

Do firms follow dividend smoothing and pecking order when they alter their capital structure?

Abstract

We empirically investigate whether and to what extent firms follow a dividend smoothing and pecking order behaviour when they alter their capital structure using a sample of US firms over the period 1960-2020. In particular, we identify four types of corporate financing activities, i.e., equity and debt issues when firms have a financing deficit and equity repurchases and debt redemptions when firms have a financing surplus. We provide evidence that firms smooth dividends more when they issue debt or repurchase equity and smooth dividends less when they issue equity and reduce debt. On the other hand, firms follow a pecking order when they issue or reduce debt and do not follow a pecking order when they issue or repurchase equity. Our study provides new insights into how corporate financing decisions are associated with dividend smoothing and pecking order policy.

1. Introduction

A “strict” pecking order theory alleviates dividend smoothing. A “strict” pecking order theory indicates that firms may prefer to hold cash to avoid equity issue when they need external funds. Thus, firms reduce dividend payments (Myers, 1984; Fama and French, 2012). However, Lintner (1956) suggests that dividend paying firms prefer to smooth their dividends. Similarly, a battery of studies find that firms do not seem to cut down dividends and managers prefer to issue equity than change dividend payments, providing to shareholders a stable stream of dividend payments (see, for example, Brav et al., 2005; Fama & Babiak, 1968; Hoang & Hoxha, 2016; Balli et al, 2022)

We identify the following three research questions to determine whether dividend paying firms follow pecking order or dividend smoothing as well as whether these firms follow a looser pecking order and “stricter” dividend smoothing policy under specific financing conditions. a) How do firms’ financing deficit and financing surplus affect dividend smoothing and pecking order? To what extent do debt or equity issuing firms follow dividend smoothing or pecking order given their financing deficit? To what extent do equity repurchasing firms or debt redemption firms follow dividend smoothing or pecking order given their financing surplus? Answering these questions, we provide evidence on how firms adjust pecking order and dividend policy decisions when they alter capital structure.

To the best of our knowledge, we are the first to show that dividend paying firms prefer to follow a steady stream of dividend payments when altering their capital structure, avoiding a “strict” pecking order. More precisely, building on the work of De Jong et al. (2010), we examine whether dividend smoothing hypothesis and pecking order hypothesis hold when firms have a financing deficit or surplus. Following Fama and French (2012), we split the financing deficit (surplus) into equity and debt issue (repurchase). In particular, we focus on the impact of issuing or repurchasing equity or debt on dividend smoothing using an extended version of Lintner’s model. Our study

is related to previous studies that document a positive impact of financial flexibility, financial slack or shocks absorbed by debt, on dividend smoothing; see, for example, [Myers and Majluf, 1984](#); [Fama and French, 2002](#); [Lambrecht and Myers, 2012](#); [Fliers, 2019](#).

The pecking order model of capital structure suggests that firms take the financing decisions on hierarchical order. Corporate capital structure decisions vary across firms with financing deficit and firms with financing surplus. The rationale behind managers' capital structure decisions is as follows. While capital structure decisions for firms with deficits are driven by financial costs, capital structure decisions for firms with surpluses are driven by managers' degree of optimism; A firm's manager chooses to repurchase shares, if the manager is more optimistic than investors, ([Myers, 1984](#); [Shyam – Sunder & Myers, 1999](#); [De Jong et al., 2010](#)). Firms prefer internal to external financing under a financing deficit. In case of external financing, firms prefer to issue safe debt, then risky debt and as a final resort equity. The idea of the pecking order theory works in reverse when firms pay down debt or repurchase shares. Even the most optimistic manager prefers to pay down debt than repurchase shares ([Shyam – Sunder & Myers, 1999](#)).

However, capital structure decisions influence dividend policy. Pecking order theory supports the existence of the “sticky” dividend behavior ([Myers, 1984](#)). The rationale behind the decision of pecking order and dividend smoothing indicates that the income shocks can be absorbed by debt to smooth dividends ([Fama & French, 2002](#); [Lambrecht and Myers, 2012](#); [Hoang & Hoxha, 2016](#)). Dividend paying firms seems to follow dividend smoothing ([Lintner, 1956](#); [Brav et al., 2005](#)). Thus, we build in the idea proposed by [Myers \(1984\)](#) that firms follow a looser pecking order model of capital structure to smooth their dividends. We examine how dividend smoothing decisions and pecking order decisions vary across firms with four types of financing activities, i.e.,—equity issue, debt issue, equity repurchase and debt redemption. We assume that firms with financing deficit (surplus) issue (repurchase) debt or equity.

We document a marginal asymmetry in dividend smoothing across financing – deficit firms and financing – surplus firms. Firms with deficit seems to smooth dividends slightly more compared to financing surplus firms. However, going deeper, we find that dividend smoothing significantly varies across a) debt and equity issuing firms and b) debt redemption and equity repurchasing firms. In particular, for financing deficit firms, we provide unique evidence that debt – issuing firms tend to smooth dividends more than equity – issuing firms. In addition, for financing surplus firms, debt – redemption firms smooth dividends less, while equity – repurchasing firms smooth dividends more.

Our results indicate an asymmetry on pecking order coefficient between firms with financing deficit and firms with financing surplus. Firms with deficit seem to follow less pecking order than firms with surplus. This asymmetry corroborates the findings of [De Jong et al. \(2010\)](#). However, unlike [De Jong et al. \(2010\)](#), we find that this asymmetry is marginal. We argue that this may be attributed to the fact that our sample is restricted to dividend paying firms. In addition, we find that debt – issuing firms apply pecking order, while equity – issuing firms do not follow pecking order. This

result is not a surprise, as pecking order assumes that managers prefer to issue debt to equity (Myers, 1984). . . We also document that debt – redemption firms tend to follow the pecking order model, while equity – repurchasing firms do not follow the pecking order model. This result is in line with Shyam – Sunder & Myers, (1999), who document that the pecking order theory works in financing surplus.

Next, we investigate how both dividend smoothing and pecking order behavior are affected across different levels of a) deficit and surplus b) debt issues and equity issues and c) equity repurchases and debt redemption on dividend smoothing and pecking order model. We find that as deficit level increases the pecking order coefficient significantly decreases and dividend smoothing coefficient remains almost steady. We also provide evidence that as surplus level rises, dividend smoothing decreases and the impact on pecking order coefficient is insignificant. Thus, firms with deficit do not change dividend smoothing behavior under any level of financing deficit, confirming our hypothesis that firms adhere to dividend smoothing.

