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Share repurchases, catering, and dividend substitution

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ABSTRACT

We first extend Baker and Wurgler's (2004a) catering theory of dividends to share repurchases. Consistent with the notion that firms cater to investor demand for share repurchases, we report evidence that the market's time-varying repurchase premium *positively* affects firms' choice to repurchase shares. Next, we use the catering behavior as a novel framework for testing the dividend substitution hypothesis. Consistent with the notion that managers consider dividends and share repurchases to be substitute payout mechanisms, we find that the dividend premium *negatively* affects the repurchase choice, whereas the repurchase premium *negatively* affects the choice to pay dividends.

1. Introduction

The extant literature offers numerous explanations for why firms disburse funds to their shareholders in the form of dividends and/or share repurchases. Most notably, Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985) propose that firms disburse funds to signal favorable information to the capital market. Nissim and Ziv (2001) and Lie (2005a) report evidence in favor of the signaling theory, whereas Benartzi et al. (1997), Grullon, Michaely, and Swaminathan (2002), Grullon et al. (2005), and Gong et al. (2008) question this evidence. Related to the signaling theory, Brav et al. (2005) report that CFOs and Treasurers deem undervaluation of the stock to be the most important consideration for the decision to repurchase shares (but not to pay dividends). Alternatively, Easterbrook (1984) argues that payouts mitigate agency problems between managers and shareholders by reducing funds available to managers, but the empirical evidence on this in Denis et al. (1994), Lang and Litzenberger (1989), Yoon and Starks (1995)), and Lie (2000) is also mixed.

In their seminal paper, Baker and Wurgler (2004a) propose a new theory for why firms pay dividends. They argue that investors' demand for dividend-paying stocks is time-varying, thereby causing the relative prices of dividend-paying and non-dividend-paying stocks to fluctuate. Consequently, managers cater to investor demand for dividends by paying dividends when investors place a premium on dividend-paying stocks. Consistent with their theory, they report empirical evidence that aggregate dividend initiations are positively related to their measure of dividend premium. Furthermore, Baker and Wurgler (2004b) report that the dividend premium is related to the propensity to pay dividends documented in Fama and French (2001).

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While Baker and Wurgler's (2004a) original catering theory pertains to dividends, it has since been extended to other corporate decisions. Baker et al. (2009) propose a catering theory of nominal share prices in which managers set the stock price in response to demand for shares in different price ranges. This can explain the choice of IPO offer prices and the timing of stock splits. Polk and Sapienza (2009) suggest that the market might misprice firms according to their investment level, causing managers to try to inflate share prices via their investment decisions. Finally, Aghion and Stein (2008) argue that managers choose between maximizing sales growth and improving profit margins depending on what is in vogue in the stock market.

There is, however, no study on managers catering to time-varying demand for share repurchases. This is surprising, because share repurchases are similar to dividends and have become increasingly popular during the last couple of decades. In this study, we empirically examine catering incentives for corporate share repurchases. In this sense, we extend the literature on the multiple ways in which firms cater to investors' time-varying demands.

In addition, we use the catering behavior to provide new evidence on the hypothesis that managers view dividends and share repurchases as substitutes. The prior literature provides mixed evidence on this. On the one hand, DeAngelo et al. (2000) report that even though the frequency of special dividends has decreased over time, they were not displaced by share repurchases. Furthermore, Jagannathan et al. (2000) find evidence that firms use dividends to disburse permanent cash flows and repurchases to disburse temporary cash flows. They conclude that "Repurchases do not appear to be replacing dividends; rather they seem to serve the complementary role of paying out short-term cash flows" and that "Dividends and repurchases are used at different places in the business cycle by different types of firms" (page 382). On the other hand, Grullon and Michaely (2002) find that firms that disburse less funds in the form of dividends than predicted tend to repurchase relatively more shares, consistent with a substitution effect. Our research approach is novel, because we examine not only the effects of premiums on the corresponding corporate decisions (i.e., the effect of the dividend premium on the dividend decision and the effect of the repurchase premium on the repurchase decision), but also the effects of premiums on the alternate decisions (i.e., the effect of the dividend premium on the repurchase decision and the effect of the repurchase premium on the dividend decision). This allows us to study whether managers consider both payout mechanisms before making a choice.

As the first step of our empirical analysis, we develop a time-varying repurchase premium measure based on the values of firms that have repurchased shares during each of the last three years versus the values of other firms. There are two reasons why we focus on firms that have repurchased during each of the last three years rather than just the last year. First, we are concerned that some firms seek to repurchase shares only when they are undervalued, which, could induce some bias in our repurchase premiums. We believe that firms that have demonstrated a longer-term and regular commitment toward share repurchases are less likely to be motivated primarily by perceived undervaluation, and that focusing on these firms mitigates bias stemming from misvaluation. In contrast, measuring dividend premiums that simply compare last year's dividend payers to nonpayers does not suffer from similar bias, because the capital market generally assumes dividend payers are committed to paying them regularly (i.e., dividends are sticky). Second, to the extent that repurchases occur irregularly, they might be viewed by investors as a peripheral firm characteristic. We mitigate this concern by focusing on firms that have repurchased during each of the last three years, because investors likely view the repurchasing behavior for these firms to be a salient characteristic.

We find that the relations between the repurchase and dividend premiums and the payout decisions are consistently in support of catering theory. The repurchase premium positively affects the probability that firms will initiate or continue their share repurchase activity. Meanwhile, the dividend premium positively affects the probability that firms initiate or otherwise increase dividends. Importantly, these results are robust to the inclusion of the firm risk measures suggested by Hoberg and Prabhala (2009) in our multivariate analysis, and the dividend and repurchase premiums therefore do not appear to merely proxy for risk. Rather, it appears that managers cater to investors' separate demands for share repurchases and dividends.

Next, we examine the substitution effect. We find that the dividend premium negatively affects the probability that firms initiate or continue their share repurchase activity, whereas the repurchase premium negatively affects the probability that firms initiate or otherwise increase dividends. In fact, the effect of the dividend premium on the repurchase decision seems as strong as its effect on the dividend decision, and the effect of the repurchase premium on the dividend decision seems as strong as its effect on the repurchase decision. These results suggest that managers are considering both payout mechanisms before making a final payout choice. In this sense, dividends and share repurchases are treated as substitutes, at least until investor demand tilts the choice toward one or the other. Our results complement those in Grullon and Michaely (2002), who also conclude that share repurchases and dividends are substitutes. While Grullon and Michaely find that firms that pay less dividends than predicted instead repurchase more shares, they do not provide evidence on whether managers actually consider both payout mechanisms before making a choice, as we do.

In a contemporaneous study, Kulchania (2012) also studies how catering might lead to a substitution between repurchases and dividends. Kulchania creates a "difference premium" measure, calculated as a repurchase premium minus a dividend premium. He finds that when the difference premium is high, firms are more likely to repurchase and less likely to pay dividends. He further finds weak evidence that the difference premium explains deviations from "expected" dividend payouts based on the Lintner (1956) model, and that the abnormal stock returns surrounding dividend increase (cut) announcements are negatively (positively) correlated with the difference premium. In contrast, we break out the repurchase and dividend premiums. Doing so allows us to focus on how the repurchase premium incrementally affects the dividend decision while controlling for the dividend premium, and how the dividend premium incrementally affects the repurchase decision while controlling for the repurchase premium. Furthermore, we provide important insights by examining important sub-categories of firms that initiate dividends/repurchases versus firms that continue dividends/repurchases.

The remainder of the paper proceeds as follows. The next section discusses the sample. Section 3 presents empirical results. Section 4 discusses results from robustness checks. Finally, Section 5 summarizes and concludes.

2. Sample

2.1. Sample selection

Our sample includes firms with available data from Compustat and CRSP that have a share code of 10 or 11. Following Baker and Wurgler (2004a, page 1132) and Fama and French (2001, pages 40–41), we require data for total asset (Compustat data item 6), stock price (199), shares outstanding (25) at the end of the fiscal year, income before extraordinary items (18), interest expense (15), dividend per share by ex date (26), preferred dividends (19), and preferred stock liquidating value (10), preferred stock redemption value (56), or preferred stock at carrying value (130). We further require data for stockholder's equity (216), liabilities (181), or both common equity (60) and preferred stock par value (130). We exclude firms with book equity below $250,000 or book assets below $500,000. We also exclude utilities (SIC codes from 4900 to 4949) and financial firms (SIC codes from 6000 to 6999). Finally, we also require shares outstanding data in CRSP to measure repurchase fraction. This leaves us with 15,022 firms and 156,469 firm-years.

