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ABSTRACT

Payout policies based on share repurchase programs provide greater flexibility than do those based on cash dividends. We develop and test an empirical model in which strongly governed companies outperform weakly governed companies after announcing share repurchase programs. Our findings include positive associations between strong governance and both post-announcement adjusted operating performance and abnormal stock returns. The results are robust to sample selection bias, different sample criteria, governance measurement, and various control variables. In addition, governance strength is associated with larger post-announcement changes in CEO incentive compensation and merger and acquisition activity, both of which we argue are consistent with strongly governed companies using the financial flexibility derived from choosing share repurchases over cash dividends to drive better performance. Consistent with current literature on attenuation of former anomalies, the associations we find between governance and post-announcement performance tend to disappear in the latter half of our sample period.

1. Introduction

We propose and test an agency-based hypothesis to explain the relation between company corporate governance and changes in company valuation and operating performance after *open market share repurchase program* announcements (henceforth share repurchase programs). For companies that possess it, free cash flow presents a potential agency conflict (Jensen, 1986). Companies can mitigate this conflict between managers and shareholders by simply paying out excess cash to shareholders through cash dividends or share repurchases (Easterbrook, 1984; Jensen, 1986). Cash dividends represent a costly, credible agency cost-reducing pre-commitment to pay out cash to shareholders for the foreseeable future (John and Knyazeva, 2006; Brav et al., 2005). These pre-commitment costs may include sub-optimal future investment policy, cash dividend taxation, and future external financing costs. Share repurchases do not face these costs, but do not provide the agency cost-reducing pre-commitment to pay out future cash. Despite their lack of pre-commitment benefits, share repurchases by US corporations represent a significant and increasing portion of total distributions.[1]

Following John et al. (2015), we develop a model where corporate governance and cash payout policies are substitutes for one another in reducing agency conflicts. In the context of their particular governance environment, companies choose their payout

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[1] Babenko et al. (2012) report that although the greatest number of repurchase announcements occurred in 1998 and 1999, the combined total dollar amount was higher in 2006 and 2007. Wang and Bost (2014) report on www.bloomberg.com that the proportion of cash flow used for share repurchases has doubled in the last decade.

policy. Firms with relatively weaker governance mitigate their inherently higher agency conflicts by choosing to pre-commit themselves to future cash dividends, while strongly governed companies, with inherently lower agency conflicts, choose to maintain financial flexibility by paying out excess cash through share repurchases. In choosing its payout policy, each firm makes a tradeoff between governance and payout type. John et al. (2015) report results consistent with this model, concluding that weakly governed companies tend to use regular cash dividends, and strongly governed companies tend to use nonbinding share repurchases (or special dividends) for payouts (see also Grullon and Michaely, 2014). Using a 21-year sample of repurchasing companies, we examine whether adherence or lack of adherence with these tendencies is reflected in differential long-term post-announcement stock and operating performance.

We find that announcements of share repurchase plans by strongly governed companies that adhere to the tendency reported by John et al. (2015) are associated with better long-term performance relative to weakly governed companies, which do not adhere to the tendency. Our results hold after controlling for different measures of performance, multiple control variables, and the self-selection problem identified by Heckman (1979). Our results are new to the literature, and suggest that the strength of a company's corporate governance system plays an important role as an ex ante indicator of announcing companies' future performance. However, this positive association between governance and performance only holds for the first half of our sample period. We find no statistically significant association between governance and performance in the period after the year 2000, which is consistent with the findings in the growing literature on the attenuation of former market-related anomalies (Chordia et al., 2014). We conclude that a firm's corporate governance system is both an important factor in the payout choice decision, as was concluded by John et al. (2015), and an ex ante indicator of future performance, but that its association with performance has recently diminished (Fu and Huang, 2015).

In Section 2, we develop our agency-based hypotheses by reviewing the literature on share repurchase programs and corporate governance, and briefly preview our results. We explain our data and methodology in Section 3. We present and discuss our results in Section 4. Our summary and conclusions appear in Section 5.

2. Literature review and hypothesis development

2.1. Substitution between payout policy and corporate governance

Our goal is to analyze the role corporate governance plays in the post-announcement performance of share repurchasing companies. Managers of strongly governed companies are relatively more closely monitored, which tends to mitigate agency conflicts at these firms. Weakly governed companies, conversely, face higher levels of agency conflicts due to their lower levels of managerial monitoring. Gillan et al. (2011) show that individual corporate governance mechanisms may act as substitutes for one another. For instance, companies with powerful boards tend to also have a greater number of protective antitakeover charter provisions and vice versa, which is consistent with the existence of an optimal mix or adequate number of governance mechanisms, beyond which there may be diminishing returns to additional agency conflict-reducing mechanisms.

Governance is not the only way to reduce agency conflicts. Easterbrook (1984) describes the agency cost-reducing role played by cash payouts to shareholders via cash dividends and share repurchases, arguing that formal managerial monitoring is costly. Regular cash dividends force managers to generate the cash to make the payout and to access outside capital markets more frequently, both of which tend to substitute for tighter formal monitoring of management.

John and Knyazeva (2006) and John et al. (2015) argue that since a company's corporate governance system defines its level of formal managerial monitoring, governance measures can be used to test the substitution between formal monitoring and cash payouts. While not contractually required, as are interest payments on debt, regular quarterly cash dividends represent an implied pre-commitment to pay out cash to shareholders. Surveys of corporate executives indicate that managers are loath to reduce or omit a cash dividend payment (Lintner, 1956; Baker et al., 1985; Brav et al., 2005). This reluctance is backed by empirical findings of significant negative returns to dividend cuts and omissions (Lang and Litzenberger, 1989; Healy and Palepu, 1988). Consistent with the agency cost-reducing role of dividends proposed by Easterbrook (1984), John et al. (2015) report event study results showing that the market reacts more negatively when weakly relative to strongly governed companies announce a surprise dividend cut. This stronger adverse market reaction when cutting their dividends combined with their greater tendency to pay dividends supports John et al.'s (2015) hypothesis that weakly governed companies supplement their formal monitoring systems by pre-committing to regular cash dividends. Conversely, the tendency for strongly governed companies to pay out cash by repurchasing shares, coupled with a relatively less negative market reaction to dividend cuts is consistent with these companies having sufficient levels of monitoring without the need to pre-commit to cash dividends. For these companies, which already benefit from low agency conflicts, such pre-commitments are not only unnecessary, they may decrease value as the costs of the pre-commitment outweigh marginal reductions in already low agency costs. Without the need to pre-commit to cash dividends, distributing excess cash via more flexible share repurchase policies allows strongly governed companies to take advantage of value-enhancing closer ties between earnings, payouts, and investment policies.

2.2. Hypotheses

We hypothesize that substitution between strong governance systems and pre-commitment to pay cash dividends, both of which reduce agency conflicts, implies a difference in repurchasing companies' post-announcement performance. Strongly governed companies enhance value by not pre-committing to permanent increases in cash dividends, thus avoiding their

associated pre-commitment costs and enhancing future financial flexibility.[2] However, for weakly governed companies, the decision to repurchase shares precludes value enhancement from pre-commitments to cash dividends, and is incongruent with the tendencies reported by John et al. (2015).[3] When these weakly governed firms choose to repurchase shares instead of paying cash dividends, any gains from financial flexibility are offset by the losses associated with greater agency costs. In general, share repurchase programs will tend to be relatively more value-increasing for strongly governed companies, and this separation between strongly and weakly governed companies should be reflected in differences in the long-term post-announcement operating performances and stock returns of the repurchasing companies.

2.2.1. Post-announcement operating performance

Prior post-announcement operating performance studies have reported mixed results. Grullon and Michaely (2004) report that share repurchase program announcements are not followed by improvements in annual operating performance for their sample period from 1980 to 1996. Lie (2005) refines the analysis by using quarterly data collected from 1981 to 2000. Lie reports that announcing companies improve post-announcement operating performance for up to eight quarters relative to benchmark companies selected by an algorithm based on past performance. However, this average improvement is limited primarily to companies who follow-up their share repurchase announcements with actual share buybacks. Using a sample of companies announcing repurchase programs between 1984 and 2002, Gong et al. (2008) find that the more heavily a firm uses accruals to manage pre-announcement earnings downward, the more positive the subsequent operating performance (see also Chan et al., 2010).[4] Chen and Wang (2012) report positive (negative) abnormal changes in operating performance for financially unconstrained (constrained) companies announcing 1990–2007. Due to the costs of pre-committing to cash dividends, the benefits of financial flexibility associated with share repurchases, and the payout tendencies reported by John et al. (2015), we posit the following hypothesis.

Hypothesis 1. Strongly governed companies have higher post-announcement long-term adjusted operating performance relative to weakly governed companies.

2.2.2. Post-announcement stock returns

The literature is replete with studies examining the effects of share repurchase program announcements on long-term stock returns. Ikenberry et al. (1995) find average 4-year excess stock returns of 12.1% in their sample of repurchasing firms announcing 1980–1990. Chan et al. (2004) collect a sample of share repurchase announcements made from 1980 to 1996 and find 4-year post-announcement abnormal returns averaging 23.6%. Peyer and Vermaelen (2009) report 4-year cumulative average abnormal returns of 24.2% in their sample of companies making share repurchase announcements from 1991 to 2001. Finally, with a sample spanning 1984–2012, Fu and Huang (2015) report 3-year excess returns between 5% and 10% for their full sample. With the costs and benefits of cash dividends and repurchases, respectively, and the payout tendencies reported in John et al. (2015), we posit the following hypothesis.

Hypothesis 2. Strongly governed companies have higher post-announcement long-term abnormal stock returns relative to weakly governed companies.

2.2.3. Anomalies

Recent work has shown that many of the equity market anomalies found in the earlier literature have diminished or disappeared completely (Chordia et al., 2014), and attribute this attenuation to increased arbitrage activity. Fu and Huang (2015) find that post-announcement long-term performance increases following share repurchases and seasoned equity offerings have disappeared over the past decade, which they attribute to changes in the trading environment and enhanced regulations on corporate governance and information disclosure. In order to test whether this weakening of the association between governance and performance is present in our work, we split our sample into repurchase announcements made through the year 2000 and those made post-2000, and posit the following hypothesis.

Hypothesis 3. The relation between governance and post-announcement company performance has diminished since the end of year 2000.

2.2.4. Factors affecting post-announcement performance

If repurchasing shares provides relatively greater financial flexibility to strongly governed companies, it may be possible to identify ways in which this additional flexibility benefits these companies. We investigate two possibilities. First, CEO incentive compensation is intended to intensify managerial efforts to enhance firm value. Jensen and Murphy (1990) measure the sensitivity of CEO compensation to changes in share prices and report the average CEO's wealth increases by a statistically significant $3.25 for each $1000 increase in firm value. Mehran (1995) finds that equity incentives lead to improved outcomes, reporting

[2] Possible benefits of this financial flexibility include freeing up future free cash flow for profitable future investment opportunities, which we examine later.

[3] Both Zwiebel (1996) and Myers (2000) develop models in which self-interested managers choose to pay cash dividends in order to preempt future control challenges or position the firm for future outside financing opportunities, respectively. Following John et al. (2015), we assume that share repurchases also provide these benefits to poorly governed firms, but without the agency conflict-reducing pre-commitment benefits of paying cash dividends.