Dividend smoothing marginally fluctuates across the level of debt and equity issues. Dividend paying firms seem to keep dividends constant under any level of equity or debt issue. However, dividend smoothing coefficient is lower under debt issue compared to equity issue, indicating a stickier dividend policy under debt issue. We also show that very large debt – redemption firms follow the least dividend smoothing. Managers may not give priority to dividends, as they target a high level of financial slack (Lemmon & Zender, 2010; Khieu & Pyles, 2016; De Angelo, 2022). Lastly, we find that pecking order coefficient significantly decreases in both very high level of debt issue and debt redemption. However, in both very high level of equity issue and equity repurchase, pecking order coefficient increases. The results seem surprising at first glance. However, the rationale behind firm’s behavior is explained by financing constraints, financing flexibility, stockholders wealth maximization and managers’ willing to minimize agency conflicts, as discussed later in this paper (see Section (5)) (Chirinko & Singha, 2000; Karpavičius, 2014).

The remainder of the paper proceeds as follows. Section (2) develops the theoretical rationale behind hypotheses development. Section (3) presents the data and our empirical analysis. Section (4) and (5) discusses the results of our empirical analysis. Section (6) concludes the paper.

2. Theoretical Implications and Hypotheses Development

2.1 Dividend Smoothing

Since the seminal paper of Lintner (1956), dividend smoothing is widely documented (see for example, Dewenter & Warther, 1998; Javakhadze et al., 2014; Michaely & Roberts, 2012). While dividend paying firms seem to prefer a steady stream of dividends than large dividend – payments fluctuations over the years (Brav et al., 2005), there is no clear reason why do firms prefer to smooth their dividends.

Several studies focus on the impact of ownership structure on dividend smoothing or on the impact of financial transparency on dividend smoothing (Dong et al., 2024; Salikhova et al., 2024). Brockman (2022) suggest that investors value dividend smoothing firms more than non – dividend smoothing firms and Gombola and Liu

(1993) support that dividend smoothing signals cash flow stability. Other studies also suggest that dividend smoothing is explained through information asymmetry or agency theory (Leary & Michaely, 2011; Javakhadze et al., 2014; Lee & Lin, 2023). Fliers (2019) examines the impact of capital structure adjustment speeds on dividend smoothing. He finds that there is a positive relation between capital structure adjustment speeds and dividend smoothing.

2.2 *Pecking order*

Another strand of corporate finance literature focuses on the pecking order model of capital structure suggesting that firms take the financing decisions on hierarchical order. Firms prefer internal to external financing under a financing deficit. More precisely, if internal resources are not sufficient for firm's funding needs, firms turn to external resources. Then, firms prefer the safest issuing process. Firms prefer to issue safe debt, then risky debt and as a final resort equity (Myers, 1984).

The idea of the pecking order theory works in reverse when firms pay down debt or repurchase shares. Shyam – Sunder and Myer (1999) propose that pecking order holds under the presence of financing surplus. The rationale that lies behind the validity of pecking order in the presence of financing surplus is as follows. The most optimistic managers may want to repurchase shares, hence the stock price increases under the upcoming repurchasing event. In effect, the stock price elevates so high that no manager wants to repurchase shares. Managers prefer to pay down debt than repurchase equity (De Jong et al., 2010); even the most optimist manager prefers to pay down debt than repurchase shares (Shyam – Sunder & Myers, 1999).

Thus, the rationale behind capital structure decision varies across firms with financing deficit and financing surplus. While capital structure decisions for firms with deficits are driven by financial costs, capital structure decisions for firms with surpluses are driven by managers' optimism (Myers, 1984; Shyam – Sunder & Myers, 1999; De Jong et al., 2010).

In theory, a "strict" pecking order hierarchy never allows equity issue (Myers, 1984). Myers (1984) and Myers and Majluf (1984) recognize this problem and propose a "modified" pecking order model that allows equity issue. They also notice that a "strict" pecking order theory is always rejected in real world finance. Similarly, Chirinko and Singha (2000) define the "modified" pecking order as "semi – strong", implying that firms with debt issue capacity, turn to equity issue. Leary and Roberts (2010) present a spectrum of firms' pecking order compliance ranging from strict to liberal. The liberal form implies that financial unconstrained firms, with unused debt capacity, issue equity to finance their funding needs than debt. Firms follow a looser financing hierarchical order.

2.3 *Hypotheses Development*

Myers (1984) and Fama and French (2012) recognize that firms may prefer to decrease dividends to hold more cash and finance their investments under the "strict" pecking order, although firms do not seem to cut down dividends (Brav et al., 2005). It seems that firms prefer to issue equity than change dividend policy, providing to shareholders the "promised" dividend payments, as shareholders put a premium on

dividend smoothing firms to non – smoothing (Brockman et al., 2022). Managers are willing to raise external capital or forego positive NPV projects to avoid cutting dividends (Fama & Babiak, 1968; Allen & Michaely, 2003; Brav et al., 2005; Hoang & Hoxha, 2016; Balli et al., 2022). Thus, firms seem to have a “sticky” dividend target and slowly adjust their dividends to their target (Lintner, 1956).

Hypothesis 1a: Firms smooth dividends under financing deficit and financing surplus

De Jong et al. (2010) split firms into financing deficit and financing surplus. They find that firms with financing surplus have higher pecking order coefficient than firms with financing deficit. Thus, firms with higher pecking order coefficient follow the pecking order model.

Hypothesis 1b: Firms follow a pecking order under financing surplus and they do not follow a pecking order under financing deficit

External financing splits to debt issue and equity issue (Fama & French, 2012). Previous studies suggest that debt is a shock absorber of cash flows. Keeping investments constant, debt issues absorb any income variation, enhancing dividend smoothing (Lambrecht and Myers, 2012). Furthermore, the debt – issuing firms are more likely to redistribute wealth from bondholders to stockholders through dividends (Handjinicolaou & Kalay, 1984). However, lenders consider payout as good news. The positive payouts is a sign of future firm’s profitability (Handjinicolaou & Kalay, 1984; Lambrecht & Myers, 2017). Thus, we expect that debt – issuing firms smooth their dividends more.

According to the financing hierarchical order, firms prefer to issue debt to equity (Myers, 1984). Managers of debt – issuing firms may want to lower the cost of issuing securities; hence, they prefer to issue debt than equity. Thus, we anticipate that debt – issuing firms follow the pecking order model.

