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Stock market liquidity and the decision to repurchase ☆

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ABSTRACT

We examine the impact of stock market liquidity on managerial payout decisions. We argue that stock market liquidity influences payout policy through a first-order effect on the share repurchase decision, and a second-order or residual effect on the dividend decision. Managers compare the tax and flexibility advantages of a repurchase against its liquidity cost disadvantage. All else equal, higher market liquidity encourages the use of repurchases over dividends. Our empirical results confirm that stock market liquidity plays a significant role in repurchase and dividend initiations, as well as in recurring payout decisions. Unlike previous studies that measure liquidity changes following the repurchase decision, we examine liquidity levels prior to the payout decision. We show that managers condition their repurchase decision on a sufficient level of market liquidity, consistent with Barclay and Smith's [Barclay, M.J., Smith, C.W. Jr., 1988. Corporate payout policy: cash dividends versus open-market repurchases. Journal of Financial Economics 22, 61–82.] theoretical analysis and Brav et al.'s [Brav, A., Graham, J.R., Campbell, R.H., Michaely, R., 2005. Payout policy in the 21st century. Journal of Financial Economics 77, 483–528.] CFO survey results. Repurchases have recently become the payout decision of choice in part because of rising stock market liquidity.

1. Introduction

Managers establish payout policy by selecting the level, timing, and composition of cash remittances. Recent research has shown that while the level and timing of aggregate cash flows have changed relatively little since the 1970s, the composition of these payouts has changed significantly. The level of aggregate cash payouts has remained constant at roughly 3–5% of equity value (Allen and Michaely, 2003), and managers have persistently paid dividends at regular quarterly intervals. In contrast, the composition of corporate payouts has grown from a repurchase-to-dividend ratio of 8.44% in 1972 to 113.11% in 2000 (Grullon and Michaely, 2002). The shift towards repurchases is not only meaningful in percentage terms. During the five-year period ending in 2000, managers repurchased over $846 billion of their companies' equity (Grullon and Michaely, 2002). This striking transformation in payout policy has attracted considerable interest among academics, regulators, and practitioners. Although it is unlikely that any single variable can fully account for all of these empirical regularities, we argue that stock market liquidity plays a significant role in explaining changes in the composition of corporate payouts.

In contrast to payout policy irrelevancy under perfect capital markets, real-world managers operate in a business environment characterized by asymmetric information, incentive problems, and transaction costs. Under these conditions, alternative payout policies have a direct impact on the firm's cost of capital and market value.[1] Value-maximizing managers will search for the payout

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[1] DeAngelo and DeAngelo (2006) argue that payout policy is relevant to firm value even in perfect capital markets.

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mechanism that minimizes the sum of transaction, incentive, and information costs. When market liquidity is low, managers are more reluctant to repurchase shares and reduce float because their market transactions could increase the price impact of trading — and survey evidence shows that managers are aware that price impact matters to investors (Brav et al., 2005). Managers are also reluctant to repurchase shares when liquidity is low because their trading activity could impact transaction costs by widening bid–ask spreads (Barclay and Smith, 1988). Thus, we hypothesize that managers will prefer repurchases to dividends when stock market liquidity is relatively high. We further posit that stock market liquidity will have a direct impact on repurchases and a residual impact on dividends through the substitution effect described in Grullon and Michaely (2002). This analysis suggests one important channel through which a firm's market microstructure can influence its corporate decisions (Lipson, 2003).

Barclay and Smith (1988) treat the level and timing of payouts as predetermined and examine why managers prefer one payout mechanism over another. Managers attempt to maximize firm value by minimizing the total cost of cash distributions. Although tax advantages appear to favor share repurchases over dividends, Barclay and Smith (1988) show that repurchases also induce higher asymmetric information costs. When managers announce repurchase programs, uninformed investors realize that they are exposed to a higher probability of trading against informed insiders. This realization impairs the firm's information environment and results in higher liquidity costs. Dividend payments, on the other hand, do not increase the probability of trading against informed managers and therefore do not increase liquidity costs.

A direct consequence of this analysis is that managers consider the liquidity of the stock in making the decision about the form of the payout. We refer to this hypothesis as the liquidity hypothesis of repurchases. One testable implication of this hypothesis is that the firm's current liquidity level will significantly influence subsequent payout choices. Previous studies have examined the effect of the current payout decision on subsequent changes in liquidity (e.g., Miller and McConnell, 1995; Brockman and Chung, 2001; Cook et al., 2004). While these studies provide useful results about the consequences of repurchases, the purpose of this study is to examine the determinants of repurchases.

A second testable implication of our liquidity hypothesis is that market liquidity will have a stronger impact on repurchase decisions than on dividend decisions. In a related study, Banerjee et al. (2007) examine the impact of stock market liquidity on dividend policy. Although their dividend hypothesis yields some observationally-equivalent predictions, our results suggest that stock market liquidity has a first-order effect on the repurchase decision and a residual effect on the dividend decision. High levels of liquidity allow managers to benefit from the tax and flexibility advantages of repurchase programs — and dividends decline as a consequence.

Consistent with our central claim, Brav et al. (2005) provide evidence based on financial executive surveys and interviews that supports our liquidity hypothesis of repurchases. Managers express a keen awareness that their "stock price would decrease if the overall liquidity of the stock were to fall" (pp. 515–516). In addition,

> One-half of firms feel that the liquidity of their stock is an important or very important factor affecting their repurchase decisions (Table 8, row 4). Interview discussion clarifies that the executives think that reduced liquidity can hurt their stock price because demand for a stock falls if investors think that their trades would move the stock price. Therefore, a company would restrict repurchases if it feels that doing so would reduce liquidity below some critical level.

Managers are clearly concerned that repurchase decisions can impair their firms' market liquidity, and that any such impairment would reduce market values. In contrast, managers do not appear to condition their dividend decisions on stock market liquidity. They describe the role of liquidity in dividend decisions as "not important." Our empirical findings fit these survey and interview results very closely. Stock market liquidity influences payout policy primarily through the repurchase decision.

We conduct empirical tests of the liquidity hypothesis of repurchases using company payout data from 1983 to 2006. We divide our empirical analysis into two main sections corresponding to payout initiation decisions and ongoing payout decisions. Similar to Skinner's (2008) results, we find that there are two main groups of corporate payers: firms that make repurchases only, and firms that make both repurchases and dividend payments. The latter group consists of large, mature firms that have a history of paying dividends. There is also a much smaller group of firms that make dividend payments only. We provide separate analyses for each of these groups.

In our payout initiation analysis, we show that repurchase-initiating firms are significantly more liquid than non-initiating firms. We find that dividend-initiating firms are generally less liquid than non-initiating firms, although the dividend-initiating results are not as robust or economically significant as their repurchase-initiating counterparts. These differential results corroborate the claim that the repurchase decision is more sensitive to stock market liquidity than the dividend decision. Our findings also verify that, given a payout initiation, the probability of a repurchase increases with the liquidity of the initiating firm. We use alternative measures of liquidity, including multiple control variables, and mitigate endogeneity concerns by using the current period's liquidity measure to explain the subsequent period's payout decision. Overall, our payout initiation results provide support for the liquidity hypothesis of repurchases.

After confirming that liquidity plays a significant role in payout initiations, we test its explanatory power in ongoing payout decisions. We find that the size of the repurchase increases significantly with the stock market liquidity of the repurchasing firm. Parallel to the initiation results, we find that the size of the dividend generally decreases with the liquidity of the dividend-paying firm, although these results are again weaker than their repurchase counterparts. We also show that the repurchase portion of a firm's total payout is an increasing function of the firm's market liquidity. That is, stock market liquidity helps to

explain the substitution between repurchases and dividends.[2] Taken together, our empirical findings strongly support the hypothesis that stock market liquidity affects payout policy primarily through its impact on the repurchase decision.

