.333 | 4.188 | 0.405 | 0.260 | 0.040 | 0.043 |
| N = 180 | 2.670 | 47 | 0.610 | 0.056 | 0.110 | 0.257 | 22.712 | 0.215 | 0.160 | 0.225 | 0.013 | 1.650 | 0.307 | 3.748 | 0.392 | 0.240 | 0.017 | 0.040 |
| Bad Downgrade | 0.641 | 47 | 0.847 | 0.060 | 0.073 | 0.313 | 22.498 | 0.325 | 0.122 | 0.853 | 0.032 | 1.422 | 0.354 | 3.049 | 0.415 | 0.267 | 0.003 | 0.040 |
| N = 88 | 1.005 | 48 | 0.800 | 0.041 | 0.069 | 0.289 | 22.611 | 0.315 | 0.113 | 0.595 | 0.028 | 1.186 | 0.326 | 2.885 | 0.411 | 0.274 | 0.004 | 0.035 |
| Good Downgrade | 2.394 | 45 | 1.042 | 0.048 | 0.099 | 0.329 | 22.897 | 0.295 | 0.150 | 0.522 | 0.024 | 1.796 | 0.373 | 3.303 | 0.354 | 0.264 | 0.106 | 0.039 |
| N = 129 | 1.980 | 47 | 0.900 | 0.027 | 0.096 | 0.264 | 22.770 | 0.296 | 0.143 | 0.404 | 0.022 | 1.539 | 0.375 | 3.044 | 0.336 | 0.247 | 0.060 | 0.034 |
| Systemic Downgrade | 0.336 | 48 | 0.887 | 0.073 | 0.058 | 0.335 | 22.699 | 0.344 | 0.101 | 0.797 | 0.031 | 1.442 | 0.292 | 2.549 | 0.366 | 0.231 | 0.033 | 0.044 |
| N = 69 | 0.490 | 51 | 0.720 | 0.053 | 0.056 | 0.308 | 22.706 | 0.317 | 0.101 | 0.538 | 0.026 | 1.281 | 0.244 | 2.305 | 0.357 | 0.195 | 0.005 | 0.043 |
| Type 1 Upgrade | 3.423 | 46 | 0.879 | 0.074 | 0.119 | 0.329 | 22.664 | 0.252 | 0.181 | 0.319 | 0.016 | 2.121 | 0.363 | 4.422 | 0.419 | 0.262 | 0.010 | 0.042 |
| N = 104 | 2.740 | 47 | 0.750 | 0.060 | 0.115 | 0.270 | 22.667 | 0.235 | 0.171 | 0.242 | 0.013 | 1.794 | 0.330 | 3.851 | 0.402 | 0.243 | 0.012 | 0.039 |
| Type 2 Upgrade | 3.018 | 41 | 0.605 | 0.065 | 0.095 | 0.315 | 23.148 | 0.218 | 0.153 | 0.402 | 0.015 | 1.501 | 0.289 | 3.605 | 0.370 | 0.245 | 0.127 | 0.046 |
| N = 26 | 2.385 | 48 | 0.485 | 0.062 | 0.092 | 0.269 | 23.308 | 0.228 | 0.139 | 0.153 | 0.013 | 1.373 | 0.261 | 2.823 | 0.286 | 0.184 | 0.097 | 0.050 |
| Type 3 Upgrade | 3.881 | 45 | 0.878 | 0.101 | 0.107 | 0.341 | 23.234 | 0.223 | 0.164 | 0.246 | 0.014 | 1.879 | 0.321 | 3.952 | 0.397 | 0.252 | 0.016 | 0.046 |
| N = 17 | 2.410 | 48 | 0.520 | 0.077 | 0.107 | 0.196 | 23.223 | 0.191 | 0.141 | 0.210 | 0.014 | 1.934 | 0.314 | 3.734 | 0.414 | 0.277 | -0.006 | 0.042 |

**Notes:** The table illustrates the mean (first row) and the median (second row) of each characteristic under a credit rating change.

# 6. Robustness Checks

## *6.1. Different time periods*

Our sample includes firm-year observations from 1995 to 2016. We split the sample into two sub-periods to test our findings before (1995–2006) and after (2007–2016) the US financial crisis. Our main results remain robust, especially in the post-crisis period.

Table 10 in Appendix A illustrates the results of Equations

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

and

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i.t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e \quad (5)$$

in the pre-crisis and post-crisis periods. We observe a marginal change in dividend policy after the financial crisis that include both credit rating downgrades and upgrades. Although downgrades have a significant positive impact on dividend smoothing before the financial crisis, they have a significant negative impact on dividend smoothing after the financial crisis.

We also find that, after the financial crisis, the absolute value of the lagged dividend coefficient (-0.174) under a credit rating upgrade is greater than the absolute value of the lagged dividend coefficient under a credit rating downgrade (-0.0455). This implies an even stronger negative impact on dividend smoothing in the post-crisis period under credit rating upgrades. Following Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i.t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e \quad (5),$$

the results are even more dramatic in the post-crisis period. The SOAs are 0.3526 and 0.644 under downgrade and upgrade, respectively. The earnings per share coefficient under credit rating upgrades was significantly positive (0.0705), indicating that firms adjust their dividends quickly in response to increased earnings (to 0.0959). Thus, we

find that upgraded firms' managers prefer a residual dividend policy after the financial crisis.