Hypothesis 2a: Debt – issuing firms increase dividend smoothing and they follow the pecking order model.

Equity issuing firms want to attract investors, conveying good news to the market by smoothing their dividends to achieve a successful equity issue. Managers recognize that investors prefer dividend – smoothing firms as these firms have higher market value (Brockman et al., 2022). However, equity – issuing firms are more likely to face higher costs (e.g. stocks are riskier securities) than debt – issuing firms (Fama & French, 2012). Thus, firms having in mind the benefits and costs of equity issues, may be more conservative about firm’s dividend policy. We expect that equity – issuing firms follow dividend smoothing to convey good news to the market, but they may slightly decrease the dividend smoothing behavior due to high costs of equity issue.

Previous studies suggest that the pecking order coefficient is lower than one (Shyam – Sunder and Myers, 1999). It seems reasonable because firms issue equity as well as debt. However, pecking order coefficient may take significantly low values; much lower than one, indicating the disappearance of the pecking order. These firms may have high levels of unused debt capacities, although firms prefer to issue equity than debt due to higher financing flexibility. Thus, managers end up issuing equity to finance their funding needs (De Jong et al., 2010). We expect that equity – issuing firms have pecking order coefficient of low values.

Hypothesis 2b: Equity – issuing firms slightly decrease dividend smoothing behavior and they do not follow the pecking order model.

According to the pecking order theory, even the most optimistic managers do not repurchase shares (Shyam – Sunder & Myers, 1999). They prefer to pay down debt. Thus, we expect a high value of pecking order coefficient for debt – redemption firms. However, firms with undervalued stock price, take the opportunity to repurchase shares in low prices, implying the violation of the pecking order theory; hence, we expect low values of pecking order coefficient under equity – repurchasing firms.

However, the stock price increases as managers repurchase shares (De Jong et al., 2010). The higher the stock price, the wealthier the stockholders. Karpavicius (2014) support that share price is positively related to dividend smoothing leading to shareholder wealth maximization.

Hypothesis 3a: Equity – repurchasing firms increase dividend smoothing but they do not follow the pecking order model.

Debt – redemption firms prefer to pay down debt to increase their unused debt capacity or to retain their financial slack (De Angelo, 2022), implying that dividend smoothing is of secondary importance. The firm's performance may outweigh the bad signal of fluctuated dividends. Previous studies document that profitability is negatively related to dividend smoothing (Javakhadze et al., 2014) and high – risk firms tend to follow dividend smoothing (Kumar & Lee, 2001), especially in bad times (Lambrecht & Myers, 2017). Moreover, firms that pay down debt may struggle with debt constraints, indicating a low unused debt capacity. Fliers' (2019) finds a positive relation between unused debt capacity and dividend smoothing. Thus, we expect firms to smooth their dividends under equity repurchases, although they forego dividend smoothing under debt redemption.

Hypothesis 3b: Debt – redemption firms decrease dividend smoothing and they follow the pecking order model.

3. Data and Methodology

3.1 Data

We collect balance sheet annual data, for the US firms, from COMPUSTAT database. Following previous studies, we exclude financial firms (with SIC codes 4900 – 4999) and utilities (with SIC code 6000 – 6999). We only consider the dividend

paying firms with more than 5 consecutive years of dividend payments, as by default we analyze dividend smoothing behaviour and therefore, we require that firms be dividend payers (see, Leary & Roberts, 2011).¹

We also exclude firms that have deficit equal to zero, because we examine the impact of positive or negative deficit on dividend smoothing and on pecking order theory. Also, we include in the sample firms with non – missing equity issues (repurchase) and debt issues (redemptions) for more than 5 consecutive years. We consider share repurchases as a part of capital structure rather than as a part of payout policy, because repurchases are a pro – cyclical variable (Karpavicius, 2014).

Finally, following Chang and Dasgupta (2009), we winsorize our dataset at 0.5% and 99.5% level to eliminate the influence of outliers in our results². Thus, we eventually end up with a panel dataset of 3173 unique US firms, with 59796 firm – year observations over the period of 1960 – 2020³.

3.2 Methodology

3.2.1 Dividend Smoothing

Basic Lintner model

Lintner (1956) suggests that firms have a dividend target; hence, dividends are smoothly fluctuated towards the target. The partial adjustment model of Lintner (1956), is widely used in literature to test the existence of dividend smoothing across firms (see for example, Aivazian et al., 2006).

We estimate Lintner’s model to examine the existence of dividend smoothing behavior (Lintner, 1956), as shown in Equation (1).

$$D_{i,t} = a_0 + a_1 D_{i,t-1} + a_2 E_{i,t} + e_1 \quad (1)$$

$D_{i,t}$ is the annual dividend per share of firm i at time t , $D_{i,t-1}$ is the annual dividend per share of firm i at time $t - 1$, and $E_{i,t}$ is the annual earnings per share of firm i at time t . We calculate dividend’s speed of adjustment (SOA), as $1 - \alpha_1$. The component of SOA is the inverse metric of dividend smoothing. The larger the SOA, the lower the dividend smoothing.

Financing deficit and financing surplus

To address the impact of financing deficits and surplus, large deficits, small deficits, large surpluses and small surpluses on dividend smoothing, we estimate the following equation (Eq. 2):

$$D_{i,t} = a_0 + a_1 D_{i,t-1} + a_2 E_{i,t} + a_3 x_{i,t} D_{i,t-1} + e_1 \quad (2)$$

$x_{i,t}$ is a vector of controls of firm i at time t . SOA is calculated as $1 - (\alpha_1 + \alpha_3)$.

The control variables are dummy variables. Deficit (DEF) is a dummy variable equal to one if the firms have financing deficit (surplus); zero otherwise. Large deficit (large_DEF) is a dummy variable equal to one if a firm’s financing deficit, divided by total assets, takes positive values above the 75th percentile; zero otherwise. Large

¹ We also examine firms with at least 10 and 15 consecutive years. The results are essentially the same.

² The results remain essentially the same under a 1% and 99% level of winsorization.

³ We also examine a different period from 1971 to 2020. The results are essentially the same.

surplus (large_SUR) is a dummy variable equal to one if a firm's financing surplus, divided by total assets, takes negative values below the 25th percentile; zero otherwise. Small deficit (small_DEF) is a dummy variable equal to one if a firm's financing deficit, divided by total assets, takes positive values below the 25th percentile ; zero otherwise. Small surplus (small_SUR) is a dummy variable equal to one if a firm's financing surplus, divided by total assets, takes negative values above the 75th percentile; zero otherwise.