Our study contributes to a growing literature that connects market microstructure to corporate finance. Previous research has linked market microstructure to security offerings (Ellul and Pagano, 2006; Karolyi, 2003; Butler et al., 2005), asset pricing and cost of capital (Amihud and Mendelson, 1986; Amihud et al., 1997), mergers and acquisitions (Lipson and Mortal, 2007), and announcement effects related to dividend signaling (Fuller, 2003) and analyst recommendations (Kim et al., 1997; Irvine, 2003). Other related studies have linked market microstructure to specific corporate decisions, including capital structure decisions (Lipson and Mortal, 2008) and investment decisions (Becker-Blease and Paul, 2006). Our study contributes to this line of research by establishing a significant role for market liquidity in corporate payout decisions.

Most related studies examine the impact of the repurchase decision on the firm's subsequent market liquidity (Barclay and Smith, 1988; Wiggins, 1994; Singh et al., 1994; Miller and McConnell, 1995; Brockman and Chung, 2001; Cook et al., 2004; Ginglinger and Hamon, 2005). These studies have produced decidedly mixed results.[3] In contrast, we begin with the firm's market liquidity and then examine its influence on the repurchase decision. If the decision to repurchase is conditioned on its expected liquidity impact, then measuring the liquidity impact for self-selected repurchasing firms will tend to understate the significance of liquidity as a managerial decision variable. The (ex-post) repurchase sample consists predominantly of liquid firms whose managers chose to repurchase shares only after considering their firms' ability to absorb the liquidity costs of this payout mechanism. Using our approach, we are able to show that stock market liquidity is a significant determinant of the repurchase decision.

Another contribution of this study is that we identify the precise mechanism through which stock market liquidity affects payout policy. As stated by Skinner (2008, p.1), "the question of why firms are less likely to pay dividends, along with the relation of repurchases to this phenomenon, remains unresolved in corporate finance." Our liquidity hypothesis of repurchases asserts that stock market liquidity encourages managers to substitute repurchases for dividends. Our empirical results confirm that higher levels of stock market liquidity enable managers to take advantage of the tax and flexibility advantages of repurchases. When liquidity is relatively high, non-payout firms will initiate with repurchases instead of dividends, and positive payout firms will increase repurchases relative to dividends. It is the repurchase dog that wags the dividend tail.

The rest of our paper proceeds as follows. In Section 2, we provide a description of our data and sample selection. In Section 3, we present and analyze our empirical findings, and in Section 4, we summarize and conclude the paper.

2. Data description

We obtain our data from Compustat, CRSP, and TAQ databases. We exclude all firms in the financial and utilities sectors (SIC codes between 6000–6999 and 4900–4999). Our sample period begins in 1983 and ends in 2006. Prior to the SEC's adoption of safe harbor Rule 10b-18 in 1982, uncertainty about potential charges of price manipulation dampened managerial enthusiasm for repurchases (see Grullon and Michaely, 2002).

The payout (dependent) variables are repurchases/assets, dividends/assets, and repurchases/total payouts. Following Grullon and Michaely (2002), we compute repurchases using the purchases of common and preferred stock (item 115) and then subtract any reductions in the redemption value of preferred stock (item 56). Dividends correspond to data item 21, and total assets to data item 6. Total payout is the sum of repurchases and dividends.

We use turnover as our primary measure of liquidity. Turnover is a commonly used proxy for liquidity in previous empirical studies (e.g., Kang and Stulz, 1997; Chalmers and Kadlec, 1998; Datar et al., 1998; Banerjee et al., 2007). We also test alternative measures of liquidity including Amihud's (2002) illiquidity measure, a modified Amihud (2002) illiquidity measure, quoted bid–ask spreads, effective bid–ask spreads, quoted spreads divided by depth, depth, and trade size. All spread measures are computed as a percentage of stock price. We define turnover as the monthly trading volume divided by total shares outstanding.[4] We follow Amihud's (2002) definition of a price impact illiquidity measure by dividing the absolute value of daily stock returns by daily dollar volume. We also create a second (modified) price impact measure by dividing the absolute value of daily stock returns by daily turnover. Our turnover, Amihud, and modified Amihud measures are annual averages.

The quoted spread is the daily time-weighted bid–ask spread divided by the spread midpoint, and the effective spread is two times the daily trade size-weighted difference between the transaction price and spread midpoint divided by the spread midpoint. We construct a combined spread and depth measure by dividing the daily quoted spread by the daily depth. We define depth as the

[2] The substitution hypothesis examines the extent to which dividends and repurchases are interchangeable. DeAngelo et al. (2000) and Dittmar (2000) show that repurchases do not fully replace dividends. Grullon and Michaely (2002) nonetheless provide evidence of significant substitutability between dividends and repurchases. They show that the average total payout ratio (i.e., dividends plus share repurchases as a percent of equity) remains relatively constant between 1972 and 2000. This finding suggests that dividends and repurchases are interchangeable, and that the recent rise in the use of repurchases comes at the expense of dividends. Recent evidence by Skinner (2008) confirms that "payout mechanisms are now largely interchangeable." If stock market liquidity affects the repurchase decision as described in our liquidity hypothesis, the substitution effect will cause secondary changes in dividend payouts. To the extent that substitution is not one-to-one, the dividend effect will be weaker than the repurchase effect.

[3] Although early studies analyze liquidity changes around repurchase announcements, more recent research focuses on liquidity changes around actual repurchases, e.g., Brockman and Chung (2001), Ginglinger and Hamon (2005), and Cook et al. (2004).

[4] There are market microstructure differences between the NYSE and Nasdaq exchanges (Bessembinder, 1999). To account for the overstatement of Nasdaq trading volume relative to NYSE trading volume, we divide Nasdaq volumes by two (Atkins and Dyl, 1997). We also run separate tests for NYSE- and Nasdaq-listed firms and find confirm our main results for each exchange.

Table 1
Repurchase initiations — summary statistics

	Full sample		Non-dividend payers		Dividend payers	
	Non-init.	Initiators	Non-init.	Initiators	Non-init.	Initiators
Payout						
Repurchases/assets	0.0000	0.0297	0.0000	0.0318	0.0000	0.0271
Dividends/assets	0.0075	0.0086	0.0000	0.0000	0.0201	0.0199
Liquidity measures						
Turnover	7.3788	7.8684	8.1684	9.4594	6.0706	5.7902
Amihud	0.0207	0.0144	0.0242	0.0164	0.0149	0.0119
Amihud (mod.)	0.7057	0.5050	0.7307	0.5176	0.6641	0.4886
Rel. quoted sprd.	2.5567	2.0085	2.8230	2.2155	1.9197	1.6163
Rel. effective sprd.	1.7938	1.4043	1.9858	1.5695	1.3345	1.0913
Rel quoted sprd/depth	0.3714	0.2630	0.3983	0.2872	0.3071	0.2173
Depth	21.83	24.57	16.75	19.21	34.00	34.70
Trade size	1279.81	1428.30	1243.19	1387.22	1367.46	1505.98
Firm characteristics						
Operating income/assets	0.0836	0.1374	0.0457	0.1200	0.1464	0.1601
Non oper. income/assets	0.0122	0.0123	0.0121	0.0129	0.0122	0.0114
Operating income std. dev.	0.0639	0.0540	0.0806	0.0682	0.0362	0.0355
Total assets (million $)	1795	2028	641	677	3707	3793
Book leverage	0.1750	0.1644	0.1706	0.1540	0.1823	0.1779
Return	0.0165	0.0175	0.0172	0.0190	0.0153	0.0155
Market to book	3.05	2.73	3.49	3.07	2.31	2.29
Age	13.89	15.68	11.17	10.96	18.40	21.85
Number of observations	13,571	3441	8463	1949	5108	1492

