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ORIGINAL RESEARCH

Payout flexibility and capital expenditure

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Abstract Over the past two decades or so, repurchases have become an appealing method for disbursing cash to shareholders compared to the traditional dividends. Managerial perception as well as empirical evidence suggests that repurchases are inherently more flexible than dividends, which may account for their increasing popularity. The rigidity of dividends and the apparent flexibility of share repurchases could impact firm investments. Firms may forego profitable investment opportunities to maintain their dividend levels, while repurchases could be easily scaled back to fund profitable investment projects without fear of an adverse market reaction. We test the flexibility hypothesis of repurchases by regressing capital expenditures on repurchases and dividends in addition to other control variables. Consistent with our hypotheses, we find an inverse relationship between capital expenditures and repurchases but an insignificant relationship with dividends. Further, we find that the flexibility associated with repurchases is especially evident for firms that are financially constrained, and during the recent financial crisis period when external capital constraints were severe. Finally, we find that flexibility of repurchases with respect to capital expenditures is stronger in the more recent time period during which regulatory changes made repurchases more attractive as a mechanism to disburse cash back to shareholders.

Keywords Payout policy · Stock repurchases · Stock buybacks

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1 Introduction

Share repurchases have become an important mode of payout in recent years. Firms that choose to initiate payouts show an increasing propensity to repurchase stock rather than pay dividends. Even dividend-paying firms have increased the proportion of share repurchases in their total payout over time (Grullon and Michaely 2002). The increased preference for share repurchases over dividends could be due to many reasons. One that has received considerable attention, and the focus of this study, is the flexibility accorded by repurchases as opposed to dividends.[1] Very simply, by flexibility we mean that repurchases do not engender a commitment on the part of the firm to continue to make payouts once initiated or to raise them periodically. Dividends, on the other hand, are assumed to have this implicit commitment. The flexibility of repurchases can have real consequences, especially when firms face financial constraints. It enables firms to curtail or even eliminate buybacks when there is a need to preserve liquidity or to pursue profitable investment opportunities without fear of being penalized by the market.

The preference for payout flexibility is supported by both survey and empirical evidence. Brav et al. (2005) survey financial executives and find that managers like the flexibility of share repurchases and dislike the rigidity of dividends. Survey results reveal that this preference for repurchases stems from the view that once a firm initiates a dividend, it is expected to continue to pay dividends. However, share repurchases are not viewed as being subject to similar expectations. Further, while most managers agree that reducing dividends will draw a negative market reaction, only a small proportion of financial executives perceive a similar adverse consequence if repurchases are reduced.

Consistent with the reservations expressed by managers on dividends, Fama and French (2001) note that the proportion of firms paying cash dividends has decreased drastically. They document a lower propensity to pay dividends, even after controlling for the observed tilt in listed firms towards characteristics that do not favor payment of dividends—small, low earnings, and high-investment firms. They also state that the perceived value of paying dividends has declined. Grullon and Michaely (2002) and Jagannathan et al. (2000) find that share repurchases have increased in prominence compared to dividends. Grullon and Michaely (2002) document that large, established firms have not decreased their payouts to shareholders; they have merely shifted the form of payout from dividends to share repurchases. Thus the growth in share repurchases can explain the decreasing propensity to pay dividends, which also corroborates the survey evidence in Brav et al. (2005). However, none of these studies explicitly tests the flexibility hypothesis. The flexibility offered by share repurchases could be a primary factor explaining why firms choose to repurchase shares instead of paying dividends.

In this paper, we test the relative flexibility of repurchases and dividends by focusing on how flexibility affects firms' investment activity. Flexibility implies that firms can easily adjust their payout policies to accommodate their capital expenditure needs with little or no adverse consequence. Specifically, we test the sensitivity of capital expenditures to dividends and repurchases. In brief, we document a negative coefficient for repurchases and a generally insignificant coefficient for dividends when capital expenditures are regressed on

[1] Financial flexibility is more common in recent literature (Arslan-Ayaydin et al. 2014). In this paper we focus on the flexibility of share repurchases.

the two forms of payout and other control variables. The inverse relationship between capital expenditures and repurchases suggests that when investment needs are high, firms are able to scale back on repurchases and vice versa. The insignificant coefficient for dividends, on the other hand, implies that dividends are not secondary to capital investments. Further, we expect and find that the flexibility of repurchases is stronger for firms that are more financially constrained. Finally, and not surprisingly, we find that support for flexibility is stronger in the second half of the sample period (1992–2014) when repurchases became much more popular as a result of regulatory changes making it easier for firms to employ this payout mechanism.

We are not the first to examine the flexibility of repurchases over dividends. As mentioned earlier, the Brav et al. (2005) survey paper provides insight into the relative flexibility of repurchases from the viewpoint of managers. From an empirical perspective, Jagannathan et al. (2000) claim to have settled the debate on flexibility between share repurchases and dividends. They state that share repurchasers have volatile cash flows and payouts, implying that the latter are more flexible than dividends. Furthermore, they find that firms repurchase stock following poor performance and increase dividends following good performance. These results, in our opinion, do not establish that share repurchasers are more flexible than dividend payers. We argue that payout flexibility should manifest itself in firm policies and decisions, including those related to investments, capital sourcing, and liquidity management. Bliss et al. (2015) and Floyd et al. (2014) are two recent papers that come closer to examining the flexibility aspects of repurchases. The former studies the payout policy responses during the financial crisis and documents a negative impact on payouts, with repurchases exhibiting sharper cutbacks. The focus of the paper is mostly on liquidity conservation during the financial crisis period. The latter examines the evolution of payout policy for industrials and banks. They complement the payout policy literature by adding the banking industry to the sample, which has been largely neglected by researchers. Floyd et al. (2014) find that the declining propensity to pay reversed course in 2002 and that banks largely mirror that trend. Consistent with Bliss et al. (2015), they find that during the financial crisis, nonfinancial firms and banks were reluctant to cut dividends.

In contrast to the above-mentioned papers, our study focuses on the flexibility impact of repurchases on firm investment activity (capital expenditures). Rather than focusing on an extreme period such as the financial crisis, our goal is to see whether repurchases accord firms flexibility with regard to the their capital expenditures over time generally. We also hypothesize that flexibility, if it exists, is likely to be stronger for firms subject to greater financial constraints. Finally, we hypothesize that the flexibility effect will be stronger during the more recent period when repurchases became more appealing and also during the financial crisis period when financial constraints were especially severe.

The remainder of the paper is organized as follows. The next section presents the hypotheses. Section 3 describes the methodology and sample construction. Section 4 presents the results, while Sect. 5 concludes.

2 Hypotheses development

The flexibility offered by share repurchases can be classified into short-term and long-term flexibility. In the short term, a firm that announces an open market share repurchase program may choose not to carry through with the promise. Once a repurchase program has

been announced, a firm may opt not to repurchase any stock under the program owing to market timing considerations (Bozanic 2010); it may divert the cash earmarked for repurchases to some other purpose. Alternately, the firm may opt to repurchase only a fraction of the amount sought during the announcement of the program. In the long term, a firm that distributes excess cash flow through share repurchases may choose not to announce a share repurchase program every year. The firm also may not be expected to maintain the same level of share repurchases as the previous year. The firm may choose to increase or decrease the amount spent on share repurchases.

On the other hand, dividends are not perceived to offer the firm such flexibility. Managers consider dividends to be fairly rigid (Brav et al. 2005). Once a firm initiates dividends, it is expected to continue this course of action, which acts as a disincentive to initiate dividends in the first place. It is also expected that firms increase dividends each year, or at least maintain the level of dividends paid in the previous period. Firms contend that there is not much reward when they raise dividends. With dividends, firms believe that the cost of altering course by reducing dividends is greater than the cost of maintaining it. Any reduction in the dividend is interpreted as a sign of an ominous future and share prices tumble once a dividend reduction is announced (e.g., Liu et al. 2008, Michaely et al. 1995). Therefore, firms will opt to cut dividends only under extreme circumstances.

Maintaining dividends thus assumes top priority, and any increases in dividends are considered to be second order. Under these circumstances, one has to infer that dividends are not treated as residual cash flows. Dividend decisions are made at least simultaneously with investment decisions, if not earlier. Such a conservative dividend policy means that firm investments could suffer if it boils down to a choice between maintaining dividends and investment spending. Firms anticipating larger investment expenditures may opt to suppress dividend expectations by maintaining a low dividend payout (Beatty et al. 1997). A portion of the cash flow will be apportioned towards dividends as well as necessary investments. To the extent that dividends impose a binding constraint on the firm's cash flows, the firm may not invest adequately if cash flow is not sufficient to support both dividends and investments or if there is a constraint in accessing external capital (Yang et al. 2000). Consistent with this notion, managers interviewed by Brav et al. (2005) expressed the view that they might pass up some positive net present value (NPV) projects before cutting dividends. Some even expressed a willingness to raise external capital to fund investments without cutting dividends. Raising external capital, however, is costly. The fact that managers are willing to raise external capital instead of cutting dividends to support investments lends further support to the view that dividends could be a binding constraint that may hamper necessary investments. This view is also supported by Daniel et al. (2010), who find that only 6 % of the firms in their sample cut dividends when faced with a cash flow shortfall. Interestingly, 68 % of firms opt to make significant cuts to investments. More formally, dividend inflexibility leads to the following testable hypothesis.