Our results for the different types of credit rating downgrades are robust for the period after the financial crisis. After the crisis, a bad downgrade and a systemic downgrade are negatively related to dividend smoothing, while a good downgrade is positively related to dividend smoothing (Table 10 in Appendix A). However, we find positive coefficients for each type of credit rating downgrade before the financial crisis. In the pre-crisis period, managers seem to increase dividend smoothing under any type of downgrade, which confirms our previous finding of whole downgrades, indicating that the positive impact of downgrades on dividend smoothing is from all types of downgrades. Thus, we conclude that, while firms seem to alter their dividend payout policy under bad and systemic credit rating downgrades, they do not change their behavior under good credit rating downgrades. In other words, managers hesitate to continue a dividend smoothing policy and prefer to follow a flexible policy under bad and systemic downgrades in the post-financial crisis era. This outcome is not surprising, since Abreu and Gulamhussen (2013) suggest that macroeconomic conditions affect dividend policies. Campello et al. (2010) found similar results. However, this result is not the same for good downgrades as we show that in this case the dividend smoothing policy is not affected by the macroeconomic conditions.

We further estimate Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (6)$$

in both periods (Table 10 in Appendix A). The negative and significant earnings per share coefficient as an interaction term implies a slow adjustment of dividends to increased earnings, indicating a higher level of dividend smoothing.

Table 10 in Appendix A presents the estimates for credit rating upgrades. Our results remain robust for both periods. We provide evidence that firms do not alter their dividend payout policy under Type 1 credit rating upgrades. However, the negative impact on dividend smoothing is even more evident after the financial crisis. The SOAs after the financial crisis are 0.522 (Column 2 of Table 10) and 0.736 (Column 4 of Table 10), indicating less smoothing. This implies that firms follow a residual dividend policy. The observed decrease of dividend smoothing in the post-crisis period is reflected in the coefficient of earnings per share as an interaction term. This coefficient is significantly positive, suggesting that firms adjust dividends much more quickly in response to increased earnings (to 0.127). Thus, our main findings remain valid for both the pre- and post-crisis periods.

### *6.2. Different sample selection*

We perform the same regressions (Equations

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

through

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e$$

(**7**)) using different subsamples of at least 100 firms. Thus, we decrease the number of firms to 100 from 139. Appendix A (Table 11) shows the results for the first and last 100 firm. Our main results remain valid. We also split the sample in half, and the results are consistent confirming that the main results are robust.

## 7. Conclusions

This study reveals the role of the information embedded in the announcement of a credit rating change in our understanding of how a bond rating downgrade impacts on dividend smoothing behavior. This crucial information has not been considered in

previous studies on dividend smoothing. Building on the work of Goh and Ederington (1993) we classify bond rating downgrades into bad, good and systemic based on the reason that is behind each bond rating downgrade.

Our findings provide unique evidence that dividend smoothing significantly varies across these three types of bond downgrades. We find that bad downgrades are negatively associated with dividend smoothing, whereas good downgrades are positively related to dividend smoothing. In addition, we document that firms smooth less when their bonds are subject to systemic downgrades. Focusing on bond upgrades, we show that firms smooth less when their bond upgrades are attributed to strong financial performance. Finally, we find no association between dividend smoothing and bond upgrades related to successful acquisitions, deleveraging, or exogenous events.

Our results suggest that managers take into account the information that lies behind a bond rating change when formulating their dividend policy. Therefore, bond downgrades or upgrades cannot be treated as homogeneous events when investigating their impact on dividend smoothing. The information that triggers a credit rating change must be considered.

## References

Abreu, J. F., & Gulamhussen, M. A. (2013). Dividend payouts: Evidence from U.S. bank holding companies in the context of the financial crisis. Journal of Corporate Finance, 22, 54–65. https://doi.org/10.1016/j.jcorpfin.2013.04.001

Ahmed, M. U., Kristal, M. M., & Pagell, M. (2014). Impact of operational and marketing capabilities on firm performance: Evidence from economic growth and downturns. International Journal of Production Economics, 154, 59–71. https://doi.org/10.1016/j.ijpe.2014.03.025

Aivazian, V. A., Booth, L., & Cleary, S. (2006). Dividend Smoothing and Debt Ratings. Journal of Financial and Quantitative Analysis, 41(2), 439–453. https://doi.org/10.1017/S0022109000002131

Allen, F., & Michaely, R. (2003). Payout Policy. In Handbook of the Economics of Finance (Vol. 1, pp. 337–429). https://doi.org/10.1016/S1574-0102(03)01011-2

Andres, C., & Hofbaur, U. (2017). Do what you did four quarters ago: Trends and implications of quarterly dividends. Journal of Corporate Finance, 43, 139–158. https://doi.org/10.1016/j.jcorpfin.2017.01.003