Summary statistics for a sample of repurchase initiators vs. non-initiators. The sample is composed of all firms with data available on Compustat and CRSP between 1983 and 2006. For statistics based on spreads, depth and trade size, we also require data availability on the TAQ dataset, which starts in 1993. Repurchase initiators are firms that have not repurchased in the last 3 years, and repurchase for the first time this year. By contrast, non-initiators are firms that have not repurchased during the past 3 years, and will not repurchase during this year nor the following two years. We further divide our sample into dividend payers and non-dividend payers, depending on whether the firm reports a positive dividend during the current year.

daily time-weighted number of shares available at the highest bid and lowest ask prices divided by two. The trade size variable is the daily share volume divided by the daily number of trades. All measures related to spreads, depths, and trade sizes are annual averages of daily values covering the period from 1993 to 2006.

Our control variables include measures of cash flow permanence, cash flow volatility, firm size, leverage, underpricing, investment opportunities, and company age.[5] Following Jagannathan et al. (2000), we use operating cash flows to proxy for permanent cash flows (item 13) and non-operating cash flows to proxy for temporary cash flows (item 61). We standardize both of these measures by the firm's book value of assets. We define cash flow volatility as the standard deviation of the firm's operating cash flows to total assets during the previous five-year period (i.e., from year −4 through the current year). We require that the firm have data available in at least three of these five years. We measure firm size as the book value of assets, and leverage as long term debt (item 9) scaled by the book value of assets.

Following Dittmar (2000), we use stock price returns as a measure of underpricing and the market-to-book (M/B) ratio as a proxy for investment opportunities. We compute returns as the fiscal year's average of monthly returns. The market value of equity is the closing fiscal year-end price (item 199) multiplied by the total number of shares outstanding (item 25). The book value of equity corresponds to data item 60. We exclude firms that have prices below $5 per share or total assets less than $1 million, and we trim the most extreme values from the top and bottom of each variable using a 0.5% cutoff.

3. Empirical results

We divide our empirical analysis into two sections. In the first section (Tables 1–5), we examine the role of stock market liquidity in the decision to initiate cash payouts. In the second section (Tables 6–9), we investigate the role of stock market liquidity in ongoing repurchase and dividend decisions.

3.1. Payout initiations

We first consider payout initiations. We analyze the decision to initiate a share repurchase in Tables 1 and 2, the decision to initiate a dividend payment in Tables 3 and 4, and the decision to substitute repurchases for dividends in Table 5. We define a repurchase initiator as a firm that repurchases shares in the current year, but not during the previous three years. We define a non-

[5] We measure a company's "age" as the time between the current year and the first year that the company appears in Compustat.

Table 2
Repurchase initiations — logistic regressions

	Full sample		Non-dividend payers		Dividend payers	
	Coef.	Elast.	Coef.	Elast.	Coef.	Elast.
Panel A						
Log(turnover)	0.1506***	0.0242	0.1626***	0.0231	0.0898**	0.0161
	(0.000)		(0.000)		(0.030)	
Operating income/assets	3.3469***	0.0796	3.5126***	0.0888	3.8984***	0.0495
	(0.000)		(0.000)		(0.000)	
Non oper. income/assets	5.2923***	0.0144	9.7004***	0.0256	−1.7252	−0.0047
	(0.000)		(0.000)		(0.482)	
Op. income std. dev.	0.3506	0.0035	0.2742	0.0029	0.6029	0.0031
	(0.449)		(0.583)		(0.668)	
Log(assets)	0.0618***	0.0173	0.1259***	0.0266	0.0482*	0.0159
	(0.001)		(0.000)		(0.063)	
Book leverage	−0.6445***	−0.0160	−0.9794***	−0.0235	0.0271	0.0007
	(0.000)		(0.000)		(0.926)	
Return	−1.2773**	−0.0084	−1.0106*	−0.0070	−2.5412**	−0.0125
	(0.015)		(0.090)		(0.025)	
Market to book	−0.0295***	−0.0160	−0.0307	−0.0174	−0.0423**	−0.0173
	(0.002)		(0.005)		(0.027)	
Log(age)	0.1532***	0.0167	−0.0211	−0.0019	0.4352***	0.0504
	(0.000)		(0.667)		(0.000)	
Intercept	−2.4184***		−2.4259***		−3.0635***	
	(0.000)		(0.000)		(0.000)	
Number of observations	17,012		10,412		6600	
Initiations (%)	18.14		16.03		21.12	
Non-repurchasers (%)	81.86		83.97		78.88	
Pseudo-R^2	0.0580		0.0757		0.0476	
Panel B						
Log(Amihud)	−0.1762***	−0.0675	−0.1385***	−0.0463	−0.1737***	−0.0763
	(0.000)		(0.000)		(0.000)	
Log(Amihud(mod.))	−0.1487***	−0.0308	−0.1465***	−0.0273	−0.1040***	−0.0244
	(0.000)		(0.000)		(0.002)	
Log(rel. quoted sprd)	−0.4023***	−0.0596	−0.3947***	−0.0517	−0.2655***	−0.0457
	(0.000)		(0.000)		(0.004)	
Log(rel. effective sprd)	−0.4382***	−0.0607	−0.4159***	−0.0493	−0.3299***	−0.0545
	(0.000)		(0.000)		(0.000)	
Log(rel. quoted sprd/depth)	−0.2115***	−0.0459	−0.2363***	−0.0406	−0.1405***	−0.0409
	(0.000)		(0.000)		(0.004)	
Log(depth)	0.0860*	0.0115	0.1103*	0.0116	0.0812	0.0148
	(0.058)		(0.067)		(0.212)	
Log(trade size)	0.3259***	0.0313	0.2945***	0.0243	0.3407***	0.0425
	(0.000)		(0.000)		(0.000)	

Logistic regressions on the probability of a repurchase initiation vs. a non-initiation. The dependent variable takes the value of 1 when the firm initiates a repurchase, and therefore a positive coefficient implies a greater probability of a repurchase. Repurchase initiations are firms that have not repurchased in the last 3 years, and repurchase for the first time this year. By contrast, non-initiators are firms that have not repurchased during the past 3 years, and will not repurchase during this year nor the following two years. We further divide our sample into dividend payers and non-dividend payers, depending on whether the firm reports a positive dividend during the current year. Independent variables are lagged one year. Elasticity is the change in the probability of an initiation given a change in the independent variable of a ±1/2 standard deviation around the mean. All regressions include year dummies, not reported. The numbers in (parenthesis) contain *p*-values, based on standard errors adjusted for clustering at the firm level. Panel A reports regression results using turnover as our proxy for liquidity, while Panel B reports liquidity coefficients from regressions using alternative liquidity proxies.

initiator as a firm that does not repurchase shares in the current year, the past three years, or the next two years. We add the condition that the firm does not repurchase in the next two years to eliminate firms that are "about to" initiate a repurchase. However, our results are robust to dropping this condition, as well as to replacing the three-year non-activity window with a five-year non-activity window.

In Table 1, we report summary statistics for our full sample, non-dividend-paying subsample, and dividend-paying subsample. Previous studies show that dividend-paying firms are significantly different from non-dividend-paying firms with respect to firm characteristics. Consistent with these studies, we find that dividend-paying firms are over five times as large as non-dividend-paying firms in terms of total assets.