Debt and equity issues

To address the impact of equity and debt issue on dividend smoothing, we estimate the following equation (Eq. 3):

$$D_{i,t} = \alpha_0 + \alpha_1 D_{i,t-1} + \alpha_2 E_{i,t} + \alpha_3 Equity_{Issue_{i,t}} D_{i,t-1} + \alpha_4 Debt_{Issue_{i,t}} D_{i,t-1} + e_1 \quad (3)$$

Equity_{Issue_{i,t}} and Debt_{Issue_{i,t}} are dummy variables of firm *i* at time *t*, equals to one in case of large equity issue and large debt issue, respectively. A large equity or debt issue is defined if a firm's net equity or debt issues, divided by total assets, is greater than 5% (Hovakimian, 2004; Chang & Dasgupta, 2009). SOA is calculated as $1 - (\alpha_1 + \alpha_3)$ under large equity issue and $1 - (\alpha_1 + \alpha_4)$ under large debt issue.

Debt and equity repurchases

To address the impact of equity repurchase and debt redemption on dividend smoothing, we estimate the following equation (Eq. 4):

$$D_{i,t} = \alpha_0 + \alpha_1 D_{i,t-1} + \alpha_2 E_{i,t} + \alpha_3 Equity_{Repurchase_{i,t}} D_{i,t-1} + \alpha_4 Debt_{Repurchase_{i,t}} D_{i,t-1} + e_1 \quad (4)$$

Equity_{Repurchase_{i,t}} and Debt_{Repurchase_{i,t}} are dummy variables of firm *i* at time *t*, equals to one in case of large equity repurchase and large debt redemption, respectively. A large equity or debt repurchase is defined if a firm's net equity or debt repurchases, divided by total assets, is greater than 5% (Hovakimian, 2004; Chang & Dasgupta, 2009). SOA is calculated as $1 - (\alpha_1 + \alpha_3)$ under large equity repurchase and $1 - (\alpha_1 + \alpha_4)$ under large debt redemption.

3.2.2 Pecking order model

Basic model

We follow the model of Shyam – Sunder and Myers (1999) to examine the pecking order behavior in our sample (Eq. 5).

$$Net\ Debt\ Issue_{i,t} = \alpha_0 + b_{PO} Deficit_{i,t} + e_1 \quad (5)$$

Deficit_{*i,t*} is the financial deficit scaled by total assets. *b*_{PO} is the pecking order coefficient. Firms tend to follow pecking order policy, when pecking order coefficient takes values close to one. Ideally, a pecking order coefficient equals to one means that firms cover \$1 of deficit with \$1 of issuing debt without issuing equity.

Financing deficit and financing surplus

To investigate the difference in pecking order behavior for firms with financing deficits, large deficits, small deficits, large surpluses and small surpluses, we estimate the following model (Eq. 6):

$$Net\ Debt\ Issue_{i,t} = a_o + b_{PO}Deficit_{i,t} + b_1Deficit_{i,t}x_{i,t} + e \quad (6)$$

Pecking order coefficient is calculated as $b_{PO} + b_1$ under deficit.

Debt and equity issue/repurchase

To test the impact of large equity and debt issue on pecking order policy, we use the model of [Shyam – Sunder and Myers \(1999\)](#) as in Equation (5), controlling for debt issue and equity issue. We use the same model for equity repurchase and debt redemption.

4. Results

Financing Deficit and Financing Surplus

We test Equation (1) using the econometric technique of feasible generalized least squares to solve possible econometric problems of autocorrelation. We also use different econometric techniques with firm, industry and year fixed effects. The results remain essentially the same.

Table 1: Dividend smoothing and pecking order policy

Panel A: Lintner model		
Equations	(1)	(2)
D_{t-1}	0.667*** (230.29)	0.654*** (178.73)
E_t	0.0899*** (84.01)	0.0896*** (83.63)
$DEF_t * D_{t-1}$		0.0197*** (5.79)
Intercept	0.103*** (31.22)	0.103*** (31.29)
Obs.	56623	56623
Panel B: Pecking order model		
Equations	(5)	(6)
$Deficit_t$	0.703*** (171.51)	0.702*** (64.35)
DEF_t		0.0103*** (14.42)
$DEF_t * Deficit_t$		-0.0307** (-2.47)
Intercept	0.00307*** (12.49)	-0.00183** (-3.30)
Obs.	49424	49424

Notes: We calculate the dividend smoothing using Equation (1) and the dividend smoothing under financing deficit/surplus using Equation (2) in Panel A and the pecking order coefficient using Equation (5) and Equation (6) in Panel B. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

The pecking order model predicts the dividend stickiness view ([Myers, 1984](#)). In our sample, it is more likely for firms to follow dividend smoothing policy (SOA = 0.333) (Table 1, [Panel A](#)) as well as the pecking order policy (pecking order coefficient

equal to 0.703) (Table 1, Panel B) because of the collection of the data towards dividend paying firms. The results of Equation (1) and (5) are presented in Table 1. They confirm previous studies, implying that dividend smoothing firms tend to follow pecking order policy (Myers, 1984; Fama & French, 2002).

Next, we examine the impact of deficit and surplus on dividend smoothing (Table 1, Panel A) using Equation (2), as well as on pecking order policy (Table 1, Panel B) using Equation (6). The results indicate an asymmetry between deficit and surplus. Dividend smoothing seems to be marginally larger in firms with deficits (SOA = 0.326) than in firms with surpluses (SOA = 0.346). Similarly, firms with deficit seems to follow the pecking order model less ($b_{PO} = 0.671$) than firms with surpluses ($b_{PO} = 0.702$). However, while the results are statistically significant, the asymmetry is marginal.

Financing Deficit – External Financing

We split firms' external funding decisions into two categories under financing deficit. We assume that firms with financing deficit and funding needs, use two external source of funds. They issue either debt or equity. Denis and McKeon (2021) notice a third external source of fund, the sale of fixed assets. However, we examine only the equity issue and debt issue, as external finance, under the purview of the pecking order.