Asimakopoulos, P., Asimakopoulos, S., & Zhang, A. (2021). Dividend smoothing and credit rating changes. The European Journal of Finance, 27(1–2), 62–85. https://doi.org/10.1080/1351847X.2020.1739101

Balli, F., Agyemang, A., Gregory-Allen, R., & Ozer Balli, H. (2022). Corporate dividend smoothing: The role of cross-listing. Journal of Corporate Finance, 72. https://doi.org/10.1016/j.jcorpfin.2021.102151

Bannier, C. E., & Hirsch, C. W. (2010). The economic function of credit rating agencies–What does the watchlist tell us?. Journal of Banking & Finance, 34(12), 3037-3049. https://doi.org/10.1016/j.jbankfin.2010.07.002

Behr, P., & Güttler, A. (2008). The informational content of unsolicited ratings. Journal of Banking & Finance, 32(4), 587-599. https://doi.org/10.1016/j.jbankfin.2007.04.021

Bhattacharya, S. (1979). Imperfect Information, Dividend Policy, and "The Bird in the Hand" Fallacy. The Bell Journal of Economics, 10(1), 259–270. https://doi.org/10.2307/3003330

Blanchard, O. J., Lopez-de-Silanes, F., & Shleifer, A. (1994). What do firms do with cash windfalls? Journal of Financial Economics, 36(3), 337–360. https://doi.org/10.1016/0304-405X(94)90009-4

Brav, A., Graham, J. R., Harvey, C. R., & Michaely, R. (2005). Payout policy in the 21st century. Journal of Financial Economics, 77, 483–527. https://doi.org/10.1016/j.jfineco.2004.07.004

Brockman, P., Hanousek, J., Tresl, J., & Unlu, E. (2022). Dividend Smoothing and Firm Valuation. *Journal of Financial and Quantitative Analysis, 57*(4), 1621-1647. https://doi.org/10.1017/S0022109021000673

Campello, M., Graham, J. R., & Harvey, C. R. (2010). The real effects of financial constraints Evidence from a financial crisis. Journal of Financial Economics, 97, 470–487. https://doi.org/10.1016/j.jfineco.2010.02.009

Chang, X., & Dasgupta, S. (2009). Target Behavior and Financing: How Conclusive Is the Evidence? The Journal of Finance, 64(4), 1767–1796. https://doi.org/10.1111/j.1540-6261.2009.01479.x

Chemmanur, T. J., He, J., Hu, G., & Liu, H. (2010). Is dividend smoothing universal? Journal of Corporate Finance, 16(4), 413–430. https://doi.org/10.1016/j.jcorpfin.2010.03.001

Chung, K. H., Ann Frost, C., & Kim, M. (2012). Characteristics and information value of credit watches. Financial Management, 41(1), 119-158. https://doi.org/10.1111/j.1755-053X.2012.01180.x

Copeland, R. M. (1968). Income Smoothing. *Journal of Accounting Research*, *6*, 101–116. https://doi.org/10.2307/2490073

Dewenter, K. L., & Warther, V. A. (1998). Dividends, Asymmetric Information, and Agency Conflicts: Evidence from a Comparison of the Dividend Policies of Japanese and U.S. Firms. The Journal of Finance, 53(3), 879–904. https://doi.org/10.1111/0022-1082.00038

Dichev, I. D., & Piotroski, J. D. (2001). The Long-Run Stock Returns Following Bond Ratings Changes. The Journal of Finance, 56(1), 173–203. https://doi.org/10.1111/0022-1082.00322

Easterbrook, F. H. (1984). Two Agency-Cost Explanations of Dividends. *The American Economic Review*, *74*(4), 650–659. http://www.jstor.org/stable/1805130

Ederington, L. H., & Goh, J. C. (1998). Bond Rating Agencies and Stock Analysts: Who Knows What When? *The Journal of Financial and Quantitative Analysis*, *33*(4), 569–585. https://doi.org/10.2307/2331132

Fama, E. F., & Babiak, H. (1968). Dividend Policy: An Empirical Analysis. Journal of American Statistical Association, 68(324), 1132–1161. DOI: 10.1080/01621459.1968.10480917

Fernau, E., & Hirsch, S. (2019). Meta-analysis data for the literature on dividend smoothing. Data in brief, 22, 815-820. https://doi.org/10.1016/j.dib.2019.01.002

Finnerty, J. D., Miller, C. D., & Chen, R. R. (2013). The impact of credit rating announcements on credit default swap spreads. Journal of Banking & Finance, 37(6), 2011–2030. https://doi.org/10.1016/j.jbankfin.2013.01.028

Fliers, P. T. (2019). What is the relation between financial flexibility and dividend smoothing? Journal of International Money and Finance, 92, 98–111. https://doi.org/10.1016/j.jimonfin.2018.12.009

Fudenberg, D., & Tirole, J. (1995). A Theory of Income and Dividend Smoothing Based on Incumbency Rents. Journal of Political Economy, 103(1), 75–93. http://dx.doi.org/10.1086/261976