Our full-sample results in Table 1 show that repurchase-initiating firms repurchase 2.97% of total assets on average during the year of initiation, compared to 3.18% for the non-dividend-paying subsample and 2.71% for the dividend-paying subsample. The full-sample results also show that initiating firms concurrently pay out 0.86% of total assets in the form of dividends, compared to 0.75% for the non-initiating firms. These values are considerably lower than their counterparts in the dividend-paying subsample with 1.99 and 2.01%, respectively.

Table 3
Dividend initiations — summary statistics

	Full sample		Non-repurchasers		Repurchasers	
	Non-init.	Initiators	Non-init.	Initiators	Non-init	Initiators
Payout						
Repurchases/assets	0.0119	0.0153	0.0000	0.0000	0.0334	0.0340
Dividends/assets	0.0000	0.0134	0.0000	0.0128	0.0000	0.0141
Liquidity measures						
Turnover	8.6203	7.6020	8.4534	7.1352	8.9157	8.1632
Amihud	0.0215	0.0249	0.0240	0.0283	0.0170	0.0208
Amihud (mod.)	0.6377	0.6596	0.7010	0.7645	0.5256	0.5321
Rel. quoted sprd.	2.4127	2.0186	2.6570	2.3462	2.0204	1.6648
Rel. effective sprd.	1.7116	1.4158	1.8758	1.6434	1.4480	1.1701
Rel quoted sprd/depth	0.3408	0.3305	0.3771	0.3716	0.2828	0.2864
Depth	16.99	16.86	16.06	19.17	18.49	14.38
Trade size	1248.10	1133.51	1228.96	1268.83	1278.84	988.10
Firm characteristics						
Operating income/assets	0.0885	0.1586	0.0672	0.1549	0.1262	0.1631
Non oper. income/assets	0.0122	0.0106	0.0120	0.0103	0.0125	0.0110
Operating income std. dev.	0.0708	0.0494	0.0762	0.0518	0.0612	0.0464
Total assets (million $)	616	1444	546	1188	740	1753
Book leverage	0.1643	0.1488	0.1673	0.1546	0.1589	0.1419
Return	0.0173	0.0251	0.0182	0.0276	0.0157	0.0221
Market to book	3.11	2.58	3.28	2.67	2.81	2.46
Age	11.42	14.12	10.94	13.97	12.26	14.29
Number of observations	19,779	707	12,639	386	7140	321

Summary statistics for a sample of dividend initiators vs. non-initiators. The sample is composed of all firms with data available on Compustat and CRSP between 1983 and 2006. For statistics based on spreads, depth and trade size, we also require data availability on the TAQ dataset, which starts in 1993. Dividend initiators are firms that have not paid dividends in the last 3 years, and pay dividends for the first time this year. By contrast, non-initiators are the firms that have not paid dividends during the past 3 years, and will not pay during this year nor the following two years. We further divide our sample into repurchasers and non-repurchasers, depending on whether the firm reports a positive repurchase during the current year.

The common pattern across all liquidity measures is the most striking result in Table 1. Stock market liquidity is higher for repurchase initiators than for non-initiators in the full sample across all liquidity measures, consistent with the liquidity hypothesis. Repurchase initiators have higher turnovers, lower price impact measures, lower bid–ask spreads, higher depths, and larger trade sizes relative to non-initiators. Our findings for firm characteristics also display a consistent pattern between initiating and non-initiating firms. Repurchase initiators have higher operating income/assets, higher non-operating income/assets, and lower operating income volatility. Repurchase initiators also have larger asset values, less leverage, higher lagged returns, and fewer investment opportunities (i.e., lower market-to-book ratios). They also tend to be older than non-initiating firms.

In Table 2, we report our findings for repurchase initiations using logistic regressions across the full, non-dividend-paying, and dividend-paying subsamples. We include year dummies (unreported) in all regressions. All explanatory variable values refer to the current year, while the decision to initiate a repurchase refers to the subsequent year. This research design mitigates endogeneity concerns because it is unlikely that next period's repurchase decision causes current liquidity levels.

The results in Panel A include estimated coefficients, *p*-values (in parentheses), and elasticities for all control variables and the primary variable of interest, firm turnover. Following Petersen (in press), we use Rogers standard errors to determine the significance of estimated coefficients. The results in Panel B include estimated coefficients, *p*-values, and elasticities for our alternative measures of liquidity. We do not report results for the control variables associated with each liquidity measure in order to conserve space. In the discussion that follows, we refer to a coefficient with a *p*-value of less than 5% as significant, and a coefficient with a *p*-value between five and 10% as marginally significant.

The results in Table 2 support the liquidity hypothesis by showing that there is a positive relation between liquidity in the current year and the decision to initiate a repurchase in the subsequent year. In Panel A, we observe a positive and significant turnover coefficient of 0.1506 for the full sample. The elasticity value of 2.42% measures the impact on the probability of initiating a repurchase from a change of one standard deviation around the mean log turnover level. Only operating income has a larger elasticity among all independent variables. The non-dividend-paying turnover coefficient of 0.1626 is positive and significant, as is the dividend-paying turnover coefficient of 0.0898. All of these results are consistent with the liquidity hypothesis, both in terms of statistical and economic significance.

In the full sample, our control variable coefficients for operating income/assets and non-operating income/assets are positive and significant, while the coefficient on operating income volatility is insignificant. Higher operating and non-operating incomes increase the likelihood of initiating a repurchase. The volatility of operating income does not appear to play a significant role in the initiation decision. Initiating firms are significantly larger and less levered than their non-initiating counterparts. Initiating firms experience negative and significant lagged returns in the period leading up to their initiation decision, consistent with previous studies showing a negative relation between repurchases and prior period performance. Finally, the firm's investment opportunity set has a negative impact on the decision to initiate a share repurchase. The market-to-book coefficient is negative and significant, and age is positive and significant.

Table 4
Dividend initiations — logistic regressions

	Full sample		Non-repurchasers		Repurchasers	
	Coef.	Elast.	Coef.	Elast.	Coef.	Elast.
Panel A						
Log(turnover)	−0.2615***	−0.0052	−0.2350***	−0.0040	−0.3266***	−0.0080
	(0.000)		(0.000)		(0.000)	
Operating income/assets	5.2328***	0.0174	5.5540***	0.0170	4.7191***	0.0153
	(0.000)		(0.000)		(0.000)	
Non oper. income/assets	4.4341*	0.0016	4.3784	0.0014	4.4594	0.0020
	(0.075)		(0.170)		(0.248)	
Op. income std. dev.	−3.7941	−0.0052	−3.3501**	−0.0041	−4.1550*	−0.0061
	(0.002)		(0.081)		(0.056)	
Log(assets)	0.2281***	0.0070	0.2179***	0.0055	0.2493***	0.0098
	(0.000)		(0.000)		(0.000)	
Book leverage	−1.2748***	−0.0044	−1.1989***	−0.0035	−1.3963***	−0.0062
	(0.000)		(0.002)		(0.002)	
Return	4.1267***	0.0040	3.8744***	0.0033	4.6089***	0.0052
	(0.000)		(0.004)		(0.004)	
Market to book	−0.0662***	−0.0047	−0.0480*	−0.0031	−0.0938***	−0.0073
	(0.003)		(0.079)		(0.005)	
Log(age)	0.3068***	0.0039	0.3743***	0.0040	0.2003*	0.0032
	(0.000)		(0.000)		(0.052)	
Intercept	−4.9431***		−5.4422***		−4.1729***	
	(0.000)		(0.000)		(0.000)	
Number of observations	20,486		13,025		7461	
Initiations (%)	1.99		1.66		2.58	
Non-payers (%)	98.01		98.34		97.42	
Pseudo-R^2	0.0927		0.0869		0.1095	
Panel B						
Log(Amihud)	0.1915***	0.0097	0.1993***	0.0079	0.1990***	0.0138
	(0.000)		(0.000)		(0.000)	
Log(Amihud(mod.))	0.1662***	0.0045	0.1659***	0.0038	0.1788***	0.0062
	(0.000)		(0.000)		(0.003)	
Log(rel. quoted sprd)	0.2741***	0.0047	0.4144***	0.0059	0.1521	0.0031
	(0.002)		(0.001)		(0.224)	
Log(rel. effective sprd)	0.2892***	0.0044	0.4056***	0.0052	0.1758	0.0032
	(0.006)		(0.003)		(0.292)	
Log(rel. quoted sprd/depth)	0.1637***	0.0036	0.2007**	0.0037	0.1423*	0.0038
	(0.005)		(0.013)		(0.087)	
Log(depth)	0.0158	0.0002	0.0886	0.0010	−0.0964	−0.0015
	(0.853)		(0.419)		(0.443)	
Log(trade size)	−0.0607	−0.0006	0.0732	0.0007	−0.2600	−0.0030
	(0.597)		(0.647)		(0.145)	