Debt and Equity Issue

We examine the impact of large equity and large debt issue under financing deficit, as defined in Chang and Dasgupta's (2009) study, on dividend smoothing and on pecking order coefficient. We document that equity – issuing firms follow a looser dividend smoothing policy and no pecking order policy, while debt – issuing firms follow a tighter dividend smoothing policy and pecking order policy. Panel A of Table 2 illustrates that equity – issuing firms smooth dividends less (SOA = 0.434) than debt – issuing firms (SOA = 0.331). The nature of debt as shock absorber may explain the dividend smoothing asymmetry between equity – issuing firms and debt – issuing firms. We also find that equity – issuing firms do not follow pecking order ($b_{PO} = 0.073$), while debt – issuing firms follow ($b_{PO} = 0.901$) (Table 2, Panel B). The results confirm that dividends are smoothed (less or more) and pecking order coefficient varies regarding the type of the security issue (debt or equity). The findings confirm hypothesis 2a and 2b.

Table 2: Dividend smoothing and pecking order under equity / debt issue

Panel A: Dividend Smoothing		
Equation	(3)	
D_{t-1}	0.645***	(188.33)
E_t	0.0892***	(75.13)
equity_issue _t * D_{t-1}	-0.0794***	(-8.00)
debt_issue _t * D_{t-1}	0.0241***	(5.81)
Intercept	0.117***	(31.41)
Obs.	47704	

Panel B: Pecking Order Model		
Equations (5)	Equity Issue	Debt Issue
Deficit _t	0.0730***	0.901***
	(10.55)	(246.85)
Intercept	-0.00385***	0.00642***
	(-3.62)	(14.30)
Obs.	1859	13677

Notes: We calculate dividend smoothing using Equation (3) in Panel A. We test the impact of security issue on dividend smoothing. We also calculate pecking order coefficient using Equation (5) in Panel B. We test the impact of security issue on pecking order coefficient. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

Debt and Equity Repurchase

We split firms' repurchase decisions into two categories under financing surplus. We assume that firms with financing surplus use the excess cash holdings to pay down debt or repurchase equity. [Lambrecht and Myers \(2017\)](#) mention that firms with surpluses and accumulated cash may prefer to lend excess cash, although we test only the debt redemption and equity repurchase under the purview of the pecking order. We examine the impact of large equity and debt repurchase under financing surplus on dividend smoothing and on pecking order coefficient. Panel A of Table 3 illustrates that equity – repurchasing firms smooth dividends more (SOA = 0.315) than debt – redemption firms (SOA = 0.420). Debt – redemption firms seems to follow a looser dividend smoothing policy. In Panel B of Table 3, we show that equity – repurchasing firms do not follow pecking order ($b_{PO} = 0.168$), while debt – redemption firms follow ($b_{PO} = 0.851$). Our findings support hypotheses 3a and 3b.

Table 3: Dividend smoothing and pecking order under security repurchase
Panel A: Dividend Smoothing

Equation	(4)
D_{t-1}	0.653*** (195.70)
E_t	0.0891*** (75.08)
equity_repurchase _t * D_{t-1}	0.0317*** (2.75)
debt_repurchase _t * D_{t-1}	-0.0734*** (-11.53)
Intercept	0.117*** (31.63)
Obs.	47704

Panel B: Pecking Order Model

Equation (5)	Equity Repurchase	Debt Repurchase
Deficit _t	0.168*** (13.01)	0.851*** (204.25)
Intercept	0.0211*** (17.01)	-0.0167*** (-38.06)
Obs.	1188	4689

Notes: We calculate dividend smoothing using Equation (4) in Panel A. We test the impact of security repurchase on dividend smoothing. We also calculate pecking order coefficient using Equation (5) in Panel B. We test the impact of security repurchase on pecking order coefficient. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

5. Robustness Check

5.1 Large and Small Deficit

We split deficit in large deficit and small deficit (Table 4, left – hand column). Firms with large deficit follow looser pecking order theory ($b_{PO} = 0.562$) than firms with small deficit ($b_{PO} = 0.845$). Firms with large deficit may face financial constrains to issue more debt, hence they turn to issue equity (Shyam – Sunder & Myers, 1999; Chirinko & Singha, 2000; De Jong et al., 2010). The asymmetry, between large and small deficit, is supported by De Jong et al. (2010) findings. However, the magnitudes of the estimated pecking order coefficients significantly differ. In particular, 0.09, under large deficit. we find a pecking order coefficient of 0.562, while the pecking order coefficient documented in De Jong et al. (2010) is very low, i.e., 0.09.. As previous studies support (Myers, 1984), pecking order theory predicts dividend smoothing, hence the large difference in values of the pecking order coefficient of De Jong et al. (2010) study with ours is not a surprise.

Panel A of Table 4 reports the results of Equation (2). It seems that firms do not change dividend smoothing behavior under any magnitude (large and small) of deficit. Both coefficients of large deficit and small deficit are statistically insignificant,

indicating that firms smooth their dividends under large and small deficit level (SOA = 0.334), supporting our previous findings that firms with deficit smooth their dividends. We also show no asymmetry in firms' dividend decisions under large and small deficit. This finding support our first hypothesis (Hypothesis 1), that dividends remain steady under the “modified” pecking order.

5.2 *Large and Small Surplus*

We split surplus in large and small surplus (Table 4, right – hand column). The pecking order coefficients are statistically insignificant indicating that both large and small surplus do not change pecking order policy. It seems that managers prefer to pay down debt than repurchase equity under financing surplus. This finding is in line with the work of De Jong et al. (2010). De Jong et al. (2010) find that both constrained and unconstrained firms prefer to pay down debt under financing surplus.

We also find an asymmetry n dividend smoothing behavior under large and small surplus. While, firms with large surplus decrease dividend smoothing (SOA = 0.405), firms with small surplus increase dividend smoothing (SOA = 0.299). Thus, firms with large surplus seem to slightly concern about the surplus level when they take decisions about dividend policy indicating that dividend smoothing is of secondary importance. Firms may prefer to pay down debt or lend money than maintain dividends steady (Lambrecht & Myers, 2017).