Gande, A., & Parsley, D. C. (2005). News spillovers in the sovereign debt market. Journal of Financial Economics, 75(3), 691-734. https://doi.org/10.1016/j.jfineco.2003.11.003

Goh, J. C., & Ederington, L. H. (1993). Is a bond rating downgrade bad news, good news, or no news for stockholders?. The journal of finance, 48(5), 2001-2008. https://doi.org/10.1111/j.1540-6261.1993.tb05139.x

Goh, J. C., & Ederington, L. H. (1999). Cross-sectional variation in the stock market reaction to bond rating changes. The Quarterly Review of Economics and Finance, 39(1), 101-112. https://doi.org/10.1016/S1062-9769(99)80006-4

Gombola, M. J., & Liu, F. Y. (1993). Considering dividend stability in the relation between dividend yields and stock returns. Journal of Financial Research, 16(2), 139–150. https://doi.org/10.1111/j.1475-6803.1993.tb00135.x

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. Journal of Financial Economics, 57. https://doi.org/10.1016/S0304-405X(01)00044-7

Grullon, G., Michaely, R., & Swaminathan, B. (2002). Are Dividend Changes a Sign of Firm Maturity? *The Journal of Business*, *75*(3), 387–424. https://doi.org/10.1086/339889

Guay, W., & Harford, J. (2000). The cash-flow permanence and information content of dividend increases versus repurchases. Journal of Financial Economics, 57, 385–415. https://doi.org/10.1016/S0304-405X(00)00062-3

Ham, C. G., Kaplan, Z. R., & Leary, M. T. (2020). Do dividends convey information about future earnings? Journal of Financial Economics, 136(2), 547–570. https://doi.org/10.1016/j.jfineco.2019.10.006

Hand, J. R. M., Holthausen, R. W., & Leftwich, R. W. (1992). The Effect of Bond Rating Agency Announcements on Bond and Stock Prices. The Journal of Finance, 47(2), 733–752. https://doi.org/10.1111/j.1540-6261.1992.tb04407.x

Handjinicolaou, G., & Kalay, A. (1984). Wealth redistributions or changes in firm value: An Analysis of Returns to Bondholders and Stockholders around Dividend Announcements. Journal of Financial Economics, 13, 35–63. https://doi.org/10.1016/0304-405X(84)90031-X

Harford, J., Klasa, S., & Walcott, N. (2009). Do firms have leverage targets? Evidence from acquisitions. Journal of Financial Economics, 93(1), 1–14. https://doi.org/10.1016/j.jfineco.2008.07.006

Hite, G., & Warga, A. (1997). The Effect of Bond-Rating Changes on Bond Price Performance. Financial Analysts Journal, 53(3), 35–51. https://doi.org/10.2469/faj.v53.n3.2083

Hoang, E. C., & Hoxha, I. (2016). Corporate payout smoothing: A variance decomposition approach. Journal of Empirical Finance, 35, 1–13. https://doi.org/10.1016/j.jempfin.2015.10.011

Holthausen, R. W., & Leftwich, R. W. (1986). The effect of bond rating changes on common stock prices. Journal of Financial Economics, 17(1), 57-89. https://doi.org/10.1016/0304-405X(86)90006-1

Jagannathan, M., Weisbach, M. S., & Stephens, C. P. (2000). Financial flexibility and the choice between dividends and stock repurchases. Journal of Financial Economics, 57, 355–384. https://doi.org/10.1016/S0304-405X(00)00061-1

Javakhadze, D., Ferris, S. P., & Sen, N. (2014). An international analysis of dividend smoothing. Journal of Corporate Finance, 29, 200–220. https://doi.org/10.1016/j.jcorpfin.2014.09.007

Jorion, P., & Zhang, G. (2010). Information transfer effects of bond rating downgrades. Financial Review, 45(3), 683-706. https://doi.org/10.1111/j.1540-6288.2010.00266.x

Khieu, H. D., & Pyles, M. K. (2012). The Influence of a Credit Rating Change on Corporate Cash Holdings and Their Marginal Value. Financial Review, 47(2), 351–373. https://doi.org/10.1111/j.1540-6288.2012.00332.x

Khieu, H. D., & Pyles, M. K. (2016). The Influence of a Credit Rating Change on Dividend and Investment Policy Interactions. Financial Review, 51(4), 579–611. https://doi.org/10.1111/fire.12104

Kisgen, D. J. (2006). Credit Ratings and Capital Structure. The Journal of Finance, 61(3), 1035–1072. https://doi.org/10.1111/j.1540-6261.2006.00866.x

Kumar, P., & Lee, B.-S. (2001). Discrete Dividend Policy with Permanent Earnings. *Financial Management*, *30*(3), 55–76. https://doi.org/10.2307/3666376

Lambrecht, B. M., & Myers, S. C. (2012). A Lintner Model of Payout and Managerial Rents. The Journal of Finance, 67(5), 1761–1810. https://doi.org/10.1111/j.1540-6261.2012.01772.x