2.2. Measure of repurchase fraction

Our measure of the number of shares repurchased is similar to that used in Stephens and Weisbach (1998) and Jagannathan et al. (2000). Specifically, we estimate the repurchase fraction, $Repurchase\_Fraction_t$, as $\left|\sum_{m=1}^{12} \frac{Min(\Delta shrout_m, 0)}{shrout_{m-1}} \times 100\right|$, where $\Delta shrout_m$ is the change in the number of shares outstanding from the end of month $m-1$ to the end of month m in year t after adjusting for non-repurchase activity such as stock splits and new equity issues, and $shrout_0$ is the number of shares outstanding at the end of the year $t-1$. That is, when adjusted shares outstanding declines from month $m-1$ to month m, we assume a share repurchase has occurred. The shares outstanding come from CRSP. We adjust for (i) stock splits using the cumulative factor to adjust shares ('CFACSHR') and (ii) new equity issues by distribution code of 6581 and by the factor to adjust shares ('FACSHR'). We set $Repurchase\_Fraction_t$ to be zero if it is smaller than 0.1, and define a firm-year as a repurchaser if $Repurchase\_Fraction_t$ is positive.[1]

Some papers (e.g., Baker and Wurgler (2004a), Dittmar (2000), Grullon and Michaely (2002), Jagannathan et al. (2000), Li and Lie (2006), Lie (2005c), Stephens and Weisbach (1998), and Kulchania (2012)) use Compustat item 115 ("Purchases of Common and Preferred Stock") to measure stock repurchases (with or without adjusting for preferred stock repurchases). In our robustness check section, we discuss results using this alternative measure of repurchases.

2.3. Repurchase initiations and continuations

To identify firms that initiate repurchases or continue repurchases, we first need to define their *past* repurchase behavior. In doing so, we propose a loose way of defining their past behavior and a strict way of defining their past behavior. In the loose definition, past repurchasers (nonrepurchasers) are firms that did (did not) repurchase in year $t-1$. In the strict definition, past repurchasers (nonrepurchasers) are firms that did (did not) repurchase in years $t-1$, $t-2$, and $t-3$. One way to interpret the latter definition is that these firms are "regular"/"frequent" repurchasers or nonrepurchasers.[2] Similarly, we also use a loose and strict way of new and continuing repurchasers. New repurchasers are past nonrepurchasers that initiate repurchases in year t (loose definition) or in years t, $t+1$, and $t+2$ to become "regular" or "long-term commitment" repurchasers (strict definition). Continuing repurchasers are past repurchasers that continue to repurchase in year t (loose definition) or in years t, $t+1$, and $t+2$ (strict definition). Given that we have loose and strict definitions of both past repurchasing behavior and subsequent repurchasing behavior, there exist several combinations of ways we can define our final variables called $New\_Repurchasers_t$ and $Continuing\_Repurchasers_t$. We pick the following three ways: (1) new (continuing) repurchasers are past nonrepurchasers (repurchasers) in year $t-1$ and initiate (continue) repurchases in year t (we denote these as $k=1$ firms); (2) new (continuing) repurchasers are past "regular" nonrepurchasers (repurchasers) in years $t-1$, $t-2$, $t-3$ and initiate (continue) repurchases in year t (we denote these as $k=2$ firms); and (3) new (continuing) repurchasers are past "regular" nonrepurchasers (repurchasers) in years $t-1$, $t-2$, $t-3$ and initiate (continue) repurchases for three consecutive years in years t, $t+1$ and $t+2$ (we call these $k=3$ firms). So, there are three concepts in defining $New\_Repurchasers_t^k$ and $Continuing\_Repurchasers_t^k$. For $k=1$ firms, it is simply a very loose way to define their repurchase behavior. For $k=2$, these are firms that exhibit a past "regular" behavior and then they "unexpectedly" change behavior or "expectedly" continue their behavior. For $k=3$, these are firms that exhibit a past "regular" behavior and then they "unexpectedly" change to a new "regular" behavior or "expectedly" continue their "regular" behavior. Unlike dividend decisions, repurchase decisions are not sticky in nature. Therefore, we think it is necessary to use different definitions of repurchase behavior to make sure our results are robust.

Table 1 reports yearly rates of repurchase initiations and continuations from 1963 to 2010. Panel A shows summary statistics of the number $New\_Repurchasers_t^k$ and $Past\_Nonrepurchasers_t^k$, where $Past\_Nonrepurchasers_t^k$ are firms with available data in year

[1] Our results are robust to alternative cutoffs, including 0%, 0.001%, 0.01%, 0.5%, and 1%.

[2] We acknowledge that the way we define a "regular" repurchaser is somewhat arbitrary. However, in a similar vein, Grinstein and Michaely (2005) define regular repurchasers as firms that repurchase in year t and repurchase at least once in year $t-1$ and $t-2$. Therefore, our definition of a regular repurchaser is stricter than theirs.

Table 1
Rates of repurchase initiation and continuation from 1963 to 2010. The sample includes firms with available data from Compustat and CRSP that have a share code of 10 or 11. Following Baker and Wurgler (2004a, page 1132)) and Fama and French (2001, page 40–41), we require data (Compustat data items in parenthesis) for total asset (6), stock price (199), shares outstanding (25) at the end of the fiscal year, income before extraordinary items (18), interest expense (15), dividend per share by ex date (26), preferred dividends (19), and (i) preferred stock liquidating value (10), (ii) preferred stock redemption value (56), or (iii) preferred stock at carrying value (130). We further require data for (i) stockholder's equity (216), liabilities (181), or (iii) common equity (60) and preferred stock par value (130). We exclude firms with book equity below $250,000 or book assets below $500,000. We also exclude utilities (SIC codes from 4900 to 4949) and financial firms (SIC codes from 6000 to 6999). Finally, we require shares outstanding data in CRSP to measure repurchase fraction. This leaves us with 15,022 firms and 156,469 firm years. We estimate the repurchase fraction as $\left|\sum_{m=1}^{12}\frac{Min(\Delta shrout_m,0)}{shrout_{m-1}}\times 100\right|$, where $\Delta shrout_m$ is the change in the number of shares outstanding from the end of month $m-1$ to the end of month m after adjusting for non-repurchase activity such as stock splits and new equity issues, and $shrout_0$ is the number of shares outstanding at the end of the previous year. The shares outstanding come from CRSP. We adjust for (i) stock splits using the cumulative factor to adjust shares ('CFACSHR') and (ii) new equity issues by distribution code of 6581 and by the factor to adjust shares ('FACSHR'). We set the repurchase fraction to be zero if it is smaller than 0.1. We define a firm-year as a repurchaser if the repurchase fraction is positive. $Past\_Nonrepurchasers_t^k$ are firms with available data in year t if $k=1$ or $k=2$, or in years t, $t+1$, and $t+2$ if $k=3$, and did not repurchase shares in year $t-1$ if $k=1$ or did not repurchase shares in years $t-1$, $t-2$, and $t-3$ if $k=2$ or $k=3$. $New\ Repurchasers_t^k$ is the subset of $Past\_Nonrepurchasers_t^k$ that repurchase shares in year t if $k=1$ or $k=2$, or years t, $t+1$, and $t+2$ if $k=3$. $Initiate_t^k$ is simply the ratio of $New\_Repurchasers_t^k$ to $Past\_Nonrepurchaser_t^k$. $Past\_Repurchasers_t^k$ are firms with available data in year t if $k=1$ or $k=2$, or in years t, $t+1$, and $t+2$ if $k=3$, and repurchase shares in year $t-1$ if $k=1$, or repurchase shares in years $t-1$, $t-2$, and $t-3$ if $k=2$ or $k=3$. $Continuing\_Repurchasers_t^k$ is the subset of $Past\ Repurchasers_t^k$ that repurchased shares in year t if $k=1$ or $k=2$, or years t, $t+1$, and $t+2$ if $k=3$. $Continue_t^k$ is simply the ratio of $Continuing\_Repurchasers_t^k$ to $Past\_Repurchasers_t^k$.

Panel A

Year	$New\_Repurchasers_t^k$			$Past\_Nonrepurchaser_t^k$			$Initiate_t^k$ (in %)		
	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$
1963	34			358			9.50		
1964	49			392			12.50		
1965	50	27	7	446	286	282	11.21	9.44	2.48
1966	62	31	4	555	308	302	11.17	10.06	1.32
1967	53	18	1	1042	352	348	5.09	5.11	0.29
1968	45	19	2	1192	455	447	3.78	4.18	0.45
1969	74	40	1	1351	918	896	5.48	4.36	0.11
1970	92	62	7	1475	1047	1012	6.24	5.92	0.69
1971	76	51	0	1585	1159	1115	4.79	4.40	0.00
1972	123	86	5	1663	1267	1205	7.40	6.79	0.41
1973	60	43	6	1696	1329	1239	3.54	3.24	0.48
1974	424	181	16	2717	1388	1302	15.61	13.04	1.23
1975	394	218	33	2352	1330	1213	16.75	16.39	2.72
1976	186	132	24	2289	1757	1546	8.13	7.51	1.55
1977	494	298	45	2482	1653	1442	19.90	18.03	3.12
1978	293	192	29	2069	1520	1324	14.16	12.63	2.19
1979	372	222	34	2195	1487	1292	16.95	14.93	2.63
1980	323	153	31	2256	1295	1135	14.32	11.81	2.73
1981	501	253	42	2321	1370	1206	21.59	18.47	3.48
1982	507	276	32	2266	1333	1138	22.37	20.71	2.81
1983	375	173	28	2,251	1233	1009	16.66	14.03	2.78
1984	624	256	49	2551	1268	1000	24.46	20.19	4.90
1985	440	184	31	2366	1181	944	18.60	15.58	3.28
1986	485	223	46	2422	1222	978	20.02	18.25	4.70
1987	630	273	57	2484	1226	975	25.36	22.27	5.85
1988	668	286	47	2446	1145	926	27.31	24.98	5.08
1989	397	155	38	2219	1060	856	17.89	14.62	4.44
1990	653	251	44	2403	1152	966	27.17	21.79	4.55
1991	391	172	20	2117	1099	913	18.47	15.65	2.19
1992	467	155	32	2502	1157	976	18.67	13.40	3.28
1993	507	171	36	2783	1201	1035	18.22	14.24	3.48
1994	609	259	62	3080	1440	1238	19.77	17.99	5.01
1995	625	278	60	3163	1569	1286	19.76	17.72	4.67
1996	646	299	105	3265	1659	1315	19.79	18.02	7.98
1997	715	301	87	3478	1634	1236	20.56	18.42	7.04
1998	943	440	110	3243	1575	1148	29.08	27.94	9.58
1999	463	216	52	2622	1379	1016	17.66	15.66	5.12
2000	938	369	117	2866	1319	999	32.73	27.98	11.71
2001	568	227	39	2275	1048	817	24.97	21.66	4.77
2002	516	199	52	2134	1036	846	24.18	19.21	6.15
2003	472	164	43	2125	1007	837	22.21	16.29	5.14
2004	464	193	73	2080	1059	878	22.31	18.22	8.31
2005	645	284	87	2126	1080	870	30.34	26.30	10.00
2006	471	206	85	1814	940	740	25.96	21.91	11.49
2007	483	217	65	1747	892	717	27.65	24.33	9.07
2008	551	219	51	1643	787	640	33.54	27.83	7.97
2009	294	139		1329	681		22.12	20.41	