[4] Chen and Huang (2013) report that such behavior has decreased markedly since passage of the Sarbannes–Oxley Act in 2002.

that firm performance is positively related to the CEO's equity-based compensation percentage. Core et al. (1999) link corporate governance and CEO compensation to operating performance and stock returns. Separating out the equity component of compensation, our tests of Hypotheses 1 and 2 also find a positive relation between CEO equity compensation and post-announcement operating and stock performance. Increased CEO incentive compensation after the repurchase announcement is one possible use of greater financial flexibility that may increase post-announcement company performance as stronger incentives lead to increased effort, which leads us to posit the following hypothesis:

Hypothesis 4. After announcing share repurchase programs, strongly governed companies invest relatively more in their CEOs' equity incentive compensation.

Another potential use (or misuse) of financial flexibility that could influence post-announcement performance is acquisitions of other companies, which is one of the largest forms of corporate investment (Masulis et al., 2007). If an attractive takeover target presents itself, companies that have not previously committed to dividend payouts have relatively greater internal capital with which to finance the acquisition (John et al., 2015). However, not all acquisitions benefit shareholders. As Jensen (1986) points out, managers have incentives, such as empire building, compensation plans focused on assets or sales size, and middle management promotion incentives, to grow firms under their control beyond optimal size. Mitchell and Lehn (1990) agree and report evidence that mergers can be good or bad for shareholders, and that acquirers in bad mergers that destroy shareholder value can set themselves up to become future takeover targets. A commonly used proxy for value-enhancing investment opportunities is Tobin's Q, which is defined as the ratio of company market value to asset replacement value (Lang and Litzenberger, 1989; Asker et al., 2015). Acquisitions by firms with superior growth opportunities are more likely to provide synergistic benefits to shareholders than acquisitions by firms with inferior investment opportunities. Wang and Xie (2009) report evidence that when strongly governed companies acquire weakly governed ones, the merger creates more shareholder value. Masulis et al. (2007) present evidence that supports their hypothesis that weakly governed companies are more likely to indulge in empire-building and value-destroying acquisitions. In order to examine this aspect of how financial flexibility affects post-announcement performance changes, we posit the following hypothesis:

Hypothesis 5. Strongly governed companies with relatively superior investment opportunities increase post-announcement acquisitions of companies relative to other sample companies.

2.3. Contribution

To our knowledge, we are the first to focus on the association between corporate governance and repurchasing firms' long-term operating and stock performance. Following John et al. (2015), we measure corporate governance using the number of state antitakeover laws in effect in the firm's state of incorporation each year. This governance measure is largely exogenous to sample companies' repurchase decisions (Karpoff and Wittry, 2015).[5] Since the decision to repurchase is made in the shareholder payout policy context in general, we begin by studying tradeoff determinants between repurchases and dividends using probit regressions. Consistent with John and Knyazeva (2006) and John et al. (2015), we find that strong governance is positively associated with the repurchase decision, but negatively associated with regular cash dividend payments. In order to analyze the relation between long-term performance and corporate governance, we use the two-step Heckman (1979) methodology, which controls for sample selection bias. The dependent variables are the differences between pre- and post-announcement operating performance adjusted for the performance of a benchmark company and the post-announcement abnormal stock returns. Our findings show a significant positive association between strong governance and post-announcement operating and stock performance. We also contribute to the literature on anomaly attenuation. Consistent with Bebchuk et al. (2013) and Fu and Huang (2015), we find in our sample that the association between governance and post-announcement performance disappears after the year 2000.

Our results are robust to tests using subsamples of firms that (a) follow-up their repurchase announcements with actual repurchases, and (b) make unexpected repurchase announcements. We find similar results after redefining our corporate governance measure as a transformed version of the Bebchuk et al. (2009) entrenchment index and we include a measure of internal governance (John et al., 2015) showing that our results are robust to governance measurement. Finally, we investigate post-announcement changes in investments. Consistent with a performance-enhancing use of financial flexibility, we find that strong governance tends to be associated with higher levels of investments in CEO incentive pay and acquisition activity.

3. Data and methods

3.1. Repurchase sample

In order to analyze the share repurchase decision in the context of a firm's overall payout policy, we collect a panel dataset comprised all 53,523 companies listed on AMEX, NASDAQ, and NYSE with the quarterly Compustat, Execucomp, Institutional Shareholder Services/RiskMetrics, and CRSP data to compute our variables. For the panel companies, we used SDC Platinum to

[5] Karpoff and Wittry (2015) list companies that lobbied for enactment of their home state antitakeover laws, and argue that the resulting laws are endogenous for these specific companies. To eliminate this source of potential endogeneity, we remove these companies from our sample.

identify share repurchase announcement dates made by US companies from January 1, 1991 to December 31, 2011, excluding share repurchases made by non-US companies, financial companies, firms that helped to motivate or actually lobbied for state antitakeover laws, firms for which we could not identify the state of incorporation, and all repurchase tender offers.[6] These data screens produce a total of 1726 distinct quarterly share repurchase announcements over the sample period.[7] All companies with available data during the sample period are included in our panel and first-stage Heckman regressions.

3.2. Governance variables

Following John et al. (2015), we measured the strength of a firm's corporate governance using an index of the number of antitakeover laws enacted by the state in which the firm is incorporated. The smaller the index, which ranges from 0 to 5, the fewer antitakeover laws were enacted by a given firm's home-state government, and the stronger the implied corporate governance. The state antitakeover laws include business combination, fair price, control share acquisition, poison pill, and director's duties laws (Karpoff and Wittry, 2015). In robustness tests, we also measure governance strength following John and Knyazeva (2006), who use an index (specified in Section 4.5) comprised three separate internal governance mechanisms to measure internal governance, and the Bebchuk et al. (2009) entrenchment index as a measure of external governance.[8] John and Knyazeva (2006) transform both indexes to range between 0 and 1 so that 1 indicates the strongest possible level of governance. Panel A of Table 1 presents various descriptive statistics for the variables used in our panel regressions, while their definitions appear below (and in Appendix A). Panel companies are subject to a mean (median) of 2.22 (1.00) state antitakeover laws, with a standard deviation of 1.64. The internal and external governance variables have means (medians) of 0.63 (0.67) and 0.58 (0.50), respectively. Panel B contains the Pearson correlation coefficients among the variables. While the correlation coefficients between the three governance measures are not large, they are statistically significant. The negative coefficients between the state law index and the internal (−0.052) and external governance (−0.144) indexes indicate that strong state-level governance tends to be reinforced with strong firm-level governance. The negative coefficient between internal and external governance (−0.115) is consistent with a substitution effect between strong internal and strong external governance.

3.3. Control variables

Following John et al. (2015), we model the payout choice as a function of various company-specific control variables, and test the statistical significance of the addition of our governance measures. All control variables are lagged one quarter unless otherwise noted. *Free cash flow* is the sum of earnings before interest, taxes, and amortization, interest expense and tax expense less capital expenditures to total assets, and controls for the excess cash flow hypothesis (Dittmar, 2000); *Book-to-market* is book-divided by market-value of equity, and controls for company growth opportunities (John and Knyazeva, 2006; John et al., 2015); *Log* (*total assets*) is the natural logarithm of total assets and is included to control for small companies using repurchase announcements to signal performance (Lakonishok and Vermaelen, 1990); *Book leverage* is total debt divided by total assets and controls for the use of share repurchases in capital structure policy (Chan et al., 2004); *CEO options* equals the ratio of the aggregate S&P Black/Scholes value of CEO stock option grants during the year to company market value (Fenn and Liang, 2001; John et al., 2015); *CEO ownership* is the ratio of the number of shares, excluding option grants, owned by the CEO to the total number of shares outstanding (Fenn and Liang, 2001; John et al., 2015); *Payout/OCF* is the ratio of the dollar amount of total cash payouts (repurchase and/or dividends) to operating cash flow and controls for the payout size (Dittmar, 2000); *Takeover threat* is the number of mergers and acquisitions within a Fama-French 12 industry group and fiscal quarter, and is used to control for companies using the cash payout to deter a possible takeover attempt (Dittmar, 2000; Billett and Xue, 2007); *Tax* is the ratio of tax expense to earnings before interest and taxes and controls for the influence of taxes on cash flow available for payouts (John and Knyazeva, 2006); *Risk* is defined as the standard deviation of a company's excess returns and controls for the influence of market risk on a company's willingness to payout cash to shareholders (John and Knyazeva, 2006); and *Sales growth* is the quarter-to-quarter change in sales and controls for higher opportunity costs of payouts for growing companies (John and Knyazeva, 2006).

3.4. Methodology

We compute adjusted long-term operating performance using quarterly operating performance data obtained from Compustat following the Lie (2005) benchmark adjustment procedure controlling for industry, previous operating performance, and the market-to-book ratio. Our intent in using the Lie (2005) benchmarking procedure is to find the single industry competitor closest economically to each sample firm immediately prior to the repurchase announcement. We compute each repurchasing firm's

[6] For a discussion of share repurchase tender offers see Dann (1981) and Vermaelen (1981).

[7] We treat multiple repurchase announcements made by a company in a single quarter as one announcement.

[8] The internal governance index is based on relative rankings of higher institutional holdings (Cremers and Nair, 2005), smaller boards of directors (Yermack, 1996), and higher proportions of independent directors (Weisbach, 1988) each of which has been associated with stronger corporate governance (higher equity value).

Table 1
Descriptive statistics.

Panel A: Variables. Descriptive company statistics for our panel data. Financial variables and SIC codes are obtained from Compustat.

Variables	Obs	Mean	Median	Standard deviation
Antitakeover law index	53,523	2.22	1.00	1.64
Internal governance	42,170	0.63	0.67	0.15
External governance	53,523	0.58	0.50	0.24
Free cash flow	53,242	0.03	0.03	0.03
Book-to-market	53,493	1.59	1.14	1.92
Log (total assets)	53,523	7.55	7.44	1.47
Book leverage	53,431	0.39	0.39	0.25
CEO options	53,523	0.03	0.00	0.08
CEO ownership	53,523	1.46	0.15	4.32
Payout/Operating cash flow	53,523	0.22	0.10	0.40
Takeover threat	53,523	5.39	2.00	7.77
Tax	53,503	0.24	0.29	0.49
Risk	53,519	0.02	0.02	0.01
Sales growth (%)	53,519	0.04	0.02	0.19
Abnormal accruals	1731	0.00	0.00	0.02

Panel B: Correlations among the regression variables (see Appendix A for definitions and abbreviations). *P*-values are in the brackets.