Lamont, O. (1997). Cash Flow and Investment: Evidence from Internal Capital Markets. The Journal of Finance, 52(1), 83–109. https://doi.org/10.1111/j.1540-6261.1997.tb03809.x

Larkin, Y., Leary, M. T., & Michaely, R. (2017). Do Investors Value Dividend Smoothing Stocks Differently? Management Science, 63(12). https://doi.org/10.1287/mnsc.2016.2551

Leary, M. T., & Michaely, R. (2011). Determinants of dividend smoothing: Empirical evidence. The Review of Financial Studies, 24(10), 3197-3249. https://doi.org/10.1093/rfs/hhr072

Li, K., & Zhao, X. (2008). Asymmetric Information and Dividend Policy. Financial Management, 37(4), 673–694. https://doi.org/10.1111/j.1755-053X.2008.00030.x

Lintner, J. (1956). Distribution of Incomes of Corporations Among Dividends, Retained Earnings, and Taxes. *The American Economic Review*, *46*(2), 97–113. http://www.jstor.org/stable/1910664

Matolcsy, Z. P., & Lianto, T. (1995). The incremental information content of bond rating revisions: The Australian evidence. Journal of Banking & Finance, 19(5), 891-902. https://doi.org/10.1016/0378-4266(94)00082-E

Maxwell, W. F., & Rao, R. P. (2003). Do Spin-offs Expropriate Wealth from Bondholders? The Journal of Finance, 58(5), 2087–2108. https://doi.org/10.1111/1540-6261.00598

Maxwell, W. F., & Stephens, C. P. (2003). The Wealth Effects of Repurchases on Bondholders. The Journal of Finance, 58(2), 895–919. https://doi.org/10.1111/1540-6261.00550

Miller, M. H., & Rock, K. (1985). Dividend Policy under Asymmetric Information. The Journal of Finance, 40(4), 1031–1051. https://doi.org/10.1111/j.1540-6261.1985.tb02362.x

Norden, L., & Weber, M. (2004). Informational efficiency of credit default swap and stock markets: The impact of credit rating announcements. Journal of Banking & Finance, 28(11), 2813–2843. https://doi.org/10.1016/j.jbankfin.2004.06.011

Omar, N., & Rizuan, S. (2014). Financial Deceitful Trick through Dividend Smoothing. Procedia - Social and Behavioral Sciences, 145, 300–307. https://doi.org/10.1016/j.sbspro.2014.06.038

Wansley, J. W., & Clauretie, T. M. (1985). The impact of creditwatch placement on equity returns and bond prices. Journal of Financial Research, 8(1), 31-42. https://doi.org/10.1111/j.1475-6803.1985.tb00423.x

Wansley, J. W., Glascock, J. L., & Clauretie, T. M. (1992). Institutional bond pricing and information arrival: the case of bond rating changes. Journal of Business Finance & Accounting, 19(5), 733–750. https://doi.org/10.1111/j.1468-5957.1992.tb00654.x