H_1: Dividends and investments are not inversely related.

Unlike dividends, firms may not feel as constrained with share repurchases. While dividend payout ratio targets have been widely discussed in the literature, there is rarely any mention of a share repurchase ratio target in the academic world or in the business press. The dividend paying history of a firm also determines the decision to pay dividends. However, the share repurchase history of a firm is scarcely ever indicated as a motivation to repurchase more shares. Firms may not feel as burdened with a history of shares repurchases when it comes to their current decisions on share repurchase programs. While

dividends may be simultaneously determined along with investments, share repurchases are decided once necessary investments and liquidity needs have been met. To that extent, share repurchases are truly residual cash flows. Firms can choose to cut share repurchases to support positive NPV projects without the fear of an adverse market reaction. Therefore, the ability of share repurchases to adversely impact firm investments is expected to be negligible. The flexibility of repurchases implies the following testable hypothesis.

H_2: Repurchases and investments are inversely related.

Our next hypothesis examines the sensitivity of the repurchase-capital expenditure flexibility relationship to financial constraints, i.e., costly external financing. There is a considerable amount of research on how financial constraints affect investments. Much of this literature focuses on the sensitivity of investments to cash flow. The idea is that financially constrained firms have to primarily rely on internal cash flow sources; therefore, for these firms investments will be much more sensitive to internal cash flows than unconstrained firms. In their seminal paper, Fazzari et al. (1988) document a greater sensitivity of investment to cash flows for financially constrained firms even after controlling for growth opportunities. Using participation in the capital markets (debt) as an indicator of financial constraint, Gilchrist and Himmelberg (1995) find that firms that did not participate had very high sensitivity of investments to cash flow.[2]

Based on the above, the flexibility argument for repurchases should be stronger when financial constraints are more severe. This leads to our third testable hypothesis.

H_3: The inverse relationship between repurchases and investments is stronger for more financially constrained firms.

Bliss et al. (2015) document that external financial constraints were especially severe during the recent global financial crisis of 2008–2009. Short-term interest rates shot up, and the liquidity crunch was so severe that the money market virtually dried up. Payout flexibility is extremely valuable during such a difficult period. We believe that the flexibility of repurchases to fund investment needs was particularly strong during the financial crisis period. Thus our fourth hypothesis may be stated as:

H_4: Repurchases and investments exhibit a stronger inverse relationship during the financial crisis period.

Our final hypothesis examines the change in the sensitivity of investments to repurchases over time. There are several reasons why this sensitivity may change over time.

[2] Not everyone agrees with the interpretation that higher sensitivity of investments to internal cash flows is associated with higher constraints. Kaplan and Zingales (1997) find that the least constrained firms exhibit higher investment-cash flow sensitivity than firms that are classified as more financially constrained. They state that cash flow may act as a proxy for investment opportunities and the presence of outliers may explain the conflicting results found by Fazzari et al. (1988). Classifying firms *a priori* into different groups by size, Kadapakkam et al. (1998) use an international sample and find that investment-cash flow sensitivity is lowest in the small firm group and highest among the large firms, which is also confirmed by Cleary (1999). On the other hand, Allayannis and Mozumdar (2004) show that the Kaplan and Zingales (1997) results may have been influenced by possible outliers and by firms that face financial distress. Using negative cash flows as proxy for financial constraints and by removing some of the outliers in the Kaplan and Zingales (1997) study, Allayannis and Mozumdar (2004) find results that are more in line with Fazzari et al. (1988). Using simulated data, Alti (2003) demonstrates that investment and cash flow can be closely related even when financing is frictionless. While these studies question the interpretation of the sensitivity of investments to cash flow as an indication of the impact of financial constraints on investments, they do not suggest that financial constraints do not impact investments.

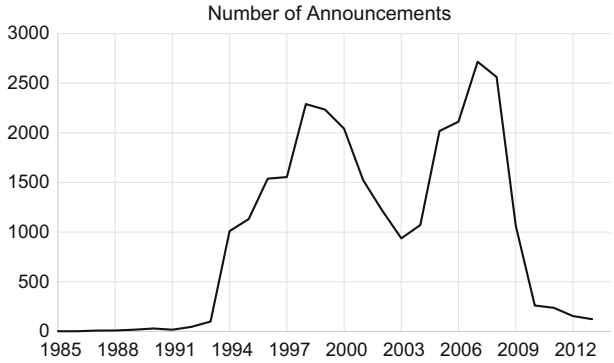

Fig. 1 Number of share repurchase announcements by year. Figure 1 plots the number of share repurchase announcements per year on the y-axis. We collect this information from SDC Platinum, which started collecting data in 1985. Share repurchase announcements include both tender offers and open market repurchases, although the latter represent the vast majority of announcements

Fama and French (2001) find that the propensity of firms to pay dividends dropped from 66.5 % in 1978 to 20.8 % in 1999. They attribute this decline in propensity to changing characteristics of listed firms towards smaller, less profitable, and high-growth firms–firms that are unlikely to pay dividends. Grullon and Michaely (2002) propose a substitution hypothesis, stating that repurchases have replaced dividends as the preferred mode of payouts for many firms. In part, this is attributed to the Securities and Exchange Commission's adoption of 10b-18 Safe Harbor Rules in 1982. This rule provided a safe harbor from liability for manipulation of security prices and made share repurchases more appealing as a way to disburse cash without suffering potential legal backlash from shareholders. Firms that comply with the provisions of Rule 10b-18 are deemed not to violate the anti-fraud provisions of the Securities Exchange Act of 1934. Specifically, Rule 10b-18 covers the manner of repurchase, time of repurchases, the price paid, and volume of shares repurchased. In Fig. 1, we plot the number of all share repurchase announcements since 1985.[3] This data is from SDC Platinum, who started collecting this data from 1985 onwards. Figure 1 shows that the number of share repurchase announcements is flat until 1992 and increases after that. Similarly, in Fig. 2 we plot the mean values of our test variable *Repurchases* from 1971 onwards. Figure 2 also displays a clear trend of increasing repurchases since 1992. We consider the early 1990s a turning point in the use of repurchases.

The regulatory change discussed above coupled with the demographic shift in listed firms to smaller, higher growth firms with greater earnings volatility, suggests that the perceived flexibility of repurchases became more appealing during the latter part of the sample period. This leads to our final testable hypothesis.

H_5: The inverse relationship between repurchases and investments is stronger in the latter part of the sample period.

[3] Figure 1 includes all repurchases, including open market, Dutch auction, and tender-offer repurchases, though the vast majority are of the open market type.

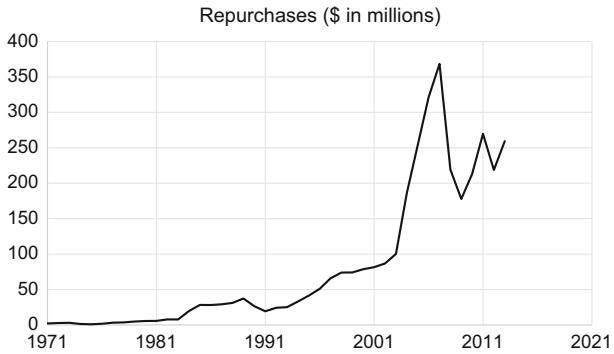

Fig. 2 Mean volume of repurchases by year. Figure 2 plots the average dollar value spent on repurchases ($ in millions)

3 Empirical methodology and sample

Our empirical methodology is straightforward. We regress capital expenditures on repurchases, dividends, and a host of control variables.

$$Capex_{i,t} = \beta_1 repurchases_{i,t} + \beta_2 Dividends_{i,t} + \boldsymbol{\delta ControlVariables_{i,t}} + \varepsilon_{i,t} \quad (1)$$

All variables are measured annually. The dependent variable, *Capex*, is defined as capital expenditures scaled by total assets. Our main test variable, *Repurchases*, is defined per Grullon and Michaely (2002) as cash expenditures for the purchase of common and preferred stock minus any reduction in the book value of preferred stock. This measure has been used in other papers, including Billett and Xue (2007) and Lie (2005). *Dividends* is defined as the total dividends paid per year. Both *Repurchases* and *Dividends* are scaled by total assets. Next we discuss the control variables. The control variables reflect those commonly used in related literature (Nohel and Tarhan 1998; Babenko et al. 2012; Andriosopoulos and Lasfer 2015; Andriosopoulos et al. 2013; Farrell et al. 2014). *Size* is defined as the log of total assets. *Leverage* is defined as the sum of long-term debt and short-term debt scaled by the total assets net of cash equivalents. *Market to Book*, which captures the growth potential of a firm, is defined as the sum of market value of shares and total assets net of cash equivalents and book common equity with the sum being scaled by total assets net of cash equivalents. *Tangibility*, a measure of borrowing capacity, is defined per Almeida and Campello (2007) as follows.

$$\text{Tan}gibility = (0.715 \times Rec + 0.547 \times Invt + 0.535 \times Ppe)/(Totassets - Cash) \quad (2)$$

where *Rec, Invt, Ppe, Tot assets*, and *Cash* are receivables, inventory, net property plant and equipment, total assets, and cash and equivalents, respectively. We also include a variable, *Cash Flow*, to control for internal cash availability. It is defined as operating income before depreciation scaled by total assets net of cash equivalents. All of the above-mentioned variables are taken from Compustat. Our final variable, *Firm Age*, is defined as the number of years the firm has appeared on Compustat.