	Index	InGov	ExGov	FCF	BM	L(TA)	Lev	Opt	Own	P/OCF	Threat	Tax	Risk	Grow	Acc
Index	1														
InGov	−0.052	1													
	(0.000)														
ExGov	−0.144	−0.115	1												
	(0.000)	(0.000)													
FCF	0.023	−0.013	0.037	1											
	(0.000)	(0.007)	(0.000)												
BM	0.004	0.006	−0.026	−0.215	1										
	(0.345)	(0.249)	(0.000)	(0.000)											
L(TA)	−0.016	0.239	−0.007	−0.009	0.072	1									
	(0.000)	(0.000)	(0.110)	(0.031)	(0.000)										
Lev	0.019	0.093	−0.048	−0.081	0.382	0.235	1								
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)									
Opt	−0.061	−0.065	0.036	−0.032	−0.045	−0.176	−0.087	1							
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
Own	0.052	−0.153	0.103	0.052	−0.055	−0.144	−0.143	0.043	1						
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
P/OCF	0.014	0.015	−0.01	0.068	−0.132	0.052	−0.103	−0.01	0.006	1					
	(0.001)	(0.002)	(0.022)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.175)						
Threat	−0.083	0.012	−0.011	−0.006	−0.123	−0.003	−0.216	0.09	0.022	0.079	1				
	(0.000)	(0.018)	(0.008)	(0.187)	(0.000)	(0.495)	(0.000)	(0.000)	(0.000)	(0.0000					
Tax	−0.001	−0.027	0.015	0.138	−0.085	−0.002	−0.113	−0.003	0.032	0.038	−0.027	1			
	(0.893)	(0.000)	(0.001)	(0.000)	(0.000)	(0.619)	(0.000)	(0.497)	(0.000)	(0.000)	(0.0000				
Risk	−0.106	0.007	0.036	−0.187	0.334	−0.313	0.045	0.196	0.053	−0.116	0.069	−0.067	1		
	(0.000)	(0.171)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
Grow	−0.003	−0.026	0.015	0.229	−0.025	−0.001	0.006	0.001	0.011	−0.08	0.004	0.015	−0.024	1	
	(0.421)	(0.000)	(0.001)	(0.000)	(0.000)	(0.881)	(0.156)	(0.896)	(0.010)	(0.000)	(0.317)	(0.000)	(0.000)		
Acc	0.013	−0.035	−0.049	0.046	0.043	0.01	0.042	−0.016	0.033	−0.085	0.042	−0.04	−0.082	0.133	1
	(0.599)	(0.160)	(0.041)	(0.055)	(0.071)	(0.670)	(0.078)	(0.509)	(0.168)	(0.000)	(0.079)	(0.100)	(0.001)	(0.000)	

adjusted operating performance by taking the difference between the sample firm's operating performance and that of the matched benchmark company as follows:

$$\text{Adjusted } OP_{t,si} = \left\{ \sum_{t=+1}^{T} \left(\frac{OP_{t,si}}{T} \right) - \overline{OP_{si}} \right\} - \left\{ \sum_{t=+1}^{T} \left(\frac{OP_{t,bi}}{T} \right) - \overline{OP_{bi}} \right\} \quad (1)$$

where OP is the operating performance for sample company si or benchmark company bi, T equals 4, 8, or 12 quarters subsequent to the repurchase announcement, and $\overline{OP_i}$ is the average operating performance over quarters −3–0 for companies si and bi. See Lie (2005) for more information on selection of the benchmark company.

We compute abnormal post-repurchase long-term stock returns using monthly with-dividend returns from CRSP following the standard (Daniel et al., 1997) portfolio benchmark adjustment procedure controlling for company size (market capitalization), the industry-adjusted book-to-market ratio, and the previous 12-month total stock return (henceforth referred to as DGTW). We implement the DGTW benchmarking procedure in July of each sample year by forming 125 benchmark portfolios. We compute the *long-term cumulative abnormal return* (LCAR) for 12, 24, and 36 months after a share repurchase announcement for each company announcing a share repurchase program. The LCAR for an individual security is the sum of the differences between

a company's monthly raw return and the monthly return for the respective benchmark portfolio to which it belongs and is given by:

$$LCAR_{i,t} = \sum_{t=1}^{T} \left(R_{i,t} - R_{i,t}^{b} \right) \tag{2}$$

where T is the length of the accumulation period (12, 24, or 36 months), $R_{i,t}$ is company i's raw return in the *t*th calendar month following the share repurchase announcement, and $R_{i,t}^{b}$ is the analogous return to the benchmark portfolio *b*. See Daniel et al. (1997) for more information on the development of the benchmark portfolios.

As we show in Table 2 below, a company's payout policy is determined by various company and market characteristics. While our list of payout choice variables is extensive, there may be others, particularly nonpublic ones, which we have missed. These missing choice determinants, if not specifically modeled, may produce biased estimated coefficients. Following Li and Prabhala (2005) we model our company performance analysis as a repurchase self-selection problem. The decision to announce a share repurchase is a discrete event; a company either makes the announcement or does not. We model this decision with a probit regression and the determining variables defined in Section 3.3:

$$\text{Choice to announce repurchase} = R \equiv r^{*} = Z_i\delta + \mu_i > 0 \tag{3}$$

$$\text{Choice to not announce repurchase} = NR \equiv r^{*} = Z_i\delta + \mu_i \leq 0 \tag{4}$$

$$\text{Company performance after announcement} = Y_i = X_i\beta + \varepsilon_i \tag{5}$$

where Z_i denotes the information expected to influence payout choice, δ is a vector of coefficients, and μ_i is an error term orthogonal to Z_i. When $r^{*} > 0$, the company makes the choice to repurchase and $R = 1$, and when $r^{*} < 0$, it chooses not to repurchase and $R = 0$. However, we do not observe the value of r^{*}, only the company choice, R or NR, when it decides to repurchase or not. If

Table 2
Corporate payout. This table examines the relation between corporate governance (antitakeover law index) and the corporate payout. Probit is used in columns (1)–(5), where the dependent variable equals zero if a payout announcement is made and zero otherwise. Tobit with censoring at 0 is used in columns (6) and (7), where the dependent variable is the ratio of the dollar payout to operating cash flow. Standard errors are clustered by state in columns (2)–(7). *Rep* (*Div*) refers to repurchase (dividend) announcement. All independent variables are measured in t-1. Robust z-statistics are in the brackets.

Specification	Probit					Tobit	
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	All rep [0/1]	All rep [0/1]	Rep only [0/1]	Div only [0/1]	Div inc [0/1]	Rep/OCF	Div/OCF
Antitakeover law index	−0.019***	−0.019*	−0.048***	0.050*	0.031**	−0.016**	0.029***
	[−2.800]	[−1.901]	[−2.669]	[1.671]	[2.458]	[−2.165]	[3.226]
Free cash flow	3.699***	3.699***	2.740***	0.272	2.833***	3.127***	0.592
	[9.924]	[12.565]	[8.346]	[0.281]	[2.968]	[10.930]	[1.298]
Book-to-market	−0.097***	−0.097***	−0.041	−0.024*	−0.188***	−0.060***	−0.009**
	[−6.557]	[−4.699]	[−1.555]	[−1.666]	[−8.390]	[−4.500]	[−2.410]
Log (total assets)	0.080***	0.080***	0.014	0.160***	0.096***	0.043***	0.046***
	[10.150]	[4.862]	[0.440]	[6.167]	[8.922]	[10.028]	[5.875]
Book leverage	−0.170***	−0.170***	−0.145**	−0.353***	−0.276***	−0.306***	−0.143**
	[−3.386]	[−2.927]	[−2.320]	[−2.649]	[−4.707]	[−11.568]	[−2.237]
CEO options	0.665***	0.665***	0.722***	−1.011***	−0.832***	0.277***	−0.603***
	[5.777]	[4.393]	[4.374]	[−8.607]	[−5.265]	[7.856]	[−8.341]
CEO ownership	0.001	0.001	0.004*	0.006	0.001	0.001	0.001
	[0.409]	[0.404]	[1.663]	[1.274]	[0.230]	[0.845]	[0.248]
Payout/OCF	0.245***	0.245***	0.124***	0.550***	0.130***	0.490***	0.300***
	[12.456]	[15.388]	[4.472]	[4.720]	[5.936]	[39.244]	[8.095]
Takeover threat	0.004***	0.004***	0.010***	−0.030***	−0.016***	0.004***	−0.011***
	[3.077]	[3.350]	[3.835]	[−5.633]	[−14.675]	[9.006]	[−6.309]
Tax	0.018	0.018	0.005	0.040**	0.054**	0.019**	0.007
	[0.732]	[0.597]	[0.152]	[2.073]	[2.541]	[2.356]	[0.643]
Risk	−0.698	−0.698	6.568***	−19.070***	−25.202***	−2.426	−10.604***
	[−0.618]	[−0.478]	[5.239]	[−4.484]	[−12.342]	[−1.467]	[−8.844]
Sales growth (%)	−0.141**	−0.141***	−0.062	−0.185*	0.053	−0.142***	−0.176***
	[−2.326]	[−2.699]	[−0.791]	[−1.928]	[0.534]	[−3.221]	[−5.091]
Constant	−2.470***	−2.470***	−2.527***	−0.470***	−1.423***	−0.544***	−0.065
	[−31.703]	[−14.713]	[−11.670]	[−3.720]	[−15.264]	[−10.006]	[−1.467]
Observations	53,523	53,523	53,523	53,523	53,523	53,523	53,523
Pseudo R^2	0.0434	0.0434	0.0347	0.115	0.0847	0.151	0.119

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

the company chooses R, then we calculate performance measures, Y_i, for company i, in which case X_i denotes a set of variables we expect to be related to company performance, β is a vector of coefficients, and ε_i is an error term that is orthogonal to X_i. Since Y_i depends on choice R, ε_i in Eq. (5) is a function of Eqs. (3) and (4). Through substitution, Eq. (5) can be rewritten as:

$$Y_i = X_i\beta + \rho_{\mu\varepsilon}\sigma_\varepsilon\lambda_C(Z_i\delta) \tag{6}$$

where $\rho_{\mu\varepsilon}$ is the correlation between bivariate normal error terms μ_i and ε_i, σ_ε is the standard deviation of ε_i, and λ_C is the inverse Mills ratio. We use the two-step Heckman estimation method to estimate Eq. (6). Stage one is a payout choice probit regression (Eqs. (3) and (4)), the estimates of which are used to estimate the inverse Mills ratio for each observation. Stage two is an ordinary least squares regression of Eq. (6) including stage one's estimated inverse Mills ratio λ as a regressor. The estimated coefficient on λ estimates ρ. Many of the control variables in X_i are also included in the set of choice variables, Z_i, with important exclusions. These exclusions provide identification for our system of equation estimations, which otherwise could suffer from collinearity.[9] While variables Payout/OCF, Takeover threat, Tax, Risk, and Sales growth are intuitive possible determinants of the choice to repurchase, it is less clear how they would affect post-announcement performance. Therefore, we exclude these five variables from our stage-2 outcome regressions. Finally, since Gong et al. (2008) find that companies tend to manipulate earnings prior to announcing share repurchases, we include in X_i *Abnormal accruals* to control for any effects of earnings management activities on performance. Please see Gong et al. for details on the computation of *Abnormal accruals*.

If there is self-selection bias introduced into the estimation of β, it will manifest itself as significant correlation, ρ, between the error terms μ_i and ε_i. The Wald test of independent equations ($\rho = 0$) is a chi-square test with one degree of freedom. The Wald test rejects the null hypothesis of independent equations in the majority of our performance regressions reported below, particularly the abnormal stock return regressions. Therefore, sample selection bias appears to be a significant problem in our sample of repurchasing companies.[10]

4. Results

4.1. Probit regressions of payout policy

We begin by analyzing a company's payout choice. When choosing a payout policy, companies can make indirect payouts to shareholders via share repurchases, direct cash dividend payments to shareholders, or both. Columns 1 and 2 of Table 2 present probit regression results in which the dependent variable equals 1 in quarters when a sample firm announces a share repurchase and equals 0 otherwise. The difference between these two columns is that standard errors are clustered at the state level in column 2 (as are the standard errors in columns 3–7) and are not clustered in column 1.[11] In column 3 the dependent variable equals 1 in quarters in which sample companies announce a share repurchase, without a concurrent dividend announcement, and 0 otherwise. The estimated coefficients on our corporate governance measure, the state antitakeover law index, are negative and statistically significant in all three columns, indicating that good governance is associated with the choice to repurchase shares (a higher index implies weaker governance). Most of the estimates on the control variables are statistically significant. The decision to repurchase is negatively related to the book-to-market ratio, leverage, and sales growth, and significantly positively related to free cash flow, company size, CEO stock option holdings, the repurchase yield, and the takeover threat.