(continued on next page)

Table 1 (*continued*)

Panel A

Year	$New\_Repurchasers_t^k$			$Past\_Nonrepurchaser_t^k$			$Initiate_t^k$ (in %)		
	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$
2010	389	112		1583	678		24.57	16.52	
Mean	409.19	189.63	41.70	2079.56	1151.76	991.02	18.34	16.05	4.26
Std	234.91	95.81	30.01	737.03	351.26	285.42	7.83	6.69	3.10

Panel B

Year	$Continuing\_Repurchasers_t^k$			$Past\_Repurchasers_t^k$			$Continue_t^k$ (in %)		
	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$
1963	20			55			36.36		
1964	20			56			35.71		
1965	30	5	1	78	12	11	38.46	41.67	9.09
1966	42	6	0	87	9	9	48.28	66.67	0.00
1967	36	3	0	139	14	13	25.90	21.43	0.00
1968	21	3	0	88	13	13	23.86	23.08	0.00
1969	20	6	0	71	12	12	28.17	50.00	0.00
1970	32	2	0	94	9	9	34.04	22.22	0.00
1971	35	3	0	123	8	8	28.46	37.50	0.00
1972	37	5	0	111	8	8	33.33	62.50	0.00
1973	21	2	2	161	14	13	13.04	14.29	15.38
1974	39	2	1	105	2	2	37.14	100.00	50.00
1975	170	5	2	458	10	9	37.12	50.00	22.22
1976	142	5	3	565	18	16	25.13	27.78	18.75
1977	138	26	16	311	46	39	44.37	56.52	41.03
1978	250	49	27	605	71	66	41.32	69.01	40.91
1979	251	53	23	538	74	71	46.65	71.62	32.39
1980	297	83	43	628	136	122	47.29	61.03	35.25
1981	301	80	32	595	127	109	50.59	62.99	29.36
1982	432	120	48	812	149	127	53.20	80.54	37.80
1983	395	106	44	945	184	148	41.80	57.61	29.73
1984	373	131	54	764	195	162	48.82	67.18	33.33
1985	476	131	57	997	202	160	47.74	64.85	35.63
1986	465	121	59	884	192	154	52.60	63.02	38.31
1987	492	168	77	933	236	194	52.73	71.19	39.69
1988	642	171	90	1117	233	193	57.48	73.39	46.63
1989	616	179	82	1242	274	244	49.60	65.33	33.61
1990	622	241	75	991	325	297	62.76	74.15	25.25
1991	605	221	74	1260	386	357	48.02	57.25	20.73
1992	446	169	73	979	304	277	45.56	55.59	26.35
1993	428	178	84	930	287	252	46.02	62.02	33.33
1994	468	142	72	944	220	198	49.58	64.55	36.36
1995	590	162	86	1098	234	208	53.73	69.23	41.35
1996	633	200	106	1182	277	240	53.55	72.20	44.17
1997	738	248	130	1254	344	303	58.85	72.09	42.90
1998	927	285	147	1419	376	308	65.33	75.80	47.73
1999	946	324	182	1779	461	391	53.18	70.28	46.55
2000	918	382	177	1302	494	427	70.51	77.33	41.45
2001	1,086	419	191	1739	589	526	62.45	71.14	36.31
2002	929	343	157	1561	530	479	59.51	64.72	32.78
2003	828	426	194	1358	603	525	60.97	70.65	36.95
2004	693	330	190	1251	538	456	55.40	61.34	41.67
2005	772	355	207	1130	457	388	68.32	77.68	53.35
2006	916	372	237	1355	461	390	67.60	80.69	60.77
2007	919	431	227	1317	530	456	69.78	81.32	49.78
2008	1,022	526	248	1339	616	555	76.33	85.39	44.68
2009	889	426		1513	677		58.76	62.92	
2010	672	420		1127	565		59.63	74.34	
Mean	455.00	175.33	79.95	820.63	250.48	203.30	48.44	62.22	30.72
Std	339.69	155.28	77.00	521.97	210.04	173.52	13.84	17.99	16.75

t if $k=1$ or $k=2$, or in years t, $t+1$, and $t+2$ if $k=3$ and did not repurchase shares in year $t-1$ if $k=1$ or did not repurchase shares in years $t-1$, $t-2$, and $t-3$ if $k=2$ or $k=3$. $Initiate_t^k$ is simply the ratio of $New\_Repurchasers_t^k$ to $Past\_Nonrepurchaser_t^k$. Panel B shows summary statistics of the number of $Continuing\_Repurchasers_t^k$ and $Past\_Repurchasers_t^k$, where $Past\_Repurchasers_t^k$ are firms with available data in year t if $k=1$ or $k=2$, or in years t, $t+1$, and $t+2$ if $k=3$ and repurchase shares in year $t-1$ if $k=1$, or repurchase shares in years $t-1$, $t-2$, and $t-3$ if $k=2$ or $k=3$. $Continue_t^k$ is simply the ratio of $Continuing\_Repurchasers_t^k$ to $Past\_Repurchasers_t^k$.

Panel A shows that the average rates of repurchase initiation, $Initiate_t^k$, are 18.3%, 16.1%, and 4.3% for $k=1$, $k=2$, and $k=3$ respectively. Panel B shows that the average rates of repurchase continuation, $Continue_t^k$, are 48.4%, 62.2%, and 30.7% for $k=1$, $k=2$, and $k=3$ respectively. Both rates exhibit substantial yearly variation and tend to increase over time.

2.4. The repurchase premium

Table 2 reports the time-series values of the repurchase premium. We define the repurchase premium in a manner analogous to Baker and Wurgler's (2004a) dividend premium. Specifically, $Repurchase\_Premium_t$ is defined as the difference between the logarithm of book-value-weighted market-to-book ratios of firms classified as *Frequent Repurchasers* (firms that repurchase shares in each year t, $t-1$, and $t-2$) and the logs of book-value-weighted market-to-book ratios of *Nonfrequent Repurchasers* (firms that are not *Frequent Repurchasers*), and it is standardized to have zero mean and unit variance. Similarly, $Repurchase\_Premium_t^{EW}$ is defined as the difference between the logs of equal-weighted market-to-book ratios of *Frequent Repurchasers* and the logs of equal-weighted market-to-book ratios of *Nonfrequent Repurchasers*, and it is standardized to have zero mean and unit variance.

The market-to-book ratio is the market value (measured as the market value of equity plus the book value of debt) divided by book value of the firm. The market value of equity is the closing price at the end of calendar year (data item 24) multiplied by the number of shares outstanding (25).[3] The book value of debt is the book value of total assets less the book value of equity. Similar to Baker and Wurgler (2004a), the book value of equity is stockholders' equity (216) [or common/ordinary equity (60) plus preferred stock par value (130) or total assets (6) minus liabilities (181)] minus preferred stock liquidating value (10) [or preferred stock redemption value (56) or par value (130)] plus balance sheet deferred taxes and investment tax credit (35) if available minus core post retirement adjustment (330) if available.

In Panel A of Table 2, the second and the third columns report the number of firms defined as *Frequent Repurchasers* and their book-value-weighted market-to-book ratios (BVW M/B). The fourth and the fifth columns report the number of firms defined as *Nonfrequent Repurchasers* and their book-value-weighted market-to-book ratios (BVW M/B). The last two columns report the values of $Repurchase\_Premium\_Raw_t$ and $Repurchase\_Premium_t$, where the former variable is the unstandardized value of $Repurchase\_Premium_t$. In Panel B, we replicate Panel A for the equal-weighted version of the repurchase premium, $Repurchase\_Premium_t^{EW}$.