Our initial sample consists of all firm-year observations in Compustat from 1971 to 2014 with available information needed to estimate the model discussed above. The base sample consists of the broadest set of firms in terms of their payout practices—firms that paid dividends, engaged in repurchases, paid dividends and repurchased stock, or did not engage in either payout activity in a given year. However, we also focus on the subset of firm-year observations that involved repurchases; this set includes firms that bought back

stock or bought back stock and paid dividends in the same year. That is, we eliminate nonrepurchasing firms (including dividend-only paying firms and nonpayout firms). Our primary reason for examining the subset of repurchasing firms is to see whether the sensitivity of investments to repurchases is affected by the overwhelming number of nonrepurchasing firms in the full sample. Also, repurchasing firms may be fundamentally different from dividend-only paying or nonpayout firms, resulting in potentially confounding effects. For example, higher dividend payout firms are generally associated with lower growth and lower capital expenditures; this would yield an inverse relationship between dividends and capital expenditures, but this is not an indication of flexibility. However, using the restricted sample of repurchasing firms, we are still able to test for the relative flexibility of dividends because many firms that repurchase shares also disburse cash to their shareholders via cash dividends; that is, they follow a dual payout policy. This actually allows us to conduct a more meaningful test of the relative flexibility of dividends and repurchases because the same firm serves as a control. By comparing the relative use of dividends and repurchases by the same firm, we need not worry about combining what may be two fundamentally different groups of firms that find it optimal to follow an exclusive payout policy. Although our main focus is on repurchasing firms, in a later part of the study we also more carefully examine the subset of firms that are dividend payers exclusively and do not engage in buyback activity.

Our empirical methodology also requires a method to identify a firm's degree of financial constraint. Recall that Hypothesis 3 proposes that the need for payout flexibility will be especially important for highly financially constrained firms. There are several proxies to measure a firm's degree of financial constraint. Two measures that have been widely used in the literature are the KZ index (Chen and Wang 2012) and the WW index (Lamont et al. 2001; and Whited and Wu 2006). We present results using both measures.

3.1 Summary statistics

Table 1 presents summary statistics for the full sample and two subsamples. Table 1, Panel A, presents summary data for the full sample of firm-year observations. For the sample as a whole, the mean capital expenditure per year as a percent of total assets amounts to 8.7 % with a median of 5.2 %. The mean repurchases as a percent of total assets equals 1.2 % while the median is zero. Firms on average pay out dividends equal to 1.4 % of total assets, but the median firm does not pay out anything in dividends. The average equity issuance ratio is 1.1 % while the median is 0.5 %. The mean firm total asset size is $1.3 billion, though the median is only $87 million. Mean leverage for the full sample is 20 % with a median of 21 %. The mean growth value as reflected in the market-to-book ratio appears to be considerably high at 2.16, but the median is only 1.19. The sample firms have a healthy cash flow averaging 6.9 % (6.3 % median) of total assets. Fixed assets on average make up 38 % (40 % median) of total assets. The average age of the sample firms is 12.5 years (9 years median).

Panel B presents the summary statistics for repurchasing firms, which we define as firms that repurchase stock in a given year or both repurchase stock and pay dividends in a given year. This subset of firms on average invest 7.3 % (4.7 % median) of total assets in capital expenditures. In terms of payout, repurchasing firms on average spend the equivalent of 3.5 % (1 % median) of total assets on share buybacks. Repurchasing firms also pay out dividends equal to 1.6 % of total assets, though the median is close to zero. Thus, many firms that buy back shares also pay out dividends. Repurchasing firms also issue equity averaging 2 % (1 %) of total assets. The average repurchasing firm has $2 billion in assets

Table 1 Descriptive statistics and correlations

Variable	N	Mean	SD	1st quartile	Median	3rd quartile
Descriptive statistics						
Panel A: Descriptive statistics for all firm-year observations						
Capex	218,935	0.0873	0.0859	0.0196	0.0518	0.0962
Repurchases	218,935	0.0123	0.0245	0.0000	0.0000	0.0105
Issuances	218,935	0.0110	0.0744	0.0000	0.0050	0.0130
Dividends	218,935	0.0137	0.0520	0.0000	0.0000	0.0167
Size	218,935	1330.0470	4213.4057	11.0451	86.7653	549.7329
Leverage	218,935	0.1952	0.2602	0.0516	0.2056	0.3758
Market to book	218,935	2.1567	2.8988	0.9231	1.1967	1.9065
Cash flow	218,935	0.0689	0.1878	0.0154	0.0633	0.1118
Tangibility	218,935	0.3759	0.1563	0.2672	0.4012	0.4976
Age	218,935	12.4664	11.8426	4.0000	9.0000	17.0000
Panel B: Descriptive statistics for firm-year observations in which firms repurchased shares						
Capex	64,349	0.0727	0.0880	0.0200	0.0474	0.0937
Repurchases	64,349	0.0350	0.0700	0.0023	0.0105	0.0348
Issuances	64,349	0.0197	0.0327	0.0035	0.0101	0.0187
Dividends	64,349	0.0157	0.0334	0.0000	0.0011	0.0185
Size	64,349	2053.8001	8111.1804	6.5920	66.3277	667.2799
Leverage	64,349	0.2250	0.2100	0.0428	0.1844	0.3415
Market to book	64,349	2.1156	3.5242	0.9930	1.2828	2.0389
Cash flow	64,349	0.0609	0.1677	0.0319	0.0839	0.1307
Tangibility	64,349	0.3639	0.1522	0.2584	0.3963	0.4865
Age	64,349	15.7100	13.3428	6.0000	12.0000	22.0000
Panel C: Descriptive statistics for all firm-year observations without share repurchases						
Capex	154,586	0.0951	0.0848	0.0196	0.0518	0.1062
Issuances	154,586	0.0063	0.0969	0.0000	0.0000	0.0079

Table 1 continued

Variable	N	Mean	SD	1st quartile	Median	3rd quartile
Dividends	154,586	0.0126	0.0620	0.0000	0.0000	0.0149
Size	154,586	940.3338	2114.6029	15.4990	87.2030	572.5370
Leverage	154,586	0.1792	0.2872	0.0537	0.2194	0.4049
Market to book	154,586	2.1788	2.5621	0.9071	1.1561	1.8509
Cash flow	154,586	0.0732	0.1986	0.0006	0.0633	0.1118
Tangibility	154,586	0.3823	0.1585	0.2867	0.4280	0.5045
Age	154,586	10.7199	11.0348	3.0000	7.0000	15.0000

Panel D: Correlation matrix for full sample

	Capex	Repurchases	Issuance	Dividends	Size	Leverage	Market to book	Cash flow	Tangibility	Age
Capex	1.000									
Repurchases	−0.012**	1.000								
Issuance	0.043**	−0.238***	1.000							
Dividends	0.001*	0.001	−0.006	1.000						
Size	−0.052**	0.052***	0.003	−0.014**	1.000					
Leverage	−0.005*	−0.017**	0.006**	−0.0003	−0.031***	1.000				
Market to book	0.019**	−0.045**	0.011*	0.0003	−0.033***	0.106***	1.000			
Cash flow	0.133***	0.046**	−0.021***	0.0002	0.031***	−0.042***	−0.118***	1.000		
Tangibility	0.149***	0.085***	−0.103***	−0.018***	0.068***	−0.059***	−0.018***	0.016***	1.000	
Firm age	−0.051***	0.007	0.061*	0.005	0.410***	−0.006	−0.012**	0.001	0.053**	1.000

The sample includes all firm-year observations in Compustat during the period 1971 to 2014 with the required data. The sample excludes financial and utility firms. Panel A reports the descriptive statistics for the full sample of firm-year observations. Panel B reports descriptive statistics for firm-year observations in which firms repurchased shares or repurchased shares and paid dividends, and Panel C reports descriptive statistics for firm-year observations with no repurchase activity, i.e., firms that either paid dividends only or did not engage in any form of payout activity. Panel D reports the Pearson correlation coefficients for the full sample. All variables are winsorized at the 1st and 99th percentiles

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

($66 million median). The average leverage ratio is 22.5 % with a median of 18 %. Average market-to-book ratio is 2.1 (1.3 median). The sample of repurchasing firms has a healthy cash flow averaging 6.1 % (8.4 % median) of total assets. On average, fixed assets make up 36 % (40 %) of total assets. The average age of repurchasing sample firms is 16 years (12 years median).