Columns 4 and 5 present the results of estimating coefficients for the same set of independent variables, but the dependent variables are dummy variables equal to 1 when a company pays a dividend or increases the dividend that quarter, respectively, and 0 otherwise. The primary results are those related to our governance measure, and are the opposite sign from those in the case of the decision to repurchase. The positive and significant estimates on the governance variable in both columns are in contrast with those related to the repurchase decision, the dividend decision tends to be made by companies with relatively poor governance. These contrasting results for the governance estimates between repurchases and dividends are consistent with those of John et al. (2015). As for the control variables, the decision to pay a cash dividend is significantly negatively related to the book-to-market ratio, leverage, the takeover threat, the value of CEO options, and the risk variable, and significantly positively related to free cash flow, company size, the repurchase yield, and the tax ratio. In addition to the contrasting results for our governance measures, we note three conflicting control variable coefficient estimates for the repurchase and dividend decisions. The results for CEO options were consistent with option-holding CEOs choosing to both repurchase shares and to not pay dividends. Repurchasing shares reduces share outstanding, thus spreading company earnings across fewer shares, which tends to enhance stock and option values. Not paying dividends prevents the loss of value associated with cash payouts as stock options do not participate in dividend distributions. Similarly, the results for the takeover threat variable indicate that when companies are confronted with a takeover threat, they tend to repurchase shares and tend not to pay dividends. The contrast between the positive and significant estimate on the risk term in the repurchase regressions (column 3) and the negative and significant estimates

[9] See Li and Prabhala (2005) for a discussion of identification in self-selection models.

[10] As noted above, we could also model the sample selection bias as an omitted variable problem where the omitted information is the private information used to help make the repurchase choice. In this case, statistically significant ρ indicates that private information is important in making $r^* > 0$, and the decision to announce a repurchase.

[11] Coefficient estimates are identical in columns 1 and 2, but the robust z-statistics are different. We present the column 1 results as those representative of the coefficients in stage one of the Heckman two-step methodology.

Table 3
Operating performance. This table reports the second-stage Heckman regression results of post-announcement adjusted operating performance, which is computed using the Lie (2005) benchmark method. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Adjusted operating performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.003*	−0.008***	−0.012**	−0.005**	−0.013***	−0.020***	0.002	−0.002	−0.002
	[−1.679]	[−2.757]	[−2.382]	[−2.234]	[−3.107]	[−2.954]	[0.715]	[−0.517]	[−0.292]
Free cash flow	0.028	0.904***	1.539***	−0.037	0.905***	1.616***	−0.033	0.687***	1.242***
	[0.251]	[4.263]	[4.435]	[−0.255]	[3.365]	[3.850]	[−0.245]	[2.621]	[2.700]
Book-to-market	−0.008*	−0.029***	−0.042***	−0.006	−0.017	−0.024	−0.003	−0.030***	−0.046**
	[−1.735]	[−3.490]	[−3.105]	[−0.987]	[−1.566]	[−1.479]	[−0.494]	[−2.707]	[−2.332]
Log (total assets)	0.004*	0.003	−0.001	0.004	−0.001	−0.009	0.001	0.003	0.001
	[1.815]	[0.591]	[−0.158]	[1.253]	[−0.199]	[−0.882]	[0.520]	[0.556]	[0.152]
Book leverage	−0.024	−0.055**	−0.090**	−0.020	−0.106**	−0.174**	−0.019	−0.009	−0.018
	[−1.639]	[−2.003]	[−2.004]	[−0.821]	[−2.387]	[−2.504]	[−1.158]	[−0.286]	[−0.317]
CEO options	0.046	0.198***	0.311***	0.012	0.068	0.047	0.066	0.284***	0.547***
	[1.352]	[3.134]	[3.012]	[0.240]	[0.756]	[0.334]	[1.569]	[3.464]	[3.807]
CEO ownership	−0.001	0.000	0.002	−0.000	−0.000	0.000	−0.001	−0.000	0.001
	[−1.245]	[0.084]	[0.878]	[−0.405]	[−0.312]	[0.165]	[−1.114]	[−0.129]	[0.319]
Abnormal accrual	0.094	−0.092	−0.453	0.054	0.087	−0.080	0.149	−0.347	−0.993*
	[0.846]	[−0.437]	[−1.307]	[0.357]	[0.311]	[−0.184]	[0.892]	[−1.062]	[−1.729]
Lambda	0.0472**	0.0492	0.00152	0.0324	−0.0213	−0.0898	0.0188	0.0276	−0.0244
	[2.076]	[1.155]	[0.0218]	[1.213]	[−0.436]	[−1.174]	[1.030]	[0.772]	[−0.390]
Constant	−0.119*	−0.079	0.083	−0.078	0.133	0.381*	−0.045	−0.058	0.078
	[−1.893]	[−0.669]	[0.430]	[−1.078]	[0.999]	[1.837]	[−0.811]	[−0.534]	[0.410]
Observations (censored)	1716	1716	1716	860	860	860	856	856	856
Wald χ^2	12.22	58.73	69.36	9.531	44.93	53.20	6.765	33.55	39.99

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

in the dividend regressions is consistent with the idea that as market risk increases, companies are more reluctant to pre-commit to and/or increase dividends, but are more likely to distribute excess cash through share repurchases. Finally, the results presented in column 5 indicate that the factors influencing the decision to initiate a dividend for the first time are similar to those influencing the general dividend payment decision.

Columns 6 and 7 in Table 2 present the Tobit regression results of repurchase and dividend dollar amounts relative to the company's operating cash flow on the same independent variables. The results are consistent with those in columns 2 through 5. Most importantly, the estimated coefficients on our corporate governance measure are significantly negative in the repurchase regression and significantly positive in the dividend regression. When accounting for payout size, rather than just a particular payout type, strong governance continues to be associated with repurchases, while weak governance continues to be associated with dividend payments. In addition, CEO option value and the firm's takeover threat level are positively related to the size of the repurchase, but negatively related to the size of the dividend payment. Market risk is negatively associated with repurchase and dividend dollar size, but significantly so only for dividends.

4.2. Operating performance

Table 3 presents the second-stage results of the two-step Heckman estimation procedure where the outcome or dependent variable is the 4-, 8-, and 12-quarter adjusted operating performance on independent variables, including the strength of corporate governance and control variables.[12] Models 1, 2, and 3 contain the estimated coefficients over the full sample period. The estimated coefficients on corporate governance are all significantly negative, indicating better adjusted operating performance for more strongly governed companies. This finding is consistent with Hypothesis 1. Among the independent variables, repurchasing companies providing higher levels of incentive compensation for top management tend to outperform those whose managers are less incentivized, which is consistent with Hypothesis 4. The negative and significant estimates on book-to-market across the three performance periods are consistent with Hypothesis 5; companies with better investment opportunities tend to outperform those with fewer such opportunities. Finally, companies with more free cash flow and less book leverage also tend to outperform those with lower cash flow and higher leverage.

[12] In the regression models for the full sample in Tables 3 and 4, the probit estimates are essentially identical to those contained in column 1 of Table 2, and are not reported.

Table 4
Stock performance. This table reports the second-stage Heckman regression results of post-announcement abnormal long-term performance regressions, which is computed using the Daniel et al. (1997) benchmark adjustment procedure. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Abnormal stock performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.010*	−0.016**	−0.014*	−0.023**	−0.036***	−0.033**	−0.003	−0.006	−0.007
	[−1.769]	[−2.199]	[−1.680]	[−2.268]	[−3.020]	[−2.350]	[−0.519]	[−0.697]	[−0.702]
Free cash flow	−0.181	0.072	0.324	−0.998	−1.232*	−1.214	0.177	0.583	0.879
	[−0.451]	[0.145]	[0.551]	[−1.623]	[−1.660]	[−1.403]	[0.479]	[1.116]	[1.409]
Book-to-market	0.026*	0.000	−0.028	0.093***	0.093***	0.066**	−0.022	−0.066***	−0.079***
	[1.652]	[0.023]	[−1.204]	[3.907]	[3.241]	[1.983]	[−1.393]	[−2.928]	[−2.988]
Log (total assets)	−0.018**	−0.020*	−0.022*	−0.053***	−0.066***	−0.080***	0.003	0.009	0.012
	[−2.018]	[−1.834]	[−1.729]	[−3.680]	[−3.790]	[−3.938]	[0.399]	[0.812]	[0.921]
Book leverage	0.006	0.034	0.063	0.010	0.163	0.202	0.039	−0.033	0.004
	[0.102]	[0.527]	[0.829]	[0.095]	[1.349]	[1.429]	[0.829]	[−0.513]	[0.059]
CEO options	0.280**	0.431***	0.512***	0.368*	0.753***	0.851***	0.018	−0.260	−0.314
	[2.348]	[2.928]	[2.931]	[1.797]	[3.049]	[2.956]	[0.159]	[−1.604]	[−1.625]
CEO ownership	0.002	−0.001	−0.003	−0.001	−0.005	−0.008	−0.003	−0.011**	−0.013**
	[0.971]	[−0.406]	[−0.865]	[−0.237]	[−1.260]	[−1.631]	[−1.105]	[−2.505]	[−2.563]
Abnormal accrual	−0.264	−0.798	−0.820	−0.085	−0.360	−0.388	−0.350	−1.170*	−1.041
	[−0.660]	[−1.622]	[−1.412]	[−0.139]	[−0.499]	[−0.455]	[−0.769]	[−1.932]	[−1.454]
Lambda	−0.003	0.124	0.220*	−0.408***	−0.579***	−0.604***	0.102**	0.347***	0.437***
	[−0.0337]	[1.235]	[1.852]	[−3.593]	[−4.198]	[−3.777]	[2.014]	[4.798]	[5.064]
Constant	0.188	−0.014	−0.161	1.310***	1.801***	2.016***	−0.199	−0.683***	−0.879***
	[0.839]	[−0.051]	[−0.492]	[4.242]	[4.809]	[4.637]	[−1.296]	[−3.116]	[−3.366]
Observations (censored)	1720	1724	1726	861	862	862	859	862	864
Wald χ^2	24.86	29.78	30.40	42.27	51.83	43.18	5.025	25.11	24.91

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

To test Hypothesis 3, we split our sample into subsamples from 1991 to 2000 and 2001 to 2011.[13] Models 4–6 (7–9) present the estimated coefficients for the earlier (later) sub-period. During the pre-2001 period, the estimated coefficients on corporate governance are larger and their statistical significance is stronger than the respective estimates in columns 1–3. In the post-2000 period, none of the estimated coefficients is different from 0. This diminishment in the relation between performance and governance is consistent with Hypothesis 3. It is also consistent with Fu and Huang (2015), who report a disappearance in post-repurchase returns.