2.5. Descriptive statistics

Table 3 presents descriptive statistics for our sample. To conduct our regression tests, we require complete data for year $t-1$ and t, which leaves us with 125,523 firm-years.[4] We partition this sample into eleven mutually exclusive groups based on share repurchases and dividends: (1) repurchase initiations (share repurchase in year t but not in year $t-1$), (2) dividend initiations (dividend in year t but not in year $t-1$), (3) repurchase & dividend initiations, (4) repurchase continuations, (5) dividend increases (higher dividend in year t than in year $t-1$), (6) dividend continuations (same dividend in years t and $t-1$), (7) dividend decreases (lower dividend in year t than in year $t-1$), (8) repurchase continuations & dividend increases, (9) repurchase & dividend continuations, (10) repurchase continuations & dividend decreases, and (11) the reference group of the remaining firm-years. Panel A of Table 3 presents the frequency of the eleven payout groups. During 1965 to 2010, the payout group (excluding the reference group) with the highest frequency is dividend increases with 17,722 firm-years, representing 14.1% of the total firm-years, followed by repurchase initiations (9592 firm-years or 7.6% of the sample), dividend continuations (9542 firm-years or 7.6% of the sample), and repurchase continuations (8960 firm-years or 7.1% of the sample).

Panel B of Table 3 reports means and medians (in parentheses) of firm-specific variables for the mutually exclusive payout groups of repurchase initiations, dividend initiations, repurchase continuations, dividend increases, and all other groups combined. $Cash_{t-1}$ is cash (data item 1) divided by total assets (data item 6) at the end of year $t-1$. $Cash\ Flow_{t-1}$ is net income (data item 172) plus depreciation (data item 14) plus changes in deferred taxes (data item 50) and other deferred charges (data item 152) for year $t-1$ divided by total asset at the end of year $t-1$.[5] $Market\text{-}to\text{-}Book_{t-1}$ is the market value divided by the book value of total assets at the end of year $t-1$. $Payout\ Ratio_{t-1}$ is dividends per share by ex date (data item 26) divided by earnings per share (data item 58) during year $t-1$.[6] $Log\ Assets_{t-1}$ is the log of total asset at the end of year $t-1$. $Return_{t-1}$ is the buy-and-hold return adjusted for the value-weighted market return during year $t-1$. $Ind.Adj.\ Leverage_{t-1}$ is the debt ratio minus the industry median debt ratio at the end of year $t-1$, where debt is defined as the sum of long term debt (data item 9) and current liabilities (data item 34) divided by total asset, and the industry median debt ratio is based on firms with the same first two-digit SIC code.

[3] Following Baker and Wurgler (2004a, footnote 10), we aggregate the market-to-book measure for a precise point in time, at the end of the calendar year. Later in the paper, when we use market-to-book as a firm characteristic, we use the end of fiscal year stock price (this also follows Baker and Wurgler).

[4] The requirement of available data for independent control variables in year t and $t-1$ results in a reduction of our sample size from 156,469 firm-year observations to 125,523 firm-year observations. Although our regression analysis is based on the sample that have available data for year t and $t-1$, our premium measures are calculated using the whole sample of 156,469 firm-years.

[5] Our cash flow measure follows Dittmar (2000). In a robustness check, we define an alternative cash flow measure as operating income before depreciation (data item 13) less income taxes (data item 16) less interest expenses (data item 15) plus changes in deferred taxes (data item 50) and changes in other deferred charges to total assets (data item 152), scaled by total assets. Results using this alternative cash flow measure are qualitatively similar to our reported results.

[6] Our payout ratio measure is similar to Dittmar (2000) and Jagannathan, Stephens, and Weisbach (2000). In a robustness check, we substitute dividend payout ratio with dividend yield, measured as dividend per share by ex date (data item 26) divided by stock price at fiscal year-end, and the results are qualitative similar to reported results.

Table 2
Repurchase Premia from 1964 to 2010. The repurchase premium, $Repurchase\_Premium_t$, is defined as the difference between the logarithm of book-value-weighted market-to-book ratios of firms classified as *Frequent Repurchasers* (firms that repurchase shares in year t, $t-1$, and $t-2$) and the logs of book-value-weighted market-to-book ratios of *Nonfrequent Repurchasers* (firms that are not *Frequent Repurchasers*), and it is standardized to have zero mean and unit variance. Similarly, $Repurchase\_Premium_t^{EW}$, is defined as the difference between the logs of equal-weighted market-to-book ratios of *Frequent Repurchasers* and the logs of equal-weighted market-to-book ratios of *Nonfrequent Repurchasers*, and it is standardized to have zero mean and unit variance. The market-to-book ratio is the market value (measured as the market value of equity plus the book value of debt) divided by book value of the firm. The market value of equity is the closing price at the end of calendar year (data item 24) multiplied by the number of shares outstanding (25). The book value of debt is the total book value less the book value of equity. Similar to Baker and Wurgler (2004a), the book value of equity is stockholders' equity (216) [or common/ordinary equity (60) plus preferred stock par value (130) or total assets (6) minus liabilities (181)] minus preferred stock liquidating value (10) [or preferred stock redemption value (56) or par value (130)] plus balance sheet deferred taxes and investment tax credit (35) if available minus core post retirement adjustment (330) if available. In Panel A, the second and the third columns show the number of firms defined as *Frequent Repurchasers* and their book-value-weighted market-to-book ratios (BVW M/B), respectively. The fourth and the fifth columns show the number of firms defined as *Nonfrequent Repurchasers* and their book-value-weighted market-to-book ratios (BVW M/B), respectively. The last two columns report the values of our main repurchase premium. $Repurchase\_Premium\_Raw_t$ is simply the unstandardized value of $Repurchase\_Premium_t$. In Panel B, we replicate Panel A except that we use equal weighted values for the market-to-book ratios and report the equal-weighted version of the repurchase premium, $Repurchase\_Premium_t^{EW}$.

Panel A: Value-weighted

Year	*Frequent Repurchasers*		*Nonfrequent Repurchasers*		*Repurchase Premium*	
	N	BVW M/B	N	BVW M/B	$Repurchase\_Premium\_Raw_t$	$Repurchase\_Premium_t$
1964	12	1.18	519	1.74	−0.3840	−1.9281
1965	9	1.56	638	1.77	−0.1241	−0.6059
1966	14	1.23	1182	1.52	−0.2096	−1.0405
1967	13	1.39	1291	1.65	−0.1712	−0.8454
1968	12	1.74	1435	1.65	0.0505	0.2826
1969	9	1.63	1593	1.45	0.1164	0.6175
1970	8	0.99	1749	1.37	−0.3276	−1.6408
1971	8	0.98	1813	1.43	−0.3828	−1.9219
1972	14	1.18	1894	1.52	−0.2510	−1.2514
1973	2	0.77	2939	1.28	−0.5057	−2.5469
1974	10	0.76	2933	1.00	−0.2723	−1.3595
1975	18	0.85	2958	1.08	−0.2388	−1.1894
1976	48	0.97	2896	1.16	−0.1726	−0.8524
1977	72	1.03	2802	1.06	−0.0243	−0.0979
1978	82	1.05	2856	1.03	0.0245	0.1502
1979	139	1.01	2961	1.05	−0.0347	−0.1507
1980	133	1.10	3025	1.13	−0.0311	−0.1326
1981	163	1.14	3174	1.03	0.1084	0.5773
1982	198	1.01	3269	1.08	−0.0631	−0.2952
1983	219	1.02	3451	1.18	−0.1408	−0.6907
1984	213	1.04	3606	1.15	−0.1020	−0.4932
1985	207	1.27	3570	1.19	0.0642	0.3524
1986	260	1.39	3603	1.26	0.1033	0.5510
1987	259	1.30	3817	1.25	0.0354	0.2058
1988	298	1.31	3692	1.22	0.0712	0.3876
1989	348	1.26	3470	1.37	−0.0813	−0.3880
1990	397	1.23	3360	1.29	−0.0491	−0.2243
1991	318	1.55	3473	1.39	0.1137	0.6040
1992	301	1.71	3728	1.44	0.1721	0.9013
1993	235	1.72	4135	1.51	0.1244	0.6585
1994	238	1.81	4443	1.44	0.2300	1.1958
1995	298	2.09	4593	1.58	0.2781	1.4404
1996	360	2.12	4964	1.66	0.2474	1.2843
1997	397	2.32	5003	1.80	0.2517	1.3060
1998	514	2.46	4623	2.02	0.1946	1.0154
1999	538	2.05	4391	2.56	−0.2212	−1.0997
2000	641	1.91	4127	2.15	−0.1191	−0.5802
2001	558	1.78	3653	1.82	−0.0227	−0.0899
2002	640	1.70	3229	1.55	0.0952	0.5099
2003	568	1.92	3080	1.63	0.1648	0.8638
2004	483	2.19	3100	1.60	0.3144	1.6250
2005	497	2.02	3003	1.60	0.2343	1.2175
2006	566	2.01	2856	1.64	0.2005	1.0456
2007	658	1.83	2700	1.72	0.0590	0.3258
2008	709	1.48	2437	1.31	0.1182	0.6268
2009	596	1.66	2382	1.40	0.1702	0.8914
2010	563	1.75	2321	1.50	0.1501	0.7891
Mean	273.26	1.48	3036.96	1.45	−0.0050	0.0000
Std	225.72	0.44	1059.12	0.32	0.1966	1.0000