Panel C provides summary statistics for the subset of nonrepurchasing firms, which includes firms that pay only dividends (with no share buybacks) or do not engage in any form of payout in a given year. The nonrepurchasing firms on average invest 9.5 % (5.2 % median) of total assets in capital expenditures, which is higher than the repurchasing subset. However, this is in all likelihood driven by the nonpayout firms in this subgroup. The mean dividend payout ratio is 1.3 % with a median of zero. The relatively low dividend ratio is obviously influenced by the large of number of nonpayout firms in this subset. Nonrepurchasing firms issue very little equity at 0.63 %. The average nonrepurchasing firm has a mean firm size of $940 million in assets ($87 million median). The average leverage ratio is approximately 18 % (22 % median). The mean market-to-book ratio is 2.2, with a median of 1.2. The firms in this subset have a cash flow that averages 7.3 % (6.3 % median) of total assets. Fixed assets on average make up 38 % (43 %) of total assets. The average firm age for this subgroup is 11 years (7 years median).

Panel D presents correlation statistics for key variables for the full sample.[4] It is interesting to note that capital expenditures are negatively correlated with repurchases, which is consistent with our flexibility argument. However, dividends exhibit a significant positive correlation with capital expenditures. Larger firms and older firms appear to spend less on capital expenditures while higher cash flows are associated with higher capital expenditures. There is also a positive relationship between tangibility and capital expenditures, which is expected. The correlation matrix also reveals that multicollinearity is not likely to be a problem based on the pair-wise correlations between the various independent variables.

4 Results

4.1 Relationship between dividends, repurchases, and capital expenditures (Hypotheses 1 and 2)

Table 2 presents estimates of Eq. (1), which we use to test Hypotheses 1 and 2. Our focus is on the significance and sign of the coefficient for *Repurchases* and *Dividends*. In Model 1, we present estimates of Eq. (1) for the full sample consisting of all firm-year observations, including firms that bought back shares and/or paid out dividends and firms that did not engage in any form of payout in a given year. Our test variable *Repurchases* is negatively related to capital expenditures, *Capex*. The coefficient is significant at the 5 % level. *Dividends*, on the other hand, are not related to capital expenditures. Model 1 supports Hypothesis 2 that firms curtail repurchases to fund capital investment needs. On the other hand, we observe that the coefficient for *Dividends* is insignificant, supporting Hypothesis 1 that firms do not adjust dividends in response to their investment needs. We see similar results in Model 2, which is restricted to firms that bought back shares in a given year or followed a dual payout policy of buying back shares and paying dividends in

[4] For the sake of brevity, we omitted the correlation statistics for the subgroups but they are available from the authors upon request.

Table 2 Payout flexibility and capital expenditures

Independent variable	Dependent variable—Capex/net assets					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Repurchases	−0.0001	−0.0004	−0.0003	−0.0007	−0.0950	−0.4368
	(−2.4700)**	(−2.9300)***	(−5.5400)***	(−4.1200)***	(−3.1200)***	(−2.6700)**
Dividends	−0.0001	−0.0002	−0.0001	−0.0002	−0.0001	−0.0003
	(−1.1400)	(−0.9100)	(−1.5200)	(−0.8500)	(−1.1600)	(−1.0300)
Size	−0.0050	−0.0014	−0.0022	−0.0031	−0.0055	−0.0029
	(−13.7700)***	(−8.7200)***	(−14.9100)***	(−7.9200)***	(−13.8200)***	(−7.4100)***
Leverage	0.0004	−0.0001	−0.0002	−0.0021	0.0006	−0.0019
	(5.4500)***	(−4.7200)***	(−2.4500)**	(−2.3400)**	(6.0100)***	(−2.0300)**
Market to book	0.0000	0.0010	0.0000	0.0016	0.0000	0.0014
	(2.2400)**	(14.3500)***	(2.7600)***	(17.6200)***	(3.1100)***	(15.2200)***
Cash flow	−0.0000	−0.0000	0.0000	−0.0000	−0.0005	0.0000
	(−4.7100)***	(−0.3700)	(0.3400)	(−0.7100)	(−4.9700)***	(−0.3600)
Tangibility	−0.0502	0.0433	−0.0286	0.0484	−0.0508	0.0493
	(−8.4500)***	(17.5700)***	(−11.8300)***	(16.0100)***	(−8.4700)***	(16.1700)***
Firm age	−0.0012	−0.0006	−0.0010	−0.0006	−0.0019	−0.0006
	(−15.5600)***	(−22.4800)***	(−32.3100)***	(−15.3200)***	(−17.6200)***	(−17.0000)***
Intercept	0.1628	0.0857	0.1327	0.1611	0.1660	0.1924
	(51.1700)***	(62.2400)***	(101.6200)***	(32.2300)***	(52.300)***	(47.7200)***
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
# Observations	218,935	64,349	198,676	62,821	218,935	64,349

Table 2 continued

Independent variable	Dependent variable—Capex/net assets					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Adj. R^2	0.06	0.19	0.07	0.16	0.06	0.17

The dependent variable is the ratio of Capex to Net Assets. The independent variables are Repurchases, Dividends, and control variables. All variables are defined in the text. In Model 1 we use contemporaneous values of the dependent and independent variables, including Repurchases and Dividends and including the full sample of firm-year observations from 1971 to 2014. The full sample consists of firms that paid dividends and/or bought back stock or did not engage in any form of payout activity in a given year. Model 2 is similar to Model 1 but uses a restricted set of observations that only includes repurchasing firms that repurchased stock or repurchased stock and paid dividends in a given year. Models 3–6 control for endogeneity. Models 3 and 4 are similar to Models 1 and 2 except that Repurchases and Dividends are lagged one year to control for endogeneity. Models 5 and 6 use the instrumental variables approach to control for endogeneity; estimates shown are for the second stage regressions. Industry dummies are based on two-digit Standard Industrial Classification codes. Heteroskedasticity adjusted T-Statistics are shown in parentheses

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

the same year. Thus, we document that the flexibility of repurchases with respect to capital expenditures is evident in both the restricted sample as well as more generally when all firm-year observations are considered.

It is interesting to note that in the restricted set, dividends continue to be insignificant. Recall that the restricted sample includes firms that repurchased their shares and paid out dividends in the same year. Thus, with the restricted sample we are still able to test for the relative flexibility of dividends as called for in our first hypothesis. This actually makes for a more meaningful test of the relative flexibility of dividends and repurchases because the same firms serve as controls. That is, by comparing the relative use of dividends and repurchases by the same firm, we need not worry about combining what may be two fundamentally different groups of firms that find it optimal to follow an exclusive payout policy.[5]

Our models to test Hypotheses 1 and 2 could be affected by endogeneity. The decision to repurchase shares could be predetermined along with investment policy. For example, a firm may be in an industry that could be experiencing slower growth or even negative growth. This situation could be the result of macro-economic factors or structural changes such as changes in consumers' buying habits and behavior or heavy competition. Such an environment could force firms to conserve cash and curtail both investments and repurchases at the same time, which makes share repurchases endogenous with investments. We control for endogeneity by lagging the test variables *Repurchases* and *Dividends* and by employing a two-stage instrumental variables approach as in Brockman et al. (2008) and Brockman and Chung (2001). Specifically, we use the risk-free interest rate, cash flow from operations, and standard deviation of the value-weighted monthly market returns during the year of the share repurchase to predict share repurchases and use the predicted values as our test variable. These results are presented in Models 3–6 in Table 2. Models 3 and 4 are equivalent to Models 1 and 2 but use lagged values for *Repurchases* and *Dividends* as a means of mitigating endogeneity. Our results continue to hold–repurchases are significantly negatively related to capital expenditures, whereas dividends are not related. In Models 5 and 6, we use the two-stage instrumental variables method and report the second stage results. Once again, we confirm Hypotheses 1 and 2; dividends are not inversely related to capital expenditures, but repurchases are inversely related to capital expenditures.