4.3. Stock performance

Table 4 contains the second-stage results of the two-step Heckman estimation procedure in which the outcome or dependent variable is the 12-, 24-, or 36-month abnormal long-term stock return on independent variables, including the strength of corporate governance and control variables. Models 1, 2, and 3 contain the full sample estimated coefficients. The estimates for our governance measure are negative and statistically significant, indicating that strong governance is associated with better abnormal stock returns 1, 2, and 3 years after the repurchase announcement. This finding is consistent with Hypothesis 2 and with John et al. (2015). Only two control variables are consistently statistically significant. Similar to the results reported in Table 3, the relative value of CEO stock options tends to be positively associated with abnormal stock returns, which is consistent with Hypothesis 4 and indicates that financial incentives matter in generating better performance. Unlike the operating performance results, smaller sized companies tend to have higher abnormal stock returns than larger companies. Finally, we find limited support for Hypothesis 5 as growth opportunities are positively associated with stock returns only in Model 1.

Examining our pre-2001 subperiod results for corporate governance, reported in Models 4–6, the estimated coefficients on governance double in absolute value from those for the full sample, and their negative value indicates that strong governance is associated with better performance. During the latter period, reported in Models 7–9, the estimated coefficients are not statistically different from 0. This difference in the governance coefficients between the two subperiods is again consistent with Hypothesis 3, corroborates our Hypothesis 1 findings, and is consistent with Fu and Huang (2015).

[13] Chordia et al. (2014) note that decimalization of stock prices occurred in January 2001, and following them, we form subsample periods using December 2000 as our breakpoint.

Table 5
Operating performance for carry-through repurchase sample. This table reports second-stage Heckman regression results of post-announcement adjusted operating performance for the subsample that actually repurchased shares, which is computed using the Lie (2005) benchmark method. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.*

Dependent variable	Adjusted operating performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.004**	−0.009***	−0.013**	−0.008***	−0.016***	−0.023***	0.001	−0.003	−0.003
	[−2.163]	[−2.767]	[−2.293]	[−3.009]	[−3.211]	[−2.905]	[0.667]	[−0.621]	[−0.434]
Free cash flow	−0.049	0.826***	1.483***	−0.120	0.860***	1.562***	−0.016	0.801***	1.461***
	[−0.435]	[3.825]	[4.158]	[−0.790]	[2.957]	[3.425]	[−0.115]	[2.811]	[2.902]
Book-to-market	−0.007	−0.028***	−0.038**	−0.003	−0.015	−0.019	−0.003	−0.031**	−0.047**
	[−1.290]	[−2.631]	[−2.190]	[−0.434]	[−1.023]	[−0.797]	[−0.445]	[−2.536]	[−2.175]
Log (total assets)	0.002	−0.002	−0.009	0.000	−0.005	−0.014	0.002	0.003	0.000
	[0.921]	[−0.389]	[−1.151]	[0.100]	[−0.838]	[−1.394]	[0.521]	[0.575]	[0.017]
Book leverage	−0.014	−0.037	−0.061	−0.012	−0.104**	−0.176**	−0.009	0.008	0.015
	[−0.928]	[−1.289]	[−1.269]	[−0.441]	[−2.094]	[−2.251]	[−0.541]	[0.242]	[0.258]
CEO options	0.021	0.230***	0.315***	−0.024	0.052	0.030	0.071	0.424***	0.648***
	[0.578]	[3.237]	[2.682]	[−0.437]	[0.506]	[0.189]	[1.486]	[4.453]	[3.847]
CEO ownership	−0.001	0.000	0.002	−0.001	−0.001	−0.000	−0.001	−0.000	0.001
	[−1.096]	[0.235]	[0.818]	[−0.736]	[−0.347]	[−0.083]	[−0.650]	[−0.155]	[0.279]
Abnormal accrual	0.071	−0.147	−0.603	0.026	0.043	−0.174	0.119	−0.439	−1.242**
	[0.606]	[−0.644]	[−1.605]	[0.162]	[0.139]	[−0.362]	[0.674]	[−1.253]	[−1.999]
Lambda	0.0261	0.00622	−0.0659	0.00380	−0.0593	−0.157	0.0150	0.0307	−0.0243
	[1.277]	[0.157]	[−1.008]	[0.156]	[−1.268]	[−2.133]	[0.837]	[0.859]	[−0.385]
Constant	−0.055	0.044	0.275	0.015	0.250**	0.571***	−0.042	−0.079	0.068
	[−0.997]	[0.415]	[1.555]	[0.236]	[2.071]	[3.009]	[−0.757]	[−0.719]	[0.348]
Observations (censored)	1504	1504	1504	723	723	723	781	781	781
Wald χ^2	9.181	52.20	59.66	11.63	33.89	38.21	4.138	44.18	44.14

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

4.4. Carry-through and fresh repurchases

In this section we investigate the potential effects on the association between governance and post-announcement performance of two previously reported share repurchase characteristics. Companies announcing open market share repurchase programs are under no obligation to repurchase shares. Actual share buybacks depend on subsequent market conditions, and this characteristic actually enhances the flexible nature of repurchases relative to the pre-commitment associated with cash dividends. That is, if market conditions change after the announcement making a share repurchase undesirable, the company can simply not repurchase stock. Lie (2005) finds that about 24% of his sample of announcing companies do not repurchase any shares within the announcement quarter, but that 76% of repurchasing firms continue to repurchase for at least one quarter after the announcing quarter (see Fig. 1 in Lie, 2005). Gong et al. (2008) report that about 84.7% of their sample of announcing firms carry through with actual share repurchases in the announcement and subsequent quarter, and only these firms manage their earnings leading up to their announcements and experience improvements in subsequent performance. About 87.6% of our sample firms report actual repurchases by the quarter following the repurchase program announcement.[14] In Tables 5 and 6, we rerun our analysis on the subsample of firms that follow their announced repurchase plans with actual repurchases in quarters 0 and +1. Comparing Table 5 estimates with Table 3 estimates shows little difference in the relation between adjusted operating performance and corporate governance or the control variables. For the full sample period (Models 1–3) and the pre-2001 sample period, estimated coefficients on the governance measure in Table 5 are significantly negative, indicating a significant association between strong governance and better post-announcement operating performance. Also similar to Table 3, the relation between governance and performance disappears in the post-2000 period. Finally, comparing the subperiod sample sizes allows us to examine possible changes in repurchasing behavior. The pre-2001 sample size in Table 3 (Table 5) is 860 (723), while the respective post-2000 sample size is 856 (781). Thus, about 84.1% of the sample firms carry through with their announced repurchases in the pre-2001 subperiod, nearly identical to the ratio reported by Gong et al. (2008), while 91% carry through in the post-2000 subperiod. Anecdotally, more companies tend to carry through with their announced repurchase programs post-2000. Table 6 contains the estimated coefficients when the abnormal stock returns are the dependent variables, and while negative and similar in size, the governance estimates using the full sample period are not quite statistically significant using conventional significance levels. In the pre-2001 subperiod, the estimates are significantly negative, while in the post-2000 subperiod the estimates are

[14] Following Gong et al. (2008) we identify companies that actually repurchase shares using Compustat.

Table 6
Stock performance for carry-through repurchase sample. This table reports second-stage Heckman regression results of post-announcement abnormal long-term stock returns for the subsample that actually repurchased shares, which is computed using the Daniel et al. (1997) benchmark adjustment procedure. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Abnormal stock performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.006	−0.013	−0.013	−0.018	−0.032**	−0.031*	0.001	−0.003	−0.006
	[−0.866]	[−1.573]	[−1.436]	[−1.502]	[−2.307]	[−1.924]	[0.242]	[−0.349]	[−0.619]
Free cash flow	−0.246	−0.342	−0.129	−0.740	−0.753	−0.594	0.259	0.286	0.483
	[−0.593]	[−0.679]	[−0.218]	[−1.111]	[−0.951]	[−0.651]	[0.648]	[0.512]	[0.723]
Book-to-market	0.046**	0.017	−0.007	0.144***	0.151***	0.132***	−0.014	−0.070***	−0.085***
	[2.247]	[0.663]	[−0.245]	[4.210]	[3.729]	[2.828]	[−0.816]	[−2.872]	[−2.991]
Log (total assets)	−0.021**	−0.028***	−0.032**	−0.041***	−0.051***	−0.064***	0.001	0.007	0.010
	[−2.391]	[−2.601]	[−2.560]	[−2.725]	[−2.873]	[−3.115]	[0.062]	[0.625]	[0.702]
Book leverage	0.013	0.087	0.115	−0.000	0.192	0.226	0.027	−0.016	0.022
	[0.231]	[1.266]	[1.452]	[−0.000]	[1.425]	[1.452]	[0.553]	[−0.241]	[0.293]
CEO options	0.264*	0.432***	0.560***	0.448*	0.874***	1.053***	−0.105	−0.434**	−0.476**
	[1.950]	[2.621]	[2.900]	[1.908]	[3.143]	[3.278]	[−0.803]	[−2.381]	[−2.180]
CEO ownership	0.001	−0.002	−0.003	−0.001	−0.005	−0.008	−0.004	−0.011***	−0.014***
	[0.531]	[−0.578]	[−1.031]	[−0.400]	[−1.195]	[−1.524]	[−1.138]	[−2.606]	[−2.698]
Abnormal accrual	−0.291	−0.840	−0.870	−0.068	−0.418	−0.359	−0.512	−1.359**	−1.408*
	[−0.667]	[−1.579]	[−1.395]	[−0.101]	[−0.532]	[−0.390]	[−1.046]	[−2.080]	[−1.822]
Lambda	−0.0737	−0.0142	0.0723	−0.433***	−0.609***	−0.615***	0.0691	0.299***	0.391***
	[−0.965]	[−0.153]	[0.666]	[−3.992]	[−4.701]	[−4.136]	[1.376]	[4.207]	[4.597]
Constant	0.341*	0.319	0.208	1.217***	1.676***	1.836***	−0.124	−0.569***	−0.755***
	[1.648]	[1.268]	[0.707]	[4.354]	[5.021]	[4.789]	[−0.801]	[−2.599]	[−2.883]
Observations (censored)	1507	1510	1512	723	723	723	784	787	789
Wald χ^2	21.08	27.29	29.69	39.15	49.47	43.05	5.315	26.85	26.59

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

insignificant. While the statistical significance of the estimated coefficients is lower in Table 6, the general findings are consistent with and supportive of our conclusions from Table 4. That is, strongly governed companies tend to have higher abnormal stock returns after making share repurchase program announcements, but this association disappears post-2000.

Many companies continually renew their repurchase programs so that repurchase announcements may eventually be expected by the market. Since they may provide a larger element of surprise, there may be a stronger market reaction to companies making share repurchase announcements for the first time, which Grullon and Michaely (2002) show empirically.[15] In subsequent cumulative abnormal return regression analysis, they run a separate regression with a first-time announcer sample only and report similar results to the estimated coefficients using their full sample. Li and McNally (2007) examine a sample of Canadian companies and report a significant difference in announcement period abnormal returns between first-time (0.93%) and repeat (0.53%) announcements, which they define as a repurchase announcement within a year of a previous announcement. Following Grullon and Michaely (2002), we ran a separate regression with our non-repeat announcer sample, which we define as a repurchase announcement that was not preceded by another announcement within the previous year, and which we term as "fresh" announcements. Table 7 contains the results, using our fresh repurchase announcement subsample, of regressing adjusted operating performance on corporate governance. The sample size drops from 1716 to 1089, a reduction of about 36.5%. The estimated coefficients on our measure of corporate governance are very similar to those with the full sample in Table 3, and our conclusions remain unchanged. Strong governance is associated with better future adjusted operating performance in the full sample, but that association is limited to the pre-2001 subperiod only. We present in Table 8 the regression results using abnormal stock returns as the dependent variable, and while the estimated coefficients are larger in absolute value, their statistical significance is somewhat weaker. Our conclusions, however, remain the same as in Table 4: strong governance is associated with better long-term stock returns for the full sample and the first subperiod, but not the second subperiod.