Table 2 (*continued*)

Panel B: Equal-weighted						
Year	*Frequent Repurchasers*		*Nonfrequent Repurchasers*		*Repurchase Premium*	
	N	EW M/B	N	EW M/B	$Repurchase\_Premium\_Raw_t^{EW}$	$EW\ Repurchase\_Premiumt\ _t^{EW}$
1964	12	1.24	519	1.68	−0.3006	−0.5328
1965	9	1.95	638	1.86	0.0475	1.9054
1966	14	1.29	1182	1.50	−0.1531	0.5002
1967	13	1.49	1291	1.94	−0.2655	−0.2871
1968	12	1.68	1435	2.20	−0.2684	−0.3071
1969	9	1.51	1593	1.81	−0.1829	0.2917
1970	8	1.03	1749	1.49	−0.3696	−1.0158
1971	8	1.10	1813	1.54	−0.3381	−0.7957
1972	14	1.14	1894	1.58	−0.3266	−0.7149
1973	2	0.77	2939	1.25	−0.4882	−1.8473
1974	10	0.93	2933	0.92	0.0065	1.6182
1975	18	0.83	2958	0.98	−0.1568	0.4744
1976	48	0.95	2896	1.09	−0.1353	0.6250
1977	72	0.95	2802	1.10	−0.1431	0.5706
1978	82	0.97	2856	1.10	−0.1295	0.6656
1979	139	1.04	2961	1.31	−0.2270	−0.0173
1980	133	1.13	3025	1.67	−0.3869	−1.1374
1981	163	1.10	3174	1.58	−0.3598	−0.9472
1982	198	1.07	3269	1.66	−0.4390	−1.5023
1983	219	1.27	3451	1.84	−0.3693	−1.0144
1984	213	1.25	3606	1.62	−0.2606	−0.2529
1985	207	1.38	3570	1.76	−0.2450	−0.1436
1986	260	1.36	3603	1.88	−0.3238	−0.6953
1987	259	1.23	3817	1.76	−0.3539	−0.9063
1988	298	1.37	3692	1.76	−0.2536	−0.2033
1989	348	1.43	3470	1.91	−0.2919	−0.4718
1990	397	1.33	3360	1.66	−0.2202	0.0306
1991	318	1.59	3473	2.14	−0.2961	−0.5011
1992	301	1.69	3728	2.18	−0.2526	−0.1967
1993	235	1.70	4135	2.28	−0.2897	−0.4567
1994	238	1.67	4443	1.98	−0.1726	0.3636
1995	298	1.88	4593	2.35	−0.2269	−0.0164
1996	360	1.88	4964	2.34	−0.2166	0.0558
1997	397	1.95	5003	2.31	−0.1708	0.3767
1998	514	1.94	4623	2.24	−0.1434	0.5684
1999	538	1.78	4391	3.50	−0.6771	−3.1701
2000	641	1.66	4127	2.37	−0.3573	−0.9299
2001	558	1.64	3653	2.08	−0.2378	−0.0929
2002	640	1.61	3229	1.69	−0.0487	1.2315
2003	568	1.99	3080	2.28	−0.1377	0.6085
2004	483	2.16	3100	2.45	−0.1247	0.6996
2005	497	2.12	3003	2.32	−0.0916	0.9310
2006	566	2.24	2856	2.36	−0.0513	1.2135
2007	658	2.07	2700	2.30	−0.1036	0.8472
2008	709	1.57	2437	1.47	0.0646	2.0255
2009	596	1.75	2382	1.79	−0.0238	1.4060
2010	563	1.94	2321	2.06	−0.0608	1.1474
Mean	273.26	1.48	3036.96	1.85	−0.2245	0.0000
Std	225.72	0.39	1059.12	0.48	0.1428	1.0000

$Option_{t-1}$ is options outstanding (which is usually data item 215) scaled by shares outstanding (data item 25) at the end of year $t-1$. To measure options outstanding, we mainly use common shares reserved for conversion for stock options (data item 215) from Compustat.[7] However, because this data item is only available from 1984 to 1995, we estimate options outstanding from 1962 to 1983 and from 1996 to 2009 using two different approaches. From 1962 to 1983, for each firm, options outstanding is estimated by multiplying its common shares reserved for conversion of stock options, convertible securities, and warrants (data item 40) by its time-series mean ratio of common shares reserved for conversion for stock options (data item 215) to common shares reserved for conversion of stock options, convertible securities, and warrants (data item 40) during 1984 to 1995.[8] Options outstanding in 1996 is

[7] Dittmar (2000) and Jagannathan and Stephens (2003) also use this data item as a proxy for options outstanding.

[8] If the firm's time-series mean ratio of data item 215 to data item 40 during 1984–1995 cannot be estimated due to missing data, then we simply use 0.688 as the ratio, which is the average ratio of data item 215 to data item 40 during 1984–1995 for *all* firms, to impute the options outstanding measure for firm-years during 1962–1983. For a robustness check, we drop firm-year observations for which we use the 0.688 ratio and we find qualitatively similar results to reported results.

Table 3
Descriptive statistics. The sample of 125,523 firm-years with data for year $t-1$ and t is divided into eleven mutually exclusive groups based on share repurchases and dividends: (1) repurchase initiations (share repurchase in year t but not in year $t-1$), (2) dividend initiations (dividend in year t but not in year $t-1$), (3) repurchase & dividend initiations, (4) repurchase continuations, (5) dividend increases (higher dividend in year t than in year $t-1$), (6) dividend continuations (same dividend in years t and $t-1$), (7) dividend decreases (lower dividend in year t than in year $t-1$), (8) repurchase continuations & dividend increases, (9) repurchase & dividend continuations, (10) repurchase continuations & dividend decreases, and (11) the reference group of the remaining firm-years. We use dividend per share by ex date (data item 26) provided by Compustat to identify dividend initiations and dividend changes. $Repurchase\_Fraction_t$ is defined as $\left|\sum_{m=1}^{12}\frac{Min(\Delta shrout_m, 0)}{shrout_{m-1}}\times 100\right|$, where $\Delta shrout_m$ is the change in the number of shares outstanding from the end of month $m-1$ to the end of month m in year t after adjusting for non-repurchase activity such as stock splits and new equity issues, and $shrout_0$ is the number of shares outstanding at the end of year $t-1$. $Repurchase\_Fraction_t$ is set to zero if it is smaller than 0.1. $Cash_{t-1}$ is cash (1) divided by total assets (6) at the end of year $t-1$. $Cash\ Flow_{t-1}$ is net income (172) for year $t-1$ plus depreciation (data item 14) plus changes in deferred taxes (data item 50) and other deferred charges (data item 152) divided by total asset at the end of year $t-1$. $Market\text{-}to\text{-}Book_{t-1}$ is the market value divided by book value of total asset at the end of year $t-1$. $Payout\ Ratio_{t-1}$ is the dividend per share by ex date (26) divided by earnings per share (58) during year $t-1$. $Log\ Assets_{t-1}$ is the log of total asset at the end of year $t-1$. $Return_{t-1}$ is the buy-and-hold return adjusted for the value-weighted market return during year $t-1$. $Ind.\ Adj.\ Leverage_{t-1}$ is the debt ratio minus the industry median debt ratio at the end of year $t-1$, where debt is defined as the sum of long term debt (9) and current liability (34) divided by total asset and the industry median debt ratio is based on firms with the same first two-digit SIC code. $Option_{t-1}$ is options outstanding (which is usually data item 215) scaled by shares outstanding (25) at the end of year $t-1$. During 1962–1983, data item 215 is unavailable, so for each firm during this period, options outstanding is estimated by multiplying its common shares reserved for conversion of stock options, convertible securities, and warrants (data item 40) by its time-series mean ratio of common shares reserved for conversion for stock options (data item 215) to common shares reserved for conversion of stock options, convertible securities, and warrants (data item 40) during 1984 to 1995. If the firm's time-series mean ratio of data item 215 to data item 40 during 1984–1995 cannot be estimated due to missing data, then we simply use 0.688 as the ratio, which is the average ratio of data item 215 to data item 40 during 1984–1995 for *all* firms, to impute the options outstanding measure for firm-years during 1962–1983. During 1996–2009, options outstanding come from Thomson Reuters TFN Insider Filing Database. We run a market model regression of daily excess returns on value-weighted market excess returns. $Systematic_{t-1}$ is the standard deviation of regression fitted values in year $t-1$, and $Idiosyncratic_{t-1}$ is the standard deviation of regression residuals in year $t-1$. Panel A presents the frequency of the eleven payout groups. Panel B reports means and medians (in parentheses) of selected firm variables for the payout groups of Repurchase initiations, Dividend initiations, Repurchase continuations, Dividend increases, and all other groups combined. The variables are winsorized at the 5% level.