With respect to the control variables, we find that some of the variables behave consistently across all the six models in Table 2, but there are instances where some variables exhibit a mixed pattern. The mixed cases, however, tend to be consistent across models within a given sample. Older firms are associated with lower capital expenditures, which could be attributed to firm maturity. Firm size is also negatively related to capital expenditures across all six models. Firms with higher market-to-book, expectedly, spend more in capital expenditure. We also find that firms with higher cash flow tend to spend less on capital expenditures, but this relationship is not very strong. Tangibility exhibits a mixed relationship with capital expenditures. Models 1, 3, and 5 exhibit a negative relationship whereas Models 2, 4, and 6 exhibit a positive relationship. On the surface, this result looks perplexing. But a careful examination reveals that this is not the case. Models 2, 4, and 6 are based on firms that engage in buyback activity, whereas Models 1, 3, and 5 include all firm-year observations. The positive association between tangibility and capital expenditures in the subsample of repurchasing firms may be due to the fact that

[5] Strictly speaking, this is not entirely true as the restricted sample of repurchases also include firms that engage in repurchases only and do not follow a dual repurchase-dividend policy.

Table 3 Payout flexibility: effect of financial constraints and time period

Independent variables	Dependent variable—Capex/net assets							
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Repurchases	−0.0010	0.0003	−0.0139	−0.0026	−0.0162	−0.0004	−0.0181	0.0003
	(−2.2100)**	(0.5000)	(−2.4700)**	(−2.2500)**	(−2.2200)**	(−2.9000)**	(−2.4700)**	(1.5800)
KZ dummy	−0.0001	0.0002						
	(−0.0700)	(−0.1000)						
KZ * repurchases	−0.0097	−0.0272						
	(−3.1600)***	(−6.1900)***						
KZ * dividends	−0.0002	−0.0002						
	(−0.2700)	(−0.1000)						
WW dummy			0.0371	0.0079				
			(3.1100)***	(6.7700)***				
WW * repurchases			−0.0019	−0.0002				
			(−2.1500)**	(−1.9700)**				
WW * dividends			−0.0001	−0.0001				
			(−0.9200)	(−1.0700)				
FC dummy					−0.0080	−0.0710		
					(−1.9100)*	(−2.9800)***		
FC dummy * repurchases					−0.0042	−0.0099		
					(−3.1900)***	(−2.7600)***		
FC dummy * dividends					−0.0019	−0.0027		
					(−0.8700)	(−1.1900)		
1992 dummy							−0.0097	−0.0081
							(−0.5700)	(−0.4200)
1992 dummy * repurchases							−0.0020	−0.0003
							(−2.7900)***	(−2.5300)**

Table 3 continued

Independent variables	Dependent variable—Capex/net assets							
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
1992 dummy * dividends							0.0009	0.0012
							(1.5400)	(1.9700)**
Dividends	−0.0002	−0.0002	−0.0003	−0.0002	−0.0002	−0.0002	−0.0002	−0.0001
	(−1.5400)	(−0.7200)	(−1.2500)	(−0.7100)	(−1.3300)	(−0.8900)	(−1.1600)	(−0.3000)
Firm size	−0.0068	−0.0031	−0.0072	−0.0043	−0.0071	−0.0014	−0.0076	−0.0021
	(−15.3000)***	(−8.5700)	(−15.9100)***	(−8.0200)***	(−14.7200)***	(−8.9400)***	(−15.3200)***	(−7.6300)***
Leverage	0.0004	−0.0001	0.0003	−0.0001	0.0004	−0.0001	0.0007	−0.0001
	(5.6100)***	(−4.9200)***	(3.2100)***	(−4.9000)***	(4.6500)***	(−4.6800)***	(7.1300)***	(−5.3100)***
Market to book	0.0000	0.0021	0.0000	0.0010	0.0000	0.0008	0.0000	0.0008
	(1.9600)**	(14.9200)***	(2.6500)**	(14.8300)***	(2.3200)**	(13.4000)***	(2.6100)**	(12.2300)***
Cash flow	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000
	(−4.6200)***	(−0.9100)	(−4.9100)***	(−0.7100)	(−3.7100)***	(−1.0600)	(−4.8500)***	(−1.3100)
Tangibility	−0.0541	0.0427	−0.0562	0.0452	−0.0572	0.0427	−0.0564	0.0569
	(−9.2100)***	(16.7100)***	(−9.0200)***	(17.7100)***	(−9.7100)***	(17.3100)***	(−9.0700)***	(22.3700)***
Firm age	−0.0016	−0.0006	−0.0014	−0.0007	−0.0015	−0.0006	−0.0014	−0.0007
	(−17.2000)***	(−27.1000)***	(−16.1300)***	(−27.3600)***	(−16.7800)***	(−22.5800)***	(−16.1200)***	(−22.7900)***
Intercept	0.1721	0.0812	0.1714	0.0735	0.1910	0.1620	0.1461	0.1097
	(43.0400)***	(21.1500)***	(47.5200)***	(24.2300)***	(42.8700)***	(40.1200)***	(41.8700)***	(38.2100)***
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	218,935	64,349	218,935	64,349	218,935	64,349	218,935	64,349

Table 3 continued

Independent variables	Dependent variable—Capex/net assets							
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Adj. R^2	0.06	0.19	0.07	0.19	0.06	0.19	0.06	0.20

The dependent variable is the ratio of Capex to Net Assets. The independent variables are Repurchases, Dividends, and control variables. In addition, the models contain variables to test for sensitivity of payout flexibility to financial constraints and time period. Financial constraints are proxied by the Kaplan-Zingales (KZ) and Whited-Wu (WW) indexes. The KZ (WW) Dummy takes the value of 1 if KZ (WW) value is higher than the median and 0 otherwise. We interact the dummy with the two payout variables to test whether the flexibility of the payout variable is stronger when financial constraints are more severe. To test for the sensitivity to the financial crisis period, we include the FC Dummy variable (= 1 for 2008 and 2009) for the financial crisis years and its interaction with the two payout variables. For time period tests, we explore the sensitivity of payout flexibility to the second half of the sample period (= 1 for post-1992). We do this by including the 1992 Dummy variable (for post-1992 observations) and its interaction with the two payout variables. For each set of tests we provide regressions for the full sample followed by the restricted sample of firms that repurchased stock or repurchased stock and paid dividends in a given year. The first six models provide tests related to financial constraints. Models 1 and 2 (3 and 4) provide estimates for the KZ (WW) financial constraint measure, while Models 5–6 test for the effects of the financial crisis period. Models 7 and 8 test for the sensitivity of effects to the second half of the time period. Industry dummies are based on two-digit Standard Industrial Classification codes. T-Statistics are in parentheses. The t-statistics are based on heteroskedastic-consistent standard errors

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

repurchasing firms tend to be high growth firms that may be investing in tangible assets. The negative coefficient in the full sample may be attributed to the presence of dividend paying firms that are in a mature phase; tangibility in these firms may be a proxy for maturity, which in turn is associated with low capital expenditures. Leverage is negatively associated with capital expenditures except in Models 1 and 5.

Overall, based on the evidence in Table 2, it is apparent that firms adjust their repurchases depending on their capital expenditure needs, but leave dividends untouched or view them independently of their capital expenditure decisions.

4.2 Impact of financial constraints and the financial crisis on repurchase flexibility (Hypotheses 3 and 4)

In Hypothesis 3, we examine the potential moderating role of financial constraints on the flexibility of repurchases. Firms with low financial constraints may have access to external capital sources to continue their payouts without any disruptions to their capital investments. On the other hand, firms that rank high on financial constraints either have to forgo profitable opportunities or, as we argue in this hypothesis, redirect their repurchases to more profitable investments.[6] To test this hypothesis, as discussed previously, we utilize the KZ and WW financial constraint indexes. We calculate these indexes for each firm every year and classify firms into low and high financial constraint subsamples using the median values of the respective indexes for each year. We then estimate regression Eq. (1) augmented with the financial constraint dummy variables (*KZ Dummy*, *WW Dummy*) and their interactions with the payout variables (*KZ*Repurchases*, *KZ*Dividends*, *WW*Repurchases*, *WW*Dividends*). The results are reported in Table 3. Models 1 and 2 (3 and 4) provide estimates for the full and repurchase sample using the KZ (WW) financial constraint index measures, respectively. We note that the coefficient for *Repurchases* is significantly negative in all models except Model 2 and that its interaction with the financial constraint variable is significantly negative across all four models. Thus, we find that the flexibility of repurchases with respect to capital expenditures is especially strong when firms are financially constrained. Interestingly, we find no evidence of the moderating effect of financial constraints on dividends.