Logistic regressions on the probability of a dividend initiation vs. a non-initiation. The dependent variable takes the value of 1 when the firm initiates a dividend, and therefore a positive coefficient implies a greater probability of a dividend initiation. Dividend initiators are firms that have not paid dividends in the last 3 years, and pay dividends for the first time this year. By contrast, non-initiators are firms that have not paid dividends during the past 3 years, and will not pay dividends during this year nor the following two years. We further divide our sample into repurchasers and non-repurchasers, depending on whether the firm reports a positive repurchase during the current year. Independent variables are lagged one year. Elasticity is the change in the probability of an initiation given a change in the independent variable of a ±1/2 standard deviation around the mean. All regressions include year dummies, not reported. The numbers in (parenthesis) contain *p*-values, based on standard errors adjusted for clustering at the firm level. Panel A reports regression results using turnover as our proxy for liquidity, while Panel B reports liquidity coefficients from regressions using alternative liquidity proxies.

We report the estimated coefficients, *p*-values, and elasticities for seven alternative liquidity measures in Panel B. In all three samples (full, non-dividend payers, and dividend payers), the estimated coefficients for our price impact measures (Amihud and modified Amihud) and all bid–ask spread measures (relative quoted spread, relative effective spread, and relative quoted spread/depth) are negative and significant. That is, the more illiquid the firm in terms of its price impact measures or bid–ask spreads, the less likely the managers are to initiate a repurchase. The trade size coefficients are positive and significant, and the depth coefficients are positive and mostly significant. These results confirm that managers of firms with high levels of market liquidity in terms of depth and trade size are more likely to initiate repurchases.[6] We also note that the elasticities of these alternative liquidity measures are mostly larger (in absolute values) than other independent variables.

[6] In addition to the control variables reported in Table 2 (and all subsequent tables), we also include managerial stock options as an explanatory variable for a reduced sample due to data availability. We use the shares reserved for conversion from stock options (item 215) scaled by total shares outstanding as our proxy for managerial stock options. This data item is available between 1984 and 1995. Consistent with Fenn and Liang (2001), we find that the existence of stock options increases managerial preference for repurchases over dividends. The reduced sample liquidity results are consistent with those reported earlier (i.e., a positive relation between liquidity and repurchases). We also rerun our Table 2 results (and for all subsequent tables) after deleting the stock market crash year of 1987, as well as on two sub-samples (before and after 1993). In all cases, the resulting liquidity coefficients are consistent with those reported earlier.

Table 5
Repurchase vs. dividend initiations — logistic regressions

	Coef.	Elast.
Panel A		
Log(turnover)	0.5139***	0.0304
	(0.000)	
Operating income/assets	−3.0419***	−0.0239
	(0.007)	
Non oper. income/assets	0.6377	0.0006
	(0.888)	
Op. income std. dev.	0.4384	0.0018
	(0.807)	
Log(assets)	−0.2006***	−0.0181
	(0.006)	
Book leverage	0.6105	0.0061
	(0.273)	
Return	−7.3683***	−0.0220
	(0.000)	
Number of observations	1845	
Repurchase init. (%)	93.70	
Dividend init.(%)	6.30	
Pseudo-R^2	0.1298	
Panel B		
Log(Amihud)	−0.3892***	−0.0574
	(0.000)	
Log(Amihud(mod.))	−0.3646***	−0.0296
	(0.000)	
Log(rel. quoted sprd)	−0.9972***	−0.0481
	(0.000)	
Log(rel. effectives prd)	−1.0909***	−0.0475
	(0.000)	
Log(rel. quoted sprd/depth)	−0.5949***	−0.0395
	(0.000)	
Log(depth)	0.1234	0.0053
	(0.526)	
Log(trade size)	0.3886	0.0123
	(0.179)	

Logistic regressions on the probability of a repurchase vs. a dividend initiation. The dependent variable takes the value of 1 when the firm initiates a repurchase, and therefore a positive coefficient implies a greater probability of a repurchase. Initiators are defined as firms that have not paid off any cash in the last 3 years, and repurchase or pay a dividend for the first time this year. Independent variables are lagged one year. Elasticity is the change in the probability of an initiation given a change in the independent variable of a ±1/2 standard deviation around the mean. All regressions include year dummies, not reported. The numbers in (parenthesis) contain *p*-values, based on standard errors adjusted for clustering at the firm level. Panel A reports regression results using turnover as our proxy for liquidity, while Panel B reports liquidity coefficients from regressions using alternative liquidity proxies.

Having established a positive relation between liquidity and the repurchase-initiation decision, we turn now to the decision to initiate dividend payments. Given the decision to distribute cash, managers prefer the tax and financial flexibility benefits of a repurchase initiation as long as their firms' shares have sufficient liquidity to absorb the liquidity impact at low cost. But if there is insufficient liquidity, managers may forego the tax and flexibility benefits and initiate with a dividend. We therefore expect dividend-initiating firms to be less liquid than repurchase-initiating firms. We test this prediction in Table 5. But first we examine the liquidity of dividend-initiating firms relative to non-initiating firms in a manner parallel to our earlier comparison of repurchase-initiating and non-initiating firms.

We report the dividend-initiating results in Tables 3 and 4. We describe the dividend-initiating data in Table 3, and provide the logistic regression results in Table 4. Our full sample results in Table 3 show that dividend-initiating firms pay out 1.34% of total assets on average during the year of initiation, compared to 1.28% for the non-repurchasing subsample and 1.41% for the repurchasing subsample. The general pattern across liquidity measures is not as consistent as in the repurchase-initiation results (see Table 1). Market liquidity is lower for dividend initiators relative to non-initiators for turnover, Amihud and modified Amihud measures, depth, and trade size. In contrast, market liquidity is higher for dividend initiators for all three spread-related measures. Firm characteristics exhibit a consistent pattern between initiating and non-initiating firms. Dividend initiators have higher operating income/assets, lower non-operating income/assets, and lower operating income volatility. Dividend-initiating firms have greater assets, lower leverage ratios, more positive lagged returns, and fewer investment opportunities relative to non-initiators. They are also older than non-initiating firms.