Panel A: Distribution of firm-years across payout groups

Group	Frequency	Percent
Repurchase initiations	9592	7.64
Dividend initiations	1705	1.36
Repurchase & dividend initiations	404	0.32
Repurchase continuations	8960	7.14
Dividend increases	17,722	14.12
Dividend continuations	9542	7.60
Dividend decreases	7309	5.82
Repurchase continuations & dividend increases	5637	4.49
Repurchase & dividend continuations	2470	1.97
Repurchase continuations & dividend decreases	1535	1.22
Reference group	60,647	48.32

Panel B: Descriptive statistics for select payout groups

	Repurchase initiations	Dividend initiations	Repurchase continuations	Dividend increases	All others combined
$Repurchase\_Fraction_t$ (%)	2.8617	0.0000	3.2107	0.0000	0.5821
	(1.7536)	(0.0000)	(2.3629)	(0.0000)	(0.0000)
$Cash_{t-1}$	0.1711	0.1276	0.1751	0.0965	0.1385
	(0.0949)	(0.0763)	(0.1072)	(0.0602)	(0.0688)
$Cash\ Flow_{t-1}$	0.0015	0.0606	0.0166	0.0761	0.0076
	(0.0316)	(0.0583)	(0.0381)	(0.0719)	(0.0389)
$Market\text{-}to\text{-}Book_{t-1}$	1.7769	1.3388	1.5705	1.4765	1.6880
	(1.3618)	(1.0726)	(1.2302)	(1.2118)	(1.2849)
$Payout\ Ratio_{t-1}$	0.0048	0.0000	0.0059	0.3007	0.1333
	(0.0000)	(0.0000)	(0.0000)	(0.2788)	(0.0000)
$Log\ Assets_{t-1}$ (*log of mil*$)	4.1333	4.1591	4.6232	5.3191	4.4736
	(3.9556)	(3.9926)	(4.5160)	(5.2139)	(4.2629)
$Return_{t-1}$ (%)	−3.0857	19.2348	−4.8421	9.7348	−0.0315
	(−13.667)	(11.2309)	(−13.145)	(4.2905)	(−7.3976)
$Ind.\ Adj.\ Leverage_{t-1}$	0.0056	−0.0160	−0.0066	−0.0326	0.0030
	(−0.0177)	(−0.0264)	(−0.0380)	(−0.0346)	(−0.0121)
$Option_{t-1}$	0.1014	0.0759	0.1058	0.0547	0.0842
	(0.0859)	(0.0555)	(0.0915)	(0.0390)	(0.0658)
$Systematic_{t-1}$	0.0072	0.0071	0.0072	0.0068	0.0070
	(0.0060)	(0.0060)	(0.0059)	(0.0060)	(0.0059)
$Idiosyncratic_{t-1}$	0.0402	0.0315	0.0373	0.0210	0.0343
	(0.0369)	(0.0292)	(0.0338)	(0.0193)	(0.0303)

estimated by common shares reserved for stock options in year 1995 plus the number of options granted in 1996 less the number of options exercised in 1996. Options outstanding in subsequent years are estimated by options outstanding from the prior year plus options granted for the current year less options exercised for the current year. We obtain number of options granted and exercised from Thomson Reuters TFN Insider Filing Database.[9]

We also run a market model regression of daily excess returns on value-weighted market excess returns. $Systematic_{t-1}$ is the standard deviation of regression fitted values in year $t-1$, and $Idiosyncratic_{t-1}$ is the standard deviation of regression residuals in year $t-1$. The reason we estimate these risk variables is because Hoberg and Prabhala (2009) argue that the dividend premium could simply proxy for risk. Therefore, it might be necessary to account for risk when testing catering theories.

Panel B shows that the mean (median) yearly repurchase fraction for repurchase initiations is 2.9% (1.8%) while the mean (median) value for repurchase continuations is 3.2% (2.4%). In general, firm-years classified as repurchase initiations and repurchase continuations are associated with larger cash holdings, lower cash flows, lower payout ratios, lower market-adjusted returns, more options outstanding, and higher risk (both systematic and idiosyncratic risk) in the preceding year than other firm-year classifications. Firm-years classified as dividend initiations and dividend increases are associated with higher cash flow, lower market-to-book ratio, higher market-adjusted return, lower debt ratio, and fewer options outstanding in the preceding year than other firm-year classifications.

3. Empirical results

3.1. The payout decision

We first examine whether the probabilities of repurchasing shares and paying dividends are related to the repurchase and dividend premiums. To do so, we run a multinomial logistic regression of the decision to conduct one of ten different payout types identified in Panel A of Table 3. The key independent variables are the repurchase premium, $Repurchase\_Premium_{t-1}$, and the dividend premium, $Dividend\_Premium_{t-1}$. We already described the definition of repurchase premium in detail in Section 2.4. Following Baker and Wurgler (2004a), we define the dividend premium as the difference between the logarithm of book-value-weighted market-to-book ratios of *Dividend Payers* (firms that have positive value of dividend per share by ex date in year $t-1$) and the logarithm of book-value-weighted market-to-book ratios of *Nondividend Payers* (firms that do not have positive values of dividend per share by ex date in year $t-1$), and we standardize it to zero mean and unit variance. The control variables are described in Panel B of Table 3.

Table 4 reports our logit results for repurchase initiations, dividend initiations, repurchase continuations, dividend increases, dividend continuations, and dividend decreases.[10] The results show that firms are more likely to initiate, increase or continue payouts (either repurchases or dividends) if they are large, have low market-to-book ratios and low leverage. Moreover, firms are more likely to initiate payouts, continue repurchases, or increase dividends if they have high cash flow. Firms are more likely to repurchase shares (either initiate or continue past repurchases) or initiate dividends if the cash balance is strong and past dividend payouts are low, while firms that increase or continue dividends exhibit the opposite tendencies, i.e., they have weak cash balance and high past dividend payouts. Finally, firms are less likely to initiate repurchases and dividends when risk is high.

More importantly, we find that when the repurchase premium is large, firms are more likely to initiate or continue share repurchases. This suggests that managers cater to the aggregate demand of investors for repurchases when making their repurchase decisions, and that the original catering theory on dividend by Baker and Wurgler (2004a) also pertains to share repurchases. Not surprisingly, when the dividend premium is large, firms are more likely to initiate or increase dividends, consistent with (Baker and Wurgler (2004a) and Li and Lie (2006)). These findings hold even after controlling for risk, which Hoberg and Prabhala (2009) argue is important to do when testing catering theories. However, the dividend premium does not seem to affect firms' decisions to continue paying dividends. This finding initially appears at odds with catering theory. But it turns out that when the dividend premium is high, many firms increase rather than continue their dividend payouts. Furthermore, when the dividend premium is low, many firms tend not to cut the dividend. As a result, there is no positive relation between dividend continuation and the dividend premium even in the presence of catering behavior.[11]

[9] From the Insider Filing Database, we include director stock options (DIREO and DIRO), and employee stock options (EMPO). Because there are an increasing number of high tech firms using stock options for employees in recent years, our estimate of option grants using TFN Insider Filing Data may underestimate the number of options grants because TFN Insider Filing Data mainly focus on senior executives and directors. In a robustness check, we use Compustat Execucomp to measure total option grants to all employees and options exercises by executives. We calculate total option grants to all employees by multiplying the number of options granted to executives with the inverse of the percentage of options granted to executives. We define options outstanding after 1995 as options outstanding in year $t-1$ plus total option grants to all employees in year t less options exercised by executives in year t. Although this measure may overestimate options outstanding because it does not include options exercised by nonsenior executives, it serves as a valid control variable if the increasing number of employee options in recent years is a potential factor that explains firms' repurchase decisions in recent years. We find that our results are qualitatively similar when we use the Execucomp option measure.

[10] Repurchase initiations (continuations) are defined in Panel A of Table 3 as firms that repurchase stock in year t and did not (did) repurchase stock in year $t-1$. That is, these are new and continuing repurchasers defined under category $k=1$. We later discuss the results for new and continuing repurchasers defined under the stricter categories $k=2$ and $k=3$.

[11] Baker and Wurgler (2004a) do not distinguish between firms that continue to pay the same dividend amount versus firms that increase their dividend amount. Instead, they combine these two sets of firms into one broad category of continuing dividend payers. When we combine dividend continuers and dividend increasers into one broad category of continuing dividend payers, we also find a significant positive relation between the dividend premium measure and dividend continuations, consistent with Baker and Wurgler.

Table 4
Multinomial Logit Model. This table shows results from a multinomial logistic regression based on the sample of 125,523 firm-years from 1965 to 2010 with data for years $t-1$ and t. The sample is divided into mutually exclusive groups based on share repurchases and dividends, as described in Table 3. The repurchase premium is defined in Table 2. Following Baker and Wurgler (2004a), the dividend premium is the difference between the logarithm of book-value-weighted market-to-book ratios of *Dividend Payers* (firms that have positive values of dividend per share by ex date in year $t-1$) and the logarithm of book-value-weighted market-to-book ratios of *Nondividend Payers* (firms that do not have positive values of dividend per share by ex date in year $t-1$), and it is a standardized value with zero mean and unit variance. Independent variables also include ten firm-level control variables and two market-level control variables. Firm-level control variables are defined as in Table 3. Market-level control variables, *Market Return*$_t$ and *Market Return*$_{t-1}$, are value-weighted market returns in year t and year $t-1$, respectively. All firm-level control variables are winsorized at the 5% level. Industry dummies are included to control for industry effects and are based on 1-digit SIC codes. We report results for the payout groups of repurchase initiations, dividend initiations, repurchase continuations, dividend increases, dividend continuations, and dividend decreases. *p*-values are reported in parenthesis.