We next consider an interesting extension of the financial constraints analysis by focusing on the financial crisis period. The financial crisis of 2008–2009 (Bliss et al. 2015) put a strain on the liquidity of firms, including their ability to raise external capital. In such a scenario, firms must rely on their internal cash flow and otherwise conserve their cash to fund their investments. Given the extreme nature of the financial crisis period, it is conceivable that both repurchases and dividends could be equally curtailed to sustain firm investments. To examine whether repurchases and dividends were reduced to sustain investments, we replace the firm financial constraint dummy variables and their interaction terms with a financial crisis dummy variable that takes the value 1 for the financial crisis years of 2008/2009 and 0 otherwise (*FC Dummy, FC Dummy* × *Repurchases, FC Dummy* × *Dividends*). Estimates are presented in columns 5–6 in Table 3. It is interesting to note that the coefficient for *FC Dummy* is negative, indicating (not surprisingly) that during the financial crisis capital expenditures were curtailed. The negative coefficient for *FC Dummy* × *Repurchases* is consistent with the idea that firms reduced repurchases to invest in capital expenditures, although their overall capital expenditures may have

[6] There are other options that firms may avail, including asset sales, alliances, etc.; but these may take more time to implement.

declined during the financial crisis period. Thus, even in the difficult environment of the financial crisis, repurchases continued to exhibit their flexibility with respect to capital expenditures. Dividends, however, did not evidence similar flexibility over the financial crisis period.

4.3 Repurchase flexibility and time period (Hypothesis 5)

In our final test, we estimate the capital expenditure-payout relationship for the sample classified by time. We hypothesize that the flexibility associated with repurchases will be stronger in the second half of the sample period. As hypothesized, repurchases became much more common starting in the 1980s because of easier regulation and presumed awareness of their flexibility. Specifically, the SEC's adoption of Rule 10b-18 in 1982 made repurchases less vulnerable to potential litigation, thereby enhancing its use as a payout mechanism with greater flexibility than dividends.

As noted in the hypotheses development section, the increasing trend for repurchases is especially notable after 1992. Consequently, we augment Eq. (1) with the dummy variable, *1992 Dummy*, that takes the value of 1 for firm-years post-1992 and 0 otherwise; we also interact this dummy variable with the payout variables *Repurchases* and *Dividends*. The results are shown in Models 7 and 8 of Table 3. The interaction term *1992 Dummy* × *Repurchases* is significantly negative in the full and subsample estimations, though the *Repurchases* variable itself is significant in the full sample but not the subsample. The evidence clearly supports the notion that managers became much more aware of the flexibility of repurchases and used it effectively to support their capital expenditure programs in the post-1992 period relative to the earlier period. With respect to dividends, we continue to find no support for the flexibility hypothesis either in the full or post-1992 periods.

4.4 Additional tests[7]

In this section we present some additional tests focused specifically on dividend payers and extending the analysis to include the effect of payouts on a longer window of capital expenditures.

4.4.1 Flexibility of dividend payer subsample

We examine more carefully our conclusions with respect to the flexibility of dividends by focusing exclusively on firm-year observations that only include firms that paid out dividends and did not engage in any share buybacks. One could make an argument that including share repurchases and dividends in a single model might confound the results and make them biased. Put another way, the true effect of dividends could be masked by the presence of repurchases. We test the above conjecture by keeping only firm-year observations with dividends; that is, we drop all firms that bought back shares, bought back shares and paid dividends, or did not engage in any form of payout in a given year. The results are presented in Table 4. Model 1 estimates use contemporaneous values of Dividends, while Model 2 utilizes lagged values for *Dividends*. Surprisingly, the coefficient for Dividends is significantly negative in both models. Thus restricting the sample to dividend payers only indicates that dividends may be flexible after all. However, this conclusion

[7] We thank an anonymous reviewer for suggesting these additional robustness tests.

Table 4 Flexibility tests for dividends only sample

Independent variable	Dependent variable—Capex/net assets	
	Model (1)	Model (2)
Dividends	−0.0025	−0.0017
	(−3.4100)***	(−3.3600)***
Size	−0.0002	−0.0002
	(−0.8200)	(−0.9500)
Leverage	0.0018	0.0019
	(3.2100)***	(3.3600)***
Market to book	0.0020	0.0023
	(16.5400)***	(17.4600)***
Cash flow	−0.0076	−0.0074
	(−5.3100)***	(−4.8900)***
Tangibility	0.0620	0.0639
	(25.2000)***	(26.2500)***
Firm age	−0.0003	−0.0004
	(−12.3000)***	(−17.3700)***
Intercept	0.0690	0.0640
	(47.2000)***	(45.3900)***
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
Number of observations	81,317	76,760
Adj. R^2	0.21	0.21

The dependent variable is the ratio of Capex to Net Assets. The independent variables are Dividends and control variables. All variables are defined in the text. This table tests the flexibility of dividends using only the sample of firms that paid out dividends exclusively in any given year. In Model 1 (2), contemporaneous (lagged) values of Dividends are used. Industry dummies are based on two-digit Standard Industrial Classification codes. Heteroskedasticity adjusted T-Statistics are in parentheses

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

could be misleading. It is conceivable that the inverse relationship reflects an agency explanation rather than one rooted in flexibility. Specifically, high dividends are generally associated with firms with few growth opportunities. Thus an inverse relationship simply reflects Jensen's (1986) agency-based free cash flow argument that firms with low investment needs should disburse their excess cash in the form of dividends in order to minimize agency problems. To see whether the negative coefficient for *Dividends* is reflective of an agency-based rather than a flexibility-motivated explanation, we conduct two additional tests.

Our first test involves splitting the sample into two subsamples using the median market-to-book ratio. Firms with lower (higher) market-to-book ratios are classified as low-growth (high-growth). Following Jensen's (1986) free cash flow argument, managers of firms that face low growth may decide to return cash to their investors and also refrain from increasing capital expenditures. Thus an inverse relationship between dividend and capital expenditures in the low-growth subsample, but not in the high-growth subsample, is consistent with an agency-based explanation rather than one based on flexibility. Table 5 presents the results of the subsample analysis. Model 1 presents estimates with contemporaneous cash dividends, and Model 2 estimates use lagged cash dividends. Models 3 and 4 replicate Models 1 and 2, but for the high-growth subsample. Cash dividends are found to be inversely related to capital expenditures only in the low-growth sample, not in the high-growth sample. The high-growth subsample is where you would expect flexibility to be a motivating factor, i.e., ability to scale back dividends to finance investments. However, we note that the coefficient for *Dividends* is insignificant for this subgroup.

Table 5 Flexibility tests on dividends: market-to-book subsamples

Independent variable	Dependent variable—Capex/net assets			
	Low growth sample		High growth sample	
	Model (1)	Model (2)	Model (3)	Model (4)
Dividends	−0.0026	−0.0025	−0.0002	−0.0001
	(−5.2400)***	(−4.3000)***	(−0.2400)	(−0.1300)
Size	−0.0006	−0.0010	−0.0001	−0.0001
	(−1.6100)	(−2.1300)**	(−0.0700)	(−0.1200)
Leverage	0.0018	0.0013	0.0018	0.0028
	(3.7600)***	(3.8200)***	(3.2100)***	(5.2200)***
Market to book	0.0011	0.0013	0.0027	0.0033
	(9.6200)***	(9.5900)***	(17.1200)***	(18.2400)***
Cash flow	−0.0079	−0.0079	−0.0068	−0.0067
	(−4.8900)***	(−5.2100)***	(−4.9100)***	(−4.8500)***
Tangibility	0.0612	0.0629	0.0628	0.0634
	(23.8700)***	(23.0600)***	(27.0100)***	(25.1800)***
Firm age	−0.0006	−0.0010	−0.0002	−0.0005
	(−16.7200)***	(−23.2500)***	(−9.0200)***	(−19.2600)***
Intercept	0.0682	0.0636	0.0691	0.0643
	(45.0600)***	(42.1600)***	(48.1700)***	(41.3700)***
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Number of observations	40,658	38,380	40,659	38,380
Adj. R^2	0.25	0.23	0.16	0.17

The dependent variable is the ratio of Capex to Net Assets. The independent variables are Dividends and control variables. All variables are defined in the text. This table tests the flexibility of Dividends for subsamples classified into high and low market-to-book subsamples. The sample is confined to firms that only paid dividends in any given year. Models 1 and 2 (3 and 4) provide estimates for the low (high) market-to-book subsample. Models 1 and 3 (2 and 4) use contemporaneous (lagged) values of Dividends. Industry dummies are based on two-digit Standard Industrial Classification codes. Heteroskedasticity adjusted T-Statistics are in parentheses

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

In our second test, we split the dividend-paying firms into high and low dividend subgroups using the median value for *Dividends*. The high-dividend subgroup is subject to the free cash-flow problems highlighted by Jensen (1986) and should exhibit a negative coefficient for Dividends consistent with an agency-based rather than a flexibility-based explanation. These firms tend to have excess free cash flow and few growth opportunities, so from an agency perspective, the firms are better off increasing their dividend payout to shareholders and lowering their capital expenditures. Empirically, this implies a negative relationship between *Dividends* and *Capex*. On the other hand, the low-dividend firms that are presumed to have low free cash flow, should benefit from scaling back dividends to finance additional investments consistent with the flexibility hypothesis. Thus, for the low-dividend subgroup, a negative coefficient for Dividends is consistent with a flexibility