Previous researchers have discovered that not all share repurchase announcements are followed by actual repurchases, and that surprise repurchase announcements are more informative to the market. After accounting for these two characteristics of share repurchases, we continue to find support for each of our hypotheses.

[15] Although they do not separate out the cumulative abnormal return (CAR) for non-first-time announcements, the mean CAR for first-time announcements (3.13%) is larger than that for their full sample (2.57%).

Table 7
Operating performance for fresh repurchase sample. This table reports the second-stage Heckman regression results of post-announcement adjusted operating performance for the firms that initiate a fresh repurchase (no share repurchase in the prior 4 quarters), which is computed using the Lie (2005) benchmark method. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Adjusted operating performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.002	−0.011**	−0.017**	−0.006*	−0.015**	−0.021*	0.003	−0.000	0.002
	[−0.925]	[−2.124]	[−1.979]	[−1.836]	[−2.210]	[−1.848]	[0.897]	[−0.038]	[0.194]
Free cash flow	−0.079	1.436**	2.913***	0.047	0.621	1.095	−0.148	0.594	1.415**
	[−0.260]	[2.297]	[2.805]	[0.191]	[1.268]	[1.315]	[−0.778]	[1.589]	[2.106]
Book-to-market	−0.003	−0.046*	−0.077*	−0.010	0.009	0.034	0.002	−0.039**	−0.058*
	[−0.227]	[−1.743]	[−1.768]	[−0.918]	[0.438]	[0.940]	[0.166]	[−2.108]	[−1.773]
Log (total assets)	0.004	0.018	0.035	0.012	−0.009	−0.029	−0.000	0.004	0.009
	[0.455]	[1.112]	[1.265]	[1.465]	[−0.583]	[−1.054]	[−0.008]	[0.475]	[0.556]
Book leverage	−0.018	−0.109	−0.236*	−0.033	−0.048	−0.075	−0.027	0.022	0.016
	[−0.474]	[−1.373]	[−1.788]	[−0.688]	[−0.505]	[−0.465]	[−1.079]	[0.435]	[0.177]
CEO options	0.037	0.294*	0.555*	0.083	−0.021	−0.149	0.030	0.168	0.372**
	[0.441]	[1.668]	[1.897]	[1.016]	[−0.126]	[−0.533]	[0.567]	[1.591]	[1.963]
CEO ownership	−0.000	0.002	0.004	0.001	−0.002	−0.003	−0.001	0.002	0.004
	[−0.340]	[0.991]	[1.543]	[0.740]	[−0.688]	[−0.656]	[−0.589]	[0.556]	[0.850]
Abnormal accrual	0.173	0.156	−0.054	0.130	0.285	0.201	0.271	−0.015	−0.457
	[1.188]	[0.554]	[−0.117]	[0.658]	[0.761]	[0.347]	[1.235]	[−0.035]	[−0.591]
Lambda	0.0206	0.252	0.449	0.118	−0.318	−0.712*	−0.0121	0.00781	−0.0675
	[0.157]	[0.928]	[0.997]	[1.029]	[−1.383]	[−1.812]	[−0.255]	[0.0842]	[−0.405]
Constant	−0.061	−0.668	−1.219	−0.334	0.868	1.952*	0.037	−0.026	0.113
	[−0.169]	[−0.902]	[−0.990]	[−1.083]	[1.409]	[1.850]	[0.271]	[−0.097]	[0.236]
Observations (censored)	1089	1089	1089	573	573	573	516	516	516
Wald χ^2	5.606	13.97	20.07	6.770	11.43	12.44	6.228	13.00	16.15

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

4.5. Robustness to governance measurement

In this section we test our findings' robustness to the specific measure of corporate governance. Following John et al. (2015) we replace the state-level antitakeover law index with two separate firm-level governance indexes. The first is a transformation of Bebchuk et al.'s (2009) E index computed as follows:

$$External\ governance = \frac{6 - \text{E index}}{6} \tag{7}$$

where E index is a count from 0 to 6 of six antitakeover provisions found most associated with performance (Bebchuk et al., 2009) including staggered boards, limitations on amendments to company bylaws, supermajority voting for business combinations and charter amendments, golden parachutes, and poison pills. *External governance* ranges from values of 0 for the most weakly governed companies to 1 for those most strongly governed. The second governance index is obtained by sorting sample companies into quartiles based on three different internal governance mechanisms. Higher institutional holdings (Cremers and Nair, 2005), smaller boards of directors (Yermack, 1996), and higher independent director proportions (Weisbach, 1988) have each been associated with stronger corporate governance. Sample companies are assigned an internal governance index (*IGI*), based on the sum of the governance quartiles into which they land in any given year, where the strongest governance quartile is assigned a value of 4 and the weakest is assigned a value of 1. We transform IGI into a measure consistent with external governance using the following equation:

$$Internal\ governance = \frac{IGI}{12} \tag{8}$$

Internal governance ranges in value from 0.25 for the most weakly governed companies to 1 for those most strongly governed. Both governance measures are constructed so that higher values indicate stronger governance.

Gompers et al. (2003) and Bebchuk et al. (2009) show that firm-level antitakeover indexes are associated with strong performance, although Bebchuk et al. (2013) report evidence indicating that the association between governance and performance has disappeared since the early 2000s when the Gompers et al. results became widely known. To account for this previously documented association, we add a governance screen to our benchmark companies' selection when computing our performance

Table 8
Stock performance for fresh repurchase sample. This table reports the second-stage Heckman regression results of post-announcement abnormal long-term stock returns for the subsample that initiates a fresh repurchase (no share repurchase in the prior 4 quarters), which are computed using the Daniel et al. (1997) benchmark adjustment procedure. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Abnormal stock performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.030*	−0.039*	−0.046	−0.027*	−0.037*	−0.035	−0.006	−0.014	−0.012
	[−1.834]	[−1.744]	[−1.376]	[−1.834]	[−1.802]	[−1.555]	[−0.738]	[−1.076]	[−0.783]
Free cash flow	3.478*	4.259	6.370	−1.003	−2.106	−2.147	0.344	1.139	1.343
	[1.808]	[1.636]	[1.633]	[−0.919]	[−1.415]	[−1.290]	[0.647]	[1.360]	[1.358]
Book-to-market	−0.089	−0.154	−0.260	0.145***	0.165***	0.147**	−0.023	−0.095**	−0.121**
	[−1.130]	[−1.420]	[−1.603]	[3.100]	[2.603]	[2.060]	[−0.884]	[−2.351]	[−2.530]
Log (total assets)	0.079	0.091	0.141	−0.074**	−0.114**	−0.127**	0.001	0.014	0.021
	[1.467]	[1.263]	[1.330]	[−2.032]	[−2.321]	[−2.327]	[0.085]	[0.636]	[0.871]
Book leverage	−0.472*	−0.533	−0.670	0.117	0.392	0.448	0.079	−0.105	−0.001
	[−1.704]	[−1.519]	[−1.332]	[0.535]	[1.369]	[1.400]	[1.001]	[−0.897]	[−0.008]
CEO options	1.154**	1.439*	1.974*	0.119	0.250	0.237	0.090	−0.059	−0.113
	[2.071]	[1.926]	[1.780]	[0.321]	[0.495]	[0.421]	[0.599]	[−0.241]	[−0.392]
CEO ownership	0.006	0.004	0.003	0.001	−0.007	−0.010	−0.002	−0.013**	−0.012*
	[1.220]	[0.547]	[0.324]	[0.113]	[−0.799]	[−1.034]	[−0.554]	[−2.098]	[−1.721]
Abnormal accrual	0.013	−0.631	−0.897	0.032	−0.356	−0.575	−0.450	−1.361*	−1.668*
	[0.019]	[−0.670]	[−0.638]	[0.040]	[−0.384]	[−0.522]	[−0.736]	[−1.686]	[−1.782]
Lambda	1.525*	2.017*	3.013*	−0.879*	−1.543**	−1.586**	0.0941	0.646***	0.777***
	[1.803]	[1.761]	[1.779]	[−1.703]	[−2.181]	[−2.014]	[0.709]	[3.062]	[3.142]
Constant	−4.058*	−5.202*	−7.839*	2.529*	4.380**	4.635**	−0.194	−1.446**	−1.815**
	[−1.748]	[−1.656]	[−1.689]	[1.824]	[2.307]	[2.194]	[−0.505]	[−2.357]	[−2.527]
Observations (censored)	1090	1093	1094	574	575	575	516	518	519
Wald χ^2	8.702	7.563	5.317	23.19	20.22	16.22	4.635	16.13	15.94

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

variables. We define well-governed, neutrally governed, and poorly governed companies as those with E indexes of 0 or 1, 2 or 3, and 4 or more, respectively. We term these three groupings of companies the "governance groups." In selecting the benchmark company, using the (Lie, 2005) adjusted operating performance methodology or the DGTW abnormal stock returns methodology, we require the matched company to be in the same governance group, thus controlling for the well-known "governance effect."[16]

Table 9 presents the second-stage Heckman regression results when the dependent variables are the performance- and governance-adjusted operating performance of repurchasing companies, and when we replace the state law index with the two firm-level governance measures defined above. The estimated coefficients on external governance are positive and significant for the full sample and pre-2001 subsample periods, indicating a positive association between strong governance and post-announcement operating performance. In the post-2000 subperiod, the relation between external governance and operating performance disappears. These findings are fully consistent with our Table 3 results using the state law index, and supports Hypotheses 1 and 3. Finally, the estimated coefficients on the control variables are generally consistent with those in Table 3.

Table 10 contains the second-stage Heckman regression results when the dependent variables are the governance-adjusted abnormal stock returns of repurchasing companies and the independent variables include our firm-level governance measures. While the estimated coefficients on external governance are positive for the full and pre-2001 sample periods, only the estimate in Model 1 is statistically significant. All the post-2000 estimates are insignificant and two are negative. While the estimate's signs are consistent with those in Table 4, their general lack of statistical significance indicates that support for Hypothesis 2 is weak using these measures of governance. Interestingly, the estimates for the control variable internal governance are positive and significant for the full sample period and the post-2000 subsample period. The results for the other control variables are generally consistent with those in Table 4.

4.6. Tests of factors affecting post-announcement performance

In this section we test Hypotheses 4 and 5. As noted in Section 2.2.4 above, investing in managerial incentives is one way strongly governed firms can use financial flexibility to enhance performance. Table 11 presents stage two Heckman regression

[16] Unfortunately, there are not enough observations to match a benchmark company on E index itself, which is why we develop and use governance groups as our screen.