	Initiation method		Continuation method			
	Repurchase initiations	Dividend initiations	Repurchase continuations	Dividend increases	Dividend continuations	Dividend decreases
Repurchase_Premium$_{t-1}$	0.15	−0.21	0.23	−0.23	−0.16	−0.21
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Dividend_Premium$_{t-1}$	−0.21	0.56	−0.22	0.19	−0.02	−0.07
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1364)	(0.0001)
Cash$_{t-1}$	0.45	0.30	1.19	−1.49	−1.42	−1.84
	(0.0000)	(0.1382)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Cash Flow$_{t-1}$	1.93	10.33	3.06	12.97	−0.35	2.10
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1419)	(0.0000)
Market-to-Book$_{t-1}$	−0.10	−0.84	−0.33	−0.43	−0.46	−0.15
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Payout Ratio$_{t-1}$	−12.12	−465.35	−12.18	5.36	7.00	6.48
	(0.0000)	(0.1553)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Log Assets$_{t-1}$	0.06	0.09	0.25	0.13	0.08	−0.03
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000	(0.0016)
Return$_{t-1}$	−0.11	0.94	−0.18	0.56	0.03	0.77
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.4727)	(0.0000)
Ind. Adj. Leverage$_{t-1}$	−0.30	−1.22	−1.13	−0.40	−0.39	−0.22
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0447)
Market Return$_t$	−1.07	−0.50	−0.90	−0.06	−0.24	−0.15
	(0.0000)	(0.0000)	(0.0000)	(0.2177)	(0.0001)	(0.0202)
Market Return$_{t-1}$	−0.46	−0.18	−1.21	−0.40	−0.75	−0.46
	(0.0000)	(0.1185	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Option$_{t-1}$	0.17	−3.49	1.01	−2.97	−2.52	−3.73
	(0.2125)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Systematic$_{t-1}$	−8.58	−12.44	−27.53	20.21	20.99	21.91
	(0.0008)	(0.0416)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Idiosyncratic$_{t-1}$	−1.84	−48.70	−2.35	−67.61	−48.83	−59.29
	(0.0136)	(0.0000)	(0.0036)	(0.0000)	(0.0000)	(0.0000)
Industry dummies	Yes					
R^2	0.8884					
N	125,523					

Next, we use catering behavior as a backdrop for testing whether managers consider both dividends and share repurchases before settling on one of them, which should be true if managers regard dividends and share repurchases as substitute payout mechanisms. In particular, if managers cater to investors' demand when making dividend and repurchase decisions *and* consider both types of payouts before making the final choice, we expect that firms are more likely to initiate, increase, or continue to pay dividends when the repurchase premium is low, and more likely to initiate or continue share repurchases when the dividend premium is low. Thus, our framework permits a fresh perspective in the literature that debates whether dividends and share repurchases are substitutes or complements.

The results reveal that the probability of dividend initiations, increases, or continuations decreases with the repurchase premium, whereas the probability of share repurchase initiations or continuations decreases with the dividend premium. This is consistent with catering theory, and further suggests that dividends and share repurchases are regarded as substitutes by managers, at least before shareholder demand tilts the choice in one direction or the other.

We also examine the economic significance of the premium coefficients. When the dividend and repurchase premium measures are set to zero and other independent variables are set at their respective payout group means, a one-standard deviation increase in the repurchase premium increases the absolute (relative) probability of a repurchase initiation by 1.4% (11.4%) from 12.3% to 13.7% and a repurchase continuation by 2.5% (20.0%) from 12.5% to 15.0%. Furthermore, a one-standard deviation increase in the dividend premium increases the absolute (relative) probability of dividend initiations and increases by 3.4% (72.3%) and 5.6% (15.6%), respectively. Based on absolute increases, repurchase decisions appear to be half as sensitive to variations in the repurchase premium as dividend decisions are to variations in the dividend premium, but based on relative increases, repurchase decisions appear to be

roughly as sensitive to variations in the repurchase premium as the dividend increase decision is to variations in the dividend premium.

Next, we examine the economic significance of the substitution effects. A one-standard deviation increase in the repurchase premium decreases the absolute (relative) probability of a dividend initiation, increase, and continuation by 1.0% (21.3%), 6.0% (16.8%), and 2.3% (10.0%), respectively. A one-standard deviation increase in the dividend premium decreases the absolute (relative) probability of a repurchase initiation and continuation by 1.9% (15.4%) and 2.0% (16.0%), respectively. Thus, dividend decisions appear to be roughly as sensitive to variations in the repurchase premiums as to variations in the dividend premium, and repurchase decisions are about as sensitive to variations in the dividend premiums as to variations in the repurchase premiums. These results provide further support for the notion that managers consider share repurchases and dividends to be substitutes.

Finally, we examine the effect of dividend and repurchase premiums on decisions to cut dividends. The regression results reveal that dividend cuts are more likely to occur when both the dividend and repurchase premiums are low. The result for the dividend premium is consistent with catering theory. The result for the repurchase premium is curious. It is not consistent with a substitution effect. However, the result may not be surprising in light of Lie (2005b), who reports evidence that firms that cut dividends have performed poorly over several years and are financially weak, and cutting dividends is a necessary measure to preserve financial flexibility. Thus, when the premium on payouts (either for dividends or for repurchases) is low, then managers of poor-performing dividend-paying firms may use that as an opportunity to cut dividends.

3.2. Determinants of the magnitude of the repurchase amount

The previous section shows that the repurchase and dividend premiums affect the probability that firms repurchase shares. A natural extension is to examine whether the repurchase and dividend premium affect the magnitude of the repurchase amounts as well. To do so, we use a Tobit model to regress the repurchase fraction (i.e., repurchase amount scaled by shares outstanding, as defined in Section 2.2) against the repurchase and dividend premiums and the same control variables as in the previous analysis.

Table 5 reports the results from the Tobit regressions. The first (last) three columns of results are for new (continuing) repurchasers. We report results for the three different ways we define new and continuing repurchasers (i.e., for $k = 1$, 2, and 3). Table 5 shows that firms tend to repurchase more shares when cash, cash flow, firm size, and option grants are large and the market-to-book ratio, dividend payout, leverage, risk, and stock returns are low.

The coefficient on the repurchase premium is positive and statistically different from zero. Thus, as the repurchase premium increases, firms repurchase more shares. For $k = 1$, a one-standard deviation increase in the repurchase premium increases the repurchase fraction for new repurchasers by 0.1%, representing 11.0% of the mean repurchase fraction of 0.9%, and increases the repurchase fraction for continuing repurchasers by 0.2%, representing 8.5% of the mean repurchase fraction of 2.4%. These results show that catering theory partially explains the magnitude of the repurchase amount.

The coefficient on the dividend premium is negative and statistically different from zero. In other words, as the dividend premium declines, firms repurchase more shares. For $k = 1$, a one-standard deviation increase in the dividend premium decreases the repurchase fraction for new repurchasers by 0.1%, representing 11.0% of the mean repurchase fraction of 0.9%, and decreases the repurchase fraction for continuing repurchasers by 0.2%, representing 8.5% of the mean repurchase fraction of 2.4%. Comparing these effects to the effects from the repurchase premium suggests that the effects from repurchase premium and the effects from dividend premium are very comparable for $k = 1$. We find similar results for $k = 2$ where the sample is past nonrepurchasers. For $k = 2$ where the sample is past repurchasers, the repurchase fraction actually depends a little more on the dividend premium than on the repurchase premium. For $k = 3$, however, the repurchase premium has the dominant effect on the repurchase fraction even though the effect from the dividend premium is still non-trivial. Consequently, the magnitude of the repurchase amount is partially explained by investors' demand (or lack thereof) for dividends, consistent with the joint conjecture that managers cater to investor demand and that they regard dividends and share repurchases to be substitutes.

4. Robustness checks

4.1. Using data from Compustat to measure repurchases

While we use changes in shares outstanding from CRSP to identify share repurchases, a common alternative measure is based on Compustat data item 115 ("Purchases of Common and Preferred Stock"), with or without adjusting for preferred stock purchases (Baker and Wurgler (2004a), Dittmar (2000), Grullon and Michaely (2002), Jagannathan et al. (2000), Li and Lie (2006), Lie (2005c), Stephens and Weisbach (1998), and Kulchania (2012)). However, as pointed out by Stephens and Weisbach (1998), this measure suffers from two shortcomings. First, it is reported in value terms, not shares. Thus, we have to make an assumption about the price at which the shares are repurchased, which could introduce bias if certain firms tend to repurchase only when they feel their shares are undervalued. Second, the Compustat measure is an aggregate of all security repurchases and retirements during the quarter or year, and will therefore overstate repurchases in many firm-years.