Table 6 Flexibility tests on dividends: dividend yield subsamples

Independent Variable	Dependent variable—Capex/net assets			
	Low dividend-yield sample		High dividend-yield sample	
	Model (1)	Model (2)	Model (3)	Model (4)
Dividends	0.0019	0.0012	−0.0015	−0.0018
	(2.0600)**	(1.8100)*	(−3.3500)***	(−4.8700)***
Size	−0.0005	−0.0004	−0.0002	−0.0002
	(−3.1300)***	(−2.5500)***	(−2.1700)**	(−2.4300)**
Leverage	0.0016	0.0017	0.0014	0.0015
	(4.4900)***	(3.1900)***	(2.0300)**	(3.0400)***
Market to book	0.0027	0.0026	0.0026	0.0029
	(19.5600)***	(19.0600)***	(24.7300)***	(20.3300)***
Cash flow	−0.0048	−0.0056	−0.0065	−0.0068
	(−5.5000)***	(−5.4100)***	(−4.3900)***	(−4.7400)***
Tangibility	0.0459	0.0472	0.0936	0.0895
	(15.9000)***	(16.4400)***	(36.6500)***	(35.2100)***
Firm age	−0.0002	−0.0002	−0.0005	−0.0005
	(−9.5900)***	(−10.0600)***	(−19.4800)***	(−19.1100)***
Intercept	0.0037	0.0039	0.0034	0.0037
	(26.3500)***	(27.2400)***	(17.6100)***	(16.7700)***
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Number of observations	40,658	38,380	40,659	38,380
Adj. R^2	0.16	0.15	0.27	0.26

The dependent variable is the ratio of Capex to Net Assets. The independent variables are Dividends and control variables. All variables are defined in the text. This table tests the flexibility of dividends for subsamples classified into high- and low-dividend yield subsamples. The sample is confined to firms that only paid dividends in any given year. Models 1 and 2 (3 and 4) provide estimates for the low (high) dividend yield subsample. Models 1 and 3 (2 and 4) use contemporaneous (lagged) values of Dividends. Industry dummies are based on two-digit Standard Industrial Classification codes. Heteroskedasticity adjusted T-Statistics are in parentheses

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

explanation rather than an agency-based explanation. Table 6, Models 1–4, present results of this analysis. The table is formatted similar to Table 5. The results are once again consistent with an agency-based explanation. The low-dividend sample exhibits a positive relationship between dividends and capital expenditures, contrary to the flexibility hypothesis. On the other hand, the high-dividend sample, which is potentially subject to free cash flow problems, exhibits a significantly negative relationship between *Dividends* and *Capex*. Based on the subsample results in Tables 5 and 6, it is apparent that the negative relationship between cash dividends and capital expenditures for dividend-paying firms observed in Table 4 can be attributed to Jensen's (1986) agency-based explanation where mature, low-growth firms have low capital expenditure needs and find it optimal to disburse their excess cash through dividends.

Table 7 Regressions of capital expenditures on payout-long-term trend

Independent variable	Dependent variable—3-year forward looking moving average of Capex/net assets		
	Model (1)	Model (2)	Model (3)
Repurchases	−0.0008	–	−0.0005
	(−2.3700)**	–	(−2.1100)**
Dividends	−0.0002	0.0005	−0.0002
	(−1.7700)*	(2.5100)**	(−1.7500)*
Size	−0.0054	−0.0061	−0.0055
	(−10.0600)***	(−11.1100)***	(−4.8400)***
Leverage	0.0008	0.0030	0.0017
	(7.2800)***	(6.0100)***	(8.1700)***
Market to book	0.0013	0.0024	0.0000
	(2.7500)***	(17.2000)***	(−3.1500)***
Cash flow	−0.0002	−0.0020	−0.0048
	(−10.5700)***	(−16.8000)***	(−30.1000)***
Tangibility	−0.0204	−0.0430	−0.0415
	(−2.3400)**	(−17.5600)***	(−2.1600)**
Firm age	−0.0008	−0.0004	−0.0002
	(−7.5000)***	(−17.4000)***	(−0.8000)
Intercept	0.1650	0.0611	0.1051
	(20.2800)***	(43.2300)***	(9.9100)***
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Number of observations	174,479	52,979	61,423
Adj. R^2	0.08	0.15	0.11

The dependent variable is the ratio of average future 3-year Capex to Net Assets. The dependent variable is the ratio of Capex to Net Assets. The independent variables are Repurchases, Dividends, and control variables. All variables are defined in the text. This table looks at the flexibility of payout variables in relation to long-run average of Capex defined as the 3-year (current plus subsequent 2 years) forward-looking moving average of the ratio of Capex to Net assets. In Model 1 we use the full sample of firm-year observations from 1971 to 2014. The full sample consists of firms that paid dividends, bought back stock, paid dividends and bought back stock, or did not engage in any form of buyback in a given year. Model 2 is similar to Model 1 but uses a restricted set of firms that paid only dividends in a given year. Model 3 uses a restricted set of observations of repurchasing firms that either repurchased stock or repurchased stock and paid dividends in a given year. Industry dummies are based on two-digit Standard Industrial Classification codes. Heteroskedasticity adjusted T-Statistics are in parentheses

***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

4.4.2 Flexibility using long-term trend of capital expenditures

Up to now we have examined the flexibility impact of payouts on capital expenditures from a short-term perspective. Our estimations involved regressing current-year *Capex* on either current-year payouts or 1-year lagged payouts. Our results document that repurchases, but not dividends, are statistically inversely related to capital expenditures consistent with the flexibility hypothesis. In this section, we explore whether payout flexibility extends to the long term, especially for dividends. It is conceivable that while dividends may be inflexible in the short term owing to the negative signaling impact of cutting dividends, this may not

be the case when flexibility is viewed over a longer term window. In many instances, capital expenditures may be episodic and planned several years in advance. In such a situation, the flexibility of dividends, if it exists, may manifest itself when relating current payout to capital expenditures assessed over a longer future interval.

To capture the relationship between extended investment activity and payout policy, we modify the dependent variable and calculate the 3-year, forward-looking, moving average of *Capex*. A negative coefficient for *Dividends* would suggest that flexibility exists in the longer term. However, we do not confine this analysis to dividends only. We also examine the relationship between repurchases and the future forward average of capital expenditures. We do this to see whether the flexibility of repurchases extends to a longer future window of capital expenditures in addition to the short term. Table 7 presents results for this additional test. Model 1 provides estimates for the full sample. We find a statistically significant negative coefficient for both *Dividends* and *Repurchases*. The negative coefficient for *Repurchases* supports the view that the flexibility of repurchases manifests itself in adjusting to capital expenditure needs both in the short term and over a longer term window. The negative coefficient for *Dividends* indicates that while dividends were not shown to be flexible in adjusting to capital expenditures in the short term, they do appear to be flexible when capital expenditures are averaged over a longer term. That is, lower dividends today are associated with higher investments in the future longer term interval.

To ensure that these results are robust, we repeat the regressions for subsamples of exclusive dividend payers and repurchasers. Model 2 provides estimates for firm-year observations in which companies paid dividends but did not engage in repurchases. Interestingly, once we restrict the sample to exclusively dividend payers, the coefficient for *Dividends* is positive and significant. That is, dividends in the current period are associated with greater average capital expenditures over the current and subsequent 2 years, which is contrary to the flexibility hypothesis. We surmise that the positive coefficient is picking up the signaling effect of dividends. Higher dividends today could signal higher future earnings emanating from increased future capital expenditures. But this leaves us with a puzzle as to why the coefficient for *Dividends* is negative in the full sample. Obviously, the negative coefficient is not attributable to firms that follow an exclusive dividend payout policy. The only other explanation is that the negative coefficient must be due to the dividends paid out by repurchasing firms that subscribe to a dual payout policy. We confirm this in Model 3, which presents regression estimates for the subsample of firms that engaged in repurchases only or both repurchases and dividends in a given year. As can be seen, the coefficient for *Dividends* is significantly negative. Thus it appears that only in the case of dual payout firms are dividends flexible in adjusting to capital expenditure needs in the long run. Overall, the evidence in Table 7 indicates that firms following an exclusive dividend policy do not view dividends to be flexible in meeting long-run capital expenditure needs.