We report the dividend-initiation results using logistic regressions in Table 4. There is a negative relation between liquidity in the current year and the decision to initiate a dividend payout in the subsequent year. In Panel A, we observe a negative and significant turnover coefficient of −0.2615 for the full sample. The related elasticity value is −0.52% — compared to 2.42% for repurchases in Table 2. The turnover coefficient for the non-repurchase subsample, −0.2350, is negative and significant, while the repurchasing subsample turnover coefficient of −0.3266 is also negative and significant.

Table 6
Summary statistics by method of payment

Variable	Full sample	Repurchasers only	Dividend payers only	Div. payers and repurchasers
Payout				
Repurchases/total payout	0.4429	1.0000	0.0000	0.4438
Repurchases/assets	0.0210	0.0347	0.0000	0.0301
Dividends/assets	0.0154	0.0000	0.0199	0.0224
Liquidity measures				
Turnover	6.9570	9.2199	6.1066	6.0945
Amihud	0.0123	0.0162	0.0135	0.0082
Amihud (mod.)	0.4885	0.5075	0.5736	0.3970
Rel. quoted sprd.	1.5027	1.8208	1.5859	1.1382
Rel. effective sprd.	1.0602	1.3071	1.1068	0.7910
Rel quoted sprd/depth	0.2325	0.2689	0.2647	0.1751
Depth	24.68	17.43	27.42	29.26
Trade size	1227.72	1177.52	1227.01	1274.19
Firm characteristics				
Operating income/assets	0.1486	0.1266	0.1468	0.1662
Non oper. income/assets	0.0109	0.0115	0.0109	0.0105
Operating income Std. dev.	0.0405	0.0581	0.0361	0.0318
Total assets (million $)	3713	998	3620	5764
Book leverage	0.1726	0.1617	0.1879	0.1664
Return	0.0149	0.0149	0.0152	0.0145
Market to book	2.56	2.78	2.28	2.67
Age	20.48	12.97	20.75	25.67
Number of observations	33,566	9218	11,618	12,730

The sample is composed of all firms with data available on Compustat and CRSP between 1983 and 2006 that disburse cash through either a dividend or a repurchase, or both. For statistics based on spreads, depth and trade size, we also require data availability on the TAQ dataset, which starts in 1993. We present sample means for the full sample, repurchasers only, dividend payers only, and firms paying both dividends and repurchases.

Turning to our control variables, the coefficients for operating income/assets, total assets, non-operating income (full sample only), lagged returns, and age are positive and significant. As expected, dividend initiators are found among large, successful firms with relatively high operating income. Our estimated coefficients for operating income volatility, leverage, and investment opportunities are negative and significant. Managers are unlikely to initiate a dividend when cash flows are volatile or when their firms are highly levered.

We report the logistic regression results for our alternative liquidity measures in Panel B. Both price impact measures (Amihud and modified Amihud) exhibit positive and significant coefficients across all samples. Managers of relatively illiquid firms (i.e., high price impact) are more likely to initiate dividend payouts than managers of liquid firms. We find that higher quoted and effective bid–ask spreads generally increase the likelihood of dividend initiation, although these coefficients are insignificant for the repurchasing subsample. None of the depth or trade size coefficients is significant at conventional levels. Comparing the statistical and economic significance levels between Tables 2 and 4, the results suggest that stock market liquidity plays a stronger role in the repurchase decision than in the dividend decision.

In Table 5, we examine the impact of liquidity on the trade-off between repurchase and dividend initiations. The dependent variable of our logistic regression takes the value of one for repurchase-initiating firms, and zero for dividend-initiating firms. Our sample includes only those firms that initiated a cash payout over the sample period, 1983–2006. The estimated turnover coefficient of 0.5139 reported in Panel A is positive and significant. Holding constant the decision to initiate cash payouts, managers of relatively liquid firms are more likely to initiate with repurchases. This result supports the claim that liquidity influences the decision to substitute repurchases for dividends.

Among the control variables, operating income, size, lagged returns, and age are negative and significant. Managers of large, mature firms with high operating income are more likely to forego a repurchase and initiate with a dividend. The inverse relation between lagged returns and repurchases is consistent with the underpricing explanation for repurchases.

We report the logistic regression results for our alternative liquidity measures in Panel B. Consistent with the liquidity hypothesis, both price impact measures have negative and significant coefficients. Managers of relatively illiquid firms (i.e., high price impact) are less likely to initiate repurchases than managers of liquid firms. The alternative liquidity measures related to spreads are also negative and significant, while depths and trade sizes are positive but not significant.

In summary, the initiation results in Tables 1 through 5 confirm that liquidity is a significant determinant of payout initiation decisions. Our focus on payout initiations also mitigates endogeneity concerns since it is unlikely that next year's initiation causes this year's liquidity level. Consistent with the liquidity hypothesis of repurchases, we show that stock market liquidity enables managers to initiate their payouts with repurchases.

3.2. Ongoing payout decisions

In this section, we analyze the role of liquidity in ongoing payout decisions. After the decision to initiate a payout, managers must decide on the dollar value of ongoing payouts. We expect to find a positive relation between market liquidity and repurchase

Table 7
Repurchase amount — panel regressions

	Full sample	Non div. payers	Dividend payers
Panel A			
Log(turnover)	0.0043***	0.0019***	0.0048***
	(0.000)	(0.005)	(0.000)
Operating income/assets	0.0833***	0.0775***	0.1052***
	(0.000)	(0.0000)	(0.000)
Non oper. income/assets	0.1560***	0.2142***	0.1189***
	(0.000)	(0.000)	(0.000)
Op. income std. dev.	0.0328***	0.0274**	0.0342*
	(0.002)	(0.034)	(0.085)
Log(assets)	−0.0003	0.0021***	−0.0006**
	(0.284)	(0.000)	(0.032)
Book leverage	−0.0418***	−0.0528***	−0.0335***
	(0.000)	(0.000)	(0.000)
Return	−0.0399***	−0.0566***	−0.0073
	(0.000)	(0.000)	(0.613)
Market to book	0.0022***	0.0023***	0.0021***
	(0.000)	(0.000)	(0.000)
Log(age)	−0.0007	0.0001	0.0005
	(0.202)	(0.872)	(0.492)
Intercept	0.0142***	0.0122***	0.0057
	(0.000)	(0.005)	(0.106)
Number of observations	22,114	9218	12,896
R^2	0.134	0.140	0.137
Panel B			
Log(Amihud)	−0.0035***	−0.0033***	−0.0030
	(0.000)	(0.000)	(0.000)
Log(Amihud(mod.))	−0.0034***	−0.0023***	−0.0034***
	(0.000)	(0.000)	(0.000)
Log(rel. quoted sprd)	−0.0074***	−0.0070***	−0.0060***
	(0.000)	(0.000)	(0.000)
Log(rel. effective sprd)	−0.0075***	−0.0079***	−0.0058***
	(0.000)	(0.000)	(0.000)
Log(rel. quoted sprd/depth)	−0.0052***	−0.0040***	−0.0049***
	(0.000)	(0.000)	(0.000)
Log(depth)	0.0034***	0.0014	0.0042***
	(0.000)	(0.240)	(0.000)
Log(trade size)	0.0071***	0.0041**	0.0080***
	(0.000)	(0.016)	(0.000)

Panel regressions of repurchases scaled by assets. The sample includes firm years with positive repurchases. We divide the sample into dividend and non-dividend payers depending on whether the firm reports positive dividends in that year. Independent variables are lagged one year. All regressions include year dummies, not reported. The numbers in (parenthesis) contain *p*-values, based on standard errors adjusted for clustering at the firm level. Panel A reports regression results using turnover as our proxy for liquidity, while Panel B reports liquidity coefficients from regressions using alternative liquidity proxies.

size. We examine the relation between liquidity and repurchases/assets in Table 7, between liquidity and dividend/assets in Table 8, and between liquidity and repurchases/total payouts in Table 9.