Table 4: Dividend smoothing and pecking order under large / non large financing deficit or surplus

Panel A: Dividend Smoothing		
Equation (2)	Large & Small Deficit	Large & Small Surplus
D_{t-1}	0.666*** (215.65)	0.671*** (224.31)
E_t	0.0899*** (83.97)	0.0890*** (83.11)
large_DEF _t * D_{t-1}	0.00418 (0.87)	
small_DEF _t * D_{t-1}	0.00435 (1.10)	
large_SUR _t * D_{t-1}		-0.0762*** (-12.20)
small_SUR _t * D_{t-1}		0.0299*** (5.47)
Intercept	0.103*** (31.16)	0.104*** (31.49)
Obs.	56623	56623
Panel B: Pecking Order Model		
Equation (6)	Large & Small Deficit	Large & Small Surplus
Deficit _t	0.748*** (141.06)	0.692*** (140.80)
large_DEF _t	0.0386*** (15.47)	
large_DEF _t * Deficit _t	-0.186*** (-14.50)	
small_DEF _t	-0.00295*** (-4.49)	
small_DEF _t * Deficit _t	0.0974*** (2.82)	
large_SUR _t		-0.0112*** (-4.07)
large_SUR _t * Deficit _t		-0.0162 (-0.79)
small_SUR _t		-0.00611*** (-6.61)
small_SUR _t * Deficit _t		-0.0665 (-0.66)
Intercept	0.00237*** (9.27)	0.00472*** (16.46)
Obs.	49424	49424

Notes: We calculate dividend smoothing using Equation (2) in Panel A. In the first (second) column, we test the impact of large/small deficit (surplus) on dividend smoothing. We also calculate pecking order coefficient using Equation (6) in Panel B.

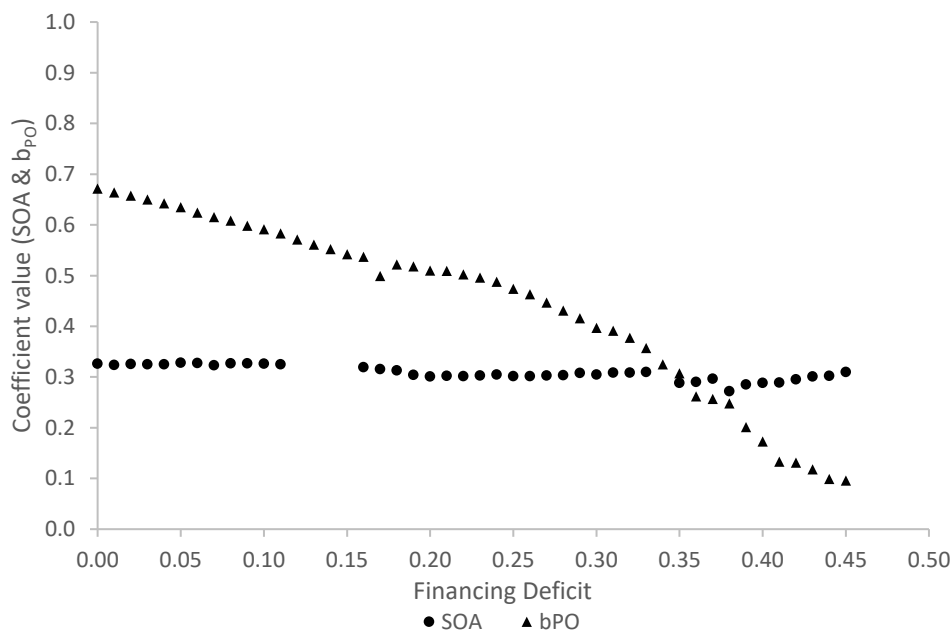
In the first (second) column, we test the impact of large/non large deficit (surplus) on pecking order coefficient. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

5.3 Financing Deficit

Level of Deficit

According to the level of deficit, it seems that as deficit levels rises, pecking order coefficient decreases, but dividend smoothing remains steady (Figure 1). In Figure 1, we show how pecking order coefficient and SOA vary as deficit level rises. We notice that the pecking order coefficient significantly decreases, while SOA remains almost steady. The result confirms our first hypothesis under lower levels of deficits. Thus, dividend smoothing does not move together with pecking order policy under large financing deficit. The rationale behind the pecking order extinction indicates that firms with large debt outstanding or financially constrained firms cannot issue more debt. Thus, they finance the remaining deficit with equity (Shyam – Sunder & Myers, 1999; Chirinko & Singha, 2000; De Jong et al., 2010). To achieve equity issuance, firms convey good news to the market by smoothing their dividends. As previous literature support, managers avoid cutting dividends (Brav et al., 2005) because of negative reaction in the stock price (Handjinicolaou & Kalay, 1984) and investors seem to prefer dividend smoothing firms as they have higher market value (Brockman et al., 2022).

Figure 1: The SOA and pecking order coefficient across different levels of financing deficit



Notes: The triangle – shaped dotted line represents the pecking order coefficient across different levels of financing deficit. We calculate the pecking order coefficient as $b_{PO} + b_1$ using Equation (6). The circle – shaped dotted line represents the SOA across

different levels of financing deficit. We calculate the SOA as $1 - (\alpha_1 + \alpha_3)$ using Equation (2).

Level of Security Issue

When firms issue very large amount of debt are characterized by high level of unused debt capacity, financial flexibility or they have low leverage ratio. However these firms seem to be violators of the pecking order. Firms' financial flexibility may indicate that firms have alternatives to fund their extremely high financing needs

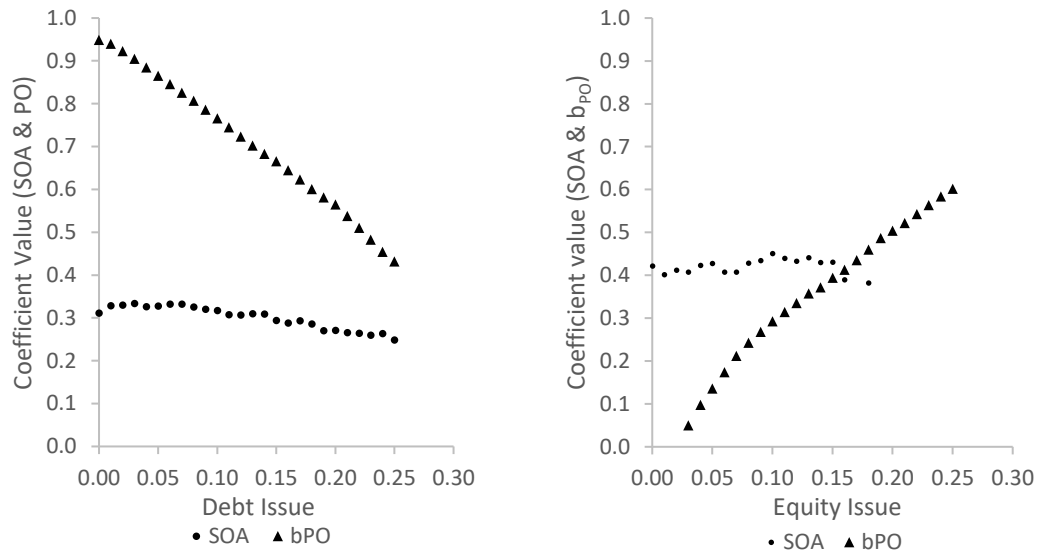
However, Chirinko and Singha (2000) and Lemmon and Zender (2010) show that firms with very large debt issue may increase their leverage ratios and become more debt constrained⁴. Thus, they turn to equity issue as a final resort. Moreover, the debt – constrained firms are more likely to issue very large amount of equity, as firms do not have alternative sources of raising external capital. The existence of no alternatives determines the definition of “firms issue equity as a final resort”. Thus, we expect that the “semi – strong” form of the pecking order theory, proposed by Chirinko and Singha (2000), is confirmed under a very high level of equity issue.