5 Conclusions

Firms have increasingly turned to repurchases as a way to disburse cash to shareholders. For some firms, this replaces dividends. In others, it is used in combination with dividends as a way to implement payout policies. Managers consider share repurchases to be more flexible than dividends, which may account for its increased popularity in the past two decades. Survey evidence indicates that managers perceive dividends to be permanent commitments while repurchases are assumed to be flexible. As a result, firms may be

constrained by their dividend policies. When internal cash flow is insufficient to meet investment needs, a firm has several options: reduce its investments and continue its payouts, raise external capital to support investments, or reduce payouts to support investments. If firms are constrained from cutting their dividends, then investments may be pared back. On the other hand, because repurchases are viewed to be flexible, managers can adjust their repurchase activities to meet capital expenditure needs without worrying about investor backlash.

We tested the flexibility hypothesis by regressing capital expenditures on repurchases and dividends. Consistent with the hypothesis, we found that capital expenditures are inversely related to repurchases but not to dividends. We also hypothesized that the flexibility of repurchases would be especially evident for financially constrained firms. Consistent with our expectations, we found that the inverse relationship manifests itself in high financially constrained firms. We also documented that the inverse relationship was stronger during the financial crisis period when raising external capital was severely constrained. Finally, we found that flexibility of repurchases with respect to capital expenditures was stronger in the more recent time period when regulatory changes made repurchases more attractive. Overall, we conclude that share repurchases are more flexible than dividends.

Appendix: This table describes the main variables used in the study

Variable name	Description	Data source
Firm age	Number of years since a firm first appeared on COMPUSTAT	COMPUSTAT
Capex/net assets	Capital expenditures divided by total assets	COMPUSTAT
Cash flow	Sum of net income before extraordinary items plus depreciation and amortization divided by total assets	COMPUSTAT
Dividends	The amount of dividends paid divided by total assets	COMPUSTAT
KZ dummy	Measure of firm financial constraints based on Kaplan-Zingales methodology, dummy variable is equal to 1 (0) for KZ values greater (below) the sample median	COMPUSTAT
Leverage	Sum of long-term debt and short-term debt scaled by the total assets net of cash equivalents	COMPUSTAT
Market to book	Sum of market value of shares and total assets net of cash equivalents and book common equity. The sum is then scaled by total assets net of cash equivalents	COMPUSTAT
Repurchases	Cash expenditures for the purchase of common and preferred stock minus any reduction in the book value of preferred stock	COMPUSTAT
Size	Natural log of total sales	COMPUSTAT
Tangibility	Defined per Almeida and Campello (2007)	COMPUSTAT
WW dummy	Measure of firm financial constraints based on Whited-Wu methodology, dummy variable is equal to 1 (0) for WW values greater (below) the sample median	COMPUSTAT

References

Allayannis G, Mozumdar A (2004) The impact of negative cash flow and influential observations on investment-cash flow sensitivity estimates. J Bank Financ 28(5):901–930. doi:10.1016/S0378-4266(03)00114-6

Almeida H, Campello M (2007) Financial constraints, asset tangibility, and corporate investment. Rev Financ Stud 20(5):1429–1460. doi:10.1093/rfs/hhm019

Alti A (2003) How sensitive is investment to cash flow when financing is frictionless? J Financ 58(2):707–722. doi:10.1111/1540-6261.00542

Andriosopoulos D, Lasfer M (2015) The market valuation of share repurchases in Europe. J Bank Financ 55:327–339. doi:10.1016/j.jbankfin.2014.04.017

Andriosopoulos D, Andriosopoulos K, Hoque H (2013) Information disclosure, CEO overconfidence, and share buyback completion rates. J Bank Financ 37(12):5486–5499. doi:10.1016/j.jbankfin.2013.04.011

Arslan-Ayaydin Ö, Florackis C, Ozkan A (2014) Financial flexibility, corporate investment and performance: evidence from financial crises. Rev Quant Financ Account 42(2):211–250. doi:10.1007/s11156-012-0340-x

Babenko I, Tserlukevich Y, Vedrashko A (2012) The credibility of open market share repurchase signaling. J Financ Quant Anal 47(05):1059–1088. doi:10.1017/S0022109012000312

Beatty R, Riffe S, Welch I (1997) How firms make capital expenditure decisions: financial signals, internal cash flows, income taxes and the Tax Reform Act of 1986. Rev Quant Financ Account 9(3):227–250. doi:10.1023/A:1008211016618

Billett M, Xue H (2007) Share repurchases and the need for external finance. J App Corp Financ 19:42–55. doi:10.1111/j.1745-6622.2007.00145.x

Bliss BA, Cheng Y, Denis DJ (2015) Corporate payout, cash retention, and the supply of credit: evidence from the 2008–2009 credit crisis. J Financ Econ 115(3):521–540. doi:10.1016/j.jfineco.2014.10.013

Bozanic Z (2010) Managerial motivation and timing of open market share repurchases. Rev Quant Financ Account 34(4):517–531. doi:10.1007/s11156-009-0145-8

Brav A, Graham JR, Harvey CR, Michaely R (2005) Payout policy in the 21st century. J Financ Econ 77(3):483–527. doi:10.1016/j.jfineco.2004.07.004

Brockman P, Chung DY (2001) Managerial timing and corporate liquidity: evidence from actual share repurchases. J Financ Econ 61(3):417–448. doi:10.1016/S0304-405X(01)00068-X

Brockman P, Khurana IK, Martin X (2008) Voluntary disclosures around share repurchases. J Financ Econ 89(1):175–191. doi:10.1016/j.jfineco.2007.08.004

Chen SS, Wang Y (2012) Financial constraints and share repurchases. J Financ Econ 105(2):311–331. doi:10.1016/j.jfineco.2012.03.003

Cleary S (1999) The relationship between firm investment and financial status. J Financ 54(2):673–692. doi:10.1111/0022-1082.00121

Daniel ND, Denis DJ, Naveen L (2010) Sources of financial flexibility: evidence from cash flow shortfalls. Drexel University Working Paper

Fama EF, French KR (2001) Disappearing dividends: Changing firm characteristics or lower propensity to pay? J Financ Econ 60(1):3–43. doi:10.1016/S0304-405X(01)00038-1

Farrell K, Unlu E, Yu J (2014) Stock repurchases as an earnings management mechanism: the impact of financing constraints. J Corp Financ 25:1–15. doi:10.1016/j.jcorpfin.2013.10.004

Fazzari SM, Hubbard RG, Petersen BC (1988) Financing constraints and corporate-investment. Brook Pap Econ Act 1:141–195. doi:10.2307/2534426

Floyd E, Li N, Skinner DJ (2014) Payout policy through the financial crisis: the growth of repurchases and the resilience of dividends. J Financ Econ 118(2):299–316. doi:10.1016/j.jfineco.2015.08.002

Gilchrist S, Himmelberg CP (1995) Evidence on the role of cash flow for investment. J Monet Econ 36(3):541–572. doi:10.1016/0304-3932(95)01223-0

Grullon G, Michaely R (2002) Dividends, share repurchases, and the substitution hypothesis. J Financ 57(4):1649–1684. doi:10.1111/1540-6261.00474

Jagannathan M, Stephens CP, Weisbach MS (2000) Financial flexibility and the choice between dividends and stock repurchases. J Financ Econ 57(3):355–384. doi:10.1016/S0304-405X(00)00061-1

Jensen MC (1986) Agency cost of free cash flow, corporate finance, and takeovers. Am Econ Rev 76(2):323–329

Kadapakkam PR, Kumar PC, Riddick LA (1998) The impact of cash flows and firm size on investment: the international evidence. J Bank Financ 22(3):293–320. doi:10.1016/S0378-4266(97)00059-9

Kaplan SN, Zingales L (1997) Do investment-cash flow sensitivities provide useful measures of financing constraints? Q J Econ 112:169–215. doi:10.1162/003355397555163

Lamont O, Polk C, Saa-Requejo J (2001) Financial constraints and stock returns. Rev Financ Stud 14(2):529–554. doi:10.1093/rfs/14.2.529
Lie E (2005) On the timing of CEO stock option awards. Manang Sci 51(5):802–812. doi:10.1287/mnsc.1050.0365
Liu Y, Szewczyk SH, Zantout Z (2008) Underreaction to dividend reductions and omissions? J Financ 63(2):987–1020. doi:10.1111/j.1540-6261.2008.01337.x
Michaely R, Thaler RH, Womack KL (1995) Price reactions to dividend initiations and omissions: Overreaction or drift? J Financ 50(2):573–608. doi:10.2307/2329420
Nohel T, Tarhan V (1998) Share repurchases and firm performance: new evidence on the agency costs of free cash flow. J Financ Econ 49(2):187–222. doi:10.1016/S0304-405X(98)00022-1
Whited T, Wu G (2006) Financial constraints risk. Rev Financ Stud 19(2):531–559. doi:10.1093/ref/hhj012
Yang CC, Lin CJ, Lu YC (2000) Investment strategy, dividend policy and financial constraints of the firm. Rev Pac Basin Financ Mark Policies 3(02):235–267. doi:10.1142/S0219091500000121