# Appendix A

**Table 10:** Before and after the financial crisis.

| Panel A: Before and after the financial crisis – downgrades and upgrades | | | | |
|---|---|---|---|---|
| Equations | (2) | | (5) | |
| Time Periods | 1995 - 2006 | 2007 – 2016 | 1995 - 2006 | 2007 - 2016 |
| $DPS_{t-1}$ | 0.559*** | 0.697*** | 0.552*** | 0.716*** |
| | (10.50) | (7.90) | (10.44) | (8.05) |
| $Downgrade_t * DPS_{t-1}$ | 0.0338* | -0.0455* | 0.0645*** | -0.0686** |
| | (1.90) | (-1.95) | (3.25) | (-2.07) |
| $Upgrade_t * DPS_{t-1}$ | -0.0404* | -0.174*** | 0.00193 | -0.360*** |
| | (-1.93) | (-3.36) | (0.06) | (-3.91) |
| $Downgrade_t * EPS_t$ | | | -0.0176*** | 0.0145 |
| | | | (-2.78) | (1.00) |
| $Upgrade_t * EPS_t$ | | | -0.0134** | 0.0705*** |
| | | | (-2.30) | (2.94) |
| $EPS_t$ | 0.0344*** | 0.0344*** | 0.0383*** | 0.0254*** |
| | (8.36) | (5.50) | (8.77) | (3.70) |
| Constant | 0.366*** | 0.290* | 0.364*** | 0.285 |
| | (6.10) | (1.67) | (6.10) | (1.60) |
| Obs. | 1644 | 1380 | 1644 | 1380 |
| Panel B: Before and after the financial crisis – downgrades | | | | |
| Equations | (3) | | (6) | |
| Time Periods | 1995 - 2006 | 2007 - 2016 | 1995 - 2006 | 2007 - 2016 |
| $DPS_{t-1}$ | 0.562*** | 0.647*** | 0.557*** | 0.644*** |
| | (10.63) | (6.52) | (10.55) | (6.43) |
| $Down1_t * DPS_{t-1}$ | 0.0285 | -0.0957*** | 0.0324 | -0.0761* |
| | (0.77) | (-2.59) | (0.88) | (-1.70) |
| $Down2_t * DPS_{t-1}$ | 0.0501* | 0.0443 | 0.121*** | 0.108** |
| | (1.82) | (1.43) | (3.00) | (2.26) |
| $Down3_t * DPS_{t-1}$ | 0.0521 | -0.143*** | 0.0651* | -0.142*** |
| | (1.47) | (-3.52) | (1.82) | (-3.26) |
| $Down4_t * DPS_{t-1}$ | -0.0154 | 0.0390 | -0.0110 | 0.0432 |
| | (-0.48) | (0.77) | (-0.23) | (0.84) |
| $Down1_t * EPS_t$ | | | -0.00165 | -0.0250 |
| | | | (-0.12) | (-1.55) |
| $Down2_t * EPS_t$ | | | -0.0323*** | -0.0311* |
| | | | (-3.05) | (-1.76) |
| $Down3_t * EPS_t$ | | | -0.00982 | 0.00943 |
| | | | (-0.62) | (0.26) |
| $Down4_t * EPS_t$ | | | -0.00197 | -0.0139 |
| | | | (-0.09) | (-0.74) |
| $EPS_t$ | 0.0337*** | 0.0295*** | 0.0358*** | 0.0308*** |
| | (8.15) | (4.51) | (8.53) | (4.55) |
| Constant | 0.363*** | 0.350* | 0.362*** | 0.350* |
| | (6.10) | (1.85) | (6.04) | (1.84) |
| Obs. | 1644 | 1380 | 1644 | 1380 |
| Panel C: Before and after the financial crisis – upgrades | | | | |
| Equations | (4) | | (7) | |
| Time Periods | 1995 - 2006 | 2007 - 2016 | 1995 - 2006 | 2007 - 2016 |
| $DPS_{t-1}$ | 0.565*** | 0.682*** | 0.566*** | 0.697*** |
| | (10.62) | (7.66) | (10.66) | (7.95) |
| $Up1_t * DPS_{t-1}$ | -0.0676** | -0.204*** | -0.0668 | -0.433*** |
| | (-2.57) | (-3.32) | (-1.39) | (-3.98) |
| $Up2_t * DPS_{t-1}$ | -0.131** | -0.0477 | -0.0829 | 0.0613 |
| | (-1.99) | (-0.67) | (-1.11) | (1.00) |
| $Up3_t * DPS_{t-1}$ | -0.00948 | -0.0138 | 0.0246 | 0.102 |
| | (-0.09) | (-0.17) | (0.06) | (0.49) |
| $Up4_t * DPS_{t-1}$ | 0.0236 | -0.102* | 0.0643 | -0.254* |
| | (0.52) | (-1.85) | (1.10) | (-1.71) |
| $Up1_t * EPS_t$ | | | -0.000359 | 0.0977*** |
| | | | (-0.04) | (3.06) |
| $Up2_t * EPS_t$ | | | -0.0145 | -0.0333* |
| | | | (-1.44) | (-1.68) |
| $Up3_t * EPS_t$ | | | -0.00879 | -0.0164 |
| | | | (-0.08) | (-0.40) |
| $Up4_t * EPS_t$ | | | -0.0143 | 0.0465 |
| | | | (-1.50) | (1.04) |
| $EPS_t$ | 0.0332*** | 0.0347*** | 0.0342*** | 0.0293*** |
| | (8.06) | (5.63) | (8.00) | (4.59) |
| Constant | 0.364*** | 0.300* | 0.362*** | 0.292 |
| | (6.06) | (1.69) | (6.06) | (1.63) |
| Obs. | 1644 | 1380 | 1644 | 1380 |

**Notes:** Panel A illustrates the impact of credit rating change on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i.t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e$$

(5), before and after the financial crisis. We use the econometric technique of fixed effects with autocorrelated errors. "Downgrade$_t$" and "Upgrade$_t$" are dummy variables equal to 1 in case of downgrade and upgrade, respectively.

Panel B illustrates the impact of credit rating downgrades on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + e \quad (3)$$

and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (6)$$

before and after the financial crisis. We use the econometric technique of fixed effects with autocorrelated errors. "Down1$_t$", "Down2$_t$", "Down3$_t$" and "Down4$_t$" are dummy variables equal to 1 in case of bad, good, systemic and other credit rating downgrades, respectively.

Panel C illustrates the impact of credit rating upgrades on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4)$$

and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e \quad (7)$$

before and after the financial crisis. We use the econometric technique of fixed effects with

autocorrelated errors. "$Up1_t$", "$Up2_t$", "$Up3_t$", and "$Up4_t$" are dummy variables equal to 1 in case of Type 1, Type 2, Type 3, and Type 4 credit rating upgrades, respectively.