Table 9
Operating performance—robustness to governance measure. This table reports second-stage Heckman regression results of post-announcement adjusted operating performance, which is computed using the Lie (2005) benchmark method. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Adjusted operating performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
External governance	0.029**	0.076***	0.106***	0.064***	0.146***	0.188***	−0.004	−0.012	−0.011
	[2.349]	[3.212]	[2.743]	[3.161]	[4.033]	[3.309]	[−0.250]	[−0.393]	[−0.217]
Internal governance	0.040*	−0.009	−0.038	0.035	−0.026	−0.037	0.051**	−0.021	−0.089
	[1.660]	[−0.190]	[−0.517]	[0.881]	[−0.363]	[−0.329]	[2.055]	[−0.412]	[−1.021]
Free cash flow	0.388***	1.909***	3.144***	0.267	1.891***	3.247***	0.513***	1.840***	2.899***
	[3.085]	[7.997]	[8.055]	[1.607]	[6.340]	[6.912]	[3.593]	[6.308]	[5.797]
Book-to-market	0.001	−0.025***	−0.047***	−0.002	−0.027**	−0.049***	0.002	−0.021	−0.038*
	[0.115]	[−2.781]	[−3.236]	[−0.357]	[−2.395]	[−2.821]	[0.368]	[−1.636]	[−1.764]
Log (total assets)	0.003	0.001	0.001	−0.001	−0.004	−0.009	0.007**	0.007	0.011
	[1.440]	[0.124]	[0.163]	[−0.146]	[−0.629]	[−0.887]	[2.273]	[1.061]	[1.042]
Book leverage	−0.050***	−0.143***	−0.246***	−0.011	−0.136***	−0.236***	−0.076***	−0.144***	−0.244***
	[−3.090]	[−4.638]	[−4.888]	[−0.381]	[−2.731]	[−3.024]	[−4.159]	[−3.869]	[−3.830]
CEO options	0.108***	0.235***	0.385***	0.043	0.095	0.117	0.186***	0.369***	0.619***
	[2.895]	[3.327]	[3.336]	[0.782]	[0.956]	[0.747]	[4.143]	[4.023]	[3.939]
CEO ownership	−0.001	−0.001	0.001	−0.001	−0.001	0.001	−0.002*	−0.002	−0.002
	[−1.469]	[−0.526]	[0.333]	[−0.657]	[−0.496]	[0.240]	[−1.763]	[−0.910]	[−0.514]
Abnormal accrual	0.110	0.045	−0.267	0.251	0.383	0.285	−0.203	−0.539	−1.174*
	[0.892]	[0.191]	[−0.689]	[1.469]	[1.233]	[0.583]	[−1.143]	[−1.459]	[−1.841]
Lambda	0.0516*	0.0744	0.0949	0.0498	0.0304	0.0159	0.0559***	0.0731*	0.0794
	[1.952]	[1.482]	[1.157]	[1.406]	[0.480]	[0.159]	[3.065]	[1.968]	[1.247]
Constant	−0.183**	−0.173	−0.182	−0.169*	−0.061	0.033	−0.208***	−0.172	−0.145
	[−2.348]	[−1.170]	[−0.753]	[−1.747]	[−0.350]	[0.121]	[−3.396]	[−1.373]	[−0.677]
Observations (censored)	1571	1571	1571	786	786	786	785	785	785
Wald χ^2	26.86	153.6	172.6	17.54	117.8	133.6	41.28	92.73	92.01

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

results when the dependent variable is the sample firms' post-announcement changes in CEO options.[17] For the full sample period, Models 1–3, strongly governed companies tend to invest relatively more in CEO equity incentives than do weakly governed firms. This finding supports Hypothesis 4, and is consistent with our regression results in Tables 3 and 4. The results after splitting our sample into subperiods are consistent with Hypothesis 3; the association between strong governance and investments in CEO equity incentives disappears after the start of 2001.

The dependent variables in the stage-two Heckman regressions presented in Table 12 are change indicator variables of the sample firms' acquisition activity surrounding repurchase announcements.[18] We develop Hypothesis 5 being mindful that strong governance does not necessarily imply an investment environment with positive net present value investment opportunities. Hence, we modify our governance variable to facilitate the joint test implied by Hypothesis 5. We define a dummy variable, *StrongGov*, to equal 1 when a firm's state antitakeover law index is below the panel sample's median index value, and 0 otherwise. Similarly, we define the dummy variable *PosNPV* to equal 1 when the firm's market-to-book ratio (which we use to proxy for Tobin's Q) is greater than 1, and 0 otherwise. The stage-one Heckman probit regressions are identical to those estimated previously, although estimated coefficients change when subsamples are used. In the second stage regressions, we replace the independent variables antitakeover law index and BM with dummy variables StrongGov and PosNPV, respectively. We also include the interaction term StrongGov × PosNPV. The interaction term captures the effect of strong governance coupled with superior growth opportunities on post-announcement changes in acquisition activities. A statistically significant positive estimated

[17] We construct this variable by first computing the ratio of the Black–Scholes value of CEO options granted to company market value for years 0, +1, +2, and +3, where year 0 is the announcement year. To compute the change in CEO options granted we subtract the average annual post-announcement ratio from the respective year 0 ratio. For example, to compute a company's 3-year post-announcement change in CEO options granted ratio, we find the average option ratio over years +1, +2, and +3 and subtract from it the year 0 ratio.

[18] We construct the acquisition change indicator dependent variable as the difference between change indicators in the pre- and post-announcement periods. *PreAcq* is an indicator variable that equals 1 if the firm acquires one or more companies through merger or acquisition between quarters −3 and 0, and 0 otherwise. *PostAcq* is an indicator variable that equals 1 if the firm acquires one or more companies between quarters +1 and +4, +1 and +8, and +1 and +12, for years 1, 2, and 3, respectively. The acquisition change dependent variable equals PostAcq minus PreAcq and can only take the values −1, 0, and +1.

Table 10
Stock performance—robustness to governance measure. This table reports the second-stage Heckman regression results of post-announcement abnormal long-term stock returns, which are computed using the Daniel et al. (1997) benchmark adjustment procedure, plus a screen for governance group. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	Abnormal stock performance								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Performance change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
External governance	0.116*	0.093	0.046	0.132	0.169	0.135	0.077	−0.027	−0.064
	[1.836]	[1.080]	[0.429]	[1.147]	[1.061]	[0.690]	[1.175]	[−0.310]	[−0.650]
Internal governance	0.241**	0.328**	0.373*	−0.044	−0.319	−0.295	0.293***	0.550***	0.685***
	[1.990]	[1.976]	[1.818]	[−0.193]	[−1.013]	[−0.759]	[2.745]	[3.858]	[4.212]
Free cash flow	−0.132	1.080	2.481**	−0.606	1.070	3.195**	0.124	0.528	0.785
	[−0.208]	[1.240]	[2.304]	[−0.644]	[0.816]	[1.973]	[0.202]	[0.644]	[0.839]
Book-to-market	0.043*	0.097***	0.122***	0.086**	0.147***	0.203***	−0.012	0.013	0.015
	[1.820]	[2.971]	[3.023]	[2.477]	[3.064]	[3.386]	[−0.456]	[0.360]	[0.377]
Log (total assets)	−0.033***	−0.046***	−0.053***	−0.034	−0.028	−0.051	−0.016	−0.024	−0.041**
	[−2.670]	[−2.735]	[−2.585]	[−1.590]	[−0.959]	[−1.405]	[−1.229]	[−1.388]	[−2.067]
Book leverage	0.010	−0.029	−0.144	−0.014	−0.001	−0.208	0.010	−0.117	−0.077
	[0.115]	[−0.254]	[−1.038]	[−0.090]	[−0.003]	[−0.771]	[0.122]	[−1.089]	[−0.646]
CEO options	0.475**	0.774***	0.602*	0.636**	1.296***	1.246**	0.364*	0.324	0.002
	[2.521]	[3.001]	[1.888]	[2.028]	[2.974]	[2.307]	[1.884]	[1.255]	[0.008]
CEO ownership	0.003	0.003	0.005	0.000	−0.002	0.004	−0.005	−0.010	−0.015*
	[0.788]	[0.568]	[0.787]	[0.072]	[−0.223]	[0.442]	[−0.990]	[−1.418]	[−1.877]
Abnormal accrual	−0.562	−0.601	−0.966	−0.057	0.687	0.199	−1.027	−2.239**	−2.705**
	[−0.887]	[−0.692]	[−0.899]	[−0.060]	[0.525]	[0.120]	[−1.304]	[−2.168]	[−2.283]
Lambda	−0.0901	−0.0598	0.0386	−0.475**	−0.728***	−0.535	0.0662	0.259**	0.246**
	[−0.675]	[−0.326]	[0.170]	[−2.346]	[−2.590]	[−1.549]	[0.846]	[2.472]	[2.060]
Constant	0.215	0.138	−0.082	1.180**	1.712**	1.352	−0.241	−0.699**	−0.608
	[0.546]	[0.254]	[−0.122]	[2.131]	[2.227]	[1.433]	[−0.917]	[−1.984]	[−1.513]
Observations (censored)	1565	1570	1571	782	786	786	783	784	785
Wald χ^2	36.16	44.93	39.90	17.12	22.70	26.03	17.28	28.11	35.62

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

coefficient provides support for Hypothesis 5. In addition, StrongGov captures the effect on acquisition activity changes when the firm has strong governance but inferior investment opportunities, while PosNPV captures the effect on acquisition activity changes when the firm has weak governance and superior investment opportunities. Models 1–3 present the full sample period results. The estimated coefficients on the interaction terms in all three models are positive and statistically significant, which is consistent with Hypothesis 5; strongly governed firms with superior investment opportunities increase their acquisition activities relatively more than other sample firms. The estimates on dummy variables StrongGov and PosNPV are all negative and statistically significant in Models 1 and 2, but not significant in Model 3. In general, these results indicate strongly governed (weakly governed) firms with inferior (superior) investment opportunities tend to reduce post-announcement acquisitions relative to strongly governed firms with superior opportunities. The subperiod results are consistent with Hypothesis 3; statistically significant results pre-2001 become insignificant post-2000.

In this section, we examine two ways in which companies can affect post-announcement performance via the financial flexibility afforded by share repurchases. Companies can invest more in executive incentive compensation, and they can invest more in acquiring companies through the mergers and acquisitions market. Strongly governed companies tend to out-invest other sample companies in both ways. In Tables 3 and 4 we show that better post-announcement performance is related to stronger CEO incentive compensation. Here we show that strong governance and larger post-announcement increases in CEO incentive pay are related. These results are consistent with increased executive effort producing the better performance we document. Similarly, our evidence that strongly governed companies with superior investment opportunities increase acquisition activity more than other sample firms is also consistent with better performance.