Our sample includes all firm years with cash disbursements during the sample period. We report sample means for the full sample in Table 6, along with subsample means for repurchases only, dividends only, and dividend and repurchases. There are more firm years in the dividend-and-repurchase subsample (12,730) than in either of the repurchase-only (9218) or dividend-only (11,618) subsamples. Managers are more likely to pay out a combination of dividends and repurchases than to pay out either one in isolation. For the full sample, the mean repurchase represents 2.10% of the firm's underlying assets and the mean dividend represents 1.54% of assets. Repurchases constitute 44.29% of the typical firm's total payout. In the repurchase-only subsample, the mean repurchase is 3.47% of assets. This payout proportion is considerably larger than the 1.99% of assets for the dividend-only subsample. For the firm which simultaneously pays both dividends and repurchases, 3.01% of assets are repurchased and 2.24% of assets are paid out as dividends. Similar to the full sample, less than half of total payouts (44.38%) are in the form of repurchases.

We report OLS regression results for repurchasing firms in Table 7. The dependent variable is the dollar value of repurchases scaled by the firm's assets. As in the payout initiation section, all regressions include year dummies (unreported). The estimated turnover coefficient for the full sample (0.0043) is positive and significant, as are the estimated turnover coefficients for the repurchase-only subsample (0.0019) and the repurchase-and-dividend subsample (0.0048). Similar to our payout initiation findings, these results are strongly supportive of the liquidity hypothesis of repurchases. Managers of liquid firms are able to repurchase larger amounts of stock, thereby capturing tax and flexibility benefits, with relatively little concern about adverse liquidity shocks. If stock market liquidity is low, however, managers are concerned about the adverse impact of large repurchases.

The control variables reported in Table 7 are generally consistent with expectations. In the full sample, we find a positive and significant relation between the repurchase amount and the firm's operating income, non-operating income, volatility of operating

Table 8
Dividend amount — panel regressions

	Full sample	Non-repurchasers	Repurchasers
Panel A			
Log(turnover)	−0.0025***	−0.0022***	−0.0028***
	(0.000)	(0.000)	(0.000)
Operating income/assets	0.0783***	0.0714***	0.0869***
	(0.000)	(0.000)	(0.000)
Non oper. income/assets	0.1277***	0.1206***	0.1287***
	(0.000)	(0.000)	(0.000)
Op. income std. dev.	0.0136	0.0328*	−0.0039
	(0.133)	(0.015)	(0.705)
Log(assets)	0.0006***	0.0003	0.0008***
	(0.001)	(0.265)	(0.000)
Book leverage	−0.0230***	−0.0192***	−0.0275***
	(0.000)	(0.000)	(0.000)
Return	−0.0747***	−0.0614***	−0.0874***
	(0.000)	(0.000)	(0.000)
Market to book	0.0014***	0.0009***	0.0017***
	(0.000)	(0.000)	(0.000)
Log(age)	0.0013***	−0.0004	0.0032***
	(0.002)	(0.415)	(0.000)
Intercept	0.0059***	0.0117***	0.0004
	(0.001)	(0.000)	(0.868)
Number of observations	26,472	11,275	12,205
R^2	0.235	0.159	0.342
Panel B			
Log(Amihud)	−0.0001	−0.0004*	0.0003
	(0.605)	(0.080)	(0.119)
Log(Amihud(mod.))	0.0005**	0.0000	0.0010***
	(0.019)	(0.905)	(0.000)
Log(rel. quoted sprd)	0.0012***	0.0002	0.0018***
	(0.008)	(0.761)	(0.001)
Log(rel. effective sprd)	0.0011**	0.0002	0.0016***
	(0.017)	(0.743)	(0.004)
Log(rel. quoted sprd/depth)	−0.0001	−0.0003	−0.0001
	(0.656)	(0.410)	(0.744)
Log(depth)	0.0017***	0.0014***	0.0020***
	(0.000)	(0.006)	(0.000)
Log(trade size)	−0.0009	−0.0019**	−0.0003
	(0.138)	(0.031)	(0.707)

Panel regressions of dividends scaled by assets. The sample includes firm years with positive dividends. We divide the sample into repurchasers and non-repurchasers depending on whether the firm reports positive repurchases in that year. Independent variables are lagged one year. All regressions include year dummies, not reported. The numbers in (parenthesis) contain *p*-values, based on standard errors adjusted for clustering at the firm level. Panel A reports regression results using turnover as our proxy for liquidity, while Panel B reports liquidity coefficients from regressions using alternative liquidity proxies.

income, and investment opportunity set. There is a negative and significant relation between the repurchase amount and the firm's leverage and lagged returns. Firm size and age are insignificant.

In Panel B, we report the results for our alternative liquidity measures. The relation between repurchase amounts and market liquidity is significant, and with the expected sign, for all alternative liquidity measures in the full sample. The two price impact and three spread measures have negative and significant coefficients. The depth and trade size measures have positive and significant coefficients. We find almost identical results in each of the two subsamples. Taken together, our Table 7 findings for turnover, price impact, bid–ask spreads, depths, and trade sizes offer compelling evidence that market liquidity is a determinant of managerial payout decisions.

We report OLS regression results for dividend-paying firms in Table 8. The dependent variable is the dollar value of dividends scaled by the firm's assets. The estimated turnover coefficient for the full sample (−0.0025) is negative and significant. This coefficient is less than 60% of its repurchase counterpart (Table 7) in absolute terms. The turnover coefficient for the dividend-only subsample is −0.0022, and the turnover coefficient for the dividend-and-repurchase subsample is −0.0028. These negative relations mean that managers of illiquid firms prefer relatively large dividend payments. The control variable results are generally consistent with expectations. There is a positive and significant relation between the dividend amount and the firm's operating income, non-operating income, size, investment opportunity set, and age. There is a negative and significant relation between the dividend amount and the firm's leverage and lagged returns. The coefficient for operating income volatility is insignificant.

In Panel B, we report the results for our alternative liquidity measures. The relation between dividend amounts and liquidity is much weaker than the relation between repurchase amounts and liquidity as reported in Table 7. In the full and repurchase subsamples, the Amihud measure, relative quoted spread/depth, and trade size coefficients are insignificant. The modified Amihud price impact and relative and quoted spreads are positive and significant, consistent with expectations. The depth coefficient is also