In all panels, $DPS_{t-1}$ is the annual lagged dividend per share and $EPS_t$ is the annual earnings per share. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

**Table 11:** First 100 and Last 100 firms

| Panel A: First 100 and Last 100 firms – downgrades and upgrades | | | | |
|---|---|---|---|---|
| Equations | (2) | | (5) | |
| | First 100 | Last 100 | First 100 | Last 100 |
| $DPS_{t-1}$ | 0.778*** | 0.835*** | 0.788*** | 0.838*** |
| | (17.91) | (22.52) | (18.02) | (22.41) |
| $Downgrade_t * DPS_{t-1}$ | -0.0159 | -0.0348** | -0.0140 | -0.0316 |
| | (-0.89) | (-2.16) | (-0.58) | (-1.54) |
| $Upgrade_t * DPS_{t-1}$ | -0.134*** | -0.0851*** | -0.264*** | -0.114** |
| | (-3.67) | (-2.62) | (-3.85) | (-2.08) |
| $Downgrade_t * EPS_t$ | | | -0.00265 | -0.00281 |
| | | | (-0.26) | (-0.30) |
| $Upgrade_t * EPS_t$ | | | 0.0460*** | 0.0104 |
| | | | (2.74) | (0.98) |
| $EPS_t$ | 0.0442*** | 0.0399*** | 0.0408*** | 0.0393*** |
| | (8.73) | (8.83) | (7.28) | (7.94) |
| Constant | 0.152* | 0.316*** | 0.148* | -0.107** |
| | (1.90) | (2.58) | (1.84) | (-2.06) |
| Obs. | 2177 | 2177 | 2177 | 2177 |
| Panel B: First 100 and Last 100 firms – downgrades | | | | |
| Equations | (3) | | (6) | |
| | First 100 | Last 100 | First 100 | Last 100 |
| $DPS_{t-1}$ | 0.767*** | 0.829*** | 0.767*** | 0.827*** |
| | (16.95) | (22.20) | (17.12) | (22.18) |
| $Down1_t * DPS_{t-1}$ | -0.0815*** | -0.104*** | -0.0592** | -0.0881*** |
| | (-2.88) | (-3.92) | (-2.00) | (-2.95) |
| $Down2_t * DPS_{t-1}$ | 0.0513* | 0.0136 | 0.153*** | 0.0440 |
| | (1.79) | (0.58) | (3.06) | (1.50) |
| $Down3_t * DPS_{t-1}$ | -0.0631* | -0.0540 | -0.0672* | -0.0458 |
| | (-1.74) | (-1.45) | (-1.71) | (-1.18) |
| $Down4_t * DPS_{t-1}$ | -0.0161 | -0.00918 | -0.00577 | 0.00538 |
| | (-0.49) | (-0.22) | (-0.14) | (0.13) |
| $Down1_t * EPS_t$ | | | -0.0233 | -0.0181 |
| | | | (-1.41) | (-0.94) |
| $Down2_t * EPS_t$ | | | -0.0463*** | -0.0146 |
| | | | (-2.91) | (-1.21) |
| $Down3_t * EPS_t$ | | | 0.0143 | -0.00908 |
| | | | (0.55) | (-0.51) |
| $Down4_t * EPS_t$ | | | -0.00956 | -0.0120 |
| | | | (-0.50) | (-0.74) |
| $EPS_t$ | 0.0413*** | 0.0381*** | 0.0434*** | 0.0397*** |
| | (8.02) | (8.34) | (7.92) | (8.23) |
| Constant | 0.162** | 0.350*** | 0.155* | -0.101*** |
| | (1.98) | (2.79) | (1.90) | (-2.06) |
| Obs. | 2177 | 2177 | 2177 | 2177 |
| Panel C: First 100 and Last 100 firms – upgrades | | | | |
| Equations | (4) | | (7) | |
| | First 100 | Last 100 | First 100 | Last 100 |
| $DPS_{t-1}$ | 0.778*** | 0.829*** | 0.791*** | 0.834*** |
| | (18.20) | (22.52) | (18.57) | (22.51) |
| $Up1_t * DPS_{t-1}$ | -0.148*** | -0.105** | -0.326*** | -0.199** |
| | (-3.22) | (-2.37) | (-3.70) | (-2.36) |
| $Up2_t * DPS_{t-1}$ | -0.0635 | -0.227*** | -0.00951 | -0.150* |
| | (-1.00) | (-2.84) | (-0.12) | (-1.68) |
| $Up3_t * DPS_{t-1}$ | -0.0137 | 0.0331 | 0.0102 | 0.101 |
| | (-0.20) | (0.55) | (0.07) | (0.66) |
| $Up4_t * DPS_{t-1}$ | -0.145*** | -0.00917 | -0.231*** | 0.0318 |
| | (-3.00) | (-0.22) | (-2.60) | (0.58) |
| $Up1_t * EPS_t$ | | | 0.0645*** | 0.0369* |
| | | | (2.90) | (1.92) |
| $Up2_t * EPS_t$ | | | -0.0201 | -0.0235* |
| | | | (-1.12) | (-1.86) |
| $Up3_t * EPS_t$ | | | -0.00132 | -0.0138 |
| | | | (-0.04) | (-0.41) |
| $Up4_t * EPS_t$ | | | 0.0337 | -0.0143 |
| | | | (1.27) | (-1.25) |
| $EPS_t$ | 0.0445*** | 0.0408*** | 0.0412*** | 0.0403*** |
| | (8.95) | (9.16) | (8.17) | (8.82) |
| Constant | 0.150* | 0.321*** | 0.143* | -0.091* |
| | (1.88) | (2.63) | (1.78) | (-1.88) |
| Obs. | 2177 | 2177 | 2177 | 2177 |