We also expect that in very large equity issue, firms follow dividend smoothing and pecking order, implying that financially constrained firms want to attract investors through dividend smoothing to raise funds (Chirinko & Singha, 2000; Lemmon & Zender, 2010; Brockman et al., 2022). In addition, firms with very large debt issue are more likely to smooth their dividends. Lambrecht and Myers (2012) show that debt can be a shock absorber that allows steady dividends. Thus, external financing behavior seems to support dividend smoothing policy (Brav et al., 2005). We expect that firm's dividend smoothing decisions remains unaltered and dividend smoothing do not change under any level and form of external financing. However, we also expect that debt issuing firms have a lower dividend smoothing coefficient than equity issuing firms.

In Figure 2, we explore how dividend smoothing and pecking order vary across different levels of debt and equity issues. According to the level of debt and equity issue, it seems that pecking order coefficient significantly decreases as debt issue level rises (Figure 2, [left – hand figure](#)) and increases as equity issue level rises (Figure 2, [right – hand figure](#)). Dividend smoothing seems to vary across the levels of debt and equity issues, although the fluctuations are insignificant. The type of financing do not affect firm's dividend decisions.

⁴ Very large debt and very large equity issue: greater than 10% threshold

Figure 2: The SOA and pecking order coefficient across different levels of security issue



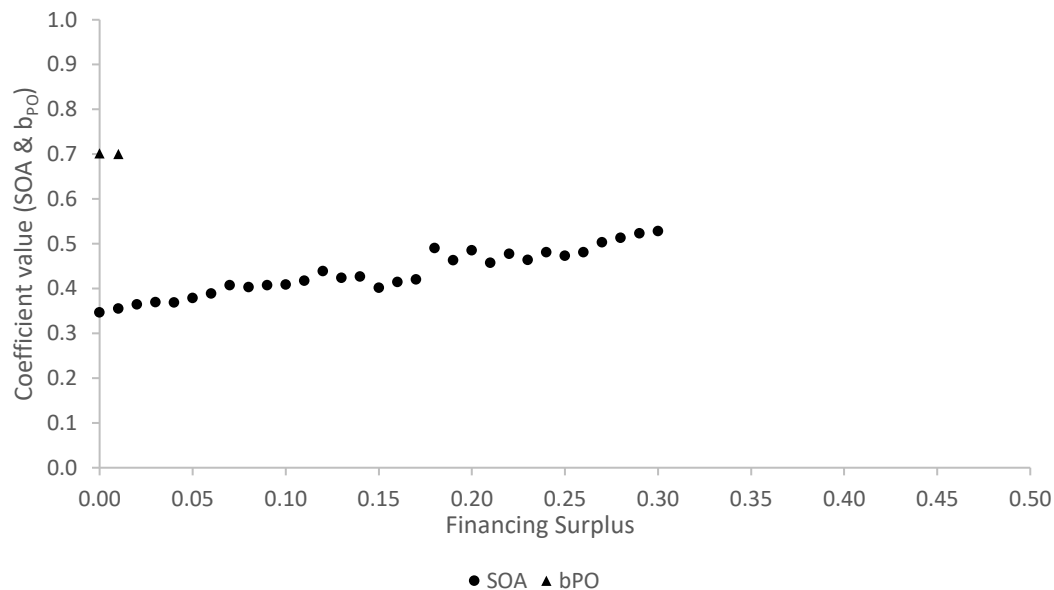
Notes: In this figure, the left – hand figure shows both coefficients of SOA and pecking order under debt issue. The right – hand figure shows both coefficients of SOA and pecking order under equity issue. The triangle – shaped dotted line represents the pecking order coefficient across different levels of security issue. We calculate pecking order coefficients using Equation (5) controlling for equity issue firms. We also calculate pecking order coefficients using Equation (5) controlling for debt issue firms. The circle – shaped dotted line represents the SOA across different levels of security issuance. We calculate SOAs as $1 - (\alpha_1 + \alpha_3)$ and $1 - (\alpha_1 + \alpha_4)$ under equity issue and debt issue using Equation (3), respectively.

5.4 Financing Surplus

Level of Surplus

According to the level of surplus, it seems that as surplus level rises, dividend smoothing decreases, but the impact on pecking order coefficient is insignificant (Figure 3). In Figure 3, we test the varying values of pecking order coefficient and SOA as surplus level rises. We notice that the pecking order coefficient is not affected by the surplus level, while SOA eventually increases.

Figure 3: The SOA and pecking order coefficient across different levels of financing surplus



Notes: The triangle – shaped dotted line represents the pecking order coefficient across different levels of financing surplus. We calculate the pecking order coefficient as $b_{PO} + b_1$ using Equation (6). The circle – shaped dotted line represents the SOA across different levels of financing surplus. We calculate the SOA as $1 - (\alpha_1 + \alpha_3)$ using Equation (2).

Level of Security Repurchase

According to the pecking order theory, firms prefer to pay down debt than repurchase shares, although our results imply the violation of pecking order theory at very high level of debt or equity repurchase. It seems that very large debt – redemption (greater than 10%) firms do not follow pecking order theory neither dividend smoothing. It is obvious that dividend smoothing is of secondary importance by the costs of financial slack. However, the lower pecking order coefficient is a surprising outcome.

Very large debt – redemption firms are more likely to be profitable firms that accumulate cash and prefer to pay down debt⁵. These firms may also foresee possible future investment opportunities (Khieu & Pyles, 2016). According to the possible future investment opportunities argument, firms want both to hold cash by reducing payout and to target high level of financial slack to finance possible future investment opportunities (Khieu & Pyles, 2016). Thus, we expect that very large debt – redemption firms, decrease dividend smoothing.