Measuring repurchases based on changes in shares outstanding in CRSP is also susceptible to measurement error. Specifically, this measure underestimates actual repurchases if the number of shares contemporaneously increases (e.g., through distribution

Table 5
Tobit regression of repurchase fraction on repurchase premium. This table shows results from Tobit regressions of the repurchase fraction in year t on repurchase premium, dividend premium, and control variables in year t and $t-1$ based on the sample from 1965 to 2010. The dependent variable is the repurchase fraction, defined as $\left|\sum_{m=1}^{12}\frac{Min(\Delta shrout_m,0)}{shrout_{m-1}}\times 100\right|$, where $\Delta shrout_m$ is the change in the number of shares outstanding from the end of month $m-1$ to the end of month m in year t after adjusting for non-repurchase activity such as stock splits and new equity issues, and $shrout_0$ is the number of shares outstanding at the end of year $t-1$. The repurchase fraction is set to zero if it is smaller than 0.1. For $k=3$, repurchase fraction is also set to zero if repurchase fraction is not larger than 0.1 for three consecutive years from year t to year $t+2$. In other words, repurchase fraction is positive only if the firm-year is defined in Table 1 as a new repurchaser or a continuing repurchaser based on $k=1$, $k=2$, or $k=3$. The regressions are run for various subsamples based on past repurchase activity, as described in Table 1. The repurchase premium is defined in Table 2. Following Baker and Wurgler (2004a), the dividend premium is the difference between the logarithm of book-value-weighted market-to-book ratios of *Dividend Payers* (firms that have positive value of dividend per share by ex date in year $t-1$) and the logarithm of book-value-weighted market-to-book ratios of *Nondividend Payers* (firms that do not have positive values of dividend per share by ex date in year $t-1$), and it is the standardized value with zero mean and unit variance.

	Repurchase fraction					
	Sample of *Past Nonrepurchasers*$_t^k$			Sample of *Past Repurchasers*$_t^k$		
	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$
Repurchase_Premium$_{t-1}$	0.55	0.60	1.54	0.31	0.15	0.82
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0069)	(0.0000)
Dividend_Premium$_{t-1}$	−0.57	−0.51	−0.75	−0.42	−0.31	−0.60
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Cash$_{t-1}$	1.63	2.26	3.35	2.12	1.61	1.26
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0071)
Cash Flow$_{t-1}$	4.55	5.12	11.31	5.17	5.40	9.43
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Market-to-Book$_{t-1}$	−0.53	−0.61	−0.82	−0.22	−0.07	0.01
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1263)	(0.9146)
Payout Ratio$_{t-1}$	−1.50	−1.85	−4.70	−1.23	−1.69	−2.07
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Log Assets$_{t-1}$	0.26	0.19	0.54	0.37	0.24	0.21
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Return$_{t-1}$	−0.33	−0.38	−0.63	−0.50	−0.47	−0.44
	(0.0000)	(0.0000)	(0.0008)	(0.0000)	(0.0000)	(0.0045)
Ind. Adj. Leverage$_{t-1}$	−1.40	−1.29	−2.84	−1.50	−0.84	−0.84
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0009)	(0.0519)
Market Return$_t$	−2.92	−2.94	−6.80	−1.26	−0.57	−1.00
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0002)	(0.0002)
Market Return$_{t-1}$	−1.27	−1.60	−3.84	0.14	1.04	−0.73
	(0.0000)	(0.0000)	(0.0000)	(0.1743)	(0.0000)	(0.0167)
Option$_{t-1}$	1.55	1.68	0.46	1.79	1.68	0.81
	(0.0000)	(0.0008)	(0.6847)	(0.0000)	(0.0007)	(0.3407)
Systematic$_{t-1}$	−36.37	−22.03	−87.00	−41.59	−30.97	8.60
	(0.0000)	(0.0108)	(0.0000)	(0.0000)	(0.0005)	(0.6045)
Idiosyncratic$_{t-1}$	−4.93	−5.35	−21.50	−4.78	−10.32	−43.47
	(0.0094)	(0.0578)	(0.0015)	(0.0059)	(0.0005)	(0.0000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
$2\times(lnL_{full}-lnL_{intercept\ only})$	2244	1010	658	2388	570	630
N	87,972	48,906	40,850	34,341	10,276	8210

of benefit plans or exercise of executive stock options). To gauge whether the potential underestimation significantly alters our reported results, we reestimate our regressions using Compustat data item 115 to measure share repurchases.[12]

When using the Compustat measure of repurchases in our logit regressions, we still find that the repurchase premium positively predicts repurchase initiations and continuations and negatively predicts dividend initiations, increases, and continuations. The coefficients on the repurchase premium variable are all statistically significant and their magnitudes are similar to those of coefficients on the repurchase premium in our reported logit results that use CRSP to measure actual share repurchases. For the Tobit regressions based on the Compustat measure of repurchases, we again find that the repurchase premium positively predicts the repurchase amount for both new repurchasers and past repurchasers. For $k=1$ and $k=2$, the coefficients on the repurchase premium variable are all statistically significant and similar in magnitude as the coefficients on the repurchase premium variable in our reported Tobit results that use CRSP to measure actual share repurchases. However, for $k=3$, the parameter coefficients are about half the size of the coefficients reported in Table 5.

[12] The repurchase fraction is obtained by scaling the repurchase value by the market value of equity at the previous fiscal year-end. This fraction is then set to zero if it is smaller than 0.1%.

4.2. Using a stricter definition of repurchasers

Our two main findings that (i) the repurchase premium positively predicts repurchase initiations and continuations and (ii) repurchases and dividends appear to be substitute payout mechanisms, are robust when firms are restricted to the stricter $k=2$ or $k=3$ categories of new and continuing repurchasers. For example, when we replicate Table 4 for repurchasers defined under the $k=2$ or $k=3$ categories, the magnitude of the coefficients on the repurchase premium are nearly the same as what is reported in Table 4, and their p-values are all less than 0.01.

4.3. Using a looser definition of repurchasers

As noted earlier, our repurchase premium measure requires repurchasers to be regular (i.e., frequent) repurchasers. Specifically, we require repurchasers to have purchased stock for the prior three consecutive years and for non-repurchasers not to have purchased stock for the prior three consecutive years. As a robustness test, we redefine repurchasers and nonrepurchasers based on repurchasing behavior in only the prior year and then reestimate the repurchase premium variable and the regressions. Using the less strict definition of a repurchaser, we find qualitatively similar results to our reported logit and Tobit results. However, the magnitude of the coefficients on the repurchase premium variable is smaller than in the reported logit and Tobit regressions. On average, they are about half the size of the reported coefficients, but they are still statistically significant.

4.4. Using the equally-weighted measure of the repurchase premium

The findings from the reported logit and Tobit models are based on the value-weighted measure of the repurchase premium. When we use the equally-weighted measure of the repurchase premium, the results, including the magnitude of the coefficients, are similar to the tabulated results.

4.5. Controlling for a time trend

It is conceivable that our documented relations between payout policies and repurchase and dividend premiums are simply attributable to a time trend. Thus, we include the calendar year at $t-1$ in our regression models. Overall, a time trend negatively affects repurchase initiations and positively affects repurchase continuations. More importantly, for the repurchase and dividend premium variables, the coefficients (both their magnitudes and their signs) are similar to our reported results in Tables 4 and 5, and they are all statistically significant.

5. Summary and conclusion

In this study, we apply Baker and Wurgler's (2004a) catering theory of dividends to share repurchases. To do so, we first calculate a time-varying repurchase premium, analogous to Barker and Wurgler's dividend premium, and then relate this repurchase premium to the decision to repurchase shares. Consistent with the notion that firms cater to the investors' time-varying demand for share repurchases, the likelihood that a firm initiates or continues share repurchases is positively related to the repurchase premium.

The second contribution of our study is that we use the catering behavior of managers to offer new evidence on whether managers view dividends and share repurchase as substitute payout mechanisms. That is, we examine whether managers consider both dividends and share repurchases when they make payout choices. If so, both the dividend and repurchase premiums should affect the payout choice, irrespective of whether that choice is to pay dividends or repurchase shares, but the effects should go in different directions (the dividend premium should positively affect dividend decisions and negatively affect repurchase decisions; the repurchase premium should positively affect repurchase decisions and negatively affect dividend decisions). Consistent with the notion that managers view dividends and repurchases as substitute payout mechanisms, the likelihood that a firm initiates or continues to pay dividends (repurchase shares) is negatively related to the repurchase (dividend) premium. In addition, the fraction of shares repurchased increases with the repurchase premium and decreases with the dividend premium. Our findings here complement findings from a contemporaneous study by Kulchania (2012). Kulchania constructs a “difference premium” measure, calculated as a repurchase premium minus a dividend premium, and finds that when the difference premium is high, firms are more likely to repurchase and less likely to pay dividends. He further finds that abnormal stock returns surrounding dividend increase (cut) announcements are negatively (positively) correlated with his difference premium. Therefore, both his and our papers find support for a substitution hypothesis between repurchases and dividends using catering theory.

Our collective results on the catering theory are particularly important in light of the research by Hoberg and Prabhala (2009), which suggests that the dividend premium might just proxy for risk. We find strong evidence of catering even when we include various risk measures (e.g., systematic risk and idiosyncratic risk, following Hoberg and Prabhala) as control variables in the regression specifications. Furthermore, it is hard to explain how the failure to properly control for risk can give rise to the negative relations between repurchase decisions and the dividend premium and between dividend decisions and the repurchase premium. Thus, our study not only supports the catering theory in the context of corporate payouts, it actually suggests that the catering effects are more omnipresent than what has been suggested in extant literature.

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