5. Summary and conclusion

This paper finds that strongly governed companies tend to perform better after making share repurchase program announcements relative to weakly governed companies. Using an agency–cost argument, John et al. (2015) show that companies with weak governance systems tend to pre-commit to cash dividends, while companies with strong governance tend to repurchase shares, concluding that the sample companies substitute strength of governance with cash payout policies in an effort to find

Table 11
CEO incentive compensation changes. This table reports second-stage Heckman regression results of post-announcement CEO option changes for sample firms, which is computed by subtracting from the respective post-announcement CEO option value to company market value ratio the respective ratio for year 0. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2000, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable	CEO incentive compensation changes								
Subperiod	Full			Pre-2001			Post-2000		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CEO option change after	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
Antitakeover law index	−0.001**	−0.001***	−0.002***	−0.001*	−0.002**	−0.002***	−0.000	−0.000	−0.001
	[−2.213]	[−2.678]	[−2.776]	[−1.675]	[−2.297]	[−2.584]	[−0.751]	[−0.728]	[−0.754]
Free cash flow	0.081***	0.122***	0.120***	0.057	0.066	0.057	0.059**	0.136***	0.155***
	[3.012]	[3.200]	[2.690]	[1.593]	[1.312]	[0.983]	[2.021]	[3.251]	[3.105]
Book-to-market	−0.001	0.001	0.000	−0.000	0.001	0.001	0.001	0.003*	0.003
	[−0.578]	[0.383]	[0.240]	[−0.121]	[0.690]	[0.516]	[1.143]	[1.693]	[1.286]
Log (total assets)	0.000	−0.001*	−0.003***	−0.001	−0.003***	−0.006***	−0.000	−0.001	−0.001
	[0.171]	[−1.727]	[−2.817]	[−0.859]	[−2.793]	[−4.016]	[−0.494]	[−1.041]	[−0.812]
Book leverage	−0.004	−0.005	−0.005	−0.002	−0.004	−0.005	−0.003	−0.003	−0.006
	[−1.138]	[−0.949]	[−0.937]	[−0.300]	[−0.462]	[−0.504]	[−0.818]	[−0.601]	[−0.981]
CEO options	−0.095***	−0.207***	−0.290***	−0.137***	−0.277***	−0.366***	−0.062***	−0.145***	−0.223***
	[−11.845]	[−18.070]	[−21.562]	[−11.453]	[−16.523]	[−18.952]	[−6.924]	[−11.292]	[−14.544]
CEO ownership	−0.000	0.000	−0.000	−0.000	−0.000	−0.000	−0.000*	−0.000	−0.001
	[−1.180]	[0.174]	[−0.058]	[−0.844]	[−0.223]	[−0.707]	[−1.888]	[−1.238]	[−1.366]
Abnormal accrual	−0.074***	−0.115***	−0.161***	−0.093**	−0.141***	−0.173***	−0.024	−0.035	−0.098
	[−2.819]	[−3.079]	[−3.684]	[−2.503]	[−2.723]	[−2.899]	[−0.656]	[−0.672]	[−1.541]
Lambda	0.0109*	0.0102	0.0127	−0.00144	−0.00910	−0.0111	0.00149	0.000944	0.00832
	[1.948]	[1.301]	[1.393]	[−0.222]	[−0.996]	[−1.066]	[0.364]	[0.166]	[1.215]
Constant	−0.022	−0.007	0.003	0.014	0.057**	0.085***	−0.003	0.000	−0.014
	[−1.423]	[−0.302]	[0.106]	[0.799]	[2.260]	[2.949]	[−0.207]	[0.015]	[−0.676]
Observations (censored)	1686	1643	1602	856	845	834	830	798	768
Wald χ^2	304.7	513.2	705.6	172.1	284.8	369.3	163.9	279.0	418.3

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

the optimal mix of agency–cost reduction and financial flexibility. Pre-committing to cash dividends constrains future decisions by weakly governed companies, which reduces agency conflicts in these firms. In contrast, buying back shares allows strongly governed companies to put their greater financial flexibility to work when attractive future investment opportunities appear. Borrowing their argument, we hypothesize that financial flexibility gained from not pre-committing to paying cash dividends allows strongly governed companies to outperform financially constrained, weakly governed companies.

Using a largely exogenous measure of corporate governance, our empirical results indicate that strongly governed companies tend to have higher adjusted operating performance and abnormal stock returns than do weakly governed companies in the 1, 2, and 3 years after making a share repurchase plan announcement. This finding is robust to limiting the sample to only companies that carry through with actual share buybacks, have not made a share repurchase announcement within the last year, and to a different measure of governance. We also show that in the post-announcement period, strongly governed companies tend to invest relatively more in CEO incentive compensation, and to increase their acquisition activity relatively more than weakly governed companies, which could explain strongly governed companies' better long-term performance. In short, we find that strongly governed companies announcing share repurchases create more value for their shareholders in the post-announcement period than do weakly governed companies.

Finally, our major findings are all dependent on the time period of the tests. The associations we find between governance and performance, and CEO incentive compensation changes and acquisition activity changes are statistically significant over the full sample period we study, and in the first subperiod ending in December 2000. But the associations disappear in our latter subperiod starting in January 2001. This last finding is consistent with the growing literature on attenuation of former anomalies as the market is subject to increased arbitrage activities and enhanced regulations (Chordia et al., 2014; Fu and Huang, 2015; Bebchuk et al., 2013).

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Table 12
Acquisition changes. This table reports the second-stage Heckman regression results of post-announcement change in acquisition activity for sample firms, which is computed by subtracting from an indicator of acquisition activity in quarters 1–4, 1–8, and 1–12 the respective indicator variable for quarters −3–0. Columns (1)–(3) show the results for the full sample. Columns (4)–(6) and (7)–(9) present the results for the subperiods pre-2001 and post-2001, respectively. All independent variables are measured in t-1. Z-statistics are in the brackets.

Dependent variable:	Acquisition changes								
Subperiod:	Full			Pre-2001			Post-2000		
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acquisition change after:	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
StrongGov	−0.092**	−0.071*	−0.065	−0.129***	−0.168***	−0.170***	−0.025	0.067	0.093
	[−2.377]	[−1.683]	[−1.494]	[−3.425]	[−3.649]	[−3.301]	[−0.332]	[0.880]	[1.250]
StrongGov X PosNPV	0.123**	0.140**	0.150***	0.135**	0.161**	0.187***	0.091	0.083	0.073
	[2.403]	[2.517]	[2.614]	[2.563]	[2.495]	[2.589]	[0.992]	[0.893]	[0.806]
PosNPV	−0.090**	−0.082*	−0.063	−0.092**	−0.069	−0.074	−0.070	−0.073	−0.026
	[−1.998]	[−1.678]	[−1.237]	[−2.043]	[−1.247]	[−1.199]	[−0.852]	[−0.887]	[−0.321]
Free cash flow	−0.384	−0.458	−0.164	−0.817	−1.283**	−1.432**	0.652	0.851	1.418
	[−0.711]	[−0.780]	[−0.271]	[−1.611]	[−2.071]	[−2.074]	[0.746]	[0.959]	[1.611]
Log (total assets)	−0.009	0.007	0.004	−0.001	0.012	0.006	−0.008	−0.004	−0.007
	[−0.769]	[0.565]	[0.301]	[−0.117]	[0.879]	[0.374]	[−0.451]	[−0.207]	[−0.367]
Book leverage	0.010	−0.080	−0.029	0.015	0.035	0.222**	−0.014	−0.134	−0.177*
	[0.148]	[−1.049]	[−0.371]	[0.183]	[0.350]	[1.996]	[−0.132]	[−1.266]	[−1.683]
CEO options	−0.461***	−0.455***	−0.257	−0.498***	−0.229	0.012	−0.377	−0.672**	−0.583**
	[−2.909]	[−2.635]	[−1.442]	[−3.000]	[−1.130]	[0.054]	[−1.414]	[−2.477]	[−2.164]
CEO ownership	−0.004	−0.005*	−0.001	−0.009***	−0.010***	−0.005	0.004	0.004	0.006
	[−1.609]	[−1.754]	[−0.261]	[−3.443]	[−3.017]	[−1.356]	[0.549]	[0.555]	[0.837]
Abnormal accrual	0.308	−0.163	−0.723	0.020	−0.834	−1.203*	0.481	0.210	- 0.683
	[0.573]	[−0.279]	[−1.194]	[0.039]	[−1.337]	[−1.729]	[0.447]	[0.193]	[−0.646]
Lambda	−0.113	−0.0609	0.0383	−0.249***	−0.271***	−0.302***	0.119	0.219**	0.366***
	[−1.183]	[−0.588]	[0.358]	[−2.903]	[−2.590]	[−2.586]	[1.109]	[2.015]	[3.395]
Constant	0.513*	0.454	0.310	0.758***	0.827***	0.975***	−0.046	−0.108	−0.359
	[1.771]	[1.438]	[0.953]	[3.070]	[2.749]	[2.907]	[−0.123]	[−0.287]	[−0.965]
Observations (censored)	1727	1727	1727	863	863	863	864	864	864
Wald χ^2	19.28	21.26	12.85	35.99	33.19	25.58	5.883	16.98	25.22

* Significant at less than the 10% level using a two-tailed test.
** Significant at less than the 5% level using a two-tailed test.
*** Significant at less than the 1% level using a two-tailed test.

Appendix A. Variable definitions

Description		
Variable	Governance measures	Source
Antitakeover law index (*Index*)	The total number of antitakeover law (business combination, fair price, control share acquisition, poison pill, and director's duties) in effect in the state of the firm's incorporation. Firms that motivate and lobby for these laws are excluded.	Karpoff and Wittry (2015)
External governance (*ExGov*)	(6 − E)/6, where E is the entrenchment index (Bebchuk et al., 2009), which counts the total number of the following provisions: classified board, limits to amend bylaws, limits to amend charter, supermajority requirement to approve merger, poison pill, and golden parachute.	ISS/Riskmetrics
Internal governance (*InGov*)	The average annual firm ranks according to the largest institutional holding, proportion of independent directors on board, and number of directors on the board. The ranks are then scaled to [0, 1].	Thomson Financial 13F, and ISS/Riskmetrics
Firm characteristics		
Free cash flow (*FCF*)	(oibdpq + xintq + txtq + capxy)/atq, where capxy is transformed from a year-to-date to a quarterly measure.	Compustat Quarterly
Book-to-market (*BM*)	atq/(cshoq * prccq)	Compustat Quarterly
Log (total assets) (*LTA*)	The logarithm of atq	Compustat Quarterly
Book leverage (*Lev*)	(dlcq + dlttq)/(dlcq + dlttq + ceqq)	Compustat Quarterly
CEO options (*Opt*)	The ratio of aggregate S&P Black–Scholes value of stock options granted during the year to firm market value. [(option_awards_blk_value/1000)/(cshoq × prccq_f + dlc + dltt)] × 100	Execucomp
CEO ownership (*Own*)	The ratio of the number of shares held by the CEO, excluding stock options (shrown_excl_opts) to the number of common shares outstanding, times a hundred.	Execucomp
Payout/Operating cash flow (*P/OCF*)	(dvy + prstkcy)/oibdpq, where both dvy and prstkcy are transformed from a year-to-date to a quarterly measure.	Compustat Quarterly
Takeover threat (*Threat*)	The number of firms involved in a merger and acquisition within an industry-quarter. Industry code follows Fama-French 12 classification.	Compustat Quarterly
Tax (*Tax*)	txtq/(oibdpq − dpq)	Compustat Quarterly

Appendix A (*continued*)

Description		
Variable	Governance measures	Source
Risk (*Risk*)	The standard deviation of excess daily return, measured as the difference between daily stock return (ret) and daily value-weighted index return (vwretd) during a fiscal quarter.	CRSP
Sales growth (*Grow*)	The quarter-to-quarter sales growth.	Compustat Quarterly
Abnormal accrual (*Acc*)	The average of the performance-matched abnormal total accruals (Gong et al., 2008) for quarter −1 and quarter 0.	Compustat Quarterly

Abbreviations, in parentheses, appear on Table 1, panel B.

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