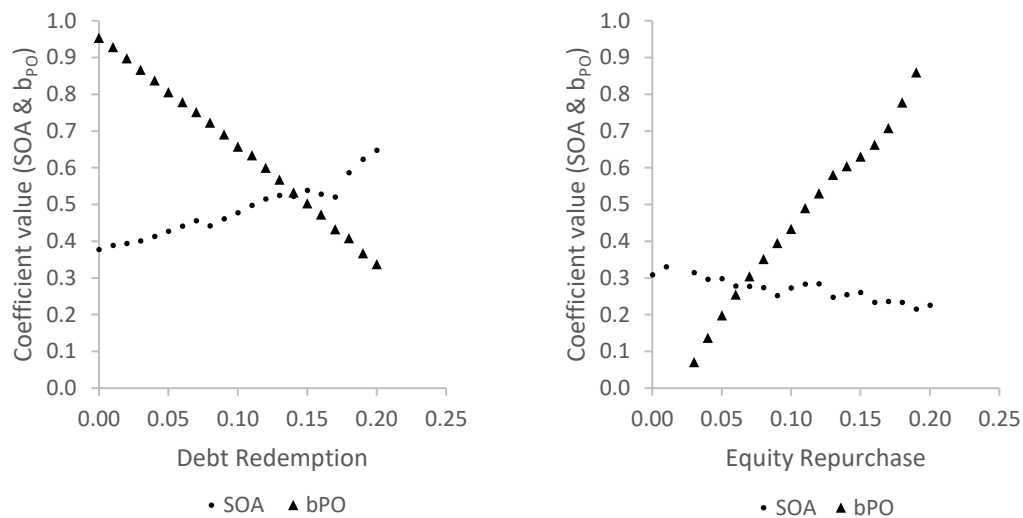
However, paying – down – debt firms do not seem to work in favour of stockholders. Thus, firms eventually decide to increase the value of stocks through repurchases (De Jong et al., 2010), and dividend smoothing (Brockman et al., 2022).

⁵ Very large debt and very large debt repurchase: greater than 10% threshold

These arguments indicate a decreasing pecking order coefficient in very high level of debt – redemption, an increasing pecking order coefficient in very large equity repurchases under the “semi – strong” form of the pecking order theory (Chirinko & Singha, 2000) as well as an increasing dividend smoothing coefficient. In other words, repurchasing shares without paying off all of the debt indicates the violation of the “strict” pecking order; hence, the decreasing values of pecking order coefficient under high level of the debt redemption is expected. We also expect higher level of pecking order as share repurchases increase. These firms prefer to pay down debt and then repurchase shares. Firms seems to minimize the agency conflict between stockholders and debtholders. Thus, firms may follow stockholders wealth maximization strategy reducing a possible agency conflict between bondholders and shareholders originating by the remaining cash holdings after paying off some of the debt.

In Figure 4, we test how dividend smoothing and pecking order respond to different levels of debt redemption and equity repurchase. According to the level of debt and equity repurchase, it seems that pecking order coefficient significantly decreases as debt redemption level rises (Figure 4, left – hand figure) and increases as equity repurchase level rises (Figure 4, right – hand figure).

Figure 4: The SOA and pecking order coefficient across different levels of security repurchase



Notes: In this figure, the left – hand figure shows both coefficients of SOA and pecking order under debt redemption. The right – hand figure shows both coefficients of SOA and pecking order under equity repurchase. The triangle – shaped dotted line represents the pecking order coefficient across different levels of security repurchase. We calculate pecking order coefficients using Equation (5) controlling for equity repurchase firms. We also calculate pecking order coefficients using Equation (5) controlling for debt redemption firms. The circle – shaped dotted line represents the SOA across different levels of security repurchase. We calculate SOAs as $1 - (\alpha_1 + \alpha_3)$

and $1 - (\alpha_1 + \alpha_4)$ under equity repurchase and debt redemption using Equation (4), respectively.

6. Conclusions

We empirically investigate whether and to what extent dividend paying firms follow a dividend smoothing and pecking order behaviour when they alter their capital structure. More precisely, we identify four types of corporate financing activities, i.e., equity and debt issues when firms have a financing deficit and equity repurchases and debt redemptions when firms have a financing surplus.

Pecking order theory is one of the dominant theories of capital structure. However, Myers (1984) and Myers and Majluf (1984) recognizes that a “strict” pecking order model is always rejected in modern finance, as firms tend to issue equity or repurchase shares. Thus, the term “modified” pecking order seems more realistic and fit in modern finance (Myers 1984; Chirinko & Singha, 2000; Leary & Roberts, 2010). Moreover, Myers (1984) and Fama and French (2012) mention that managers should fluctuate dividends to avoid issue equity under the “strict” pecking order theory, meaning the disappearance of dividend smoothing behavior. However, since the seminal paper of Lintner (1956), several studies suggest that dividend paying firms prefer to smooth their dividends; see, for example, Leary & Michaely, 2011; Michaely & Roberts, 2012; Javakhadze et al., 2014, among others).

Our study contributes to the dividend smoothing literature as it provides new insights how dividend smoothing policy is affected when firms make financing decisions. In particular, we provide novel evidence that firms smooth dividends more when they issue debt or repurchase equity and smooth dividends less when they issue equity and reduce debt. On the other hand, firms follow a pecking order when they issue or reduce debt and do not follow a pecking order when they issue or repurchase equity.

This study reveals how corporate financing decisions can impact on dividend smoothing when firms have financing deficit or financing surplus. To the best of our knowledge, this is the first study that directly links dividend smoothing with capital structure. Our approach can be extended investigating how dividend payouts vary across these four corporate financing events, i.e., debt issues, equity issues, debt redemptions and equity repurchases.

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Appendix*Variable Definitions*

Dividend per share: item 26

Earnings per share: item 58

Total assets: item 6

Retained earnings: item 36

Deficit: change in total assets minus change in retained earnings scaled by total assets

Surplus: negative values of deficit

Net equity issue: change in book equity minus change in retained earnings scaled by total assets

Book equity: total assets minus total liabilities (item 181) and preferred stocks plus deferred taxes and investment tax credit (item 35) plus convertible debt (item 79)

Preferred stocks: item 10, or item 56 if item 10 is missing, or item 130 if item 10 and item 56 is missing

Net equity repurchase: negative values of net equity issues

Net debt issue: change in total assets minus change in retained earnings minus net equity issue scaled by total assets

Net debt repurchase: negative values of net debt issue

Growth: multiplied close price (item 199) by common shares outstanding (item 25) plus total assets (item 6) minus book equity, all divided by total assets (item 6)