Table 9
Repurchases as a proportion of payout — panel regressions

	Full sample	Dividend payers	Div. payers and repurchasers
Panel A			
Log(turnover)	0.2057***	0.0264***	0.0622***
	(0.000)	(0.001)	(0.000)
Operating income/assets	−0.7232***	1.0864***	0.2359***
	(0.000)	(0.000)	(0.000)
Non oper. income/assets	0.9202	0.5768	0.0336
	(0.135)	(0.134)	(0.880)
Op. income std. dev.	3.0742***	−0.8236***	−0.0077
	(0.000)	(0.000)	(0.959)
Log(assets)	−0.1088***	0.0150***	−0.0072***
	(0.000)	(0.000)	(0.010)
Book leverage	−0.1998**	−0.2575***	−0.0392
	(0.017)	(0.000)	(0.234)
Return	−0.4183**	−0.1603	0.6493***
	(0.029)	(0.278)	(0.000)
Market to book	0.0160***	−0.0011	0.0007
	(0.000)	(0.684)	(0.648)
Log(age)	−0.1928***	0.1024***	−0.0208***
	(0.000)	(0.000)	(0.003)
Intercept	0.8509***	−0.5798***	0.3840***
	(0.000)	(0.000)	(0.000)
Number of observations	34,210	24,788	12,988
Left censored	11,800	11,800	
Uncensored	12,988	12,988	
Right censored	9422	0	
R^2			0.103
Pseudo-R^2	0.100	0.071	
Panel B			
Log(Amihud)	−0.1483***	−0.0559***	−0.0314***
	(0.000)	(0.000)	(0.000)
Log(Amihud(mod.))	−0.1305***	−0.0418***	−0.0398***
	(0.000)	(0.000)	(0.000)
Log(rel. quoted sprd)	−0.2799***	−0.1318***	−0.0693***
	(0.000)	(0.000)	(0.000)
Log(rel. effective sprd)	−0.2808***	−0.1399***	−0.0677***
	(0.000)	(0.000)	(0.000)
Log(rel. quoted sprd/depth)	−0.1986***	−0.0776***	−0.0443***
	(0.000)	(0.000)	(0.000)
Log(depth)	0.1048***	0.0375***	0.0220***
	(0.000)	(0.001)	(0.003)
Log(trade size)	0.3699***	0.1101***	0.0697***
	(0.000)	(0.000)	(0.000)

Panel regressions of repurchases as a proportion of total payout for firm years with positive payout. We estimate Tobit regressions for the full sample (two-sided tobit) and firm years documenting a positive dividend (one-sided tobit). We estimate standard OLS regressions for firm years documenting a positive dividend and repurchase. Independent variables are lagged one year. All regressions include year dummies, not reported. The numbers in (parenthesis) contain *p*-values. Standard errors of Tobit regressions are computed through bootstrapping assuming clustering at the firm level, and 500 draws. Standard errors of OLS regressions are corrected for clustering at the firm level. Panel A reports regression results using turnover as our proxy for liquidity, while Panel B reports liquidity coefficients from regressions using alternative liquidity proxies.

positive and significant, but this is inconsistent with expectations. In the non-repurchase subsample, even fewer coefficients are statistically significant. Overall, these results suggest that stock market liquidity exerts a weaker, second-order influence over dividend amounts.

In Table 9, we examine the impact of liquidity on the decision to substitute repurchases for dividend payouts. The dependent variable for our tobit and OLS regressions is the dollar amount of repurchases divided by the dollar amount of total payouts (repurchases/total payouts). We estimate all tobit standard errors using a bootstrapping technique designed to reduce the effects of clustering, as described in Kayhan and Titman (2004). The full sample includes all firm years with positive payouts over the sample period. We also examine two subsamples: all dividend payers and only those dividend payers that simultaneously repurchase. We use a two-sided tobit model on the full sample (censored at zero and one), one-sided tobit model on the all dividend-payers subsample (censored at zero), and OLS on the combined dividend-and-repurchase subsample (uncensored).

We report the regression results for turnover in Panel A of Table 9. The estimated turnover coefficient (0.2057) is positive and significant for the full sample, as well as for the dividend-paying (0.0264) and combined dividend-and-repurchase (0.0622) subsamples. High turnover levels alleviate managerial concerns about the potential adverse liquidity impact of repurchases. With higher levels of liquidity, managers are more willing to substitute repurchases for dividends. This finding is also consistent with our payout initiation results which show that higher levels of liquidity increase the probability of a repurchase initiation.

The control variable coefficients in Panel A are generally significant. For the full sample, there are positive and significant coefficients for operating income volatility and the investment opportunity set. There is a negative and significant relation between repurchases/total payouts and operating income/assets, size, leverage, lagged returns, and age. The coefficient on non-operating income is insignificant.

We report the alternative liquidity measures in Panel B. Each liquidity coefficient is significant and consistent with expectations across all three samples. The coefficients for Amihud's price impact measure, modified Amihud measure, relative quoted spread, relative effective spread, and relative quoted spread/depth are negative and significant, while the coefficients for depth and trade size are positive and significant.

In summary, the ongoing payout results in Tables 6–9 extend and strengthen our payout initiation findings in Tables 1–5. Managers prefer to initiate cash payouts in the form of a repurchase when stock market liquidity is high relative to both non-initiating and dividend-initiating firms. In addition, managers are willing to pay higher dollar amounts of repurchases, both as a proportion of assets and total payouts, when stock market liquidity is high. Taken as a whole, our empirical evidence supports the central claim that stock market liquidity plays a significant role determining corporate payout policy. Liquidity has a direct impact on managers' willingness conduct repurchases and an indirect impact on dividend through an imperfect substitution effect.

4. Summary and conclusion

We hypothesize that stock market liquidity affects corporate payout policy primarily through its influence on the decision to repurchase. Our liquidity hypothesis of repurchases is consistent with Barclay and Smith's (1988) theoretical framework as well as with Brav et al.'s (2005) survey and interview results. Managers prefer repurchases over dividends because of tax and flexibility advantages, although their ability to conduct repurchases is subject to various constraints. Prior to the enactment of safe harbor Rule 10b-18, managers were constrained by uncertainty about charges of price manipulation. Repurchase activity increased significantly after this regulatory constraint was lifted by the SEC's ruling in 1982. We argue that stock market liquidity directly impacts the repurchase decision and, through the substitution effect, indirectly impacts the dividend decision.

Our empirical results confirm that managers use stock market liquidity as a decision variable in setting payout policies. We divide our results into two sections corresponding to payout initiation decisions and ongoing payout decisions. We find that repurchase-initiating firms are significantly more liquid than non-initiating firms, and that dividend-initiating firms are generally less liquid than non-initiating firms. The repurchase-initiating results are stronger than their dividend-initiation counterparts, as hypothesized.

We confirm parallel patterns for ongoing payouts. We show that the size of the repurchase increases significantly with the market liquidity of the repurchasing firm. These repurchase results are significant for every measure of market liquidity. We find that the size of the dividend generally decreases with the liquidity of the dividend-paying firm, although these dividend results are considerably weaker than their repurchase counterparts, both in terms of statistical and economic significance. Similar to our initiation findings, stock market liquidity has a first-order effect on the repurchase decision and a weaker, residual effect on the dividend decision. Overall, our payout initiation and ongoing payout results provide considerable support for the liquidity hypothesis of repurchases.

In addition to connecting market microstructure to corporate finance, our study contributes to a coherent picture of corporate payout policy that is currently emerging from the literature. Fama and French (2001) show that dividend policy has changed substantially since the 1970s, and that these changes cannot be fully attributed to firm characteristics. DeAngelo et al. (2004) confirm that there has been a downward shift in the percentage of firms that pay dividends, in spite of the fact that total dividend payouts have continued to increase since the 1970s. Grullon and Michaely (2002), among others, document the secular rise in share repurchases over this same time period. Given the evidence that managers have been substituting repurchases for dividends, the next step is to examine the underlying causes of this substitution effect.

Skinner (2008) shows that two groups of payers have emerged since the 1980s: firms that use repurchases exclusively, and firms that use repurchases and dividends combined. The latter group consists of well-established, mature firms that have been paying dividends for a number of years. Managers of these firms are reluctant to cut dividends because of perceived “negative consequences” (Brav et al., 2005), but they use repurchases for payout increases if there is sufficient liquidity. Stock market liquidity determines the extent of the substitution effect for mature, dividend-paying firms. For the former group of repurchase-only firms, stock market liquidity plays an even more pervasive role since their entire payout depends on liquidity thresholds. When payout opportunities arise, these managers will choose repurchases as long as there is sufficient liquidity.

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