**Notes:** Panel A illustrates the impact of credit rating change on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + e \quad (2)$$

and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i.t-1} Down_{i,t} + b_2 DPS_{i,t-1} Up_{i,t} + c_1 EPS_{i,t} Down_{i,t} + c_2 EPS_{i,t} Up_{i,t} + e$$

(5), for the first and the last 100 firms of our sample. We use the econometric technique of fixed effects with autocorrelated errors. "Downgrade$_t$" and "Upgrade$_t$" are dummy variables equal to 1 in case of downgrade and upgrade, respectively.

Panel B illustrates the impact of credit rating downgrades on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + e \quad (3)$$

and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Down1_{i,t} + b_2 DPS_{i,t-1} Down2_{i,t} + b_3 DPS_{i,t-1} Down3_{i,t} + b_4 DPS_{i,t-1} Down4_{i,t} + c_1 EPS_{i,t} Down1_{i,t} + c_2 EPS_{i,t} Down2_{i,t} + c_3 EPS_{i,t} Down3_{i,t} + c_4 EPS_{i,t} Down4_{i,t} + e \quad (6),$$

for the first and the last 100 firms of our sample. We use the econometric technique of fixed effects with autocorrelated errors "Down1$_t$", "Down2$_t$", "Down3$_t$" and "Down4$_t$" are dummy variables equal to 1 in case of bad, good, systemic and other credit rating downgrades, respectively.

Panel C illustrates the impact of credit rating upgrades on dividend smoothing using Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + e \quad (4)$$

and Equation

$$DPS_{i,t} = a_o + a_1 DPS_{i,t-1} + a_2 EPS_{i,t} + b_1 DPS_{i,t-1} Up1_{i,t} + b_2 DPS_{i,t-1} Up2_{i,t} + b_3 DPS_{i,t-1} Up3_{i,t} + b_4 DPS_{i,t-1} Up4_{i,t} + c_1 EPS_{i,t} Up1_{i,t} + c_2 EPS_{i,t} Up2_{i,t} + c_3 EPS_{i,t} Up3_{i,t} + c_4 EPS_{i,t} Up4_{i,t} + e \quad (7),$$

for the first and the last 100 firms of our sample. We use the econometric technique of fixed effects with

autocorrelated errors. "$Up1_t$", "$Up2_t$", "$Up3_t$", and "$Up4_t$" are dummy variables equal to 1 in case of Type 1, Type 2, Type 3, and Type 4 credit rating upgrades, respectively.

In all panels, $DPS_{t-1}$ is the annual lagged dividend per share, and $EPS_t$ is the annual earnings per share. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

**Table 12:** Variables' Construction.

| Firm Characteristic | Empirical Proxy |
|---|---|
| Firm's size | natural log of total assets |
| Firm's age | the number of years since the firm's first appearance in the COMPUSTAT database |
| Tangible assets | net property, plant and equipment divided by total assets |
| Earnings Volatility | standard deviation of EBITDA divided by total assets |
| Cash to Total Assets | cash divided by total assets |
| Growth opportunities | market value of equity plus total assets minus book value of equity, all divided by total assets |
| Dividend Level | common/ordinary dividend divided by income before extraordinary items |
| Free cash flow | operating income before depreciation minus capital expenditures all divided by total assets |
| Profitability | income before extraordinary items divided by total assets |
| Dividend Yield | dividend per share ex-date divided by close price |
| Leverage | total debt in current liabilities plus total long term debt, all divided by total assets |
| Retained Earnings | retained earnings divided by total assets |
| Liability | current liabilities divided by total assets |
| Financial Deficit | change in total assets minus change in retained earnings divided by total assets |
| Liquidity | current assets divided by total assets |
| Altman's Z - score | Altman's Z- score was calculated using the following formula: z = 1,2*(Working Capital/Total Assets) + 1,4*(Retained earnings/Total Assets) + 3,3 (EBIT/Total Assets) + 0,6*(Market Value of Equity/Total Liabilities) + 1*(Sales/Total Assets) |

**Notes:** The table provides the definition of firm-specific variables used in the study.

[1] Holthausen and Leftwich (1986) define within class rating change according to "whether the rating change takes place within gradations of a major class (e.g., AA+ to AA-)."

[2] Andres and Hofbaur (2017) document that, for the period of 1927 to 2012, 94.75% of firms paid dividends quarterly, 3.59% semi-annually, and 1.66% annually.

[3] Lintner (1956) estimates the value of SOA as 0.3; Asimakopoulos et al. (2021) estimate the value of SOA as 0.314; Aivazian et al. (2006) estimate the value of SOA as 0.216; and Fama and Babiak (1968) estimate the value of SOA as 0.366.